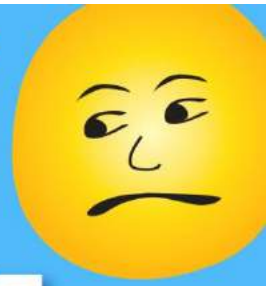


The Great DAYLIGHT SAVING TIME Controversy



Chris Pearce

The Great Daylight Saving Time Controversy

a nonfiction work by

Chris Pearce

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Preface

Daylight saving time has been described as one of the most controversial issues in modern history. More than a century after it first came into the British Parliament in 1908 as a bill, the mere mention of daylight saving produces strong reactions from supporters and opponents alike. This encyclopedia of daylight saving time commemorates 100 years of the scheme since it was first introduced nationally in 1916 by European countries on both sides of World War I to save fuel.

Part I examines the origins of daylight saving, including the historical development of calendars, clocks, standard time, and the idea of changing the clock to give more daylight late in the day. Part II looks at the history of daylight saving in the United Kingdom and Europe, while Part III covers the United States, Canada and the rest of North America. Australia and New Zealand are dealt with in Part IV. Daylight saving experiences of Asian, South American and African countries appear in Part V. An appendix details all years of daylight saving time for every country plus each state of the US, Canada (provinces), Australia and Brazil.

The Great Daylight Saving Time Controversy features many intriguing and often prolonged battles between advocates and critics of daylight saving in countries around the world, as well as lighter moments. It highlights the determination of daylight saving time champions such as the UK's William Willett, the US's Robert Garland and Harley Staggers, New Zealand's Thomas Sidey and Tasmania's John Steer. It delves into the chaotic daylight saving situations that emerged, notably in the US and Canada, but also elsewhere. Every country and sometimes each state has a different and usually controversial story to tell. The sheer number of policy changes in some countries and states is astounding.

All sources used to write this ebook are or were on the web and consist of thousands of websites and many thousands of web pages, including books, reports, newspaper and other articles, surveys, parliamentary records, blogs, etc. In many cases, more detail would be available in local libraries, newspaper houses and parliamentary records, and this book might provide a starting point for some more detailed local studies on daylight saving. Also, the book only looks at a selection of the large number of government and academic studies on daylight saving. I wrote the initial chapters best part of a decade ago and the rest more recently.

By the term daylight saving time (DST), or just daylight saving, we really mean daylight shifting. There is of course no extra daylight. An hour more daylight in the evening is balanced by an hour less in the morning although in a sense daylight is "saved" from the early part of the day and used later. Other terms for the measure include daylight time, advanced time and fast time (all common in the US), summer time (common in the UK and Europe and parts of Asia and South America), and daylight savings time, usually regarded as incorrect. Australia mainly calls it daylight saving while Canada uses several of the terms.

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This book is available at Amazon, Apple iTunes and Kobo Books. My other books can also be found at these outlets and at Google Play. *A Weaver's Web* is a historical novel set in early nineteenth century Manchester, UK and follows the trials and tribulations of the Wakefield family through poverty and wealth. *Through the Eyes of Thomas Pamphlett: Convict and Castaway* is a nonfiction book on the life of an early Australian convict best known for his time as a castaway with two others in a remote and unsettled part of the country, a story of courage, determination and survival.

I have a background in economics, statistics, accounting, management, marketing, history, research, writing and editing. I was in the public service for 25 years (federal and state) and the business sector for 13 years. In addition to writing books, my other interests include family history and tenpin bowling. My wife and I live in Brisbane, Australia.

Chris Pearce, BEcon (Hons), MBA
December 2016

Part I

Origins of daylight saving time

1 Calendar chaos

Measuring time has always been about tracking the movement of the sun, moon, planets and stars. Stone Age people got up with the sun, went about their hunting and gathering and domestic activities, and then sat around their fire in the evening before going to sleep. Their day was well defined. So were their month and year, by the cycle of the moon and the seasons. More precise measurement wasn't required although hunters in Europe over 20,000 years ago made markings on and holes in sticks and bones, possibly counting the 29-30 days between moons.

Several paintings by Cro-Magnon man 15,000 years ago in caves at Lascaux in southwest France may depict the moon's cycle alongside animals. Archaeoastronomer Dr Michael Rappenglueck of the University of Munich is convinced that this is what they show. On a tour of the caves in 2003, he showed the BBC's David Whitehouse a painting of a horse with many black dots near it. "There are 29 of them – one for each day of the moon's 29-day cycle when it runs through its phases in the sky. It was a rhythm of nature that was important to these people," he exclaimed. He is quite possibly right. Another explanation might be that the dots were painted at the same time and represent a path the beast took to try and evade the hunters¹ given that the dots are below the animal rather than above it and suddenly veer off at one stage.



A 15,000 year old painting of a dappled brown horse and a supposed lunar calendar (the black dots), Lascaux caves, France

Source: Web Exhibits, "Other ancient calendars", at <http://webexhibits.org/calendars/calendar-ancient.html>

From the start of agriculture in Mesopotamia (in today's Iraq) in the eastern part of the Fertile Crescent around 9500 BCE, farmers no doubt counted moon cycles to plan their planting and harvesting activities. They would have soon learned that there were

¹ People didn't domesticate or ride horses until much later.

12 and a bit cycles between springs, enabling them to calculate how long to the planting season. Thus the first calendars were lunar calendars.

The Egyptians were the first to develop a solar calendar. The point on the horizon where the sun rises at the time of the northern winter solstice (shortest day) in late December was regarded as the birthplace of their sun god, Ra. Around 4500 BCE, they counted the time elapsed between his visits to his birthplace as 365 days. So they could keep track of Ra's birthday, the people of Lower (northern) Egypt introduced a lunisolar calendar of this length. It had 12 moons or months of 29 or 30 days and an intercalary or additional month every two or three years as the first month. This meant the celebration of the birth of Ra could always be in the last month.

In Upper (southern) Egypt, the year was the time elapsed between two floodings of the Nile River. This was a very important event for the farming communities living along its banks, and they wanted a way of determining the actual time of the flood. They noticed Sirius, or the Star of Isis or the Nile Star as they called it, rising next to the sun every 365 days, a few days before the Nile's inundation. This coincided with the northern summer solstice (longest day) in late June. Priests would declare the start of a new year as soon as they saw Sirius in this position. This was the first sidereal calendar (one based on star movements) and dates back to 4241 BCE, the world's earliest recorded year.

The two Egypts unified around 3100 BCE and so did their calendars. This was relatively easy as the time difference between the winter solstice and the rising of Sirius just before the summer solstice is about six months. In an otherwise lunar calendar, the rising of Sirius became the dominant marker, the interval of its successive appearances next to the sun being just 12 minutes shorter than the solar year.

Ever since the early Egyptians worked out their calendar, numerous calendars have been developed by civilisations around the world to meet their various needs, usually based on the lunar cycle or solar year or, most commonly, both. No easy solution presented itself – calendars use whole days but the lunar cycle is about 29.53 days and the solar year is around 365.24 days. A further problem is that solar years cannot be divided evenly into lunar months, so any attempt to align the lunar cycle with the solar year resulted in days left over or not enough days. Possible solutions were innumerable and the ancients spent thousands of years chopping and changing their calendars. Regional variations were numerous too.

Indeed, the new Egyptian calendar soon failed to serve all purposes. While keeping their sidereal lunar calendar for agriculture, religion and everyday life, the Egyptians developed a civil calendar of 12 months of 30 days each plus five extra days for government and administration. But the civil calendar of 365 days was just short of the solar year and progressively fell out of alignment with the seasons. As a result, they invented a second lunar calendar for religious events. But it was based on the civil year and to keep the two aligned, an intercalary month was added when necessary. Meanwhile, the Egyptians had introduced three seasons of four months each: inundation from our early September to early January, growth from early January to early May and harvest from early May to early September. The original

sidereal lunar calendar was retained for agricultural purposes as it aligned with the seasons.

Thus by 2500 BCE, Egypt had three calendars and they ran side by side for over 2,000 years. Despite the Egyptians calculating a solar year as 365.25 days by around 2050 BCE or earlier, the priests wouldn't change their sacred calendar and it drifted from the solar year and the seasons at a rate of about a quarter of a day per year or by a whole year over a period of some 1,500 years. It was not until 238 BCE that the king, Ptolemy III Euergetes, rectified the situation by introducing an extra day every fourth year, but it wasn't fully adhered to until Rome conquered Egypt in 30 BCE.

Egyptian years were numbered in accordance with the current king, for example, year 4 of King Tutankhaten. Civil year months weren't named but were referred to as the first month of inundation, second month and so on. Months under the new lunar calendar had names. The Egyptian day began at sunrise as their month started when the old moon disappeared just before dawn. For most civilisations, the day and new month began at sunset when the new moon could be first seen.

The Sumerians in southern Mesopotamia had a calendar of twelve 30 day months by around 3000 BCE. Their solar or agricultural year was divided into two seasons: summer and winter. Names of months were based on festivals or activities and differed between cities and sometimes within a city. A new month was declared at first visibility of the new moon. The Sumerians developed a financial year, based on the barley cycle. Around 2400 BCE, a royal year was established, starting at the time of the barley harvest when the king offered the first part of the crop to the gods. Later, a particular year was named after some royal achievement such as a battle victory or temple building. After about 1700 BCE, years were numbered from the start of the reign of each king.

A lunar calendar was set up by the Babylonians with the first sighting of the new moon designating the start of a new month. From the twenty-first century BCE, they had a fixed calendar of alternating 29 and 30 day months plus an intercalary month three times in every eight years. But the extra month wasn't added often enough and varied between regions, and the calendar became a mess. In the eighth century BCE, they returned to the old Sumerian calendar of twelve 30 day months, but adding five days at the end.

Sometime between 432 BCE (or perhaps earlier) and about 380 BCE, Babylon adopted the Metonic cycle, named after the Greek astronomer Meton of Athens, who introduced it into Greece in 432 BCE (although the Babylonians may have known about it and used it before this, and Meton might have simply put his name to it). He found that 19 solar years almost equals 235 lunar months. The system involved adding seven 30 day intercalary months over a 19 year cycle and was accurate to one day in 219 years. The Babylonian New Year's Day was near the northern spring equinox (day and night of equal length), in March.

The Mayans in Central America used the sun and moon and also Venus to establish calendars of 365 and 260 days as long ago as 2000 BCE. The former used 18 twenty day months plus an extra five day "unlucky" period. The Mayans had 17 cosmological calendars, some going back 10 million years and needing astronomers,

astrologers, geologists and mathematicians to decipher them. Their main calendar was accurate to one day in about 5,000 years.

The Chinese calendar goes back at least to 1300 BCE although legend has it that Huangdi, the Yellow Emperor, invented it in 2637 BCE. It is a lunisolar calendar with an ordinary year of 12 months or about 354 days and a leap year of 13 months or about 384 days. The extra month was inserted when 13 new moons appeared between the start of the eleventh month of one year and the eleventh month of the following year. Other intercalation methods were used from time to time. By the sixth century BCE, the Chinese were using a method that coincided with the 19 year Metonic cycle, a century before Meton. From the third century BCE, they used a meteorological cycle of 24 points each 15 degrees apart on the ecliptic.

Over the centuries, Chinese scholars tried to improve the alignment of lunar cycles with solar years and published astronomical almanacs of their work. There were over 100 types of these almanacs and some were used regularly. The scholars competed for the position of calendar master at the imperial court. This was a highly sought after position, even though mistakes in their almanac often resulted in punishment, including death.

Chinese years have names that are repeated in a 60 year cycle and start at the new moon nearest the winter solstice. Years were also counted from the accession of a new emperor, which always marked a new era, or when a reigning emperor declared a new era if he felt that the connection between earth and heaven had been broken. Sun Yat-sen, first leader of the new Republic of China in 1912, wanted continuity and to count years from when Huangdi came to power in 2698 BCE rather than when the Yellow Emperor devised the Chinese calendar. Chinese year 4714 started on 8 February 2016.

The Hebrew calendar is based on the Babylonian calendar and uses the Metonic cycle. It was set down by Sanhedrin (the main Jewish court) president Hillel II around 359 CE. The problem was when to add the extra month into the calendar. In ancient Israel, if religious leaders deemed the roads not dry enough for pilgrims and the lambs not ready for slaughter, they inserted the intercalary month. Similarly in Taiwan, if migrating flying fish didn't appear near the new moon at the start of spring, the new year and its reunion fish dinner would be held off until next month, thereby creating an extra month.

An intercalary month is now added to the Hebrew calendar in years 3, 6, 8, 11, 14, 17 and 19 of the 19 year cycle. This makes it the most complicated calendar today, causing religious holidays to move back and forth. The Jews have four new year's days: one for the new calendar year as well as one each for trees, kings and taxes, although the last two are no longer celebrated. The calendar starts at 3761 BCE, the year they believe the world was created. Hebrew year 5777 started on 3-4 October 2016. It is the calendar of the Jewish religion and of Israel.

Another lunisolar calendar based on the Babylonian calendar was the Greek calendar. It had a base of 354 days divided into alternating 29 and 30 day months (although this could vary) and a 90 day period added every eight years. Athens began a new year in summer, whereas other regions started theirs in winter or autumn. The Greeks used the Meton cycle from 432 BCE although whether to add an intercalary month was up

to the archons at the time, a group of elected officials who formed a type of executive government. Inserting the extra month was probably based on observation, making it hard to determine the dates of festivals such as the Olympiad.

Adding to the confusion, Athens had a second calendar for the political year split into *prytanies*. Citizens were divided into *phylai* (singular, *phyle*), or tribes or races based on a supposed common ancestor, which in turn were divided into kinship groups and families. The city was served by a council divided into *prytaneis* (singular, *prytanis*) or committees, with each *prytanis* serving a *phyle* and acting for part of the year, called a *prytany*. Before 307 BCE, there were 10 *phylai*, and hence *prytaneis* and *prytanies*, and a *prytany* was 34-39 days. After this, the number varied between 11 and 13, although it was usually 12, and consequently *prytanies* were shorter. The years under the two calendars were about the same length in the fourth century BCE but differed earlier and later.

While most calendars in ancient times consisted of 12 months roughly in line with the lunar cycle plus some extra days, or an extra month in some years, to align with the solar year, the early Roman calendar had 10 months. At the founding of Rome around 753 BCE, the native Etruscan people had months ranging from 20 or less to 35 or more days. These months may have followed crop and animal cycles. Romulus, legendary first king of Rome, is said to have introduced the early Roman calendar in about 738 BCE. It probably came from the Greek lunisolar calendar. He retained the Etruscan system of 10 months, declaring there would be six months of 30 days each and four of 31 days each, totalling 304 days, with March as the first month of the year. We can recognise the names of most of his months (see table).

The 10 months of the early Roman calendar

| <i>Month</i> | <i>Days</i> | <i>Origin</i> |
|------------------|-------------|---|
| Martius | 31 | after Mars, the Roman god of fertility and agriculture, and later their god of war |
| Aprilis | 30 | from the Latin word <i>aperire</i> , meaning to open (i.e. when trees grow new leaves and flowers open) |
| Maius | 31 | probably after the Roman goddess Maia, who was mother of Mercury and god of trade and profit and of merchants and travellers; or from the Latin word <i>maiores</i> , meaning grown men |
| Junius or Iunius | 30 | probably after the Roman goddess Juno, queen of the gods, who also guarded the finances; or from the Latin word <i>juniors</i> , meaning young men |
| Quintilis | 31 | from the Latin word <i>quintus</i> , meaning five (i.e. month five); later named Julius after Julius Caesar, being his month of birth |
| Sextilis | 30 | from the Latin word <i>sex</i> , meaning six (i.e. month six); later named Augustus after Roman emperor Augustus (real name Gaius Octavius) |
| September | 30 | from the Latin word <i>septem</i> , meaning seven (i.e. month seven) |
| October | 31 | from the Latin word <i>octo</i> , meaning eight (i.e. month eight) |
| November | 30 | from the Latin word <i>novem</i> , meaning nine (i.e. month nine) |
| December | 30 | from the Latin word <i>decem</i> , meaning ten (i.e. month ten) |

The new calendar ignored the other 61 days of the solar year. These were in mid winter when perhaps not much happened and most people stayed home. Actual calendar year length probably varied.

A few decades later, around 713 BCE, second Roman king Numa Pompilius added Januarius and Februarius. Januarius was named after Janus, the two headed Roman god of beginnings and endings who looked backwards over the old year and forwards over the new year. This became the first month of the year. Februarius is also Latin

and means to purify, and was the month for purification festivals. It became the last month, until it was moved to the second month in 452 BCE.

Pompilius is said to have deducted a day from each of the 30 day months, probably due to a Roman suspicion of even numbers, leaving 56 days for the two new months, in a 354 day lunar year. Januarius was given an extra day, to make it an odd number (29), taking the number of days in a year to an odd number (355). Februarius was left at 28 days, but this month had connections to the infernal gods and so an even number of days didn't matter. The new calendar was still about 10 days short of the solar year, so he added a short leap month of 22 or 23 days, Mercedinus, roughly every second year, to follow the 23rd day of Februarius. The remaining five days of Februarius followed Mercedinus although sometimes they were regarded as part of the extra month. This resulted in an average year length of 366.25 days, about a day longer than the solar year.

It fell to the pontiffs (priests) to decide if Mercedinus was to be added in any particular year. But negligence, ignorance and corruption meant the leap month was irregular, often causing seasonal chaos. The *pontifex maximus* (the Roman equivalent of the Pope) and the other pontiffs had the power to lengthen or shorten a year, and would sometimes add or delete days, even months, to keep favoured politicians in office or remove those they didn't like (appointments to public office were based on the calendar year). They were no doubt influenced by bribes from commercial and political interests.

An exchange between two of Steven Saylor's characters, a father and son, in his 1996 novel *A Murder on the Appian Way*, set in Roman times, highlights the confusion with the calendar:

“Be quiet! The Roman calendar is the most perfect yet devised. It has twelve months.”

“Except when it has thirteen, as this year.”

“And all of these months have either thirty-one or twenty-nine days.”

“Except for Februarius, which has twenty-eight. Only this year, according to you, it has only twenty-four.”

“It works out in the end.”

“Or does it? I mean, the calendar is so permanently out of joint now that sometimes the seasons don't match the traditional holidays.”

“Yes, and I've seen it get progressively worse in my lifetime. I suppose it would be even worse without snipping away at Februarius and inserting Intercalarius as needed.”²

The set month lengths weren't always followed, with the priests and the general population often preferring the more observable month lengths offered by the lunar cycle, which also had religious significance (Luna was their moon god). When an assigned pontiff first sighted the thin crescent of a new moon, he would call out the start of a new month. The Romans called this first day of the month *Kalendae* or *Kalends*, from the Latin word *calare*, meaning to announce or call out. This is where our word “calendar” comes from. The other two days of the month with names were

² Steven Saylor, *A Murder on the Appian Way*, 1996, Libros.am, at <http://www.libros.am/book/read/id/366823/slug/a-murder-on-the-appian-way-1>

the *Nonae* or *Nones* (5th or 7th day of the month) and the *Idus* or *Ides* (13th or 15th day of the month).

By the first century BCE, the Roman calendar was a mess. Enter Julius Caesar. He instigated and won a civil war in 49 BCE, which heralded the start of the transition of the 460 year old Roman Republic into the Roman Empire. Among the dictator's extensive reforms to Roman society and government was to streamline the calendar.

He established the Julian calendar in 46 BCE, effective from 45 BCE, making a number of changes to the old calendar. First, the calendar year needed to be aligned with the solar year. This was done by making 46 BCE 445 days long, as the pontiffs hadn't been adding Mercedinus often enough. It was dubbed the "Year of Confusion". Caesar added a total of 10 days to the old 355 day calendar: two days to each of Januarius, Sextilis (August) and December, and one each to Aprilis, Junius, September and November. The lengths of all 12 months remain the same today. He did away with the intercalary month of Mercedinus. A new leap day was added to Februarius every fourth year, as the month's 24th day (followed by the 25th to the 29th days). But the pontiffs seemed to misunderstand Caesar's directives and added the extra day every third year, an error not picked up for 30 years. Emperor Augustus cancelled some leap years to fix it.

Importantly, the Julian calendar got rid of the lunar cycle as a determinant of months, making it less complicated and less prone to error and corruption. For thousands of years, the importance of the moon and its cycle to religious beliefs and customs had meant most calendars were based on this cycle, with various intercalary days or months having to be added to align the calendar with the solar year, often resulting in a muddle.

It seems the impetus for the new calendar came from Cleopatra VII, Queen of Egypt. She and younger brother Ptolemy XIII had fallen out and were vying for the throne. During the Roman civil war, Caesar's rival Pompey had fled to Alexandria. In 48 BCE, knowing that Caesar was about to visit and that Egypt was in debt to Rome, Ptolemy is thought to have arranged the assassination of Pompey. Two days later, Caesar arrived in the Egyptian capital and Ptolemy presented him with Pompey's severed, pickled head. But Caesar wasn't impressed, probably because Pompey was still Consul of Rome and widower of Caesar's only daughter, who died in childbirth with their son.

Caesar took the city and installed himself as arbiter between Ptolemy and Cleopatra. Taking advantage of Caesar's anger with her brother, Cleopatra is said to have got inside a roll of carpet or bed coverings and had servants present it to Caesar. It was unrolled and out tumbled the young queen, naked. This time, Caesar was impressed and the two became lovers despite a 30 year age difference. He abandoned his plans of annexing Egypt and supported Cleopatra's claim to the throne.

She discussed with him how the Egyptians set their time by the sun rather than the moon, and introduced him to the astronomer Sosigenes. He and Cleopatra told Caesar about the Egyptian calendar introduced in the third century BCE by her ancestor Ptolemy III, based on the sun. It was a calendar of 365 days and a leap year of 366 days every fourth year, with Sirius as the marker, although it seems the Egyptians often ignored the leap year.

Caesar wanted to change the Roman New Year's Day, officially 1 January since 153 BCE, to the northern spring equinox (late March) or northern winter solstice (late December). The Roman new year used to start on 15 March (and earlier it was probably 1 May and 1 July, among other dates). This was early spring and the time many of his countrymen perhaps still regarded as the logical start of the year. Cleopatra wanted the new year to coincide with the great Egyptian festival of the birth of their god of the sky or sun god, Horus (similar to Ra), at the winter solstice (25 December under the new Julian calendar). This was the celebration date of nearly all the sun gods of civilisations around the world, including the Romans' various sun gods and was their *dies natalis solis invicti* or "the birthday of the invincible sun". The Roman Senate wanted to retain 1 January as the start of the year. Caesar decided this would be the date, keeping the Senate happy, and also Cleopatra as the date was close to her preference. Later, 25 December became the day celebrated as Christ's birth date although his actual date of birth may have been 6 January or sometime in spring or maybe autumn.

Counting years after the birth of Christ wasn't introduced until 525 CE. Before that, Julian calendar years in different regions were identified by the name of the consul in office that year or the current or a past emperor, or the number of years since the founding of Rome or since the creation. When sixth century monk Dionysius Exiguus from Scythia Minor was working out Easter dates in Rome, he invented the numbering system *Anno Domini* or "in the year of our Lord" or "AD" as he didn't want to use the name of Diocletian (the Roman emperor from 284 to 305 CE) due to his persecution of Christians. Up until then, *Anno Diocletiani* was one of the ways years were counted. Dionysius determined it was 525 years since the incarnation of Christ. How he arrived at this number isn't known. He wasn't far out – we now know that Christ was probably born around 4-6 BCE. There were other calculations of Christ's birth, both before and after Dionysius, but his version stuck. The system began to be adopted in Western Europe in the eighth century but wasn't commonly used until the ninth century. The term "before Christ" or "BC", first used by English monk the Venerable Bede in 731 CE, wasn't used widely until the late fifteenth century.³

Over the centuries, people in the northern hemisphere blamed Caesar for starting the year at the coldest and gloomiest time, and near to the shortest day. They argued that March should have remained the start of the new year to coincide with spring and new growth. But the old Roman calendar officially had its first month as January (since around 713 BCE) and any attempt by Caesar to change this significantly would have put him out of favour with the Senate and Cleopatra. The calendar remained, and so did 1 January as New Year's Day.

³ "Common Era" or "CE" and "Before the Common Era" or "BCE" are used increasingly instead of "AD" and "BC" as the new terms do not presuppose faith. The new terms refer to the same year (for example, 45 BC = 45 BCE; 525 AD = 525 CE) and are used in this book.

But the Julian calendar wasn't totally accurate. Greek astronomer Hipparchus had calculated the solar year as 365.242 days in the second century BCE, remarkably close to the present day estimate of 365.24219 days and more accurate than Caesar's calendar year of 365.25 days. It would be another 16 centuries before religious and civic leaders set about correcting the Julian calendar error.

By the eighth century, people were noticing that the calendar was late compared with the times of solstices and equinoxes. Thirteenth century English academic and friar Roger Bacon calculated that the Julian calendar was by then nine days out of alignment with the solar year. He informed the pope. The church wasn't interested, believing the second coming was near and the calendar would change or, worse, the world would end.

Discussions of calendar reform, including with Nicolaus Copernicus in the 1510s, continued over the years, with the church becoming worried that Easter, the most important feast on the Christian calendar, and other holy days were being celebrated at the wrong times. Common Easter dates had been determined at the First Council of Nicaea in 325 CE, 12 years after Emperor Constantine granted tolerance to Christianity. The conference of about 300 bishops from across the empire (except from England) put together the first uniform Christian doctrine, the Nicene Creed. But over the following centuries, churches celebrated Easter as various times using different equinox dates and moon cycles, and Rome wanted to bring everyone back into line with what had been decided at Nicaea.

In 1563, three centuries after the work of Bacon, the Council of Trent urged Pope Pius IV to make changes to the calendar. Italian doctor and chronologist Aloysius Lilius spent 10 years creating a new calendar proposing that the next 10 leap years be ordinary years and that leap years divisible by 100 but not 400 also be ordinary years. After his death in 1576, his brother Antonio presented the manuscript to Pope Gregory XIII. In 1579, German priest and astronomer Christopher Clavius, living in Rome, was assigned to review the manuscript and recommended the 10 days be eliminated all at once.

In his tenth year in office, Pope Gregory issued a papal bull, *Inter gravissimas*, on 24 February 1582 for a new solar calendar. It was clear from the wording of the papal bull that getting the dates of Easter right was the primary reason for introducing the new calendar. Gregory decreed that the day after Thursday 4 October 1582 would be Friday 15 October 1582. He was accused of stealing 10 days from the month, with the general populace fearing that landlords would try and collect an extra week and half's rent. The pope took Lilius' advice on future leap years, getting rid of those divisible by 100 but not 400 (thus 2000 was a leap year but 2100 won't be). The actual date of the leap day isn't explicitly mentioned in the papal bull but can be assumed to have remained as 24 February in accordance with the Julian calendar. In practice, 29 February came to be regarded as the extra day, and most countries now accept it as leap day. In 2000, the European Union officially decided that 29 February was the day. The Catholic Church now also accepts this day as leap day.

For a while, the new calendar, effectively a modification of the Julian calendar, was sometimes called the Lilian calendar. It came to be known as the Gregorian calendar,

even though Gregory had little or nothing to do with it directly, except from an administrative point of view.

Most Catholic countries adopted the Gregorian calendar within a few years. But Gregory was a notorious persecutor of Protestants, and most Protestant countries kept using the Julian calendar. England and the British Empire finally adopted the new calendar in 1752, the British Parliament removing 11 days to align with it, deciding that the day after Wednesday 2 September would be Thursday 14 September. Germany partially adopted the Gregorian calendar in 1700 and fully in 1775. Greece and Russia didn't change until the early twentieth century. Some Orthodox churches still use the Julian calendar.

Changeover was rarely if ever easy. Britain, for example, by the mid eighteenth century no longer had a single calendar covering all religious, festive, social and agricultural activities, if it ever had one in the first place. Each city and major town had its own calendar of holidays, feasts, fasts, fairs, anniversaries, elections, processions and guild activities, on top of agricultural, financial and liturgical calendars. Also, many of the important dates of the established church's religious calendar were ignored by the increasing number of nonconformists. The new calendar meant there were problems with dates of birthdays, anniversaries and festivals. And New Year's Day, which in England had always been 25 March (the date of the northern spring equinox in Roman times and the date set by Dionysius in 525 CE as the start of the year and the commemoration of the annunciation and conception of Christ), was shifted to 1 January.

The British legislators had great difficulty drafting an Act that took all this into account, or as much of it as was necessary. An added problem in those days was that there was no mass communication and only a minority could read anyway. Inconvenience, confusion, anger and ignorance prevailed, and dissatisfaction with the new calendar was an issue at the 1754 elections. But stories of calendar riots at the time of the new calendar are probably a myth, borne out of William Hogarth's 1755 painting "Give us our eleven days", a reference to the belief of some of the population that the government stole 11 days from them. Many people took a long time to get used to and accept the new calendar.

Around the world, about 40 calendars are used today, although in most countries the Gregorian calendar is most commonly used, including in some that have had their own calendars for millennia.

The Islamic calendar is purely lunar, comprising 12 months alternating between 29 and 30 days. An extra day is added to the last month in 11 years out of 30, as the actual lunar month is slightly longer than 29.5 days. Observance of the calendar is a sacred duty for Muslims although most Muslim countries use the Gregorian calendar for civil matters and the Islamic one for religious purposes. Each month starts when the lunar crescent can first be seen with the naked eye. Islamic year 1 is set at the time of Mohammed's migration from Mecca to Medina in 622 CE. As the Islamic year is about 11 days shorter than the solar year, the months and religious festivals move through the seasons. Their year 1438 runs from 3 October 2016 to 21 September 2017.

India's five year lunisolar calendar dates from about 1300 BCE. The calendar underwent many changes over the centuries, including through the influences of Babylonian and Greek astronomy. It was aligned with the Gregorian calendar in 1975 although many local variations remain.

The Chinese calendar has lost its primary importance since China's official adoption of the Gregorian calendar in 1912. Other calendars to be introduced into China include the Hindu calendar during the Tang dynasty (618-907 CE) and the Muslim calendar in the Yuan dynasty (1271-1368 CE).

Despite the widespread use and acceptance of the Gregorian calendar, it is not quite perfect. It gives a year of 365.2425 days, about 26 seconds longer than the solar year (365.24219 days), and is a fraction less accurate than Hipparchus' calculation more than two millennia ago (365.242 days). Although the Gregorian calendar is accurate to within a day over 3,323 years compared with the Julian calendar's error of a day every 128 years, further adjustment will eventually be required. It has been suggested that years divisible by 4,000 (that is, 4000 CE, 8000 CE and so on) not be leap years. This would make the calendar accurate to one day in 20,000 years.

Imperfections with the Gregorian calendar have led to various attempts to introduce a new one. The French Revolutionary calendar was used from 1793, with 1792 becoming Year 1 of the Republic. It had 12 months of 30 days plus five or six extra days at the end of the year. Each month was divided into three *décades* of 10 days. The tenth day was a rest day. This was unpopular as under the Gregorian calendar every seventh day was a rest day. Napoleon got rid of the new calendar in 1806.

The proposed International Fixed calendar divides the year into 13 months of 28 days plus a day at the end of the year. Each month starts on a Sunday and finishes on a Saturday. A new month, Sol, is added between June and July. In a leap year, an extra day is added after June. Neither additional day takes a date or a name. Pity if you were born on one of these days! A more suitable calendar for business is the proposed World calendar where the year is divided into quarters of 91 days each. The first month in each quarter has 31 days and the other two have 30 days. The first day of each quarter is a Sunday. Additional days use the same principle as for the International Fixed calendar. A proposed 53 week calendar uses whole weeks. A year is 52 or 53 weeks (364 or 371 days), meaning 71 leap weeks every 400 years.

The use of weeks, now seven days in most modern calendars, goes back to the third millennium BCE. The ancients needed regular meeting or market days more often than once a lunar month, and the week allowed a cycle ranging from three to 10 days. Egyptian astronomers in the ninth and tenth dynasties (c. 2160-2040 BCE) observed 36 "decan" stars, one every 10 days throughout the year. A decan star was one that rose just before sunrise and marked the start of a 10 day *décade* or civil week.

Theories as to the origin of the seven day week include the division of the lunar month roughly into four, the biblical account of God making the universe in six days and resting on the seventh (written in about the sixth century BCE), and the solar system's seven heavenly bodies that can be seen with the naked eye: the sun, the moon, Mercury, Venus, Mars, Jupiter and Saturn. Many people used a seven day period before Christianity, including the Sumerians, Babylonians, Hindus, Jews,

Persians, Egyptians and Romans. Reports vary as to who first used the planets and sun and moon as names of the week and when. Some say it was the Sumerians as long ago as 2350 BCE, whereas others suggest the Babylonians around 700 BCE or earlier, and some argue that the names of heavenly bodies weren't used as days of the week until about the fourth to first centuries BCE. Certainly they were in use before Pompeii was destroyed in 79 CE.

The Romans, and the Etruscans before them, had an eight day week, with market day every eighth day. But many Romans, especially those in the eastern part of the empire, adopted the seven day week already in use in many areas. They officially adopted it in 321 CE when Emperor Constantine regulated it due to the myriad of days used for religious observance up to that time. He set Sunday for religious activities and rest for all groups although Jews retained Saturday for these purposes. When Islam was established, it adopted Friday as this day.

The evolution of our weekday names is shown in the following table. English uses the names of Nordic or German gods for Tuesday to Friday instead of Roman gods who gave name to the planets. Tuesday comes from the Nordic god Tiw, Wednesday is from German god Woden, Thursday from Nordic god Thor and Friday from Nordic goddess Frigg (or Freya).

Evolution of the names of the days of the week

| | | | | | | | |
|-----------------|------------|------------|-------------|---------------|---------------|--------------|--------------|
| Roman | dies Solis | dies Lunae | dies Martis | dies Mercurii | dies Jovis | dies Veneris | dies Saturni |
| <i>meaning:</i> | Sun's day | Luna's day | Mars' day | Mercury's day | Jupiter's day | Venus' day | Saturn's day |
| Italian | Domenica | Lunedì | Martedì | Mercoledì | Giovedì | Venerdì | Sabato |
| French | Dimanche | Lundi | Mardi | Mercredi | Jeudi | Vendredi | Samedi |
| English | Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
| <i>from:</i> | | | Tiw's day | Woden's day | Thor's day | Frigg's day | |

A seven day week doesn't quite line up with the lunar or solar calendar. The World calendar and the International Fixed calendar overcome this. A Norse calendar in early Viking days had 12 months each divided into six weeks of five days plus five or six extra days. The proposed Hermetic Lunar Week calendar divides the lunar month into four weeks varying from six to nine days. As we've seen, the ancient Romans used an eight day week. Egypt used a 10 day week as did the French Revolutionary calendar. The Mayans used 13 and 20 day weeks. West Africa used four days whereas central Asia used five days. The USSR introduced a five day week in 1929 with one day off a week, changing it to a six day week with a day off in 1931. They returned to a seven day week in 1940. Lithuanians had a nine day week before adopting Christianity.⁴

⁴ The author would like to add to the debate by suggesting a calendar of twelve 30 day months with five or six extra days at end of year. Weeks would alternate between seven and eight days. The working week would be five days. The eighth day, at end of every second week, would be Earthday. We have a day named after the sun, the moon, and the five visible planets (if we use Italian or French names) but no day of the week named for our own planet. Existing public holidays would usually be celebrated on this extra day, as would other special activities and days. The first day of each month would always be a Monday. The five or six extra days would follow December and coincide with the traditional holiday

And so, after thousands of years, we have an imperfect calendar divided into imperfect months and weeks. Can we do any better with time of day?

period between Christmas and New Year. Christmas Day and Boxing Day would shift to 29 and 30 December, a Sunday and Earthday respectively, and in non-leap years would be the seventh and sixth last days of the year, as now.

2 Counting the hours

Around 4500 BCE, when the Egyptians calculated the time between winter solstices or the birthdays of their sun god Ra as 365 days, they wanted to estimate the time of sunrise each day so that they knew what time they should make offerings to their god. They did this by picking a star pattern that would herald the dawn for 15 days, then picking another one for the next 15 days, and so on. By going through 24 star patterns in this manner, the stars did a full circle, in 360 days. They learned that a star moved one 360th of a circle in a day and rose four minutes earlier each day, and therefore moved fifteen 360ths or one 24th of a circle and rose an hour earlier after 15 days. Although the Egyptians at this time weren't splitting their day into parts, the concept of dividing a day into 24 parts had been set, as had the division of a circle into 360 parts.

With the development of bureaucracies, religion and other activities, there was a need to better organise time, and civilisations in the Middle East and North Africa started dividing the day into parts. The Egyptians built obelisks as early as 3500 BCE and used them to divide daylight hours into parts. By 2150 BCE, the Egyptians were probably the first to divide daytime into 12 equal parts and night-time into 12 equal parts. Their length thus varied with the seasons.

Around 3000 BCE, the Sumerians divided the day into 12 parts, each equal to two hours of our time. This may have been influenced by the Egyptians' 24 part division and been used for astronomical purposes, as there were no clocks to accurately measure elapsed time in this way. They had sundials though, and may have used other divisions of the day. Later, Babylonian astronomers divided the day into 24 equal parts but the astronomical day differed from their civil day. The Babylonians divided each day and each night into three "watches", which were subdivided into half or quarter watches.

The Romans divided daytime into 12 parts or hours from about 291 BCE, also breaking it into before midday and after, and a little later into early morning, forenoon, afternoon and evening. Similarly, they divided their night into 12 hours and four parts. India and China also split day and night into 12 parts each.

But why was 12 or 24 the base and not 10, using a simple count of fingers and thumbs? After all, a decimal system was used by the Elamites of Iran around 2500-3500 BCE, by the Egyptians from 2900 BCE, in the Indus Valley from 2600 BCE, in China from 1400 BCE and in India from 1200 BCE. Reasons are several. There was the early Egyptian use of 24, and then 12 and 24 in other civilisations. The 12 lunar cycles in many ancient calendars might also have something to do with it. Quite probably the main reason is simply because 12 is more divisible and therefore more versatile than 10. Divisibility prompted ancient merchants to use dozen rather than 10. A gross or 20 was commonly used by merchants for the same reason.

For the ancients, sunrise (or sometimes dawn) was the start of the first hour of daytime, midday was the end of the sixth hour and sunset (or sometimes darkness) the end of the twelfth hour. This was quite universal despite claims from some sources

that the Romans counted hours from midnight.⁵ Their civil day went from midnight to midnight⁶ but they counted their hours from sunrise to sunset, and from sunset to sunrise. Although they varied in length between seasons and latitudes, for example, from 44 minutes to 75 minutes in Rome, hours were used for various tasks and meetings. For example, courts opened at the third hour and people had lunch at the end of the sixth hour (noon). Counting hours from midnight assumes 24 hours of equal length all year round, and clocks simply weren't accurate enough for this to be tried, let alone succeed.

Hipparchus in the second century BCE suggested that the solar day be divided into 24 equal parts. Noon remained exactly halfway through the daylight hours, and day and night were each 12 hours long at the equinox. At other times of the year, the number of daytime hours and night-time hours weren't equal. The case for a day of 24 equal parts was furthered by Bede in 731 CE. But such a system remained impractical without accurate timepieces and people kept using the old method with its hours of varying lengths until the advent of mechanical clocks in the fourteenth century.

Around this time, Italy adopted a 24 hour clock of equal hours throughout the year, with the first hour starting at sunset (or sometimes darkness). People knew how many hours they had left to finish their work before dark as this was the end of the day, that is, the end of the 24th hour. There were several disadvantages:

- ☼ Clock readings for sunrise, midday and other times varied through the seasons and people weren't used to this.
- ☼ Clocks had to be frequently altered so that sunset remained the start of the first hour.
- ☼ Sunset could vary within the same city or locality depending on topography.
- ☼ On a gloomy day, the moment of sunset was hard to determine.
- ☼ The point of darkness is earlier on a gloomy day.

Nevertheless, the system was widely used until the mid eighteenth century, with some regions using it until the mid nineteenth century. Poland and Bohemia used it until the seventeenth century. A few clocks in Italy still show a 24 hour face, for example, the one in St Mark's Clock Tower in Venice. Some countries using this system started their count of hours at sunrise. By contrast, clocks in northern Europe generally used a 12 hour numbering system and showed daytime and night-time separately, known as the "double XII system".

As clocks became more accurate and people had greater need for precise time, a fixed point was required to mark the start of a new day. The only two feasible points were the midpoint between sunrise and sunset and the midpoint between sunset and sunrise.

⁵ These are usually Christian sources trying to explain away a contradiction in the Bible. The Gospel of John suggests Christ's crucifixion was sometime after the sixth hour (that is, after noon) (John 19:14-15), whereas the Gospel of Mark says Christ was crucified at the third hour (that is, around mid morning) (Mark 15:25). The sources suggest that John was using the Roman system of counting hours from midnight (and thus John's reference to the sixth hour is about 6 a.m.), but no such system existed until much later.

⁶ Most civilisations began their day at sunset. Another exception was Egypt where sunrise was the start of the day. Astronomers preferred a day to be from noon to noon so that all observations for a particular night related to the same day. A Julian day always started at noon for this reason. Astronomers used this reckoning until 1925 when the newly formed International Astronomical Union shifted the start of an astronomical day from noon to midnight.

To begin a new day when the sun was highest in the sky wasn't logical (except to astronomers), so the middle of the night or midnight became the marker. Twenty-four hour clocks were gradually replaced by 12 hour clocks as they were simpler and cheaper to make.

Early clocks only had an hour hand and weren't accurate enough to warrant minute or second hands although the concept of dividing hours into smaller units goes back thousands of years. When the Sumerians split a day into 12 parts of two hours in about 3000 BCE, they further divided each part into thirty units of four minutes. This was probably based on the fact that a star rises four minutes earlier each night. Whether the Sumerians worked it out themselves or it came from the Egyptians is unknown.

Our minute and second have their roots in the sexagesimal (base 60) numeral system used by the Sumerians and the Babylonians. It became a very popular system due to the versatility of 60 as a divisor⁷ and was soon used throughout Mesopotamia and later by the Egyptians, Greeks and Romans. The Sumerians and Babylonians divided a circle into 360 parts (although the Egyptians appear to have been first to do this). We now know the parts as degrees, a concept that comes from the Greeks. Hipparchus divided a degree into 60 parts. Greek mathematician Claudius Ptolemy in the second century CE split one of these parts into 60 further parts. In Latin, these two units of angle were known as *pars minuta prima* or the first small part or prime minute and *pars minuta secunda* or the second small part or second minute. Later they also became units of time, called the prime minute and the second minute, and then shortened to minute and second.

It's easy enough to divide a day into parts and subparts. Measuring these parts was another thing. Civilisations invented a variety of devices to tell the time. The Egyptians made the first ones, a type of sundial, as early as 3500 BCE. These were obelisks, which were tall, thin, tapering, four sided structures made from a single piece of stone. Up to 100 feet (30 metres) or more in height, their moving shadow formed a kind of clock, dividing the daylight hours into two parts either side of midday. These structures showed the year's longest and shortest days, when the shadow at noon was shortest and longest respectively. Later examples included markings around the base to show further divisions of day.

The Romans loved obelisks. The first one in Rome was looted from Sicily in 264 BCE but the markings weren't changed for the difference in latitude and gave the wrong time for a century. They took a number of obelisks from Egypt and Greece as war booty as well as constructing some themselves. Twenty-six ancient Egyptian obelisks survive but they are scattered around the world, with 11 in Italy, eight in Egypt, three in England and one each in France, Israel, Turkey and the United States. One of those taken to Rome was erected on the wall at the Circus of Nero in 37 CE. A millennium and a half later in 1586, under the direction of architect Domenico Fontana, the obelisk of more than 80 feet (24 metres) and 330 tons was excavated and moved to the middle of St. Peter's Square in Vatican City. Nearly 1,000 men, 140 carthorses and 47 cranes took 18 days to move it, watched by a large crowd, no doubt

⁷ It has 12 factors: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60, more than any other manageable number.

including senior church figures. It is said that Fontana had a team of horses at the ready in case the project failed and he had to make a quick getaway.

In about 1500 BCE, the Egyptians developed a more accurate type of sundial, the shadow clock. This was the first portable timepiece. It divided daylight hours into 10 parts plus a twilight hour at each end of the day. An elevated crossbar cast a moving shadow over a long stem that had five spaced marks. But it had to be turned the other way at noon and was no good on overcast days. Various improvements were made over the centuries and by 30 BCE, Roman writer Vitruvius identified 13 different sundial types used in Greece, Asia Minor and Italy. The Romans had pocket sundials only a few centimetres in diameter.

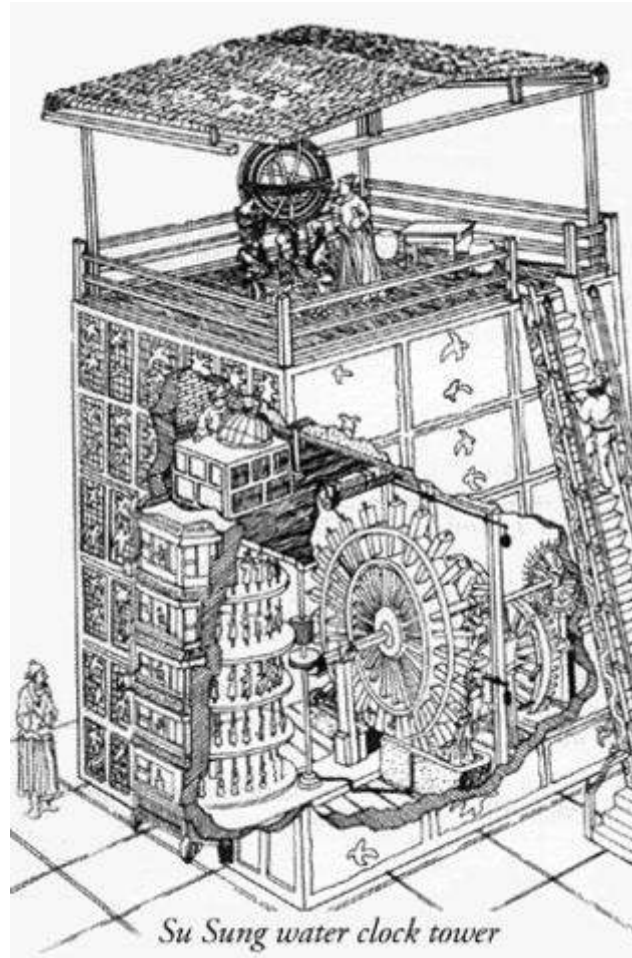
The star clock or *merkhet*, developed by the Egyptians around 600 BCE, is the oldest known astronomical tool and was used to align the foundations of pyramids and temples with the compass points. It was made from the central rib of a palm leaf and used a string with a weight on the end to obtain a vertical line. Using the Pole Star, two of them could be used to determine a north-south line and thus night-time hours when other stars crossed the meridian.

Another Egyptian invention was the water clock. It was more accurate than the obelisk and perhaps the earliest timekeeping device that didn't depend on using celestial bodies. One was found in the tomb of pharaoh Amenhotep I, who was buried around 1500 BCE. The Greeks used them from about 325 BCE, calling them *clepsydras*, meaning "water thieves". They were stone vessels with sloping sides and a tiny hole in the bottom that allowed water to drip out at a constant rate. Others were cylindrical or bowl shaped, designed to slowly fill with water through a tiny hole, with markings on the inside measuring the number of hours it took. They could be used by day or night and were often set up alongside a sundial for use on gloomy days and at night. Similar bowls, made of metal, were still in use in northern Africa in the twentieth century.

Greek and Roman horologists and astronomers developed more elaborate, mechanised water clocks from 100 BCE to 500 CE. They regulated pressure, had bells and gongs (probably the first alarm clock), or had doors and windows that opened to show little figures of people, or moved pointers or dials. Some included astrological models of the universe.

Macedonian astronomer Andronikos built the Tower of the Winds in Athens in about 50 BCE to show scholars and customers mechanical hour indicators and sundials. It had a 24 hour mechanised water clock or *clepsydra* and indicators for the eight winds, as well as showing the seasons and astrological information. The building still stands, near the Acropolis.

Astronomical and astrological clock making developed in China between 200 and 1300 CE. A clock tower built by Su Sung in 1088 CE showed the lengths people went to in order to tell the time. An elaborate contraption over 30 feet high, it had a water-driven escapement, a power-driven armillary sphere (a ball representing the earth and showing the poles, equator, meridians, parallels and apparent path of the sun) for observations, an automatically rotating celestial globe, and figures that rang bells or gongs and held tablets showing the hour.



Su Sung's water clock tower, China, 1088 CE

Source: National Institute of Standards and Technology, U.S. Department of Commerce, "A walk through time: Early clocks", at <https://www.nist.gov/pml/walk-through-time-early-clocks>

Water flow rates were hard to control and a high degree of accuracy of time wasn't possible with water clocks. People looked for other ways. But in Europe there wasn't much technological advancement in the Middle Ages (about 500 and 1500 CE). Some people had simple sundials above their doorways to show noon and the four "tides" (time periods) that governed the working day in the medieval period. Candle clocks were also used. Several types of pocket sundials were common from the tenth century, and an English version took account of the sun's altitude in different seasons.

Hourglasses were the first dependable and fairly accurate timepieces. Although a number of ancient civilisations had the technology to make them (the Egyptians invented glassmaking around 1500 BCE), the first definite evidence was when one appeared in a painting by Italian Ambrogio Lorenzetti in 1328. They were used on ships from the fourteenth century and perhaps as early as the eleventh century. Portuguese explorer Ferdinand Magellan had 18 hourglasses on each of his five ships for his voyage around the world from 1519. From the fifteenth century, they were used in churches, in industry and for cooking. They are still commonly used as egg timers, in board games and on computer screens. The Australian Parliament uses one to time certain procedures.

Large mechanical clocks, with an hour hand only, began appearing in the towers of English and Italian cities as early as the 1270s. The clocks were weight-driven and had a verge and foliot escapement mechanism, usually involving weighted rope unwinding from the barrel, turning a toothed escape wheel. The oscillation period was hard to regulate as the mechanism depended on the amount of driving force and friction. Clocks could be out by plus or minus an hour a day.

The first portable clock came around 1500 CE when German locksmith Peter Henlein invented a spring powered clock. This allowed for smaller clocks that people could put on a table or shelf rather than on the wall. Using the same technology, Henlein created the first pocket watch in 1524 (the first wristwatch wasn't until the late nineteenth century). It is thought that Henry VIII wore a watch on a chain around his neck. But these clocks and watches slowed as the mainspring unwound, making them too inaccurate to worry about a minute hand. The first clock with a minute hand was by Swiss clockmaker Jost Burgi in 1577 but it wasn't precise.

Greater accuracy of clocks was achieved in the seventeenth century. Dutch scientist Christiaan Huygens built the first pendulum clock in 1656, based on a design by Galileo Galilei. The clock was accurate to within a minute a day and soon to less than 10 seconds. A pendulum clock's escapement usually involves a weight or spring on the gear, forcing it to rotate. The gear pushes against an arm that is connected to the pendulum, making it move from side to side. Minute hands and then second hands were introduced in the 1670s, but the addition of these hands was gradual, and a hundred years later some town clocks still only had an hour hand. Pendulum clocks remained the most accurate clock type through to about 1930.

Huygens developed the balance wheel and spring assembly in 1675, allowing watches to be out by no more than 10 minutes a day. The mechanism is still used in some wristwatches.

The accuracy of pendulum clocks improved to one second a day in 1721 thanks to English clockmaker George Graham when he found a way to compensate for changes in the length of a pendulum caused by temperature variation.

English carpenter and self-taught clockmaker John Harrison refined Graham's method and also found new ways of reducing friction. He revolutionised sea travel by inventing a chronometer, a maritime clock that could accurately assess longitude, and show the time. After 2,000 men were killed in a maritime disaster in 1707, the British government sought improvements to navigation. In 1714, it offered a £20,000 prize (more than £3 million or US\$4 million today) through an Act of parliament to the first person to find a way of determining longitude to within half a degree and a clock accurate to two seconds a day on a long sea voyage. These were important to exploration and empire building. By 1761, after 30 years of trial and error, Harrison perfected his chronometer. He was then 68 years of age and sent his son William on a trans-Atlantic trial to the West Indies, where the clock's longitude reading was only out by about one mile (1.6 kilometres). Despite the rolling of the ship and the varying temperature, air pressure and humidity, the clock kept time to a fifth of a second a day, nearly as good as a pendulum clock on land in those days.

Harrison claimed the prize but the Board of Longitude, set up under the Act, thought the accurate readings were luck and refused to pay. The matter got to parliament, which offered him £5,000, but he arranged another trip to the West Indies. The readings were again excellent but the board still wouldn't pay. It went back to parliament and this time £10,000 was offered. The board spent a lot of time on further tests of the chronometer and Harrison began work on an update. But he got fed up and went to the king (George III), who expressed annoyance with the board and tested Harrison's new chronometer in his own laboratory. Finding it very accurate, the king brought pressure on parliament to pay the full prize, bypassing the board. Harrison finally got his money in 1773 at age 80, three years before his death. Explorer James Cook's chronometer was a copy of Harrison's 1761 version and he spoke very highly of it.

Our pursuit of accuracy and perfection continued. Siegmund Riefler of Germany developed a clock in 1889 with an almost free pendulum and accurate to a hundredth of a second a day. The first free pendulum clock was invented around 1898 by R. J. Rudd. The pendulum swung freely for one minute without control by the escapement, while he used a subsidiary or "slave" clock to send an impulse to the pendulum every minute and keep time between impulses.

W. H. Shortt's free pendulum clock, first demonstrated in 1921, replaced Riefler's clock as the standard in astronomical observatories. The gravity arm or slave pendulum pushed the timekeeping or master pendulum to maintain its motion and drive the clock's hands. Thus the timekeeping pendulum had no mechanical tasks to disturb its regularity. This clock remained the norm until the development of quartz crystal clocks in the 1930s and 1940s.

Crystals generate voltage when mechanical stress is applied, allowing crystal clocks to operate. A crystal changes shape if an electric field is applied to it. By squeezing or bending it, the crystal generates an electric field. The interaction between mechanical stress and electric field makes the crystal vibrate. This gives a constant frequency electric signal to operate an electronic clock. Canadian Warren Marrison of Bell Laboratories made the first quartz clock in 1927. These clocks were far more accurate than any previous clock as they have no gears or escapements to upset their regular frequency. However, they do rely on mechanical vibration, whose frequency depends on the size and shape of the crystal. Quartz clocks still dominate the market as they are reliable, accurate enough for most purposes, and cheap.

Most car clocks now have quartz movements. In earlier times, travellers used a range of portable timepieces, including pocket sundials and pocket watches. Pendulum clocks only work when they are stationary and are no use in vehicles because motion and a change in speed will affect the movement and pace of the pendulum. In the 1790s, Swiss watchmaker Abraham-Louis Breguet, living and working in France, made the first carriage clock, selling it to Napoleon. Placing pocket watches in leather holders and attaching them to a carriage's front board was popular. Mechanical car clocks could be bought as an accessory by 1908 and electric clocks from the 1930s.

Atomic clocks are considerably more accurate again than quartz. The first one, based on ammonia, was built in 1949 by the United States' National Institute of Standards and Technology. In 1955, Louis Essen of the National Physical Laboratory in the

United Kingdom came up with a caesium based atomic clock. NIST completed a caesium clock in 1957. With the high degree of accuracy of these clocks, it was decided in 1967 to base the definition of a second on atomic time rather than on the earth's revolution around the sun, which had been used from 1956. A second is thus defined as 9,192,631,770 cycles of the caesium atom's resonant frequency. Claims as to the accuracy of atomic clocks include a billionth of a second per day and one second in six million years.

We have come to depend on very precise time. Gone are the days when people only needed to know the time to the nearest hour, minute or even second. Technology and industry need extremely accurate clocks. Demand continues to drive the search for ever greater accuracy of time. Global positioning systems and network time protocol are used to synchronise timekeeping systems around the world.

There have been few attempts to change the long-held tradition of dividing the day into 24 hours of 60 minutes each of 60 seconds each. The French Revolutionary calendar introduced metric time in 1793, with a day comprising 10 hours of 100 minutes each of 100 seconds each. France abandoned metric time in 1795 when the rest of the metric system was introduced for length, area, dry volume, liquid capacity, weight or mass, and currency. Metric time has a number of modern day proponents.

You would think we now had time all worked out: a calendar we seem happy with despite imperfections, and virtually perfect timekeeping. American statesman Benjamin Franklin threw a spanner in the works.

3 Benjamin Franklin's humour

As an American agent in London between 1757 and 1762 and again from 1764 to 1775, Benjamin Franklin made an interesting observation one midsummer's day:

... in walking thro' the Strand and Fleet-street one morning at seven o'clock, I observ'd there was not one shop open, tho' it had been daylight and the sun up above three hours; the inhabitants of London chusing [choosing] voluntarily to live much by candle-light, and sleep by sunshine, and yet often complain, a little absurdly, of the duty on candles and the high price of tallow.⁸

In Paris from 1776 to 1785 as the American commissioner to France, Franklin attended a demonstration one evening in spring 1784 of a new oil lamp invented by his friends and fellow inventors Antoine Lavoisier and Berthollet. For centuries oil lamps had been quite smoky and smelly and the light dim, but recent innovations were starting to make them more competitive with candles. A lengthy discussion ensued as to whether the oil consumed by the new lamp matched the light it gave out and if indeed there would be any savings using it. No one at the gathering knew the answer, but all agreed it was important to save on the expense of artificial lighting wherever possible.

Franklin finally went home and to bed between three and four o'clock, still mulling over the subject. He was awoken by a noise at about six o'clock and could see his room was quite bright. Initially, he thought a number of the new lamps had been placed there but on waking more fully he realised it was broad daylight and the sun already above the horizon. His servant had forgotten to close the shutters the previous evening. He checked his almanac and found that the sun was due to rise at this hour (making it late March, given that local time in Paris is GMT+0.09) and that it would get earlier every day until June when sunrise would be just before four o'clock.

He envisaged that Paris could make great savings in candles if people got out of bed sooner and made better use of daylight, especially in the warmer months when it got light so early. Franklin was by then 78 years of age, his gout and gallstones restricted his movements, and he didn't get out as much as he used to. His health didn't hamper his writing though and he decided to write a piece on the cost of artificial light and send it to his close friend Antoine-Alexis Cadet de Vaux, editor of the *Journal de Paris*.

His letter to the editor was headed up "To the Authors of the Journal of Paris" and was published by the newspaper on 26 April 1784 under the title "An economical project for diminishing the cost of light". It was a whimsical and rather verbose letter, longer than a typical feature article in a newspaper today. He started off his letter describing his evening at the demonstration of the new oil lamp and how he went to bed in the wee small hours only to be woken at six o'clock to discover it was light. He expressed his surprise that the sun was up so early and he was sure the whole of Paris slept in until midday:

⁸ Benjamin Franklin, *The Autobiography of Benjamin Franklin*, World Wide School, at <http://www.worldwideschool.org/library/books/hst/biography/TheAutobiographyofBenjaminFranklin/c hap48.html> (first published 1793)

Your readers, who with me have never seen any signs of sunshine before noon, and seldom regard the astronomical part of the almanac, will be as much astonished as I was, when they hear of his rising so early; and especially when I assure them, *that he gives light as soon as he rises*. I am convinced of this. I am certain of my fact. One cannot be more certain of any fact. I saw it with my own eyes. And, having repeated this observation the three following mornings, I found always precisely the same result.⁹

Franklin mentioned how he told others of his sighting of the sun so early and how they didn't believe him. He told the reader that a philosopher friend advised him he "must certainly be mistaken as to the circumstance of the light coming into my room; for it being well known, as he says, that there could be no light abroad at that hour, it follows that none could enter from without; and that of consequence, my windows being accidentally left open, instead of letting in the light, had only served to let out the darkness ...".

It should be remembered that the letter was only semi-serious, a parody of himself and the strange hours he kept. Franklin was a diplomat, politician, civil activist, philosopher, author, printer, publisher, scientist and inventor, and one of the "Founding Fathers" of the United States, but he was also a bit of a joker. As for Parisians not getting up until noon, this might have applied to Franklin and his circle, if not to too many others. He was well known for playing chess with friends, spies and fellow statesmen almost nightly to nearly dawn. During one game, a messenger came with important dispatches from America but Franklin waved him away until he had finished playing. In a game with the Duchess of Bourbon, he captured her king against the rules. She said: "We do not take kings so." Franklin responded: "We do in America." In 1779, he wrote an essay, *The Morals of Chess*, setting out to justify chess as a very useful activity in so many ways although he was known to blame his gout on too much chess and lack of exercise. He was apparently a very good player and in 1999 was finally admitted to the US Chess Hall of Fame.

An alternative version sometimes given as to what prompted Franklin to write his pioneering daylight saving letter involved a game of chess. One night, he was absorbed in a chess game when the candles blew out. He ordered some more be found, until someone said it's already light. Franklin opened the shutters and said, "You are right, it is daytime. Let's go to bed." Perhaps it was with some guilt that he wrote of how many candles and how much money Parisians could save if they all went to bed early and got up early, and of his professed "love of economy".

In his letter, he admitted that had he not been woken at sunrise, he would have slept through six hours of daylight until noon and used an extra six hours of candlelight the following night because of it. He knew this light was far more expensive than natural light and set out in his letter how much could be saved if people rose with the sun.

⁹ See "Benjamin Franklin's essay on daylight saving", WebExhibits, at <http://webexhibits.org/daylightsaving/franklin3.html>, for the complete 1784 letter.



Benjamin Franklin Drawing Electricity from the Sky, Benjamin West, c. 1816

Source: Flickr, courtesy of Philadelphia Museum of Art (item 1958-132-1), gift of Mr and Mrs Wharton Sinkler, 1958, photo by Graydon Wood, at <http://www.flickr.com/photos/franklinremix/99760623>

Franklin assumed Paris had 100,000 families (population was 660,000) and they got up at noon, with each one using half a pound of candles an hour for seven hours a night. This was based on the average length of sunlight before noon during the six months between the spring and autumn equinoxes, and was therefore the number of hours of extra and unnecessary candlelight used each evening.

He multiplied the number of hours candles were used per night (7) by the number of nights from 20 March to 20 September (183) and multiplied the answer (1,281) by the number of families (100,000) to arrive at 128,100,000 candle hours. Multiplying this by half a pound of wax and tallow used per candle hour gave 64,050,000 pounds or about 28,600 tons of this material. Franklin used a price of 30 sols or one and a half livres tournois per pound to reach an estimated total sum of 96,075,000 livres tournois

(or something over US\$200 million in today's prices), "an immense sum! that the city of Paris might save every year, by the economy of using sunshine instead of candles", he exclaimed.

The figure was obviously overstated as most people would have got up much earlier than Franklin and needed fewer candles at night. Even so, many millions would clearly be saved. But he kept playing along with the idea that people rose at noon, saying they were used to doing this and would need inducement to make them change. He believed all those with commonsense would get out of bed at sunrise when they read about the savings and suggested a number of regulations to bring the rest into line. His four tongue-in-cheek proposals were to:

- ☀ put a tax on windows that have shutters to keep the daylight out
- ☀ place guards in shops selling candles and make sure no family buys more than a pound of them a week
- ☀ post guards to prevent coaches travelling after sunset, "except those of physicians, surgeons, and midwives"
- ☀ set all bells in every church to ring at sunrise and, if necessary, fire a cannon in every street "to wake the sluggards effectually, and make them open their eyes to see their true interest".

The changeover would be easy after the first few days, argued Franklin. "Oblige a man to rise at four in the morning, and it is more than probable he will go willingly to bed at eight in the evening; and, having had eight hours sleep, he will rise more willingly at four in the morning following." He also pointed to savings, albeit smaller, in the cooler half of the year and to the cheaper price of candles in the winter as so much stock would be left over from the summer.

Franklin wanted neither fame nor fortune from what he found: that the sun came up early and emitted light straightaway and that substantial savings could be made. "For the great benefit of this discovery, thus freely communicated and bestowed by me on the public, I demand neither place, pension, exclusive privilege, nor any other reward whatever. I expect only to have the honour of it."

His "discovery" wasn't forgotten. Cadet de Vaux reprinted Franklin's letter more than a year and a half later on 30 November 1785. And it seems the inventors of the oil lamp, Quinquet and Lange, took the daylight saving idea somewhat more seriously than did Franklin. They kept corresponding with Franklin after he returned to America.

Although Franklin was the first to talk about saving daylight and the savings from using more natural light and less artificial light, or at any rate the first to get his ideas on the subject published, he didn't use the term "daylight saving time" or propose that clocks be put forward. Nevertheless, the concept of daylight saving time was born.

Daylight saving wasn't the only area where Franklin was ahead of his time. He invented bifocal spectacles, the lightning rod, the heater (called the Franklin stove), the flexible urinary catheter, the odometer, swimming paddles, a rocking chair with a fan, a writing desk with a built-in chair, a stepladder stool with a chair, a mechanical hand for getting books off high shelves, and a musical instrument of glass bowls he called a glass armonica (different from a harmonica).

He was a pioneer in the areas of street lighting, paving, post offices and postal systems, fire brigades, and insurance, and started the first circulating library. He developed a phonetic language. In the area of electricity, he was the first to recognise charge conservation, developed a theory of static electricity, and proved lightning is an electrical phenomenon. He realised the importance of ocean currents and arranged the mapping of the Gulf Stream along the eastern coast of North America for the first time. He correctly predicted balloons would be used for military, recreational and scientific purposes, and that a kite would carry a person across water and into the air. And he questioned the existence of a god in a satirical pamphlet (in 1725!).

His thoughts on daylight saving came well before any sort of standards for uniform time were set. To be practical, a system of daylight saving time has to first have a system of standard time in place. This was yet to come.

4 Railways impose their time

In Benjamin Franklin's time, and throughout recorded history, cities and towns had set their clocks by the sun, with midday or 12 o'clock noon corresponding to the sun's highest point. People set their own timepieces by the town clock. But clocks in towns to the east or west of each other would show slightly different times, by a minute roughly every 11 miles (18 kilometres).¹⁰ Also, the time of solar noon varies slightly through the year from clock time, by up to a quarter of an hour or so either way.¹¹ Some towns changed their clocks and others didn't or perhaps didn't notice the difference. This meant that clock times in two towns on the same longitude a few miles apart could differ by up to half an hour, depending on what time of year the clocks were set. Clocks to the west could be ahead of clocks to the east for the same reason. If clocks in certain towns, regions or countries were put forward to save daylight, this would have added to the time differences.

In the late eighteenth century, coaches heading east or west observed local time, carrying clocks adjusted to gain or lose time to reflect the change in time at each town. The degree of accuracy wasn't always high. But people didn't worry about exact time and, besides, most didn't travel far. Farmers, and often shops, factories and other businesses, altered their operating hours with the seasons.

Local mean time was used in many places from the early nineteenth century and this resolved the problem of clocks in the same city or in nearby towns showing different times. The first local mean time was Greenwich Mean Time, when the Royal Observatory was set up a few miles to the south-east of London in 1675 to assist mariners to determine longitude.

English chemist Dr William Hyde Wollaston was the first person known to suggest standard time when he served as a member of the Board of Longitude from 1818 to 1828. German-born astronomer John Herschel, living in England, urged the adoption of standard time in 1828. No doubt others suggested it. Abraham Follett Osler, a supporter of standard time and in charge of the clock at the Birmingham Philosophical Institution, secretly put it forward seven minutes early one Sunday morning in the 1840s to align it with London time. Other clock keepers in the city were in the habit of adjusting their clocks to the institute's clock on a Sunday morning. Next day, people got to work late according to factory clocks. It is said that no one realised Osler had manipulated time and workers took their timepieces to watch repairers, who did a roaring trade. He kept his secret for years.

Pressure to standardise time came mainly from the railways. Trains were many times faster than coaches, and timepieces needed constant changing to match local time in each town they passed through. The first intercity railway linked boom cotton town Manchester with thriving port Liverpool in 1830. Within a decade, railways were springing up everywhere. Inconsistencies in local time became a nightmare for

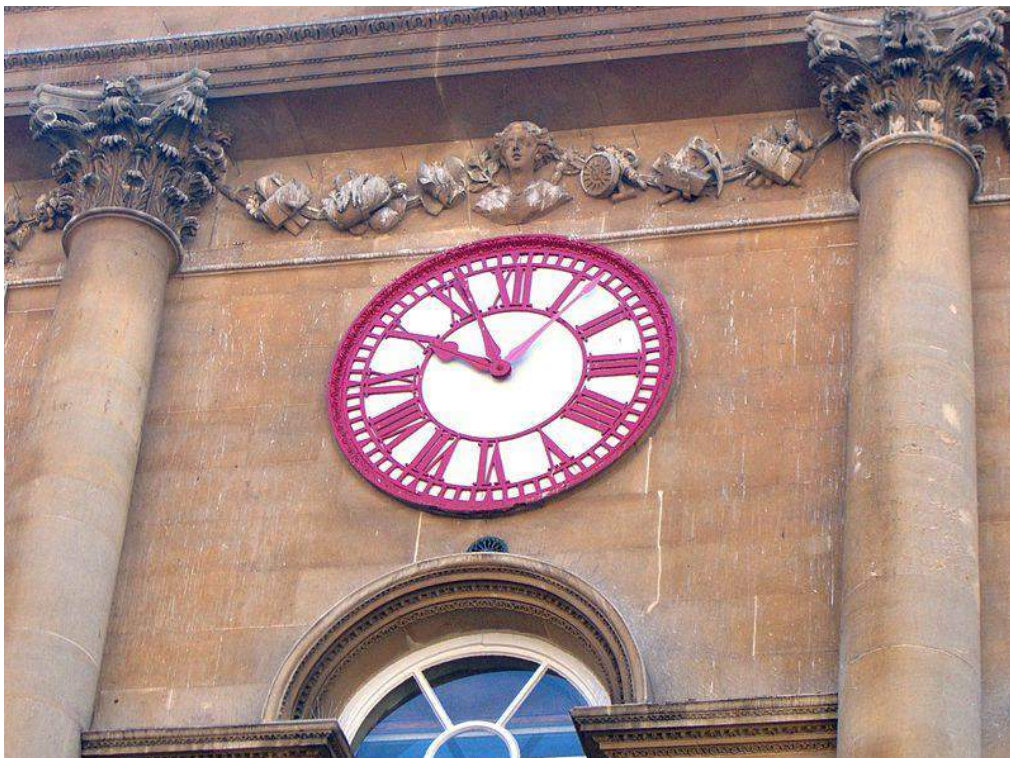
¹⁰ This is in southern England. At the equator, it's about 17 miles (28 kilometres). The further from the equator, the less is the distance.

¹¹ This is due to the tilt of the earth's rotation axis and the planet's orbit not being quite circular. An "equation of time" has been developed to calculate the difference between solar noon and clock time through the year. See http://en.wikipedia.org/wiki/Equation_of_time.

railway companies trying to devise timetables. For example, the difference between London and Plymouth times was 16 minutes, with a number of other local times along the way. People needed to know what time a train arrived or departed, and using local clock time made it hard to do so, especially for trains travelling east or west. Even more important were safety issues. Two trains could be on different times heading in opposite directions on the same bit of track at the same moment.

The Great Western Railway adopted London or Greenwich time in November 1840. This was the world's first system of standard time and first time zone, and "railway time" was born. Other railways quickly followed and by 1847 the timetables of most English railways used Greenwich Mean Time. In September of that year, the railways recommended all stations use it.

The Times newspaper labelled the new railway time "a dangerous innovation". Passengers had mixed feelings about it, with differences between Greenwich Mean Time and local mean time resulting in numerous incidents of people arriving early or, worse, late for their train and having to wait hours or until the following day for the next train. A few public clocks were changed over to Greenwich time. Most communities resisted railway or standard time as they didn't want to be governed from London in this way. In 1852, when a master clock at Greenwich was designed to send electric pulses to clocks across the land by telegraph, some called it "railway aggression". But by 1855, an estimated 98 per cent of public clocks in Britain were set to Greenwich time although some had two minute hands, one showing London time and the other retaining the old local time.



Clock with two minute hands showing Bristol time 11 minutes behind London time or railway time, The Exchange building, Bristol, United Kingdom

Source: Wikimedia Commons, photo by Rod Ward, 20 April 2007, at <https://commons.wikimedia.org/wiki/File:Exchangeclock.JPG>

The only group that didn't change time was the legal fraternity, who remained on local time. In the case of *Curtis v March* at the Dorchester Assizes in November 1858, the judge ruled that time in a legal sense meant local mean time. This view persisted until the Statutes (Definition of Time) Act 1880 made Greenwich Mean Time the legal time for Great Britain and Dublin Mean Time the legal time in Ireland. Clocks again only needed one minute hand.

America started building railroads at the same time as Britain. In 1830, there were a handful of short railroads in the east totalling 23 miles (37 kilometres). Ten years later this grew to 4,520 miles (7,270 km) of line. By 1860, the eastern third of the country was a spaghetti network of over 30,000 miles (48,000 km) of track. A line to the west coast was laid in the 1860s, and the network continued to expand until it crisscrossed the whole country by the 1880s. Distances were immense compared with those in England and in 1870 the United States had 200 local times and 80 railroad times. This was despite certain railroads setting up regional time zones from the early 1850s, for example, New England, New York, Philadelphia and Chicago. Travellers from Maine in the east to California in the west still had to change their timepieces 20 times.

Train travel chaos was inevitable with such a system. Anyone planning a trip of any distance and who had to make connections to different lines needed a wad of timetables and the ability to perform complicated calculations to get to their ultimate destination. Railway stations had clocks lined up along their walls showing the time of each rail company or line and sometimes local mean time. St Louis, for example, had six different railroad times. The time used by a train might be based on the local time where it originated or where it terminated. And some cities and towns used local time while others used railway time or the time at a nearby larger centre. It was the responsibility of passengers to work out their trips. Train was the only viable method of long distance travel, there being no motor cars or aeroplanes. Business folk and other travellers had no choice. Getting to meetings or appointments on time was hit or miss. To add to the turmoil, there were seven different track gauges in the United States in 1860.

Some examples of railroad time that had the potential to lead to great confusion and annoyance follow:

The Pennsylvania Railroad in the east used Philadelphia time, which was 5 minutes slower than New York time and 5 minutes faster than Baltimore time. The Baltimore & Ohio used Baltimore time for trains running out of Baltimore, Columbus time for trains in Ohio, Vincennes time for trains running west of Cincinnati. Some of its trains ran under New York time, Philadelphia time, and Chicago time. The Michigan Central operated on Detroit time. In the Chicago district the New York Central and the Pennsylvania used Columbus time, which was 6 minutes faster than Cincinnati time and 19 minutes faster than Chicago time. Generally speaking, the railroads running west and south from Chicago used Chicago time; those running west from St. Louis used St. Louis time.¹²

¹² Freundeskreis Europäischer Modellbahner (FREMO), <https://www.fremo-net.eu/en/home>, although the page with the quote is no longer there; most of the quote is at: Michael Downing, *Spring Forward: The Annual Madness of Daylight Saving Time*, Shoemaker & Hoard, Washington, D.C., United States, 2005, p. 23, at <http://michaeldowningbooks.com/wp-content/uploads/2012/04/spring-forward.pdf>

Jewellers also were important timekeepers and often had a clock in their window showing the time so people could check their watches. Problem was each jeweller had his own “standard time” and this varied by as much as 20 minutes in the same locality.

In the end, no one knew what the time was with any certainty. The whole situation became so bad in Kansas City that astronomer Henry Smith Pritchett was called in. His recommendation of a time ball system only partially solved the problem. This is where a large wooden or metal ball up to a yard or more in diameter would be dropped from a mast atop a tall building at noon. Thousands of people for miles around would gather to watch and set their timepieces. Time balls were common in America and Britain. They were invented by Royal Navy captain Robert Wauchope in 1829 and the first one was erected at Plymouth, England.

But time balls didn't resolve railroad time versus local time. People suggested a time system similar to the one in Britain, where the local mean time for one place became the standard. But the difference in local time between the eastern and western extremities of the United States exceeded three hours, too large an area to be lumped into one time zone. Way before the railroads, around 1809, amateur astronomer William Lambert had approached Congress to establish time zones based on meridians. Undoubtedly, many others had similar thoughts before the idea was taken up again around 1863 by educator Charles Dowd, who proposed dividing the country into four time zones with north-south borders, each area differing by an hour. From 1869, he consulted with railroad companies, lectured, wrote newspaper and journal articles, and prepared detailed rail timetables. He produced a pamphlet, *A System of National Time for Railroads*, using Washington, D.C. time as the base and took it to Congress in 1870 before completing a revised system in 1872 based on Greenwich time.

Dowd got support from other quarters. Railroad companies and some public societies such as the American Meteorological Society, the Society of Civil Engineers and the Canadian Institute took up the cause. People started suggesting railroad time be made the only time. This led to great controversy, with many stalwart civic leaders wanting to keep their own time as a matter of local pride. William Allen, secretary of the American Railroad Association, also lobbied long and hard for a system of time zones. He and Dowd finally got their way when a meeting of US and Canadian railroad company bosses in Chicago in 1883 decided to introduce a system of time zones. These were very close to what Dowd had proposed 11 years earlier.

The changeover on Sunday 18 November 1883 went remarkably smoothly and was called “The Day of Two Noons” by the press as people adjusted their timepieces at local noon to the new noon time within their new standard time zone: Intercolonial, Eastern, Central, Mountain or Pacific. Many public institutions and jewellers also made the change and crowds gathered outside shop windows, or wherever they could find a clock, to witness the spectacle. Some people were in awe and couldn't quite understand how time could be stopped for up to half an hour or more, or how it could skip this interval, depending on location. Others protested that man couldn't change “God's time” and were going to complain to their church and the government. But there was no legislation or other government action to change the time. It was purely a

collective decision by the railroad companies of the United States and Canada, and most people, businesses and other organisations followed it.

Initially, many places retained local mean time alongside railroad standard time. But on the whole this didn't happen for long. Within days, around 70 per cent of American schools, courts and local governments adopted the new time system. After a year, about 85 per cent of cities with a population over 10,000 were using it instead of local time. Most pockets of resistance steadily converted to standard time although for some places the change took longer.

A few large or state capital cities stayed on local mean time for a number of years, such as Detroit, Columbus, Cincinnati, Pittsburgh and Augusta, or reverted to local mean time, such as Louisville. In some other localities, many people and businesses kept to local time especially in areas away from the railroads and also where standard time meant the sun set up to half an hour or so earlier than under local mean time.

Whether a place should use local time or standard time was the subject of a number of court cases. The courts seemed to mainly favour local time before 1900 and standard time afterwards. In Georgia in 1889, the Supreme Court felt that standard time could be used along rail routes but local mean time away from the railroads.¹³ Another court decision in 1889 stated: "The only standard of time ... recognized by the laws of Georgia is the meridian of the sun ... An arbitrary and artificial standard of time, fixed by persons in a certain line of business, can not be substituted at will in a certain locality for the standard recognized by the law."¹⁴ In the Iowa Supreme Court, a saloon owner charged with violating closing time laws argued he operated by local time and not railroad time.

Thirteen states legislated for standard time between 1884 and 1914: Connecticut, Maryland, New Jersey, New York and Wyoming in 1884, Michigan and Wisconsin in 1885, Maine and Pennsylvania in 1887, Florida in 1889, Ohio in 1893, Minnesota in 1901 and South Dakota in 1909. But local governments, businesses and households didn't always follow this state legislation.

Detroit, Michigan was particularly slow to change. The view among much of the city's population was that the sun, and hence God, not man, should decide the time. Engineer and future car manufacturer Henry Ford favoured standard time and designed a watch with two dials, to show both standard time and Detroit time. Finally, in 1900, city councillors decided to put clocks back 28 minutes to Central time, but many people refused to change and after much quarrelling the city returned to local mean time. Someone sent a facetious offer to put a sundial at the front of City Hall and council scornfully forwarded it to the Committee on Sewers. Lively debate continued and in 1905 the city voted to adopt Central time again.

¹³ Orville Butler, "From local to national: Time standardization as a reflection of American culture", in *Beyond History of Science: Essays in Honor of Robert E. Schofield*, edited by Elizabeth Garber, Lehigh University Press, Bethlehem, Pennsylvania, United States, 1990, p. 257, at https://books.google.com.au/books/about/Beyond_History_of_Science.html?id=cyTRqSduJfKc&redir_esc=y

¹⁴ Ian R. Bartky, *Selling the True Time: Nineteenth-Century Timekeeping in America*, Stanford University Press, California, United States, 2000, p. 261, at <https://www.amazon.com/Selling-True-Time-Nineteenth-Century-Timekeeping/dp/0804738742>

A More Daylight Club was set up by Dr George Renaud and C. M. Hayes in Detroit in 1907 with the goal to move the city to Eastern time and gain an extra hour of daylight at the end of the day compared with Central time and 32 minutes more than under local mean time. This movement was perhaps the first daylight saving type push in the United States although the group aimed to achieve it via a shift in time zone rather than a clock change over the summer months. Not deterred by the club's initial meeting that attracted no one other than its two founders, the pair pursued their goal despite opposition from the press and every organisation they approached. In 1908, the club convinced Detroit Council to hold a public vote on the issue but the cause was lost in all 150 precincts of the 18 wards. Later, support grew and in 1911 voters in eight of the 18 wards wanted to move to the Eastern time zone.

The club had greater success in nearby Cleveland, Ohio, where it won support from the Chamber of Commerce and baseball and gridiron interests. On 30 April 1914, the city changed from Central time to Eastern time. The city of Akron, to the south of Cleveland, had moved two years earlier but went back when nearby cities wouldn't participate. Detroit remained on Central time although the More Daylight Club targeted the two great loves of the city's people: cars and baseball. The Model T Ford, the first motor car affordable to the general public, was a few years old and sales were soaring. Motorists wanted an extra hour of daylight to go touring after work in an era when night-time driving was still hazardous. They had the full support of car manufacturers as additional daylight in the afternoon would boost car sales and reduce artificial lighting costs at plants.

Baseball was huge by this time, and teams in the national competition played a game nearly every day from mid April until early October. When the Cleveland Indians gained the advantage of an extra hour of daylight and had fewer home games postponed due to nightfall, the Detroit Tigers and their fans wanted the same. Tigers' all-time great batter Tyrus "Ty" Cobb endorsed the campaign to change time zones. Detroit Council succumbed to pressure from car and baseball interests and moved the city to Eastern time on 15 May 1915. A citywide vote of more than two to one ratified the shift in September 1916. Most places between Detroit and Cleveland stayed on Central time, while quite a few people still used sun time.

Standard time legislation in the United States finally came in the form of the Standard Time Act of 1918 after most of the country had been on railway time for well over three decades. Provision for daylight saving time was included in the same Act (see chapter 11: United States adopts measure late).

The story of uniform time based on railway time is similar in many other places. Railways spread rapidly in all continents in the mid and late nineteenth century, and railway time or some sort of unified time system usually replaced or ran alongside local time or local mean time. Speed of adoption varied and certain towns and areas held out. Many countries used the local mean time of their capital city as the basis, such as Italy from 1866. The Swedes picked the meridian halfway between Stockholm and Göteborg in 1879. North German railways introduced standard time in 1874. New Zealand, then a British colony, began standard time in 1868, 11.5 hours ahead of Greenwich, the first country to do so on a nationwide basis.

Some places, such as the Australian colonies, didn't have unified time during this period. Railways in Australia started in the 1850s and were based on the British model of private enterprise. It soon became apparent that this wasn't viable due to long distances and small populations, and rail development was left to uncoordinated colonial governments in a period before the colonies became states of the new Commonwealth of Australia in 1901. Many railways were built to transport agricultural and mining produce from isolated inland communities to ports. Most passenger and freight movement between colonies and between the more populated coastal towns and cities was by ship. Colonies used different gauges and intercolonial rail links were few. Everywhere tended to keep to their own local time, and there weren't the private rail companies to push for railway time in any case.

While many countries used railway time as a national or regional standard time, the idea of a world system of standard time was brewing. In 1871, the first International Geographical Congress at Antwerp in Belgium decided that the Greenwich meridian should be the zero meridian or starting point for longitude within 15 years. The congress met again in Rome in 1875. France said that if the United Kingdom accepted the metric system,¹⁵ the French would accept the Greenwich meridian. The meeting agreed that a prime meridian was needed and it should be Greenwich, and if this was accepted worldwide, Great Britain might adopt a decimalised system. But the British weren't planning to go metric.¹⁶

The catalyst for standard time is often given as an incident in Ireland in 1876. Canadian engineer and inventor Sandford Fleming arrived at Irish country station Bandoran late one afternoon in July 1876 to catch the 5:35 p.m. train to Londonberry. It didn't turn up despite his travellers' guide stating there was a train at this time. After some enquiries, he discovered that the train was due at 5:35 a.m. and the time in his guide was a misprint. He felt that a 24 hour clock would be the solution. His mind soon turned to thoughts of time zones and this became his main interest.

In November 1876, back in Toronto, Fleming delivered a paper, "Uniform non-local time (terrestrial time)", to the Canadian Institute. He was a keen supporter of railway time zones across North America, but at this session he proposed a system of standard time zones right round the world instead of each country going its own way. He advocated 24 time zones, each equal to 15 degrees of longitude or one hour, and promoted his views at subsequent conferences, including the Geographical Congress in Venice in 1881 and the Geodetic Conference in Rome in 1883.

After being a key player in the implementation of US railway time in 1883, Fleming was instrumental in convening the Prime Meridian Conference in Washington, D.C. in October 1884, a meeting called by US president Chester Alan Arthur. At the time, ships trying to get their bearings were confronted with 11 reference meridians: Berlin, Cadiz, Copenhagen, Greenwich, Lisbon, Paris, Rio de Janeiro, Rome, St Petersburg, Stockholm and Tokyo. Also, Jerusalem had been favoured as the prime meridian by some religious groups. Various other cities and places had been used as a reference meridian from time to time.

¹⁵ There was a push to adopt a unified metric system to replace the various systems then in use, just as there was a push to standardise time.

¹⁶ The United Kingdom only began the transition to a metric system in 1965.

Many of the conference's 41 delegates, who represented 25 countries in Europe, Asia and North and South America, argued for Greenwich as the prime meridian. About 72 per cent of commercial shipping used Greenwich and 8 per cent used Paris. Since 1879 or earlier, Fleming had wanted the prime meridian to run through the middle of the Pacific Ocean, exactly 180 degrees from Greenwich. France didn't want Greenwich, dropped its push for Paris and sided with Fleming.¹⁷ Complete agreement couldn't be reached and delegates voted on whether they wanted Greenwich or a neutral meridian. Greenwich won by 22 votes to 1, with San Domingo being against it and France and Brazil abstaining. Several countries wanted to count longitude west from Greenwich to 360 degrees instead of 180 degrees each way.

Resolutions passed at the meeting were intended as suggestions to governments and were as follows:

- ☼ That it is the opinion of this Congress that it is desirable to adopt a single prime meridian for all nations, in place of the multiplicity of initial meridians which now exist.
- ☼ That the Conference proposes to the Governments here represented the adoption of the meridian passing through the centre of the transit instrument at the Observatory of Greenwich as the initial meridian for longitude.
- ☼ That from this meridian longitude shall be counted in two directions up to 180 degrees, east longitude being plus and west longitude minus.
- ☼ That the Conference proposes the adoption of a universal day for all purposes for which it may be found convenient, and which shall not interfere with the use of local or other standard time where desirable.
- ☼ That this universal day is to be a mean solar day; is to begin for all the world at the moment of mean midnight of the initial meridian, coinciding with the beginning of the civil day and date of that meridian; and is to be counted from zero up to twenty-four hours.
- ☼ That the Conference expresses the hope that as soon as may be practicable the astronomical and nautical days will be arranged everywhere to begin at mean midnight.
- ☼ That the Conference expresses the hope that the technical studies designed to regulate and extend the application of the decimal system to the division of angular space and of time shall be resumed, so as to permit the extension of this application to all cases in which it presents real advantages.¹⁸

Standard time and 24 time zones were proposed by Fleming and one other delegate but were rejected as a local issue and outside the scope of the conference: to choose a prime meridian. Thus, contrary to popular belief, the meeting didn't adopt standard time or time zones. Ultimately, this would be up to individual countries and their governments although the groundwork had been laid by the Prime Meridian Conference and Sandford Fleming. New Zealand (1868) and Britain (1880) and unofficially the United States and Canada (1883) were already on standard time and had worked out their time zone or zones. Other countries gradually followed suit. Governments were lobbied on the one side by rail and business interests wanting

¹⁷ Fleming's prime meridian would have placed the International Date Line through the middle of England, France, Spain and several African countries. People living on either side of this line would have been on different days.

¹⁸ "International conference held at Washington for the purpose of fixing a prime meridian and a universal day: Protocols of the proceedings", Washington, D.C., United States, October 1884, at <http://www.gutenberg.org/files/17759/17759-h/17759-h.htm>

standard time and on the other by civic and religious leaders demanding local time be kept, and on both sides by assorted groups and individuals, before finally passing legislation, the supporters of standard time winning the day.

Several countries implemented standard time, based on Greenwich Mean Time (GMT),¹⁹ and chose their time zone straight after the 1884 conference. Most took much longer. In many countries, the changeover in practical terms was even slower, especially in rural areas. There seemed to be little or no relation between the time it took a country to adopt standard time and its size, wealth or technological advancement. By the 1920s, all major countries were on standard time and using time zones based on Greenwich time. Countries and regions gave their own names to their particular time zones, for example, Australian Eastern Standard Time, Central European Time, Alaska Standard Time, Beijing Time (or China Standard Time) and numerous others. Interestingly, the Netherlands didn't use standard time until 1940. The last country to adopt it was Liberia, in 1972, nearly 90 years after the Prime Meridian Conference. The years that countries and other jurisdictions adopted standard time are shown in the following table.

Year adopted standard time by country, territory or colony^a

| <i>Year</i> | <i>Country, territory or colony</i> |
|-------------|---|
| 1847/1880 | United Kingdom ^b |
| 1868 | New Zealand |
| 1880 | Gibraltar, Lebanon |
| 1883/1918 | United States ^c |
| 1883-1906+ | Canada ^d |
| 1884 | Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Slovenia |
| 1885 | Botswana |
| 1888 | Japan |
| 1890 | Afghanistan, Burundi, Hungary, Korea |
| 1891 | Czech Republic, Slovakia |
| 1892 | Belgium, Cape Colony, Namibia, Orange River Colony, Transvaal |
| 1893 | Austria, Germany, Italy, Malta, San Marino, Somalia, Togo, Vatican |
| 1893-1924 | Russia ^e |
| 1894 | Bulgaria, Denmark, Liechtenstein, Switzerland |
| 1895 | Christmas Island, Lord Howe Island, Natal, New South Wales, Norway, Papua New Guinea, Queensland, South Australia, Svalbard, Tasmania, Victoria, Western Australia |
| 1896 | Hawaii, Taiwan |
| 1897 | Democratic Republic of the Congo |
| 1899 | Philippines, Puerto Rico |
| 1900 | Alaska, Cocos (Keeling) Islands, Egypt, Palestine, Sweden |
| 1901 | Andorra, Cook Islands, Federated States of Micronesia, Guam, Kiribati, Marshall Islands, Niue, Northern Mariana Islands, Palau, Pitcairn Islands, Spain, Tokelau, Tuvalu, United States Minor Outlying Islands, Wallis and Futuna Islands |
| 1903 | Lesotho, Malawi, Mozambique, Swaziland, Zambia, Zimbabwe |
| 1904 | Hong Kong, Luxembourg |
| 1905 | Bangladesh ^f , India ^f , Malaysia, Mongolia, Myanmar ^f , Pakistan ^f , Singapore, Sri Lanka ^f |
| 1906 | Seychelles |
| 1907 | British Indian Ocean Territory, Cape Verde, Mauritius |
| 1908 | Faroe Islands, Iceland, Panama, Peru |

¹⁹ This is the mean solar time at the Royal Observatory, Greenwich, London, United Kingdom. Greenwich Mean Time (GMT), or Universal Time (UT) from 1926, is often used interchangeably with Universal Coordinated Time (UTC), which began in 1961, and replaced GMT/UT as the international time reference from 1972. Strictly, UTC is an atomic time and only approximates GMT. UTC is a compromise between the English coordinated universal time (CUT) and the French *temps universel coordonné* (TUC).

| <i>Year</i> | <i>Country, territory or colony</i> |
|-------------|--|
| 1910 | Chile, Turkey |
| 1911 | Algeria, American Samoa, Angola, Cambodia, Comoros, Djibouti, Dominica, France, French Guiana, Grenada, Guadeloupe, Laos, Madagascar, Martinique, Mayotte, Monaco, Montserrat, Réunion, Saint Barthélemy, Saint Martin, Saint Pierre and Miquelon, Samoa, Tunisia, Vietnam, Virgin Islands |
| 1912 | Anguilla, Antigua and Barbuda, Aruba, Azores, Bahamas, Belize, Benin, Bonaire, Burkina Faso, Cameroon, Cayman Islands, Central African Republic, Chad, Curaçao, East Timor, Equatorial Guinea, Falkland Islands, French Polynesia, Gabon, Guinea, Guinea-Bissau, Ivory Coast, Jamaica, Macau, Madeira, Mali, Mauritania, New Caledonia, Niger, Portugal, Republic of the Congo, Saba, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, São Tomé and Príncipe, Senegal, Sint Eustatius, Sint Maarten, Solomon Islands, Trinidad and Tobago, Turks and Caicos Islands, Vanuatu, Venezuela |
| 1912/1928 | China, Tibet |
| 1913 | Morocco, Sierra Leone |
| 1914 | Albania, Brazil, Colombia |
| 1915 | Fiji, Guyana, Poland |
| 1916 | Greece, Greenland, Ireland, Northern Ireland |
| 1917 | Haiti |
| 1918 | Estonia, Ghana, Guatemala, Iraq, Israel |
| 1919 | Lithuania, Nigeria |
| 1920 | Argentina, Bahrain, Libya, Nepal, Oman, Qatar, Syria, Thailand, United Arab Emirates, Uruguay |
| 1921 | Åland Islands, Costa Rica, Cyprus, El Salvador, Finland, Honduras, Nauru |
| 1922 | Mexico |
| 1924 | Armenia, Azerbaijan, Belarus, Georgia, Indonesia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Ukraine, Uzbekistan |
| 1925 | Cuba |
| 1926 | Brunei, Latvia |
| 1928 | Kenya, Uganda |
| 1930 | Bermuda |
| 1931 | Ecuador, Galápagos Islands, Jordan, Moldova, Paraguay, Romania, Sudan, Tanzania |
| 1932 | Barbados, Bolivia, Easter Island |
| 1933 | Dominican Republic |
| 1934 | Nicaragua, Western Sahara |
| 1935 | Gambia, Newfoundland, Rwanda |
| 1936 | Eritrea, Ethiopia |
| 1940 | Netherlands |
| 1941 | Tonga |
| 1945 | Suriname |
| 1946 | Iran |
| 1947 | Bhutan |
| 1950 | Kuwait, Saudi Arabia, Yemen |
| 1951 | Norfolk Island, Saint Helena |
| 1957 | Chatham Islands |
| 1960 | Maldives |
| 1972 | Liberia |

^a See Appendix for a complete list of countries, territories, and states etc. of larger countries, arranged alphabetically by continent showing local mean time, the year they adopted standard time and years it changed, and each year daylight saving time applied.

^b The United Kingdom had railway standard time from 1847 and virtually everyone had accepted it by about 1855 although legislation for standard time wasn't passed until 1880.

^c The United States had railway standard time from 1883 with most areas adopting it straightaway or very quickly (with quite a few exceptions) although legislation for standard time wasn't passed until 1918.

^d Canada had railway standard time from 1883 although some areas didn't move until much later.

^e In Russia, the year standard time was adopted varied between regions. See Appendix.

^f India used standard time of GMT+5:30 from 1905 and this included Burma (now usually Myanmar), Ceylon (now Sri Lanka) and the areas now known as Pakistan and Bangladesh. How widespread was

its use (versus local time) isn't known although it was probably mainly confined to larger cities for several decades.

Sources: Time and Date AS, at <https://www.timeanddate.com>; and other sites

A major country slow to adopt standard time both in practice and via legislation was France, which stuck with Paris Mean Time until 1911. The delay was due to a reluctance to recognise Greenwich as the prime meridian. Another quandary for the French was whether to move their clocks forward nearly an hour and be on the same time as most of Western Europe or go back less than 10 minutes but be on the same time as the English. In the end, France decided on GMT, the authorities declaring it was Paris time delayed by nine minutes 21 seconds, or in other words Greenwich time but the French weren't saying as much. Later, France joined other European countries in the GMT+1 time zone.

The following map shows current time zones used around the world. They generally follow national or state boundaries, but also natural features such as rivers or mountains. In the United States, they go through the middle of 14 states. Time zone boundaries for many countries have changed considerably over the years and are still occurring. Half a dozen or more changes have been common in many European and Asian countries. See the Appendix for all known changes in standard time. Most changes tend to be in a westerly direction and are often for the purpose of saving daylight. This results in a skewing of zones and is evident in places like the United States, Canada, southern South America, Western Europe, parts of Africa, as well as Russia, China and Mongolia. For some countries, the choice of zones is largely influenced by what's used in neighbouring or trading partner countries.



World map showing standard time zones, 2015

Source: Free Large Images, at <http://www.freelargeimages.com/time-zone-map-915>

Shifting zones hasn't always proved beneficial. The United Kingdom and Ireland trialled Central European Time in 1968, aligning with most of Europe in the GMT+1 zone. The experiment was unpopular and ended in 1971 due to an increase in road accidents on dark winter mornings, many involving children walking to school. Sunrise in London in midwinter during these years was around 9 a.m. (and sunset

about 5 p.m.). Portugal too tried Central time in the periods 1966-1976 and 1992-1996.

Arguments against time zone changes have been made even more strongly in Russia. In 1930, 10 of the 11 Russian time zones moved an hour ahead of the old standard time (Kaliningrad Oblast was the exception) and have been shifted back and forth a number of times since then. Opposition to standard time being well ahead of solar time continues to the present. In 2003, Saint Petersburg's Committee for the Restoration of Standard Time in Russia, a group comprising specialists such as biologists and astronomers, alleged that:

... the current situation ... is damaging to people's health, impairs workplace productivity, increases the number of road accidents, and drives some people to drink, drugs and even suicide. A return to the previous standard ... would reduce Russia's mortality rate by as much as 10 percent.²⁰

It was for economic reasons that Russia shifted its time zones in 1930. But a 1997 estimate of power savings was put at 1.8 billion kilowatt hours a year or less than 0.5 per cent of the country's total. The Saint Petersburg group believes the government should consider the human cost rather than the economic cost, but the government denies the human cost is significant. Thirty years of daylight saving time ended in 2010 and standard time in most of Russia went a further one hour ahead of where it was in 1930, which must have really irked the group. It then went back an hour in 2014. Interestingly, when the US Department of Transportation receives a request from a county or state to change its time zone, the main consideration is "convenience of commerce".

Russia is one of a number of countries that, while using standard time, has never made the full transition or took a long time to do so. Moscow Time (UTC+3) is used throughout Russia for many purposes. Clocks at rail stations and ports are set to Moscow Time, which can differ from standard time in other parts of the country by up to nine hours, although air travel uses the country's various standard time zones. Radio stations across the country refer to Moscow Time. Standard time in a region is often expressed in terms of Moscow Time; for example, Vladivostok Time will be described as MSK+7 rather than UTC+10.

Several countries or parts of countries don't quite use standard time or time zones in the way they were originally intended. Israel, for example, starts its day at 6 p.m. In essence, this puts it eight hours ahead of Greenwich instead of two. Half hour deviations from standard time are used by Afghanistan, India, Iran, Myanmar, Sri Lanka, Newfoundland and Labrador, Venezuela, South Australia, Northern Territory and several islands. Nepal and Chatham Islands east of New Zealand use quarter hour deviations. Certain islands in the Pacific use UTC+13 and +14 rather than UTC-11 and -10. Thus there are now 39 time zones, the earliest and latest being 26 hours apart. On a global scale, three different days exist at any one time and any calendar date extends for 50 hours around the world.

²⁰ Galina Stolyarova, "Group says getting up early is bad for you", *The St. Petersburg Times*, Saint Petersburg, Russia, 18 February 2003, at <http://www.prometeus.nsc.ru/science/scidig/03/febr2.ssi>

In the case of South Australia, it initially used GMT+9 in 1895. All Australian colonies enacted standard time legislation in that year, following the outcomes of several earlier meetings. At the Intercolonial Conference of Surveyors in Melbourne in 1892, a meeting attended by Sandford Fleming on a visit to Australia, Queensland surveyor and politician Augustus Gregory proposed that time zones be introduced in Australia. There was unanimous agreement. This was taken further at the Postal and Telegraphic Conference in Brisbane in 1893 and in New Zealand in 1894. Charles Todd, postmaster-general of South Australia, submitted a paper at each meeting for a single time zone in Australia, GMT+9. After discussion, the New Zealand conference resolved to push for three time zones in Australia, GMT+8, +9 and +10, and +11:40 in New Zealand (although it remained at GMT+11:30 where it had been since 1868). Australia's Overland Telegraph system, put in place in 1872, had been a major influence in the push to standardise time in that country.

Each Australian colony passed a Standard Time Act 1895, which came into force on 1 January of that year in Queensland, 1 February in New South Wales, Victoria and South Australia, 1 September in Tasmania and 1 December in Western Australia. WA chose GMT+8, SA GMT+9 and the eastern states (Queensland, NSW, Victoria and Tasmania) GMT+10. South Australians weren't happy with their new time zone being an hour behind the eastern states despite the whole of the state being geographically located within this zone. Residents claimed it caused inconvenience, delay and confusion, while firms complained of a great disadvantage when conducting interstate business. Sports people and farming communities also wanted a reduction in the time difference between South Australia and the eastern states. Adelaide local time was nine hours 14 minutes ahead of Greenwich and thus only 14 minutes in front of GMT+9, but the problem was the difference between Adelaide and Melbourne times. Under local time, this was about 26 minutes; under the new standard time zones, it became an hour.

Accordingly, South Australia enacted new legislation on 1 May 1899 putting it at GMT+9:30. Using a fractional time zone has brought criticism over the years. However, proposals in 1986 and 1994 to move the state to UTC+10 or revert to UTC+9 were unsuccessful. Broken Hill in far western New South Wales uses South Australian time and has done so since 23 August 1896 because the rail line from the mining centre went to South Australian coastal town Port Pirie.

Another oddity in Australia involves a small area along the Eyre Highway midway between Adelaide and Perth that unofficially uses UTC+8:45. Towns include Cocklebidy, Madura, Mundrabilla and Eucla in Western Australia and Border Village in South Australia. The time zone has clear boundaries marked by road signs and appears on maps of the area. It puts its clocks on an hour when Western Australia has daylight saving time.

Australia didn't use railway time in the nineteenth century like many countries but more recently it has used "train time". The Indian Pacific train uses UTC+9 between Kalgoorlie and Port Augusta when South Australia is on daylight saving time (UTC+10:30) and Western Australia isn't (UTC+8), as passengers would otherwise have to change their watches by 2.5 hours in one go.

But this isn't the biggest change in time around the world between neighbouring countries or states. People entering Afghanistan from China have to set their watches back 3.5 hours. Between 1912 and 1949, China had 4-5 time zones. Since then, the whole country has been in the one time zone, UTC+8, despite the difference in local time between western and eastern extremities of about four hours. This means the time when the sun is highest in the sky varies from around 11 a.m. in the east to 3 p.m. in the west.²¹ A single time zone in China doesn't appear to cause too many problems although it should be noted that people in Xinjiang and Tibet in the far west have unofficially used UTC+6 probably at least since the Cultural Revolution (1966-1976) and maybe before this.

At any rate, by the twentieth century, after thousands of years trying to perfect calendars and the measuring of time, the world finally had a calendar, the Gregorian, and a system of standard time and time zones which although not perfect did work quite well. Just when we thought that people, businesses and governments were more or less happy with what had been put in place, a formal system of daylight saving time was about to emerge.

²¹ There is a school of thought that says a country should use one time zone rather than worrying about what the clock says at sunrise, sunset, solar noon or any other time of day; in other words, synchronise people over sunlight. A single time zone might be an advantage in the 48 contiguous states of the United States and in Australia where the mean solar time range between western and eastern extremities is 3.8 hours and 2.7 hours (both less than in China). Or at most, two zones could be used in each of these countries, one for the eastern and central parts and one for the western part.

5 William Willett's dream

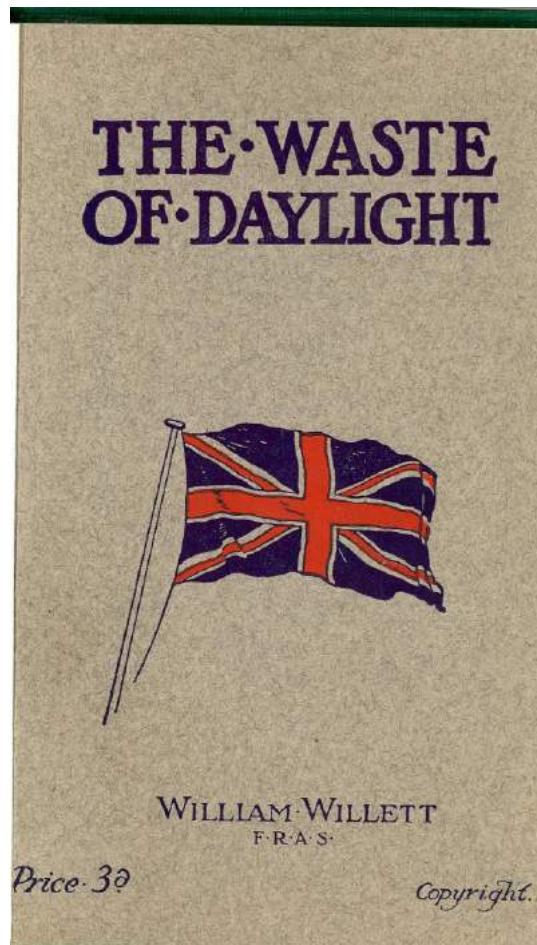
In the first decade of the twentieth century, at a time when many countries were coming to grips with standard time and time zones or hadn't yet introduced them, English builder and fellow of the Royal Astronomical Society, William Willett, was worried people were wasting daylight. Benjamin Franklin had raised the issue over 100 years earlier. Whereas Franklin suggested half jokingly that we get up and go to bed sooner, Willett proposed seriously that we move the clock hands forward. But the world was still in the middle of shifting its clocks from solar or local time to standard time.

After attending Marylebone Grammar School and gaining some commercial experience, Willett worked in his father's business, Willett Building Services. The pair built houses in the better parts of London, where "Willett built" became synonymous with quality housing. He was always conscious of making the most of natural light in his buildings. At age 48, Willett was riding his horse in Petts Wood near his home at Chislehurst, Kent, south-east of London, early one summer's morning in 1905. As a builder, he would take notice of the various houses he passed. He saw most of the blinds still shut and an idea for saving daylight occurred to him.

In his spare time over the next couple of years, Willett developed a plan to shift some of the early morning daylight to later in the day, noting the benefits this would bring and any objections he was likely to encounter. He wrote and published a booklet called *The Waste of Daylight* in July 1907.²² In it, he expressed concern about the hours of morning daylight not utilised in spring and summer and the lack of daylight at the end of the working day for outdoor leisure activities. He suggested that if some of the sunlight could be transferred from the morning to the evening, the advantages of extra exercise and recreation and the money saved on artificial lighting would accrue to all. He claimed opportunities for rifle practice as a further advantage.

His plan was to put clocks forward 20 minutes each Sunday in April for a total of 80 minutes and then back 20 minutes each Sunday in September. This process of phasing the change in and out, he argued, would mean no one would really notice it, yet people would have the benefit of an hour and 20 minutes extra light late in the day over the summer months. He illustrated how easy the change would be by describing how those travelling east or west by ship changed their watches and quickly forgot about it as they enjoyed other activities.

²² William Willett, *The Waste of Daylight*, London, 1907, reprinted in *British Time* by Donald de Carle, Crosby Lockwood & Son Ltd, London, United Kingdom, 1946, pp. 152-157, at <http://webexhibits.org/daylightsaving/willett.html>



Front cover of William Willett's booklet, *The Waste of Daylight*, London, 1907
Source: Library of Congress, Inside Adams, "Saving energy: The fall back position", at https://blogs.loc.gov/inside_adams/2011/11/saving-energy-the-fall-back-position/

Willett's idea seemed sensible, especially with daybreak so early in Britain in summer. Sunrise in London on 21 June was 3:43 a.m. and civil dawn 2:55 a.m., explaining the popularity of blinds and shutters to keep the light out. Under his proposal, sunrise would be just after 5 a.m. At the other end of the day, adding 80 minutes to the sunset time of 8:22 p.m. would push it out to 9:42 p.m. and civil dusk to 10:29 p.m. This would allow people to go to bed at 10 p.m. and not have to use artificial light. Those who retired later would need their electric lights, candles and lamps for up to 80 minutes less than usual.

His booklet included a calculation of total savings his idea could be expected to generate. He assumed the cost of artificial light was a tenth of a penny per head per hour. Under the scheme, the total amount of extra daylight in the evening was 210 hours a year. Using Whitaker's estimate of the population of Great Britain and Ireland at that time of 43.66 million, gross savings would equate to £3,820,250.²³ He then deducted a third of this "to meet all possible objections, including loss of profit to producers of artificial light", arriving at net savings of £2,546,833. He claimed "a permanent economy equivalent to a reduction of the National Debt by at least one

²³ Savings = 0.1 x 210 x 43,660,000 = 916,860,000 pennies or £3,820,250 (916,860,000 ÷ 240)

hundred million pounds sterling”, but didn’t initially elaborate on how he arrived at this figure.²⁴

One of the best attractions of his plan, William Willett argued, was that virtually all trains would run to existing timetables. Only the “continental” trains needed different timetables. These were the British trains taking passengers to ports where steamers ferried them to Europe. So that people reached their connections on time, these trains would require special timetables for the period the clocks were wound forward. But Willett believed the extra cost to the railways of new timetables would be less than the savings in artificial lighting at stations and on trains, and that the longer days would bring more passengers and profit.

He admitted to some slight inconvenience due to changes in time differences between Britain and other countries, but quickly pointed out some further benefits:

Light is one of the great gifts of the Creator. While daylight surrounds us, cheerfulness reigns, anxieties press less heavily, and courage is bred for the struggle of life. Against our ever-besieging enemy, disease, light and fresh air act as guards in our defence, and when the conflict is close, supply us with most effective weapons with which to overcome the invader. Even the blind keenly realise the difference between daylight and darkness. They are always cheered by the former, but depressed by the latter.²⁵

Willett may have read Benjamin Franklin’s article, “An economical project for diminishing the cost of light”, but he considered it futile to think that the savings and benefits of better utilising daylight could be done by rising earlier. He felt that “the exceptional exercise of this virtue usually calls forth more sarcasm than admiration or imitation. Leisure must follow, not precede, work, and compulsory earlier business hours are quite unattainable”. Under his plan though, businesses would in fact open 80 minutes earlier in real time, whereas the clock face would show the same opening time as before.

He claimed other countries had changed their clocks to save daylight so why not the United Kingdom. He maintained that standard time in Victoria was advanced 20 minutes in 1895 to align with New South Wales and Queensland and in Cape Colony by 16 minutes in 1892 and another 30 minutes in 1903. This is perhaps one of the few parts of his argument that could be questioned as these were simply examples of places moving to standard time. The Australian colonies first used standard time in 1895. In that year, Victoria’s capital city, Melbourne, put its clocks forward 20 minutes, but this was to bring it into the GMT+10 time zone (which the four eastern states adopted) from the old local mean time of nine hours 40 minutes ahead of Greenwich. Similarly, in Cape Colony, the move to standard time in 1892 meant the capital, Cape Town, advanced its clocks 16 minutes from local time to GMT+1:30. It made a further adjustment of 30 minutes in 1903 to align with the GMT+2 zone. In any case, these weren’t regular adjustments; under Willett’s proposal, clocks would change eight times a year.

²⁴ Later editions of his booklet clarified this statement to mean that £2.5 million was equal to the interest on £100 million of national debt.

²⁵ William Willett, *The Waste of Daylight*, 1907

Notwithstanding, plenty of advantages of changing the clocks in summer were included in the booklet and Willett urged “every man and woman, and every youth in particular” to ensure that voters approached their member of parliament. He had to say it this way as not everyone was eligible to vote in 1907. Women couldn’t vote and the only men who could do so had to hold land to the value of at least £10 or be paying annual rent of this amount, thereby excluding 40 per cent of adult males from voting. Universal suffrage for people over 21 wasn’t achieved in the United Kingdom until 1928 although women over 30 were given the vote in 1918 subject to property restrictions.

He asked voters favouring a six month trial of his proposal to send their member a postcard to this effect, and include their name, address and qualification to vote. He thought that “if postcards are sent in considerable numbers, there ought to be no insuperable difficulty in obtaining an Act for six months’ experiment to be made”. Willett sent his pamphlet to all members of parliament and many councils, businesses, unions, debating societies, clubs and other organisations. He campaigned vigorously, believing his idea was sure to be a success, with its potential to save a great deal of money and increase the health and wellbeing of the nation. Printing, distribution, travelling and lobbying cost him thousands of pounds.

Almost immediately, the scheme met with opposition. Farmers were against it and the press ridiculed it. Typical newspaper comments included: “Will the cows give their milk earlier because of Mr. Willett?” and “Will the chickens know what time to go to bed?” Willett was called names such as “faddist” and “dangerous crank”.

Undeterred and armed with copies of his *Waste of Daylight* booklet, he forged ahead, finding new supporters every day, calling meetings and getting prominent local people to talk about the scheme’s advantages. By 1908, his proposal was known throughout the land. The medical fraternity supported him, saying the plan would be good for people’s eyesight, rickets, anaemia and general health. Businesses and banks favoured the proposition, some stating that an additional benefit was that clerks could play cricket after work. Harrods printed 50,000 copies of their own brochure on saving daylight. Some in the railways approved of it. And Arthur Conan Doyle, creator of Sherlock Holmes, came out in support.

Resistance was just as widespread. Farmers were among the most vocal. They worked from dawn to dusk and couldn’t adjust their hours simply because the clock showed a different time. The cows were ready at dawn, and grass couldn’t be harvested with dew on it as the machinery wouldn’t work. International traders complained that their trading times would be out of kilter, especially with American companies. Operating times of stock exchanges in London and New York overlapped by one hour, but with daylight saving in Britain it would be zero. Some railway bosses, businessmen and scientists who had helped achieve standard time and time zones were opposed to it. Other scientists and astronomers were against the scheme too, claiming that compiling data from continuously recording meteorological instruments would be made difficult.

William Willett was winning plenty of parliamentary support though. Former and future prime ministers Arthur Balfour, David George, Ramsay MacDonald and Winston Churchill liked the idea, as did King Edward VII. In the winter of 1901, the king had ordered all 180 clocks at Sandringham to be put forward half an hour to

allow more time for hunting. The tradition was maintained each winter until 1936 and is one of the rare examples of saving daylight in the cooler months.

Several politicians promised to bring in a bill in support of Willett's plan if their chance came up in the ballot for private members' bills. Robert Pearce, Liberal member representing Leek in Staffordshire, who had contacted him earlier in support of his suggestion, was one of those successful in the 1908 ballot. He introduced his Daylight Saving Bill, a "Bill to promote the earlier use of daylight in certain months", into the House of Commons on 4 February of that year. Basically, the bill stated that the hour between 2 a.m. and 3 a.m. on each of the first four Sundays in April would be regarded as 40 minutes, and as 80 minutes in September. The new time was to be known as British Time. The Act would apply in the United Kingdom and Ireland and be called the Daylight Saving Act 1908. Greenwich time would still be used for astronomy and navigation.

Interestingly, Willett hadn't used the term "daylight saving" in his literature, nor had Franklin used it as far as we know. Pearce may have devised it as two nice sounding words to help the passage of the bill. People liked daylight and the word "saving" evoked thoughts of people saving up for something they wanted. "Daylight shifting" would perhaps have been a more accurate term as the proposal was for some daylight to be transferred or shifted from the start of the day to the end. But in another sense, some daylight was saved from the morning and used in the afternoon. Also, "daylight saving" was more marketable. Or was it?

By March 1908, Willett had the support of nearly 200 members of the Commons and in April a select committee headed by Edward Sassoon was formed to discuss the bill. After Willett spoke in its favour, a number of politicians and representatives from the post office, railways and navy expressed concern about the four 20 minute time changes required, suggesting variously three of 30 minutes, three of 20 minutes, two of 30 minutes, one of an hour and one of 45 minutes. The railways in particular were worried that if drivers, guards and signalmen had to change their watches several times, it would only take one of them to forget once and a disaster could result. Public inconvenience of four time changes in three weeks was also put forward as an issue.

In all, the select committee met 13 times and heard 42 witnesses. Finally, it altered the bill to one clock change of an hour forward in spring and one of an hour back in autumn, and on 30 June 1908 handed a 188 page report supporting the bill to parliament. Various objections were addressed in the report, including that the effects on international business would be minimal and Greenwich Time would still apply for scientific purposes. The committee listed what it saw as the main advantages of changing the clocks:

- ☼ to move the usual hours of work and leisure nearer to sunrise
- ☼ to promote the greater use of daylight for recreative purposes of all kinds
- ☼ to lessen the use of licensed houses
- ☼ to facilitate the training of the Territorial Forces
- ☼ to benefit the physique, general health, and welfare of all classes of the community
- ☼ to reduce the industrial, commercial, and domestic expenditure on artificial light.

Scientific journal *Nature* said that if we change time we may as well change temperature and facetiously suggested an alternative bill:

... to increase the readings of thermometers by ten degrees during the winter months, so that 32°F shall be 42°F. One temperature can be called another just as easily as 2 a.m. can be expressed as 3 a.m.; but the change of name in neither case causes a change of condition.²⁶

But there was a more serious stumbling block to the bill. Prime minister Herbert Asquith didn't like the idea. The bill didn't make it through the House of Commons and opponents cheered. Many letters to the press dismissed the scheme as a gimmick simply allowing young people to play more games. Another common thought among the public was that people should get up earlier rather than changing clocks. *Nature* magazine opined: "All that is needed is for banks, places of business, and schools to open at an earlier hour during the summer months." But some firms had already advanced their clocks in anticipation of daylight saving time legislation being passed.

Willett kept lobbying, and in March 1909, a second Daylight Saving Bill was introduced by Liberal member Thomas Dobson of Plymouth. A public meeting supporting the bill took place at the Guildhall in London, officiated by the lord mayor and attended by about 1,800 people. Also, resolutions by various public bodies and business groups were passed approving the bill and asking the government to consider it. These included the corporations of London, Glasgow, Belfast, Wolverhampton, Derby and others, chambers of commerce of London, Liverpool, Manchester, Leeds, Sheffield, Bristol and others, and the Convention of the Royal Boroughs of Scotland. House of Commons members voted in the bill's favour by 130 votes to 94.

A second select committee heard from 24 witnesses. Opposition came from the Associated Chambers of Agriculture representing 150 farming organisations. The railways were concerned that passengers heading to Europe wouldn't make their connections at the proper time. Theatre owners said patronage would be down as people would consider it too light to attend shows. The London Stock Exchange and the Liverpool Cotton Exchange were worried about disruption to overseas business. And the press was worried cricket matches wouldn't finish early enough for results to appear in evening papers.

There were objections about adopting "hypocritical time" and departing from the "truth" in matters of time. But so-called truth in time or "God's time" had disappeared in Britain from 1847 for most practical purposes with railway time and officially in 1880 with legislation for standard time. One of Winston Churchill's favourite criticisms of daylight saving time was "that wealthy people liked to dine late, and that ladies preferred artificial light".²⁷

However, support for the bill came from diverse quarters. A railway company estimated savings in artificial light across Great Britain would be £92,000 a year. Another company predicted a fall in the number of rail accidents. Farmer and Commons member Richard Winfrey said agriculturalists wouldn't suffer, but allotment and small holders would benefit. A large fruit grower in Kent stated that

²⁶ "The Daylight Saving Bill", *Nature*, vol. 78, pp. 223-226, 9 July 1908, at <http://www.nature.com/nature/journal/v78/n2019/abs/078223a0.html>

²⁷ The Churchill Centre, <http://www.winstonchurchill.org>, although the page with the quote is no longer there and doesn't appear elsewhere on the web

many extra tons of fruit and hops could be picked in the evening light. The musical adviser to London County Council believed attendance at band concerts would almost double.

The committee rejected the bill by one vote due to diversity of opinion and doubts as to whether daylight saving time was something that could be legislated without causing great inconvenience to certain groups. A manifesto in favour of daylight saving was signed by 60 parliamentarians, 33 mayors and provosts, eight privy councillors, four judges, five railway chiefs and 101 other leading figures. Enthused by the positive response, Willett stepped up his campaign. He printed new editions of his pamphlet, which now included the names of his ever-growing band of supporters, sent out more letters and travelled extensively.

In 1911, Robert Pearce brought a third daylight saving bill into the House, now called the Summer Season Time Bill. Willett organised another meeting at Guildhall to assist the cause, again presided over by the lord mayor and attracting a crowd similar in size to the 1909 meeting. The main speaker was Churchill, a brilliant orator and already home secretary at age 36 and an active supporter of daylight saving who had become president of the Daylight Saving League. To cheers, he roared:

An extra yawn one morning in the springtime, an extra snooze one night in the autumn is all that we ask in return for dazzling gifts. We borrow an hour one night in April; we pay it back with golden interest five months later ... If the change is not found to be beneficial, the experiment need never be repeated. But we are confident that advantages of a most substantial and important character would be immediately secured in almost every sphere and aspect of national life.

Despite Churchill's stirring speech, the bill was rejected by the select committee appointed to look at it. Around the time of the meeting, he said: "One day a grateful posterity will build statues to Mr Willett and decorate them with garlands on the longest day of the year."²⁸

Further bills in 1912 and 1913 also failed. At the same time, there were meetings against daylight saving. Strongest resistance came from agricultural interests. Another group firmly opposed to any change was clockmakers. They argued that turning striking and chiming clocks back and forth was no good for them. Later, technology improved and summer time wasn't an issue from that point of view. One group that liked the idea of daylight saving was the staff at Oxford University Press who in 1912 were enjoying their third summer of 7 o'clock starts.

In March 1914, William Willett produced the nineteenth edition of *The Waste of Daylight* in time for a sixth summer season time bill.²⁹ He had been updating the booklet constantly with fresh details of support. In the latest one, he included some of the names of the 285 members of the House of Commons who "have expressed their approval of the principle of the Bill" and all of the names of the 59 members of the

²⁸ "Centenary of Wm. Willett who invented Summer Time", *The Ottawa Journal*, Ottawa, Ontario, Canada, 30 April 1956, p. 6, Newspapers.com (subscription only), at <http://www.newspapers.com/image/48816384>

²⁹ William Willett, *The Waste of Daylight (with an account of the progress of the daylight saving bill)*, 19th edition, March 1914

House of Lords who “expressed their goodwill towards the Bill”. He listed the names of organisations that had passed resolutions in favour of the bill, including 689 city, town, district and county councils and 82 chambers of commerce. He also claimed support from 59 unions and over 400 business, political and other associations and societies.

He even got some more agricultural interests on board, in addition to the Kent fruit grower mentioned above, and included details in his new booklet. Fifty fruit merchants signed a document stating that daylight saving would be a boon to the fruit industry, and three chambers of agriculture were in favour, one believing the change “will be of the greatest benefit to every individual in the British Isles”. But a Lincolnshire Farmers’ Union meeting concluded that the bill would make little difference to them, with one farmer saying: “The Bill is meant for those poor devils who are grinding out their lives behind a counter, so that they can get out earlier in the evening ... It will not affect us.” Despite Willett’s unrelenting efforts, the 1914 bill was defeated as it had the backing of only 43 per cent of the 658 members of the Commons.

In the meantime, his idea was becoming popular in other countries, with *The Waste of Daylight* being translated into French and German. Willett spoke at the sixth International Congress of Chambers of Commerce in Paris in June 1914 to delegates from 37 countries. Germany’s Associated Chambers of Commerce wanted daylight saving. Bills were introduced in Canada, Newfoundland, New Zealand, Victoria and New South Wales but none was successful.

A further impediment to Willett’s campaign in the United Kingdom was the outbreak of a war on 28 July 1914 that would become known as the Great War and later as World War I. Unlike the previous several years, in 1915, with the government consumed in other business, no daylight saving bill was brought before parliament.

Tragically, Willett caught influenza and died on 4 March of that year, aged 58. A memorial sundial set to daylight saving time stands in Petts Wood. The nearby Daylight Inn is named in his honour. His London house, 16 Avenue Crescent, Acton, has a green plaque at the front which reads: “William Willett 1856-1915 builder and originator of Daylight Saving Time lived here 1882-1894”. His great-great-grandson is rock band Coldplay’s lead singer Chris Martin who co-wrote “Clocks”, which won Record of the Year at the 2004 Grammy Awards and has featured in movies, television programs and advertisements. The first verse would have been a fitting tribute at Willett’s funeral:

Lights go out and I can’t be saved
Tides that I tried to swim against
Have brought me down upon my knees
Oh I beg, I beg and plead.



Memorial sundial to William Willett in Petts Wood, Bromley, Kent, United Kingdom. Inscription reads: “horas non numero nisi æstivas”, meaning “I count only the summer hours”

Source: Hidden London, by Russ Willey, “Petts Wood, Bromley”, at <http://hidden-london.com/gazetteer/petts-wood>

Willett is often credited as the founder of daylight saving time although George Vernon Hudson of New Zealand was actually the first to propose it, in 1895 (see chapter 21: The long road to daylight saving across the ditch). But if there is a father and champion of daylight saving time, it is William Willett. His determination and perseverance over nearly a decade to keep advancing a cause he believed in was long remembered by supporters and opponents alike. Unfortunately, he didn't live to see his long-held passion become a reality on a national scale. That would happen in 1916, just over a year after his death, though not first in Britain but in Germany and other European countries. What Willett might have thought of this outcome can only be guessed at.

Part II

Daylight saving in UK and Europe

6 Wartime imperatives

While sport and other outdoor activities were often the reasons people put forward for wanting daylight saving time in the years before World War I, the potential for fuel savings in wartime became the overriding motive for a time change by the mid 1910s. In the House of Commons on 16 February 1916, Basil Peto, member for Devizes, Wiltshire, enquired of the need to conserve oil and gas for Britain's war effort. More questions were asked about saving time and power a few weeks later on 7 March. Prime minister Herbert Asquith held firm in his objection to altering the clocks, pointing out that other policies to save energy were already in place:

The joint effect of the darkening of the streets and the early closing of places where intoxicants are sold has probably contributed more towards shortening the interval between sunset and bedtime than would the adoption of Central European Time as the standard time during the summer.³⁰

While England continued to debate the issue, the German Empire was doing the same. In 1912, Henry Böttinger, industrialist and member of the Prussian House of Lords, proposed a daylight saving system where the working day would start and finish earlier reducing demand for artificial light. The Conference of Chambers of Commerce advocated daylight saving and a member of the Lords proposed a bill in 1913. The Enabling Act 1914 was put through the German parliament, the Bundestag, on 4 August, a week after the start of the war, and this Act allowed the government to implement various economic policies in wartime, such as food rationing, asset seizures and time changes.

A British blockade of Germany from 1914 cut off imports of all sorts of goods, including petroleum and paraffin. And local coal supplies were needed to produce electricity for weapons and other industries and gas for city lighting. The country suffered a fuel shortage by 1915. It knew that redirecting fuel from domestic and normal business use into war industries would be to its advantage and that the quickest and easiest way to do this was to reduce the use of artificial light. The German Federal Council decided on 6 April 1916 to implement summer time, or *Sommerzeit*, as a wartime economy measure. The government estimated that the scheme would result in energy savings over the summer of 900 million marks. Clocks were wound forward an hour on Sunday 30 April at 11 p.m. and were to be put back an hour on Sunday 1 October at 1 a.m. The new time applied across most of the empire and included Germany itself, most of Poland, part of what is now the Czech Republic, and Kaliningrad.

For the first day or two, many people turned up for work at the wrong time and traffic was busy. But there was no serious opposition to the move, with most people either agreeing with the change or perhaps too scared not to agree. The government warned it would crack down on any firms found not operating on summer time. Some clothing shops included the new time in their advertising, announcing to the public that summer fashions could be bought an hour earlier. In the city of Bremen,

³⁰ Parliament of the United Kingdom, *Hansard*, House of Commons, 7 March 1916, at <http://hansard.millbanksystems.com/commons/1916/mar/07/daylight-saving-bill>

households and businesses used less electricity and gas, and thus coal, but energy providers complained of a reduction in revenue of 40,000 marks, which the city made up by increasing income tax.

Daylight saving wasn't the only way Germany conserved fuel. In December 1916, a "light-saving order" forbade lighting for outdoor advertisements and enforced shops to close by 7 p.m. except pharmacies, food stores and restaurants. Theatres had to finish by 10 p.m. Street lighting was reduced and lights in houses had to be cut to a minimum.

Many other European countries used daylight saving during World War I. Germany's ally Austria-Hungary began it on the same day and time as its neighbour and Netherlands and Belgium one hour later at midnight on 1 May 1916. Denmark, Luxembourg and Sweden had it from 14 May. At last, the United Kingdom would act too, on 21 May. Norway started daylight saving on 22 May, Italy on 4 June, France on 14 June and Portugal on 17 June. Iceland, Russia and maybe Spain commenced it in 1917 and Estonia and Latvia in 1918.

Austria-Hungary was put under pressure by Germany to introduce daylight saving for the sake of uniformity of time between the two countries and to save energy. Cities and industries were happy with the measure but agricultural areas and schools weren't in support. The parts of the Austro-Hungarian Empire that had daylight saving included Austria and Hungary themselves plus what is now the country of Slovakia, most of the Czech Republic and part of Poland.

The Netherlands took a neutral position during World War I although trade connections with Germany prompted it to introduce daylight saving. When it began on 1 May 1916, city people were in the streets at midnight on a Sunday night cheering as they watched public clocks being altered to 1 a.m. In one household, the father put the clock forward one hour, but the mother did the same, and then the domestic also advanced it an hour, with the result that the son left for school at 6 a.m. Less enthusiastic were conservative rural folk such as Friesland farmers in the country's north who steadfastly refused to accept the new time, which meant that milk supplies were an hour late in the morning. To them, changing time was a sin and, at any rate, was simply inconceivable:

As crops were sown in spring and reaped in August, as the calendar numbered the days, as the cold came in winter and the heat in summer, so come the hours to man. How could nine be ten; how could eleven be twelve? Could a meadow be a cornfield; could a pasture be a garden? What of the milking hour and the time of meals? Could you coerce a cow by clockwork; could you deceive a horse by turning a key? Would the lark sing earlier because the clock lied; would the sun spurt over the horizon at the signal of a premature Angelus?³¹

All this was in a country that hadn't yet adopted standard time. Controversy had raged in the Netherlands over whether it should use GMT and turn clocks back about 20 minutes or use GMT+1 and go forward 40 minutes. Agreement couldn't be reached, so they stayed on local time long after all other European countries had moved to

³¹ James Dunn, "Daylight saving", *Daily Mail*, London, United Kingdom, in *The Mercury*, Hobart, Tasmania, Australia, 30 June 1916, p. 7, at <http://trove.nla.gov.au/ndp/dep/article/1045428>

standard time. Local mean time of capital city Amsterdam, GMT+0:19:32, had been used nationwide for decades and this became the legal time, including for the railways from May 1909 (instead of GMT which they had used since 1892). When the Dutch started using daylight saving, they added one hour to local time, making it GMT+1:19:32. The Netherlands used standard time of a sort, GMT+0:20, from 1937 and GMT+1 from 1940.

Most of Belgium was occupied during World War I. The country's time zone was changed from GMT to GMT+1 by German decree on 8 November 1914 and everyone was supposed to use "German time". The local population often kept their watches on "Belgian time", using it for appointments and daily life although this was an offence under occupation rules and some people were fined or jailed. When the country was moved to daylight saving time on 1 May 1916, things became even more chaotic. German time was now two hours different from the preferred Belgian time and was one hour 43 minutes ahead of sun time in capital city Brussels. A diary entry by an English nurse working in Belgium read: "We were very undecided whether to go on duty Belgian or German time[;] outside one had to have German time but inside the nuns insist on Belgium time, result most comical & we don't know where we are."³²

There was even greater confusion at the town of Overstag on the Belgian-Dutch border. The church was in Belgium and used Belgian time (GMT), but the village's tower clock was on German summer time (GMT+2). Dutch officials were on Netherlands daylight saving time (approximately GMT+1:20) while Dutch schools operated on German standard time (GMT+1). When the priest's watch showed 12 noon, school clocks were on 1 p.m., Dutch officials' watches about 1:20 p.m. and the tower clock 2 p.m.

Another country to have daylight saving imposed upon it while under German occupation was Luxembourg. Clocks went forward on 14 May at 11 p.m. It was already in the GMT+1 zone and people didn't have to cope with time being two hours different from what they were used to, as Belgium did, although the new time wasn't popular.

The Scandinavian countries were neutral during World War I but adopted daylight saving in 1916 to conserve energy as they had no idea where the war was going or how long it would last. Denmark initiated the idea among these nations on 14 May to save fuel and due to difficulties with train timetables after Germany went onto summer time. Sweden launched daylight saving by royal decree on the same day as a test run. The move was accepted in the cities, where it was regarded as good for social activities and health, but farmers complained that they lost an hour of daylight in the morning and that the cows didn't want to be milked in the dark. Energy savings were thought to be small. Norway passed a daylight saving bill for clocks to be forwarded on 22 May.

The year 1916 was proving to be a bleak one for the British. On 29 April, they were defeated by the Ottoman Empire Turks at Kut Al Amara, Iraq. This loss ended the 147 day Siege of Kut, with British Empire casualties reaching 23,000 dead or wounded

³² Tammy M. Proctor, *Civilians in a World at War, 1914-1918*, New York University Press, New York, NY, United States, 2010, p. 136, at <https://books.google.com.au/books?isbn=081476715X>

out of a total of 31,000 troops. The remaining 8,000 men, made up of about 3,000 British and 5,000 Indian soldiers, along with leader General Townshend, were taken prisoner. The Allies also took a battering on other fronts.

Meanwhile, at home, food prices rose while Britain had only six weeks of wheat left, and bread was a staple. Coal too was in short supply, with many miners having enlisted to fight in the war. On 4 May 1916, the War Saving Committee stressed the need to economise. Home secretary Herbert Samuel said that the government favoured daylight saving to conserve fuel. Also, the railways were strongly in support of the measure.

On 8 May 1916, after much discussion, member for Blackburn, Henry Norman, an advocate of daylight saving throughout its long and bumpy ride in the British Parliament, asked that a bill for the scheme be brought into the House of Commons. The motion was carried 170 votes to 2. Samuel introduced a Summer Time Bill the next day and it was read a second time on 10 May. Unlike previous bills, debate concentrated on economic issues rather than recreational advantages. He spoke of the coal shortage and the need to reduce artificial lighting and save fuel. Owen Philipps pointed out that ship builders would be able to work an extra hour and increase the country's shipping capacity without fear of the night-time attacks of the German Zeppelin airships that had resulted in the death of around 550 British civilians up to May 1916.

Apart from Herbert Asquith, who still wasn't interested in daylight saving, one of the bill's few other detractors came from the House of Lords, where Lord Balfour of Burleigh called the bill ridiculous and absurd. As an example of a disadvantage, he asked what would happen if on 1 October a twin was born just before summer time ended and the clocks went back before the other twin was born. The births might be 10 minutes apart but the second twin would be born 50 minutes earlier in the eyes of the law and be deemed the elder. This "might conceivably affect the property and titles in that house", Balfour said. But there wasn't much he or other lords could do, even if a majority had been against the bill, as the Asquith government had abolished the power of the House of Lords to reject legislation when it passed the Parliament Act 1911.

The bill was approved on 15 May 1916 and royal assent obtained on 17 May. After eight years of bills and parliamentary debate, daylight saving time had become law, just over a week after the latest bill had been introduced. The Summer Time Act 1916 came into effect three days before Empire Day, on Sunday 21 May at 2 a.m. when clocks were put forward an hour, and would end on Sunday 1 October at 3 a.m. when they would be wound back an hour. The Act was enforceable each year for the duration of the war and applied to all public institutions, railways, post offices, police stations, banks, shops and other businesses in Great Britain and Ireland. The only exceptions were astronomy and navigation, where Greenwich Mean Time would continue to apply. In the end, the main reasons for the Act were arguably to save coal and to increase the hours available for work. The British overseas territory of Gibraltar had daylight saving for the same period as the United Kingdom.

The first day of daylight saving time was bright and sunny in London and elsewhere in England and people took advantage of the extra hour of light. Parks of the Office of

Works and the London County Council didn't close until dusk although many people were turned away from Kew Gardens as they closed by the same clock time as before. Tennis courts and bowling greens were open late. Evening concerts were able to start in May rather than waiting until June. Folk were seen dashing to hotels for a drink before closing time, forgetting they were open for another hour as their legislation was based on standard time. Bradford and Nottingham reported reduced gas use.

However, petrol consumption rose as motorists were out later than normal. Many people overslept and were late for work. Others woke with a start when their alarm clock went off an hour earlier than usual in real time. A few shift workers tried to claim the hour between 2 a.m. and 3 a.m., when clocks went forward, as an hour of work. The *Somerset Guardian* was worried that attendance at Sunday evensong would be down. In Edinburgh, confusion resulted when the castle gun was fired at 1 p.m. summer time but the time ball atop the Nelson monument on Calton Hill fell at 1 p.m. Greenwich time. The latter was for the benefit of seamen. Many farmers took no notice of daylight saving time as their day was dictated by the sun anyway.

Reaction by the press was mixed. Those opposed to summer time spoke of a storm of opposition and confusion. Conversely, a week after its introduction, *The Times* felt that daylight saving was "already an accepted institution". The world had been turned upside down by the ongoing war and people seemed willing to change time itself if it meant savings in energy to help the war effort. Initially called "Willett time" by many people, the new time was mainly known by its official name of British Summer Time or just "summer time", or as "war time", although detractors often called it "government time" and referred to their favoured system, standard time, as "God's time", a name that had previously been used sometimes to refer to local time.

Other European countries soon joined the move to save energy during wartime and took up daylight saving. Previously aligned with the Central Powers, Italy came into the war in May 1915 on the Allies' side. It introduced daylight saving on 4 June 1916 by legislative decree as the government wanted to redirect energy into war industries. The measure wasn't given much space in Italian newspapers as the media concentrated on reporting the war itself. Malta also commenced daylight saving on that day, as did San Marino and Vatican City.

France was one of the Allies too and part of it was occupied by Germany. Moves for a summer time trial were initiated in 1916 by Democratic Radical Left member André Honnorat to conserve energy. General adviser for the Low Alps region and later education minister, he believed that "victory does not depend solely on the heroism of our soldiers but it also depends on the means of production of our belligerents". He knew that if France had daylight saving, energy could be redirected from domestic and business use into war industries and he proposed a vote on the issue.

Supporters and opponents were poles apart as demonstrated by lengthy and heated debates. In the Chamber of Deputies on 18 April, one member spoke "of the urgent duty to neglect no source of wartime savings". Another complained that the enactment "of such a measure would cast serious general disorder in national life ... for a profit based on rather uncertain data". Honnorat received a number of insulting letters and even death threats. The French press criticised and joked about the proposal. Agreement was somehow reached to initially trial daylight saving and an Act was

passed on 9 June. The interior minister issued an official notice next day that summer time, or *l'heure d'été*, would commence four days later on 14 June. It stated that the reason for the change was to save coal and oil for national defence purposes by minimising the use of artificial lighting. Monaco also had daylight saving from this date.

Germany declared war on Portugal in March 1916 and that country adopted daylight saving from 17 June to conserve energy. The transition was more difficult in Portugal because of the large difference between clock time and sun time. The country had moved to standard time, GMT, in 1912. When it started daylight saving, the time in capital city Lisbon was one hour 37 minutes ahead of local mean time.

The war continued. On the first day of the Battle of the Somme in northern France on 1 July 1916, one of the largest battles of the war, the British Army suffered its worst day with 57,470 casualties including 19,240 dead. The battle dragged on for four and a half months, with several hundred thousand casualties on each side. At sea, the Royal Navy asserted its superiority at the Battle of Jutland, fought on 31 May and 1 June, in the North Sea off Denmark. But vast resources were being consumed, and at home food and fuel were very short. By October, coal was rationed by the number of rooms in a house. In these circumstances, daylight saving time would remain.

But soon there was considerable debate in the United Kingdom as to the merits of daylight saving. A Summer Time Committee chaired by member John Wilson was appointed by the government in September 1916 to enquire into the social and economic results of daylight saving and to determine if it should continue in future summers and if any changes should be made to it. The committee sent questionnaires to over 1,300 government, trade, social and other entities as well as individuals, achieving a 76 per cent response rate.

Replies were almost universal in stating that the additional hour of daylight in the evening had been used for recreation and other outdoor pursuits, including cultivating gardens and allotments. People participated more in bowls, swimming, tennis, golf and cricket, and children's gardening classes went a month longer. Women's organisations commented that it was hard to get children to go to bed and they appeared tired in the morning but that the extra time spent outdoors after school was thought to boost their overall health. Police reported an improvement in law and order and "public morals", and stated that juvenile crime was down as dusk was later and fewer boys were still hanging around the streets by then. Road casualties were reduced, as were industrial accidents with "God's sunlight giving a much better general light filling every nook and corner".³³

Employers and unions generally favoured the shift in daylight. However, the Lancashire cotton mills needed artificial light in late September mornings, making the mills hot and uncomfortable to the extent that employees refused to work in them. Farmers didn't like the change as milking had to be done sooner to meet earlier train schedules, but harvesting had to wait until the same real time when the dew lifted.

³³ Robert Garland, "Daylight saving", address to the Washington, Pennsylvania Board of Trade, 7 March 1917, at a page of an old website of the Carnegie Library of Pittsburgh, now <https://www.carnegielibrary.org>, although the page is no longer there and the quote doesn't appear elsewhere on the web

This meant farm labourers were idle for longer. Friction resulted across many farming districts as farms ignored daylight saving as much as they could, but local schools, shops and post offices used the new time.

The nation performed admirably in fuel usage with decreases in gas and electricity of about £2.5 million (or about US\$12 million), including a 20 per cent fall in power for lighting, although this only translated into a 1 per cent decline in total coal consumption. Savings in artificial lighting in homes in some English towns were 20-25 per cent. Meteorological data was still collected using Greenwich time but figures were often telegraphed from post offices just before closing, which was now an hour different in real terms, and this affected the continuity of records. In Ireland, as elsewhere, the towns liked summer time and country areas were against it.

A particular concern at the end of the daylight saving period related to damage done to certain clocks when their hands were wound back an hour. Watches and non-chiming clocks could be turned back, but chiming clocks presented a problem in that they couldn't be turned back past a chime point as impairment to the chiming mechanism was likely. Some clocks chimed every quarter hour, so winding these forward 11 hours and waiting for them to chime each time wasn't a feasible option. A quicker alternative was to stop the clock for an hour, assuming one had a watch or another clock to measure this interval. A more fiddly way was to wait until the clock almost reached a chime point and then turn it back about 12 minutes, and do this five times over the course of an hour. A further option was to leave the hands and instead turn the clock face or dial back a twelfth of a circle in spring and forward in autumn, but this method never became popular. Initially, it was common for people to try and wind the minute hand back an hour in autumn, resulting in clock repairers doing good business.

By February 1917, the Summer Time Committee had weighed up all the positive and negative responses to its questionnaire and made the following recommendations to parliament:

- ☼ that summer time should be renewed in 1917 and in subsequent years
- ☼ that the period of the operation of summer time should be from the second Sunday in April to the third Sunday in September in each year
- ☼ that the change from normal to summer time should be made on the night of Saturday-Sunday, and the reversion to normal time on the night of Sunday-Monday
- ☼ that the variation from normal time should be one hour throughout the whole period.

Parliament accepted the committee's recommendations and the Summer Time Act 1916 was to be continued indefinitely. In 1917, Great Britain and Ireland, as well as Gibraltar, had daylight saving from 8 April to 17 September, four weeks longer than in 1916. A further two weeks were added at the start and two at the end in 1918, with the summer time period running from 24 March to 30 September.

Germany also reviewed its position on daylight saving. Government and newspaper inquiries found that the public was generally supportive of it continuing. Outdoor recreation benefits and fuel savings were noted. People in regional and rural areas felt annoyed by it and often ignored it. Concerns were raised by farmers and mothers of school children. The Berlin Chamber of Commerce concluded that daylight saving was a great success in 1916, urging its continuation in 1917 and for it to start earlier,

although no mention was made of energy savings to help fight the war as a reason for the measure:

Positive views have been expressed as to the value of extending the afternoon hours and thereby providing for the recreation and the benefit of being in the fresh air, resulting in improved conditions of health and in no way shortening the hours of sleep. Workmen go to bed one hour earlier. Consequently the probability of the summer period having a harmful influence on the industrial safety need not be discussed. The Chamber of Commerce recommends most earnestly the retention of the summer period, and holds that it is most important that in the future, instead of May, the period should be fixed in the early part of April.³⁴

Daylight saving continued in Germany in 1917 but with a start date of 16 April, two weeks earlier than in 1916. However, the end date was also two weeks earlier, finishing on 17 September. A similar period of daylight saving was implemented in Germany in 1918.

Favourable news on daylight saving also came out of Austria-Hungary. US consul general to Vienna, Albert Halstead, reported that:

Daylight saving was a great success in Austria-Hungary last summer; that it proved most beneficial to the health of the residents of Vienna, owing to the extra hour of sunlight in working hours, and that it also did much to save lighting expense. It is calculated ... that in the city of Vienna alone during the four summer months the people consumed 158,000,000 cubic feet less gas, thereby saving \$142,000. The city of Vienna required 14,000,000 cubic feet less gas for street lighting. ... the plan will be resumed in Austria-Hungary next April.³⁵

Austria-Hungary had daylight saving in both 1917 and 1918, using the same dates as Germany. In 1918, the union initially decided on 7 March to add two weeks at both start and end of its summer time, extending the period from the first Monday in April to the last Monday in September. The decision was soon reversed and the same dates were used as its ally.

In France, the 1916 summer time trial resulted in savings of one ton of coal a month for each 1,000 residents and usage of electric lighting was down 15 per cent. Chambers of commerce around the country urged that the measure be continued in 1917. The French government was keen for it to be used again too, wanting it to start on 15 February while still winter, but the daylight saving bill hadn't yet been passed by parliament. That would happen on 19 March with a vote of 291 to 177 in favour of the bill. Daylight saving in France in 1917 ran from 24 March to 8 October, or five weeks longer than Britain and six weeks longer than Germany. In 1918, the French added a further two weeks at the start of their summer time period. France saved an estimated 100 million francs (or about US\$20 million or £4 million) in lighting and fuel over the two years.

³⁴ Quote no longer on web, although part of it is in *Seize the Daylight: The Curious and Contentious Story of Daylight Saving Time*, David Prerau, Thunder's Mouth Press, New York, NY, United States, 2005, p. 69, at <https://books.google.com.au/books?isbn=078673695X>

³⁵ "Elmira merchants favor daylight savings plan", *Elmira Star-Gazette*, New York State, United States, 11 January 1917, p. 15, at <http://fultonhistory.com/Newspapers%2023/Elmira%20%20NY%20Star%20Gazette/Elmira%20NY%20Star%20Gazette%201917/Elmira%20NY%20Star%20Gazette%201917%20-%2000130.pdf>

The Scandinavian countries discontinued daylight saving time after 1916 due to their high latitudes and long, light evenings. In Norway's capital city Oslo, for example, sunset in late June under standard time was around 9:45 p.m. with civil twilight extending to about 11:30 p.m.

Several other European countries had daylight saving during World War I but not until after 1916. Iceland first used the scheme on 19 February 1917 although the reason isn't clear. The country wasn't involved in the war and was then part of Denmark, which had abandoned daylight saving after 1916. Its high latitude also meant few advantages in putting clocks forward. Further, standard time of GMT-1 put capital city Reykjavik nearly half an hour ahead of local time. Around the summer solstice, the sun at the capital disappears for less than three hours a day. With daylight saving, sunset in late June was just after midnight and sunrise just before 3 a.m. Nevertheless, Iceland had daylight saving for eight months in 1917 and nine months in 1918.

Spain was also neutral during the war but suffered an economic crisis throughout this period with rising inflation and worsening food shortages. Some sources say daylight saving was introduced in 1917 to conserve coal and be on the same time as France, but others state that Spain didn't adopt the measure until 1918. The country first had summer time officially in that year when a royal decree of 5 April set dates of 15 April to 6 October.

Although it was no longer directly involved in the war by 1917, Russia had taken a heavy toll with great loss of life and its economy near collapse, largely prompting the Russian Revolution. Despite the country still being on local time, Russia took up daylight saving on 1 July 1917 but it might not have extended much beyond the Moscow area. The changeover in Moscow took clocks from GMT+2:31, which was the city's local mean time, to GMT+3:31. Daylight saving ended on 28 December, the middle of winter. In the following year, the scheme was used again but time went forward two hours instead of one, on 31 May, before going back an hour on 16 September. Daylight saving continued uninterrupted over the winter months and an hour was added on 31 May 1919. Russia was the first country to use two hours of daylight saving and the first where the measure was continuous from one summer to the next. No other country used either of these initiatives until a lot later.

The Germans moved into Latvia and Estonia in late 1917 and the entire countries were occupied by February and March 1918. Both had to use the same period of daylight saving as Germany, from 15 April to 16 September. Estonia was moved from local time to GMT+1 on 1 February, 39 minutes behind sun time in capital city Tallinn. Daylight saving then shifted it to GMT+2 or 21 minutes ahead of local time. Latvia hadn't advanced to standard time and one hour was simply added to capital city Riga's local mean time of GMT+1:36.

A number of European nations didn't have daylight saving during the war, including Finland and Switzerland as well as Bulgaria, Greece and some other eastern European countries. Finland was still on local time when Germany invaded it in April 1918 but daylight saving wasn't imposed on it. Switzerland was officially neutral but there was friction between German and French speaking groups. Its standard time, GMT+1, was

already about half an hour ahead of mean solar time. Bulgaria was one of the Central Powers in the war but didn't have daylight saving, although standard time was nearly half an hour ahead of local time in capital city Sofia. Greece entered the war late and was on the Allies' side. It first adopted standard time in July 1916, GMT+2, which meant that clocks in Athens went ahead by about 25 minutes, but the country didn't have daylight saving time until much later.

The following table shows the countries that had daylight saving time during World War I. Nations on other continents are shown for completeness and these are looked at in detail in other parts of the book. For more, see the Appendix.

Countries on daylight saving time during World War I

| Country* | WWI year | | | When first used |
|------------------------------|----------|------|------|--|
| | 1916 | 1917 | 1918 | |
| Europe | | | | |
| Austria | ✓ | ✓ | ✓ | 1916, April 30th, 11 p.m., a Sunday |
| Belgium | ✓ | ✓ | ✓ | 1916, May 1st, 12 a.m., a Monday |
| Czech Republic | ✓ | ✓ | ✓ | 1916, April 30th, 11 p.m., a Sunday |
| Denmark | ✓ | | | 1916, May 14th, 11 p.m., a Sunday |
| Estonia | | | ✓ | 1918, April 15th, 2 a.m., a Monday |
| France | ✓ | ✓ | ✓ | 1916, June 14th, 11 p.m., a Wednesday |
| Germany | ✓ | ✓ | ✓ | 1916, April 30th, 11 p.m., a Sunday |
| Gibraltar | ✓ | ✓ | ✓ | 1916, May 21st, 2 a.m., a Sunday |
| Hungary | ✓ | ✓ | ✓ | 1916, April 30th, 11 p.m., a Sunday |
| Iceland | | ✓ | ✓ | 1917, February 19th, 11 p.m., a Monday |
| Ireland | ✓ | ✓ | ✓ | 1916, May 21st, 2 a.m., a Sunday |
| Italy | ✓ | ✓ | ✓ | 1916, June 4th, 12 a.m., a Sunday |
| Latvia | | | ✓ | 1918, April 15th, 2 a.m., a Monday |
| Luxembourg | ✓ | ✓ | ✓ | 1916, May 14th, 11 p.m., a Sunday |
| Malta | ✓ | ✓ | ✓ | 1916, June 4th, 12 a.m., a Sunday |
| Monaco | ✓ | ✓ | ✓ | 1916, June 14th, 11 p.m., a Wednesday |
| Netherlands | ✓ | ✓ | ✓ | 1916, May 1st, 12 a.m., a Monday |
| Norway | ✓ | | | 1916, May 22nd, 1 a.m., a Monday |
| Poland | ✓ | ✓ | ✓ | 1916, April 30th, 11 p.m., a Sunday |
| Portugal | ✓ | ✓ | ✓ | 1916, June 17th, 11 p.m., a Saturday |
| Russia – Moscow | | ✓ | ✓ | 1917, July 1st, 11 p.m., a Sunday |
| Kaliningrad | ✓ | ✓ | ✓ | 1916, April 30th, 11 p.m., a Sunday |
| San Marino | ✓ | ✓ | ✓ | 1916, June 4th, 12 a.m., a Sunday |
| Slovakia | ✓ | ✓ | ✓ | 1916, April 30th, 11 p.m., a Sunday |
| Spain | | ✓ | ✓ | 1917, May 5th, 11 p.m., a Saturday |
| Sweden | ✓ | | | 1916, May 14th, 11 p.m., a Sunday |
| United Kingdom | ✓ | ✓ | ✓ | 1916, May 21st, 2 a.m., a Sunday |
| Vatican City | ✓ | ✓ | ✓ | 1916, June 4th, 12 a.m., a Sunday |
| North America | | | | |
| Belize ^a | | | ✓ | 1918, October 6th, 12 a.m., a Sunday |
| Canada ^b – Ottawa | | | ✓ | 1918, April 14th, 2 a.m., a Sunday |
| Charlottetown | ✓ | | ✓ | 1916, April 1st, 12 a.m., a Saturday |
| Halifax | ✓ | | ✓ | 1916, April 1st, 12 a.m., a Saturday |
| Regina | ✓ | ✓ | ✓ | 1914, April 27th?, 12 a.m., a Monday |
| Winnipeg | ✓ | | ✓ | 1916, April 23rd, 12 a.m., a Sunday |
| Newfoundland ^c | | ✓ | ✓ | 1917, June 24th, 2 a.m., a Sunday |
| United States | | | ✓ | 1918, March 31st, 2 a.m., a Sunday |
| Oceania | | | | |
| Australia ^d | | ✓ | | 1917, January 1st, 2 a.m., a Monday |
| Tasmania ^e | ✓ | ✓ | ✓ | 1916, October 1st, 2 a.m., a Sunday |
| Asia | | | | |
| Turkey | ✓ | | | 1916, May 1st, 12 a.m., a Monday |
| Africa | | | | |

| Country* | WWI year | | | When first used |
|---------------------------------|----------|------|------|---------------------------------------|
| | 1916 | 1917 | 1918 | |
| Algeria | ✓ | ✓ | ✓ | 1916, June 14th, 11 p.m., a Wednesday |
| Morocco (Tangier ^f) | | ✓ | ✓ | ?1917, May 5th, 11 p.m., a Saturday |

* current names

^a 1918-19.

^b Most of Canada didn't have daylight saving until 1918. However, some places introduced it by local ordinance before it was used in Europe, including provincial capitals and these are shown in the table.

^c Newfoundland was a separate country until 1949 when it became part of Canada. Date daylight saving first started is approximate. Bill was enacted on 17 June 1917. Capital city St. John's started daylight saving on 8 April at 2 a.m.

^d Daylight saving was first used on mainland Australia on 1 January 1917. Tasmania had it from 1 October 1916.

^e 1916-17, 1917-18 and 1918-19.

^f Tangier, Morocco probably had daylight saving in 1917 and 1918, perhaps with the same times as Spain.

Sources: Time and Date AS, at <https://www.timeanddate.com>; Horloge Parlante, at <http://www.horlogeparlante.com>; and other sites

In March 1918, as the war dragged on, Germany began a major new attack against British and French troops and made good progress, but the Allies, now bolstered by United States forces, pushed the Germans right back by July. Germany was suffering internally too, with antiwar marches, low morale within the army, and industrial output down 53 per cent since 1913. Counter-offensives launched by the Allies in August soon had them winning on all fronts. One by one, the Central Powers collapsed: Bulgaria, then the Ottoman Empire, the Austro-Hungarian Empire and finally the German Empire. In Germany, a republic was declared on 9 November 1918, marking the end of the monarchy. The Kaiser, Wilhelm II, fled to the Netherlands next day. On Monday 11 November 1918 at 11 a.m., in a train carriage at Compiègne, France, an armistice was signed with Germany. The Great War, which had claimed 20 million lives and left countless others physically and mentally scarred, was over.

As hundreds of millions of people proceeded to try and get their lives back in order, one seemingly minor issue they would need to sort out was daylight saving time. Just before war's end, Europe and North America had returned to standard time for the 1918-19 winter. Conserving fuel, the main reason for daylight saving during the war, was now less imperative. It remained to be seen whether farmers, the railways and other opponents of the scheme, or businesses and participants in sport and other outdoor activities after work, would win through in the daylight saving battle in the postwar period and beyond.

7 United Kingdom sticks with daylight saving

When World War I ended, the United Kingdom had already been back on standard time for six weeks, with daylight saving for 1918 finishing on 30 September. Most of the public seemed to favour continuing the scheme and the British Parliament decided to set the period each year under the Summer Time Act 1916, a wartime emergency Act that hadn't been repealed. There were ongoing protests from the agricultural sector, but the government considered that the benefits of daylight saving time to the community as a whole outweighed the disadvantages.

In August 1919, the government indicated its intention to propose legislation making daylight saving permanent. Nearly two years later on 28 June 1921, a daylight saving bill was read a second time in the House of Commons but went no further. Later in the year, the government held a conference with France and Belgium to try and agree to common dates for daylight saving. Agreement was reached for summer time to run from the last week in March to the first week in October.

A Summer Time Bill for permanent daylight saving was debated in the House of Lords in March 1922. Two objections were addressed: the alleged adverse effect of summer time on school children and the dislike of the scheme in rural areas. The Board of Education had asked all 299 local education authorities for feedback on daylight saving in 1921. Main benefits for children were that classes started earlier in the cool and they had more time after school for outdoor exercise. A major disadvantage was children not wanting to go to bed in the light. Overall, 61 per cent of the authorities wanted the measure to continue, 30 per cent wanted it stopped and 9 per cent were uncertain. Farmers continued to complain that they worked by the sun and couldn't change their schedules just because the clock showed a different time.

Clause 3 of the bill stated the proposed period of daylight saving. Instead of simply saying that summer time should run from 2 a.m. on the last Sunday in March (or if this is Easter, the previous Sunday) to 2 a.m. on the first Sunday in October, it said:

For the purposes of this Act the period of summer time shall be taken to be the period beginning at two o'clock, Greenwich mean time, in the morning of the day next following the last Saturday in March, or, if that day is Easter Day, the day next following the last Saturday but one in March, and ending at two o'clock, Greenwich mean time, in the morning of the day next following the first Saturday in October.³⁶

On behalf of Lord Bledisloe, the Marquess of Crewe wanted to replace October with September, arguing that dew is heavy in the northern areas by the later month and harvesting would be delayed an hour and the men idle. He was also concerned that new milking hours at dairy farms wouldn't be coordinated with train timetables. The Earl of Onslow pointed out that agreement on dates had already been reached with France and Belgium. A vote of 83 to 19 kept October as the end month of the summer time period and the bill was passed by the Lords on 22 March.

³⁶ Parliament of the United Kingdom, *Hansard*, House of Lords, 14 March 1922, at <http://hansard.millbanksystems.com/lords/1922/mar/14/summer-time-bill-hl>

The bill was delayed in the Commons and summer time dates for 1922 were set by an order in council under the Summer Time Act 1916, whose powers had been extended by the War Emergency Laws (Continuance) Act 1920, but was due to expire in August 1922. If the United Kingdom was to have daylight saving in 1923, a new summer time Act would need to be sorted out. Lengthy debate on the bill took place in the Commons on 14 June 1922, much of it revolving around the concerns of the agricultural sector and also the effects on school children and other issues.

Nevertheless, the bill was finally passed on 7 July and became the Summer Time Act 1922 on 20 July. Start and end dates for daylight saving were in accordance with those of France and Belgium. Due to pressure from agricultural interests, those dates only lasted a year before the countries were on different times again. The Summer Time Act expired on 31 December and daylight saving was renewed each year under the Expiring Laws Continuance Act 1923. In that year, Britain started daylight saving much later, on 22 April, and finished it a lot earlier, on 16 September. France didn't start until 26 May after initially planning to abandon daylight saving altogether. Belgium was also late starting, winding clocks forward on 21 April.

Doctors came out in support of daylight saving. The British Medical Association passed a resolution in 1923 that the scheme "is beneficial to the health of the nation". Similarly, the Society of Medical Officers of Health concluded that British Summer Time was "a great benefit to the community as a whole, and can find no sufficient evidence to support the view that it must prove detrimental to the health of infants and young persons". The society reiterated this view in 1923 and 1924.

In March 1924, a conference held in Paris between the United Kingdom, France, Belgium and the Netherlands settled on common daylight saving time dates, starting on the first Sunday in April, but allowing for Easter as previously, and ending on the first Sunday in October. This period was the same as the one agreed to by the first three countries in 1921, except the start date was now a week later. A UK bill was introduced to accord with the agreement but the farming community was strongly opposed and the bill was killed. Over the next few years, the parties to the agreement seemed to find it much easier to keep to the end date than the start date, which was usually late in April. The countries continued to try and get uniformity of daylight saving times.

Another bill for permanent summer time was introduced into the House of Commons in February 1925 and was debated for five hours on 13 March. Farmers remained opposed to the scheme, as did most miners. Views on the effects on children were mixed. The entertainment sector, especially the theatre industry, was opposed to summer time as people stayed outside rather than attend an indoor show. Newspapers were also against it. Town and city workers in offices, shops, manufacturing and construction, and people who enjoyed outdoor activities later in the day, tended to support daylight saving. Health benefits were put forward by various individuals and groups. On a geographic basis, the further north, the more the residents disliked the idea. There were suggestions that Scotland should be exempt. Nearly 500 local government bodies, including 52 Scottish burghs, as well as 260 trading organisations and many sporting groups came out in support of permanent daylight saving in the United Kingdom.

Members were given a free vote and the bill passed the second reading. The start date was altered from the first Sunday in April to the third week to appease the farmers. The bill went through the committee and report stages and eventually onto the Lords, where some of them wanted daylight saving to finish in September rather than October but this suggestion was defeated by 57 votes to 8. The bill was passed and became the Summer Time Act 1925 on 7 August.

The United Kingdom had daylight saving from 18 April to 3 October in 1926 in accordance with the Act, and summer time in France and Belgium was for virtually the same period. The Netherlands, which had been using start dates that varied from March to June, locked in 15 May regardless of which day of the week it fell on. Britain kept using the third weekend in April through the rest of the 1920s and the 1930s, or if that was Easter, summer time would start on the second weekend. France mainly coincided with the United Kingdom until 1931 and then used various start dates in March or April. Belgium followed France. All four countries consistently ended daylight saving time on the first weekend in October. In the early 1930s, the summer time policy was saving Britain an estimated £25 million a year in gas and electric lighting.

Most people in the United Kingdom seemed happy to put the clocks on in the warmer, lighter months and to do it for about five and a half to six months each year. The main exception was most farmers and perhaps most of the other residents in country areas. This pattern of daylight saving, and indeed people's lives, was about to be turned upside down again by another world war.

Adolf Hitler became German chancellor in 1933 and embarked on policies of racism, rearmament and territorial expansion. Germany annexed Austria in March 1938 and much of Czechoslovakia in October followed by its capital Prague in March 1939. Various agreements were broken and the League of Nations reacted weakly to the aggression with an update. Britain and France drew up an alliance with Poland over the 1939 summer. Germany invaded Poland on 1 September, which was the trigger for what would become known as World War II, with the United Kingdom and France declaring war on Germany two days later.

The United Kingdom was still on daylight saving time, as were the European countries that used it. In the House of Commons on 6 September, home secretary John Anderson was asked whether British Summer Time might extend beyond the first weekend in October so people could get home before nightfall and use less electricity in the evening. He was also asked if traders should be encouraged to open and close earlier to further save energy. Anderson was in favour of businesses and workers starting and finishing early to save fuel, but pointed out that the Summer Time Act 1925 had already delayed the end date of daylight saving by two weeks, incurring the wrath of the agricultural sector. He would, however, consider a further extension given the situation on the Continent.

After consultation with various groups, the home secretary announced that the government would, under the Emergency Powers Act 1920, push the 1939 end date of daylight saving out to 19 November, little more than a month before the shortest day. The Medway Chamber of Commerce, centred on the city of Chatham to the east of London, urged year round daylight saving for the duration of the war. Anderson didn't

seem particularly keen on such a move, noting that the start of the working day would be dark for many people.

Members pressured Anderson to bring forward the start of daylight saving in 1940 to mid February. There was also talk of advancing clocks another hour in midsummer. One reason given was that traffic accidents would be reduced as the evening blackout would start much later when fewer cars were on the roads. Again, he wasn't interested in such a proposition, stating that he didn't know "of any reason for modifying the view which has hitherto been accepted that the inconveniences of a second change in the clock would outweigh any advantages".

In the end, summer time in 1940 began on 25 February, nearly two months earlier than usual. By September, the plan was for daylight saving to finish on 17 November rather than early October. But on 24 October, new home secretary Herbert Morrison stated in the House that the summer time schedule would be extended through the winter of 1940-41.

With the war situation worsening, the feasibility of having an extra hour of daylight saving time in the summer of 1941 was examined by the government. The National Farmers' Union and other agricultural interests objected to any further extension to summer time as they felt this would seriously affect food production. Nevertheless, the home secretary announced on 4 March that the government proposed putting clocks forward two hours that summer from 4 May. Sunrise in London of around 6:30 a.m. would still be fairly early. Sunset of around 9:30 p.m. would mean civil twilight until after 10 p.m. In late June, sunrise would be at about 5:45 a.m. and sunset 10:20 p.m. with twilight lasting to 11:10 p.m. There would be little need for artificial light in the evening, leaving plenty of energy for use in war industries. Normal daylight saving would resume on 10 August. If clocks continued two hours ahead, sunrise by end of that month would be roughly 7:10 a.m. and the nightly blackout wouldn't finish before about 6:40 a.m. when many people were up and getting ready to go to work.

Mavis Tate of the governing Conservative Party and member for Frome in rural Somerset was alarmed at the government's decision to have two hours of daylight saving, believing it would be disastrous for the country's food and milk supplies, especially with imports having to be cut. She was worried that farmers who milked their cows at 4 p.m. would have to do so two hours earlier real time in order to get the produce onto trains and off to markets. Cows would have to be milked in the warmest part of the day when the quantity and quality of milk was less than optimal, which could affect the nation's health. She was also concerned about threshing and haymaking times, longer overall hours for farmhands and farmers, and the increase in costs and prices. She declared that:

The whole stamina of the nation may yet be the deciding factor in victory or defeat, and, if it is found that this step has a deleterious effect on the production of food, I most sincerely hope that those industrial interests which believe they are going to gain by this Regulation may realise, as they have not realised in the past, that their interests and

farming interests are really one and the same, absolutely indivisible, not opposed to each other, as unhappily they have so often believed in the past they were.³⁷

By contrast, Ellis Smith, member for Stoke-on-Trent, Stoke, Staffordshire, an industrial area in England's Midlands, welcomed the initiative. He believed the new time would be good for factory employees across the country who worked all day including overtime and weekends, and that they "will, after travelling many miles from their factories to their homes, be able to have some relaxation by spending a short time in their gardens, in their parks or on the bowling greens".

Herbert Morrison recognised the disadvantages for agriculture and read a letter from the Farmers' Union explaining, among other things, that a cowman who normally started at 5 a.m. would have to begin at 4 a.m. with ordinary daylight saving time and at 3 a.m. when clocks were two hours ahead if he was to get the milk to the train on time. But the home secretary was unmoved by the pleas from farmers, believing that most of the community supported the government's proposal for an extra hour of daylight saving in the midsummer. He proceeded to outline what he saw as the advantages of "double summer time" as he called it, possibly the first use of the term and one that would stick in daylight saving parlance:

- ☀ Dock work will be done quicker with more daylight working hours, enabling a faster turnaround of ships.
- ☀ Conditions on the roads will improve as traffic will be more spread.
- ☀ Freight wagons can be loaded and moved to marshalling yards to be assembled into trains all before nightfall.
- ☀ Less electricity and gas will be used for lighting.
- ☀ Two daylight working shifts may be possible.
- ☀ Morale and happiness of the public would be expected to be higher due to more daylight late in the day.

In the end, farmers did get something in their favour. On 10 April 1941, the agriculture minister Robert Hudson advised that the farm working day would be based on the usual daylight saving arrangement of time being one hour ahead rather than two. An order in council was put in place to allow the exception although he made it clear that a farmer and his employees could agree to operate on double summer time. The result was that some farms were two hours ahead, others one hour, and towns and villages two. Most farm workers lived in nearby villages.

Daylight saving was continuous for a second winter in 1941-42. A Defence (Summer Time) Regulation set the double summer time period as the first weekend in April to the second weekend in August. The start date in 1942 was a month sooner than the previous year but the end date was similar. Several members wanted a later end date but others wanted an earlier one. Agricultural bodies kept pushing for a shorter term of double daylight saving or, better still to them, abolishing it altogether. Assheton Pownall, member for Lewisham East, London, commented facetiously: "As we have already advanced the clock two hours in a relatively few years, how long will it be before we advance it a further 10 hours, so that all our watches will point out the right time?"

³⁷ Parliament of the United Kingdom, *Hansard*, House of Commons, 4 March 1941, at <http://hansard.millbanksystems.com/commons/1941/mar/04/summer-time-extension-1>

Despite objections from rural and some industrial groups to double summer time, the period was lengthened in 1944 under a new Defence Regulation to finish on 17 September, after the end of the entire harvesting season. The extension was due to the operational needs of British armed forces on the Continent and the flying bomb. Morrison did seem to be sympathetic to agriculturalists though. When Edgar Granville, member for Eye, Suffolk, asked the secretary of state if he was aware that East Anglia farmers called double summer time “foreign time” and the old time “real time”, Morrison said: “That comforts me very much.”

Two hours of daylight saving probably reduced bicycle rider fatalities. In a lengthy session in the Commons on 22 February 1945 on whether a red rear light on bicycles reduced deaths of cyclists, some members were convinced it did make a difference while others were equally sure that it didn't and that bikes were seen well enough in car headlights. One member, Alexander Walkden of Bristol South, referred to a 1944 study by the Royal Society for the Prevention of Accidents that showed a reduction in cyclist deaths at night since a regulation in mid 1941 enforcing riders to have a rear light on their bike although a large number didn't abide by it. Before the requirement, 360 cyclists were killed at night in 1939-40 and 393 in 1940-41. With the law in place, 260 died in 1941-42, 282 in 1942-43 and 283 in 1943-44. But with double summer time each year from May 1941, there would have been fewer cyclists riding home after dark and fewer motorists to run into them. By the way, after a two and a half hour debate, members voted 132 to 24 that the law on a rear light be retained.

Double summer time in 1945 started once again in the first week of April, on the Monday rather than Sunday as it was Easter. The end date was scheduled earlier than usual, on 15 July, before most of the harvesting. Agricultural interests were relieved that the government had at last taken notice of their struggle to get food and milk on the tables of nearly 50 million people quickly and cheaply. Farmers were glad to have that extra hour at an important time of year for them. Not everyone was happy, such as some who worried about the fuel shortage. Herbert Morrison assured William Snadden, member for Kinross and West Perthshire, Scotland, that once the war was over, the Emergency Powers Act 1920 would no longer apply and double daylight saving would need further legislation.

The decision to finish double summer time early was made easier by the imminent end of the European war that had dragged on for five and a half years. The tide had steadily turned against the Axis powers and in favour of the Allies from 1943 onwards. Germany was losing battles along the Eastern Front and the Allies went into Italy. In 1944, the Western Allies chased the Germans out of France and the Soviet Union invaded Germany. The Allies captured Berlin by May 1945. Some 50 million people had lost their lives, plus 25 million in the Pacific War.

After continuous summer time since February 1940, including five periods of double summer time, the United Kingdom returned to standard time on 7 October 1945. The move was in line with the prewar policy of daylight saving finishing on the first weekend of October under the Summer Time Act 1925.

At least one politician, George Walker, member for Rossendale in England's north, wanted daylight saving to continue in the winter months. He was concerned that

children in country areas wouldn't otherwise get home before dark. New home secretary James Ede said he had to weigh that up with other considerations such as people heading off for the day in darkness. Sunset in nearby Blackburn in mid December is at 3:50 p.m. An hour of daylight saving would take it to 4:50 p.m. but such a move would mean sunrise at 9:20 a.m. and just about everyone would be going to school or work in the dark or semi-light.

The year 1946 was the first one of normal summer time in the United Kingdom since 1938, with clocks advanced one hour between the second weekend of April and first weekend of October. But after one year of returning to the customary pattern of daylight saving, this arrangement would be broken in the following year due to another coal crisis.

Coal was vital to the economy and people's wellbeing, and after the fuel shortage during the war, Britain's new Labour government decided to nationalise the industry. The National Coal Board was formed in July 1946 and acquired the country's 800 coal mining companies. The National Union of Mineworkers came up with some optimistic coal production forecasts, which fuel and power minister Emanuel Shinwell seemed happy with. He hoped for a mild winter to help ease in the industry's shift to public ownership.

But Britain perhaps picked the wrong time to nationalise its coal industry. Supplies were still low from wartime with a four week stock in late 1946 compared with the normal 12 weeks prewar. The situation was made worse by one of the country's harshest winters ever in 1946-47, including the coldest February since records began in 1659. Heavy snowfall blocked roads and rail lines. Some 750,000 coal wagons were idle as 100,000 troops, including German prisoners of war, cleared snow from tracks although stockpiles of coal froze and couldn't be moved anyway. Many power stations had to shut due to lack of fuel. Electricity to residences was cut for five hours a day and business and industry sometimes had no power. Firms had to close and four million men were on the dole. Parliament, Buckingham Palace and the electricity board were on candlelight. Shinwell became an unpopular figure and the subject of a bomb threat. A record wet March was exacerbated by melting snow causing some of the worst floods ever. Fears of a food shortage led to stricter rationing than during the war.³⁸

Given the fuel crisis, questions were asked in parliament about a possible early reintroduction of summer time and double summer time. Daylight saving during the war had reduced coal consumption by 70,000 tons a year. The government announced on 26 February 1947 that normal daylight saving would be extended by a month at both start and end and an extra hour would be added for four months in the middle of the period. A new Summer Time Bill to amend the Summer Time Act 1925 was brought into the House next day. The bill was given priority in both houses and the Summer Time Act 1947 was assented to on 11 March. The National Farmers' Union reluctantly accepted the measure although the Scottish branch objected to it as did the Northern Ireland Parliament.

³⁸ The National Archives, Met Office, *Great Weather Events: The winter of 1946/47*, at <http://webarchive.nationalarchives.gov.uk/+/http://www.metoffice.gov.uk/corporate/pressoffice/anniversary/winter1946-47.html>

With ongoing recovery from the war and the previous year's bad weather, a similar term of daylight saving in 1948 was arranged by order in council under the Summer Time Act 1947, starting on 14 March and finishing on 31 October. Farmers were grateful the government didn't impose double summer time that year although they made it clear they would have been happier with the shorter span of daylight saving under the 1925 Act.

The period of British Summer Time was reduced in 1949, starting three weeks later but finishing on the same weekend as the previous year. William Snadden asked the secretary of state if he realised that allowing daylight saving to run until the end of October "will impose a very severe handicap on Scottish producers because of our damp climate?" William Gallacher, member for Fife Western, quipped: "If Summer Time is to apply to Scotland, will the Minister be good enough to see that we get some summer along with Summer Time?" James Ede didn't have an answer to the last question.

Daylight saving started a further two weeks later in 1950, on 16 April, and finally back to the prewar arrangement. But the end date was still in late October. People in rural areas wanted summer time to at least return to what they had been used to before the war if they couldn't get rid of the scheme altogether. A coal shortage persisted in the United Kingdom and power restrictions remained in place. The government felt that the extra few weeks of summer time in October would help save fuel. James Stuart, member for northern Scotland seat Moray and Nairn, had no time for fiddling with the clocks:

I always think it is rather foolish that the human race should have invented clever devices for time-keeping, and then, having worked them effectively for so many years, should now resort to these new devices, fooling ourselves, by legislation, that the time is not what it ought to be. As we all know, neither the animals nor the sun descend to these devices. I often think that if the cow could speak to us, she would tell us how stupid we appear to be, looked at from her tranquil point of view.³⁹

Stuart and country people in general would be slightly happier in 1953. Eight years after the end of World War II, the United Kingdom returned to the summer time period of about five and a half months that was in place in the late 1920s and the 1930s. But some people wanted the end date pushed back to late October again, worried about the current "curtailment of sunshine, fresh air and exercise for millions of people", in the words of member Richard Pilkington. And Albert Hunter spoke of "overwhelming public opinion" for a longer term of daylight saving. Others desired a return to double summer time. Seaside resorts wanted extra daylight saving.

By contrast, the National Farmers' Union of England and Wales and that of Scotland in February 1959 officially opposed any move to extend summer time although opinions of individual members of the former were quite even. Hunter said he had received letters from farmers across the country saying daylight saving would help rather than hinder them.

³⁹ Parliament of the United Kingdom, *Hansard*, House of Commons, 24 March 1950, at <http://hansard.millbanksystems.com/commons/1950/mar/24/summer-time>

With such a mix of views, the government was reluctant to consider any extension to the existing period. Later in the year, the English farmers' union seemed to soften its attitude somewhat and would relent if the government thought that extending daylight saving a few more weeks in October was in the national interest. This change in the farmers' position provided the government with the catalyst to conduct an inquiry into summer time and ask representatives of agriculture, industry and commerce, workers, education and local government their views on the scheme and whether it should be lengthened. A questionnaire was sent to 178 organisations in December 1959 asking:

- ☼ Should there be any change?
- ☼ Should there be an extension of summer time in the autumn?
- ☼ Should there be an extension of summer time in the spring and autumn?
- ☼ Should we adopt the Mid-European Time all the year round? (or in other words have British Summer Time all year).

Results of the Attitude Survey were available in late 1960 and a decision was able to be made about summer time for the following year. About two-thirds of the institutions preferred more daylight saving than the current period, with over 40 per cent wanting it all year or nearly half of those who responded. Surprisingly, only eight of the 178 bodies favoured extra daylight saving in autumn only and this was the option raised far more times in parliament than any other. Here's a summary of the responses to the survey:

- ☼ 41.6 per cent wanted summer time all year
- ☼ 21.3 per cent favoured more daylight saving in autumn and spring
- ☼ 4.5 per cent supported an extension in autumn only
- ☼ 14.6 per cent liked the present period of daylight saving
- ☼ 9.0 per cent of responses couldn't be classified into one of the four categories above
- ☼ 9.0 per cent didn't reply.

Individual organisations, most or all of whom consulted their membership, gave varied answers, as shown in the next table.

Known responses to summer time Attitude Survey, United Kingdom, 1960

| <i>Name</i> | <i>All year</i> | <i>Autumn & spring</i> | <i>Autumn only</i> | <i>No change</i> |
|---|---------------------|----------------------------|--------------------|------------------|
| | — choice (ranked) — | | | |
| National Farmers' Union of England and Wales | | | 1st | 2nd |
| National Farmers' Union of Scotland | | | | 1st |
| National Union of Agricultural Workers | | | | 1st |
| British Employers' Confederation | =1st | =1st | | |
| Association of British Chambers of Commerce | 1st | | | |
| Trades Union Congress | 1st | 3rd | | 2nd |
| National Union of Teachers | | 1st | | |
| Joint Committee of the Four Secondary Associations* | | 1st | | |
| Rural District Councils Association | 1st | | | |
| Urban District Councils Association | | 1st | | |
| County Councils Association | | | 1st | |
| Association of Municipal Corporations (%) | 35.6 | 25.7 | 8.9 | 19.3 |
| All 178 organisations (%) | 41.6 | 21.3 | 4.5 | 14.6 |

* Associations of Head Masters, Head Mistresses, Assistant Masters and Assistant Mistresses
 Source: Government's summer time Attitude Survey, United Kingdom, 1960, as reported in parliamentary records

Based on the results of the organisations in the table, the farm sector wanted no change to the present summer time schedule. The National Farmers' Union of England and Wales said it would tolerate a moderate addition in autumn but noted that many members asked that things stay the same. On the other hand, the business sector and trade unions supported year round summer time although not the coal and electricity industries. Teachers favoured extra daylight saving in both autumn and spring. Local government had a mixture of preferences.

Weighing up the wide range of responses, the government steered a middle path and decided to extend daylight saving by three weeks at both the start and the end of the summer time period. Business was reasonably happy but not so the workers. Twenty-one unions with 2.3 million members had chosen continuous summer time, 10 representing 2.2 million employees had opted for no change and 11 with 467,000 workers, or less than 10 per cent of the total of this group, had wanted more daylight saving in spring and autumn. Teachers were satisfied with the decision. Less impressed were the farmers and rural workers. The decision also took into account the wishes of holidaymakers, sports people and gardeners. Why the government didn't also conduct a sample survey of the general public isn't clear. Whether a majority of people would have wanted six extra weeks of daylight saving versus the status quo or some other option is therefore unknown.

In any case, clocks went forward an hour from the last weekend in March until the last one in October from 1961. The move wasn't permanent as an order in council was still needed each year. The relevant legislation remained the Summer Time Acts of 1922 and 1925, with the Summer Time Act 1947 providing a means of altering the period of daylight saving in any year.

People seemed happy with the thought of extended daylight saving time. Minister of state Dennis Vosper commented in April 1961: "The correspondence on the issue has certainly ceased, and I take that to be a sign of contentment." Letters of support or complaint remained very few through the rest of the year with less than a dozen received by the parliament. Times were less difficult than they were during the war and record cold 1946-47 winter, and with the weather fine, including in October, and people outdoors and enjoying life more, perhaps this contributed to the lack of comments either way. Another week was added to daylight saving in spring from 1964.

The question of harmonising British time with Europe came up again in parliament in 1963. Most of the Continent didn't have daylight saving at that time although many countries such as France, Belgium and the Netherlands were effectively on year round summer time with clocks 40-50 minutes ahead of the sun in their capital cities. The United Kingdom was on the same time as its European trading partners for seven months each year but was one hour behind in the other five months. Support for staying on GMT+1 all year was strong among business and workers as shown by the 1960 survey but not among the farming community or the education sector. By late December, sunrise wouldn't be until after 9 a.m. in London and around 9:45 a.m. in Edinburgh.

In general, the tide of opinion was thought to be moving in the direction of keeping the clocks forward. In October 1966, just before the end of daylight saving, a motion was introduced into the House of Commons to align with Western Europe all year:

That this House, recognising the success of the experimental extensions to the period of British Summer Time and that reversion to Greenwich Mean Time will unnecessarily hamper commercial communication with Europe, urges Her Majesty's Government to bring Great Britain into line with Europe by adopting British Summer Time, mid-European time, throughout the whole year.⁴⁰

Home secretary Roy Jenkins undertook a review into the matter in 1966 and 1967, consulting with 87 organisations in agriculture, industry, commerce, construction, energy, education, travel, health, sport, women's groups, local government, and other areas. He was able to report in March that the Trades Union Congress supported the proposal. The congress had been in favour of continuous daylight saving back in 1960. Jenkins finished his inquiry and was satisfied that shifting the United Kingdom's time zone to GMT+1 after the end of summer time in 1968 would be in the best interests of the country. An announcement to this effect was made on 22 June 1967.

There seemed to be little backlash to what would in effect be a move to ongoing daylight saving time. Even the Farmers' Union of Scotland more or less accepted the decision, with president Mr C Young stating: "We do not like it and we do not see the need for it, but we will put up with it if it is in the national interest." A public opinion poll found that 45 per cent of people approved of the government's proposal while 25 per cent didn't want any change and 27 per cent had no particular view.

Daylight saving in 1968 would commence on the earlier date of 18 February for several reasons. It would accustom people to the new time before a permanent change. Sunrise in London would be at about the same clock time, just after 8 a.m., as in late December. Sunset would be 6:20 p.m., after peak traffic, which should mean fewer road deaths and injuries. Clocks would then remain one hour ahead rather than being wound back in October.

A name was needed for the proposed new time arrangement as British Summer Time would no longer be appropriate. Home secretary James Callaghan called for suggestions from members, the media and the public as to what the new time should be called. He received over 100 different names, such as British European Time, British Standard Time, Central European Time, Mid-European Time, Western European Time, Churchill Time, Willett Time, Advance Time, Advanced Meridian Time, Civil Time, Common Time, Mean Civil Time, and Permanent Time. Names that included Greenwich were Advanced Greenwich Time, Greenwich Advanced Time, Greenwich Ante-Meridianal Time, Greenwich British Time, Greenwich Global Time, Greenwich Less One, Greenwich Mean Time Advanced, Greenwich Plus Time, Greenwich Time, New Greenwich Mean Time, and Plus Greenwich. Some novelty names included Orbitim, Orbitime, Orbitum, Same All the Year Round Time, Solar Plus, Solar Time, and Solextra.

⁴⁰ Parliament of the United Kingdom, *Hansard*, House of Commons, 23 March 1967, at http://hansard.millbanksystems.com/commons/1967/mar/23/business-of-the-house#S5CV0743P0_19670323_HOC_236

Two newspapers ran naming competitions and British Standard Time was selected by one paper as the most favoured choice by far. Callaghan agreed with it. The name was the standout choice in the government poll too, being more than five times as popular as the second favourite pick. In the House of Lords, 61 preferred British Standard Time to Advanced Greenwich Time and 49 favoured the latter. Greenwich Mean Time would be retained for astronomy, meteorology and navigation.

The British Standard Time Bill was introduced into the House of Lords in November 1967. Minister of state Lord Stonham stressed that the proposed change in time zone wasn't so much due to the United Kingdom trying to join the European Economic Community but to expected improvements in the overall economy after weighing up the advantages for productivity, energy, communication and transport with the disadvantages for agriculture and construction. On the social side were the greater opportunities for outdoor sport and other activities, the expected reduction in road accidents, relative safety for school children heading to school in the dark compared with walking home after nightfall, and not having to alter the clocks twice a year. After a lengthy debate, the bill passed the second reading by 49 votes to 13. Later it was read a third time and sent to the Commons where an even longer debate was followed by a 179 to 61 second reading vote at about 11 p.m.

The bill was eventually passed and became the British Standard Time Act 1968 on 26 July. Plenty of concerns remained, such as children in the north walking to school in the dark who would be encouraged to wear reflective armbands as well as vests and cuffs for visibility, especially as some local governments turned off street lighting at midnight. By May 1968, secretary of state for Scotland William Ross had received 114 representations from local councils, churches, agricultural and other organisations, private firms and individuals against moving permanently to GMT+1 and none in support of it. A few representations had been received by the Home Department from England, three from Wales and none from Northern Ireland by late in the year.

After more than 50 years of daylight saving, the United Kingdom abandoned the practice and instead shifted to GMT+1, which would be used 12 months of the year, initially as a three year trial from 27 October 1968. A month later, a bill to repeal the new Act, the British Standard Time Act (Repeal) Bill, was brought into the Commons by member Ronald Bell but to no avail. A Scottish public opinion poll in December found that 87 per cent of people didn't want British Standard Time. The large number of representations against the new time from Scotland continued into 1969.

A study by the National Federation of Building Trades Employers into the building industry in the 1968-69 winter months of November to January found that productivity was down and costs up. Just 26 of 540 firms with lit sites increased their production while 253 had a cut in output of up to 10 per cent and 75 lost a greater percentage. Results for firms operating unlit sites were even worse. Costs rose by 5-15 per cent at two-thirds of lit sites and by a larger percentage for unlit sites. Safety had improved for 25 firms but was worse at 64 of them.

Another bill to try and get rid of the new time, the British Standard Time (Abolition) Bill, was introduced by Joseph Godber on 26 November 1969. He wanted to stop the

standard time experiment after two years rather than three and return to the previous system of summer time for up to eight months a year and GMT for the remainder. The bill didn't pass the second reading.

There were wide variations in opinion polls on the time change. A survey in December 1969 showed that 50 per cent of people supported British Standard Time while 41 per cent wanted to return to the previous scheme. For England and Wales, the findings were 52 per cent and 39 per cent. In Scotland, 34 per cent liked the current set up and 61 per cent preferred the old one. A poll in February 1970 found that only 32 per cent of Britons favoured the new standard time and 56 per cent supported GMT with summer time. Just 13 per cent of farmers and 14 per cent of parents of school children were happy with the existing policy.

Around this time, a survey of local education authorities in England and Wales revealed that 62 per cent approved of British Standard Time and 24 per cent opposed it. However, in another survey, 15 per cent of Britain's building firms liked the current system and 70 per cent wanted the old one back. The construction industry calculated that British Standard Time added £30 million to its costs in the 1969-70 winter. Similarly, the National Farmers' Union estimated that the new time would add £15 million to the agricultural sector's overtime costs and £11 million to its electricity bills.

The Royal Society for the Prevention of Accidents and the government's Road (now Transport) Research Laboratory produced various statistics comparing periods before and after the change in time, mostly showing a decrease in accidents and casualties, including children in the hours 7-9 a.m. and 4-6 p.m. A number of politicians used assorted figures in their cases for or against clocks being forward all year.

In 1970, the government conducted a comprehensive review of the impact of British Standard Time in the 1968-69 and 1969-70 winters, including road accidents, the opinions of the public, and the effects on the groups perhaps hit hardest by the new time such as school children and the agricultural and building industries. A White Paper, "Review of British Standard Time", by the Home Office and the Scottish Home and Health Department was released on 28 October 1970.

The main part of the research was a social survey of a sample of nearly 7,000 respondents across the country. In the December 1969 wave, 50 per cent of people wanted British Standard Time to continue and 41 per cent liked the previous scheme. By late February 1970, when days had become considerably longer, the figures were virtually the same at 51 per cent and 39 per cent. In Scotland in December, only 34 per cent preferred the new time and 61 per cent the old. But by February, this had changed noticeably to 39 per cent and 47 per cent. Unskilled workers, outdoor workers, housewives, older people and late risers were opposed to year round GMT+1, whereas indoor workers, young people, early risers, most industry, tourism, sports groups, and the education sector favoured it.

In a debate on the review and future of British Standard Time in the House of Commons on 2 December 1970, several members queried the accuracy of the statistics and whether to trust sample surveys. One pointed out that percentage figures for regions didn't add up to totals, perhaps not realising that respondent numbers for

each region, Southeast, Northwest and Scotland, were weighted by population size. The same member also mentioned that component percentages sometimes added to 101 per cent, which would be due to rounding. No one in the House picked up on these comments. Indeed, one member gave their support later in the evening.

Accident statistics in the report appeared to support British Standard Time. Casualties were down 4 per cent in the United Kingdom, including 9 per cent in Scotland, between 1968-69 and 1969-70. Fatalities and serious casualties across the country were 12 per cent lower in the early morning and late afternoon. But there were other factors in play, such as an increasing use of seatbelts and other safety features as well as more breathalyser testing around this time, something the report did mention. Also, publicity might have made people more aware of the need to be careful. Overall, the number of fatalities and other injuries were declining from a peak in 1966 despite a steady increase in traffic, and they kept falling through the 1970s and beyond.

Other information showed that the new time didn't seem to impact on crime levels. Also, most local authorities weren't fussed about the position of the clock hands, with just 8 per cent supporting the change and 28 per cent favouring the previous set up. The electricity industry said it would save £100 million in capital equipment, or the equivalent of a power station, with permanent British Standard Time. The number of accidents to postmen increased from 1,104 to 2,287 over the two years due to darker mornings when much of the mail was delivered to houses and businesses.

Nine speakers put the case for the new time, talking about the benefits for sportspeople, children and the general community, and of being on the same time as much of the Continent all year. Most European countries, including Belgium, France, Germany, Netherlands and Spain, didn't have daylight saving at that stage. Eighteen members spoke against making the policy permanent and highlighted the plight of farmers, market gardeners, builders, milkmen and postmen.

On a free vote, members decided 366 to 81 not to continue British Standard Time after the three year experiment had finished. The result was somewhat surprising given the fairly strong support for the new time in the social survey. Perhaps members were swayed by more recent surveys that showed people were moving away from wanting permanent GMT+1. A Harris poll released earlier in the day had found that only 37 per cent of people favoured the present system and 57 per cent preferred the old one. Also, members may have taken account of those people and industries adversely affected by the late sunrises and didn't want to lose too many of their votes.

Fuel savings weren't an issue on this occasion despite per capita energy use growing by 9.6 per cent between 1968 and 1971. Interestingly, the annual increase in 1969 was 4.4 per cent, falling to 3.6 per cent in 1970 and to 1.3 per cent in 1971, according to World Bank data.⁴¹

After just three years of British Standard Time, the United Kingdom returned to GMT on 31 October 1971 and would once again have summer time for a bit more than seven months a year from the third Sunday in March to the last one in October.

⁴¹ From <http://www.theglobaleconomy.com>, the source of most World Bank data used in this book. Some economic data is from <http://www.tradingeconomics.com>.

8 UK's single double summer time saga

With the British Standard Time experiment over, the United Kingdom quickly set about consolidating the three Summer Time Acts of 1922, 1925 and 1947 into one. A bill brought into the House of Lords in November 1971 became the Summer Time Act 1972 three months later. By this time, an industrial dispute in coal mining led to power restrictions worse than wartime and to calls for daylight saving to be introduced as an emergency measure. Secretary of state Mark Carlisle advised that electricity savings wouldn't outweigh the disruption to agriculture, construction and other industries.

The coal industry dispute dragged on. There were three day weeks, pleas by prime minister Edward Heath for people to heat a single room in the 1973-74 winter, bans on driving and flying on Sunday, and no television programs after 10:30 p.m. The situation was exacerbated by the world oil crisis (and subsequent world recession) brought on by the Yom Kippur War in October 1973. Members called variously for extended summer time, all year summer time and double summer time. But the official response remained the same: that any change to the clocks would have little impact on energy consumption although specific estimates of savings weren't given. Per capita energy use increased by 4 per cent in 1973 but draconian restrictions on power usage plus a recession resulted in a 4 per cent contraction in 1974 and a further fall of 5 per cent in 1975 according to World Bank data.

Several western European countries reintroduced daylight saving in the 1970s, including Spain in 1974, France in 1976, and Belgium and the Netherlands in 1977. The European Economic Community, which the United Kingdom joined in 1973, wanted synchronised changeover dates and issued a "draft directive" in 1976 for all members to harmonise daylight saving start and end dates. In 1977, these four mainland countries set their daylight saving period to start in early April and end in late September, six weeks shorter than the span in Britain. The United Kingdom was reluctant to alter its dates after the failed British Standard Time experiment, fearing a hostile electorate, and decided that agreement wasn't possible.

Around this time, the United Kingdom came up with estimates of energy savings from daylight saving although the government admitted to considerable uncertainty over the numbers. With daylight saving in place between March and October, consumption was down about 1 per cent in spring and back up 1 per cent in autumn for a net savings in energy of very little indeed. Double summer time for the same period would save an estimated 0.5 per cent in energy compared with the existing scheme. All year daylight saving would make no additional difference as energy consumption in winter was about the same regardless of clock time.

An EEC directive in 1980 proposed that member countries coordinate the start of summer time on the last weekend of March, initially for 1981 and 1982. To achieve unison under the plan, daylight saving would commence a week or two later in the United Kingdom and a week earlier in Europe. A common finish date was more challenging as Britain and Europe differed by around a month and a compromise of mid October hadn't been acceptable to the British who were used to a late October ending. Reaction in the United Kingdom to the thought of a later start to summer time

was mixed. Previous prime minister James Callaghan, who was then opposition leader, stated on 10 July 1980 that:

... many of us will be very anxious to know why we are being cut short on summer time next year. We hope that there will be a full debate on this subject. There is no reason whatever why we should fall into line with the others. They ought to fall into line with us, as we have obviously the most sensible arrangement on summer time.⁴²

Six days later, the Commons debated whether to accept the proposition and subsequent summer time order for the next two years. There was a lot of discussion about whether the alignment would be a case of harmonisation for the sake of it and if the changeover should be 1 a.m. or 2 a.m. or some other time in the middle of the night. Members seemed to agree that having the same start date to daylight saving as Europe would be good for business, transport and personal communication. At just after two in the morning, the vote was 78 to 13 in favour of a common start to summer time with the Continent, namely, the last weekend in March. Another summer time order was drawn up for 1983 to 1985 and a further one for 1986 to 1988 in line with successive EEC directives on daylight saving. Agreement on a uniform end date was still a long way off.

Politicians weren't the only ones who didn't want to fall in line with European countries on the finish date of daylight saving. A government survey on summer time in 1987 invited interested groups to choose from the following five options:

- ☼ retain the status quo
- ☼ harmonise the end date with other EEC countries
- ☼ extend summer time in February and November
- ☼ adopt continuous summer time
- ☼ adopt single double summer time.

Only 11 per cent of the 410 groups that took up the offer wanted to end summer time with Europe in late September. Keeping the current set up of daylight saving from late March to late October was preferred by 34 per cent of them. The majority, 55 per cent, favoured double summer time from late March to late September, or UTC+2, and ordinary daylight saving time, or UTC+1, during the winter, or "single double summer time" as it came to be known. This option would coincide with western European times all year although it was a schedule that hadn't been used in the United Kingdom since World War II when it was in place from 1941 to 1945. No group opted for extending daylight saving over 10 months or continuous summer time.

Another survey by the government in 1988 asked people to write in with their choice from these three summer time options:

- ☼ harmonising alteration dates with the rest of Europe
- ☼ single double summer time
- ☼ retaining the status quo.

⁴² Parliament of the United Kingdom, *Hansard*, House of Commons, 10 July 1980, at <http://hansard.millbanksystems.com/commons/1980/jul/10/business-of-the-house>

Nearly 5,000 responses were received. Fifty per cent of people supported single double summer time, a similar proportion to the 1987 survey of interested groups. A further 46 per cent wanted to retain the present scheme and just 4 per cent favoured the same start and end dates as Europe. The preferences of the English and Welsh differed sharply from the Scottish. While 59 per cent of letters from England and Wales were for single double summer time, 90 per cent of those from Scotland didn't want any change. As part of the same survey, some 26,000 people signed two petitions, with 87 per cent favouring single double summer time and 13 per cent wanting no change. All signatories from England and Wales supported European time whereas 80 per cent of those from Scotland preferred the current system.

Both surveys showed that most individuals and interested groups wanted single double summer time but that many preferred the existing daylight saving scheme. The government's overall position on the summer time issue was as follows:

The Government notes that, largely as a result of changing patterns of work and leisure, there has been a shift of public opinion in favour of single double summer time ... but the Government recognises that there are many, particularly in Scotland, who are opposed to any change in the present position. This paper is intended to stimulate discussion on the issue and the options to assist the Government in reaching a decision.⁴³

In the end, the government stayed with the status quo. Nevertheless, the results of the surveys encouraged organisations such as the Daylight Extra group, which formed in 1989 and spent several years lobbying for the United Kingdom to adopt single double summer time. It had the support of various bodies who favoured this option, including the Royal Society for the Prevention of Accidents, the British Tourist Authority, British Airways, British Rail, Eurotunnel, the Sports Council, Age Concern, the Association of District Councils and the Police Federation, many of which undertook their own campaigns.

Meanwhile, the EEC directives on summer time kept coming and were still seeking a harmonised end date. The term "directive" in this case was a misnomer. Newspaper reports were giving the impression that the United Kingdom was being forced, or at least pressured, to accept summer time dates put forward by the EEC. But the community stressed that the dates were only suggestions based on work by the body and member states could accept or reject those proposals.

Dr Mayer Hillman of the Policy Studies Institute conducted several analyses on single double summer time. His 1993 report, "Time for change: Setting clocks forward by one hour throughout the year – A new review of the evidence", examined a range of statistics and expert opinion in the areas of road accidents, crime, sport and leisure, health and wellbeing, industries (including agriculture, building, services and tourism), trade, communication and fuel consumption, as well as public opinion, the Scottish view and the European Community position. He concluded that it was "unarguable" that the advantages of single double summer time clearly outweighed the disadvantages, which he felt were often overplayed.

⁴³ The Royal Society for the Prevention of Accidents (RoSPA), *Single/Double Summer Time Policy Paper*, 2006, p. 5, at, <http://www.rospa.com/rospaweb/docs/advice-services/road-safety/british-summertime-paper.pdf>

Others strongly opposed single double summer time, including farmers, builders and Scottish people. A submission to the Home Office in 1989 by the Building Employers Federation, "Keep summertime British", was totally against any move to European time. These groups maintained that single double summer time would be disruptive and hazardous for people who started work early or worked outdoors and would give Scotland very dark mornings in winter. They regarded the advantages as marginal and only benefiting certain people.

Based on its own research in 1993, the government's view on road accidents was that with single double summer time, there would be more casualties in the darker mornings but fewer in the lighter evenings for a net decrease of some 140 fatalities, 520 serious injuries and 1,200 minor injuries a year. Energy savings were hard to determine but the government estimated a reduction of less than 1 per cent as the decrease in usage at the end of the day was almost offset by an increase in the morning. Similarly, the government found it difficult to conclude that crime went up or down due to the clocks being ahead.

The official view was that single double summer time had little effect on health and wellbeing, even though the scheme was endorsed by the British Medical Association. However, the government acknowledged that the measure would increase the number of people engaged in outdoor activities. Also, the government felt that tourism, trade, transport and communication would benefit but that agriculture and construction were at a disadvantage. It didn't really seem to have an answer to Scotland's aversion to the idea although it conceded that European time wouldn't bring many advantages and would be unpopular. The government didn't seem to have an overall view on single double summer time.

In terms of what the public wanted, a Gallup poll in 1992 indicated that 68 per cent of people favoured single double summer time, taking out the "don't know" responses. The figure for England and Wales was 73 per cent, but support in Scotland was only 50 per cent (or 42 per cent wanting it and the same percentage against it). When respondents were advised of Transport Research Laboratory findings of reduced road casualties with single double summer time, approval in England and Wales increased to 77 per cent and Scotland to 69 per cent (or 62 per cent for it and 28 per cent opposed to it).

In the following year, 1993, a Eurobarometer survey across the 12 member states showed that public opinion supported a daylight saving end date in late October, with 54 per cent of respondents, rather than late September with 38 per cent. This result encouraged the European Community to propose a seventh directive in 1994 that aimed to synchronise daylight saving dates in Europe and the United Kingdom by 1997, including a late October end date.

Buoyed by all this, Nigel Waterson, member for Eastbourne, sought to introduce a bill into the Commons on 27 October 1993 to amend the Summer Time Act 1972 to allow single double summer time. He outlined the various benefits. The only other member to rise was Peter Hain, member for Neath, Wales, who spoke against the bill. He was concerned that sunrise wouldn't be until 10 a.m. in winter in some parts of Scotland. But his main worry, as the sponsored parliamentary member for the Union of

Communication Workers, was that 80-90,000 postmen and women in the United Kingdom would be outdoors delivering mail by 7 a.m. and working in the dark for two to three hours. He also spoke of the farmers, milkmen and construction workers who would be working longer in the dark and at greater risk of accidents. And he talked about the increase in road crashes according to certain statistics and in crime at particular times. Nevertheless, the House voted 103 to 86 for Waterson to bring in his bill. But it didn't go any further.

A National Opinion Poll survey conducted in October 1994 revealed that a high proportion of people, including in Scotland, were happy to have single double summer time and be on the same time as Europe year round. The question asked of respondents was as follows:

For a number of years now, there have been discussions as to whether Britain should harmonise its time with the rest of Europe, so that everywhere in Europe is on the same time. This would mean having an hour's less daylight in the morning and an hour's more daylight in the evening. Do you think that this would be a good thing or a bad thing?

Stratified sampling was used to obtain a certain number of respondents from each of the four television areas, covering Scotland, northern England, central England and Wales, and southern England, based on population size. The percentage of people who wanted single double summer time ranged from 62 per cent in Scotland to 77 per cent in the south (see table).

Survey on single double summer time, United Kingdom, 1994

| <i>Television area</i> | <i>Good thing</i> | <i>Bad thing</i> | <i>Don't know</i> |
|-----------------------------------|-------------------|------------------|-------------------|
| | | — % — | |
| Scottish | 62 | 29 | 9 |
| Tyne Tees, Granada and Yorkshire | 72 | 21 | 7 |
| Central, HTV and Anglia | 70 | 20 | 9 |
| London, Meridian and West Country | 77 | 13 | 10 |
| Total | 72 | 19 | 9 |

Source: National Opinion Poll survey, United Kingdom, October 1994

Business also supported single double summer time. A census of Association of British Chambers of Commerce members in 1994 showed that 75 per cent favoured the scheme. Backing rose to 84 per cent in southern England, falling to 75 per cent in the midlands and 70 per cent in both northern England and Northern Ireland. Less than half of members in Scotland wanted European time. The British Tourist Authority endorsed the idea, estimating that single double summer time would be worth an extra £1 billion to the industry each year.

Viscount Mountgarret brought a Central European Time Bill into the Lords in November 1994 for single double summer time in England, Wales and Northern Ireland, but not Scotland despite favourable findings in the National Opinion Poll survey the previous month. After a long debate, the bill was read a second time in January 1995. It passed the committee and third reading stages in the Lords but didn't progress in the Commons. A new single double summer time bill, the Western European Time Bill, was introduced by Viscount Montgomery of Alamein and included Scotland. It too passed all stages in the Lords in late 1995 but was held up in the Commons by another daylight saving bill.

John Butterfill, member for Bournemouth West, introduced the British Time (Extra Daylight) Bill into the Commons in January 1996. An avid supporter of single double summer time for some years, he spoke of the Transport Research Laboratory's latest estimates of more than 2,000 accidents and over 100 deaths a year that would be avoided under the scheme. He then pointed to Home Office figures that showed the number of crimes would fall by about 200,000 a year. He also discussed other benefits of the measure and the business sector's support.

There was the usual opposition from members who questioned the statistics or who argued that things were different in their area. Others felt it would get light too late, especially in the north, and have disadvantages for agriculture and construction. Butterfill had got used to calls of "daylight robbery" and "time bandit" although to some extent the comments were encouraged by reference to "extra daylight" in the bill's name. After nearly five hours, the second reading debate finished with a largely free vote of 93 to 82 but with many abstentions. The ayes were seven short under standing order no. 36 for the bill to get to the next stage. It didn't come up for further debate, with the government perhaps worried it would lose seats in the general election due in the following year if the bill got through. As it turned out, the Conservative Party lost all its Scottish seats and many others in the 1997 election won by Labour.

It was in that year that the European Community had hoped its seventh directive on daylight saving would become a reality. To the delight of most people in the United Kingdom and Western Europe, the change of dates took place a year earlier. After two decades of directives aiming for synchronisation of the summer time period on both sides of the English Channel, countries on the Continent aligned themselves with the British end date of the last Sunday in October from 1996. A common start date of the last Sunday in March had been in place since 1981. The United Kingdom was now an hour behind Western Europe at all times throughout the year. An eighth directive in 1997 extended the arrangements through the period 1998 to 2001 and a ninth directive in 2000 (Directive 2000/84/EC) made the timeframe indefinite.

Research by the European Commission before the release of the ninth directive had concluded that the benefits of summer time and of having set start and finish dates across countries outweighed any drawbacks of the scheme. The commission's findings are summarised below.

1. More than 20 years on from the adoption of the first Directive in this field, the economic sectors seen as being the most affected, i.e. agriculture, tourism and transport, have embraced summer time and no longer question its *raison d'être*.
2. As regards transport, the introduction of complete harmonisation of the timetable has led to the removal of the major obstacles encountered in the past.
3. Summer time provides greater opportunities for all sorts of evening leisure activities because of the natural light available.
4. Given that studies in this area contradict one another, it is impossible to draw valid conclusions on the impact of summer time on the environment. This applies in particular to the question as to whether summer time leads to an increase or reduction in ozone production as compared with a scenario with no change in the time.

5. Summer time helps to save energy since less electricity is used for lighting in the evening due to the fact that it is lighter. However, the increased energy consumption for heating during the morning when the time is adjusted and the higher fuel consumption caused by a potential increase in traffic in the evenings when it is lighter have to be deducted from these savings. Also, the savings actually achieved are difficult to gauge and in any event are relatively small.
6. Most of the possible effects of summer time on health are linked to the fact that the body has [to] adapt to the change in time in April and October. Specialists recognise that, at the current stage of research and know-how, most of the difficulties experienced are of short duration and are not a health hazard.
7. As regards road safety, the question is whether darker mornings, in particular in spring and autumn, and lighter evenings have an impact on the number of traffic accidents. The lack of sufficient data and the interaction of other factors such as weather conditions do not enable a definite causal link between summer time and the number of accidents to be established.⁴⁴

Many in the United Kingdom didn't just want the same summer time start and end dates as Europe but to also be on the same clock time as Europe. The single double summer time debate came up once again in the Lords in February 1998. Lord Tanlaw suggested, seriously, that European countries in the UTC+1 time zone join the United Kingdom on UTC. That might have kept Scotland happy. But with the imminent establishment of a Scottish parliament, there was plenty of talk about the possibility of a separate time zone north of the border if the rest of the United Kingdom was on European time.

In the Lords on 9 November 1998, Lady Saltoun of Abernethy moved an amendment to the Scotland Bill that Scotland be allowed to veto any changes to standard time and summer time in the United Kingdom. There was a general feeling in the House that a veto was a reasonable idea but that having Scotland on a different time wasn't practical. The move was defeated by 103 votes to 42.

A few months later on 13 April 1999, the Conservatives' Lord Archer of Weston-super-Mare (Jeffrey Archer) introduced a Time Zones and Summer Time (Devolution) Bill into the House. The bill would give Scotland and Wales the power to each set its own time zone and any summer time schedule. Labour's Lord Howie of Troon was less than enthusiastic. He gave four reasons the bill should be thrown out: time was a national issue; a time change at the Scottish or Welsh border would be "rather silly"; uncertainty over Northern Ireland time; and what he saw as "an attempt to achieve English independence in time" through the bill.

It made no mention of Northern Ireland, where local mean time is nearly half an hour behind Greenwich. If the United Kingdom adopted single double summer time, clocks in Northern Ireland would be around one and a half hours ahead of the sun in winter and two and a half hours in summer. Sunrise would be at about 9:45 a.m. in late December. Sunset in late June would be after 11 p.m. Howie said he hoped the bill

⁴⁴ European Commission, "Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee under Article 5 of Directive 2000/84/EC on summer-time arrangements /* COM/2007/0739 final */", 2007, at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52007DC0739>

would “vanish into the sand”. It passed its second reading debate on 23 July 1999, but in the end he got his wish as the bill lapsed.

Nevertheless, the bills kept coming. Nigel Beard brought an Extension of Summer Time Bill into the Commons in 2001 seeking to amend the Summer Time Act 1972 to allow year round daylight saving time. When that failed, he introduced a Lighter Evenings Bill in 2004, a single double summer time bill for England and Wales only, giving Scotland and Northern Ireland the option to determine their own time, but the bill expired. Lord Tanlaw had the Lighter Evenings (Experiment) Bill in 2005 for a three year trial of single double summer time, also leaving those two countries with the choice of opting in or out. Afterwards, he was often referred to as the Time Lord. But as always, the government had no plans to change summer time.

Next was Tim Yeo with his Energy Saving (Daylight) Bill in 2006, another single double summer time bill, this time exempting Scotland and Wales. He pointed out that energy savings of 0.6 per cent and a carbon emissions reduction of half a million tonnes a year would be achieved with all year daylight saving according to Cambridge University research. He also referred to Royal Society for the Prevention of Accidents estimates that road fatalities would be cut by over 100 a year. The bill lapsed. Two years later in 2008, he introduced a similar bill by the same name but it too ran out of time.

A more complex Daylight Saving Bill was brought into the Commons as a private member’s bill by Rebecca Harris of the Conservative Party on 30 June 2010, a few weeks after the party’s election win. Under this bill, the secretary of state had to examine the costs and benefits of putting the clocks forward a further hour, for all of the year, and only in the winter months, with a breakdown for England, Wales, Scotland and Northern Ireland. Thus time could be advanced an hour in winter, meaning year round daylight saving, or an hour in both summer and winter, giving single double summer time. The study would also consider whether the current summer time start and end dates were the most suitable. Every government department was to be involved in the project. A report had to be published within three months of the bill’s enactment.

As part of the bill, an independent commission would be established to evaluate the findings and release its recommendations within six months of it being set up. If it felt a change should be made to summer time, a three year trial of its proposal had to be put in place. The secretary of state was to review the trial shortly before it finished and put before parliament either that the change be made permanent or that some other daylight saving arrangement be put in place or that no change be made to the scheme, including dates, used before the trial.

Harris won many friends and made a few enemies along the way. She said she was “attacked for being a barbecue-obsessed Essex girl ... [and] a national traitor trying to take us on to Berlin time”. Charity organisation 10:10, which supports activities relating to climate change, launched a “Lighter Later” campaign in March 2010. A group of 83 organisations was formed supporting Harris’s bill. To try and push the bill through parliament, an online tool with details of the opinions on daylight saving of each parliamentarian was developed to help the public write to their local member.

By the time the bill came up for its second reading debate on 3 December 2010, the Lighter Later movement had got the support of over 300 organisations as diverse as the British Beer and Pub Association, Alcoholics Anonymous, Greenpeace, the Caravan Club, Parentline Plus, the Kennel Club and various sporting bodies to back the bill. Further, some 9,000 letters had been received by the Department for Business, Innovation and Skills.

The Sport and Recreation Alliance supported the bill, coming up with an impressive list of what it regarded as the wider advantages of daylight saving:

- ☼ improved levels of physical and mental health, for example, people involved in sport or physical activity are up to 50 per cent less likely to develop major chronic medical conditions
- ☼ improved social cohesion within communities
- ☼ improved skills; sport increases educational attainment
- ☼ reductions in crime and anti-social behaviour; sport and physical activity schemes involving 20,000 13-17 year olds have returned a 36 per cent reduction in burglary and an 18 per cent reduction in youth crime
- ☼ increased levels of “social capital” which helps to build strong communities; sport and exercise are the single greatest contributors to social participation
- ☼ a significant contribution to the nation’s economy.⁴⁵

A poll by the British Association of Leisure Parks, Piers and Attractions showed that two-thirds of people favoured a three year trial of single double summer time. It prepared a list of economic benefits of extra daylight saving:

- ☼ tourism earnings growth of between £2.5 billion and £3.5 billion (Policy Studies Institute forecast, 2008)
- ☼ 60,000 to 80,000 more tourism jobs (as above)
- ☼ government would benefit from additional taxation
- ☼ contribution to United Kingdom balance of payments from taxes drawn from overseas visitors.

All the usual pros and cons of daylight saving were discussed at the bill’s second reading. Road accidents and crime would fall, energy would be saved, there would be more time for sport and leisure and health would improve, and tourism and other industries would benefit, but life would be made more difficult for agricultural and construction workers as well as school children, and by late mornings in Scotland. The Farmers’ Union of Scotland didn’t necessarily favour daylight saving but it did support Harris’s bill with its proposal for a study of the costs and benefits of advancing the clocks.

Several members of parliament had received representations from astronomers, who would have to wait an extra hour to study the stars, and from the Orthodox Jewish community worried that they might not get to work on time after morning prayers in the winter. Another issue was antisocial behaviour lasting an hour longer in summer with very late sunsets. The problem of different time zones in Ireland and Northern Ireland was raised as people who lived on one side of the border and worked or attended school on the other side would have to change their watches twice a day.

⁴⁵ “British Summer Time and the Daylight Saving Bill 2010-11”, House of Commons Library, United Kingdom, p. 13, at <http://researchbriefings.files.parliament.uk/documents/SN03796/SN03796.pdf>

Labour didn't oppose the bill, with member Gordon Banks liking the provision for a detailed analysis of the evidence for and against additional daylight saving. The government, on the other hand, didn't officially support the bill because, according to parliamentary under secretary of state Edward Davey, consensus wouldn't be reached throughout the United Kingdom. He was particularly concerned about the darker mornings, border complications in Ireland, inconsistent evidence of the effects on road accidents and crime, the failed Portuguese experiment with extended daylight saving in the 1990s, and the United Kingdom's own experience shifting to GMT+1 from 1968 to 1971. But in a free vote, the bill passed the second reading 92 to 10.

Uncertainty as to whether the government would allow the bill to go to committee dogged the proposal through most of 2011. By early March, the idea had been "in then out, then in and then out", according to tourism minister John Penrose. The government said the scheme had been cut from its list as Scotland wasn't happy with it. But the bill was still very much alive again by later that year. In late October, the government stated it might support the bill if various amendments were made to it. The public wanted it to go ahead. A YouGov poll found that 53 per cent of Britons favoured single double summer time and 32 per cent didn't want it.

Firstly though, money was needed to research and report on the costs and benefits of the proposed scheme and the Commons spent 40 minutes discussing this issue on 22 November 2011, almost a year after the second reading. Business, innovation and skills minister Mark Prisk had come up with an estimate of £750,000. The motion was supported and the bill finally moved to the committee stage.

The Daylight Saving Bill Committee of 16 members from the major parties and one from the Scottish National Party met on 7 December. Many issues were raised and all sorts of changes made to the bill, lengthening it from six to 14 clauses. The SNP committee member, Angus MacNeil, sought a veto for Scotland and Wales but other members insisted the move wasn't feasible and that any alteration in time had to apply to the whole of the United Kingdom. Any change also had to be for the entire year, meaning that the bill became one for single double summer time only. No alteration to dates of the British summer time period was to be considered as these had already been harmonised under the latest European Union directive on daylight saving. The secretary of state could abandon the trial or make the scheme permanent at any time but must consult with the relevant parties.

Several members stressed the need for the study to examine the concerns of residents of each of the four countries of the United Kingdom and also the interests of religious, sporting and other groups. Edward Davey wanted the Independent Oversight Group, as the commission was now to be called, to undertake the analysis and for the group to comprise academic statisticians and researchers so as to remove possible bias that might occur with departmental or country representatives. The report had to be published within 12 months of the Act being passed or 18 months if the group felt more time was needed to finalise the study rather than the initial three months. Further, a favourable cost benefit analysis wouldn't automatically trigger a trial as specified in the original bill.

A third reading or report stage of the Daylight Saving Bill was held in the Commons on 20 January 2012. Members argued at length over many of the 95 amendments to the bill, as well as the Scottish situation, consensus, tourism, road casualties, more opportunities to play sport, the costs and benefits report, energy use and emissions, religion, health benefits and disadvantages, length of the trial period, powers of the secretary of state, and whether the bill should refer to “daylight saving” or “summer time extension”.⁴⁶ On each of the five occasions that a division was called, the deputy speaker had to ask the sergeant at arms to investigate the delay of the group of about 10 members, comprising nine Conservatives and Angus MacNeil, opposing the bill.

The five hours allocated to third reading debates expired and time was called. No further time would be allocated by the government to the bill in the current parliamentary session and it automatically expired. Despite the bill having the backing of about 120 members at the session, the actions of 10 were able to thwart its progress. Rebecca Harris was unimpressed, saying that the process for private members’ bills was:

... incredibly frustrating ... The clear will of the House was for the bill to proceed. It had amazing cross-party support and amazing support out in the country. I had hoped there would be a “what’s not to like” aspect of this, simply to ensure we had a really good quality review and something we could then have a debate on.⁴⁷

Minister Edward Davey said that there needed to be a “consensus” and that parliament had been unable to reach one. But it appeared the bill was scuttled as Scotland and Wales couldn’t veto United Kingdom decisions and would have to go along with any change in daylight saving. Tory backbencher Christopher Chope was concerned that if parliament “changes the time zone for the United Kingdom against the wishes of the people of Scotland, that is going to give extra ammunition to those people in Scotland who are campaigning for an independent Scotland”. The Scottish National Party had done well in general elections in Scotland and there may have been a fear among government members that the party could do well in a United Kingdom general election. In the event, it did *very* well in the 2015 election but mainly at the expense of the Labour Party.

Lighter Later campaign manager Daniel Vockins complained that while the majority of members, most of the public, 90 national organisations and the British government backed the bill, a few members were able to “talk it out of receiving a proper vote”. The Lighter Later campaign was ended by 10:10 in June 2012.

Despite its general opposition to extending daylight saving or allowing a study of the costs and benefits to be undertaken, the government commissioned David Simmonds Consultancy in 2012 to review what data and other evidence was available to conduct a formal cost benefit analysis towards deciding whether single double summer time would be beneficial. The overview looked at 118 studies, including in academic

⁴⁶ Certain members argued that daylight saving didn’t save daylight and that summer time extension within the meaning of the Summer Time Act 1972 should be used. But one could counter that single double summer time would run all year, including through the winter, and therefore shouldn’t be called summer time and that it would be just as easy to call it daylight saving within the meaning of a daylight saving act should one be enacted.

⁴⁷ James Meikle, “Daylight saving bill scuppered by small group of MPs”, *The Guardian*, United Kingdom, 21 January 2012, at <http://www.theguardian.com/uk/2012/jan/20/daylight-saving-bill-mps>

journal articles, commissioned research, government reports, and pieces by interested parties and the media in the United Kingdom and overseas. These covered a range of areas, such as agriculture, business, energy, road accidents, crime, health, leisure and sport, children, industry, and public opinion, although the review acknowledged the difficulty of placing a monetary value on some things. The report, finalised in July, concluded that an overall cost benefit analysis was possible but more research would be needed. However, the government said straightaway it had “no current plans” to change the daylight saving time system.

No more summer time bills have been brought into the United Kingdom Parliament at the time of writing. Various members, organisations, and interest groups have continued to campaign and lobby the government on extending daylight saving, including single double summer time to put Britain on the same time as most of Europe all year. The UK currently has daylight saving during the period specified in the Summer Time Order 2002 under the Summer Time Act 1972.

An All-Party Parliamentary Group on Lighter Evenings had been established with 20 members in June 2007 with its purpose being “to promote a lighter evenings experiment”. Labour’s Angela Billingham was the group’s last chairperson before it disbanded in 2014-15. She still pushes for a longer daylight saving period, believing that lighter evenings would help childhood obesity as children could be involved in outdoor physical activity for a further hour each day. She also argues that single double daylight saving would make the roads safer, reduce carbon emissions, allow more time for recreation and leisure, and boost tourism by £4 billion a year and provide an extra 100,000 jobs in the sector.

A YouGov poll in March 2015 found that just 33 per cent of people supported changing the clocks twice a year and 40 per cent were opposed to it. Despite using online sampling only, YouGov surveys are very often quite accurate. However, in this survey, no distinction was made between respondents who wanted UTC or British Summer Time or double summer time all year. If as little as a tenth of the 40 per cent of those who were against clock changes wanted an hour of daylight saving all year, more people would be in favour of summer time in some form than would be against it. Also, the survey was conducted on the weekend before the start of daylight saving and the wording of the options around clock changes may have got people thinking of the hassles of the clock change itself and other negative thoughts they might have had about daylight saving.

Staunch advocate for single double summer time, the Royal Society for the Prevention of Accidents, put out a British Summertime Fact Sheet in 2015, updated in 2016. The society emphasised the reduction in casualties with daylight saving, citing its latest research which showed that single double summer time would save 80 lives and cut serious injuries by 212 a year. The brochure discusses other advantages before tackling opposition to single double summer time, including from Scotland:

- ☼ postal workers would no longer deliver mail in the early morning
- ☼ modern farming practices and technology have “reduced the impact on farmers” of daylight saving
- ☼ Scotland benefits more than England “in all the major dimensions measurable – road safety, environmental benefit and fuel cost, tourism, health and wellbeing”

- ☀ the scheme would “save children’s lives, even more so in Scotland than in England” as Scottish winter evenings are longer and darker when most accidents occur.⁴⁸

RoSPA recommends a 2-3 year trial of single double summer time. It argues that evidence of its success or otherwise could then be examined in terms of road casualties before a permanent decision is made. The trial would also allow industries and the public to “experience the change for themselves”.

The official view remains that single double summer time won’t happen unless there is a “consensus”, a term for which the government doesn’t seem to have a set definition in the context of daylight saving. The term is often used to mean agreement of all four countries to a time change, with the government saying that Scotland wouldn’t support a move. With virtually all seats north of the border now held by the Scottish National Party, a bigger worry for the government might be losing seats in northern England should it consider extra daylight saving. As at December 2016, the governing Conservative Party would no longer hold a majority if it lost just four seats. Should Labour and the Scottish National Party win enough seats in the 2020 election to form a possible coalition government, any changes to daylight saving such as single double summer time would seem even less likely. Further, the European Union directive on daylight saving virtually ensures the start and end dates won’t change.

⁴⁸ The Royal Society for the Prevention of Accidents, “British Summertime Fact Sheet – 2016”, at <http://www.rosipa.com/road-safety/advice/road-users/british-summertime-fact-sheet>

9 Western Europe well ahead of the sun

After most of Europe used daylight saving time during World War I, only Belgium, France, Ireland, Luxembourg, Monaco, the Netherlands and the United Kingdom had it in all interwar years. Several countries kept summer time in a few post-WWI years, such as Italy, but then abandoned the measure. The League of Nations asked European countries in 1922 if they might consider an international agreement to use daylight saving but there wasn't much interest. Portugal and Spain dropped daylight saving and then reintroduced it a number of times between the wars. Nearly all of Europe had daylight saving at some stage during World War II, but most countries discarded the scheme soon after the end of the war. The following table shows the years each European country had summer time between 1916 and 1949. For more detail, see the Appendix.

Daylight saving, Europe, 1916 to 1949

| Country* | 1916-19 | 1920 to 1929 | 1930 to 1939 | 1940 to 1949 |
|------------------------|---------|--------------|--------------|--------------|
| Albania | | | | |
| Andorra | | | | |
| Austria | | | | |
| Belarus | | | | |
| Belgium | | | | |
| Bosnia and Herzegovina | | | | |
| Bulgaria | | | | |
| Croatia | | | | |
| Czech Republic | | | | |
| Denmark | | | | |
| Estonia | | | | |
| Finland | | | | |
| France | | | | |
| Germany | | | | |
| Gibraltar (Brit.) | | | | |
| Greece | | | | |
| Hungary | | | | |
| Iceland | | | | |
| Ireland | | | | |
| Italy | | | | |
| Latvia | | | | |
| Liechtenstein | | | | |
| Lithuania | | | | |
| Luxembourg | | | | |
| Macedonia | | | | |
| Malta | | | | |
| Moldova | | | | |
| Monaco | | | | |
| Montenegro | | | | |
| Netherlands | | | | |
| Norway | | | | |
| Poland | | | | |
| Portugal | | | | |
| Romania | | | | |
| Russia | | | | |
| Kaliningrad | | | | |
| San Marino | | | | |

| Country* | 1916-19 | 1920 to 1929 | | | | | 1930 to 1939 | | | | | 1940 to 1949 | | | | |
|----------------|---------|--------------|--|--|--|--|--------------|--|--|--|--|--------------|--|--|--|--|
| Serbia | | | | | | | | | | | | | | | | |
| Slovakia | | | | | | | | | | | | | | | | |
| Slovenia | | | | | | | | | | | | | | | | |
| Spain | | | | | | | | | | | | | | | | |
| Sweden | | | | | | | | | | | | | | | | |
| Switzerland | | | | | | | | | | | | | | | | |
| Ukraine | | | | | | | | | | | | | | | | |
| United Kingdom | | | | | | | | | | | | | | | | |
| Vatican City | | | | | | | | | | | | | | | | |

Shaded square – the country had daylight saving in that year

Blank square – no daylight saving in that year

*Current countries and names

Sources: Time and Date AS, at <https://www.timeanddate.com>; Horloge Parlante, at

<http://www.horlogeparlante.com>; and other sites

By 1950, the only European countries that still had daylight saving were Hungary, Iceland, Ireland, Portugal and the United Kingdom (see next table). Norway and Poland used summer time for several consecutive years in the 1950s and 1960s. By the late 1960s, only Italy and its tiny neighbouring states had the scheme. Other countries steadily reintroduced summer time to save energy following the oil crises of 1973-74 and 1979. By the mid 1980s, all of Europe except Iceland was again using daylight saving. From 1985, the only instances of clocks not being put forward for the summer have been Belarus in 1990 and since 2011, Estonia in 2000 and 2001, Iceland in all years, Lithuania in 2000 to 2002, Moldova in 1990 and Russia since 2011.

Daylight saving, Europe, 1950 to 1985

| Country* | 1950 to 1959 | | | | | 1960 to 1969 | | | | | 1970 to 1979 | | | | | 1980 to 1985 | | | | |
|------------------------|--------------|--|--|--|--|--------------|--|--|--|--|--------------|--|--|--|--|--------------|--|--|--|--|
| Albania | | | | | | | | | | | | | | | | | | | | |
| Andorra | | | | | | | | | | | | | | | | | | | | |
| Austria | | | | | | | | | | | | | | | | | | | | |
| Belarus | | | | | | | | | | | | | | | | | | | | |
| Belgium | | | | | | | | | | | | | | | | | | | | |
| Bosnia and Herzegovina | | | | | | | | | | | | | | | | | | | | |
| Bulgaria | | | | | | | | | | | | | | | | | | | | |
| Croatia | | | | | | | | | | | | | | | | | | | | |
| Czech Republic | | | | | | | | | | | | | | | | | | | | |
| Denmark | | | | | | | | | | | | | | | | | | | | |
| Estonia | | | | | | | | | | | | | | | | | | | | |
| Finland | | | | | | | | | | | | | | | | | | | | |
| France | | | | | | | | | | | | | | | | | | | | |
| Germany | | | | | | | | | | | | | | | | | | | | |
| Gibraltar (Brit.) | | | | | | | | | | | | | | | | | | | | |
| Greece | | | | | | | | | | | | | | | | | | | | |
| Hungary | | | | | | | | | | | | | | | | | | | | |
| Iceland | | | | | | | | | | | | | | | | | | | | |
| Ireland | | | | | | | | | | | | | | | | | | | | |
| Italy | | | | | | | | | | | | | | | | | | | | |
| Latvia | | | | | | | | | | | | | | | | | | | | |
| Liechtenstein | | | | | | | | | | | | | | | | | | | | |
| Lithuania | | | | | | | | | | | | | | | | | | | | |
| Luxembourg | | | | | | | | | | | | | | | | | | | | |
| Macedonia | | | | | | | | | | | | | | | | | | | | |
| Malta | | | | | | | | | | | | | | | | | | | | |
| Moldova | | | | | | | | | | | | | | | | | | | | |

| Country* | 1950 to 1959 | | | | | 1960 to 1969 | | | | | 1970 to 1979 | | | | | 1980 to 1985 | | | | |
|----------------|--------------|--|--|--|--|--------------|--|--|--|--|--------------|--|--|--|--|--------------|--|--|--|--|
| Monaco | | | | | | | | | | | | | | | | | | | | |
| Montenegro | | | | | | | | | | | | | | | | | | | | |
| Netherlands | | | | | | | | | | | | | | | | | | | | |
| Norway | | | | | | | | | | | | | | | | | | | | |
| Poland | | | | | | | | | | | | | | | | | | | | |
| Portugal | | | | | | | | | | | | | | | | | | | | |
| Romania | | | | | | | | | | | | | | | | | | | | |
| Russia | | | | | | | | | | | | | | | | | | | | |
| San Marino | | | | | | | | | | | | | | | | | | | | |
| Serbia | | | | | | | | | | | | | | | | | | | | |
| Slovakia | | | | | | | | | | | | | | | | | | | | |
| Slovenia | | | | | | | | | | | | | | | | | | | | |
| Spain | | | | | | | | | | | | | | | | | | | | |
| Sweden | | | | | | | | | | | | | | | | | | | | |
| Switzerland | | | | | | | | | | | | | | | | | | | | |
| Ukraine | | | | | | | | | | | | | | | | | | | | |
| United Kingdom | | | | | | | | | | | | | | | | | | | | |
| Vatican City | | | | | | | | | | | | | | | | | | | | |

Shaded square – the country had daylight saving in that year

Blank square – no daylight saving in that year

* Current countries and names

Sources: Time and Date AS, at <https://www.timeanddate.com>; Horloge Parlante, at <http://www.horlogeparlante.com>; and other sites

Whether a place had daylight saving in a particular year wasn't always easy to determine. For example, a newspaper article in 1952 listed places that used the scheme according to ship captains' reports received by the United States Hydrographic Office.⁴⁹ Other sources suggest that many of the places didn't have daylight saving in that year, including Albania, Hungary, Monaco, Poland, Aden, Japan, South Korea, Syria, Turkey, Gambia, Gold Coast (now Ghana) Libya, Morocco, Sierra Leone, South Africa, Bermuda, Dominica, Dominican Republic, Grenada, Chatham Islands and Tonga. It's quite possible that daylight saving was practised unofficially in the port areas of many of these places but not much beyond. Most sources indicate that six of them stopped having daylight saving in 1950 or 1951, and captains visiting in 1952 may have thought the places were still using the measure.

France pursued with daylight saving after World War I mainly to conserve fuel and because the United Kingdom retained the scheme albeit with different dates to the French. The summer time period was generally quite a bit longer in France than in the United Kingdom in the immediate postwar period. As early as 1921, the French government approached the British government with the view to harmonising dates. Agreement was reached between France, Belgium and the United Kingdom on uniformity and in 1922 the three countries started and finished summer time virtually together, except for the changeover times of Saturday 11 p.m. to Sunday 12 a.m. on the mainland and Sunday 2-3 a.m. in Britain. But the arrangement would only last for that year.

Whether to have daylight saving at all became a battle between urban and rural sectors in France in the early 1920s, similar to the wrangle in the United Kingdom but

⁴⁹ "Daylight time is world wide", *The Fresno Bee*, Fresno, California, United States, 21 May 1952, p. 36, Newspapers.com (subscription only), at <https://www.newspapers.com/image/25849554>

perhaps even more intense. Many rural areas had stopped following summer time by 1920 and various interest groups on both sides of the debate lobbied the government hard. The 1916 Act was due to expire in 1922. With galleries packed and crowds outside, the Chamber of Deputies decided narrowly, by 265 votes to 260, on 8 March to end daylight saving in France after that year.

Support for daylight saving remained strong in the cities and the French government introduced a summer time bill to advance clocks each year on a permanent basis. When parliament wouldn't pass the bill, Cabinet decided that work hours, train schedules, theatre times and everything else would be brought forward half an hour from 28 April to 3 November 1923 via an order in council. After plenty of criticism and jokes from the public and the press, the government realised the impracticality of its proposal. Prime minister Raymond Poincaré argued that daylight saving was needed to conserve energy and threatened to resign if the bill wasn't passed by the Senate. The bill finally went through on 23 May and France had daylight saving from 26 May until 7 October. But Poincaré seemed to make a habit of such ultimatums. A day later, he was going to quit over the Senate voting against becoming a high court and trying 18 communists, including a deputy, "charged with participating in German agitation in the Ruhr and plotting against the security of the State".⁵⁰

Clock time was a mixture from one country to another. In late April 1923, journalists were advising travellers to take a sun dial with them. England started daylight saving on 22 April, France on 26 May, Belgium on 21 April and Netherlands on 1 June. Dutch time was 20 minutes ahead of the other countries. Watches went back an hour on crossing the English Channel to France, then forward an hour when entering Belgium, back 40 minutes at the Dutch border and forward 40 minutes if going to Germany, Switzerland and Italy as they were in the GMT+1 time zone and had no daylight saving.

France had daylight saving through the rest of the 1920s and 1930s, usually starting on various dates in April and always finishing in early October. The aim was to be in unison with Belgium, the Netherlands and the United Kingdom, with the countries having greater success with a common end date than start date (see chapter 7: United Kingdom sticks with daylight saving).

With the outbreak of World War II, France extended daylight saving by a decree dated 26 September 1939. It stayed on summer time an extra six weeks, until 19 November, to conserve fuel. The country then resumed the measure just over three months later on 25 February 1940. Germany reinstated daylight saving for the first time since 1918 on 1 April 1940, putting it at GMT+2. The Germans invaded France in May and June, reaching Paris on 14 June, before an armistice between the two countries was signed on 22 June. From that date, German time was imposed on the occupied northern and western parts of France while the south remained on normal daylight saving time.

The Vichy government maintained French summer time in the south in the winter of 1940-41, but the occupied areas were on continuous German daylight saving time.

⁵⁰ M. Poincaré, "Conflict with Senate. Offers to resign. Trial of French communists", *The Sydney Morning Herald*, Sydney, New South Wales, Australia, 26 May 1923, p. 13, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/16060557>

The one hour difference between south and north caused problems coordinating trains, with rail travel becoming dangerous for passengers and impractical for German military movements. The non-occupied zone moved to German summer time on 5 May 1941, placing the whole of France on GMT+2. This put the country about one and a half to two and a third hours ahead of local mean time. The south went back to French winter time from 6 October 1941 until about 2 March 1942. The north of the country, and Germany, remained two hours ahead of Greenwich although many residents were thought to have kept to French time in defiance of the Germans.

After more than two and a half years of continuous summer time, Germany returned to its winter time or standard time of GMT+1 on 2 November 1942 and the whole of France was also in this time zone from the same date. The French were on German summer time and then winter time through 1943 and into 1944. When France was liberated in the summer of that year, it remained at GMT+2, aligning with the United Kingdom which was on double summer time. It returned to one hour of daylight saving on 8 October.

France again had two hours of daylight saving in 1945, moving to GMT+2 on 2 April, the same as the United Kingdom. A decree of 14 August returned the country to normal summer time on 16 September and would have moved it to standard time on 18 November, breaking with "Berlin time". But a further order on 5 November cancelled the return to GMT and France changed its standard time zone from Western European Time or GMT to Central European Time or GMT+1. The country had been on continuous daylight saving since 25 February 1940. It was now effectively still on summer time all year, with clocks in Paris being 51 minutes forward of local mean time. They were one hour 18 minutes ahead of the sun in Brest in the west and 29 minutes in Strasbourg in the east. Despite some opposition to the new time, France stayed on GMT+1 but without official daylight saving.

After World War II, most of Europe stopped observing daylight saving time and didn't seriously consider bringing it back until the 1970s. The 1973-74 oil embargo by OPEC quadrupled oil prices from about \$3 a barrel to \$12 in the five months to March 1974. Stock markets crashed and the world went into recession. Countries looked for ways to ease the effects of the downturn and the higher oil prices, spurring many of them to once again contemplate putting their clocks on an hour in the warmer months. In France, annual economic growth fell steadily from around 6 per cent in March quarter 1974 to become negative in the first quarter of 1975 according to Trading Economics data. Petrol was rationed and television programs finished at 11 p.m. But daylight saving wasn't brought back straightaway.

French president Giscard d'Estaing announced in spring 1975 that daylight saving would be reintroduced in France from 1976 despite standard time already being well ahead of the sun and the proposed time being the same as Berlin time during the war. The aim was to cut fuel consumption by 300,000 tons a year or about 2 per cent although the environment and energy department came up with estimated savings of only 0.5 per cent. In 1975, France proposed that all of the European Economic Community have daylight saving and that start and end dates be in unison, suggesting 1 April to 1 October each year. But most member countries hadn't used the measure since the war or soon after it. British Summer Time already ran for a longer period,

from mid March to late October, and secretary of state Tony Benn doubted “whether the harmonisation would contribute to the conservation of energy”.

Under a decree dated 19 September 1975, France had daylight saving from 28 March to 26 September 1976. By the time the measure was introduced, annual economic growth was already back up to about 3 per cent, rising to nearly 6 per cent later in the year. According to World Bank figures, energy use per capita in France had increased rapidly through to 1973 and then fell 4 per cent in 1974 and a further 6 per cent in 1975 due to high cost of fuel, but rose by 6 per cent in 1976 despite daylight saving.

In subsequent years, France’s summer time dates were usually from the first Sunday in April to the last Sunday in September. Economic growth rates fell from around 4 per cent at the time of the second oil crisis, in 1979, to zero in early 1981 before recovering. Energy consumption per head fell by 1 per cent in 1980, 3 per cent in 1981, and another 3 per cent in 1982 making it more than 3 per cent lower than in 1973 despite per capita real gross domestic product growth of 8 per cent over this period.

Not everyone was happy to have daylight saving time, especially as France was effectively already on year round summer time. Another hour forward in the warmer months was in essence double summer time. The Association Against Double Summer Time, or *l’Association Contre l’Heure d’Été double*, or ACHED, or ACHE, is a lobby group created in 1983 and seeks stable time in Europe. Most people seemed to support daylight saving though, with a Sofres poll in March 1989 showing that 58 per cent of French people favoured the scheme and 34 per cent didn’t.

A bill was introduced into the French Senate on 17 May 1989 to abolish “double summer time” and to return to standard time of UTC in winter and UTC+1 in summer. At the first reading, various reasons were put forward for the proposed change. France had increased its use of nuclear power from 8 per cent of its electricity needs in 1976 to around 70 per cent by 1988 and fossil fuel savings by then were therefore much smaller. Senators were concerned about the results of health studies showing that daylight saving upsets people’s body clock or circadian rhythm, produces hormonal imbalances, affects blood pressure, and causes loss of sleep with the extra fatigue having high economic costs. They were also worried that children and the elderly were particularly vulnerable to the clock changes. There were disadvantages for farm and construction workers and the schedules of other workers, mothers, children and babies were also inconvenienced. A committee furnished a report on 25 April 1990 supporting the bill. After various delays, the bill passed its first reading in the National Assembly on 8 April 1993 but it eventually lapsed.

Industry minister Roger Faroux called for an end to the practice of daylight saving in France in early 1990. His reasons were twofold: a report showed negligible energy savings as the country’s main power source by then was nuclear, and latest polling showed that almost half the population didn’t want the clocks to change. In his view, the French “like less and less being told what hour to get up and what hour to sleep”

and that it was “rude to impose changes on citizens in their private lives”.⁵¹ He wanted the European Economic Community to abandon daylight saving.

In late 1996, president Alain Juppé proposed to the European Community that France ditch summer time and use either UTC+1 or UTC+2 all year. An EC official commented: “It would be illegal if they [France] were to do it. To us it looks like a Juppé one-man show. He seems to have come under pressure from a persuasive minority lobby group [ACHED].”⁵² Juppé also said that any change should align with “the European situation”, prompting observers to wonder if the country was trying to get other European Union members to reconsider daylight saving time. In the end, the EU’s transport ministers, whose responsibilities included time, dismissed the request, saying it would cause chaos in airline scheduling.

Surveys by the Research Centre for the Study and Observation of Living Conditions, or CRÉDOC, found an increase in support for daylight saving during the 1990s, up from 25 per cent in 1993 to 32 per cent in 1999 while opposition fell from 55 per cent to 45 per cent. In two waves of another survey, commissioned by ACHED, respondents were asked what time system they would prefer if France abandoned two clock changes a year. In 1996, 58 per cent of people opted for staying on winter time all year or UTC+1 and 34 per cent for summer time or UTC+2. But by 2000, almost equal numbers supported each alternative, with 46 per cent wanting UTC+2 and 45 per cent UTC+1. A Sofres survey in 2002 showed that 45 per cent favoured summer time year round and 24 per cent winter time while the other 31 per cent were indifferent.

A series of European Community directives on the period for summer time gradually resulted in member countries using the same start and end dates. Nine directives have been released since 1980, with the latest in 2001 fixing start and finish dates of the last Sunday in March and the last one in October indefinitely (see chapter 8, UK’s single double summer time saga, for more on these directives). ACHED appealed against this current directive in the Court of Justice of the European Union, Luxembourg. The court decided that member countries were obliged to abide by the directive’s mandatory start and end dates only if they used daylight saving.

In 2008, France wanted a 20 per cent reduction in energy use by 2020 to help fight climate change and to become more energy independent. A study by the Environment and Energy Management Agency, or ADEME, in 2009 estimated that summer time saved 440 gigawatt hours of electricity used in lighting a year or 44,000 tons of carbon emissions. The study emphasised that the savings were equal to what was used in 800,000 homes although this equated to just 0.1 per cent of the nation’s total electricity consumption based on U.S. Energy Information Administration data. More efficient lighting technology was expected to reduce the savings to 340 gigawatt hours by 2030. A further 70 gigawatt hours would be saved due to less heating and cooling in tertiary buildings.

⁵¹ “French minister wants end to daylight-savings time”, *Times-News*, Hendersonville, North Carolina, United States, 25 March 1990, p. 3, at <https://news.google.com/newspapers?nid=1665&dat=19900325&id=yBoaAAAIBAJ&sjid=OSQEA AAAIBAJ&pg=4160,5850321&hl=en>

⁵² Michael Mann, “Incredulity at French plan to abandon summer-time”, *Politico*, 9 November 1996, at <http://www.politico.eu/article/incredulity-at-french-plan-to-abandon-summer-time>

ACHED continues to be involved in summer time studies in areas such as energy use, health, sleep, and road safety and to lobby the French and EU governments to abandon daylight saving. Their arguments against the measure, especially two hours of it, can be summarised as follows:

- ☀ Meteorology. Weather forecasting is more difficult. Mornings are darker and cooler, the early afternoon is “too hot” and evenings warm. Traditional schedules are upset.
- ☀ Environment. Earlier traffic means emissions have longer to react with sunlight to form photo-oxidants, increasing ozone peaks.
- ☀ Energy. Decreases in power for lighting and heating in the evening are largely offset by increases in the morning. Low energy light bulbs are now commonplace.
- ☀ Recreation and tourism. People have more time on weekends and holidays and daylight saving isn’t much advantage, but is a minor benefit on weekdays.
- ☀ Sleep. The shift in hours means it is harder to fall asleep at night and more difficult to get up in the morning, resulting in fatigue.
- ☀ Work. Physical labour is harder early on cold mornings. There are difficulties for farmers. Children are less attentive in class.
- ☀ Transport. Time changes cause traffic disruption.
- ☀ Traffic safety. Morning mist makes driving more hazardous. Studies show there are more accidents with daylight saving.⁵³

A month before he was elected as French president in May 2012, François Hollande told ACHED he was sympathetic to the opponents of daylight saving, stating that “the transition to summer time raises serious controversies and a significant part of the population remains firmly opposed to this measure ... Many people ... think that this change induces major disruptions in our society.” He promised to act: “If I am elected I want to reopen the debate and initiate evaluation of the consequences of this device with all stakeholders.” In March 2015, ACHED commented that “nothing concrete yet” had happened. In that month, energy minister Ségolène Royal commissioned a study into the effect of daylight saving on energy consumption. There have been no updates on progress of the investigation at time of writing.

Recent public opinion surveys in France indicate that many people would prefer to be on the same time all year rather than have two clock changes. A survey by CRÉDOC in 2012 found that 40 per cent of residents supported daylight saving while 38 didn’t and 21 per cent had no view either way. According to an OpinionWay poll in 2014, under 20 per cent of the population liked daylight saving. Three-quarters of respondents said the change adversely affected their health, including difficulty sleeping, being less productive at work and appetite loss. Another OpinionWay survey in October 2015 revealed that 52 per cent of the public didn’t want any more clock changes. If it came to a choice between summer time (UTC+2) and winter time (UTC+1) all year, 76 per cent favoured the summer schedule, keeping much of the country about two hours ahead of sun time. Just 28 per cent of people felt that daylight saving conserved energy and 63 per cent said the time change affected their body in some way.

Many French residents refer to summer time as double summer time as the clocks are so far ahead of solar time, and winter time as single summer time as the sun is still

⁵³ “Heure-ete: Argumentaire pourquoi réduire les avancements”, ACHED, at <http://www.heure-ete.net/argumentaire.htm> (translated version used)

around an hour behind the clock in most parts of the country. They consider UTC as France's "natural" time zone. The situation is similar in Spain and a lot of people argue that both countries should be on the same time as the United Kingdom or UTC in winter and UTC+1 in summer. Meanwhile, many in the UK want to be on European time or "single double summer time" (see chapter 8). Some of the local residents and businesses on Molène, an island off Brittany in France's west, don't like the clock being so far ahead and go by solar time.

Other European countries that are often regarded as having summer time in winter and double summer time in summer are Belgium, the Netherlands and Spain. The first two have generally had daylight saving in the same years as France, keeping their clocks ahead throughout the interwar period. For details of daylight saving in these countries during World War I, see chapter 6: Wartime imperatives. For other years, see also chapters 7 and 8 and earlier in this chapter.

Belgium was neutral at the start of World War II but was invaded by Germany on 10 May 1940 and had to use Central European Summer Time, or what was often called Berlin summer time, of GMT+2 for nearly two and a half years from 20 May. Energy savings went nowhere near compensating Belgians for the taxes they had to pay equalling nearly two-thirds of national income to fund German occupation costs, which included some of the expenses of occupation elsewhere. Belgium was progressively liberated between September 1944 and February 1945 but still had double summer time in 1945 similar to France and the United Kingdom, and did the same in 1946 unlike the French. The country then remained on standard time, GMT+1, until the 1970s.

Battling recession and needing to conserve fuel following the 1973-74 oil crisis, Belgium recommenced daylight saving on 3 April 1977, a year after France. Similar to its neighbour, many Belgians didn't like the clocks being so far forward, with time in capital city Brussels in summer being one hour 43 minutes ahead of the sun. An organisation called the Belgian Association against Summer Time, or *l'Association Belge contre l'Heure d'Été*, actively opposes daylight saving and has conducted studies on its effects in areas such as health, sleep, road accidents, and pollution. A survey around 2000 found that 71 per cent of Belgians were averse to what many regard as double summer time. The association preference is UTC+1 all year.

The Netherlands didn't use standard time until 1940 and its summer time, or *zomertijd*, schedule from 1916 until 1937 was based on capital city Amsterdam's local mean time of GMT+0:19:32.13. In summer, the country moved to GMT+1:19:32.13. In 1937, local time was rounded to GMT+0:20 in winter and GMT+1:20 in summer. In a sense, standard time was forced upon the Netherlands by the Germans, who invaded the country on 10 May 1940 despite its neutrality and imposed German daylight saving time of GMT+2 on it six days later on 16 May. Clocks were turned back to German standard time of GMT+1 on 2 November 1942, similar to Belgium and France. Daylight saving was again implemented in 1943 and 1944.

Liberation of the Netherlands took most of 1944-45. The south was freed by September 1944 and various cities put their clocks back to GMT+1 on different dates in the second half of the month to align with British single summer time. The occupied areas returned to German standard time on 2 October. In 1945, both the

United Kingdom and Germany moved to GMT+2 on 2 April, as did all of the Netherlands although it was called British Double Summer Time in the liberated parts and Central European Summer Time in the occupied districts. Along with France, the Netherlands didn't have daylight saving from 1946, staying on standard time of GMT+1 as a provisional arrangement rather than reverting to its prewar time of GMT+0:20.

Meanwhile, Dutch ex-politician, law professor, astronomer and inventor George van den Bergh came up with an idea to maintain sunrise at around the same time all year, avoid daylight saving and its one hour time changes, and keep the farmers and other opponents of summer time happy. He suggested dividing the year into four parts and having slightly different day lengths in two of them:

- ☼ The first part would be from 10 March to 29 May with each day being two minutes shorter than the usual 24 hour day.
- ☼ The second part was 30 May to 30 June and each day would be 24 hours.
- ☼ During the third part, from 1 July to 16 October, each day was to be 90 seconds longer than normal.
- ☼ The fourth part, 17 October to 9 March, was similar to the second in that each day was 24 hours.⁵⁴

Under the scheme, an adjustment to timepieces by clockmakers and watchmakers was needed four times a year. The result would be sunrises in Amsterdam of roughly 7:30 a.m. year round, instead of ranging from about 4:20 a.m. (or 5:20 a.m. with daylight saving) in late June to 8:50 a.m. in late December. But sunset would vary from around 3:10 p.m. to 12:15 a.m. rather than 4:30 p.m. to just after 9 p.m. (10 p.m. with summer time). In 1953, the Dutch internal affairs minister decided the proposal was impractical as the country should no longer be on a different time to its neighbours.

Van den Bergh was undeterred and in 1957 came up with the "Euro-clock" for all of Europe west of the Iron Curtain. This version had only two periods. Each day would be 50 seconds shorter from 22 December to 21 June and 50 seconds longer in the other six month period. Experts advised that while clocks could be altered fairly easily to cater for the scheme, adjusting watches would be far more difficult. Also, getting about 20 countries to agree to the idea was unlikely. In 1958, the Netherlands' standard time zone of GMT+1 was made official.

By the late 1960s, a number of organisations were petitioning the Dutch government to bring back daylight saving, including Association Euro Clock, or *Vereniging Euroklok*, tourism offices, commerce chambers and recreation groups. A study by the country's Social and Economic Council in 1968 concluded that the case for summer time was strong socially and reasonable economically. But the government decided against a clock change.

The situation was different in the 1970s. Daylight saving was reintroduced in the Netherlands in 1977 in response to the 1973-74 oil crisis. The country had been one of five specifically targeted by OPEC for supporting Israel, the others being the United Kingdom, the United States, Canada and Japan. The Netherlands followed the

⁵⁴ "De oorlogsjaren en erna", Utrecht University, Netherlands, at http://www.staff.science.uu.nl/~gent0113/wettijd/wt_text4b.htm (translated version used)

European Community's daylight saving directives for start and finish dates from 1981. In the 1990s, electricity producers found that daylight saving meant energy savings of just 0.1 per cent. Energy Netherlands calculated a reduction of less than 0.2 per cent. Summer time of UTC+2 isn't particularly popular in this country, especially when clocks are so far ahead of solar time, although opinions don't seem to be as strong overall as in France, Belgium and the United Kingdom. One reason might be that in the dairy sector, a very important part of the Dutch economy, farmers now use bulk milk cooling tanks while waiting for milk to be picked up and are less dependent on the clock. Also, tourism bodies don't have strong views on summer time.

Daylight saving seems even less controversial in Luxembourg. This country had summer time in all interwar years. The Germans entered the country on 10 May 1940 and it was placed on Central European Summer Time of GMT+2 from 14 May. Liberation was in September 1944 although Luxembourg continued with single and double summer time for two more years along with a number of its allies. It took up daylight saving again in 1977. A European study of summer time in EC member countries in 1999 described the measure as being "of at best minor significance" in Luxembourg. The country has a high dependence on imports of nonrenewable energy sources and would be unlikely to want to stop using daylight saving.

By contrast, opposition to daylight saving in Spain is quite strong, with a 1995 report by the United Kingdom's Agriculture Development Advisory Service stating that public opinion against summer time was greatest in France, Spain and Belgium. These countries are well west of the time zone they are using, particularly Spain. With standard time of UTC+1, clocks in capital city Madrid are an hour and a quarter ahead of local mean time in winter and a further hour in summer. Daylight saving puts the western region of Galicia about two and a half hours ahead of the sun.

After World War I, Spain kept daylight saving time, or *el horario de verano*, in 1919 as business wanted it but then abandoned it. The scheme was reintroduced by the new government of prime minister Miguel Primo de Rivera in 1924 as the country's trading partners had it and was used again in 1926 to 1929 before his resignation in January 1930. Daylight saving was about to resume in April 1931 when the monarchy lost the municipal elections to the republicans and the measure was cancelled a few days before it was due to start.

The Second Spanish Republic brought daylight saving back in 1937, the year after the start of the Spanish Civil War in mid 1936. Start and end dates differed between republican and nationalist controlled areas. The republicans moved the country's time zone ahead an hour to Central European Time, or GMT+1, on 2 April 1938 and then ordered clocks a further hour ahead for daylight saving at two days' notice from 30 April before going back to the new standard time on 2 October. But the nationalists won the war and returned Spain to GMT on 1 April 1939, adding an hour of daylight saving from 15 April to 8 October.

President Francisco Franco then altered Spain's time zone back to Central European Time on 16 March 1940 to be on the same time as Germany. Spain was supposedly neutral, or at least officially non-belligerent, during World War II although it supported the Axis Powers. It had daylight saving again in 1942 to 1945 to align with Germany and the occupied areas of Europe. After the war, Spain had daylight saving

in 1946 and also in 1949. The country missed out on NATO membership when the organisation was formed on 4 April 1949 and may have taken up daylight saving again because its ally Portugal still used it. Spain retained standard time of GMT+1 despite this zone being well over an hour ahead of sun time in most of the country. The period 1940 to 1946 is now regarded as one of continuous daylight saving with several months of double daylight saving in each year from 1942 to 1946 before a time zone change from GMT to GMT+1 in September of that year.

Spain took up summer time again in 1974 due to the oil crisis. A surge in economic growth and development had resulted in per capita energy demand increasing nearly threefold between 1960 and 1973. When world oil prices quadrupled, Spain set out to reduce its reliance on fossil fuels and embarked on a program of exploiting renewable energy sources. It also used daylight saving although per capita power usage rose by 7 per cent in 1974 while the economy grew by just 0.5 per cent. Since the 1980s, Spain has followed the European Union directives on summer time.

The Canary Islands, off the Moroccan coast, have had daylight saving since 1980, using the EU dates. Gibraltar, near the southern end of the Iberian Peninsula, took up daylight saving again in 1982 for the first time since 1956, putting it on the same time as Spain all year. The British overseas territory had shifted time zones in 1957 from GMT to GMT+1.

A study by Spain's Institute for Diversification and Saving of Energy in 2011 found "potential" savings in lighting of 5 per cent although the estimate assumed "rational behaviour" and efficient lighting technology. The institute mentioned that weatherstripping of doors and windows can reduce energy used in heating and cooling by 5-10 per cent. It also suggested that double glazing of windows can save a further 20 per cent. These tips would appear likely to save a lot more energy than daylight saving. Most studies of energy reduction from summer time around the world have come up with a savings figure of 0-1 per cent. For example, a study by Reincke and Van Den Broek in 1999 found electricity savings of 0-0.5 per cent across 15 European Community countries. The European Commission looked at a number of studies and concluded in 2000 that savings were small. National electricity corporation Red Eléctrica de España in 2008 regarded savings as insignificant.

A combination of a skewed time zone and daylight saving in Spain is often thought to have contributed to major changes in the country's culture. The Spanish lifestyle is said to have evolved to take account of the late clock time, with dinner, prime time television and evening sports matches often starting around 10 p.m. Bedtime might not be until 1-2 a.m., yet people get up, have breakfast and go to work at the normal time. A 2:30 p.m. lunch is followed by a lengthy siesta although many people don't actually take a nap these days. Business and work hours are typically 9 a.m. to 2 p.m. and 5-8 p.m. Studies have shown that work-social balance, productivity, family life, sleep and health all suffer. The problem is usually thought to have started with the move to GMT+1 in 1940 and been made worse by daylight saving. However, the siesta break has been common in Spain and many other places with warm climates since time immemorial. But the habit is perhaps not particularly suited to modern society with its longer working hours away from home.

The National Commission for the Rationalization of Spanish Schedules, or *Comisión Nacional para la Racionalización de los Horarios Españoles*, has been lobbying for a return to UTC since 2003. Many organisations and leading citizens, including politicians, have joined the commission, which also actively encourages people and businesses to change their behaviour and aim for something closer to a 9-5 work routine, without the siesta. The government is showing support for such action. In September 2013, a parliamentary committee recommended a change in standard time back to UTC and a regular eight hour workday.

A survey by Spanish market research firm Opinea in 2014 found that 68 per cent of people wanted to return to UTC and be on the same time as Portugal and the United Kingdom. In December 2016, the government announced it was examining the effects of shifting standard time back an hour. Any change will probably not affect existing daylight saving schedules although clock time will be an hour closer to sun time than now. Also, some changes seem to have been achieved in people's lifestyle and work hours in the cities.

The tiny principality of Andorra didn't have daylight saving during the world wars and was the last European country to adopt it after the two world energy crises, although Iceland had stopped using it after 1967. The microstate changed its standard time from GMT to GMT+1 in 1946 on the same day as Spain and after France had moved to this time zone in 1945. This change put it nearly an hour ahead of local mean time. It took up daylight saving on 31 March 1985 and has followed the European Union directives despite not being a member.

Portugal continued with daylight saving time, or *hora de verão*, after World War I until 1921. The country had summer time in most years in the 1920s and 1930s although not in 1922, 1923, 1925, 1930 and 1933. Whether to have daylight saving probably came down to choice by the various governments and a tendency for the next regime to change the policies of the previous one. The period was quite a chaotic one for Portugal. During the time of the First Portuguese Republic, from 1910 to 1926, it had 45 governments.

The country was neutral during World War II, continuing to trade with nations on both sides. It used daylight saving in all years of the war, including about four months of double summer time, GMT+2, in the middle months of each year from 1942 to 1945 despite standard time in capital city Lisbon already being 37 minutes ahead of mean solar time. A total of four clock changes of two hours forward and two hours back in a year could be quite disruptive to daily routines. Other countries to have double summer time during the war were Belgium, France, Germany, Monaco, Spain, the United Kingdom and Newfoundland, but none of them kept going back and forth by two hours each year; they were generally on continuous daylight saving time and went forward another hour in summer.

After the war, Portugal used daylight saving every year for a couple of decades, one of only a few countries to do so, the others being Iceland, Ireland, the United Kingdom, most of Canada and nine states of the United States. Portugal ceased daylight saving after 1965. Instead of remaining at its old winter time, or GMT, it changed its time zone to GMT+1, which had been its summer time for most of the previous 50 years and now became its standard time. In effect, the move put the

country on continuous daylight saving, with clock time more than an hour and a half forward of solar time. The reason for the change was probably to coordinate with the rest of Western and also Central Europe.

Many people complained about the new time arrangement pushing sunrise in Lisbon out to nearly 9 a.m. for much of December and January. Workers had to get up and go to work with no sign of daylight and children walked to school in the gloom, sparking safety concerns. Children were dozing off in class due to lack of sleep and their progress suffered. The government refused to consider shifting Portugal's time zone back an hour.

Indeed, when the world energy crisis hit in 1973-74, the Portuguese government initially wanted to reintroduce daylight saving time to conserve fuel, especially as economic growth took a battering, falling from 11 per cent in 1973 to 1 per cent in 1974 to -4 per cent in 1975. But adding an hour would have almost resulted in triple summer time with clocks two hours 37 minutes ahead of the sun in the capital. In the end, the government moved the country back to standard time of UTC in 1976 and implemented daylight saving from 1977. Thus Portugal went from UTC+1 year round to summer only and UTC in winter. Other countries advanced their clocks in response to the oil shock but Portugal's were already so far ahead of solar time that it was thought to be impractical to move them any further forward.

The Portuguese economy suffered badly during the world downturn of the early 1990s, with growth slipping from 4 per cent in 1991 to 1 per cent in 1992 although per capita energy use increased by 6 per cent. Also, the Maastricht Treaty creating the European Union was signed in February 1992 and Portugal was keen to take advantage of the benefits the agreement was expected to bring and be on the same time as its major trading partners, aiding communication and transport. The country adopted the same daylight saving schedule it had avoided in the mid 1970s. A decree dated 2 July 1992 put the country in the UTC+1 time zone on 27 September, before moving to summer time of UTC+2 on 28 March 1993, a time zone it hadn't used since World War II.

No studies were conducted to assess the overall feasibility of the change before it was put in place. Energy use per person fell 1.6 per cent in 1993 and economic growth improved from -2 per cent in that year to 1 per cent in 1994 and 4 per cent in 1995. However, the new time set-up was even less popular than what the country previously had from 1977. Not only did people have to cut their sleep short and get up and go to work and school in the dark in winter, but very late sunsets midyear meant they lost sleep in summer too. The sun didn't set until after 10 p.m. and civil twilight lasted a further half an hour and nautical twilight another 40 minutes, taking the time to well after 11 p.m. Children had to be pulled out of bed in the morning in summer as well as in winter.

A study through the European Commission found that energy saved in the evening was lost in the early morning as people used more lighting and heating at the start of the day than before and often forgot, or didn't bother, to turn off lights and appliances. Difficulty sleeping at night and then trying to stay awake in the morning led to an increase in use of medication. Assaults on children in the morning increased and road

accidents were higher. An earlier rush hour in the afternoon heat meant an increase in air pollution.

Then, less than two months after the Socialist Party won government following 10 years of Social Democratic Party rule, the Astronomical Observatory of Lisbon was asked in December 1995 to advise on the appropriate standard time for the country. In February 1996, the observatory recommended UTC rather than UTC+1. A time zone change was made on 31 March, keeping the country on its old winter time of UTC+1 through the summer before falling back to UTC on 27 October. According to a forum on time zones, a news story in 1996 said that new prime minister António Guterres had become sick of getting up in the dark.⁵⁵

Parents and teachers were happy with the change, while business complained about it as Portugal was now in a different time zone to other European countries. Ironically, energy use per head declined 1 per cent in 1996 after a 10 per cent increase in 1995, while the economy grew by around 4 per cent in each year.

Since then, Portugal has had daylight saving time every year from the last Sunday in March until the last Sunday in October. Even though the country moved its time zone back an hour, clocks are still 37 minutes ahead of local mean time in Lisbon in winter and another hour forward of this in summer. *The Portugal News Online* reported in 2013 that the government was conducting a study on the benefits of cancelling daylight saving. The Confederation of Portuguese Industry wanted it retained while trade unions had no view. There was no follow-up to the story.

⁵⁵ “Why idiotic fractional time zones?”, Google Groups, at https://groups.google.com/forum/#!msg/comp.protocols.time.ntp/fsdiE_zRK0k/40IMj1S4M9wJ

10 Mixed feelings in rest of Europe

The daylight saving story in the rest of Europe has been no less controversial than in the western part of the continent. After World War I, the Weimar Republic replaced the German Empire. The new parliament discussed summer time in 1919 but the Enabling Act 1914 had expired and only a minority of members wanted to put the clocks on again. Apart from a few petitions and interest shown by sporting groups, there was little enthusiasm for daylight saving in Germany in the interwar years. World War II started in September 1939 and the country reintroduced summer time, or *Sommerzeit*, on 1 April 1940 to conserve fuel for the war effort.

Germany might have been first with daylight saving in the previous war but the Allies got the jump in the second war. The United Kingdom, Ireland, France, Monaco, Belgium, the Netherlands and Luxembourg had daylight saving throughout the interwar years and continued it in 1940 with a start date of 25 February in all but the Netherlands. Germany didn't turn its clocks back in late 1940 but had continuous daylight saving time of GMT+2 until 2 November 1942.

Meanwhile, German time, including daylight saving, was enforced in several western European countries during World War II (see chapter 9). Germany had single summer time in 1943 and 1944. The Allies entered the country from September 1944 and claimed victory in May 1945, ending hostilities in Europe. Allied occupation zones were drawn up by the United Kingdom, France, the United States and the Soviet Union. The Soviets occupied the eastern part of the country, including Berlin, and implemented double summer time, GMT+3, the same as Moscow time, from 24 May to 24 September 1945. American and British forces occupied West Berlin from July and it may have reverted to single summer time.

Subsequent to normal daylight saving in 1946, Germany had another period of double summer time in 1947. By this time, relations between the three western allies and the Soviets over Germany were becoming increasingly strained. The Allied Control Council released few further agreements relating to the country after June of that year outside of property tax law, adult education, and start and end dates and times for daylight saving. All of Germany had double summer time from 11 May to conserve energy but it finished early, on 29 June, due to protests by the public.

People didn't object to single summer time though. A survey on daylight saving in Germany in April 1948 found that 54 per cent of residents in the American zone in the country's south favoured the scheme. The figure for the city of Bremen in the north was higher, at 63 per cent, while 75 per cent of people in West Berlin supported it. Only 31 per cent of farmers liked the idea, 40 per cent were opposed and 29 per cent had no opinion. In small towns, 37 per cent wanted it, 29 per cent didn't and 35 per cent had no particular view. The main reason folk were against daylight saving was because they said they lost sleep.

Germany had single summer time in 1948 and 1949. After the Berlin Blockade in 1948-49, the three western zones became West Germany in May 1949 and the Soviet zone East Germany in October. Daylight saving was abandoned and not considered again until the oil shock of 1973-74. By then, there were strong trade and social links

between the two countries but not at the political level and the reintroduction of summer time would take them another six years.

West Germany was keen to recommence daylight saving because its economy was hit hard by the energy crisis and changing the clocks was almost seen as a necessary emergency measure in much the same way as during the world wars. However, in December 1973, early estimates of energy savings by the economics ministry were just 0.1-0.2 per cent. East Germany was much less affected by the crisis as its oil contracts were with the Soviet Union and wasn't interested in daylight saving. Besides, most of its energy supply came from brown coal. West Germany was reluctant to make the move to summer time by itself as the last thing it wanted was a Berlin split not only by a wall but by the clock. There was also resistance from trade unions concerned about children rising early and walking long distances to school. Rural voters in general were against any time change. The country resorted to "car-free Sundays" to try and save energy.

Later calculations of fuel savings from summer time in West Germany were slightly higher. For example, in 1974, the Research Centre in Energy Economics, Munich estimated that electricity for lighting could be reduced by 5 per cent although this was only 0.6 per cent of total energy consumption. Studies in East Germany found energy savings from daylight saving would be even lower than West Germany's initial estimate of 0.1-0.2 per cent in 1973. Both countries started putting more emphasis on outdoor evening activities as a more important reason in any consideration of daylight saving.

West German leader Helmut Schmidt wrote to his East German counterpart Erich Honecker in April 1978 asking his position on daylight saving and stating that the two countries should try and avoid time differences. But East Germany seemed to go from lukewarm to cold on the scheme, saying there were no advantages and that any move to adopt summer time would be a political decision. West Germany had hoped to be unified in time all year with other European countries that had reintroduced daylight saving by 1978, including Belgium, France, Italy, Luxembourg, the Netherlands, Poland and Spain.

Drafting of legislation on summer time had started in West Germany in 1976 and the country decided to finalise it despite the reaction of East Germany. The Time Act 1978 was gazetted on 25 July. Interestingly, it didn't mention conserving energy but it did include making better use of daylight and being on the same time as neighbouring countries. The second world oil crisis in 1979 probably made no difference to the progress of daylight saving implementation in the two Germanys. West Germany held off introducing summer time in 1979 due to East Germany's reluctance although later that year the eastern state surprisingly decided it would adopt the measure in the following year. Agreement was reached on dates and both countries put their clocks forward an hour from 6 April to 28 September 1980, the same period as a number of western European nations.

An Allensbach Institute survey found that about two-thirds of West Germans supported the change although there were protests from teachers, employers, trade unions and farmers. In East Germany, the scheme seemed to be very much accepted by the government and the people. Deputy chairman of the ministerial council,

Wolfgang Rauchfuß, had talked up summer time before it started, believing the country would save energy, boost productivity, and have no adverse health effects. People in both Germanys enjoyed the extra daylight after work:

Tennis fans and hobby gardeners appreciate the gift of an hour just like do-it-yourselfers, clandestine workers and fans of outdoor bars ... East Germans, for example, use the longer summer evenings for extra car rides to the countryside ...⁵⁶

However, in October 1980, East Germany announced it was going to scrap daylight saving after just one year as the government had concluded that the policy resulted in no economic benefits, just costs. One of the problems is thought to have been that the additional car trips used up more fuel than expected. The sudden decision didn't help already tense relations between the two countries. West Germany increased the entry fee for East Germans travelling west, and resolved to continue summer time in 1981.

East Germany changed its mind again about daylight saving in December 1980 and joined with West Germany to add an hour to clock time on 29 March 1981, three days before Moscow implemented daylight saving throughout the USSR for the first time since World War II. Main reasons for implementing summer time in the two Germanys were therefore harmonisation with other countries, and leisure, rather than conserving energy. There were reports that even the cows coped well with the necessary one hour real change in milking times, producing milk at previous quantities within two to three days.

Energy savings in West Germany were found to be small. In a 1983 dissertation, Hans Bouillon calculated a reduction in electricity used due to daylight saving of 0.18 per cent in 1980. Part of the reason for such a small decrease was that the proportion of electricity used for lighting had fallen from about 25 per cent in 1960 to 10 per cent 20 years later. Overall savings were even smaller as more energy was used for heating in the mornings, giving a net savings of just 0.01 per cent. A study in 1993 by Germany's electricity producers' association also found that daylight saving had little impact on energy consumption levels.

Nor was the effect of a time change on road accidents encouraging. In contrast to most UK research, road accidents in West Germany were shown to increase after implementation of summer time. Crashes in May 1980 were considerably higher than in May 1979 according to a study by G. Pfaff and E. Weber. The federal authority for roads also found an increase in accidents in 1980, with those causing injury up by 0.7 per cent.

Both East and West Germany shifted their daylight saving start date to the last Sunday in March from 1981 in accordance with the European Commission's first directive on summer time released in 1980. German reunification took place in 1990 and daylight saving continued as usual. In 1996, the end date was extended a month to the last Sunday in October, in line with the EC's seventh directive.

⁵⁶ *Der Spiegel*, 1 September 1980, p. 104, and 11 November 1980, p. 42, in "Saving energy by shifting clocks? Energy policy and the introduction of daylight saving time in East and West Germany", by Mathias Mutz, in *Past and Present Energy Societies: How Energy Connects Politics, Technologies and Cultures*, Nina Möllers and Karin Zachmann (eds), Transcript-Verlag, p. 188, at <https://books.google.com.au/books?isbn=3839419646>

By the 2000s, it was the clock changes that weren't particularly popular in Germany rather than daylight saving per se. A Forsa Institute poll in 2004 showed that only 53 per cent of respondents thought that the time changes made sense. German research in 2005 showed there were no energy savings from the time shifts. In 2006, TNS market research company found that 54 per cent of people wanted all year daylight saving. A sleep study by Till Roenneberg and Thomas Kantermann of Ludwig Maximilian University of Munich in 2007 concluded that people's biological clock took four weeks to adapt to the time change in spring and six weeks in autumn. In 2008, Germany's Federal Environment Agency president Andreas Troge declared that daylight saving had no advantages and instead cost a lot of money.

New junior partner in Germany's coalition government, the Free Democratic Party, took up the cause of ending the clock changes and keeping summer time all year in 2009. The party's energy spokesperson Gudrun Kopp said the time change gave no economic or environmental benefits, just administrative costs and other disadvantages, although she knew Germany couldn't move without the rest of Europe. Support for the party fell for various reasons and it was no longer in the Bundestag after the 2013 election.

German member of the European Parliament, Herbert Reul, has been fighting to get daylight saving abolished throughout the European Union for over a decade. He seems to have quite a bit of support in the parliament, including from members from Austria, the Czech Republic and Sweden. In a debate on daylight saving on 29 October 2015, Violeta Bulc of Slovenia reiterated the official view of the union that the "directive on summer-time arrangements in 2001 which is to ensure the proper functioning of the internal market through harmonisation of timetables is still valid" and that issues such as benefits, costs, and energy savings were incidental. Reul responded:

There is no reason at all to change the time! Let us go back to a situation that is normal. The single market argument is the silliest of all. Nobody wants to have a different time than the rest of the countries! Obviously the single market is important, and a single rule is needed but not this one. Please let's take this issue seriously!⁵⁷

Recent surveys indicate that around 70-75 per cent of Germans don't want the time change and 25 per cent say they suffer insomnia, tiredness and moods because of it. Researchers recommend no exams for at least three weeks after the end of daylight saving in autumn to allow children to adjust. Cows too were affected by the time alteration, with the German Farmers' Association protesting that milk output fell 10 per cent after the change. An innovative farmer in south-west Germany has developed his own way of overcoming lower production and is also thinking of robotic milking (Google-translated version):

Hansjörg Birch Berger from Waldshut-Tiengen brings his 80 cows carefully in the winter time. In five-minute increments, he adjusts the daily milking at 6:30 a.m. and 5 p.m. on the new era. "I milk since early October every day five minutes later," he says.

⁵⁷ European Parliament, Audiovisual Services for Media, "Hearing on summer-time changes in Europe: Extracts from the debate", 29 October 2015, at <http://audiovisual.europarl.europa.eu/Assetdetail.aspx?id=b1847e27-5a1c-419d-a77b-a5400095c2d1>

By creeping familiarisation of the 55-year-old wants to avoid that cows produce less milk. Because the animals are accustomed to being milked at the same time every day. Soon could independently of summer time and are milked: Birch Berger thinks about itself to create a milking robot. With it being no longer milked at a particular time, rather, the cows walk depending on the pressure in the udders of the robot.⁵⁸

To find out if daylight saving makes us sick, the Institute for the Study of Labor, Bonn analysed details of 160 million hospital admissions over a decade in Germany and 3.4 million respondents to surveys of the US Behavioral Risk Factor Surveillance System. The 2015 study found a slight improvement for some four days after the end of daylight saving in autumn, using both the German and US data. The finding was thought to reflect that people were getting a bit more sleep after the clocks went back an hour. However, no significant worsening in health occurred when clocks went forward in spring. That's not to say that people weren't more tired and less productive at work or that children didn't fall asleep in class.

Some studies suggest an increase in heart attacks in the days following the start and end of daylight saving. The Health Insurance Agency, Hamburg found a 25 per cent increase in hospital patients with heart problems in the three days after the start of daylight saving over the nine years to 2014. In another study, using a sample of over 25,000 fatal and non-fatal heart attack victims in Germany between 1985 and 2010 and published by the UK's BioMed Central in 2015, no overall significant change was found in the number of cases three days or a week after the clock alterations. However, men were at greater risk just after the spring transition as were people taking an angiotensin-converting enzyme inhibitor before the time change. Previous heart attack sufferers were more likely to have a recurrence immediately after the autumn changeover.

Neighbouring Switzerland has used the same summer time dates as most of Europe despite it not being a member of the European Union. The country didn't have daylight saving during World War I, the government rejecting the measure on 24 March 1917 as it felt that energy saved would be small. Switzerland maintained its usual neutral stance in World War II and while it leaned towards the Axis Powers the relationship was uneasy and it had a large army at the ready. It first had daylight saving in 1941 and 1942 from early May to early October due to ties with Germany and Austria who had it.

When the oil crisis hit in 1973-74, Switzerland was importing about 80 per cent of its energy needs, mainly fossil fuels. It reduced its energy use per capita by 7 per cent in 1974 and a further 3 per cent in 1975 without daylight saving, but consumption then increased again. The government passed legislation for summer time by 98 votes to 32 on 24 June 1977 to align with other European countries. Farmers objected to the move and collected 82,000 signatures,⁵⁹ 52,000 more than they needed to force a public vote. The government announced on 25 October that a referendum would be

⁵⁸ "Time change", *Spiegel Online*, 23 October 2015, at <http://www.spiegel.de/gesundheit/diagnose/zeitumstellung-am-sonntag-endet-die-sommerzeit-a-1059265.html> (translated version used)

⁵⁹ Photo shows a referendum committee submitting some of the signatures against daylight saving time, Bern, Switzerland, 1977, at <https://www.journal21.ch/langer-kampf-um-die-sommerzeit>

held on 28 May 1978 to decide the issue. Only 49 per cent of those eligible to vote did so and 52 per cent of those who cast a valid vote said “no” to daylight saving.

But the Swiss government still wanted to introduce summer time. Supporters of the scheme wanted train timetables, shopping hours, and television and radio program times coordinated with nearby countries. Farm workers remained against the idea as did families worried that school children would have to get up an hour earlier. Opponents couldn't muster the 50,000 signatures needed for another referendum. Then, in 1980, Germany and Austria joined France (who had summer time from 1976) and Italy (from 1966) on daylight saving and Switzerland became a “time island”. Despite the 1978 referendum result, the government passed the Time Act 1980 on 21 March and daylight saving started on 29 March 1981, although more Swiss people may have wanted summer time now that Germany and Austria had adopted the measure. Christophe Blocher of the People's Party led a protest against summer time from 1982 but it petered out by 1984.

More recently, a motion by Swiss People's Party member Yvette Estermann to drop daylight saving in Switzerland was defeated by 143 votes to 23 in September 2012. The country has had daylight saving each year since 1981, following the European Commission directives. Liechtenstein has had summer time in the same years as Switzerland and has used the same start and end dates.

Daylight saving has been less controversial in Austria although not initially. After being pressured by Germany to have summer time in 1916 to 1918, Austria was going to continue with the scheme in 1919 but discarded it two days before the scheduled start date. The government reintroduced daylight saving on 5 April 1920 although some states wouldn't cooperate. Salzburg dumped it on 1 May except for the railways. Vorarlberg, in the country's far west, didn't want it but probably relented. The state's post offices were under strict instructions to use summer time. Austria would next have daylight saving during World War II.

Germany invaded Austria in March 1938 and it became part of that country. There seemed to be little opposition, with a referendum in April asking Germans and Austrians if they approved of the Nazi Party as the only party and the annexing of Austria, all as one question. In the Austria region, the party claimed that 99.71 per cent of the electorate turned out to vote and 99.73 per cent of them voted “yes”. Massive propaganda and some coercion no doubt boosted the numbers, with campaign workers known to have kept a close eye on voting. Austria consequently had the same daylight saving dates as Germany during most of the war, including continuous summer time from April 1940 to November 1942. The Soviets launched the Vienna Offensive on 2 April 1945, introducing daylight saving on that day but it finished just 10 days later, the day before they captured the city. After the war, Austria was divided into four zones similar to Germany and continued to have daylight saving in 1946 to 1948.

Like most of Europe, summer time in Austria only became a consideration again due to the 1973-74 oil crisis. The country's economic growth fell from 4 per cent in 1974 to -0.4 per cent in 1975. The Counting Time Act was passed in 1976 and included a provision to introduce daylight saving. In 1978, Austria's Energy Consumption Agency forecast a fall in energy use of 0.43 per cent with summer time.

A decision was made in 1979 to commence daylight saving in 1980. Reasons were mainly to be in unison with neighbouring countries and recreation, but also to conserve energy. The Vienna University of Economics and Business estimated that power consumption fell just 0.24 per cent in 1980 and 0.26 per cent in 1981. In the late 1990s, Dr Hochwarter of Vienna's energy distributor Wiener Stadtwerke said that energy savings from daylight saving were 0.1-0.2 per cent. In an IFES poll in 1983, only 20 per cent of Austrians were opposed to daylight saving time, falling to less than 20 per cent in a 2011 survey, in contrast to the 70-75 per cent disapproval in Germany. Austria's economy ministry recently said that ditching summer time wasn't an option.

Italy had daylight saving, or *l'ora legale*, or literally "the legal time", in 1916 to 1918 and retained it for two years after the end of World War I. The Italians battled hard against Austria-Hungary during the war, suffering heavy losses before final victory on 3 November 1918. By previous agreement with the Allies, they had expected to gain some territory for their efforts in the war, namely Fiume, which had a large Italian population, and part of Dalmatia where they had a presence. It didn't happen and they were extremely disappointed.

They weren't happy with daylight saving either. A few days after clocks went forward in March 1920, newspapers reported that workmen "flung themselves across the railway lines, stopping the trains". They went on strike and complained that they had to get up too early in the dark and the fog. Prime minister Francesco Nitti seemed more interested in conserving coal, estimating that 150,000 tons would be saved that year. In 1924, four years after resigning due to the strains of keeping together an administration dogged by fighting between communist, fascist and anarchist factions, he jokingly said that daylight saving in Italy failed because:

Our mistake ... was in calling it "the legal hour". We should have known that no true Italian would have endured it. We should have called it "the illegal hour". Then every Italian would have been unanimously in favor of it!⁶⁰

Italy's expansionist policies in the late 1930s were almost as aggressive as those of Germany who it signed a military alliance with, the Pact of Steel, in May 1939. The speed of the German invasions and attacks caught Italy by surprise and it revealed that it wouldn't be ready to fight a major war until 1942. Soon, prime minister Benito Mussolini decided he couldn't wait that long and declared war on Britain and France on 10 June 1940. Italy started daylight saving five days later and kept its clocks an hour ahead until 2 November 1942, the same date as Germany.

The Italians were defeated but Germany set up a puppet state in northern Italy, the Italian Social Republic, while the Allies controlled the southern part of the country. There were some variations in the daylight saving periods between the two regions. The Allies finally won in Italy on 2 May 1945 but summer time continued in that year and through to 1948 before it was abandoned.

⁶⁰ "Daylight saving is not popular in Italy", *The Stanstead Journal*, Quebec, Canada, 6 March 1924, p. 4, at <https://news.google.com/newspapers?nid=805&dat=19240306&id=u0pIAAAAIBAJ&sjid=60gDAAAIBAJ&pg=3188,2370897&hl=en>

Italy reintroduced daylight saving in 1966 when no one else in continental Europe was using it. The country had suffered an economic slowdown in the mid 1960s, with growth falling from 8 per cent in 1961 to 3 per cent in both 1964 and 1965 according to World Bank data. However, the increase in energy use per capita fell only slightly to a still very high 8-9 per cent a year. Parliament legislated in May 1965 to bring in daylight saving in 1966 for four months from late May to late September. Italy resumed its postwar economic miracle, with growth in 1966 to 1969 of 6-7 per cent a year, although whether summer time had anything to do with it is hard to tell. Despite daylight saving, per capita energy consumption rose by an average of 9 per cent a year from 1966 to 1970 before plateauing in the 1970s, with strikes and social unrest in 1969-70 and the oil crisis in 1973-74 dampening economic growth.

Daylight saving in Italy was increased to six months a year from 1981 and seven months from 1996 in line with European Commission directives. Malta, San Marino and Vatican City follow Italy with daylight saving. A poll by consumer group Codacons in 2008 found that people were split 50:50 on daylight saving although when respondents were asked if winter time should be eliminated, meaning no clock changes, 80 per cent were in favour. Italian energy transmitters Terna Group estimated that the country saved around 550 million kilowatt hours of electricity in 2014 and again in 2015 with daylight saving. This equates to about 0.8 per cent of household usage and 0.2 per cent of total consumption.

Greece first tried daylight saving in the 1930s. The economy had been suffering greatly during the Depression and was dependent on exports of a few luxury agricultural products, such as tobacco, raisins and olive oil, whose demand had fallen sharply. Daylight saving was introduced on 7 July 1932 but ended less than two months later on 1 September after people complained that clock time was too far ahead of the sun. Standard time in Athens was already 25 minutes forward of local mean time and daylight saving added another hour. Greece may have had summer time in 1931 from April to October.

The country next had daylight saving during World War II. Italy invaded Greece via Albania from October 1940 but the Greek army pushed them back, causing Germany to enter Greece from 6 April 1941. Daylight saving started the next day, taking the country from GMT+2 to GMT+3. Clocks went back to GMT+2 on 30 April to be on the same summer time as Germany. The country was kept on this time until 2 November 1942 when the Germans finished summer time. Greece was then at GMT+1 along with Germany, meaning that solar time in Athens was 35 minutes ahead of the clock, which resulted in light winter mornings with sunrise around 6:40 a.m. in late December but dark afternoons with the sun disappearing by about 4:10 p.m. Many Greeks probably kept using GMT+2.

Daylight saving was implemented again in 1943 and probably 1944. Fierce resistance against the occupying Germans meant Greece was steadily liberated, with the job finalised in October 1944 when the occupiers retreated due to the approaching Russians and the arrival of the British. Instead of reverting to GMT+1, Greece stayed at GMT+2 which had been its standard time from 1916 to 1941.

Greece then had four months of daylight saving from 1 July 1952 in an attempt to reduce power usage in the early stages of the Greek “economic miracle” which featured strong growth. But expected energy savings didn’t come about and, as in 1932, the experiment met with a lot of complaints. The country didn’t have summer time again until after the first oil crisis. Economic growth fell from 8 per cent in 1973, which was about the annual average for the previous decade or so, to –6 per cent in 1974. Energy consumption had been increasing rapidly, up 20 per cent per capita in 1970, then by an average of 15 per cent a year from 1971 to 1973. Usage per head declined by 5 per cent in 1974, consistent with the economy’s contraction. Greece restarted daylight saving in 1975 despite objections.

The Greek nation has been on daylight saving each year since that time and uses start and finish dates set down in the EU directives. A proposal to change to Central European Time in early 1997 to help business and trade was short lived. People seem to be happy with the current time arrangements and there doesn’t appear to be any groups in Greece trying to make changes to them.

Among Scandinavian countries, daylight saving wasn’t used much in World War I, with Denmark, Norway and Sweden using it in 1916, Iceland in 1917 and 1918, and Finland not adopting it at all (see chapter 6). Daylight saving was discussed in Finland in 1922 but nothing came of it. A motion to change time in Sweden in 1926 failed. A number of American newspapers in 1933 stated that Finland was to have summer time in 1934 from 20 June although the plan may not have come to fruition. Daylight saving was reintroduced in most of these northern countries during World War II.

Denmark was neutral but occupied by Germany from 9 April 1940. Prime minister Thorvald Stauning thought about daylight saving but was worried about the farmers’ protests and that youth might not go to bed any earlier and not be fit for work next day. First, he considered summer time in cities only, and then putting clocks on half an hour in all areas. A short daylight saving period of a one hour time change was eventually agreed to, from 15 May to 15 August 1940, throughout the country. A week or two before the end date, many people wanted to keep daylight saving but were told they could make their own arrangements by continuing to get up an hour earlier and for businesses and offices to keep opening early. The Danish government launched a campaign, “Today’s work by the light of day” to promote the initiative. But the Wehrmacht, or Germany’s armed forces, suddenly decided that summer time would be extended to 1 September, then to 1 October, and then to end of year, and the program became redundant. Denmark had continuous daylight saving until November 1942. It then had summer time each year from 1943 to 1948, retaining it after liberation in May 1945 to save energy.

Norway was another neutral country but was also occupied during the war and had a similar daylight saving schedule to Denmark although it didn’t use the measure in the immediate postwar years. Sweden was neutral and avoided occupation due to location, diplomacy and its own military build up from 1942. It didn’t have daylight saving at all during the war, one of only three European countries not to do so, the others being Russia and Andorra. Finland fought the Soviet Union in the Winter War and the Continuation War and later Germany in the Lapland War. It had daylight saving for one year, 1942, to try and save fuel at the height of Russian hostilities.

Iceland reintroduced daylight saving on 29 April 1939, more than four months before the start of World War II. It was the only European country to start summer time that year although a number were already using the measure. Iceland was neutral but after Germany invaded Norway and Denmark, the British were worried that the northern island might be next. After Iceland refused assistance from Britain, it “invaded” the Nordic island country in May 1940. The British and then the Americans “occupied” Iceland for the duration of the war, basically protecting their interests and preventing German attacks. Iceland had daylight saving in each year of the war and maintained the scheme until 1967.

In November 1958, the Nordic Council recommended that all member countries consider using daylight saving under uniform rules. Iceland of course already had it. In Sweden, the medical fraternity favoured the move but other groups, including the railways, were opposed to it. Norwegian health director Karl Evang stressed the health benefits of the shift in daylight. In the end, the only member country to adopt the scheme at this time was Norway, who used it from 1959 to 1965 before pressure from various quarters resulted in the parliament removing it. A proposal in 1964 for summer time in Sweden went no further.

Clocks were put forward an hour to GMT in Iceland in 1968 and left there permanently. Parliament took into account the cost and inconvenience of two clock changes a year, difficulties for labour, sleep disruption and the advantage of lighter evenings. It also considered darker winter mornings for employees and children getting up and going to work and school. Fuel savings weren't a factor, despite economic growth falling from 9 per cent in 1966 to a contraction of 1 per cent in 1967, as Iceland had plenty of geothermal power and hydropower by then. The time change put standard time in Reykjavik about an hour and a half ahead of solar mean time. Sunrise at the winter solstice was around 11:20 a.m. and sunset at 3:30 p.m. but with long twilight periods. In June, however, the sun was up between about 3 a.m. and midnight, with civil twilight during the other three hours.

Some Scandinavian countries were affected by the 1973-74 oil shock more than others although no one in the region reintroduced daylight saving until 1980. Norway's economic growth was around 4-6 per cent throughout the 1970s thanks to its North Sea oil supplies. By contrast, Denmark went from annual growth of about 4 per cent in 1972 and 1973 to recession in the next two years and the country cut its per capita energy use by 8 per cent in 1974 without daylight saving. Sweden's economy fell steadily from 4 per cent growth in 1973 to be in recession in 1977. Similarly in Finland, economic growth slid from strong to virtually zero. Iceland had one poor year, 1975, but had good growth in every other year of the decade.

Denmark brought the topic of daylight saving to the Nordic Council of Ministers in 1974. A study was conducted but participants failed to reach agreement. The Swedish Parliament considered summer time in 1975-76, and in 1978-79 when a bill was passed into law. Denmark, Norway and Sweden all recommenced daylight saving in 1980, and Finland in 1981. Harmonisation with the rest of Europe was the main reason rather than conserving energy. The countries have followed the European Union directives on daylight saving dates since that time, including Norway which has never been a member after its electorate voted against joining in 1969 and 2002.

Since about 2000, Denmark has had a National Association Against Summer Time, or *Landsforeningen mod Sommertid*, which has a large number of members and lobbies the Danish and European parliaments to cancel daylight saving. The association's aim "is to make itself redundant". Its one hour annual general meeting is held via the internet at 2 a.m. on the last Sunday in March when daylight saving starts and the time suddenly becomes 3 a.m., except at the meeting.

Public acceptance of daylight saving in Denmark has fallen over time. Surveys by TNS Gallup in 1979 and 1982 indicated a strong preference among the public for summer time before and soon after its reintroduction. In more recent times, support slipped from 58 per cent in 2000-01 to 47 per cent in 2006 (see next table), the decline coinciding with studies in various countries showing adverse health effects of time changes. National Association Against Summer Time chairman Jørgen Bak believes that opposition to daylight saving has since increased further. A survey in 2003-04 asked respondents how long they took to adapt to a change in time. More than half, or 53 per cent, said straightaway, 10 per cent said a day, 8 per cent a couple of days, 9 per cent a week, 7 per cent a few weeks and 13 per cent a month or more.

Poll question: Should we have summer time in Denmark?

| <i>Year</i> | <i>Yes</i> | <i>No</i> | <i>Don't know</i> |
|-------------|------------|-----------|-------------------|
| 2000-01 | 58 | 39 | 3 |
| 2001-02 | 60 | 37 | 3 |
| 2003 | 51 | 44 | 5 |
| 2004 | 45 | 50 | 5 |
| 2005 | 51 | 45 | 4 |
| 2006 | 47 | 48 | 4 |

Note: Components may not add to totals due to rounding.

Source: "Landsforeningen mod Sommertid", at <http://www.negroj.dk/sommertid/mening.htm> (translated version used)

In Norway, loud protests came from the farmers over the decision to reintroduce daylight saving in 1980. More recently, Jenny Klinge of the Centre Party would prefer the country to remain on summer time all year due to health problems associated with clock changes and to allow people more daylight on winter afternoons. In capital city Oslo, the sun sets around 3:10 p.m. in mid December. Cecile Hansen, mayor of northern municipality Sør-Varanger from 2011 to 2015, where the sun doesn't set in June or rise in December, thinks the time change "is completely illogical" and would like lighter afternoons in spring and autumn. A 2011 poll found that 34 per cent of Norwegians would like daylight saving all year. But Norway is tied to the European Union summer time directive via the European Economic Area Agreement. Svalbard, as part of Norway, has daylight saving although the sun doesn't set for more than four months over summer.

Professor Ståle Pallesen of the Social Psychology department at Norway's Bergen University argues that people cope better with the change in time at the end of summer time than at the start. He says that if a person is put in a room with unaltered lighting, his or her natural circadian rhythm, or biological clock, will move towards a 25 hour cycle.

A study of all heart attack victims in Sweden from 1987 to 2006 by researchers at the Karolinska Institutet found that, on average, numbers rose by a statistically significant 5 per cent in the first week of daylight saving. Researcher Imre Janszky attributes the

increase to reduced sleep affecting people's body clock. The results for the first week of returning to standard time were less clear although a 5 per cent decrease was recorded on the Monday, the day following the changeover, when people are likely to have had more sleep. The Centre Party has long been in favour of year round daylight saving and put a motion to the Swedish Parliament in 2014 to scrap winter time arguing that it increases depression.

Finland has found no reduction in energy use in summer months from daylight saving and perhaps a very small cut in spring and autumn. A citizens' initiative through the ministry of justice to end daylight saving in the country due to lack of energy savings and alleged harmful effects on health was launched in October 2015. An analysis of 10 years of hospital data by researchers at Turku University found an 8 per cent rise in ischemic stroke in the first two days of daylight saving. The increase was 20 per cent for patients over 65 years of age and 25 per cent for cancer sufferers. Deaths from stroke didn't increase.

From 1994 to 2006, six proposals to extend evening daylight in Iceland by another hour all year, to UTC+1, went before the parliament without success. This would have put the sun at its highest at about 2:30 p.m. in Reykjavik. A poll in 2000 found that 48 per cent of people would be happy with such a policy and 44 per cent weren't in favour. Then, in 2010, a proposition to put clocks *back* an hour the whole year failed, as did motions in 2013 and 2014 to either go back all year or just in winter. Since about 2008, Seyðisfjörður, a town in the country's east, has wanted a return to daylight saving. Standard time is already nearly an hour forward of local time but the sun disappears behind a high mountain right next to the town by around 2:30 p.m. Local lobby group the Association for a Sunnier Society took its concerns to the government, but without luck so far.

Daylight saving hasn't been without controversy in Eastern Europe either. The area wholly or partly covered by a number of today's countries had daylight saving time in 1916 to 1918 as part of Austria-Hungary, including the Czech Republic, Hungary, Poland and Slovakia, although Bosnia and Herzegovina and Croatia didn't use it.

Estonia and Latvia were occupied by Germany in World War I and started the scheme in 1918. Both were still on local time, their capital cities of Tallinn and Riga being at GMT+1:39 and +1:36. Estonia moved back 39 minutes to GMT+1 on 1 February before having daylight saving from 15 April to 16 September, the same dates as Germany. After the war, Estonia reverted to local time on 1 July 1919 but then moved to GMT+2 on 1 May 1921. Latvia also started and ended daylight saving on the German dates in 1918 and had it for about seven weeks in 1919, but simply added an hour to local time. The country didn't have standard time until 1926.

In the interwar years, Romania and Moldova, which was part of Greater Romania, were the only parts of Eastern Europe to have daylight saving for an extended period, after being on local time until 1931. The reason for putting clocks forward may have been the Depression and an international decline in oil production, which fell 2 per cent in 1930 and 5 per cent in each of the following two years before increasing again in 1933. Further, Royal Dutch Shell oil company chairman Henri Deterding told the Romanian Oil Gazette, or *Monitorul Petrolului Român*, in February 1931 that the domestic oil industry was in serious trouble. Romania and Moldova had daylight

saving each year from 1932 to 1940. Moldova came under the Soviet umbrella from 1940 and had daylight saving continuously from then until 1942 and again in 1943 and 1944 before a time zone change to GMT+3 put the country on the same time as Moscow.

In broad terms, the northern parts of Eastern Europe were occupied by the Germans for at least some of World War II, while the southern parts were mostly the domain of German allies and puppet states. These countries had daylight saving in various years during the war (see table at start of chapter 9, and Appendix), including continuous summer time from 1940 or 1941 to November 1942 in nearly all of them. Königsberg, which had been part of Prussia and then Germany before it became part of the USSR at the end of the war and renamed Kaliningrad, had daylight saving from 1940 until 1945. Several Eastern European states continued with daylight saving in the years immediately after the war: Czechoslovakia (now the Czech Republic and Slovakia) and Poland until 1949 and Hungary to 1950.

Two Eastern European countries put their clocks ahead in summer for a period well before the world oil crises of the 1970s. Hungary had daylight saving from 1954 to 1957 to try and reduce energy consumption from near capacity levels at the evening peak. Poland used summer time in the years 1957 to 1964, also to conserve fuel.

All nations in Eastern Europe reintroduced daylight saving within a decade of the 1973-74 oil shock to save fuel and be in unison. They soon fell into line with European Commission directives. Albania, one of the Continent's poorest countries, was first in 1974. Its five year plan for 1971 to 1975 hadn't been progressing well and dictator Enver Hoxha was criticising just about everyone, including the industry and mining minister in 1972 for not being frugal enough with raw materials such as crude oil. The country may have adopted daylight saving regardless of any world oil crisis. Ironically, it is rich in natural resources.

Next was Poland in 1977. Daylight saving doesn't seem to be particularly popular in this country, with people often thinking of summer time as the norm and winter time as unnecessary. One of the many agenda items of the Polish Rationalist Association is to scrap the twice a year clock change as studies show it doesn't save much energy and to use Central European Summer Time or UTC+2 all year. Poland is on the eastern edge of the CET time zone and capital city Warsaw has a local mean time of UTC+1:24, so the proposal arguably makes sense. In 2013, the association wrote to the then prime minister Donald Tusk, now European Council president, asking for the time alteration to be abandoned, pointing out that (with slight adjustments for readability in English):

... fundamental change in the structure of employment in industry, computerisation and robotics manufacturing, communications revolution, flexible work, the increasing role of self-employment, the emergence of a huge number of new professions and services, and change in daily activity of humans ... [has reduced] the economic viability of the time change ...

... [The] twice yearly time change is very expensive and complicated ... [for] rail ... [and] information systems. There are more and more documented reports about the negative impact of this manipulation on human health. There are serious indications linking it [to] the increase in the number of strokes, heart attacks, sleep disorders,

depression and road accidents. The ... disorder of circadian rhythm is unjustified, highly tiring and is a harassment.

... The expectations of many Poles are clear – we want more daylight in the afternoon in winter.⁶¹

Four more Eastern European countries reintroduced summer time in 1979: Bulgaria, Romania and what are now the Czech Republic and Slovakia. According to World Bank data, while energy use per capita didn't rise in the Czech Republic area in the 1970s, it rose rapidly in the other three countries, and then more or less plateaued for a decade after daylight saving came back in. Czech baker Stanislav Pecka campaigned tirelessly from 1981 until his death in 2009 for the removal of daylight saving time, approaching the government numerous times and even the European Court of Human Rights. He won the support of some Czech deputies and tried unsuccessfully to enter politics himself. The European Parliament discussed a proposal by Peter Šilar of the Christian and Democratic Union – Czechoslovak People's Party in March 2015 to stop switching between summer and winter time.

Hungary was the only Eastern European state to recommence daylight saving in 1980. This was followed in 1981 by Belarus, Estonia, Latvia, Lithuania, Moldova and Ukraine. Standard time in these countries had been the same as Moscow since World War II, UTC+3, and already 1-1.5 hours ahead of solar time. The USSR started daylight saving in 1981 and therefore time in the six countries moved another hour ahead of the sun in summer. All of them were able to return to standard time of UTC+2 in 1989, 1990 or 1991 when the USSR was crumbling. Belarus and Moldova missed a year of daylight saving in 1990 although the others continued with it through this period.

Estonia, Latvia and Lithuania didn't have summer time in 2000 as surveys had shown people were opposed to it. But some Estonian businesses weren't impressed with the loss of daylight later in the day and started an hour earlier. A poll in this country in 2001 found that residents for and against daylight saving were almost the same. By 2002, the public had changed its mind and the country reinstated the measure to conserve energy and to help with its European Union membership application. Latvia readopted summer time in 2001 and Lithuania in 2003. All three became EU members in 2004. People seemed to rethink daylight saving again by 2006 with 55 per cent against it and 32 per cent in favour in Lithuania and 60 per cent not wanting it in Latvia although the latter survey didn't use random sampling. A Latvian study in 2006 found minimal energy savings from summer time.

Last of the Eastern European countries to take up daylight saving in response to the 1970s oil shocks was the former Yugoslavia in 1983, now the six separate states of Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia and Slovenia. Serbia's state owned electricity company Elektroprivreda Srbije estimated that power savings in the days after transitioning to daylight saving were about 0.4 per cent.

⁶¹ "A permanent CEST in Poland", letter to prime minister Donald Tusk from Polish Rationalist Association, 23 October 2013, at http://www.petycje.pl/petycja/10027/wprowadzenie_stalego_czasu_letniiego_zrodkowoeuropejskiego_w_polsce.html (translated version used)

The European Union defended the system of uniform daylight saving time among member countries in a 2014 study, “The application of summertime in Europe”, by consultants ICF International. The idea was to “examine the implications, for the internal market, business and citizens[,] of the application of summertime no longer being synchronised” rather than to determine if the scheme per se was useful. Six scenarios were developed to show the effects of one or more member countries changing their summer time policy and moving out of synchronisation with other members, complete with cost estimates for each case.

Only 18 of the 28 member countries responded to the survey. Five of these 18 said they would consider changing their summer time position if not for current Directive 2000/84/EC on daylight saving, by scrapping it altogether or keeping clocks forward all year or changing the start and end dates. Of 230 business and consumer organisations contacted, just 26 responded. The consultants took this apathy as a sign that the current daylight saving system was satisfactory to most groups. On the other hand, the disinterest may have reflected a feeling that whatever respondents said about daylight saving, the European Union would be unlikely to change its mind regarding the present set up.

The EU concluded that daylight saving was beneficial to industries such as tourism and leisure and had less effect on agriculture nowadays due to modern farming techniques, while it conceded that energy savings were small. It emphasised that any changes by a member country to current daylight saving arrangements would be harmful to intercountry business, trade, investment and transport due to higher costs, lower productivity and less convenience. The report also detailed various benefits of daylight saving. And it noted that most studies showed positive outcomes of summer time on crime, road accidents and the environment, along with mixed results relating to health and sleep.⁶²

Fairly strong opposition to daylight saving continues in many European Union countries, including Spain, France, Belgium, the Netherlands, Germany and Italy, but also in some of the northern and eastern states. Interestingly, most deputies of the Transport Committee of the European Parliament called for an end to daylight saving in October 2015 as there were few advantages for transport and limited energy savings. Many countries are reducing power consumption by various other means. Per capita energy use in Germany fell by 20 per cent from 1979 to 2012. France’s is down 15 per cent in 10 years since peaking in 2004, and Belgium’s by 16 per cent over 14 years after peaking in 2000.

Russia abandoned daylight saving after 2010, taking Belarus and nearly Ukraine and Moldova’s Transnistria region with it, none of which are members of the European Union. After World War I, the Moscow region had daylight saving in 1919, including double summer time for a month, with local mean time of GMT+2:31 still being the base. The area moved to standard time of GMT+3 later that year. Daylight saving was used again in 1921 when clocks went forward an hour in February and a further hour in March, putting the time in Moscow two and a half hours ahead of the sun. Other

⁶² ICF International, “The application of summertime in Europe: A report to the European Commission Directorate-General for Mobility and Transport (DG MOVE)”, 2014, at <http://ec.europa.eu/transport/facts-fundings/studies/doc/2014-09-19-the-application-of-summertime-in-europe.pdf>

parts of Russia took up standard time between 1919 and 1924, ranging from GMT+3 in the western areas to GMT+11 in far eastern Siberia, but none probably had daylight saving in this period. Standard time in the Moscow area shifted back an hour to GMT+2 in October 1922, but there were no corresponding changes in other regions.

The USSR was formed two months later and daylight saving wasn't used again until 1981 although Moscow returned to standard time of GMT+3 in 1930 while the rest of Russia (except Kaliningrad) and some of the Asian republics also moved an hour ahead from their various time zones, putting them well in front of solar time (see Appendix for details). All of the Soviet Union had daylight saving from 1981 to save electricity, putting the various regions even further ahead of the sun. It was the first time most of Russia and any of the Asian republics had the scheme (for the story of daylight saving in Asia, see chapter 22: Asian countries opting out). By 1985, the entire USSR was using the same start and end dates as European Union countries.

When the USSR was dissolved in 1991, all of Russia continued with daylight saving as did the European republics (although Belarus and Moldova missed 1990) and some of the Asian republics, which were separate countries again. Nearly all countries changed their standard time zone back an hour, including Russia. In the following year, all of Russia except Kaliningrad (and the Samara area, which had moved back in 1989 and forward again in 1991) cancelled the change and reverted to the zone they had used since 1930.

In 2008, energy savings in Russia were found to be less than previously thought, but the government had no intention of scrapping summer time at that stage. Then, in November 2009, president Dmitry Medvedev began suggesting the country might ditch daylight saving and keep clocks ahead all year, prompting several studies. The Russian Academy of Medical Sciences reported that heart attacks increased by 50 per cent and suicides by 66 per cent with a clock change. Power saved was estimated at just 0.2 per cent. In Kamchatka in the country's far east, 3,000 people held a rally in December 2010 against winter time saying it pushes up crime and causes depression. Then in the following month in that area, local authorities criticised a scene in a version of the play *Cinderella*, where the king wound the clock back so she could stay at the ball another hour, as causing "unhealthy emotions".

A national poll in February 2011 found that about 60 per cent of people didn't want the twice a year time change. In that month, Medvedev announced that daylight saving would end, mainly for public health reasons. He said:

Every fall and every spring we are swearing at this system. Our biorhythms are damaged. We are all angry. We either oversleep and turn up late for work or wake up too early and don't know what to do with this free time. Let alone poor cows and other animals that can't understand why they should have their meals or be milked earlier or later.⁶³

Russia moved its time zones forward an hour (to UTC+4 in Moscow) on the last Sunday in March 2011, allegedly forever, when it would normally have started daylight saving. Metrology agency RosStandard deputy head Vladimir Krutikov was

⁶³ "Time stops: Russia abolishes daylight saving time practice", *RT* (previously *Russia Today*), 8 February 2011, at <https://www.rt.com/news/daylight-saving-time-abolished>

sceptical whether this would be the last change. Instead of changing back in late October, clocks stayed the same. But many computers and other devices reverted to the old winter time automatically. Trains from Russia to Ukraine, which was also expected to keep its clocks forward but reneged 10 days out, broke down. Transnistria, which is adjacent to Ukraine, kept to its summer-winter schedule too. Belarus moved with Russia, ending daylight saving there. Anti-government demonstrations in Russia in December 2011 included protestors with placards carrying messages demanding a return to winter time. Some folk, arguing that promised reform didn't really happen under Medvedev, felt that locking Russia into summer time was his only legacy and not a very good one.

A bill proposing to permanently move clocks back an hour came into the Russian Parliament in September 2012. Vladimir Putin, who had been president since May, was thought to be in support of the bill and that his intention was to embarrass Medvedev who was now prime minister. But there were rumours of a deal between the two whereby Putin wouldn't interfere with the time system and humiliate the former president. Within days, Putin decided that Medvedev and his cabinet should sort out the time issue, and the bill was removed.

But by January 2014, more than 100 Duma deputies had signed a bill to once again change the clocks in Russia, from eternal summer time to everlasting winter time. People had been starting work and children going to school in the dark, there were health concerns, and the time difference made it harder to do business with Europe. Putin said publicly he didn't like summer time and any agreement between him and Medvedev about what time system to use seemed over.

Clocks across Russia were brought back an hour on 26 October 2014, the sixth change to standard time in most of the country, and the seventh in Moscow: GMT+3 in 1919 (from local mean time of GMT+2:31), GMT+2 in 1922, GMT+3 in 1930, UTC+2 in 1991, UTC+3 in 1992, UTC+4 in 2011 and UTC+3 in 2014. Geography Institute deputy director Arkady Tishkov wasn't happy with the latest time change saying it was done for advertisers as the darker evenings would mean people watch television longer. Belarus was content, now being on the same time as Moscow. But many residents of Crimea were less than happy when Russia annexed the peninsula in March 2014 and promptly put it on Moscow time, which was then still UTC+4 or two hours ahead of the region's old time, before moving it to UTC+3 when Russia changed permanently to winter time. The rest of Ukraine stayed in the UTC+2 time zone and still has daylight saving.

Part III

Daylight saving in North America

11 United States adopts measure late

Among the last countries to introduce national daylight saving time during World War I was the United States. The underlying reason was probably because America wasn't directly involved in the war until quite late and therefore the urgency to save fuel wasn't as great as in Europe and perhaps Australia.

Unlike mainland European countries, whose adoption of daylight saving was quick, the American process was long and controversial, similar to that in the United Kingdom. It started when England's daylight saving champion William Willett wrote to every member of Congress in 1909 to try and gain support for his idea at home. If he could convince the United States to start daylight saving, then the one hour overlap of the London and Liverpool stock exchanges with the New York exchange would be maintained if the United Kingdom also embraced the concept. But he got no support from Congress. And US financiers had been concerned about the first daylight saving bill in England in 1908, saying that tea at 5 p.m. would reduce business hours.

However, in Ohio, Cincinnati businessman E. H. Murdock took up the cause after a trip to England where he had learned about Willett's proposal. He got together an assortment of prominent business people and they formed the National Daylight Association of Cincinnati. Feeling confident in their objective, they arranged to meet with US president William Howard Taft, also from Cincinnati, on 17 May 1909. The group proposed a daylight saving bill to him. While helpful, he couldn't promise them anything and suggested they approach Congress. A week later, Massachusetts representative Andrew J. Peters introduced a bill for national daylight saving, based on Willett's proposal in Britain. Under the plan, clocks would be put forward 20 minutes on each of four Sundays in April and back in similar fashion in September. The bill received little support. But like Willett in England, Murdock kept campaigning. In 1910, Cincinnati passed an ordinance for daylight saving but it was soon repealed due to opposition from the public.

Both support and opposition for daylight saving slowly grew but it remained a minor issue compared with that in Britain. William Allen, who had led the push for railway time in the 1880s, came out against the plan, as did the railroads in general. It would be too dangerous for all stations and officials to alter timepieces twice a year, they argued, as it would take just one driver or signaller to forget to change his watch and disaster could occur. Farmers maintained their steadfast resistance to daylight saving, just as they did in Britain. On the other hand, momentum for the idea came from the burgeoning leisure and retail industries, which knew the value of an extra hour of daylight for baseball games, amusement parks and department stores. By the mid 1910s, local business groups were advocating daylight saving time in a number of cities, including Baltimore, Boston, Chicago, Kansas City, Philadelphia, Providence and New York.

Debate intensified in America in 1916 when European countries on both sides of the war took up daylight saving to conserve fuel. But serious argument in the United States was mixed with humour and scoffing. A daylight saving bill was initiated by representative William P. Borland of Missouri and senator Jacob Gallinger of New Hampshire in May, the same month a number of European nations, including the

United Kingdom, adopted the measure. At a Senate hearing into the bill, John O’Laughlin of the *Chicago Herald* tried on 26 May to convince the committee, all from Washington, D.C., that:

... [yesterday] the baseball club which represents the National Capital and the one which represents Chicago battled 14 innings to a tie. Darkness prevented [your] young men from adding a much needed ball game to the winning column. With an extra hour of sunlight, Washington might well have been leading the league again.⁶⁴

The result of course may well have gone the other way. O’Laughlin didn’t mention that the Washington Senators had lost to the Chicago White Sox 1-4 on 24 May and perhaps did well to last out for a 3-3 draw on 25 May when fading light stopped play. At any rate, the bill was thrown out.

Proponents wasted no time in keeping the issue alive. Three days later, on 29 May 1916, New York clothing manufacturer Marcus M. Marks met with 15 union, business and local government leaders to discuss ways to promote daylight saving. They formed the National Daylight Saving Association with Marks as president. In the summer of that year, the Pittsburgh Chamber of Commerce, with industrialist and city councillor Robert Garland as president, became the first business association to advocate nationwide daylight saving.

While national efforts continued, a handful of centres went ahead and adopted the scheme. The city of Eastport, Maine, near the Canadian border, may have been the first place in the United States to have daylight saving (as distinct from a time zone change) when it put clocks forward for a two week trial from about 1 July 1916. The old mining town of Blewett, now a ghost town, in the state of Washington may have been the second, using the measure from about 2 August. By then, the town was owned by a lumber company and the workday began at 5 a.m. In the city of Seward, to the south of Anchorage, Alaska, the railroad, a number of businesses and the school had daylight saving from 1 October but not the council. Within days, residents were unimpressed having to keep two times and after a week most businesses were back on standard time. The experiment officially ended in late November.

Boston retailer A. Lincoln Filene got the Boston Chamber of Commerce to form a committee to study the feasibility of daylight saving. A favourable report was produced in January 1917 called “An hour of light for an hour of night” recommending all year national daylight saving. The report referred to the usual advantages put forward for the scheme, including fewer industrial accidents, fuel savings, better health and improved morals. It also outlined 10 supposed benefits for farmers although each one was shown to be incorrect. For example, the committee claimed that harvesting early in the day retained dew on the produce, making it look fresher and more appealing to buyers. But farmers knew that wet crops couldn’t be harvested and, in any case, dew would evaporate before produce reached market. The committee stated that farmers could sleep in, but in fact they would have to be up earlier, in terms of real time, if they were to get dairy produce to towns and cities on

⁶⁴ US Senate Hearings, 1916, in David Prerau, *Seize the Daylight: The Curious and Contentious Story of Daylight Saving Time*, 2005, Thunder’s Mouth Press, New York, NY, United States, p. 80, at <https://books.google.com.au/books?isbn=078673695X>

time. It was also suggested that animals preferred working in the early, cooler hours. Farmers retorted that their beasts didn't wear watches.

Nevertheless, Garland and Filene, along with the National Daylight Saving Association, presented their case to the US Chamber of Commerce. President of the chamber, R. G. Rhett, set up a National Committee on Daylight Saving, comprising Garland as chairman, Filene and six others. Their meeting at the William Penn Hotel, Pittsburgh, Pennsylvania on 5 December 1916 was attended by Marks and a report was submitted recommending legislation. The document was endorsed by the chamber's annual meeting in Washington, D.C., held from 31 January to 2 February 1917. This meant the daylight saving movement now had the support of more than 800 commerce chambers and trade boards representing over half a million businessmen across the nation.

The American Federation of Labor favoured the idea of daylight saving and so did the National Lawn Tennis Association and the National League of Professional Baseball Clubs. In a letter to Garland, the league's president John K. Tener wrote:

I am today, and always have been, in favor of this plan, in order that all the people might enjoy just that much more of daylight and God's sunshine. You may record not only my present advocacy of the plan, but the hearty cooperation which will be given you by the National League of Professional Base Ball Clubs in bringing about the desired end.

The proposition should recommend itself to all who are interested in welfare work, as well as to those red-blooded Americans who are interested in outdoor sports, whether their pleasure be in witnessing contests on the field or participating in them, and who appreciate how necessary it is to the nation's moral worth that its leisure hours be spent in outdoor, healthful recreation.⁶⁵

The Daylight Saving Association arranged a two day National Daylight Saving Convention at New York's Astor Hotel on 30 and 31 January 1917. Lapel badges of Uncle Sam putting a clock forward an hour were handed out to 5,000 delegates from commerce, industry, unions, government and other groups across the country. They listened to speakers including Borland, New York mayor John P. Mitchel, Tener, Columbia University professor Harold Jacoby, Garland, and British House of Commons member J. H. Whitehouse. US president Woodrow Wilson, known to like the idea of daylight saving, sent a letter of support to the convention.

Farming communities and the railways remained opposed to the plan although a number of railroad companies stated they would be happy with one permanent change in time, not two adjustments each year. In February 1917, the American Railway Association said it wouldn't support any legislation for a temporary change in time. Despite overall widespread support for daylight saving, bills before both houses of Congress in the session from 4 December 1916 to 3 March 1917 were defeated.

⁶⁵ Robert Garland, *Ten Years of Daylight Saving from the Pittsburgh Standpoint*, p. 12, at a page of an old website of the Carnegie Library of Pittsburgh. Quote can now be found at a page of the Columbia University Libraries Preservation Division, at Internet Archive page, https://archive.org/stream/daylightsavingst00unit/daylightsavingst00unit_djvu.txt.

A factor that would soon play a role in the issue was World War I. A German U-boat had sunk British passenger liner *Lusitania* in May 1915 with 128 Americans among the dead. President Wilson had declared that “America was too proud to fight” and demanded an end to passenger ship attacks. Soon supporters of daylight saving were linking the idea to patriotism and efficiency, with slogans such as “mobilize an extra hour of daylight and help win the war”.

Then, in February 1917, America learned of a coded telegram sent the previous month by German foreign secretary Arthur Zimmermann via the German ambassador in Washington, D.C. to the German ambassador in Mexico. It asked that he persuade the Mexican government to become Germany’s ally against the United States in exchange for financial assistance and support to regain Texas, New Mexico and Arizona, lost in the Mexican-American War of 1846-1848. The telegram was intercepted by the British. The same message announced that Germany was starting unrestricted submarine warfare from 1 February. Over the next two months, a number of American merchant ships were attacked and three sank. This was the final straw.

On 2 April 1917, the first day of the new parliamentary session, Wilson asked Congress to declare war on Germany. Congress complied and on 6 April the United States was at war. Less than two weeks later, on 17 April, a bill calling for standard time and daylight saving time was drawn up by the National Daylight Saving Association and brought into Congress by Borland and senator William Calder of Brooklyn. The bill not only asked for five months of daylight saving, but to finally make railway time (effectively standard time) official, which had been observed by virtually the whole country for well over 30 years.

A long list of leading daylight saving supporters testified before the Senate committee, including Marks, Garland, Filene, George Renaud, C. M. Hayes and Jacoby. They presented a wide range of arguments in favour of daylight saving, such as reduced fuel consumption, an increase in food production, improved health, and more time for recreation. Garland, for example, stated that the estimated number of incandescent lamps in America was 130 million and growing rapidly, and to illuminate them all for one hour a day from May to September took 937,000 tons of coal. The energy saved could be rechannelled into the war effort, he pointed out. Professor Robert Willson of Harvard University reminded the committee of how most cities near railway time zone boundaries chose the eastern zone and hence longer afternoons. Sidney Colgate of Colgate & Company spoke about his firm’s experiment in 1915, where it put clocks an hour ahead in July and August. A vote among staff found that 94 per cent wanted it to continue through September.

Meanwhile, very few places advanced their clocks in the summer of 1917. Two that did were the cities of Green Bay and Superior in Wisconsin although a number of businesses around the country and a few schools kept daylight saving hours. Perhaps the general thinking among communities was that national daylight saving was close and there was no need to go it alone.

As usual, farmers and the railways were against daylight saving time. The American Railway Association’s D. C. Stewart had calculated the number of timepieces at stations and on rail staff across the country at about 1.7 million and stressed to the

committee that if just one clock or watch wasn't changed correctly, there could be a terrible accident on one of the many single track lines.

While the reasons to have daylight saving were sufficient to carry the bill through the Senate on 27 June 1917, the bill's path in the House of Representatives took much longer. Various government and business spokesmen supported the bill, and the press now largely favoured the scheme. P. S. Risdale of the National War Garden Commission said that daylight saving would add 910 million person hours of home vegetable gardening a year. This meant that more food produced by the large farms could be transported to America's allies in Europe where millions of farm hands had been taken off the land to become soldiers, and countries were starving.

But farming and railway groups kept up their fierce opposition to daylight saving, as did many politicians. Some felt they couldn't treat it as a pressing matter, such as representative Otis Wingo of Arkansas who commented:

I do not know that I have any particular objection to this bill; I just decline to take it seriously. ... A majority of the men who advocate this character of legislation have not seen the sun rise for twenty years. ... This bill is for the relief of the slackers of the nation who are too lazy to get up early. ... We should not be wasting our time on such bills, but should go on to the war-finance bill. ... While our boys are fighting in the trenches, we are here like a lot of schoolboys "tinkering" with the clocks.⁶⁶

Nevertheless, the tide of support for the bill continued to grow. When the House was advised that considerably more coal was consumed in the cooler months of March and October than over summer, it revised the bill from five to seven months of daylight time to start on the last Sunday in March and finish on the last Sunday in October. The amended bill was passed by 253 votes to 40 on 15 March 1918 and approved by the Senate the following day, becoming law on 19 March. The result was the Standard Time Act of 1918, or the Calder Act, which included daylight saving time, the long title being "An Act to save daylight and to provide standard time for the United States".

Except for Alaska, clocks throughout the country were put forward an hour for the first time at 2 a.m. on Sunday 31 March 1918. Thus 2 a.m. became 3 a.m. Many folk stayed up until 2 a.m. to make the change although the National Daylight Saving Association had suggested that households adjust their clocks before they went to bed the previous evening and for workplaces to alter theirs at the end of the last shift of the previous week. It was Easter and priests were worried that people would oversleep and be late for service due to the time change. The association advised churches to "ring their bells more lustily than usual".

Some people went out and celebrated the changeover. Thousands turned out at Madison Square Park in New York to watch a parade featuring the New York Police Department Band and members of the Boy Scouts. As the crowd listened to patriotic speeches, Marcus Marks appeared from the Aldine Club where he had been celebrating with other Daylight Saving Association members. He made his way to the

⁶⁶ United States, Congressional Record, 1917, in David Prerau, *Seize the Daylight: The Curious and Contentious Story of Daylight Saving Time*, 2005, Thunder's Mouth Press, New York, NY, United States, p. 89, at <https://books.google.com.au/books?isbn=078673695X>

Metropolitan Tower and moved the minute hand of the clock ahead an hour to resounding cheers. Similarly, William Calder attended a gathering in nearby Brooklyn where the Borough Hall clock was wound forward.

One city that didn't join in the celebrations was Detroit, Michigan, which was already about half an hour ahead of local mean time. A council ordinance of 1918 moved the city from Eastern to Central time during the daylight saving period, meaning that the time didn't change at all but stayed at GMT-5. In less than two decades, Detroit had gone from local time to Central time, back to local, then to Central, to Eastern, and back to Central time in 1918. But from a federal viewpoint, the Standard Time Act had shifted Michigan from the Central to the Eastern zone. Daylight saving took the state to GMT-4, except Detroit and a few other places that held out or changed back during the summer.



Ohio Clock in the US Capitol building, Washington, D.C., being turned forward for the country's first daylight saving time in 1918; William Calder is at left

Source: Library of Congress, United States, at <http://www.loc.gov/pictures/item/hec2009000649>

Elsewhere, the change went relatively smoothly across the nation. Initially, many people arrived late for church services, work or appointments, but no disasters were reported and the sun rose and set as usual. Baseball fans and motorists were happy, and businesses attracted more customers and didn't need lighting late in the day. Some clocks were hard to change though. In Illinois, three men took an hour to reset the main Elgin National Watch Company clock of 20 feet (six metres) in diameter and with a 500 pound (225 kilograms) pendulum.

Many people were unimpressed with daylight saving, including residents on the western edge of a time zone where clocks were now typically about an hour and a half ahead of local time. Workers on early shifts didn't like it, resenting rising in darkness so that middle class businessmen could play golf in the late afternoon. Farmers' schedules were upset. Light evenings meant the movie industry lost money. Some opponents felt daylight saving was like robbing Peter to pay Paul. Church groups didn't want any change to "God's time".

Nevertheless, the press soon became quite enthusiastic about daylight saving, with the *Literary Digest* stating that "daylight saving is now a permanent feature of our national life". It was commonly called daylight saving time or daylight time in America rather than summer time as in Europe. It was also referred to as war time, as in Britain. Other frequently used terms for it in the United States were advanced time and fast time, as distinct from standard time or slow time or, curiously, God's time, which had previously been used to refer to local or sun time. Many politicians wanted the new time year round as a way of reducing peak loads at power stations and the Senate passed a winter daylight saving bill, something even the Daylight Saving Association was against. The House wasn't interested either and America's first period of daylight saving ended, as scheduled, on Sunday 27 October 1918.

Farmers kept up their protests and were a very influential group in Congress in a period when the nation's rural population was similar in number to those living in cities. World War I ended in November and farmers felt this added to their case for getting rid of daylight saving. They pressured Congress into a review, convincing representatives Dudley Doolittle of Kansas and Edward King of Illinois to introduce bills on 19 February 1919 to repeal the measure.

Within days, many letters and telegrams protesting against the bills were sent to politicians by various groups, including chambers of commerce, the Merchants' Association, the National War Garden Commission, and the Women's Association of Commerce of the United States which urged that "working girls and women ... be not deprived of this extra hour of sunshine and recreation". A few state legislatures took a vote and petitioned Congress one way or the other, while the Daylight Saving Association launched a campaign against repeal. To a large extent, the debate was a struggle between city and country.

But the bills hadn't reached the House floor by 4 March, making revocation in 1919 too late, and daylight saving went ahead across the country in that year as planned. There were again a few exceptions such as Detroit, and some communities abandoned daylight saving part way through the summer. Overall, the scheme seemed to have a lot of support, including from business, labor unions, sporting groups, city people in general, the press, and of course the Daylight Saving Association. However, the

farmers were very much opposed to the policy as they had to rise and work by the sun and were put out if everyone else in the community, including shops, schools, railways and banks, was an hour ahead. An Iowa farmer explained to a visiting city relative why two clocks on his mantelpiece showed different times. One was set to “God’s time. We get up in the morning, do our farming and go to bed by that time. The other is [president] Woodrow Wilson’s time. That’s what we go to the train by”.

In early June 1919, business and labour voiced strong opposition against revoking daylight saving at a House Interstate Commerce Committee hearing with representative John Esch of Wisconsin as chairman. Ironically, he had introduced a repeal bill the previous week, on 29 May, one of more than 20 such bills that had come into Congress by that time.

At the hearing, Henry Sterling spoke on behalf of the three million members of the American Federation of Labor, stressing that daylight saving resulted in “better health and better living for the general workers”. Thomas Atkeson of the farmers’ group National Grange with its 600,000 patrons pointed out that because dew stayed on the crops an hour later by the clock, “the farmer and his men must stand idly by. Then, in the afternoon, when the work is finished, he goes to the store only to find that, under the new law, it is closed”. In response, representative Thetus Sims of Tennessee fired back: “Why not utilize those early morning hours that he wastes waiting for the dew to disappear by going to the store.” On 6 June, the committee voted 10 to 8 to rescind the Act although the three members who were absent were known to favour daylight saving.

Perhaps surprisingly, the Federation of Labor annual conference in Atlantic City, New Jersey on 10 June voted 180 to 154 not to protest against the daylight saving repeal bill. Petitions to revoke the measure continued to arrive in Washington, D.C., such as those from 25,000 Iowans on 16 June in two large bundles that resembled laundry bags. On 18 June, the House easily passed the bill, by 233 votes to 122, to end daylight time in October for good. The Senate added the repeal bill as a rider to the \$34 million Agricultural Appropriation Bill for 1920, making sure the annulment got through, and passed it with a vote of 56 to 6 on the same day.

Many groups variously urged President Wilson, a Democrat with a city background, to sign the repeal bill or veto it. He reportedly gave the issue lengthy and careful consideration before rejecting the decision of both houses and vetoing the agricultural bill. In a statement supporting daylight saving on 12 July 1919, he said:

I believe that the repeal of the act ... would be of very great inconvenience to the country. ... It would involve a serious economic loss. The act resulted not only from a careful study of industrial conditions by competent men familiar with the business operations of the country, but also from observation of the happy and beneficial consequences of similar legislation in other countries ... where it has resulted, as ... in the United States, in substantial economies.⁶⁷

A two-thirds majority was needed in each house to overturn the president’s decision to veto and both sides of the debate swung into immediate action. National Daylight

⁶⁷ “House to fight Wilson’s veto”, *The Detroit Free Press*, Detroit, Michigan, United States, 13 July 1919, p. 1, Newspapers.com (subscription only), at <https://www.newspapers.com/image/118664218>

Saving Association president Marcus Marks was sure that 90 per cent of the population wanted daylight saving and encouraged everyone to petition senators and representatives by telegram and letter to uphold the veto. Senator Calder said that “as the father of the daylight saving measure”, he implored people to do the same. Farmer groups were equally adamant that their side had by far the greater number of supporters and that petitions against daylight saving easily exceeded those in favour.

On 14 July, two days after Wilson’s veto, the House voted by 247 to 135 to pass the agricultural bill and its rider to abolish daylight saving. But this wasn’t quite enough to overturn his decision, needing 23 more votes to get to a two-thirds majority. On the following day, Senate leaders insisted that the House try again but a second attempt, on 18 July, failed after heated debate. The Senate passed the agricultural bill minus the rider on 23 July and would now vote on Esch’s bill that had been passed by the House on 18 June rather than attaching it as a rider to another, more favourable bill, even though the president was thought likely to veto again on the strength of the agricultural bill with rider not achieving the two-thirds majority vote in the House. In the end, the Senate passed the daylight saving repeal bill by 41 votes to 12 on 1 August. Meanwhile, petitions from bodies representing 25 million people, or about a third of the voting age population, had been sent to Wilson asking him to veto the bill.

Predictions of what the president would do turned out to be correct. On 15 August 1919, he vetoed the bill for a second time and sent it back to Congress. He said he weighed up the inconveniences to the farmers with the advantages for industry before concluding that the farmer’s “life and methods are more easily adjusted” than those of the manufacturer and merchant who profit from extra production with daylight saving. Congress members and officials couldn’t recall any other bill rejected twice by a president and doubted a two-thirds majority could be achieved in the House.

An announcement was made on 16 August that the House would vote again on the repeal bill three days later and supporters on both sides sent telegrams to members exhorting them to return to Washington. Absenteeism of city representatives was expected to be higher than for rural members. The House voted 223 to 101 to ditch daylight saving, thus exceeding the two-thirds majority. The “yes” vote was down 24 and the “no” vote by 34, reflecting the greater number of city members absent compared with the previous count. Voting went on city-country lines rather than by party. A total of 116 Republicans and 107 Democrats didn’t want daylight time, while 54 and 46 respectively plus one independent favoured the scheme. Over 100 representatives weren’t there, and had 11 more city members turned up, the result might have been different. Next day, the Senate voted 57 to 19 to revoke the bill, easily reaching the required majority. National daylight saving time ended on 26 October 1919.

No longer a federal issue, daylight saving was set to become a state and local matter across America, starting perhaps the most chaotic period in the scheme’s history anywhere in the world. Marks and the Daylight Saving Association swung into action on the same day the Senate voted to end the measure, starting a campaign to get cities and towns across the nation to make local laws for daylight saving. Straightaway, New York head alderman Robert Moran felt that the scheme had overwhelming support of residents and promised a bill for a local ordinance.

On 22 August, two days after the Senate vote, the Pittsburgh Chamber of Commerce, which had been the first business association in America to champion daylight saving back in May 1916, resolved to ask the city to pass an ordinance for daylight time. The chamber had plenty of support from city councillor and daylight saving stalwart Robert Garland as well as from schools, industrial workers, sports people and gardeners. It was confident that municipalities in eastern states from Maine south to Virginia would join the move to keep clocks ahead in future summers.

Country areas and many western states seemed very unlikely to share the enthusiasm of the eastern cities for local daylight saving. But Marks and the Daylight Saving Association suggested five months of advanced time from late April to late September, instead of seven, and were optimistic that most areas would follow the lead of the urban centres. In his view:

If the cities turned the clock forward and the rural districts did not ... a man from up-State would not know where he was at, and we would be doing acrobatic stunts on the clock dial all day long. All that, however, could be arranged, for if the cities adopted it the rural sections would also do so, except perhaps in a part of the West, but that would have little effect.⁶⁸

Illinois Manufacturers' Association secretary John Glenn suggested that city businesses start an hour earlier in the summer rather than changing the clock, and that way keep both urban and rural folk happy. The cities weren't interested in this potential solution. Instead, Albany, Atlantic City, Baltimore, Boston, Hartford, New York, Norfolk, Philadelphia, Pittsburgh, Providence, Richmond, Rochester and Syracuse, among others in north-eastern and Atlantic states, were planning daylight saving. Many supporters were hoping that each of the New England states would eventually pass legislation to form a large contiguous area of daylight saving along with New Jersey and Delaware. Some cities and towns in Wisconsin, Ohio, Kentucky and Tennessee also intended to adopt the scheme.

Cincinnati, Ohio was the first large city to move. With standard time of GMT-6 putting it 22 minutes behind the sun, the city passed an ordinance on 6 October 1919 for all year daylight saving from the end of that month. New York City's Board of Aldermen unanimously supported a daylight saving ordinance on 14 October. Other cities soon did the same. In Pittsburgh, many endorsements and objections were received by the council before an ordinance was finally passed on 22 December, with Daniel Winters the only councillor to vote against it. He felt that daylight saving should be national or not at all, anticipating great confusion if other municipalities didn't adopt the measure. Garland was confident they would follow the likes of New York and Pittsburgh.

A plan to have daylight saving in the New England states was announced by Massachusetts state senator George Hastings in late October 1919 and to do this with the support of local chambers of commerce and the American Federation of Labor. As always, farmers opposed reintroducing daylight saving. The annual convention of the Massachusetts State Grange on 10 December resolved to resist any move to put the clocks forward. Delegates attended the daylight saving meeting of the Boston

⁶⁸ "Plan local action to save daylight", *The New York Times*, New York, NY, United States, 23 August 1919, p. 11, Newspapers.com (subscription only), at <https://www.newspapers.com/image/20620317>

Chamber of Commerce next day and voiced their displeasure at the idea of state fast time.

The battle between city and country heated up when the Massachusetts agriculture department met on 17 February 1920 to prepare a case for a state parliamentary hearing the following week on bills proposing daylight saving. At that session, proponents made reference to various health benefits and how the scheme was favoured by 88 per cent of the state's more than 2,000 doctors and 86 per cent of its hospitals. Another speaker made the point that the state had 770,000 industrial workers and only 40,900 in farming and felt the majority should rule. A Chamber of Commerce representative told the committee that 41 members had indicated their support for daylight saving while only three didn't want it. A number of business people also advocated the measure, discussing advantages such as shorter working afternoons, fewer workplace accidents due to better light later in the day, and savings in coal.

Those opposing daylight saving at the hearing were mainly from farmer groups. They told the committee of financial losses if the legislation went through, that schedules would be out of kilter, and that dairymen would need two shifts of workers and milking in the early morning would be by lantern light. They accused city dwellers of wanting daylight saving for unimportant reasons such as more time for recreation and gardening. The commissioner of agriculture estimated that food prices would rise 10-15 per cent if the scheme went ahead. He also said neighbouring states were unlikely to want daylight time as they were largely rural.

Newspapers felt that the "friends" of daylight saving had the better case and this view continued through the hearing. The Massachusetts' House passed the bill by a massive 181 votes to 38 on 23 March 1920. While he was waiting for the Senate to decide, the governor, Calvin Coolidge, reminded everyone that daylight saving was no good for farmers and that banks and US courts weren't subject to state law and would go their own way. He was from an agricultural district and there were fears he would veto the bill. He followed the situation in nearby states carefully. Most of the other New England states weren't intending to introduce daylight saving although many cities and towns had ordinances or were considering them.

While debate continued in the Massachusetts legislature, New York became the first state to have daylight saving after the federal Act was rescinded in August 1919. A state law had been enacted during World War I to take effect should the national scheme no longer apply. A bill to repeal the state law and allow local areas to use ordinances was passed by the Senate, but defeated by 75 votes to 74 in the Assembly on 20 March 1920 and daylight saving began across New York state as scheduled on 28 March. Little confusion was reported, with trains running to the new time and shops and banks opening an hour earlier. Nineteen ex-servicemen were gainfully employed changing clocks. At the third attempt, the repeal bill was passed on 23 April although many of the state's cities and towns were already using ordinances. But the governor, Al Smith, vetoed the bill on 20 May. It came up again next year and was finally passed, with urban areas officially permitted to use daylight saving ordinances from 1922.

Back in Massachusetts, the planned start date for daylight saving came and went and both houses voted on adding an emergency preamble to the bill to allow a later commencement rather than waiting until next year. The amendment went through by an overwhelming majority of 173 votes to 29 in the House and 36 to 1 in the Senate on 5 April 1920. Two days later, Coolidge was still monitoring the situation in other states. He said he didn't like the bill but would probably go with the views of members, who were close to the public in their respective districts. Of replies he received to telegrams he had sent to mayors and newspaper editors, 65 approved daylight saving and 15 opposed it. As sentiment for the scheme seemed strong, Coolidge signed the bill on 9 April albeit reluctantly. Clocks throughout Massachusetts would go forward an hour on the last Sunday of the month.

People in the cities and towns were looking forward to finishing work earlier and to lighter evenings. Filene's department store made reference to the upcoming new time in its advertising of a woman's two piece jersey suit on 17 April in *The Boston Post*: "What better suit for the longer daylight saving days than an all-wool jersey ..."

Not everyone was happy though. Agricultural magazines editor Herbert Myrick took legal action through the Superior Court on 17 April to try and stop daylight saving in Massachusetts before it had started, but his petition failed on 24 April. The decision of the Boston and Maine Railroad to use the new Massachusetts time on its lines brought howls of protests from farmers, who would have to rise even earlier than normal to get their milk onto the train. Other trains in Maine and New Hampshire would remain on standard time. New Hampshire governor John Bartlett wrote to Coolidge on 24 April in a last ditch effort to reverse Massachusetts' daylight saving law. He stressed the difficulties for farmers, and the 6,000 school children who travelled on the B&M trains and would arrive at school an hour early. The plea was to no avail.

Daylight saving time started in Massachusetts on 25 April 1920 and the new time seemed to be accepted in Boston and other urban centres although there was confusion as trains stayed on standard time. Thus a person had to get to the station by 7:45 a.m. by their wristwatch to catch the 6:45 a.m. train into work. And if you reached your destination station at 7:15 a.m. standard time and then walked a couple of blocks to your workplace, you would be in nice time to start work, at 8:30 a.m. daylight saving time. Financial institutions and the American Telephone and Telegraph Company also kept operating on standard time. Some people wore two watches: one set to standard time and the other to daylight saving time.

Confusion over train schedules, as well as other evidently annoying aspects of the new time, was captured in verse by poet and *Boston Post* correspondent and later editor Henry Gillen:

SAVING DAYLIGHT?

I dashed to catch the midnight train
I grabbed a ticket – all in vain,
I did not leave till one – because
We're saving daylight here by laws.

I tried to milk the blooming cow,
She booted me into the scow,

I found that I was wrong – because
The cow knew naught of the daylight laws.

I went to church at half-past ten,
I got in on the last amen,
I missed the offering – because
They're singing psalms by saving laws.

I've found – to join in on the fun,
We have to disregard the sun,
And go by Beacon Hill – because
Our favored sons want daylight laws.⁶⁹



Woman wearing two watches set to different times

Source: *The Boston Post*, Boston, Massachusetts, United States, 26 April 1920, p. 2, Newspapers.com (subscription only), at <https://www.newspapers.com/image/89400014>

⁶⁹ Henry Gillen, “Saving daylight?”, *The Boston Post*, Boston, Massachusetts, United States, 26 April 1920, p. 2, Newspapers.com (subscription only), at <https://www.newspapers.com/image/89400014>. Beacon Hill, an inner neighbourhood of Boston, is the site of the Massachusetts State House.

As well as the two states that had daylight saving in 1920, New York and Massachusetts, ordinances were passed in scores of cities and towns in at least 12 other states: Maine, New Hampshire, Rhode Island, Connecticut, New Jersey, Pennsylvania, Delaware, Ohio, Michigan, Indiana, Illinois and, perhaps surprisingly, Colorado, but only in Denver, which had it for just two years. A number of Californian cities, including Los Angeles and San Francisco, and Portland, Oregon considered daylight saving. Other states with strong pushes for daylight saving in urban areas were Michigan, Wisconsin, Minnesota, Iowa, Missouri and Washington.

People got through the first season of state daylight saving time in Massachusetts although farmers were as hostile as ever towards the measure. Many of the 10,000 attendees on the first day of the 54th annual conference of the National Grange held in Boston on 10 November 1920 called daylight saving “German time” or “Bolshevik time”.

In Connecticut, the cities of Hartford and New Britain abandoned daylight saving after just one week. Manchester, New Hampshire dumped it after two months. In Pennsylvania, daylight saving ordinances turned out to be illegal under state law and a number of cities, including Philadelphia, reversed decisions to start the scheme although many shops, banks, factories and other businesses opened and closed an hour earlier. Pittsburgh went ahead with daylight saving regardless, as did neighbouring areas, but the nearby city of McKeesport threatened it with court action, before deciding to put its own clocks on a few days later.

Sometimes adjoining local government areas adopted the measure and sometimes not, resulting in large numbers of people living under one time and working or attending school under another. Start and finish dates varied. Certain municipalities took months before deciding one way or the other. Some businesses started early in places that didn't have daylight saving whereas quite a few refused to recognise it in localities that had it. Country people often ignored it as much as possible if their local area happened to be using it. Some railroads changed times, while others didn't as they were hesitant to switch when there was lack of uniformity among states and between urban areas. State and federal institutions remained on standard time, except state bodies in Massachusetts and New York. All the while, there were federal bills for daylight saving to apply to the entire Eastern time zone. Almost a quarter of the American population had the scheme in 1920.

The situation was similar in 1921. More cities commenced daylight saving, notably Louisville, Kentucky; Philadelphia; and Milwaukee, Wisconsin, while others pulled out, such as Manchester. The measure only lasted one season in Louisville and two in Milwaukee, but was retained indefinitely in Philadelphia. A bill for statewide daylight saving time was introduced into the Californian legislature in January 1921. Nothing came of it although chambers of commerce kept pushing to have the scheme at a city level. A poll by New York City businesses found that 95 per cent of their employees liked daylight saving.

By 1922, some 200 large cities and 500 smaller cities, towns and rural communities had daylight saving in the United States, mainly in the north-eastern and mid Atlantic states. Nearly all of Massachusetts, Rhode Island, Connecticut and New Jersey used it, as did Maryland although capital city Annapolis and largest city Baltimore only

had it in 1922 and the scheme subsequently lost favour in other parts of the state too. Major cities such as New York, Philadelphia, Boston and Chicago put their clocks on. Daylight saving in New York State was now up to each city and town, with the large centres passing ordinances, but cities including Rochester and Syracuse as well as various industrial and agricultural areas not adopting the measure. Trains stayed on standard time, except for a few local services in places with daylight saving. Trams and buses used whatever time the rest of a city was on. The advantages of lighter evenings for various activities had become the main reason for daylight saving rather than conserving fuel, causing farmers to become even more annoyed by the clock change.

President Warren Harding and Congress, perhaps fearful of the farmers, refused to consider national daylight saving but were happy for organisations in Washington, D.C. to open and close an hour earlier in summer. A plan to this effect was put in place on 15 May 1922, with no changes to the clock. Most government departments, shops, other businesses, schools and courts took up the idea. Train timetables were adjusted to coordinate with the earlier start and finish times. Initially, some people missed their train or didn't know whether to have lunch at 11 a.m. or 12 noon.

The plan had benefits for motorists too, giving them "an hour more for evening's enjoyment of delights of the road", according to *The Washington Post* of 14 May 1922, in an era of much less traffic. A favourite pastime was a drive in the country, and an early finish meant motorists could undertake a longer trip after work in good light. The newspaper estimated that drivers could go 20 miles (32 kilometres) further in the extra hour.

However, the government printing office, post offices, banks, the fire department, cinemas, some night schools, churches, quite a few shops and other businesses, and Congress itself (but not the White House) kept operating under normal hours. Baseball games started half an hour earlier. Street car services couldn't cope as most government workers needed transport at virtually the same time. Bankers were unimpressed as the clearing time had to come back an hour. Milkmen had to get up an hour earlier. Children weren't keen to go to school for 8 a.m. Representative Arthur Free from California filed a bill making authorities guilty of a misdemeanour with a \$100 fine or 30 days' jail if children under 14 years of age had to attend school before 9 a.m. The medical fraternity was concerned that people would go to bed at the same time but get up earlier, losing sleep. Another problem was that many commuters to Washington, D.C. came in from Virginia, which didn't have daylight saving.

Before the District's daylight saving plan commenced, representatives Ernest Ackerman of New Jersey and William Hammer of North Carolina had introduced bills on 10 March and 10 May 1922 to put the clocks forward an hour and for everyone to be on the same time. Just two days into his plan, Harding indicated he would approve a daylight saving bill although he wasn't intending to encourage it and still thought the current set up was a "fine thing" and he had no intention of abandoning it. The feeling among Congress officials was that a bill for daylight saving in the District would never get through. The bills didn't progress, but Hammer and other members wanted to resurrect the matter given that the city was now using two different times, resulting in confusion and anger.

With a number of organisations in the federal capital operating on the old time, some people felt that the new time resulted in chaos. They called it “ragtime saving”, after a musical genre where the regular rhythm is interrupted. Other people liked the change and played golf or went motoring in the late afternoon. Business groups were happy. The Merchants and Manufacturers Association noted that 80-90 per cent of businesses were abiding by the government’s plan. But letters to *The Washington Times* opposing the plan far exceeded those in favour. Many people said they would be happy with standard time or daylight time but not a mixture. Some stores reverted to their normal starting time the following week but didn’t close until later. Various courts were dropping out of the scheme. A peculiarity of the system was that usual times were maintained on Sunday, including for church services, transport schedules and park opening hours. Any chance of Hammer’s bill succeeding was killed off in a fiery debate on daylight saving in a House committee session on 24 May.

Increasingly, there were calls for the president to end his plan. More businesses returned to the old time. Many buses used standard time again although street cars and trains didn’t change their schedules back. Theatre goers rejected it. A straw poll of over 4,000 patrons by Harry Crandall at his six theatres during the third week of the plan found that only 1 in 7 supported the idea, 1 in 3 preferred the clocks to be moved forward and over half favoured standard time. Government workers didn’t like it either. A vote taken of the 820 Interior Department employees on 23 June revealed that only 21 per cent liked the current times and 78 per cent wanted the old hours.

In early July, Harding decided to end “ragtime” by late August. In a letter to labor union boss George Warren, the president promised that the scheme “will be put aside not only for this year but for all time so far as this Administration is concerned” and that in the meantime individual departments could decide whether to start at 8 a.m. or 9 a.m. The system finished on 4 September, instead of October as originally intended, with thousands of workers now reporting an hour later than they did over the previous four months. Bill Price of *The Washington Times* gave his views on the plan and daylight saving in general:

This imitation of legal daylight saving was undoubtedly the silliest and most upsetting thing ever attempted in the District. Legal daylight saving is bad enough, but the hybrid thing we had here this summer did nothing but keep the home life of the town confused, impose a severe strain upon mothers and housekeepers upon whom rested the responsibilities of getting early breakfast for their charges, and benefited only those who wished to put in an extra hour at golf, tennis, fishing, boating or other pleasures. It is pretty safe to say that we will never have any more of it. ... Daylight saving started out as a sort of trick fad and has about run its course everywhere.⁷⁰

For many, the dissatisfaction and confusion was over, and that was the end of any form of daylight saving in Washington, D.C. for a long time. But other cities and towns, and whole states, continued with daylight saving. Some dropped out while others took it up and some places opted in and out several times. Battles at both state and local level were often fierce.

⁷⁰ Bill Price, “The passing of ragtime”, *The Washington Times*, Washington, D.C., United States, 5 September 1922, p. 20, Newspapers.com (subscription only), at <https://www.newspapers.com/image/80717213>

12 Daylight saving mayhem

Daylight saving in America continued in much the same vein for the rest of the interwar period and up to 1941 with states and municipalities, and sometimes organisations, basically going their own way, and some of them hopping in and out of the scheme a number of times. The following table shows the capital cities that had daylight saving in each year from 1920 to 1941, together with the largest city in a state (second city listed) if other than the capital and if its policy was different from the capital in at least one year (see also Appendix). Complete accuracy cannot always be determined, even for capital cities. State law might say “no”, a local ordinance “yes”, and people and organisations might decide for themselves.

Daylight saving, United States, 1920 to 1941

| <i>State, etc.</i> | <i>City</i> | <i>1920 to 1929</i> | | | | | | | | | | <i>1930 to 1939</i> | | | | | | | | | | |
|----------------------|------------------|---------------------|--|--|--|--|--|--|--|--|--|---------------------|--|--|--|--|--|--|--|--|--|--|
| District of Columbia | Washington, D.C. | | | | | | | | | | | | | | | | | | | | | |
| Alabama | Montgomery | | | | | | | | | | | | | | | | | | | | | |
| | Birmingham | | | | | | | | | | | | | | | | | | | | | |
| Alaska | Juneau | | | | | | | | | | | | | | | | | | | | | |
| | Anchorage | | | | | | | | | | | | | | | | | | | | | |
| Arizona | Phoenix | | | | | | | | | | | | | | | | | | | | | |
| Arkansas | Little Rock | | | | | | | | | | | | | | | | | | | | | |
| California | Sacramento | | | | | | | | | | | | | | | | | | | | | |
| Colorado | Denver | | | | | | | | | | | | | | | | | | | | | |
| Connecticut | Hartford | | | | | | | | | | | | | | | | | | | | | |
| | Bridgeport | | | | | | | | | | | | | | | | | | | | | |
| Delaware | Dover | | | | | | | | | | | | | | | | | | | | | |
| | Wilmington | | | | | | | | | | | | | | | | | | | | | |
| Florida | Tallahassee | | | | | | | | | | | | | | | | | | | | | |
| Georgia | Atlanta | | | | | | | | | | | | | | | | | | | | | |
| Hawaii | Honolulu | | | | | | | | | | | | | | | | | | | | | |
| Idaho | Boise | | | | | | | | | | | | | | | | | | | | | |
| Illinois | Springfield | | | | | | | | | | | | | | | | | | | | | |
| | Chicago | | | | | | | | | | | | | | | | | | | | | |
| Indiana | Indianapolis | | | | | | | | | | | | | | | | | | | | | |
| Iowa | Des Moines | | | | | | | | | | | | | | | | | | | | | |
| Kansas | Topeka | | | | | | | | | | | | | | | | | | | | | |
| Kentucky | Frankfort | | | | | | | | | | | | | | | | | | | | | |
| | Louisville | | | | | | | | | | | | | | | | | | | | | |
| Louisiana | Baton Rouge | | | | | | | | | | | | | | | | | | | | | |
| Maine | Augusta | | | | | | | | | | | | | | | | | | | | | |
| | Portland | | | | | | | | | | | | | | | | | | | | | |
| Maryland | Annapolis | | | | | | | | | | | | | | | | | | | | | |
| Massachusetts | Boston | | | | | | | | | | | | | | | | | | | | | |
| Michigan | Lansing | | | | | | | | | | | | | | | | | | | | | |
| | Detroit | | | | | | | | | | | | | | | | | | | | | |
| Minnesota | Saint Paul | | | | | | | | | | | | | | | | | | | | | |
| | Minneapolis | | | | | | | | | | | | | | | | | | | | | |
| Mississippi | Jackson | | | | | | | | | | | | | | | | | | | | | |
| Missouri | Jefferson City | | | | | | | | | | | | | | | | | | | | | |
| Montana | Helena | | | | | | | | | | | | | | | | | | | | | |
| Navajo Nation | Shiprock* (NM) | | | | | | | | | | | | | | | | | | | | | |
| Nebraska | Lincoln | | | | | | | | | | | | | | | | | | | | | |
| Nevada | Carson City | | | | | | | | | | | | | | | | | | | | | |
| New Hampshire | Concord | | | | | | | | | | | | | | | | | | | | | |

| State, etc. | City | 1920 to 1929 | | | | | | | | | | 1930 to 1939 | | | | | | | | | |
|----------------|----------------|--------------|--|--|--|--|--|--|--|--|--|--------------|--|--|--|--|--|--|--|--|--|
| | Manchester | | | | | | | | | | | | | | | | | | | | |
| New Jersey | Trenton | | | | | | | | | | | | | | | | | | | | |
| | Newark | | | | | | | | | | | | | | | | | | | | |
| New Mexico | Santa Fe | | | | | | | | | | | | | | | | | | | | |
| | Albuquerque | | | | | | | | | | | | | | | | | | | | |
| New York | Albany | | | | | | | | | | | | | | | | | | | | |
| North Carolina | Raleigh | | | | | | | | | | | | | | | | | | | | |
| | Charlotte | | | | | | | | | | | | | | | | | | | | |
| North Dakota | Bismarck | | | | | | | | | | | | | | | | | | | | |
| Ohio | Columbus | | | | | | | | | | | | | | | | | | | | |
| Oklahoma | Oklahoma City | | | | | | | | | | | | | | | | | | | | |
| Oregon | Salem | | | | | | | | | | | | | | | | | | | | |
| Pennsylvania | Harrisburg | | | | | | | | | | | | | | | | | | | | |
| | Philadelphia | | | | | | | | | | | | | | | | | | | | |
| Rhode Island | Providence | | | | | | | | | | | | | | | | | | | | |
| South Carolina | Columbia | | | | | | | | | | | | | | | | | | | | |
| South Dakota | Pierre | | | | | | | | | | | | | | | | | | | | |
| Tennessee | Nashville | | | | | | | | | | | | | | | | | | | | |
| | Memphis | | | | | | | | | | | | | | | | | | | | |
| Texas | Austin | | | | | | | | | | | | | | | | | | | | |
| Utah | Salt Lake City | | | | | | | | | | | | | | | | | | | | |
| Vermont | Montpelier | | | | | | | | | | | | | | | | | | | | |
| | Burlington | | | | | | | | | | | | | | | | | | | | |
| Virginia | Richmond | | | | | | | | | | | | | | | | | | | | |
| Washington | Olympia | | | | | | | | | | | | | | | | | | | | |
| West Virginia | Charleston | | | | | | | | | | | | | | | | | | | | |
| Wisconsin | Madison | | | | | | | | | | | | | | | | | | | | |
| | Milwaukee | | | | | | | | | | | | | | | | | | | | |
| Wyoming | Cheyenne | | | | | | | | | | | | | | | | | | | | |

Shaded square – the city had daylight saving in that year

Blank square – no daylight saving in that year

* The capital of Navajo Nation is Window Rock, Arizona although details of daylight saving in the period shown in the table are unknown but possibly the same as Navajo’s largest town, Shiprock, New Mexico.

Note: Whether some areas in the United States were on daylight saving in certain years isn’t always easy to tell, for they might have had a state law that said “no” and a local ordinance or a resolution that said “yes”, but businesses and individuals often made their own decision. Sometimes, a council seemed almost certain to go one way and then jumped the other way a few days or weeks later when, for example, a mayor wouldn’t sign the ordinance. Also, there sometimes appeared to be contradictions among newspaper reports probably through no fault of the papers.

Sources: mainly Newspapers.com (subscription only), at <https://www.newspapers.com>; also Time and Date AS, at <https://www.timeanddate.com>; and other sites

In 1923, some US states were becoming quite serious about what time should be used and threatened citizens and businesses with severe penalties for having timepieces set to anything other than what was established by law. In New Hampshire, daylight saving was made illegal by the state legislator in 1921 but without penalty. State capital Concord as well as Manchester and other municipalities had daylight saving in 1922 but were reluctant to keep it going in 1923 as a bill was before the Senate on 1 March with provision for a fine of up to \$1,000 or a year’s jail for anyone not using standard time. When the bill was passed on 25 April, the maximum fine had been reduced to \$500, still a lot of money when the average wage was around \$1,500 a year.

A similar crackdown occurred in Pennsylvania. The idea was to pass a bill that prevented local governments from having daylight saving ordinances. A large delegation of more than 100 representatives from councils, shops, industry and banking arrived in state capital Harrisburg to debate the bill and argued that major cities should be exempt from such a law. Hundreds of letters and telegrams opposed or supported the bill. But Philadelphia passed a “resolution” on 13 April asking residents and businesses to voluntarily put their clocks and watches ahead an hour on 29 April. Pittsburgh did the same. The bill had already been passed by both houses and the governor, Gifford Pinchot, signed it into law on 3 May, prohibiting municipalities from authorising any time other than standard time. But the city councils pointed out that their resolutions weren’t ordinances but simply requests and no state law will be broken. It seems that just about every person and business except theatres abided by the council requests despite a possible \$500 fine from the state.

Areas on standard time near large cities on daylight time weren’t impressed, knowing that bank clearing houses, the railroads, and many local businesses and individuals would be likely to also use the measure. *The Daily Republican* newspaper of Monongahela, a small city just outside Pittsburgh, complained that:

From the attitude of the Philadelphia and Pittsburgh councils it would appear that they are bigger than the regularly elected representatives of the entire state and no matter what action they may take the councilmen ... can openly and wilfully violate the provisions of the law and force upon the people of the outlying districts something they do not want ... [so that] Councilman Garland and his henchmen might play golf or joy ride in their expensive limousines. ... it would appear that the farmers, miners and mill workers were not due any consideration.⁷¹

Connecticut had anti-daylight saving legislation in place from 1 June 1923, which included a \$100 fine or 10 days’ jail or both for a publicly displayed timepiece not on Eastern Standard Time. Presumably a pocket watch was safe but not a wristwatch unless under a long-sleeved garment. Regardless, capital city Hartford and largest city Bridgeport put clocks forward (and by 1928, about 30 of the state’s cities did so). Similarly, Delaware passed a state law banning daylight saving, but it was still used unofficially in biggest city Wilmington, where 84 per cent of more than 18,000 industrial workers at 224 sites voted in favour of the scheme. Whereas railroads determined the time back in 1883 without legislation, city councils were doing it in 1923.

Vermont and Wisconsin also had state laws against daylight saving although cities in the former didn’t use it. In Milwaukee, which had it in 1921 and 1922, the ordinance was voted out of existence by 78 per cent of residents. Rather than worry about ordinances or resolutions or state legislation, some communities merely agreed to shift their day by an hour. When Pittsburgh decided to go back to standard time on 7 May 1923 under pressure from the state, 6,000 government workers started and finished earlier and many businesses changed their hours too. There was uncertainty as to whether the city and nearby municipalities were on standard time or daylight saving time.

⁷¹ “Big cities still agitating daylight saving measures”, *The Daily Republican*, Monongahela, Pennsylvania, United States, 14 April 1923, p. 1, Newspapers.com (subscription only), at <https://www.newspapers.com/image/59160993>

Even in Massachusetts, the only state that had legislation allowing daylight saving, supporters and opponents of the measure continued to do battle. Farmer groups and politicians from rural areas had tried constantly to get the law repealed. In 1923, the two sides agreed to a referendum although the Grange was determined to get daylight saving banned not only in each state but also throughout the country via a new federal “standard time law”. The daylight saving ballot was held at the same time as the US general election in November 1924 and asked voters: “Shall daylight saving be retained by law in Massachusetts?” The outcome was closer than many had predicted, with 54 per cent of people wanting to keep the summer clock change. Opponents had portrayed the scheme as class legislation benefiting those who had time and money for golf and motoring in the late afternoon. The campaign had some success as around half or more of residents in many working class cities voted “no” to daylight saving but numbers weren’t high enough for the embattled farmers to win overall.

Undeterred, the rural side kept fighting against daylight saving. The state Department of Agriculture argued, perhaps rather oddly, that had the referendum been based on the size of districts rather than the number of people, the “no” vote would have won as a much larger part of the state geographically didn’t want daylight saving than supported it.

Country folk then decided to take the matter to court. In 1925, the Massachusetts State Grange, together with residents of the western town of Hadley and two railway unions, the Brotherhood of Locomotive Engineers and Trainmen and the Brotherhood of Locomotive Firemen and Enginemen, took state attorney-general Jay Benton, state secretary Frederick Cook and education commissioner Payson Smith to court. They claimed that the state law on daylight saving conflicted with the federal Standard Time Act of 1918, which legalised time zones and provided for daylight saving, thus excluding the states from setting time. The plaintiffs also charged that daylight saving was bad for farmers, travellers, and children’s sleep.

But in *Massachusetts State Grange v Benton*, the United States District Court judges explained that the federal Act only applied to interstate and foreign commerce and federal activities, dismissing the case as the court didn’t have jurisdiction to act otherwise. Not satisfied, the plaintiffs appealed to the US Supreme Court but in November 1926 it upheld the decision of the lower court. That meant that states and local governments could legislate for daylight saving, presumably as long as the two didn’t conflict, in which case the state would get precedence.

The ruling seemed to make little difference to an already chaotic situation. In August 1925, around 90 per cent of the Connecticut population was on daylight saving time despite the state law against the scheme. Of the state’s 169 cities and towns, 73 were on standard time, 67 used daylight time and 29 had a mixture. Most of the state’s larger towns and all cities but one were on fast time, including Hartford and Bridgeport. When a major centre had daylight saving, surrounding areas tended to follow. Publicly displayed clocks usually showed standard time so that councils and businesses escaped a possible \$100 fine.

In Pennsylvania, Harrisburg wasn’t on daylight saving although thousands of workers started and finished an hour earlier, including state government departments and

various businesses. In New York State, wider observance of daylight saving was reported compared with earlier years. Portland, the largest city in Maine, passed an ordinance in 1926 banning daylight saving despite having had the measure every year since 1918. According to a poll by businessmen, 92 per cent of the city's residents wanted daylight saving, so businesses used it while the council and churches stayed on standard time.

In 1926 in Indianapolis, the council voted 6 to 1 to have a daylight saving ordinance but mayor John Duval vetoed it. Two years later, the council passed an ordinance by 7 to 1 at a noisy public meeting on 30 April, but the decision was vetoed by mayor Ernest Slack on 11 May, only to be overturned by another council vote of 6 to 3 on 21 May although the effective date of the ordinance was 13 May. Next morning, council offices, police stations, the fire brigade and the main hospital all moved an hour ahead. However, state government offices, the railroads, the post office, schools, and various other organisations and public buildings refused to change. Banks, firms, shops, factories and churches varied although probably most commercial operations were on daylight saving within a few weeks. State offices used the new time from 11 June, the post office from 12 July, and schools for just two weeks before the scheme ended more than a month early on 24 September.

The following year, 1929, the state legislature passed a bill in March banning daylight saving in Indianapolis although the bill initially related to the entire state, then the capital, then the state again, and finally just the capital. This was the fifth attempt to prohibit daylight saving in Indiana or part of it since 1919.

In the town of Hazardville, Connecticut, three different times were used all at once in 1927. The urban area was on daylight saving, the outlying farming areas stuck with standard time, and the powder mills operated on a compromise called "half time", which was half an hour ahead of the old time rather than a full hour.

By the late 1920s, about a quarter of Americans lived in communities that had daylight saving, a similar percentage to 1920. Massachusetts and Rhode Island were the only two states where everyone was officially on daylight saving. Most of the major cities in New York, Connecticut and New Jersey used it, with Newark adopting it in 1927 for the first time since 1922. A number of cities had it in Pennsylvania, Indiana and Michigan. In Illinois, daylight saving was mainly used in Chicago. It was also used in parts of Delaware, Maine, Vermont, New Hampshire and West Virginia. In Wisconsin, banks and many businesses in Milwaukee used daylight time. Debate continued in California about whether to adopt it but all five bills in the previous 10 years had been defeated in the state legislature.

In certain locations, churches didn't observe daylight saving but held services an hour earlier. This caused even more confusion as some people still turned up too early, others were on time, and a few arrived at the end of the service. Catching a train often presented similar problems on some lines. Radio was becoming popular and daylight saving meant that favourite national programs could be an hour earlier in a local area on standard time and listeners might miss them if still at work. Watchmaker and jeweller Harry Meng of Buffalo, New York offered to add a "daylight saving hand" to watches, with the extra hand set an hour ahead of the other hour hand to "avoid confusion and enjoy the summer months". Whether this innovation helped

worshippers figure out when to attend service or commuters to catch their train or radio listeners to tune in to their shows isn't known. Across America, both sides in the daylight saving wrangle remained steadfast in their views.

Daylight saving was finding its way into song. Jazz band the Gulf Coast Seven recorded an instrumental "Daylight Savin' Blues" in 1927. Then, Gus Arnheim and his Orchestra put down "You Can Have It, I Don't Want It, Daylight Saving Time" in September 1930. This was followed by a Ted Weems Orchestra number, "When It's Daylight Saving Time in Oshkosh (I'd Rather be in Kalamazoo)", recorded a month later.

Neither the songs nor the 1930s Depression seemed to impact on people's views on daylight saving one way or the other. The number of states at least partially using it didn't vary much during the decade. There were 16 in 1930, increasing to 17 in the following year before falling to 16 in 1932 and 1933. The number rose to 17 in 1936 and 19 in 1937 but then decreased to 16 by 1940, the same as in 1930. Over 1,000 municipalities had daylight saving in 1936. Estimates of the proportion of the American population on advanced time ranged from about a quarter to a third through most of the interwar period.

Daylight saving was a perennial topic in California although it hadn't been used there since World War I. On the one side were housewives, farmers, many labor unions, the railways, theatres and motion picture operators who detested the idea, while most businesses, as well as sportspeople, gardeners and others eager to enjoy the state's balmy summer evenings outside in good light wanted to shift the time forward. In 1930, the California Daylight Saving League started initiative petitions in Los Angeles and San Francisco in May with the aim of having the measure voted on at the same time as the election in November. The required minimum of 91,529 signatures, equal to 8 per cent of total votes cast for governor at the 1926 election, was met by July. By August, there were twice as many names. But momentum built against daylight saving in coming months. People were warned they would have to wear two watches as post offices, railroads and ships wouldn't be adjusting to any daylight saving schedule. The state's press was generally against the measure. The *Santa Ana Register* of 24 October declared:

No city or state west of the Mississippi river uses Daylight Saving. No community south of the Mason and Dixon line uses Daylight Saving. Only a few smoky, congested cities in the east use it. Use your own judgment as to which class of community California is in.⁷²

A daylight saving Act was one of 26 propositions on the state ballot put to Californian voters on 4 November 1930, a Tuesday. Voting isn't compulsory in America, perhaps putting farmers and other rural dwellers at a disadvantage due to distance from a polling booth. In the cities, most businesses gave employees time off to vote. But the "no" vote won easily with 76 per cent of the total or by more than 3 to 1.

In those areas that had daylight time, it didn't always last long. After some lobbying by the Junior Chamber of Commerce, the city commissioners of Raleigh, capital of

⁷² Editorial page, *Santa Ana Register*, Santa Ana, California, United States, 24 October 1930, p. 28, Newspapers.com (subscription only), at <https://www.newspapers.com/image/74454637>

North Carolina, held a public meeting on daylight saving on 29 April 1932. The hearing attracted many supporters of the measure but not many opponents, and the commissioners voted unanimously for it. Clocks were advanced two days later. But the state government, the largest employer in Raleigh, wasn't interested as it governed for the whole state. Trains, churches and many businesses stayed on standard time, as did many residents in protest. The commissioners hastily called another meeting on the fourth day of daylight saving, all of them voting to cancel the scheme as of midnight a few hours away.

Hawaii had daylight saving in 1933 but only for a little longer than Raleigh did the year before. A bill introduced by representative Howard Worrall passed the legislature and the Territory of Hawaii started daylight saving on 30 April. But according to a washerwoman: "Everybody no like new time." Protests led to a decision on 18 May to repeal the law, with Worrall among those voting against it. Daylight saving finished two days later, thus lasting a total of three weeks. It resurfaced on 26 April 1936 but may have been over even quicker than three years earlier. Hawaii is in the tropics, which aren't particularly suited to daylight saving as length of day and night doesn't vary much through the year.

Nor did the scheme last long in Alabama's capital city Montgomery in 1935. A daylight saving bill was one of 72 bills introduced into the House on 30 April, the backlog being due to a three month recess to allow a state referendum on prohibition of alcohol. Rather than wait for the state, the city commissioners decided to act, with mayor William Gunter proclaiming daylight saving in the capital from 19 May. Businesses were happy to take it up, but whether state government offices would also use the new time was unknown as the governor, Bibb Graves, was on a weekend fishing trip. When he came back, he rejected the plan and state offices remained on standard time. The post office, trains and buses didn't shift either. One of the hospitals and the Carnegie Library reverted to standard time after one day and many firms also changed back. The city was on two times until the ordinance was cancelled as at the end of 29 May, 10 days after its commencement. And the bill for statewide daylight time was scrapped by the Senate Agriculture Committee.

Mississippi capital Jackson tried daylight saving in 1935 after a petition by 1,700 citizens. Less than a month later, another petition by "several thousand" residents wanted to get rid of the scheme. Helena and Billings in Montana also had daylight saving in 1935 but abandoned it after a couple of months due to confusion as many offices, businesses and services weren't using it.

In West Virginia, capital city Charleston officially went onto daylight saving time in 1937 but schools, beerhouses, trains and buses, and some large factories refused, while shops were undecided as a major warehouse supplying them remained on standard time. Government employees were waiting on a decision by the governor who finally opted for the old time. Courts used daylight saving although the intermediate court didn't change for several weeks. No other municipality in the state put its clocks forward although a number considered it. The city held out but there was so much confusion, with many people being an hour early or an hour late for their various engagements, that it went back to standard time in August several weeks earlier than the scheduled date. Daylight saving wasn't considered in 1938.

Other cities to have daylight time in the 1930s for the first time since World War I included Minnesota's capital city Saint Paul and largest city Minneapolis in 1932 despite a 1927 state law prohibiting the scheme in any municipality. They didn't have it in subsequent years. Washington's most populated city, Seattle, passed an ordinance by 7 votes to 2 and had daylight saving in 1933, while many of the state's other cities moved too, including capital Olympia. A public vote on daylight saving in Seattle the following year resulted in 64 per cent of residents rejecting it. Albuquerque, largest city in New Mexico, had the scheme for three months that year but widespread confusion resulted when not everyone used it. Juneau, Alaska also experimented with daylight time in 1933. Atlanta, Georgia's capital, took up daylight saving in 1935 and pursued with it through to 1941.

After much pressure from interest groups, businesses and individuals, Harrisburg, Pennsylvania reintroduced daylight saving in 1931. It was retained in 1932 although not without a battle. Over 26,000 signatures on petitions and other support for daylight saving in 1938 weren't enough to convince the mayor although the city officially had the measure again from 1939. In most if not all other years in the 1920s and 1930s, many people and businesses in Harrisburg started and finished their day an hour earlier than usual as did government workers.

Delaware capital Dover had daylight saving in 1937 probably for the first time since 1919 and retained it in following years. Wilmington had it each year despite the problems resulting from some organisations using it and some not, although many of those that kept to standard time made appropriate adjustments, with city offices opening an hour earlier and transport services altering their timetables.

A 1931 bill in Indiana initially directed that standard time was to continue to be observed statewide but it was amended to allow northern cities to have daylight saving and further altered so that everywhere except Indianapolis could use it. But like most places where daylight saving wasn't across a state, some municipalities used it and others didn't. And within a town or city, certain businesses, offices and institutions were on fast time and others on standard time.

In late April 1937, most of the eastern Indiana city of Connersville shifted to daylight saving time but not the schools. Housewives complained that they didn't want to cook two lunches. This meant that fathers working at the factories got a hot lunch but children had to eat their meal an hour later and it was cold. After a few days, 75 high school students walked out of class an hour early and wrote on bulletin boards: "We don't like cold beans." Authorities took notice and the Indiana School Board put all schools on daylight time. According to Connersville High School principal B. E. Myers, "The pupils thought it was fun to walk out of classes an hour early at noon. More pupils were joining the walkouts every day. The school board thought something should be done about it."⁷³

In New Hampshire, a bill for statewide daylight saving which would repeal the law banning local governments from using the measure was brought into the House in January 1931 but was defeated. Another bill giving cities and towns the option to have

⁷³ "Connersville pupils rebel", *The Evening Republican*, Columbus, Indiana, United States, 29 April 1937, p. 1, Newspapers.com (subscription only), at <https://www.newspapers.com/image/128010879>

daylight saving then came into the legislature but it too failed although, ironically, Concord and many other cities across the state had put clocks on in 1930 and again in 1931. Largest city Manchester didn't have daylight time although many businesses shifted their operating hours. Another bill for daylight saving throughout the state was introduced in January 1937. By then, over 100 municipalities were simply starting and finishing their day an hour earlier in the warmer months. The bill was voted down in March but finally passed in May and the whole state had daylight saving from 1938.

An American Institute of Public Opinion poll, or Gallup poll, in April 1940 found that most people approved of daylight time (see next table). Respondents were asked: "Are you in favor of daylight saving time?" About 81 per cent had a view on the topic and of those people, 60 per cent said "yes" and 40 per cent "no". The popularity of daylight saving was slightly higher than three years earlier when 57 per cent favoured it in an identical study. On a regional basis, the scheme got the most support in the north-east with 75 per cent preferring it whereas less than half of residents in the South and West Central regions wanted it. In the Far West, 51 per cent of people supported it. When respondents were asked if they would approve of daylight saving time all year rather than just in summer, 40 per cent liked the idea and 60 per cent didn't.

Support for daylight saving, United States, April 1940

| <i>Region</i> | <i>Yes</i> | <i>No</i> |
|---------------------------------|------------|-----------|
| | % | % |
| New England and Middle Atlantic | 75 | 25 |
| East Central | 64 | 36 |
| West Central | 45 | 55 |
| South | 44 | 56 |
| Far West | 51 | 49 |
| Total | 60 | 40 |
| Total: 1937 | 57 | 43 |

Note: Excludes those who gave no opinion.

Source: American Institute of Public Opinion, "Daylight saving time approved by majority in U.S.", *Lincoln Sunday Journal and Star*, Lincoln, Nebraska, United States, 28 April 1940, p. 6, Newspapers.com (subscription only), at <https://www.newspapers.com/image/66412917>

Ten years after California voted overwhelmingly against daylight saving, residents would vote again in 1940. Initiative petitions were filed in August 1939 and sufficient signatures were obtained by October. This time 212,117 names were required, or 5 per cent of the votes for governor at the last election. Daylight saving was one of 17 proposals on the state ballot at the election on 5 November 1940. Seventy per cent of people voted against the scheme, down slightly from 75 per cent in 1930.

The capital or largest city in eight states either started or ended daylight saving in 1940 or 1941 as energy conservation once again became a consideration due to another world war although America wouldn't be directly involved in it until late 1941. Alabama took up daylight time as a state initiative in May 1940 and most people seemed happy although many smaller municipalities pulled out of what some citizens called "city slicker time" during the summer. By August, only a few cities and towns were still on daylight saving and the governor, Frank Dixon, announced the end of the scheme seven weeks early. At a referendum in the state's largest city, Birmingham, on 27 May 1941, only 34 per cent of voters wanted daylight saving. The state remained on standard time that year.

In Illinois, daylight saving had previously been confined to the Chicago area but in 1940, over half the state adopted it, including capital city Springfield, and there was talk of a state law for 1941. The measure wasn't popular in all locations that used it and in some places two times were in use until the issue was sorted out one way or the other. At the November 1940 election, a referendum question asking Springfield residents if the city should have daylight saving in future years found that just 35 per cent were in favour.

Daylight saving was approved by more than 84 per cent of businesses and 83 per cent of workers in Indianapolis, according to a survey by the Chamber of Commerce in April 1941. And seven of the nine councillors were known to support advanced time. But the city had been prevented by state law from having daylight saving and had to wait for an enabling Act to be sorted out before the council could pass an ordinance. The longest day was fast approaching and the state Act still wasn't finalised when mayor Reginald Sullivan announced that daylight saving would start, albeit unofficially, on 22 June. The Chamber of Commerce asked the governor, Henry Schriker, to recommend the whole state move its clocks forward but he was reluctant to advise local governments to jump one way or the other on such a controversial subject.

In Kentucky, governor Keen Johnson didn't want to get into a row over whether the state's largest city Louisville could have daylight saving. A 1936 state law only permitted the city to use standard time with penalty up to \$500 although the governor could allow a different time for certain periods, but the attorney-general doubted the constitutionality of such a shift. The governor's unwillingness to act prompted the mayor, Joseph Scholtz, to go ahead with a daylight saving ordinance and to declare that "if anybody wants to fight it, he can". Councillors voted 8 to 3 in favour of daylight saving. The day before advanced time was due to start, government lawyers took the matter to court to determine the validity of the ordinance. Their case was lost and clocks were turned forward, but the lawyers weren't satisfied and the case went to the Court of Appeals. Meanwhile, the council of capital city Frankfort voted 12 to nil to introduce daylight saving. Later, the Louisville ordinance decision was upheld and other Kentucky cities and towns soon began daylight time.

Prior to Memphis, Tennessee going on daylight saving in 1940, a newspaper poll found that a large majority of residents favoured the idea but factory owners were opposed to it. After one season, people didn't want daylight time next year, nor did councillors. Capital city Nashville had it in 1941 although not until July. There was confusion on the first working day after the changeover, especially when the state public utilities building clock started going backwards.

Minnesota's largest city Minneapolis had daylight saving in 1941 for the first time since 1932 but not capital city Saint Paul. Vermont's capital city Montpelier and largest city Burlington used it in 1940 and 1941. Atlanta ditched the scheme in 1941. In New York, daylight saving was virtually statewide in 1940 for the first time since 1920.

With the war escalating in Europe, the United States became increasingly concerned for its friends across the Atlantic and for its own defence. By 1940, it was sending war

materials and money to the Allies, which was stepped up after France fell in spring. American volunteers were helping out in aircraft squadrons despite it being illegal, and the country was sending billions of dollars in food, oil and equipment under the Lend-Lease agreement after the Germans invaded the Soviet Union in June 1941.

Various people and organisations were calling for national daylight saving to redirect energy into the country's defence efforts by early 1941, including business groups such as the Merchants' Association of New York, interior secretary Harold Ickes, and Robert Garland, often regarded as the "father of daylight saving" in the United States and who had recently retired after 28 years as a Pittsburgh councillor. Ickes felt that substantial fuel savings could be had from daylight saving but also called for priorities and restrictions, believing that making aluminium was more important than night baseball. Power shortages were also evident in drought areas that relied on hydroelectricity. Industrialists pushed for continuous daylight saving, while defence chiefs wanted two hours of the measure. Bills were introduced for federal daylight time.

President Franklin Roosevelt asked Congress on 15 July to draft a bill to give him broad power to implement daylight saving, including on a national or regional basis, just in the summer or continuously, and for one or two hours. He wrote to the governors of south-eastern states where power shortages were particularly acute asking them to initiate daylight saving. A week later, the governors of Alabama, Tennessee, Mississippi and South Carolina issued proclamations, while Georgia, Florida and Louisiana refused, and North Carolina and Virginia at first took no action but later agreed to the measure. As governors didn't have authority to order a change in time, the proclamations only applied to state offices and not to businesses and citizens, who would have to act on a voluntary basis perhaps encouraged to varying degrees by their governor and other politicians. One person who was less than enthusiastic was South Carolina representative and chairman of the House Agriculture Committee, Hampton Fulmer, who said that "the farmers wouldn't even set their clocks ahead ... It might be all right in big cities but in the little old country villages and farms, it would be nonsense. They wouldn't pay any attention to it."⁷⁴

Overall support for daylight saving was strong though, as evidenced by a Gallup poll in June 1941 (see following table). Respondents were asked: "To save electricity and to increase daylight working hours, it has been suggested that the entire country be put on daylight saving time until the end of September. Do you favor or oppose this suggestion?" Now that the country's security was at stake, many people changed their minds about daylight saving. Results showed that all parts of the country were happy to have the measure on a national basis, including the South region where approval was at 64 per cent, while only 16 per cent were opposed and 20 per cent were undecided. Nationwide, two-thirds of people would be happy with daylight saving and just one-fifth against the idea.

⁷⁴ "Daylight saving assured despite farm opposition", *Dunkirk Evening Observer*, Dunkirk, New York, United States, 16 July 1941, p. 1, Newspapers.com (subscription only), at <https://www.newspapers.com/image/56261209>

Support for national daylight saving, United States, June 1941

| <i>Region</i> | <i>Favour</i> | <i>Oppose</i> | <i>Undecided</i> |
|---------------------------------|---------------|---------------|------------------|
| | | — % — | |
| New England and Middle Atlantic | 78 | 13 | 9 |
| East Central | 66 | 21 | 13 |
| West Central | 56 | 25 | 19 |
| South | 64 | 16 | 20 |
| Far West | 58 | 27 | 15 |
| Total | 67 | 19 | 14 |

Source: “Survey shows majority OK’s daylight time”, *Rochester Democrat and Chronicle*, Rochester, New York, United States, 20 July 1941, p. 12, Newspapers.com (subscription only), at <https://www.newspapers.com/image/136140958>

Continuous daylight saving was less popular. As part of the same survey, people were asked: “Would you favor or oppose keeping the country on daylight saving time throughout the coming year?” Just 38 per cent favoured this proposition, 41 per cent opposed it and 21 per cent were undecided. Only New England and Middle Atlantic showed majority support (see table).

Support for all year national daylight saving, United States, June 1941

| <i>Region</i> | <i>Favour</i> | <i>Oppose</i> |
|---------------------------------|---------------|---------------|
| | % | % |
| New England and Middle Atlantic | 54 | 46 |
| East Central | 47 | 53 |
| West Central | 36 | 64 |
| South | 49 | 51 |
| Far West | 42 | 58 |
| Total | 48 | 52 |

Note: As originally published; excludes those who gave no opinion

Source: As per previous table; other sources for total

Despite strong support for the measure by the public, the plan for national daylight saving was shelved on 5 December 1941 due to lack of interest by Congress. Two days later, the Japanese launched a surprise attack on the US naval base at Pearl Harbor, Hawaii and America declared war on Japan the next day. The United States immediately stepped up its assistance to the Allies, which led to Germany declaring war on the US on 11 December to which America reciprocated on the same day. Talks on daylight saving resumed by mid month, including the option of all year fast time for the duration of the war and beyond.

Another Gallup poll in December showed an increase in support for continuous daylight saving although the surveys aren’t strictly comparable over time due to different wording in questions and a new set of circumstances with America now at war. This time, respondents were asked: “As long as the war lasts, would you favor or oppose daylight saving time in your community for the entire year?” The poll found 57 per cent of people approved of the plan, 30 per cent didn’t and 13 per cent were undecided (see following table). In each region, considerably more residents backed the policy than disliked it. The Far West now had the second highest proportion in favour, probably due to the threat across the Pacific. Support for the proposal was higher in larger cities than smaller ones. Resistance continued from farmers, with just 36 per cent supporting it. A North Dakota farmer commented: “You can’t change a cow’s milk habits to fit the clock, or evaporate the morning dew an hour earlier.”

Support for all year daylight saving with United States at war, December 1941

| <i>Region</i> | <i>Favour</i> | <i>Oppose</i> | <i>Undecided</i> |
|-------------------------------------|---------------|---------------|------------------|
| | | — % — | |
| New England and Middle Atlantic | 69 | 24 | 7 |
| East Central | 52 | 35 | 13 |
| West Central | 48 | 35 | 17 |
| South | 45 | 36 | 19 |
| Far West | 54 | 28 | 18 |
| Total | 57 | 30 | 13 |
| 12 leading industrial states* | 62 | 29 | 9 |
| Farmers | 36 | 45 | 19 |
| Towns under 10,000 | 49 | 34 | 17 |
| Towns & cities of 10,000 to 100,000 | 61 | 30 | 9 |
| Cities over 100,000 | 72 | 19 | 9 |

* California, Connecticut, Delaware, Illinois, Indiana, Massachusetts, Michigan, New Jersey, New York, Ohio, Pennsylvania and Rhode Island

Source: “Majority in U.S. approves war daylight saving time”, *The Pittsburgh Press*, Pittsburgh, Pennsylvania, United States, 4 January 1942, p. 27, Newspapers.com (subscription only), at <https://www.newspapers.com/image/149698048>

In January 1942, Congress debated the bill to give the president the power to order daylight saving of up to two hours, regionally or nationally, and all year or just in summer. The House didn’t want to give him this much flexibility and set down a few specifics, including just an hour of daylight saving across the country on a continuous basis. Support for advanced time year round was strong among representatives as peak demand for electricity in the evening was higher in winter than summer and keeping the clocks ahead all year would conserve a considerable amount of extra fuel. The amendments were made and the bill was passed by both houses. Daylight saving would start 20 days after the president signed the bill and extend to six months after the end of the war or some earlier date approved by Congress.

Meanwhile, the Idaho Chamber of Commerce wanted the Interstate Commerce Commission to move the southern part of the state to Pacific time as this would put it in its true zone rather than in Mountain time. Standard time in capital city Boise was 45 minutes ahead of local time. With year round daylight saving added on, sunrise would be as late as about 9:20 a.m. in winter. Other areas would also be disadvantaged by the new time, such as parts of Ohio and Michigan which had been transferred from Central to Eastern time in 1936 and would effectively have two hours of daylight saving. However, no changes were made to standard time zones.

Roosevelt agreed to the amendments to the bill and signed it on 20 January. It became “An Act to promote the national security and defense by establishing daylight saving time”. The measure began on 9 February for all federal government and interstate commerce activities, and the government was confident the rest of the country would follow. A week before daylight saving was due to start, the government labelled it “War Time” and the Eastern time zone, for example, would be on Eastern War Time.

The switch to the new time went quite smoothly compared with past scenarios where a state might have decided one thing and a city or town another, the railroads didn’t shift, and many people, businesses and other organisations did as they pleased. On this occasion, trains, planes, radio, schools, shops and just about everyone made the change. Farmers still worked by the sun but they had to make concessions if they wanted to get their produce to the markets although some local milk trains kept to

standard time. The Lapwai School District in north-west Idaho went back to standard time after two days as children were getting up and going to school in the dark. In one case, a brother and sister had to ride six miles (10 kilometres) on a horse and then be driven two miles in a car before catching a bus to take them a further 21 miles to school. The journey had started more than an hour before light. War time would be used by the district again when the days were longer. A few communities, such as in Ohio and Michigan, returned to standard time but not for long. Overall, nearly everyone stayed on the new time and most seemed happy with it, especially as it saved energy and helped the war effort.

New York State and parts of New Jersey and Pennsylvania considered putting clocks an hour ahead in the summer of 1942 in addition to war time. In New York, a bill was before the Senate for an extra hour of daylight saving. Washington, D.C. requested the states not to adopt any “super daylight saving” plan, preferring to keep all states and communities and particularly the railways, used for military movements, on the same time system.

Three states partly or wholly dropped war time in early 1943: Georgia, Ohio and Michigan. The Georgia legislature passed a bill in February to go back to the old time, or officially from Eastern war time to Central war time, and the state remained there.

Ohio wanted to go back to standard time due to hardships for farmers, labourers, and children going to school in the dark. But the War Production Board suggested the state move an hour forward in summer rather than an hour back. A bill to exempt Ohio from war time was promptly adopted by the state legislature and part of the state moved back an hour on 21 February. Most if not all areas had returned to war time by mid May although many communities went back to standard time for the winter. Clocks went on again in 1944. Cincinnati passed an ordinance to have Central war time for seven months and Eastern war time for the rest of the year.

Michigan had a bill to return to standard time in its legislature in January 1943 although Detroit wanted to maintain war time. The state decided to let communities determine their own time, which resulted in a chaotic mixture similar to prewar summers. In Lansing, state government offices were on Central war time and the rest of the city on Eastern war time. In all three states, federal offices, businesses conducting interstate trade, and railways were by law still on war time in accordance with the Act.

Arizona stopped using war time at the end of 1943 when the governor, Sidney Osborn, proclaimed the state to be back on standard time from 1 January due to many complaints about wasting electricity and people having to get up too early. With war time, capital city Phoenix was about an hour and a half ahead of the sun and a lot of power was used in the morning darkness. Children had to be driven to school and that used up petrol. Starting lessons later wasn't feasible as parents had to go to work. The state reverted to war time from April to September 1944, but not before a bill that was passed by both houses had to go back for amendment as it had deducted instead of adding an hour. Arizona didn't have daylight saving in 1945.

A bill to end war time in Iowa was passed in the House by 79 votes to 23 in early 1943 but was held up in the Senate, which advised farmers to simply put their

timepieces back an hour. But it seems that few made the change as these people worked by the sun rather than the clock. In California, the Farm Production Council estimated that war time meant a 10 per cent reduction in output of some crops due to the hour lost with late sunrise. Citrus growers complained that pickers couldn't start work until 9 a.m. but then wanted to finish at the same time as they would miss the shops. In Wisconsin, the State Agricultural Board claimed that war time wasted electricity rather than saved it. Oklahoma had a bill to return to standard time but it went no further due to a lack of interest around the state to change the time back. Several states adopted a resolution asking Congress to cancel war time, including Ohio and Iowa in 1943 and California and Oregon in 1944.

There were attempts in Washington, D.C. to scrap war time too. Republican representative William Cole of Missouri brought in a bill in January 1943 to end war time and return to what he called "God's time". In November, a House subcommittee wanted to drop war time in northern states in winter so children could go to school in daylight. But the official view in the capital was that war time was for the good of the country and should be universal. Another Missouri representative, Democrat Clarence Cannon, introduced a bill in March 1944 to put the nation on standard time from November to February each year. In his view, war time had:

- ☼ deprived millions of a needed hour of sleep on sultry nights
- ☼ saved no electric power or light
- ☼ wasted manpower and farm products
- ☼ added confusion and distress to the already tense war situation
- ☼ contributed directly to juvenile delinquency and assaults upon women on their way to employment in the ... darkness of the morning.⁷⁵

All of this was to no avail. Instead, the War Production Board in January 1945 was considering an extra hour of war time in the coming summer to reduce electricity consumption and save coal, making the point that the United Kingdom had double summer time. Strong protests from agricultural communities led to the board dropping the idea. It did, however, put in place a brownout of non-essential lighting for most of the country from 1 February.

This didn't stop Republican senator Kenneth Wherry of Nebraska from introducing a bill on 15 February to end daylight saving. A week later, the War Production Board expressed concern that a few states had stopped daylight saving or were thinking of doing so and estimated that the measure had saved 4.8 billion kilowatt hours of electricity since 1942. Regardless, a bill was passed by the Minnesota legislature, and signed by the governor, Edward Thye, on 19 April 1945, to put the state back on standard time from 8 July. But ordinances were passed by all that state's cities and most other communities to remain on war time. Railroads and radio were still on daylight saving time too. State civil servants worked to standard time but often shared the same buildings as people on war time. Farmers were basically on standard time. Thye had two clocks on his desk set an hour apart. Also, a bill to move Indiana back to standard time was defeated.

⁷⁵ "Hearing set on bill to end daylight saving", *Wilmington Morning News*, Wilmington, Delaware, United States, 8 May 1944, p. 4, Newspapers.com (subscription only), at <https://www.newspapers.com/image/160472018>

The war in Europe finished on 8 May 1945 but Japan hadn't surrendered and America continued with daylight saving. The Japanese finally capitulated on 15 August and documents were signed on 2 September ending the war. President Harry S. Truman said in late August that he wanted Congress to repeal daylight saving quickly at the next session starting on 5 September. On that day, 10 bills to abolish the scheme were brought into the House, five by Republicans and five by Democrats. More bills were introduced in the following few days, while politicians received many thousands of letters protesting daylight saving.

The House passed a bill on the voices on 12 September and eight days later the Senate unanimously voted to terminate war time at the end of the month. There was no chance of the president vetoing the bill as wording in the war time Act meant it could only be rescinded by agreement of both houses or automatically six months after the end of the war. The president signed the bill on 25 September and daylight saving finished five days later.

After more than three and a half years, clocks in the United States finally went back to standard time although there was nothing to stop states and municipalities from using daylight saving again now or in the future. Indeed, Chicago was still on fast time by city ordinance until 28 October and many other cities and towns, such as in New York State, remained on daylight saving time. A Gallup poll found that 17 per cent of people wanted to stay on war time all year and 46 per cent preferred standard time year round while 25 per cent liked daylight saving just in summer and 12 per cent didn't mind. A return to the chaotic prewar system of communities deciding the time for themselves, and then organisations and individuals often using a different time, seemed likely.

13 What's the time? You choose

With World War II over and the federal policy of war time revoked, states and municipalities in America that didn't want to have daylight saving were free to remain on their normal time. Many areas finished off a period of daylight saving in 1945 and resumed the practice in future years. Most states stayed on standard time. The following table shows the capital cities that had daylight saving in each year during the period 1946 to 1966, together with the largest city in a state (second city listed) if other than the capital and if its policy was the opposite of the capital in at least one year (see also Appendix).

Daylight saving, United States, 1946 to 1966

| <i>State, etc.</i> | <i>City</i> | <i>1946-49</i> | <i>1950 to 1959</i> | | | | | <i>1960 to 1966</i> | | | | |
|----------------------|------------------|----------------|---------------------|--|--|--|--|---------------------|--|--|--|--|
| District of Columbia | Washington, D.C. | | | | | | | | | | | |
| Alabama | Montgomery | | | | | | | | | | | |
| Alaska | Juneau | | | | | | | | | | | |
| Arizona | Phoenix | | | | | | | | | | | |
| Arkansas | Little Rock | | | | | | | | | | | |
| California | Sacramento | | | | | | | | | | | |
| Colorado | Denver | | | | | | | | | | | |
| Connecticut | Hartford | | | | | | | | | | | |
| Delaware | Dover | | | | | | | | | | | |
| Florida | Tallahassee | | | | | | | | | | | |
| Georgia | Atlanta | | | | | | | | | | | |
| Hawaii | Honolulu | | | | | | | | | | | |
| Idaho | Boise | | | | | | | | | | | |
| Illinois | Springfield | | | | | | | | | | | |
| | Chicago | | | | | | | | | | | |
| Indiana | Indianapolis | | | | | | | | | | | |
| Iowa | Des Moines | | | | | | | | | | | |
| Kansas | Topeka | | | | | | | | | | | |
| Kentucky | Frankfort | | | | | | | | | | | |
| | Louisville | | | | | | | | | | | |
| Louisiana | Baton Rouge | | | | | | | | | | | |
| | New Orleans | | | | | | | | | | | |
| Maine | Augusta | | | | | | | | | | | |
| Maryland | Annapolis | | | | | | | | | | | |
| Massachusetts | Boston | | | | | | | | | | | |
| Michigan | Lansing | | | | | | | | | | | |
| | Detroit | | | | | | | | | | | |
| Minnesota | Saint Paul | | | | | | | | | | | |
| Mississippi | Jackson | | | | | | | | | | | |
| Missouri | Jefferson City | | | | | | | | | | | |
| | Kansas City | | | | | | | | | | | |
| Montana | Helena | | | | | | | | | | | |
| Navajo Nation | Shiprock* (NM) | | | | | | | | | | | |
| Nebraska | Lincoln | | | | | | | | | | | |
| Nevada | Carson City | | | | | | | | | | | |
| New Hampshire | Concord | | | | | | | | | | | |
| New Jersey | Trenton | | | | | | | | | | | |
| New Mexico | Santa Fe | | | | | | | | | | | |
| New York | Albany | | | | | | | | | | | |
| North Carolina | Raleigh | | | | | | | | | | | |
| North Dakota | Bismarck | | | | | | | | | | | |

| State, etc. | City | 1946-49 | | | | | 1950 to 1959 | | | | | 1960 to 1966 | | | | |
|----------------|----------------|---------|--|--|--|--|--------------|--|--|--|--|--------------|--|--|--|--|
| | Fargo | | | | | | | | | | | | | | | |
| Ohio | Columbus | | | | | | | | | | | | | | | |
| Oklahoma | Oklahoma City | | | | | | | | | | | | | | | |
| Oregon | Salem | | | | | | | | | | | | | | | |
| | Portland | | | | | | | | | | | | | | | |
| Pennsylvania | Harrisburg | | | | | | | | | | | | | | | |
| Rhode Island | Providence | | | | | | | | | | | | | | | |
| South Carolina | Columbia | | | | | | | | | | | | | | | |
| South Dakota | Pierre | | | | | | | | | | | | | | | |
| Tennessee | Nashville | | | | | | | | | | | | | | | |
| | Memphis | | | | | | | | | | | | | | | |
| Texas | Austin | | | | | | | | | | | | | | | |
| Utah | Salt Lake City | | | | | | | | | | | | | | | |
| Vermont | Montpelier | | | | | | | | | | | | | | | |
| Virginia | Richmond | | | | | | | | | | | | | | | |
| | Virginia Beach | | | | | | | | | | | | | | | |
| Washington | Olympia | | | | | | | | | | | | | | | |
| West Virginia | Charleston | | | | | | | | | | | | | | | |
| Wisconsin | Madison | | | | | | | | | | | | | | | |
| Wyoming | Cheyenne | | | | | | | | | | | | | | | |

Shaded square – the city had daylight saving in that year
Blank square – no daylight saving in that year

* The capital of Navajo Nation is Window Rock, Arizona although details of daylight saving in the period shown in the table are unknown but possibly the same as Navajo’s largest town, Shiprock, New Mexico.

Note: Whether some areas in the United States were on daylight saving in certain years isn’t always easy to tell, for they might have had a state law that said “no” and a local ordinance or a resolution that said “yes”, but businesses and individuals often made their own decision. Sometimes, a council seemed almost certain to go one way and then jumped the other way a few days or weeks later when, for example, a mayor wouldn’t sign the ordinance. Also, there sometimes appeared to be contradictions among newspaper reports probably through no fault of the papers.

Sources: mainly Newspapers.com (subscription only), at <https://www.newspapers.com>; also Time and Date AS, at <https://www.timeanddate.com>; Weather Spark, at <https://weatherspark.com>; and other sites

Despite the turmoil caused by different times prewar, thousands of communities across America set about discussing if they would have daylight saving in 1946. In New York, uncertainty over whether war time had superseded the state law allowing communities to decide on advanced time resulted in a bill to ensure all existing ordinances were still legal. In Utah, the attorney-general felt that the governor had no authority to proclaim daylight time. In most areas, daylight saving was declared to be optional. Pennsylvania representative James Fulton brought a bill into Congress on 21 March 1946 for national daylight saving to conserve energy and give home gardeners more time to help starving people abroad, but the bill didn’t progress.

President Truman said he would support national daylight saving again but not a piecemeal approach and that, for the time being, states should resolve the issue themselves. But only six states acted or had existing laws: Connecticut, Massachusetts, New Hampshire, New Jersey, Rhode Island and Vermont, all in the Northeast region. Many communities in other states wanted daylight saving, and of course many didn’t. A peacetime record of 24 states had daylight saving in one or more municipalities in 1946, the previous highest being 19 in 1937. The 18 states that allowed local areas to shift their clocks forward were Maine, New York and Pennsylvania in the Northeast; Illinois, Indiana, Michigan, Ohio, Minnesota and Missouri in the Midwest region; Delaware, Florida, South Carolina, West Virginia,

Kentucky, Tennessee and Louisiana in the South; and New Mexico and Oregon in the West. The other states and the District of Columbia had no daylight saving. At least a third of the US population used the scheme in 1946 and the starting date in most places was 28 April.

Providers of transport and communication had problems with the new time. Major broadcasters had to contact each city in their network to see if it was using daylight saving and adjust the times for shows. Interstate trains stayed on standard time while some local railways such as in New York also ran on standard time but others such as in Pennsylvania used daylight saving time.

Despite a larger number of states with daylight saving than before the war, the scheme had lost some of its popularity among citizens. A Gallup poll in April 1946 found that 50 per cent of people liked daylight saving, consisting of 31 per cent who preferred it in summer only and 19 per cent year round. Nearly as many people, 45 per cent, wanted standard time all year. Excluding the 5 per cent who were undecided, the ratio for and against was 53:47. In 1937, it was 57:43. As always, rural dwellers were largely opposed to the measure and most city folk favoured it.

The prewar battle between advocates and opponents of daylight saving was resumed with at least as much vigour and confusion in the postwar period, no more so than in Kentucky. Several of its cities, including Frankfort and Louisville, went onto daylight time in 1946 although legal opinion differed as to whether they were authorised to make this change. Attorney-general Eldon Dummit said they couldn't do it, claiming it was against their city charters to use other than standard time. Louisville aldermanic president Paul Downard believed this related to wartime measures rather than the city ordinance for daylight saving. Governor Simeon Willis said the state government would run on standard time. And the court of appeals, which had validated the ordinance in 1941, decided to use daylight time. Scores of municipalities put their clocks forward and the state took no action. As usual, response to daylight saving was mixed, with those opposed often having even stronger views than those in support of it.

State capital Frankfort repealed its ordinance and went back to standard time after just two weeks. A number of other municipalities did the same largely due to pressure from farmers. Meanwhile, the legality of the daylight saving ordinance in Louisville was fought out in the appeals court before it decided by 5 to 2 that advanced time in the city was illegal and clocks went back after five weeks. At the General Hospital, a first twin was born to Mrs William Murphy at 11:58 p.m. daylight saving time, two minutes before the changeover. The second twin was born six minutes later at 11:04 p.m. standard time, or 54 minutes earlier by the clock. The younger twin could therefore argue that he or she was the older one.

Kentucky passed a daylight saving bill in 1950 and many communities once again had advanced time, including Louisville and Frankfort. But in 1952, a bill was passed that banned daylight saving in the state although businesses and individuals could keep using it on a voluntary basis after the law came into effect on 19 June, and in Louisville the council passed a resolution urging them to do so. However, drive-in theatre operator Floyd Morrow wasn't happy that people could still choose to use daylight saving time and took the council to court over its ordinance and resolution.

He lost the case in the circuit court but took it to the appeals court, which decided that daylight saving didn't cause him "great and irreparable damage" and that voluntary fast time was legal and didn't conflict with state law.

On 18 June, a demonstration for the television cameras of how Louisville's City Hall tower clocks would be turned back an hour at midnight went wrong when they were reset for the remaining few hours of official daylight saving time and stopped working. The clocks were fixed but most people used voluntary daylight saving through to late September.

Time in the summer months in Kentucky continued as a hotchpotch of daylight time and standard time. When the appeals court in February 1960 upheld the 1952 ruling that the state law couldn't prohibit voluntary daylight saving, commissioner Watson Clay had this to say about the state's time: "What time it is is what a person thinks it is, and practically nobody in Kentucky today is quite sure." The Interstate Commerce Commission shifted Louisville and 15 other municipalities in the central part of the state into the Eastern time zone or GMT-5 on 23 July 1961. Very few communities in Kentucky used daylight saving in subsequent years. The move effectively gave Louisville nearly three-quarters of an hour of daylight saving year round as its mean solar time is GMT-5:43.

Residents of Jefferson City, capital of Missouri, were very enthusiastic about the prospects of daylight saving in the early months of 1946. Petitions attracted numerous signatures. The local radio station received over 1,400 letters in support of the scheme and only 10 against it. People were looking forward to an extra hour of evening daylight for leisure or to work in their gardens to help feed the starving in war-torn Europe, and to live radio broadcasts of baseball games. And neighbouring larger cities of St Louis and Kansas City were intending to have daylight saving as well as many other nearby municipalities. The council easily passed an ordinance and clocks went ahead on 28 April.

But Missouri governor Phil Donnelly decided that the state government would remain on standard time. This meant that while banks, shops and courts used the new time, government offices, hotels and schools were on the old time as were trains, buses and the mail. About two-thirds of residents were on daylight saving time and one-third on standard time. Businesses were a mixture too. Confusion set in and the measure quickly became disliked. After just five days, clocks in Jefferson City went back. Kansas City, which had delayed its decision to adopt the measure, abandoned the idea when the council voted 6 to 3 against it because people would miss an hour's sleep in the morning cool. Within weeks, a number of other communities returned to the old time. Neither Kansas City nor Jefferson City had daylight saving in future years.

Daylight saving received a similar strong early endorsement in Nashville, Tennessee as indicated by petitions and straw polls, and the support of the Optimist Club, the Junior Chamber of Commerce and employees of many businesses. Citizens waved placards demanding daylight saving at a heated council debate on 16 April 1946 and public sentiment convinced several councillors to change their mind over the issue.

In another rowdy public meeting three days later, booing from opponents, who were mainly some labor union representatives, drowned out speakers in favour of the

measure. The noise was so great that the council deferred a final decision on daylight saving to another time. At the suggestion of some of the protestors, one of the councillors recommended a referendum, but another dismissed the proposal “because I’m telling you that elections in Nashville are crooked”. The first councillor said he didn’t want a newspaper poll as “the vote could be stuffed”. At the next meeting, the daylight saving ordinance was passed although a councillor deliberately changed his vote from “no” to “yes” enabling him to motion for a reconsideration. This was accepted by the president (who had cast a “no” vote), which meant a further delay. Finally, the ordinance got through at a further meeting and Nashville commenced daylight saving on 9 May, with state departments making the change too.

Next day, two clocks a foot apart but on opposite sides of signage at the front of the Newspaper Printing Corporation building in Nashville showed different times. *The Nashville Tennessean* clock was on daylight saving time while the *Nashville Banner*, which supported standard time, didn’t change its clock.

Daylight saving in Nashville in 1946 went the distance but many Tennessee communities ditched it within a month or two and many others didn’t use it at all, including Memphis. In a referendum on daylight saving the following year on 8 May, about 52 per cent of Nashville citizens voted “yes” and the city put its clocks on. It had advanced time in 1948 too. But in early 1949, the state legislature passed a bill by 31 votes to 2 in the Senate and 86 to 6 in the House outlawing daylight saving although the governor, Gordon Browning, said: “There is no penalty provided and I do not see how it can be enforced.” Without penalty clause or a resolution, state law was ineffective against a local government daylight saving ordinance. Nevertheless, Nashville abided by the new Act although some communities still went ahead with daylight time.

One Nashville resident who was happy with the decision to abandon the scheme was country music singer Grandpa Jones (born Louis Marshall Jones) who later wrote and recorded a song called “Daylight Saving Time”:

[Granddaughter, talking] Get up, get up, Grandpa. Don’t you know it’s daylight saving time?

[Grandpa, talking] Yeah, I know, and I don’t know who in the world ever got it ever, don’t do nobody a bit of good.

[Grandpa, singing] For years and years folks got along with an old grandfather’s clock
Or just a common old sundial sitting out on a rock
Then the dollar watch it had its day and the wristwatch it was fine
Then along came a man that ruined us all with daylight saving time.

Well I’m a-hunting that man who first thought up daylight saving time
Until he moved the clocks around everything was agoing fine
But I guess he’s hid and won’t come out, he knows he’s out of line
I get up late, I have to wait
Can’t keep it straight, who did he hate?
I mean the man that first thought up daylight saving time.

His followers always argue that they’ve gained an hour of light
By moving all the clocks around but I can’t see they’re right
The sun still rises just the same and sets just as before
If they’d rise sixty minutes early maybe they’d have an hour more

So why not leave the clocks alone so folks won't be confused
Let them hit the floor an hour before if it's daylight that they choose.

I'm a-hunting that man who first thought up daylight saving time
If he will prove why the clocks will lose, then I'll admit it's fine
I twisted my old clock around till it ain't worth a dime
I'm a-counting sheep, losing sleep, get up late, miss my date
Couldn't get there in a Cadillac Eight
Tries to wheel [?] they'll never gain with daylight saving time.⁷⁶

Only one or two smaller communities in Maryland had daylight saving in 1946. In November, Baltimore residents voted overwhelmingly for fast time the following year. A bill that came into the state legislature in early 1947 for statewide daylight saving looked likely to succeed as neighbouring states of Pennsylvania and Delaware used the measure, Washington was thinking about it for the District of Columbia, and the state's largest metropolitan area, with 40 per cent of the state population, had voted it in. But the bill was defeated by 62 votes to 51 in the House.

Maryland was to have the same problems as many other states where daylight saving was left to each city and town. Some local governments decided to use advanced time while others stuck with the old time and many were still considering whether to change. In March 1947, a reader of *The Daily Mail*, Hagerstown wrote to the editor complaining that there wasn't any need to fiddle around with time:

... this daylight saving time question. Do we have to go through that again? Seems God made His decision when He made this old earth. Why try and change something He thought right and proper from the very beginning of time. Don't you think that's what is the matter with this old world? Think these things over.⁷⁷

Time was also a quandary for the railroads as Baltimore, Annapolis and some other Maryland communities had daylight saving time while many didn't or were undecided, and several municipalities near Washington were waiting for the national capital to act. One railroad corporation said it was "having an awful time" trying to sort out timetables. Another one scheduled morning trains into Baltimore and afternoon services out of the city on daylight time and trains leaving it in the morning and those arriving in the afternoon on standard time.

More Maryland municipalities took up daylight saving although they remained in the minority. Some businesses in standard time areas put clocks on. Farmers generally stayed on the old time regardless of whether their local government had daylight saving. Unlike some other states, virtually all communities that used advanced time maintained it until September. In the summer of 1948, most of Maryland was on daylight saving time, reducing the confusion of the previous year.

Michigan didn't usually have daylight saving outside of wartime emergencies as most of the state is already half to three-quarters of an hour ahead of local mean time. After

⁷⁶ "Daylight Savings Time", Grandpa Jones, an American original", CMH Records, YouTube, at <https://www.youtube.com/watch?v=tpQbCTebC20>

⁷⁷ "Editor's Mail Box", letter to the editor, by "A Wondering Citizen", *The Daily Mail*, Hagerstown, Maryland, United States, 6 March 1947, p. 2, Newspapers.com (subscription only), at <https://www.newspapers.com/image/20740744>

several council debates in 1948, Detroit adopted daylight saving despite a state law stipulating standard time. But in September, a public vote in Detroit resulted in 51 per cent of people opposing the scheme and it was abandoned in future years.

Members of Congress were frustrated by the patchwork approach to daylight saving around much of the country. A federal bill banning the measure nationwide with fine of \$100 was sponsored by Maryland representative Dudley Roe on 10 May 1946 but went no further. However, members were talking seriously by March 1947 of having daylight saving in the District of Columbia. Both houses passed a bill in April allowing the district commissioners to go ahead with the scheme in Washington, D.C., reversing a previous decision by the House. Truman signed the bill on 30 April and the capital started daylight saving time in May.

Congress senator John Overton of Louisiana wasn't impressed, placing a large sign on his office door: "This office operates on Standard Time only." He stayed on slow time all summer, the only member to do so. Next year, a bill to enable the national capital to have daylight saving every year was debated in the Senate in early April. Overton was irate. He called the proposal "irreverent, blasphemous infidelity", suited only to "socialites, dilettantes, parvenus, nouveaux riches" and to "retired capitalists" who "play golf and go to cocktail parties". He continued: "Standard time is God's time – time based on the division of light from darkness. We should follow God's time. There is nothing to be accomplished as the sun also rises at its own time."⁷⁸

Perhaps fellow senators weren't game enough to remind him that standard time, or railway time, only began in the United States in 1883. The bill was passed by the Senate by 46 votes to 17 and by the House, and Washington, D.C. had daylight time in 1948. It was approved on an annual basis until 1953 when a bill was passed to allow the capital to automatically use the scheme each year.

While many American communities adopted daylight saving time in the summer months, Palm Springs, California put its clocks ahead in the winter. Daytime temperatures in the desert resort city reached over 100 degrees Fahrenheit (38 degrees Celsius) most days from June to September and no one wanted an extra hour of sun in the afternoon. However, in winter, temperatures at that time of day were a far more pleasant 70 degrees Fahrenheit (21 degrees Celsius) or so. But the sun disappeared behind the 10,800 foot Mount San Jacinto by about 3 p.m. and locals and tourists alike wanted another hour of sunshine. The council passed an ordinance for four months of daylight saving to start on 17 November 1946 and the measure was called "sun time", with signage prominently displayed at the city entrance. Within weeks, people found that being on a different time to the rest of the state was more of a hindrance than a benefit and the council was forced to cancel sun time after less than two months.

Despite various organisations in California supporting daylight saving in 1946, such as the Junior Chamber of Commerce and the Bay Area Aviation Committee, its introduction statewide looked unlikely. Bills were introduced into the state legislature in 1947 but were killed. Daylight time had now been rejected five times by the state

⁷⁸ "Senator cries 'blasphemy' as daylight saving wins", *The Salt Lake Tribune*, Salt Lake City, Utah, United States, 7 April 1948, p. 2, Newspapers.com (subscription only), at <https://www.newspapers.com/image/12020362>

legislator and twice in ballots over the years. But on 11 February 1948, the Pacific Gas and Electric Company proposed daylight saving due to a power shortage caused by drought. The state was suffering from one of its worst dry periods on record and the company urged the governor, Earl Warren, to implement daylight time as an emergency measure as quickly as possible. A 20 per cent reduction in power available for industry, houses and farms had been in place for over a year.

Industry and even farm groups liked the proposal, as did the governor who wanted it given top priority. A bill to provide daylight saving time in California from 14 March for a year was passed by the Assembly 73 votes to 1 and the Senate 40 to nil. Ironically, decent rain fell in many areas over the weekend of the switch to daylight saving and by 12 April, power restrictions were lifted in northern and central areas. But authorities felt that advanced time should continue as power still wasn't abundant. A new proposed end date of 25 September was pushed out to 1 January 1949. By then, rainfall levels had improved, and the state had more power generating facilities.

Daylight saving in California had been favoured in the warmer, lighter months but was increasingly unpopular as winter set in. The governor said he had never seen anything that infuriated the public more than daylight saving in the months of September to December with complaints coming from everywhere. He was adamant California wouldn't have daylight saving in 1949. But by summer, a petition got enough signatures to add a daylight saving question to the ballot on 8 November. Supporters and opponents of the measure campaigned tirelessly. One of the things advocates pointed to was the decline in traffic fatalities in Los Angeles from 505 in 1946 without daylight time to 289 in 1948 with it. About 55 per cent of people voted "yes". California had daylight saving each year from 1950 although the bickering didn't let up.

Nevada also had drought in the late 1940s but a bill for daylight saving was defeated in 1947. A clock shift was considered again in March 1948 as the dry weather continued and as the western part of the state got most of its electricity from the California-based Pacific Gas and Electric Company, which was struggling to provide enough power. Voluntary reductions in energy consumption were put in place from 3 March. Governor Vail Pittman wanted emergency daylight saving in the state but the attorney-general advised him he couldn't do this under existing state laws and that it required new legislation. The governor insisted that daylight saving should start on 14 March but there wasn't time to get a bill through the legislature, so he asked all councils to organise the time change. Daylight saving was to be retained until January, but in October and November, 14 of the state's 17 counties went back to standard time because children were boarding buses to school in the dark and workers and farmers also had to get up too early.

An Act was passed in Nevada in 1949 allowing the governor to authorise daylight saving but, interestingly, he left the decision to councils. A number of them commenced daylight time in May. However, the attorney-general said that daylight saving by local governments wasn't legal and within weeks only one county was still using the scheme. In 1950, the governor proclaimed advanced time for the state and, like California, the clocks then went forward each year.

Daylight saving was considered but hardly used in the states of Oregon and Washington in 1946 and 1947. Most of these states, including their capitals and largest cities, used ordinances to have daylight saving in 1948 to be in unison with California and Nevada. In Oregon, a bill banning daylight saving was passed by the state legislature in April 1949. But the new law wasn't effective until mid July, so largest city Portland went onto daylight saving in the meantime as its citizens had voted in favour of it the previous November. Capital city Salem and many other local areas had it too. Daylight saving supporters gathered about 16,000 signatures to petitions, the threshold required for the new law to be delayed until the next ballot in November 1950. But a clear majority, 59 per cent, voted for standard time.

In 1951 the Oregon governor, Douglas McKay, was pondering daylight saving when the attorney-general advised that the governor could order the measure if at least one of the four adjoining states of California, Nevada, Idaho and Washington had it and if it was needed for some emergency or economic reason. He was under pressure from merchants to go with daylight saving and farmers to have standard time. Three of the four states were expected to have daylight saving and Idaho was on Mountain Standard Time, the same as Pacific Daylight Time, and the governor argued that the Oregon economy would suffer if the state was on a different time. He put the state on daylight saving time despite the poll result of less than six months earlier. The State Grange tried to get a bill into the legislature to keep standard time. When that failed, they took the matter to court. Oregon went onto daylight saving but the legal action continued and some areas more or less stayed on standard time.

Next year, 1952, after much procrastination, and estimating that 51 per cent of the letters he received favoured daylight saving and 49 per cent standard time, the governor decided the clocks wouldn't go forward. Portland defied the order and had daylight saving, with most other municipalities following. Salem was a notable exception. At the state ballot in November, 61 per cent of people voted to ban daylight saving and a bill was passed to that effect. Most of Portland still had daylight saving in 1953 although by 1954 the scheme was probably used only by a minority of the city's businesses and residents.

Oregon continued to have a mixture of standard time and daylight saving from county to county and often within a county in the warmer months, amid bills and court cases as each side tried to gain the ascendancy. In 1961, 13 of the state's counties were on standard time, eight had daylight saving, one was on Mountain Standard Time and 14 had both standard and daylight time, although it's quite possible that no county was entirely one way or the other. And start and finish dates usually varied between counties. State law still didn't officially allow advanced time, except in four counties in the Portland area under a new law that year. At the November 1962 ballot, about 63 per cent of the city's voters wanted daylight saving. Salem used the scheme again from 1963.

Similarly, daylight saving was outlawed in Washington in the November 1952 ballot. As a means of getting around the ban, Olympia councillors considered using Mountain time next summer with clocks to go ahead an hour just as they would under daylight saving. The move didn't eventuate although a few communities shifted their time zone. Advanced time became state law again after the 1960 ballot, with 52 per

cent of voters favouring the scheme. Washington had daylight saving again from 1961.

Yet another state to forbid daylight saving was Indiana where Central Standard Time, or GMT-6, had been the law since 1949. That didn't stop most municipalities putting their clocks forward each summer. A meeting of mayors, councillors and attorneys in Indianapolis in October 1954 voted to have permanent daylight saving or Eastern Standard Time, or GMT-5, and the idea quickly gained support. Many eastern and northern counties were already on Eastern time. By September, Indiana had a confusing mixture of Central and Eastern standard time and daylight saving time, with each community deciding its time zone and when to finish fast time.

A vote was held in November 1956 to determine if residents wanted Eastern or Central standard time and with or without daylight saving. Eastern Standard Time year round got the most votes (32 per cent), followed by Central Standard Time all year (31 per cent), Central time with daylight saving (24 per cent) and Eastern time with daylight saving (13 per cent). But the state legislature passed a bill in April 1957 for the third most popular option, Central time with daylight saving, figuring that none of the options had anywhere near half the vote, that Central time had more support overall (55 per cent) than Eastern time (45 per cent), and that Central Daylight Time was the same as Eastern Standard Time. That way, the politicians perhaps hoped to keep most people and communities at least partly happy although this seemed unlikely as only 37 per cent of voters wanted daylight saving. Any government official who broke the law would be subject to a fine of up to \$1,000 and jail for up to 60 days. Also, state funds could be withheld from municipalities that dared contravene the order.

Straightaway, councils looked for ways to circumvent the new law, such as operating an hour later in winter months. Indianapolis had been on EST since 1955, which is the same as Central Daylight Time, and didn't have to change its clocks in the summer of 1957. In autumn, it shifted to CST. North-eastern and south-eastern communities unofficially stayed on EST through winter and did this each year. The following summer, the capital changed back to EST and remained in this time zone. This pattern continued and by late 1960, only the north-west and south-west corners were going back to CST although the changeovers were at different times, while the majority of the state kept to EST. The boundary between CST and EST areas went through the middle of many counties and seemed subjective. In December, *The Indianapolis Star Magazine* commented on the chaos as follows:

... this state has huffed and puffed itself into a condition of horological horror, a phrenetic, incongruous mixture of such a simple thing as the time of day. ... The time map of Indiana is a cartographer's nightmare, sort of speckled all over like a purebred Dalmatian. It's a confusing, tremendously expensive, intolerable situation that we haven't been able to straighten out ourselves by compromise, treaty, referendum or legislative act.⁷⁹

⁷⁹ Joseph Shepard, "A time of confusion", *The Indianapolis Star Magazine*, Indianapolis, Indiana, United States, 4 December 1960, p. 9, Newspapers.com (subscription only), at <https://www.newspapers.com/image/105784123>

The state law demanding Central time with daylight saving was repealed in March 1961 and time was left to each community to sort out. Various bodies had been asking the Interstate Commerce Commission for some years to move the boundary between the Central and Eastern time zones to the west, which it did in June. After the shift, about half of Indiana, including the capital, was in the Eastern time zone although a considerably greater proportion of the state used this zone in practice and most or all of it kept on doing so.

Over the border in Illinois, the small city of Waterloo, near St Louis, had daylight saving but the school board insisted the students use standard time as parents in the farming areas were worried the children would go to school before their farm work was done. The kids wanted daylight saving and went on strike in spring 1953. The board mailed a ballot to parents and 476 voted for daylight time and only 100 for standard time. In a victory for the pupils, the board abided by the results.

To the north, Wisconsin, Minnesota and parts of North Dakota were on daylight saving from 1957. Many bills had been introduced into the state legislature of Wisconsin since World War II but they had always been defeated due to rural opposition. A bill was passed in February for a referendum on daylight saving in April. About 55 per cent of the public said “yes” to advanced time, the reverse of a vote 10 years earlier when the same percentage had answered “no”. Minnesota followed, passing a bill and commencing daylight saving on the same date as its eastern neighbour. Both states continued with the scheme in future years. Fargo, largest city in North Dakota and situated on the Minnesota border, also took up daylight time in 1957 along with some of the other communities in the eastern part of the state. The city returned to standard time from 1961 after an advisory ballot found that people didn’t want daylight saving.

Charleston and other large cities in West Virginia also started daylight saving in 1957 although the northern and eastern panhandles had used advanced time over the years to align with adjacent states. Most city councils outside the panhandles got rid of the scheme in 1958 and the state became a mixture of fast and slow time until 1963 when a bill for statewide daylight saving was passed by the legislature in February. West Virginia continued with the measure in subsequent years.

Postwar daylight saving didn’t get underway until a little later in most of Virginia. The measure had been confined to the city of Norfolk and the western suburbs of Washington, D.C. until 1961. Capital city Richmond then adopted it, qualifying under a state law where a city with population between 200,000 and 225,000 could have daylight saving. The state had various laws that related to a specific city but instead of naming it, legislation referred to a population range, often very narrow so that the location couldn’t be mistaken, or at least that was the idea. Problem is that the number of inhabitants in a place usually changes over time.

The daylight saving law had been specifically drafted to allow advanced time in Norfolk. Its population in 1950 was 214,000. At that time, Richmond had 230,000 people, but by the 1960 census, it had only 220,000, which allowed it to enact daylight saving. Nearby counties could also legally put their clocks forward, but many other municipalities jumped on the bandwagon until about a third of the state was on daylight time with various start and end dates. Some cities had it but their counties

didn't. In certain localities, only schools or only businesses were on daylight saving. In Richmond, the mayor had proposed a start date a day different from that adopted by the council and people turned up to church too soon or at the end of service or arrived at the cinema ahead of time or in the middle of a movie or were early or late for buses, trains and planes and for work.

Ironically, Norfolk was no longer permitted to have daylight saving under the existing law, its population having climbed rapidly to 306,000 by 1960, but the city chose to stay on standard time in 1961 in any case. Members of the legislature knew that the whole mess had to be sorted out and, after several bills and many amendments in early 1962, a law for statewide daylight saving each year was passed in May.

Another state where daylight saving became more popular in the 1960s was Iowa. Eastern border areas had used it for years to align with Illinois and Wisconsin communities. A few more towns and cities in the east decided on daylight time in 1964 and this seemed to set up a rollercoaster where areas further west took up the idea, including capital Des Moines in the middle of the state. After much debate, the legislature passed a bill for statewide daylight saving in April 1965 but only for the three month period from Memorial Day to Labor Day. Eastern municipalities had been used to six months of daylight time and kept to this schedule.

In Minnesota, a bill to extend the daylight saving period from three to five months failed in March 1965. Nevertheless, many cities went ahead and began daylight time earlier than permitted under state law, which was the fourth Sunday in May. Some cities made the change in April. Capital city Saint Paul decided on 4 May to move clocks ahead on 9 May to line up with nearby Wisconsin and other states. Adjoining city Minneapolis, the largest in the state, stuck with the law and refused to go onto daylight saving time early. Governor Karl Rolvaag was angry at the capital's decision and the legislature swung straight into action to try and sort things out and have the Twin Cities on the same time. Bills were introduced and meetings held with businessmen and community leaders. But the two mayors held their ground and nothing was achieved, while more municipalities made an early start to daylight saving. Minneapolis put its clocks forward on 23 May as per state law.

Not all of Saint Paul went onto early daylight saving. The state legislature stayed on standard time, as did the post office, state and federal offices, the courts, the telephone company, and the police department. Officers didn't know if they should book drivers for parking violations based on fast or slow time. Most businesses used daylight saving or opened an hour earlier. The local bus company, which serviced both cities, printed timetables with two sets of times. Most of the school districts of Saint Paul remained on standard time. Just over half of the city's suburbs did the same and a 15 mile drive could involve six watch changes. Trains and planes stayed on standard time.

Many people lived in one of the Twin Cities and worked in the other. By the time they shopped, caught a bus, went to an appointment, picked the kids up from school, and watched the evening news, they may have had to switch between times on half a dozen occasions during a typical day. In fact, most of the American population had to cope with the problem of different times to varying degrees in the summer months. It affected their lives and was costly and inconvenient for business and government.

Enquiries often had to be made to discover if a locality was on standard or daylight saving time. Without the internet, this sometimes involved expensive phone calls or time consuming letter writing, and was a nightmare for anyone who travelled as part of their work.

Different start and end dates for daylight saving from state to state and within states were common too. The most usual period was from the last Sunday in April until the last Sunday in October, but in 1964, there were 19 start dates in April, May and June and 14 finish dates in August, September and October throughout the country. In 1966, an interstate carrier group had to update its schedules 38 times.

Problems caused by part of the country being on daylight saving and by so many different changeover dates had worsened over the previous two decades. About a third of the US population was on daylight time in 1947, increasing to more than half by 1965. In the years following World War II, daylight saving was concentrated in the north-east and was sporadic in most of the rest of the country. Through the late 1940s and the 1950s, up to half the 48 states had daylight time, with roughly equal proportions using it statewide and in certain localities only. The number increased to 31 by 1966. Eighteen states had universal daylight saving either by state law or by local government ordinances and resolutions, including the six New England states of Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island, plus the other north-eastern states of New York, New Jersey and Pennsylvania, the midwestern states of Wisconsin, Illinois and Iowa, the southern states of Delaware and West Virginia, and the western states of Washington, Oregon, California and Colorado. The District of Columbia also had daylight saving.

Daylight saving was practised in parts of 13 other states. In the midwest, about a third of Ohio's 88 counties had daylight time. Among major cities, Cleveland and Akron were on advanced time but Columbus, Cincinnati, Toledo and Dayton were on standard time. In Indiana, the Central time zone had daylight saving while the Eastern time zone remained on standard time, bringing uniformity in summer. Only one Michigan county and part of two others were on daylight saving. Many eastern counties in Missouri had daylight time but the western areas of the state didn't use it. Most of Minnesota put clocks forward although cities on the western border kept standard time to align with the Dakotas.

In the west, the northern part of Idaho had daylight saving but not the south. The only place in Montana using it was the city of Butte and in New Mexico the county of Los Alamos. By contrast, all of Nevada except for a handful of counties had daylight saving. In the south, most of western Kentucky went forward but central and eastern areas tended to stay on standard time. Most of Virginia also had daylight time except for eight counties and two cities in the south-west. All of Maryland was on advanced time apart from Garrett County in the north-west of the state although the county's main town of Oakland used the scheme. And in Alabama, the city of Huntsville in the state's north was the only place on daylight saving.

The following table shows the states that were wholly or partly on daylight saving time and those that stuck to standard time in 1966. Daylight saving was no doubt used unofficially by at least some organisations and people in one or more of those states in

the third column, just as standard time would have been used by certain groups or individuals in states in the first column, especially farmers.

Daylight saving by state, United States, 1966

| <i>Whole state</i> | <i>Part of state</i> | <i>No part of state</i> |
|----------------------|----------------------|-------------------------|
| California | Alabama | Alaska |
| Colorado | Idaho | Arizona |
| Connecticut | Indiana | Arkansas |
| Delaware | Kentucky | Florida |
| Illinois | Maryland | Georgia |
| Iowa | Michigan | Hawaii |
| Maine | Minnesota | Kansas |
| Massachusetts | Missouri | Louisiana |
| New Hampshire | Montana | Mississippi |
| New Jersey | Nevada | Nebraska |
| New York | New Mexico | North Carolina |
| Oregon | Ohio | North Dakota |
| Pennsylvania | Virginia | Oklahoma |
| Rhode Island | | South Carolina |
| Vermont | | South Dakota |
| Washington | | Tennessee |
| West Virginia | | Texas |
| Wisconsin | | Utah |
| District of Columbia | | Wyoming |

Sources: various newspapers, including through Newspapers.com (subscription only), at <https://www.newspapers.com>, and elsewhere

Congress had become increasingly concerned over the years by the haphazard approach to daylight saving across the country, especially in those states where individual counties and municipalities went their own way. Many bills for uniform time were introduced but few made it to either house for debate and a vote. In February 1948, Kansas senator Clyde Reed had a bill for national daylight saving from the last Sunday in April until the last Sunday in September each year. But Congress didn't seem game to look at universal daylight time so soon after the controversies it had brought during the war. He got little support. One senator wrote him a letter strongly opposing the measure, closing with "Disgustingly yours".

New representative Harley Staggers of West Virginia introduced the first of his annual daylight saving bills into Congress in 1949 "after citizens from cities as well as rural areas complained of the confusion resulting from the 'two-clock system' during the summer months", he said. A few of his bills got to the committee hearings stage but no further. In 1959, he gave up on daylight saving and tried a bill for standard time, just keen to get all of the country's clocks on one time or the other rather than have a confusing mess each summer. Next year, he was back with daylight saving and, for the first time, his bill got a hearing by the House Interstate Commerce Committee. In 1962, his bill was for standard time again.

Bodies such as the Interstate Commerce Commission and the Advisory Commission on Intergovernmental Relations were keen for Congress to enact uniform daylight saving. More bills were drafted, including by Staggers and other members, often with his involvement. A New York newspaper described the US time problem as a Gordian

knot that “needs to be slashed with one mighty cut”.⁸⁰ The ICC described the system as one of “increasing chaos”. More and more farmers agreed that a uniform time system, even if it included daylight saving, was better than the present costly and confused patchwork of times.

A House commerce subcommittee approved by a vote of 9 to 8 a bill introduced by Staggers in 1964 that did away with the term “daylight saving” and instead used the four existing time zones, Pacific, Mountain, Central and Eastern, and added a new one, Atlantic time. From late April to late October, the whole of the area covered by each time zone would shift one zone to the east. For example, the Mountain zone would move to the Central zone, meaning that the region would be on Mountain Standard Time in winter and Central Standard Time in summer. People in the Eastern zone would be on Atlantic Standard Time in the warmer months. While the bill had no binding provisions for states and communities to go along with it, the author felt few areas wouldn’t welcome uniform time. Common start and end dates would be mandatory for any location using the scheme. Federal agencies and interstate transport bodies would have to comply. The Senate Commerce Committee approved a similar bill. But the current Congress session ended without the bills progressing further.

With Harley Staggers now chairman of the House Interstate and Foreign Commerce Committee from January 1966, bills for nationwide daylight saving were thought to have a better chance of getting through the chamber. The issue was his hobby horse. His varied background before being elected to Congress, including science teacher, head coach, sheriff, brakeman, rubber maker, silk mill worker, field hand, highway right of way agent, county rent control director, state director of the Office of War Information, and lieutenant commander and navigator in the US Naval Air Corps, perhaps enabled him to see the daylight saving time issue from more perspectives than most people. He gave the matter high priority.

The committee was looking at a plan where states that chose to adopt daylight saving used set dates of the last Sunday in April to the last Sunday in October and for a whole state to either use it or stick with standard time. This differed from a bill the Senate had passed the previous year that allowed local option. The House passed its own bill by a ratio of better than three to one on 16 March and sent it to the Senate. But the upper house added an amendment that permitted a state to split into two parts and have daylight time in one part and standard time in the other. Staggers called for a meeting to sort out differences. The updated bill required uniform changeover dates in all areas observing daylight saving in 1966 and for each state to use either standard or daylight time from 1967. If a state wanted to exempt itself from daylight saving, it had to legislate by 1 April of that year.

The Senate agreed to the compromise on 29 March 1966 and the House passed the bill by a vote of 281 to 91 next day. President Lyndon Johnson signed it on 14 April and it became the Uniform Time Act of 1966. After two decades of time turmoil, the United States seemed to have at last sorted out daylight saving with federal legislation rather than leaving it to states and communities. Railroad stations wouldn’t need clocks with

⁸⁰ Editorial, *The Kingston Daily Freeman*, Kingston, New York, United States, 25 May 1964, p. 4, Newspapers.com (subscription only), at <https://www.newspapers.com/image/87448963>

two hour hands anymore. Many people thought time would no longer be a problem.
Not so.

14 National daylight saving again

With the Uniform Time Act, the US states had to decide if they were going to have daylight saving or stick to standard time all year. In 1966, counties, cities and towns in 13 states had chosen whether to use advanced time, legally or otherwise. Local areas would now have to go with whatever their state decided to do. Many businesses as well as television, radio, trains, planes, bankers and golfers liked daylight time, while farmers, theatre owners, restaurants, bowling alleys, and families with children heading off to school before sunrise didn't want it. By and large, it was a city versus country dispute.

State legislatures swung into action and numerous bills were introduced in 1966 and 1967 to exempt no fewer than 25 states from daylight saving: Idaho, Indiana, Iowa, Kansas, Michigan, Mississippi, Missouri, Nebraska, North Dakota, Ohio and South Dakota in the midwest, Alabama, Florida, Georgia, Louisiana, Oklahoma, South Carolina, Tennessee and Texas in the south and Arizona, Montana, Nevada, New Mexico, Utah and Wyoming in the west. Three state legislatures weren't due to hold regular sessions in 1967: Kentucky, Virginia and Mississippi. Another complexity was that 12 states were split between two time zones and the western part of some of them had often used daylight saving in the past, meaning that both parts were on the same time in summer. The Uniform Time Act would cause the two areas to be an hour different all year.

Committees met, houses debated, and groups lobbied. In Texas, the House State Affairs Committee heard evidence for and against a daylight saving exemption bill for five and a half hours before sending it to a subcommittee. It got to the House floor but was beaten by 90 votes to 56. In Iowa, a rural legislator felt that daylight time would set the younger generation on a path of aspirin, then harder drugs, and communism, but the governor declared he would veto any bill seeking an exemption from the scheme. The governor of Kentucky wanted daylight saving and resolved not to leave the state as his deputy was ready to hold a special session of the legislature to remain on standard time. A politician from Georgia argued that advanced time would upset the chickens.

To the relief of Congress and a large proportion of the population fed up with hardly knowing the time of day in many areas, bills to exempt states from daylight saving were steadily killed. Even some states that were seen as hold-outs, such as Georgia, Nebraska, Texas, Wyoming and Tennessee, now favoured daylight time as they didn't want to risk being a "time island" when neighbouring states chose to go with the majority.

In the end, only four states didn't go onto daylight saving in 1967 when it started on Sunday 30 April. Hawaii exempted itself due to its tropical location and standard time already being about half an hour ahead of local mean time. Alaska was in four time zones and wouldn't have to decide about daylight saving until the zones were sorted out, now one of the tasks of the new Department of Transportation rather than the Interstate Commerce Commission. Kentucky was granted an extension as its legislature didn't officially meet that year although some parts of the state had daylight saving. Indiana's legislature passed a bill providing for a clock in each public

building to show daylight time and otherwise left municipalities to decide their own time, contradicting the Uniform Time Act.

In Arizona, a bill to let the state remain on standard time was passed by the House but not the Senate and the state had daylight saving with the rest of the country in 1967. Protests came from farmers, restaurant and theatre owners, and housewives who couldn't get the kids to bed. One woman complained that her plant "just can't stand that extra hour of daylight". Governor Jack Williams had this to say at a meeting of the League of Arizona Cities in June 1967: "I have never seen an issue in all my years in Arizona that can destroy any public assembly faster than the issue of daylight time." A bill was passed to exempt the state from daylight saving from 1968.

South Dakota passed a daylight saving exemption bill but subsequent petitions signed by around 20,000 people triggered a referendum at the general election in November 1968. Thus the state had two years of daylight time before about 60 per cent of citizens voted to keep going with the scheme along with all neighbouring states and nearly the entire country.

A tussle developed over daylight saving in Kentucky in early 1968 where time is an east-west issue perhaps as much as a city-rural one. In January, five bills to keep the state on standard time were introduced into the legislature. With the state split between Central and Eastern time zones, business interests in the state's west supported daylight saving as they didn't want to be two hours behind the eastern states in summer. The House voted 59 to 35 in February to keep Kentucky on standard time, but after some complex manoeuvring, the final decision came down to a Senate vote in March. However, the upper house was deadlocked at 19-19. The deputy governor, Wendell Ford, then voted with the daylight saving side because he felt it was the right thing to do. Attempts by opponents to delay daylight time by asking the Transportation Department to review the state's time zones and by a bill for a referendum were blocked. Theatre owners sued but to no avail. Kentucky had daylight saving from 28 April.

More complex and protracted battles ensued in Indiana and Michigan. Time arrangements in Indiana had been working quite well and it wanted to maintain them rather than for the whole state to shift to daylight time in summer. Officially, the state was split fairly evenly between the Eastern and Central time zones. In practice, 77 of the 92 counties used Eastern Standard Time all year except for a small area in the south-east near Cincinnati that advanced its clocks. The other 15 counties, in the state's north-west and south-west corners, were on Central time and had daylight saving to be on the same time as adjacent states and nearby cities such as Chicago. In the six warmer months, the whole state had been on the same time. Further, standard time was well ahead of sun time, with Indianapolis forward by 45 minutes, and residents didn't want to be ahead by nearly two hours with what they called "double daylight time".

Indiana, in 1967, got away with its law to put one clock in each public building an hour ahead and for communities to decide their own time. The legislature wasn't due to meet in 1968 and many people worried that the state would automatically have to go onto daylight time. Their fears were confirmed when the Transportation Department announced on 14 March 1967 that the state was to have daylight saving

that year. But the state Farm Bureau felt that business would be disrupted and took the issue to the federal court. Theatre owners did the same, as drive-in movies would be forced to start very late and would lose a lot of customers.

A month later, the department reversed its decision, which gave Indiana until the following year to fix its time problems. Farmers and theatre operators withdrew their suits. But now it was the turn of the television stations to take the matter to federal court due to “substantial advertising revenue loss” if the state was on standard time and nearly everywhere else was on daylight time. They won their case and Indiana was ordered on 17 July 1968 to switch to daylight saving within 10 days. The US district attorney appealed the decision. Meanwhile, on 26 July, the same judge rejected a plea to delay his order and directed that daylight saving begin on Sunday at 2 a.m. two days later. But on 27 July, the Appeals Court granted a week’s stay.

The time turmoil encouraged *The Indianapolis Star* to repeat an old daylight saving joke at the top of page 1 of its newspaper on the Monday: “Today’s chuckle: Daylight Saving Time is founded on the old Indian idea of cutting off one end of the blanket and sewing it on the other end to make it longer.” This relates to a comment purportedly made by a native American years earlier when told about daylight saving: “Only the government would believe that you could cut a foot off the top of a blanket, sew it to the bottom, and have a longer blanket.”

Television stations asked the Court of Appeals on 30 July to reverse its decision as they were losing revenue. The farmers and theatres reentered the row next day, seeking a delay until the next year. Joining them was the Indiana Association of Cities and Towns. On 2 August, the Appeals Court halted the daylight saving order indefinitely or until a final decision could be made. By then it was midsummer and well over a month after the longest day.

In January 1969, the Department of Transportation ruled that all of Indiana except the north-west and south-west corners would be in the Eastern time zone from April, a decision praised by the governor, Edgar Whitcomb, although the new directive reflected precisely what had been happening in practice for a number of years. The department would also seek to change the Uniform Time Act to allow states in two time zones to use daylight saving in one and keep standard time in the other. A bill to exempt the state from daylight saving was passed by both houses of the Indiana General Assembly in March but it was vetoed by the governor on the last day of the session despite close to four to one support for the bill in the House and almost three to one in the Senate. He was concerned that the state would be on a different hour to nearby states. There was no time to override the veto and the legislature wasn’t due to meet again until 1971 unless the governor called it back early, which he didn’t.

All of Indiana officially had daylight saving in 1969 although a few areas went their own way. One was the city of Huntingburg in the south-west. The council altered the city hall clock by an hour but, in an act of defiance, set out a resolution asking people to remain on Eastern Standard Time or simply pick their own time over the summer months:

Neither the federal government, the state government, the governor of Indiana nor the city of Huntingburg has the power or authority to regulate or enforce the time and hour

by which citizens shall have the right to determine their daily living habits in the practice and operation of their businesses, farms, homes, religion, education and entertainment.

The citizens ... may thereby determine for themselves, individually or collectively, and declare accordingly through their respective organized or unorganized groups, the standard of time which they intend to follow in the practice and operation of their said functions.⁸¹

Many residents and organisations complained about “double daylight time”, which they would now have to put up with for two years: 1969 and 1970. When the legislature reconvened in January 1971, the House voted 61 to 36 to override the governor’s 1969 veto of the bill to exempt Indiana from daylight saving. Ironically, the chamber clock was exactly three hours slow. The Senate voted 24-24 before another vote a few days later resulted in two senators swapping sides in a 26 to 22 count to override the veto, which was met with cheers and applause. To the relief of residents, Indiana would keep to standard time in 1971. The new law included provision for the north-west and south-west corners to use Central Daylight Time, pending an amendment to the Uniform Time Act.

That came in 1972 when the president, Richard Nixon, signed a bill on 30 March allowing states in two time zones to use different times in summer. The Senate had passed a bill nearly a year earlier but it sat in a House commerce subcommittee due to a reluctance to reopen the standard time-daylight time debate. North-west and south-west counties in Indiana could now legally have daylight saving. Seven counties in the south-east using Eastern Daylight Time weren’t covered by the amended Act but kept using this time in the warmer months regardless.

In Michigan, a bill to stay on standard time was passed by both houses and signed by the governor in March 1967. However, daylight saving supporters, including senator Raymond Dzendzel, the Chamber of Commerce and the Retailers Association, set out to obtain the 123,100 petition signatures needed (equal to 5 per cent of votes for governor at the last election) to force a referendum. If they were successful, the state would have daylight time for two summers before the scheme was put to the vote at the election in November 1968. Opponents of daylight saving, namely the state Farm Bureau, theatre owners and bowling alley proprietors, tried to block the petitions by taking the matter to the Court of Appeals. But the move was ruled to be premature. By late April, Dzendzel had collected nearly 200,000 signatures, suspending the state Act for standard time. But farming, bowling and theatre interests went back to court. The State Board of Canvassers delayed certifying the petitions due to suits pending in three courts. After a protracted battle, the Supreme Court handed the issue back to the canvassers.

Objectors to daylight saving checked a sample of signatures and found 41 per cent to be invalid, reducing the number of acceptable names to less than 120,000, and took the issue back to court again. The final number of valid signatures was determined to be about 125,000, enough for the switch to daylight time to be made on 14 June 1967.

⁸¹ “Huntingburg may ignore time change”, *The Indianapolis Star*, Indianapolis, Indiana, United States, 20 March 1969, p. 26, Newspapers.com (subscription only), at <https://www.newspapers.com/image/106830750>

As a Michigan newspaper put it: “After months of debate in the Legislature, bills, amendments, court decisions, motions, appeals, referendum calls and other legal gobbledygook, Michigan today was an hour faster than the sun.”⁸² Hotel patrons weren’t impressed as the change meant an hour’s less drinking time. Nor were Upper Peninsula residents happy when they had to go from Central Standard Time to Eastern Daylight Time, a difference of two hours, pushing sunset back to as late as nearly 10 p.m. in western parts of the state. A dozen or more Upper Peninsula counties disregarded the law and used Central Daylight Time. Proponents of standard time pursued further but unsuccessful court action over the petitions.

The lead up to the referendum in November 1968 pitted businesses, city workers, participants in outdoor activities and easterners against farmers, parents, theatres, indoor sports, bars and westerners. Preliminary results indicated that out of about 2.8 million votes, daylight time won by some 25,000 and supporters were rejoicing. More than two weeks later, the final tally showed a win for standard time by just 413 votes and suddenly the other side in the confrontation was celebrating. Given the closeness, the Board of Canvassers decided on a recount, finding tabulation errors in several counties, uncompleted returns and uncounted absentee votes. The board’s revised figures had standard time winning by 1,501 votes.

Dzendzel and several business groups sought a citizen recount at a cost of \$5 a precinct, refunded if the result was reversed. They checked about 2,700 of Michigan’s approximately 5,600 precincts in 80 of 83 counties and found many errors of various descriptions, prompting calls for a review of vote counting processes and staff training. Supporters and opponents of daylight saving anxiously followed media reports of the progress of the count. By 1 January 1969, the lead for standard time was down to 1,096 votes, reduced further to 550 by 29 January. The final difference was 488 votes, which meant that 50.01 per cent of people who voted chose standard time and 49.99 per cent daylight time although less than half the adult population cast a vote. Fast time supporters didn’t give up. Two law students took the matter to the Appeals Court. Also, a bill was introduced to rescind the standard time law.

When nearly the whole country began daylight saving on 27 April 1969, almost all of Michigan stayed on standard time. A few communities south-west of Detroit along the border with Ohio either changed to daylight time or had businesses, schools or churches that started an hour earlier. The Upper Peninsula was to shift from Central to Eastern time, and while three counties didn’t change, the others welcomed the move as they would be on the same time as Wisconsin.

A drive for petition signatures in late 1969 and into 1970 to force another ballot later that year was led by Dzendzel and there were more bills, hearings and court cases. Petitions now had to carry over 200,000 signatures as the threshold had been raised from 5 per cent to 8 per cent of votes for governor at the last election. But a problem over the legality of petition submission dates was tied up in court and time ran out for a public vote in 1970. Proponents struggled to get enough signatures and resorted to other means. A House vote on initiative petitions failed by 60 votes to 46, ensuring a referendum. In another move, the Supreme Court validated a request for the

⁸² Kit Kincaid, “Daylight saving time comes to state, some UP communities are holding out”, *The Ludington Daily News*, Ludington, Michigan, United States, 14 June 1967, p. 1, Newspapers.com (subscription only), at <https://www.newspapers.com/image/273805>

legislature to overturn its 1967 decision for the state to have standard time or else the daylight saving question would be on the November 1972 ballot. The legislature took no action.

Both sides kept pressing their views before the 1972 vote and the daylight saving advocates seemed to be winning the race according to polls. Market Opinion Research surveys found that the proportion of Michigan residents who wanted daylight time increased from 44 per cent in August to 49 per cent in September and 53 per cent in October. On election day, 55 per cent of people voted for daylight saving although the figure for the Upper Peninsula was only 27 per cent. After four years on standard time, the state joined most of the nation in putting clocks forward on 29 April 1973. That left Arizona, Hawaii and most of Indiana as the only states with year round standard time.

Later that year, daylight saving policies would again come to the forefront. In a surprise attack on 6 October 1973, Egypt and Syria entered the Sinai and Golan Heights areas, occupied by Israel since 1967, and the Yom Kippur War began. While the Soviets sent arms to Syria and Egypt, the United States supplied weapons to Israel. In retaliation, the Organization of Arab Petroleum Exporting Countries, or OAPEC, placed an oil embargo on America, starting on 17 October, at a time when the country was relying increasingly on imported oil. The war ended on 25 October but the embargo dragged on. With the United States facing an energy shortage, supporters of daylight saving suggested the scheme be used all year as one way of helping to ease the crisis. They argued that lighter afternoons and evenings wouldn't only cut electricity consumption but reduce crime and traffic accidents. Congress didn't show much interest and daylight saving finished as usual on the last Sunday in the month.

The Transportation Department had been looking at continuous daylight saving for a while, but a recent study had found that keeping the clocks an hour ahead all year would lower nationwide power usage by less than 2 per cent. Compared with wartime, people were using a lot more electric heating and air-conditioning, pushing up energy demand in the early morning as well as the evening. Farmers, fundamentalists, and parents not wanting their children to go to school before light continued to oppose daylight saving, especially any proposal for it to last the whole year.

By early November 1973, prices of petrol and heating oil were rising rapidly and supplies were expected to dwindle as the crisis became worse. The federal government was considering a range of responses to conserve energy, such as cutting the hours of non-essential industries, lessening street and other outdoor lighting, restricting shop trading hours, rationing petrol, increasing the excise tax on it, reducing speed limits, encouraging car pooling and more use of public transport, turning thermostats down to 68 degrees Fahrenheit (20 degrees Celsius), finishing television broadcasts earlier, suspending anti-pollution controls that had restricted coal use, funding the development of alternative energy sources, and daylight time year round. But Congress was accused of being slow to act. Some of these measures and others were announced by Nixon on 7 November, including all year daylight saving.

Various experts estimated energy savings from daylight time ranging from less than 1 per cent to 1.5 per cent. The government forecast a figure of up to 3 per cent, especially in the northern states, and calculated a saving of about 150,000 barrels of oil a day in the colder months. But an oil shortage of 2.8 million barrels a day was expected by the Petroleum Industry Research Foundation, 2.1 million by the Cost of Living Council and 3.5 million by the government, a large chunk of America's usual consumption of around 16 million barrels a day. Treasury Department predicted that a protracted oil embargo would cause a severe recession or even a depression.

House and Senate committees approved bills on 13 November 1973 for a two year trial of continuous daylight time, but raised concerns about children going to school before sunrise and the lack of current information on the effects of all year daylight saving, which America hadn't used since World War II. A week later, two Republican senators tried to attach a minimum wage amendment as a rider to the daylight saving bill in the knowledge that the bill would probably pass quite easily. The Democrats' minimum wage bill had been more generous but had been vetoed by Nixon. The Senate Democratic leader said the daylight saving bill wouldn't be considered until Republicans stopped trying to put the unrelated amendment through with the bill.

The House passed the bill by a vote of 311 to 88 and the Senate by 68 to 10 without any minimum wage amendment and the president signed it on 15 December, creating the Emergency Daylight Saving Time Energy Conservation Act of 1973. He then gave an "executive order" that states in two time zones could seek an exemption. Most of Indiana was already exempt. The southern part of Idaho was able to remain on standard time, placing the whole state on the same time, UTC-7. Nebraska and Michigan also toyed with the idea of staying on standard time. Arizona, which is solely in the Mountain time zone, asked for and got an exemption.

Clocks went forward an hour in all states except Hawaii, Arizona, and most of Idaho and Indiana on 6 January 1974, two weeks into winter, and weren't scheduled to go back until 26 October 1975. Idaho agreed to go along with the rest of the nation on 3 February. There were plenty of complaints from farmers and parents. The main problem seemed to be that children had to be woken up and sent to school in the dark and many parents were worried about accidents and assaults. Some schools opened an hour later but most started at the same clock time.

Authorities encouraged parents to dress their children in multi- or light coloured clothing with reflective tape or "hot dots" not only on garments but on shoes, books and cases, and to use a buddy system where a young child was accompanied by a parent or older sibling at least to the bus stop. School crossing guards often wore reflectors and carried flashlights or traffic batons with reflectors. Drivers were also asked to take extra care, especially in the snow and ice.

There were plenty of accidents to children and guards, including fatalities in the early morning. In the first three weeks of daylight saving, about 15 children were killed in predawn mishaps in Ohio, Virginia, California, Illinois, and Florida which had the worst record with eight deaths compared with two in the same period a year earlier. But six of the eight fatalities were partly due to fog or rain and the number of deaths in the afternoon was also higher in 1974 than 1973. Florida secretary of state Richard Stone said that the governor, Reubin Askew, should use an executive order to return

the state to standard time. Bills to end daylight saving were defeated in the legislature. Overall, state and local authorities argued that daylight time hadn't resulted in an increase in accident rates.

Calls to end all year daylight saving continued though, as power companies reported little if any reduction in energy usage in the initial weeks of the scheme. The Florida Power & Light Company found there were no savings from daylight time, because although people were using less electricity in the evening, they were using more in the morning. According to nationwide statistics of the Edison Electric Institute, electricity consumption in the second week of daylight saving was up 0.5 per cent on the same week the year before, whereas growth of 7 per cent was expected without the time change. Energy use in the United States had been rising rapidly over the previous decade due to economic growth, population increase, and more equipment and appliances using electricity. In this context, the policy of winter daylight saving might be regarded as successful although other factors impact on electricity consumption, such as weather, and conservation efforts of people turning off lights and appliances not in use and driving less.

By February 1974, public opinion had turned against daylight saving. In a survey by the National Opinion Research Center at the University of Chicago for the Transportation Department, 47 per cent of people favoured year round daylight time, 51 per cent disliked it and 2 per cent didn't mind. Support for the measure was down from 76 per cent in December and a similar proportion in August. A survey by Field Research Corporation for the *Los Angeles Times* in February found that 51 per cent of Californians were happy with daylight saving all year, while 36 per cent wanted to go back to standard time and 13 per cent had no view. But 58 per cent of respondents felt that daylight time didn't save enough power to be worthwhile.

Bills were introduced into Congress from late January to repeal year round advanced time due to lack of energy savings and dangers facing children heading to school before light. Some states had bills to exempt themselves from the scheme or called for the federal government to review it. But a bill to end daylight time in October was killed by the Senate on 7 March.

Ten days later the oil embargo ended. The Nixon administration had negotiated with Israel for a withdrawal from the Sinai and Golan Heights areas. Discussions began in November and by January the First Egyptian-Israeli Disengagement Agreement was in place. Negotiations were sufficiently advanced to convince OAPEC that satisfactory progress was being made and the embargo was lifted on 17 March 1974. Pressure on fuel supplies and to retain all year daylight time eased somewhat. But the ban had changed the US economy and lifestyle dramatically and people were now far more energy conscious. The embargo had quadrupled the price of oil. Big car sales had plummeted as people bought smaller vehicles, and after annual economic growth of around 3-6 per cent for well over a decade according to World Bank figures, America slipped into recession in 1974 and 1975. At the end of the embargo, winter was nearly over and mornings were becoming lighter, and the country continued with daylight saving which in the normal course of events would have restarted on 28 April.

A study by the Department of Transportation into daylight saving in the winter months of 1974 was largely inconclusive and acknowledged the difficulties of separating the effects of daylight time on things like fuel usage and accidents from the influences of other factors such as energy availability, lower speed limits, Sunday closings of gas stations and voluntary cutbacks in lighting and heating.⁸³ Given the constraints, the department estimated that daylight saving in the cooler months reduced electricity consumption by 0.75 per cent in January and February and 1 per cent in March and April. Gasoline usage was reduced slightly in winter 1974 compared with 1973, but in March and April consumption was estimated to be 0.5-1 per cent higher with the greater supply and warmer weather than it might have been under standard time.

This interim report under the Emergency Daylight Saving Time Energy Conservation Act found that motor vehicle fatalities were 24 per cent lower in the first three months of 1974 than the same period in 1973, but that the decline was mainly due to reduced speed limits and petrol shortages. Child deaths were higher in the mornings and lower in the afternoons in February compared with a year earlier. Total child road fatalities in the first two months of 1974 were down on 1973 but the decrease may have been due to differences in things like weather, vehicle numbers and school starting times rather than daylight saving. A factor that may have reduced morning deaths was that school started later for nearly half or 47 per cent of students across the 37 states that sent information to the department.

Radio and construction were the only industries to report problems caused by winter daylight saving. Early morning darkness resulted in safety hazards for construction workers. Interference problems were evident between daytime only and 24 hour radio stations during morning prime time listening. Agencies reported no significant effects on crime, labour and agriculture to the Transportation Department. The study also found that people were generally okay with daylight time but not from November to February when days were shortest.

The report recommended that the Emergency Daylight Saving Time Energy Conservation Act be amended to put the United States on standard time from 27 October 1974 to 23 February 1975. A bill to end year round daylight saving was passed by the House by 383 votes to 16 and on a voice vote in the Senate. At the same time, a program for US energy self-sufficiency was approved by the upper house. The amendment to the emergency Act was signed by the president, Gerald Ford, on 5 October and America went back onto standard time for four months.

Daylight time resumed in late February 1975 amid rain, snow and sleet, and darker mornings. The clock change was two months earlier than usual and still winter for another month. Many people protested that eight months of daylight saving was too long, preferring the previous arrangement of six months from late April to late October, or just over three months from Memorial Day to Labor Day, or none at all.

⁸³ White House Records Office: Legislation case files at the Gerald R. Ford Presidential Library, box 8, folder "1974/10/05 HR16102 Daylight Savings Time" at <https://www.fordlibrarymuseum.gov/library/document/0055/1668702.pdf>

The Transportation Department further examined the effects of daylight saving time and produced a final report under the Act in July 1975.⁸⁴ Comparing a few days both before and after the four changeover dates in 1973 and 1974, savings in electricity from daylight time was found to be about 1.2 per cent. This varied from 0.91 per cent in October 1973 (just after the start of the embargo) to 1.76 per cent in October 1974, 1.32 per cent in April 1973 and just 0.74 per cent in January 1974. Little if any change was found in gasoline use and home heating fuel consumption. One of the aims of the extended period of daylight saving was that people and businesses would voluntarily save fuel. This objective was probably achieved as per capita energy use in America fell by about 3 per cent in each of 1974 and 1975 according to World Bank data although both were recession years largely brought on by the oil crisis.

The study found a reduction in motor vehicle fatalities of 0.7 per cent in March and April 1974 with daylight saving, compared with the same months of 1973 with no daylight saving. This translates to about 50 lives. Using the historical ratio of one death to 40 injuries, the study estimated that daylight time in those two months resulted in about 2,000 fewer injuries. A similar analysis for January and February showed negligible change. Road deaths of school children fell by about 1 per cent in January to April 1974 compared with the same months a year earlier. Violent crime was estimated to be down by 10-13 per cent with daylight time in Washington, D.C. but no difference was recorded in Los Angeles.

More than half the population had a positive view of year round daylight saving in March 1974 (54 per cent) and of eight months of daylight time in March 1975 (51 per cent) (see table). Of respondents in favour of advanced time in 1975, 37 per cent said they liked it due to more light in the evening or they could do more at this time of day. Of those opposed to the scheme, 8 per cent just didn't like daylight saving and 7 per cent were worried about children going to school in the dark. In all regions, the proportion who liked daylight time was much higher than the percentage that didn't support it. More than twice the number of people were neutral on eight months of daylight time compared with all year.

Opinion of daylight saving, United States

| <i>Region</i> | <i>Positive</i> | <i>Negative</i> | <i>Neutral</i> |
|---|-----------------|-----------------|----------------|
| | | — % — | |
| All year daylight saving, March 1974 – nation | 54 | 38 | 9 |
| Eight months' daylight saving, March 1975: | | | |
| East | 60 | 24 | 16 |
| Midwest | 45 | 28 | 27 |
| South | 50 | 36 | 14 |
| West | 53 | 20 | 27 |
| Nation | 51 | 28 | 21 |

Source: Department of Transportation, "The daylight saving time study", 1975, at <http://a.abcnews.com/images/2020/DOT%20DST%20study.PDF>

Effects of daylight time on overall business activity were small. Manufacturers and retailers saved energy. Construction companies didn't like dark mornings and preferred a later transition to daylight saving. The railroads accepted the measure as long as they had 60 days' notice of any change so that new timetables could be

⁸⁴ Department of Transportation, "The daylight saving time study", Washington, D.C., United States, 1975, at <http://a.abcnews.com/images/2020/DOT%20DST%20study.PDF>

bedded down. Urban mass transit preferred daylight saving if it conserved energy and peak traffic was over by nightfall.

In view of the reductions, albeit small, in the areas of fuel consumption, traffic accidents and crime levels from an extended period of daylight saving, the Transportation Department recommended lengthening the traditional six month term of late April to late October to nearly eight months from early March to late October, thus adding almost two months at the start. The department wanted to do this for two years to enable it to conduct further analysis of the impact of the longer duration. Start and end dates of early March and late October probably make sense from the point of view of sunrise times at a particular location being similar around these dates although sunset times differ considerably. (The opposite occurs in the southern hemisphere.) This is due to the plane of the Earth's path around the sun differing from the plane of the equator by about 23 degrees and because the planet's orbit isn't quite circular.

The emergency Act finished on 26 October 1975 and the country returned to standard time and the Uniform Time Act. Bills for eight and nine months of daylight saving were presented to Congress. In February 1976, the Senate defeated the bill for a two year trial of eight months of advanced time by 62 votes to 31 but passed an amendment for a seven month period by 48 to 45 and subsequently passed the bill 70 to 23. However, the House wanted the Department of Transportation study evaluated by the National Bureau of Standards, and the United States reverted to six months of daylight time from the last Sunday in April to the last Sunday in October, the same as 1967 to 1973. A 201 page review by the NBS of the 145 page DOT report mainly used the same data and reached the same conclusions although the bureau felt there were no significant reductions in energy use or traffic fatalities from the extra period of daylight saving.

Another energy crisis hit the United States in 1979 after the Iranian Revolution. Oil prices doubled over 12 months. Further attempts to lengthen daylight saving were made in the years before, during and after this period, often to include part of March, more or all of April, Halloween on 31 October and the election in the first week of November. But they didn't get past the committee stage or failed in one house or the other. US energy use per person fell by 14 per cent between 1978 and 1982, helped by various energy conservation measures and without assistance from any extra daylight saving.

In 1981, a bill to lengthen daylight saving to eight months, from the first Sunday in March to the first Sunday in November, was passed in the House by 243 votes to 165 after an amendment to leave the finish date as the last Sunday in October. But the bill got tied up in a Senate committee and didn't progress. The main concern seemed to be children going to school in the gloom although sunrise in most of America in early March is only minutes later than in late October.

A group calling itself the Daylight Saving Time Coalition was formed by Washington lobbyist James Benfield in late 1983 after a bill to put clocks forward in early March was rejected by the House by 211 to 199 in July of that year. Supporters of the bill to extend daylight time had included the Southland Corporation whose market research showed that more women would shop at its 7-Eleven stores while heading home if still light. Charcoal manufacturer the Clorox Company had argued that its sales would

increase as more people would have barbecues after work in daylight. The Amateur Softball Association could play later in good light. The Foundation Fighting Blindness wanted extra daylight time to help sufferers of retinitis pigmentosa, a hereditary condition causing tunnel vision and difficulty seeing at night. At the time, about 400,000 Americans suffered from this disease.

These organisations and many others joined Benfield's coalition, including the International Association of Amusement Parks and Attractions, the National Association of Convenience Stores, the Sporting Goods Manufacturers Association, the National Confectioners Association which was hoping to get daylight time pushed out to early November and sell more candy at Halloween, the Hechinger Company (a home improvement chain), restaurant and hotel associations, the Barbecue Industry Association and the Chocolate Manufacturers Association.

Various coalition members calculated the annual monetary benefit that the longer period of daylight saving would give them. The American Association of Nurserymen estimated that people would spend \$315 million more on their yards with the extra daylight saving time. The National Golf Foundation forecasted that 19 million additional rounds of golf would be played, boosting the sales of golf balls by \$35 million and clubs by \$12 million. The Southland Corporation projected sales to increase by \$30 million. The Foodservice and Lodging Institute predicted that an hour more daylight in the evening would add \$800 a week to takings per store across its 50,000 fast food outlets or \$40 million in total.

By April 1985, Benfield's Daylight Saving Time Coalition had attracted associations representing 8,300 companies, or the firms themselves, with annual sales of \$135 billion. The lobby group was seeking about six more weeks of daylight saving, starting on the third Sunday in March and ending on the first Sunday in November. It estimated that this would add about \$4-5 billion to retail sales each year across America or an increase of about 0.3 per cent. The coalition also emphasised that daylight saving promotes increased recreational activities, reduces crime and road accidents, and saves energy.

An equally formidable group opposed any extra daylight saving time. Farmers were already put out for six months of the year, having to start work well before dawn to get produce to the markets. Many of them had to juggle a second job. Community and church functions in the evening might start in daylight when they were still working at the farm. Benfield didn't seem to have much time for the views of farmers, stating:

There are a lot of people who want Daylight Saving Time for a lot of reasons, and Congress is supposed to respond to the perceived needs of the people. But the farmers have been killing it, darnit, and we're in a situation where the interests of a small minority are outweighing a broader interest.

I can understand their gripe. One hour less sunlight at the end of the day gives 'em more time to bend their elbow at the bar or go to a church meeting.⁸⁵

⁸⁵ Billy Cox, "Daylight saving time – an extension in the works?", *Florida Today*, Cocoa, Florida, United States, 20 November 1984, p. 1D, Newspapers.com (subscription only), at <https://www.newspapers.com/image/125424468>

Not only farmers disliked daylight time or the thought of more of it. If daylight saving started six weeks earlier, many Orthodox Jews wouldn't have time for morning prayers, which cannot start more than 45 minutes before sunrise, and be punctual for work. Christian fundamentalists didn't like daylight time but instead wanted God's time, which to many of them was standard time. Radio stations with licences to operate only in daylight hours missed morning peak listening time. The National Parent Teacher Association was against any additional daylight saving as were drive-in movie operators, indoor sport venues, pubs and clubs, and many residents in the western part of a time zone.

Despite the level of opposition in the community, the Transportation Department and the Ronald Reagan administration supported longer daylight saving. Bills were introduced into Congress for seven or eight months of daylight time in April 1985. The most popular was a seven month version from the first Sunday in April until the first Sunday in November. The House had rejected an eight month period two years earlier, so Benfield and the Daylight Saving Time Coalition supported the shorter span and targeted about 100 representatives they felt could vote either way. Farmers and parents were slightly less unhappy with a later start.

Representatives Edward Markey of Massachusetts and Carlos Moorhead of California sponsored the House bill. Its passage wasn't straightforward. Harold Rogers of Kentucky was unimpressed with it, stating: "No matter how much you tinker with God's time, there are serious problems." Pat Roberts of Kansas said that if the truth in labelling policy was applied, the bill would become the Urban Convenience Act. A number of representatives protested about the late sunrises that would occur in April but Markey pointed out that in most of the country, they would be earlier at that time of the year under daylight saving than in December, January and February under standard time. The House passed the bill by 240 votes to 157 in October 1985.

The bill went to the Senate where it was held up in the Commerce Committee thanks largely to Wendell Ford of Kentucky, who led a group of rural senators opposed to a "big city plan" to change "God's time". They were concerned about farmers, and young children staying up late and parents not being able to get them to bed because it was still light and next morning having to head off to school before daybreak. In April 1986, the bill's sponsor in the Senate, Slade Gorton of Washington, removed the week at the end of the proposed daylight time period. He then tacked the bill on as a rider to a fire prevention and control bill that asked for a doubling of federal government expenditure on fire prevention to \$18 million a year, which was sure to get through both houses and into legislation.

The amended fire bill was passed by voice vote in both the Senate and the House. President Reagan signed the bill on 8 July 1986 and it became "An Act to authorize appropriations for activities under the Federal Fire Prevention and Control Act of 1974". Section 2(b) stated: "Section 3(a) of the Uniform Time Act of 1966 ... is amended by striking 'last Sunday of April' and inserting in lieu thereof 'first Sunday of April'".

Most of the new Act consisted of material on daylight saving time, including mention of government and other studies indicating that a longer period of daylight time "would produce a significant energy savings in electrical power consumption". The

Act also referred to other potential benefits of extended daylight saving, such as reduced crime, better road safety, extra time for outdoor activities, more opportunity for workers to shop in daylight, and greater overlap of business hours with Europe. States that had exempted themselves from the 1966 Act could remain so. And the Federal Communications Commission could adjust the hours of daytime broadcast stations.

As a result of this change to the Uniform Time Act in 1986, the United States started daylight time three weeks earlier, on the first Sunday in April, from 1987, and finished as usual on the last Sunday in October. The exceptions were those states on standard time throughout the year: Hawaii, most of Indiana, and Arizona apart from Navajo Nation, which has always observed daylight saving when most of the country has used it. However, the Hopi Indian Reservation, which sits entirely within Navajo, has always followed Arizona and stayed on standard time. The US territories of Puerto Rico, the Virgin Islands and American Samoa have never had daylight saving, except Puerto Rico during World War II.

Advocates of longer daylight saving kept trying to extend it further. For example, Markey and Moorhead introduced a bill in 1993 to add two more weeks in early spring and another week in autumn. The usual opponents were against any such move and many of them wanted the period reduced or abolished altogether. One man who ended up benefiting greatly from daylight saving was Daniel Abamonte of Rochester, New York. He and his wife were stuck in Las Vegas for most of an extra day after they forgot about the time change on 2 April 1995 and missed their early flight home. They adjourned to Caesars Palace where he had fed less than \$4 into a poker machine when he won the jackpot: a Ford Mustang convertible and \$3,000.

Less happy with the spring changeover to daylight time were the students of Ohio University. Bars in the city of Athens closed early at 2 a.m. standard time rather than the usual 2:30 a.m., because 2 a.m. became 3 a.m. daylight saving time and their liquor licences finished at this hour. In 1997, a crowd of about 1,000 drinkers emerged from downtown bars in this university city and fought with police for two and a half hours, pelting them with eggs, road flares and bottles, resulting in the arrest of 47 people, including 34 students. Next year, a similar but larger disturbance took place when bars shut a whole hour earlier, with 2,000 people doing battle with police for an hour and a half while 27 were arrested. The police blamed the media for encouraging the students to turn up by running stories on the previous year's riot. Worried about repeat performances in coming years, Athens County sheriff Dave Redecker said: "I think the students are trying to start a new tradition." In 1999, the police were ready and prevented 350 chanting students from leaving the sidewalks.

In 2001, a need to conserve energy was again the reason for wanting to extend daylight saving. The California State Legislature asked the federal government if the state could keep clocks an hour ahead that winter and have two hours of daylight saving in summer. A combination of delays in getting new power plants built, pipeline shutdowns, market manipulation, capped electricity prices and drought had led to reduced supply, a large increase in prices, and blackouts. Two energy companies went bankrupt and another came close. The state government stepped in and the problems were eventually sorted out. There was no extension of daylight saving.

Nowhere had daylight saving been more controversial than in Indiana and the situation was set to continue into the 2000s. The state had been mainly in the Eastern time zone since the 1960s and didn't have daylight saving, except for five counties in each of the north-west and south-west corners which followed Central time and had daylight time. Six counties in the south-east also had daylight time, unofficially, as they were close to Cincinnati, Ohio or Louisville, Kentucky. A steady flow of daylight saving bills had come into the Indiana General Assembly over the years. In 1993, a bill failed by 61 votes to 38 in the House. A bill in 1995 was passed 54 to 45 by mistake as members thought it related to a nonbinding referendum on daylight saving, before it was defeated in the Senate. Bills were sometimes blocked in committee.

Much of the Indiana business sector dealt with New York and wanted to be on the same time as the east whereas farmers had more dealings with Chicago markets and preferred Central time. Some groups lobbied for daylight saving for part of the state, others for the whole state. And they argued over whether the state should be in the Eastern or Central time zone. Many people felt that the state already observed daylight saving as standard time in Indianapolis, in the middle of a fairly small state, was 45 minutes ahead of local mean time.

Daylight saving was perhaps the biggest issue in Indiana politics. *Indianapolis Star* columnist Mary Beth Schneider wrote on 4 March 1995: "For all the hot issues the legislature is addressing this session ... nothing seems to rile up folks like the thought of moving the hands of their clocks one hour each spring and fall."⁸⁶ Over a year later, on 29 May, staff writer Welton Harris quoted Republican ex-member Kathy Willing as saying: "When we would send out surveys, some people would get 200 replies. Kathy [Richardson] and I would get the most responses, as high as 1,500. ... The no. 1 issue was daylight saving time. It will generate more mail, more input pro and con, than any issue in the legislature. You figure why, because I don't know why it does. None of us knows why everyone was so hyper on daylight saving time."⁸⁷

The Transportation Department tended to turn a blind eye over time in Indiana. When the department's lawyer in charge of enforcing correct time, Joanne Petrie, was told in April 1996 that the official clock in both Dearborn and Floyd counties in the state's south-east stayed on standard time and the rest of these counties used daylight saving, Mother Time, as she was often known, was okay with this arrangement.

Instead of voting on a daylight saving bill in 2001, the Indiana House passed a resolution by 51 to 46 for more study into the effects of daylight time although many members didn't want yet more research. The Senate agreed and voted the idea down by 9 to 5 in a nearly empty chamber. A state opinion poll in March found that 44 per cent of the public wanted daylight time, 50 per cent didn't and 6 per cent were neutral. Daylight saving continued to make "blood boil" according to the editor of *The Indianapolis Star*, who got more letters on it than any other issue that was before the

⁸⁶ Mary Beth Schneider, "Legislators use time, energy on bill to put us on daylight-saving", *The Indianapolis Star*, Indianapolis, Indiana, United States, 4 March 1995, p. 10, Newspapers.com (subscription only), at <https://www.newspapers.com/image/107360188>

⁸⁷ Welton Harris, "She was ready and Willing, but voters said no", *The Indianapolis Star*, Indianapolis, Indiana, United States, 29 May 1996, p. 67, Newspapers.com (subscription only), at <https://www.newspapers.com/image/106764227>

legislature. Columnist Ruth Holladay, a daylight time advocate, reported on 29 October 2002 that more hate mail was received on the topic than “diatribes on world peace, sex abuse of children and even our beloved Indianapolis Colts”.

A lobby group calling itself the Hoosier Daylight Coalition was set up by businessman and inventor Scott Jones in 2000. He had found it difficult to coordinate phone calls, flights and meetings with other parts of the country and the world when outsiders didn’t know what time it was in Indiana. A struggling state economy gave the coalition and other pro-daylight time groups more reason to push for daylight saving. Growth in per capita gross domestic product in Indiana of 2.4 per cent in 1999 and 2.3 per cent in 2000 was well below the US average of 3.5 per cent and 2.8 per cent according to Bureau of Economic Analysis figures. The state’s GDP per capita contracted by 2.5 per cent in 2001, while the national decrease was 0.1 per cent.

After actively campaigning for two summers, the coalition wound up in August 2003 due to legislative failures and lack of funds. Much of the blame was put on longstanding Democratic representative Chet Dobis who was perhaps the leading stalwart against Indiana having daylight saving from the Eastern time zone. He came from Lake County in the state’s north-west, which is on Central time, and felt that the whole state should shift to this time zone.

Bills for advanced time in Indiana kept coming into the legislature. Republican representative Gerald Torr said in October 2003 he would introduce one into the House despite believing it a hopeless cause to get the state to synchronise with the rest of the country. At least a couple of dozen attempts had been made to put the state on daylight saving time over the previous three decades. Congress had tried too. Representative Julia Carson of Indiana, a Democrat, brought in a bill in April 2002 to force the state to vote on whether it has daylight saving. She reintroduced the bill in 2003.

At Indiana’s gubernatorial election in November 2004, the public voted into office Republican nominee Mitch Daniels, a noted supporter of daylight saving, as the new governor. The day after the election, he promised he would push to make daylight time a reality, saying the measure would be “a part of economic recovery for Indiana” although per capita GDP growth of 1.9 per cent, 2.9 per cent and 3.0 per cent in 2002 to 2004 had been well above the national average. Perhaps more importantly though, the public now seemed to want daylight saving. A poll in January 2005 found that 52 per cent of Hoosiers liked the idea and 36 per cent were opposed to it.

Another daylight saving bill was introduced and a House committee heard from several dozen witnesses who favoured the scheme while just seven didn’t want it, mainly theatre owners. The proposal passed by 6 votes to 5 in February, the first time in a decade that a daylight time bill had successfully come out of a committee and onto the floor of the House. Legislation looked likely to pass both chambers, but rural members cited problems for farmers, and school children out before dawn. Also, an *Indianapolis Star* survey found that just 1 in 10 businesses felt there was a connection between daylight saving and employment levels.

Then, on 29 February 2005, the Democrats boycotted the House due to a bill requiring voters to show photo identification on election day. The party thought the high cost

would deter many people from voting. This action by the Democrats prevented a quorum of two-thirds of members to be present before the House could conduct its business and a lot of legislation was held up. The boycott was still in place at midnight the following day and 132 of 478 bills automatically lapsed, including the daylight saving bill, possibly regarded as the most difficult one facing the House. The only avenue for the bill now was to attach it to another bill on a similar subject matter. Republicans sifted through the various remaining bills trying to find one. A move to insert the daylight saving bill into one on the shipping of tobacco products was rejected by the Senate president on 23 March as unrelated to the measure but he indicated that a bill on economic development or transportation would be suitable.

Daniels maintained that daylight saving was the number one issue for Indiana and by the end of the month both houses were setting up hearings with the view to getting a new bill out. A House committee quickly approved sending a daylight time bill to the floor by 8 votes to 4. The Transportation Department was going to allow Indiana to start daylight saving on 5 June that year. But an amendment to the bill was proposed permitting counties bordering the Central time zone to opt out of daylight saving. This would allow 13 counties in the state's west, including those adjacent to Illinois, to stay on standard time, and counties next to any of those that chose not to use daylight saving could do the same, setting up a possible domino effect. Any such moves by individual counties would be illegal under federal law and the alteration to the bill would delay daylight time in the state until the following year. Nevertheless, the House passed the amendment by 52 votes to 45 on 4 April.

Due to a deadline of 11 April 2005 for bills to be passed by the House ready to be forwarded to the Senate, a decision was made to take a vote on the bill that day and to then set up a joint committee to deal with the illegal provision before the Senate took a vote. In the first House vote on daylight saving since 1993, the yeses totalled 49, two short of succeeding in the 100 seat chamber. Both sides of the debate hit the phones and had meetings, shoring up support and trying to get a few members to switch. A second vote was 51 to 47 in favour, just enough to secure passage of the bill to the Senate. "DST drama: It fails! It passes!" cried the headlines of *The Indianapolis Star* next day.

A joint committee heard testimony from various people on the daylight saving issue although the public seemed just as concerned about time zones. The bill was rewritten and went to the Senate where it was passed by 28 votes to 22 on 27 April, the first time a daylight saving bill had been voted on in the state's upper house since a 46 to 4 defeat in 1983. It went back to the House for final approval.

Next day, the House voted 49 to 48 against the bill. After 12 hours of pleading, persuasion and arm twisting by members on each side of the kerfuffle, a second vote was 49 to 48 the other way but still two short of the 51 needed for the bill to pass. Opponents started celebrating, but Republican John Ulmer's red light went green as he changed his mind and it was 50 to 47. Then Troy Woodruff, another Republican, switched sides and there were 51 green lights. Speaker Brian Bosma instantly closed off the voting machine to cheers from supporters and head shaking by opponents. The bill had passed by 51 votes to 46 at 11:36 p.m. Woodruff faced reporters a few minutes later and said: "It's time to end this thing. It's time to move the state forward." His website still said he would "always vote against this controversial piece

of legislation”.⁸⁸ His wife was angry with him and so were his constituents in Vincennes district on the state’s western border who were against daylight saving time and he was ousted at the next election in 2006 after a single two year term, obtaining just 44 per cent of the vote in this seat.

Governor Daniels signed the bill into law on 13 May 2005 and it became the Senate Enrolled Act 127. He signed it in private, unlike other bills, which had the media and public attending, believing that the newspapers had given too much attention to daylight saving and not enough to other important legislation. All of Indiana would put its clocks forward with the rest of the United States, except Arizona and Hawaii, on 2 April 2006 for the first time since 1970.

Now that daylight saving was resolved, time zones had to be looked at. The new Act provided for the Indiana legislature to petition Congress to hold hearings within the state on where the boundaries between Central and Eastern zones should be. Nineteen counties wanted to change their time zone. A Department of Transportation review rejected 11 of these but put six more south-west and two more north-west counties into the Central time zone from 2 April. Seven of these eight counties soon applied to move back to the Eastern zone, with DOT accepting six of them. This meant that only two counties were in a different time zone in 2007 from 2005: Starke County in the north-west which was happy to stay on Central time and Perry County in the south-west which had its application to shift back to Eastern time denied despite it being east of 20 Indiana counties in this zone and its proximity to Louisville.

A study of the effects of daylight saving on residential energy consumption in Indiana in 2006 by environmental economics professor Matthew Kotchen of the University of California found that while electricity for lighting fell, it rose for air-conditioning in summer and heating in autumn. He estimated the net increase to be about 1 per cent, rising to 2-4 per cent in the fall. Public sentiment for daylight time remained evenly divided. A poll in November 2007 found that 44 per cent of Hoosiers thought that daylight saving was good for Indiana while 43 per cent felt it was bad.

Daylight saving and time zones remain controversial in Indiana. The Central Time Coalition, formed in 2009, argues that none of the state should be in the Eastern time zone, citing disadvantages for farmers, dark mornings for school students, and late television programs. Many residents would prefer Eastern time for the whole state and no daylight saving. Sunset in Indianapolis in June isn’t until about 9:15 p.m. The start of daylight time in March puts sunrise at about 8 a.m. and as late as 8:20 a.m. near the end of this period in November. Indiana ranks quite low on the Gallup-Healthways Well-Being Index and some blame the clock. In 2015, the state came an overall 46th of 50 states, the same ranking it got on the physical element of “having good health and enough energy to get things done daily”.

⁸⁸ Alan Ehrenhalt, “Clockwork Blues”, April 2005, at http://www.governing.com/templates/gov_print_article?id=101311714; and Mary Beth Schneider & Kevin Corcoran, “DST a done deal”, *The Indianapolis Star*, Indianapolis, Indiana, United States, 29 April 2005, p. 1, Newspapers.com (subscription only), at <https://www.newspapers.com/image/127424619> and p. 10, at <https://www.newspapers.com/image/127424635>

But there could be many other factors apart from time influencing the results. Whether the Indiana economy has benefited or suffered from daylight saving is also hard to tell for the same reason. In the eight years to 2006, per capita GDP grew by 11 per cent in Indiana and 16 per cent in the United States. Over the next eight years to 2014, growth in this indicator was virtually zero for both state and country, mainly due to sharp contractions in 2008 and 2009 with the global financial crisis.

Nationwide, rising fuel prices in 2005 prompted Congress to introduce an energy bill to conserve fuel and encourage the use of alternative sources of power. It included an extension to daylight saving, initially for another month at each end but amended to four weeks extra in total. President George Bush signed the 1,724 page, \$12.3 billion bill on 8 August and it became the Energy Policy Act of 2005. The daylight saving provision took effect from 2007, with the period starting three weeks earlier on the second Sunday in March and finishing a week later on the first Sunday in November, including in Indiana, which only had a year on the old schedule.

However, the quantity of gasoline purchased in America rose by 2.8 per cent in the first three weeks after the time change on 11 March 2007 compared with the same period a year earlier. The increase was probably due to better weather, more people going out shopping or playing sport with the later daylight rather than staying home, and a larger population. People weren't deterred by the 4.2 per cent price rise for gas over the previous 12 months.

Businesses reported an increase in evening sales. Scott Herman of the Raging Burrito in Decatur, Georgia said takings in the last three weeks of March were up 30 per cent on past years due to daylight saving and warmer weather. An extra hour of light late in the day was thought to make Halloween safer. Over the years, child pedestrian deaths had been four times higher on that day according to the Centers for Disease Control and Prevention. But the four largest television networks had 2.7 million fewer viewers in the first six weeks of daylight saving in 2007 than a year earlier although at least part of the reduction could have been due to more reruns, less popular shows, or people recording more programs for later. Some computers and other electronic devices automatically changed time on the old dates.

A study of the success or otherwise of the daylight saving extension was conducted under the Energy Policy Act of 2005 by the US Department of Energy. The report, "Impact of extended daylight saving time on national energy consumption", released in October 2008, found that the nation saved about 0.5 per cent of its daily electricity use during the four weeks of extra daylight time, or roughly a 0.03 per cent or 1/3000th reduction over a year. A decrease in power used in the evening was partly offset by an increase in the morning during the extended daylight saving period. The daily decline in electricity use was slightly greater in the spring extension than the autumn extension, perhaps because the sun sets quite a bit later in mid March than early November and there is less need for artificial light in the early evening. Energy savings were slightly smaller in southern states than northern states, possibly due to more air-conditioning. The study found no significant change in traffic volumes or gasoline demand for passenger vehicles as a result of extended daylight saving.

Energy use per capita in the United States increased by 0.8 per cent in 2007 according to World Bank figures, but fell quite sharply after that, probably due largely to the

global financial crisis and state of the economy. Other factors, such as more awareness of the need to conserve energy, environmental concerns, the increased use of renewables, and perhaps daylight saving, also played a role in the decline.

More recent studies have looked at other effects of daylight saving. In a 2009 study, Christopher Barnes and David Wagner of Michigan State University examined a database of mining injuries from 1983 to 2006 and found a 6 per cent increase in injuries to miners on the first Monday of daylight time. The research showed a 68 per cent increase in total days lost due to these injuries, emphasising the severity of incidents on this day. Also, time use data for 2003 to 2006 revealed that workers slept about 40 minutes less than usual on those Mondays. By contrast, no significant change in amount of sleep by workers or injury numbers or severity for miners was noted on the first workday back on standard time.

Research by Alabama University in 2012 found that heart attacks rose by 10 per cent on the first two days of daylight time although they decreased by the same percentage at the switch back to standard time. A 2014 study by the American College of Cardiology found a 25 per cent increase in heart attacks on the Monday after the start of daylight saving compared with other Mondays. But the number fell by 21 per cent on the first Tuesday back on standard time.

A study by Susan Ferguson et al. found that year round daylight saving from 1987 to 1991 might have resulted in 901 fewer fatal crashes, including 727 involving pedestrians. A National Institutes of Health study in 2001 concluded that daylight saving resulted in fewer robberies and traffic deaths. The Brookings Institution and Cornell University estimated in 2015 that permanent daylight time and its lighter evenings could save the country \$4-5 billion a year due to fewer rapes and robberies, the latter down by 7 per cent. They used previous calculations of the total social cost of \$42,000 for a robbery and \$240,000 for a rape to derive a total. In 2013, Chmura Economics & Analytics determined that daylight saving cost America up to \$434 million a year based on studies showing that loss of sleep at the spring changeover caused an increase in heart attacks, a rise in work injuries in mining and construction, and a loss of productivity due to cyberloafing.

Opinion polls indicate that daylight saving has been getting less support in recent years. The 2014 Rasmussen poll found that only 33 per cent of Americans supported daylight time, while 48 per cent didn't like it and 19 per cent had no view. The proportion of people happy with the scheme was down from 37 per cent in 2013, 45 per cent in 2012 and 47 per cent in 2011.

The results of studies and polls suggest daylight saving is by no means a settled issue in the United States. Indeed, bills were introduced or proposals made to end daylight saving, or occasionally to make it year round, in nearly half the states in 2015. A common complaint was the twice yearly clock change that a lot of people seemed fed up with. They were also worried about research that showed the switch to daylight time increased road crashes, heart attacks and workplace accidents. Any state can apply to Congress to be exempt from daylight saving, either the whole state or all of the part that is in one time zone where a state is in two zones. But for a state to have year round daylight saving would require an amendment to the Uniform Time Act.

Nevertheless, Florida had bills in 2014, 2015 and 2016 for daylight time all year. Clock changes are less useful in Florida as its low latitude means day length doesn't vary much through the year. Legislators felt that an hour more light in winter evenings would allow for outdoor activities after work at that time of the year. The bills have often been referred to as the Sunshine Protection Act, stating: "As the 'Sunshine State', Florida should be kept sunny year-round. ... daylight saving time shall be the year-round standard time of the entire state and all of its political subdivisions." In 2008, a bill to abolish daylight saving in Florida didn't get out of committee.

In Nevada in 2015, a resolution asking Congress to allow the state to have daylight saving time all year was passed by 30 votes to 12 in the Assembly and by 12 to 8 in the Senate. Members supporting the move argued that most people wanted the extra hour of evening daylight in winter, that two clock changes a year disrupted sleep and caused health problems, that motor vehicle accidents increased at the start of daylight saving in spring, and that visitors to Las Vegas from California might stay another night in winter as they would have an additional hour to return home in the morning. A bill in 2005 to put Nevada on standard time year round didn't make it to the Assembly floor. The state would have been two hours behind neighbouring Utah in the east and one hour behind California to its west in summer.

Various other states had bills to keep daylight time all year despite its illegality. In New Mexico, such a bill was passed by the Senate 28 votes to 10 in March 2015, but didn't get to the House. A bill was to have been reintroduced in 2016. A South Dakota bill for permanent daylight saving was defeated in committee. Some states, such as Missouri, didn't want to take the lead. It proposed keeping the clocks ahead year round but members wanted other states to join in before committing as they were worried about the disadvantages for business if the state went it alone. A 2013 bill had sought a compact with 20 states to go on 12 month daylight time. A bill introduced into the legislature in Idaho in March 2015 was withdrawn as it went against federal law. In Alabama, a proposal for all year daylight saving was abandoned although some members were keen to switch from Central to Eastern time and not alter the clocks twice a year.

A Tennessee bill in 2014 to have standard time all year was amended to have daylight time all year. The bill came out of a subcommittee but failed by 6 votes to 5 in a committee. Meanwhile, neighbouring Kentucky had a bill to exempt itself from daylight saving and stay on standard time year round. Had both bills gone through, certain communities in the Eastern time zone in Tennessee would have been two hours ahead of some in the Central time zone in Kentucky all year despite being only a few miles apart.

Other states also wanted to exempt themselves from daylight saving time. A bill in Alaska was passed 16 votes to 4 by the Senate in March 2015 but it stalled in a House committee. The bill proposed to place the entire state into the Pacific time zone and have no daylight saving. Supporters argued that the state has plenty of daylight in summer and there was no point changing the clocks twice a year. But the local Chamber of Commerce didn't like the idea as it would put Alaska further out of alignment with other states. As at June 2016, the bill was still tied up in committee. There was no further news by late in the year and the bill may have lapsed. A Dittman

Research poll in 2004 and a Hellenthal and Associates survey in 2005 had both found that only 37 per cent of Alaskans supported daylight saving.

In Texas, a bill to end daylight saving was defeated in the House in May 2015. A major factor seemed to be that interstate National Football League games on Sunday in autumn would start an hour earlier Texas time and this might clash with local church service times. Democratic representative Rafael Anchia stated: "I don't want to miss church, and I don't want to miss the Cowboys game."

Washington State had two bills in 2015 to end daylight saving but both died in committee in February. In Oregon, a bill to abandon the measure was to be put to voters by 2021. A proposal in Utah for year round standard time was tied up in committee and didn't progress. Arkansas had a bill to exempt itself from daylight saving but it failed by 69 to 11 in the House in March 2015. A bill was introduced into the Illinois legislature in the same month to stop the scheme although an informal poll found that most people wanted an extra hour of afternoon light in autumn and winter as well as in spring and summer. While many states were considering an end to daylight saving, Arizona brought in a bill to adopt the measure for the first time since 1967, with members in favour arguing it would be good for business. But the bill was withdrawn a few days later after a hostile reaction from the community.

In 2016, at least 20 states were looking to exempt themselves from daylight saving or keep clocks forward permanently. In California, a bill passed out of a Senate committee by 9 votes to 2 and went to another one, but to become law, it would need a two-thirds majority in both houses. That state and Mississippi urged Congress to let states choose whether to have daylight saving but this could herald a return to pre-Uniform Time Act chaos, something federal lawmakers would be loathe to risk.

Over in South Dakota, a Senate committee approved a bill by 5 votes to 2 for all year daylight saving time. In another move, the Senate failed by one vote in a bid to put the entire state on Mountain time all year instead of the current split between Central and Mountain time. Michigan had a bill to cancel daylight time and another bill to put the whole state in the Eastern time zone rather than having a small area in the Central zone. Massachusetts and Rhode Island had bills to opt out of daylight saving and to look at the effects of shifting from Eastern to Atlantic time as people wanted lighter afternoons. In Boston, sunset around 5:30 p.m. at the end of daylight time in early November suddenly becomes 4:30 p.m. and about 20 minutes earlier again by December.

Florida had two bills for daylight saving all year, which members argued would benefit tourism. A bill to keep Missouri on year round daylight time called on at least two of the eight adjacent states to join in. It passed a House committee unanimously. In Oklahoma, a bill to end daylight saving passed a House panel but failed by 6 votes to 1 in a Senate committee. The state of Washington had multiple bills to terminate daylight time. In Utah, a bill to scrap daylight saving failed in committee but another one planned for 2017 includes a time question at the next state ballot in 2018. Other states with bills seeking exemption from the scheme in 2016 included Wyoming, Oregon, New Mexico, Texas, Tennessee, Kansas, Idaho and Illinois.

Despite plenty of bills introduced into state legislatures in recent years to remain on standard time (or have daylight time all year), no more states have passed a bill in both houses seeking exemption from the twice yearly clock change. Arizona and Hawaii remain the only states without daylight saving. Congress has shown little interest in getting rid of the measure nationally. Revenue of thousands of firms represented by powerful business groups, especially in retail fields such as sport and recreation as well as home and gardening, is boosted considerably with daylight saving. Also, large numbers of people who like extra daylight in the afternoon and evening for a range of activities are unlikely to want to abandon the scheme.

15 Canadian clock chaos

Daylight saving time is a provincial and local government issue in Canada and various places have often tended to go their own way. Some cities and towns put their clocks forward in one or more years before the scheme was used nationwide in any country. Regina, Saskatchewan had daylight saving from 1914, two years before the United Kingdom and Europe. A national scheme operated during the two world wars. The table shows the years of daylight saving in the capital city, and largest city if not the capital, of each province and territory up to 1980 (see also Appendix). From that time, capital and largest cities and most or all other areas in every province and territory have used the measure, except Saskatchewan which hasn't had it since 1959.

Daylight saving, Canada, 1914 to 1980

| Province / territory | Ontario | | Alberta | | British Columbia | | Manitoba | | New Brunswick (b) | | Newfoundland & Lab. | Northwest Territories | Nova Scotia | Nunavut | Prince Edward Is. (c) | Quebec (d) | Saskatchewan | Yukon | | |
|----------------------------|---------|---------|----------|---------|------------------|-----------|----------|-------------|-------------------|---------|---------------------|-----------------------|-------------|---------|-----------------------|-------------|--------------|--------|-----------|------------|
| Capital / largest city (a) | Ottawa | Toronto | Edmonton | Calgary | Victoria | Vancouver | Winnipeg | Fredericton | Saint John | Moncton | St. John's | Yellowknife | Halifax | Iqaluit | Charlottetown | Quebec City | Montreal | Regina | Saskatoon | Whitehorse |
| Year | | | | | | | | | | | | | | | | | | | | |
| 1914 | | | | | | | | | | | | | | | | | | | | |
| 1915 | | | | | | | | | | | | | | | | | | | | |
| 1916 | | | | | | | | | | | | | | | | | | | | |
| 1917 | | | | | | | | | | | | | | | | | | | | |
| 1918 | | | | | | | | | | | | | | | | | | | | |
| 1919 | | | | | | | | | ? | | | | | | | | | | | |
| 1920 | | | | | | | | ? | ? | | | | | | | | | | | |
| 1921 | | | | | | | | | | | | | | | | | | | | |
| 1922 | | | | | | | | ? | | | | | | | | | | | | |
| 1923 | | | | | | | | ? | ? | | | | | | | | | | | |
| 1924 | | | | | | | | ? | ? | | | | | | | | | | | |
| 1925 | | | | | | | | ? | | | | | | | | | | | | |
| 1926 | | | | | | | | ? | ? | | | | | | | | | | | |
| 1927 | | | | | | | | ? | | | | | | | | | | | | |
| 1928 | | | | | | | | ? | | | | | | | | | | | | |
| 1929 | | | | | | | | | | | | | | | | | | | | |
| 1930 | | | | | | | | | | | | | | | | | | | | |
| 1931 | | | | | | | | ? | | | | | | | | | | | | |
| 1932 | | | | | | | | ? | ? | | | | | | | | | | | |
| 1933 | | | | | | | | ? | ? | | | | | | | | | | | |
| 1934 | | | | | | | | ? | | | | | | | | | | | | |
| 1935 | | | | | | | | ? | ? | | | | | | | | | | | |
| 1936 | | | | | | | | ? | | | | | | | | | | | | |
| 1937 | | | | | | | | | | | | | | | | | | | | |
| 1938 | | | | | | | | ? | | | | | | | | | | | | |

| | Province / territory | | Capital / largest city (a) | Province / territory | |
|------|----------------------|-----------------------|----------------------------|----------------------|---|
| | Ottawa | Ontario | | | |
| | Toronto | | | | |
| | Edmonton | Alberta | | | |
| | Calgary | | | | |
| | Victoria | British Columbia | | | |
| | Vancouver | | | | |
| | Winnipeg | Manitoba | | | |
| | Fredericton | New Brunswick (b) | ? | ? | |
| | Saint John | | | | |
| | Moncton | | | | |
| | St. John's | | Newfoundland & Lab. | | |
| | Yellowknife | Northwest Territories | | | |
| | Halifax | Nova Scotia | | | |
| | Iqaluit | Nunavut | : | : | |
| | Charlottetown | Prince Edward Is. (c) | ? | ? | |
| | Quebec City | Quebec (d) | | | |
| | Montreal | | | | |
| | Regina | Saskatchewan | | | |
| | Saskatoon | | | | |
| | Whitehorse | Yukon | | | |
| 1939 | | | | | |
| 1940 | | | | | |
| 1941 | | | | | |
| 1942 | | | | | |
| 1943 | | | | | |
| 1944 | | | | | |
| 1945 | | | | | |
| 1946 | | | | | ? |
| 1947 | | | | | ? |
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| 1949 | | | | ? | ? |
| 1950 | | | | ? | ? |
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| 1975 | | | | | |
| 1976 | | | | | |
| 1977 | | | | | |
| 1978 | | | | | |
| 1979 | | | | | |
| 1980 | | | | | |

Shaded square – the city had daylight saving in that year

Blank square – no daylight saving in that year

? – couldn't be determined from sources available online

.. – not applicable. Yellowknife was founded in 1936 and Iqaluit in 1942.

(a) For each province and territory, the first listed city is the capital; any second listed city is the largest but not the capital. For New Brunswick, Moncton has been included as the largest metropolitan area and because data for this city is more extensive than for Fredericton or Saint John.

(b) Daylight saving in New Brunswick cities can't be determined for some years. Fredericton may not have had much daylight saving in the interwar period. Saint John had it in at least 12 of these years and may have had it in some or all of the other years.

(c) Charlottetown, Prince Edward Island likely had no daylight saving in most or all years with a question mark.

(d) Quebec City, Quebec likely had daylight saving in some, most or all years with a question mark given that Montreal has had daylight saving in virtually all years.

Sources: Time and Date AS, at <https://www.timeanddate.com>; Weather Spark, at <https://weatherspark.com>; Newspapers.com (subscription only), at <https://www.newspapers.com>; and other sites

Canada took even longer than the United States to introduce daylight saving time nationwide and was the last of the major Western countries to officially implement it during World War I. The road to daylight saving was long and controversial, similar to the United Kingdom and the United States.

A daylight time bill was first introduced into the Canadian Parliament by member E. N. Lewis in March 1909, two months before America and a year after Britain. Clocks were to be put forward an hour from the last day in April until the last day in October and the new time would be called "local time". Support came from many quarters, including 19 boards of trade and the Canadian Pacific Railway. Dates were amended to run from the first Sunday in April to the first Sunday in November. The bill was approved by a select committee but went no further. Lewis reintroduced the bill in December and again 12 months later but it attracted little interest. Some businesses and offices changed their hours over the summer months, starting and finishing an hour earlier than normal. Daylight saving was left to individual communities to decide.

A number of cities in Canada had daylight saving several years before any entire country or state adopted it. The first was the city of Port Arthur (now part of Thunder Bay) in northern Ontario. John Hewitson, a teacher and then a businessman in this small shipping centre on Lake Superior, was keen for local children and sportspeople to enjoy an extra hour of daylight in summer evenings. With the support of the local trade board, he convinced Port Arthur Council to pass a bylaw to switch the city from Central time to Eastern time for a two month trial in 1908. The experiment was viewed favourably and Port Arthur voted for a permanent change from 30 April 1909. The neighbouring city of Fort William adjusted its clocks to Eastern time in 1910. In the same year, the boundary between the Central and Eastern time zones was shifted over 200 miles (320 kilometres) west and this whole region fell within the Eastern zone.

Moose Jaw, a city in southern Saskatchewan, was probably the first place in Canada to actually observe daylight saving time as distinct from a temporary or more permanent switch in time zones. The local power plant was out of action due to a fire and the city used the new time from 1 June 1912 until the end of summer on 22 September. Canadian Pacific Railway wasn't in favour of daylight saving and the

trains ran to standard time. The scheme wasn't used in subsequent years. A referendum on daylight saving was held in the city on 12 May 1915 but the results aren't known.

Neighbouring city Regina, the province's capital, adopted daylight saving in 1914. Landowners voted decisively in favour of the measure in April of that year although the Trades and Labour Council felt that the bylaw wasn't legal as only property owners were allowed to vote on it. The council also argued that daylight time would result in people having to work longer hours. In December, the annual report of the city light superintendent showed that the scheme saved ratepayers between \$20,000 and \$30,000 in artificial lighting. Baseball and football matches could be played in the evening. Or residents were able to spend the time at local attraction Lake Wascana in daylight. The scheme was deemed a success and it started a month earlier the following year although newspaper reports stated that clocks "will be turned back one hour". Regina had daylight saving in subsequent years.

Saskatoon, the province's largest city, had daylight saving from 1 June to 6 July in 1914. At a plebiscite on 30 June, less than 40 per cent of voters favoured the measure and it was dropped. Davidson, a town to the north of Moose Jaw, also had daylight saving in 1914, as did the town of Melfort, north-east of Saskatoon. The city of Prince Albert had the scheme in 1916 but not in 1917 after 67 per cent of people voted against it in a ballot. Daylight saving only lasted a year or two in most of the places in Saskatchewan that used it.

Daylight saving didn't even last a season in many localities that tried it. In the town of Orillia, Ontario, mayor Bill Frost, who liked anything progressive, new or scientific, vigorously promoted the measure for "The Town Ahead". Residents asked one another: "Do you go on God's time or Bill Frost's time?" Orillia's "leap ahead" day was Saturday 22 June 1912, but "Daylight Bill" forgot to reset his watch and in the morning was an hour late for church. Daylight saving was scheduled to go through to 31 August, but the scheme lasted just two weeks due to opposition from various groups. The town, to the north of Toronto, was probably the second in Canada to have daylight time, after Moose Jaw.

Kenora, Ontario set a starting date for daylight saving of 1 May 1914 after the majority of the town's citizens were found to favour the proposal. But it soon became apparent that folk in the neighbouring town of Keewatin, a few miles along the shoreline of the Lake of the Woods, weren't going to embrace the idea. Speculation ran through both places as to who was going to accept it and who would ignore it. Most businesses, schools and shops in Kenora made the change, while most of those in Keewatin kept the old time. The ferry stuck with standard time as most patrons were from Keewatin although on Saturday nights the ferry master observed daylight time as people came to Kenora for shopping and the theatre and wanted to be there at the right time. Many children of Keewatin timber workers went to school in Kenora and families had to use both time systems. Three weeks into the time change, on 22 May, a meeting of the local Retail Merchants' Association decided the situation was untenable and shops set their clocks back. Everyone in both towns was on standard time again by end of month.

A number of Canadian cities and towns considered daylight saving time in 1916, mainly to conserve energy and provide more opportunities for recreation late in the day. Some areas reversed decisions on daylight saving before it started and many others returned to standard time early although a few continued with the scheme to the scheduled end.

Halifax and Winnipeg, capitals of Nova Scotia and Manitoba, introduced and discarded daylight saving in 1916. Fierce debate engulfed both cities throughout the summer. In Halifax, daylight time commenced on 1 May and was scheduled to finish on 30 September. The council meeting after the decision to adopt the scheme was filled to overflowing, with plenty of applause, jeering, shouting and laughter echoing around the hall. Local newspapers were swamped with letters from readers. Petitions both for and against the change were signed by thousands. Daylight time ended four weeks early on 3 September due to sustained opposition from a large number of citizens. In the following year, opponents convinced the council not to renew the plan as it had isolated the city from the rest of the province.

Daylight saving in Winnipeg started on 23 April 1916 after a bill for the measure was carried by 8 votes to 7 on the third reading. Confusion set in on the first full day, a Monday, when local trains kept to the old timetable. Most offices and businesses used the new time, which became known locally as “city time”, although a few only changed by half an hour as a compromise. Schools, churches, police, the post office and provincial government offices all shifted their clocks an hour forward, but the law courts and the grain exchange remained on standard time.

Many nearby areas didn't change, including Saint Boniface, Fort Garry and Rosser, or at least not initially, making life difficult for residents commuting to Winnipeg for work or school. Hotels often had two clocks on the wall, one set to daylight time and the other to standard time for out of town visitors. Motion picture theatre owners complained to the council that they were making large losses due to daylight saving as many people didn't like going to the movies in the light and by the time it got dark, well after 9 p.m. in late April, they weren't interested in heading out into the cold. Labour unions didn't like daylight time either. Despite the problems, the scheme was maintained until the scheduled finish in September. Winnipeg Council took just a few minutes to repeal the daylight saving time bylaw on 2 April 1917 and the city didn't put its clocks forward that year.

Several other Canadian cities had daylight saving in 1916. Brandon, to Winnipeg's west, used it but it wasn't popular in this railway town as the trains still ran on standard time. Charlottetown, Prince Edward Island's capital city, and Saint John, the largest city in New Brunswick, also had daylight saving in 1916 but not 1917. Hamilton, Ontario used it in 1916 although it finished early, in August, and horseracing had stayed on standard time. In nearby Guelph, the scheme failed and most businesses returned to normal time by end of June. Neighbouring Galt had it too. In Brantford, clocks went back in August. Further west, London abandoned daylight saving in July. Alberta's largest city, Calgary, stopped using it in August. British Columbia city Kelowna also adopted the measure. Other Canadian municipalities no doubt had daylight saving in that year.

Canada's national capital, Ottawa, was to have daylight time in June 1916, but the council backtracked a few hours before the scheduled start due to opposition to the plan and inability to enforce observance. Also, concerns were raised that the civil service wasn't interested and that daylight saving should be national or not at all. The council had approved the measure by 13 votes to 7 but was unanimous in repealing it. The nation's largest city, Toronto, considered but shelved a daylight saving time proposal in 1916.

The first country in North America to introduce daylight saving nationwide was Newfoundland (which was separate from Canada until 1949). John Anderson, a member of Newfoundland's Legislative Council, met William Willett when on a business trip to Britain in 1907. On his return, Anderson became his country's daylight saving champion, introducing bills in 1909 and 1910. The second bill was passed by the Council but not by the House of Assembly, due to "public misunderstanding about how the change would affect daily routines".⁸⁹ Encouraged by the adoption of daylight saving in Europe, Anderson brought in a third bill in 1917 and this was passed on 17 June to become the Daylight Saving Act of 1917. Capital city St. John's had the scheme from 8 April by local ordinance. Daylight saving time in Newfoundland was initially called "Anderson's Time".

Montreal, the largest city in Quebec, had daylight saving for just one month in 1917, from 25 March to 24 April. Regina, Saskatchewan also used the scheme in that year, for the fourth year in a row. Overall, daylight saving time was probably used less in Canada in 1917 than in 1916.

The Canadian government was becoming increasingly concerned about the piecemeal approach to daylight saving across the dominion. Member George Foster introduced a bill into the House of Commons in June 1917 to have daylight saving on a national basis to conserve fuel. He wanted the scheme to commence that summer. Meanwhile, the United States had a bill for daylight time but it wasn't due to start until 1918. A delay in the Canadian bill prompted member William Pugsley to remark that "summer was making more progress than the bill", but much of the House's time was taken up with the military service bill. After a second reading on 23 July, the daylight saving bill was withdrawn due to overwhelming opposition from both sides of the House, particularly from rural members. The three main objections were:

- ☼ the lack of success of the scheme in many places that had tried it in the dominion
- ☼ additional hardships for farmers having to rise an hour earlier and still work as late in the day
- ☼ the difficulty of getting children to bed earlier at night and up earlier in the morning.

But the concept of daylight saving was favoured in some quarters and was used by one company to promote its shaving cream product in September 1917 with this advertising message:

⁸⁹ *Dictionary of Canadian Biography*, vol. 15 (1921-1930), John Anderson, at http://www.biographi.ca/en/bio/anderson_john_1855_1930_15E.html

A daylight shaver

and like “daylight saving” – intended to assist you in securing a greater amount of genuine pleasure between dawn and sundown. This pleasure can start with the morning shave[,] for

Royal Vinolia Shaving Cream

gives a delightfully creamy and luxuriant lather and leaves an exquisitely soothing after-feeling to the skin.⁹⁰

In 1918, Canada quickly followed America’s move to implement national daylight saving. Foster reintroduced his bill into the Canadian Parliament on 20 March, the day after US president Woodrow Wilson signed a bill to put his country on advanced time from 31 March. Foster’s bill went through all stages in both houses fairly quickly despite some opposition by rural politicians and from farmers and unions. But Canada didn’t have much choice. International services such as mail, telephone, telegraph, shipping and newspapers would be out by an hour and the Canadian Railway Board also decided to use US daylight time. The bill became the Daylight Saving Act, 1918 and clocks went forward an hour on Sunday 14 April at 2 a.m. as a war measure, two weeks after America. Officially, the entire country was on daylight saving time but whether the explorers, prospectors and indigenous people in the sparsely populated territories in the north took any notice is doubtful.

The switchover went fairly smoothly although quite a few people forgot to change their timepieces and arrived at church when service was finishing. Even a few priests turned up late. In coming months, nearly all individuals and organisations followed the new time, perhaps happy to save fuel and support the war effort. An exception was a school board in Toronto which enforced school hours of 10 a.m. to 5 p.m., one of the trustees declaring that they didn’t want “that scoundrel [prime minister Robert] Borden” interfering with “the Lord’s time”. One unfortunate soul by the name of Smith from Ladner, British Columbia stole a \$3 alarm clock to wake him up on time but he got caught and the magistrate sentenced him to 30 days in jail.

Canada intended to have daylight saving again in 1919 provided the United States had it. America decided to go on national daylight time from 30 March, but in Canada opposition was so strong in rural areas that just five days before the switch the country abandoned the idea although the railways went ahead with it and municipalities were permitted to use it. Many cities and towns quickly put clocks forward and Canada soon had a patchwork of different times. Most of Ontario had the scheme, including Ottawa except parliament which ran on the old time. A resolution to restore national daylight saving time was beaten by 105 votes to 50 in the House. Nevertheless, the Senate pursued with a daylight saving bill. In London, Ontario, a court decided that the council had no power to pass a daylight saving bylaw and quashed it after a citizen action.

Other places to have daylight time in 1919 included all of British Columbia under the Provincial Daylight Saving Act passed on 28 March and signed next day allowing the governor to decide dates for advanced time each year. Daylight saving started the following day. Montreal and probably other areas in the southern part of Quebec had

⁹⁰ “A daylight shaver” [advertisement for Royal Vinolia Shaving Cream], *The Ottawa Evening Journal*, Ottawa, Ontario, Canada, 13 September 1917, p. 13, Newspapers.com (subscription only), at <https://www.newspapers.com/image/42155435>

the measure. In Moncton, all government offices, shops and schools had daylight time from 31 March and other cities in New Brunswick may have used the scheme. St. John's and nearby localities in Newfoundland had daylight saving, as did some centres in Saskatchewan, and all of Yukon by ordinance.

Winnipeg was expected to have daylight saving from 2 May but, after lengthy debate, the council had defeated the bylaw by 8 votes to 5 shortly after midnight three days earlier. The people of Alberta's capital, Edmonton, said "no" to daylight saving in a plebiscite in 1919. The province didn't put clocks forward at all in the interwar years. Halifax, Nova Scotia probably didn't have daylight saving in 1919, while the town of Amherst in the northern part of the province certainly didn't. At a public meeting held by the council in April, manufacturers and merchants gave their support. But the workers were opposed to putting the clocks forward. Some 300 members of the Amherst Federation of Labour marched to the meeting, where they called daylight saving a capitalist plot to make the working day longer and hooted down businessmen favouring the scheme. The issue was squashed "flatter than the proverbial pancake" according to the town's newspaper, the *Daily News*.

Canadian businesses generally favoured daylight saving, while labour and the farmers were against it. The Convention of Dairymen unanimously opposed the measure in January 1920. Nor were the railways interested, staying on standard time. The federal government wasn't biting in and acting prime minister George Foster said in April that daylight saving was up to "towns and villages". Ottawa had daylight time after 63 per cent of ratepayers voting in a plebiscite wanted it, and there was a move to alter clocks each summer.

British Columbia had a bill for provincial daylight saving in January 1920 but no member spoke in its favour. Despite this, largest city Vancouver used the scheme, but in 1921 daylight saving was defeated by 50.5 per cent to 49.5 per cent at the ballot box although there were big variations among divisions. In capital city Victoria, the council voted 6 to 5 for daylight saving in 1920 but it lasted just two days in June. Halifax abandoned it early too, on 29 August. Next year, the city had daylight saving again although there was confusion when nearly all businesses used it but transport, communications, hotels and the council remained on standard time. The council eventually moved its clocks forward.

Elsewhere, Saskatoon didn't have daylight saving in 1920 after people voted against it in a plebiscite, but had the scheme in 1921 after another public vote resulted in enough people changing their mind. The measure was province-wide in Quebec in 1921 and in most cities of the Maritime provinces of New Brunswick, Nova Scotia and Prince Edward Island. In Saint John, 67 per cent of the electorate voted for daylight saving in February of that year. Start and finish dates varied. Adjoining municipalities were sometimes on different times as were businesses and other organisations in the same city or town. A problem for any place using advanced time was that the railways kept running on standard time although timetables were adjusted in many cases.

The *Vancouver Daily World* newspaper had this to say about daylight saving time on page 1 on 19 May 1921:

[title] Time systems much muddled.

[subtitle] Daylight saving causes clocks all over dominion to hopelessly disagree.

[subtitle] Discrepancies most awkward in Ontario and confusing in scores of cities.

... The local option method re daylight saving has produced a sort of patchwork process, a veritable crazy quilt of time areas. The result discloses some method in the madness of that irate citizen who vehemently declared that the federal government should make it a criminal offence for any city council to interfere with "God's time" by the introduction of daylight saving ordinances.⁹¹

A resolution to Canada's daylight saving problem was no closer in 1922. The dominion parliament debated the issue for an afternoon in April and most members were against the concept. One Liberal Party representative, W. F. Kay from Missisquoi County, Quebec, wanted daylight saving banned everywhere in Canada. Provinces and municipalities continued to decide for themselves.

Quebec opted out of province-wide daylight saving although many cities, including Quebec City and Montreal, still used it. People in Saskatoon kept changing their mind over the scheme and voted against having it in 1922. Winnipeg Council voted 7-7 for advanced time and the mayor used his casting vote against any change. Daylight saving was quashed by court order in Kitchener, Ontario because the municipal Act that had been used to allow the measure was restricted to bylaws on "health, safety, morality and welfare" and the judge didn't think daylight time came under any of these topics. In Prince Rupert, British Columbia, some women presented a petition to the council strongly opposing daylight saving, arguing that it meant more housework and was no good for children, but the council wasn't swayed. Clocks were put forward on different dates: Montreal, Quebec City and Halifax on 30 April, Regina on 6 May, Toronto on 14 May and Saint John on 20 May. End dates varied too and were sometimes rescheduled, such as in Montreal where daylight saving finished a month earlier than planned in 1922.

Daylight saving was often included as a ballot question in provincial and local elections. Ottawa landholders voted 55:45 to advance the clocks in a plebiscite in January 1923. By contrast, Vancouver didn't want daylight saving, with 67 per cent voting against it in June, after the city had the scheme in the previous year. The result was closer in Victoria where 54 per cent of voters opposed the measure in December 1924. In Winnipeg, the council again voted down daylight saving in 1923 and 1925 and a public vote was lost in November 1927 when 52 per cent of people preferred standard time. Just 19 per cent of Vancouver voters favoured daylight saving in 1928. In Ottawa, daylight saving was renewed annually by proclamation. A plebiscite in 1928 confirmed the city's support for the measure when 61 per cent of ratepayers voted to keep it going.

While still only a minority of Canada's population had daylight saving by 1930, it was used in many places in Quebec, cities and towns in the southern part of Ontario but not in the north, only Saint John in New Brunswick, only Halifax in Nova Scotia, and only Regina in Saskatchewan, the sole western city to have it. British Columbia, Alberta, Manitoba and Prince Edward Island had no daylight saving although the

⁹¹ "Time systems much muddled", *Vancouver Daily World*, Vancouver, British Columbia, Canada, 19 May 1921, p. 1, Newspapers.com (subscription only), at <https://www.newspapers.com/image/64543829>

issue kept coming up in many areas. In Vancouver, for example, the council voted 6 to 5 in December 1931 against a daylight saving time plebiscite. Newfoundland used the measure but it may not have extended much further than St. John's. The trains were still on standard time all year although timetables were usually changed by an hour in the summer months.

Attempts to unify daylight saving dates had mixed success. Major population centres were usually coordinated but not the smaller cities. In 1929, the main cities of Ontario started daylight saving on 29 April but others began on various dates. The Maritime provinces were two weeks later and Regina changed on 5 May. In Ontario in 1931, the cities of Ottawa, Toronto, Kingston, Oshawa and Welland, and adjoining municipalities, commenced daylight time on 26 April, St. Catharines on 16 May, Guelph on 17 May, Hamilton on 13 June, Niagara Falls and Peterborough on 15 June, Brantford on 21 June and Galt on 29 June. At midyear, some cities were still discussing whether to adopt the measure. Most of the province stayed on standard time.

In Cornwall, Ontario, south-east of Ottawa, ratepayers voted against daylight saving in 1931. However, all the city's industrial plants went onto fast time after 85 per cent of the 3,500 plant workers voted for it. Most other firms moved too, and also several churches, but schools remained on the old time. Many families had workers on daylight saving, children on standard time and housewives on both times.

Pioneering daylight saving town Orillia went on daylight time in 1934 but many merchants stayed on standard time displaying notices in their windows advising of their opening hours based on Eastern Standard Time. They were concerned about losing the business of neighbouring farmers and others who hadn't altered their clocks. A similar situation existed in the town of Arnprior to the west of Ottawa.

Winnipeg had daylight saving in 1937 for the first time since World War I when the council approved a bylaw putting the city's clocks ahead from 25 April. In past years, the city had used a form of daylight saving where people in many firms started work half an hour earlier than usual, took half an hour less for lunch and finished an hour early. Time in Winnipeg was already about half an hour ahead of the sun and daylight saving opponents in the council fought any further move all the way, delaying the start until 16 May. Daylight saving finished on 26 September and 56 per cent of landowners who cast a valid vote at the polls two months later opposed the scheme. Winnipeg reverted to standard time the following year except for the grain exchange, which had used fast time for years to align with markets to the east.

About a fifth of the Canadian population of 11 million had daylight saving in 1937, compared with roughly a quarter of people in the United States. Regina joined Winnipeg and 18 other Canadian cities and numerous smaller municipalities on daylight saving in that year after 61 per cent of ratepayers voting in the Saskatchewan city wanted to resume the scheme after remaining on standard time in the previous two years.

By then, a map of who had daylight time and who didn't resembled a patchwork quilt. Adding to the confusion were the widely differing start and end dates to daylight saving. The next table shows all Canadian cities that had the scheme in 1937 and their

start and finish dates. Regina was the first city to start, on 11 April, and last to finish, on 10 October. Nine cities used the period 25 April to 26 September. These were the dates recommended by the Railway Association of Canada. In all, there were 11 different start dates ranging from mid April to early July and seven finish dates from late August to early October.

Daylight saving start and end dates, cities, Canada, 1937

| <i>City</i> | <i>Province</i> | <i>Start date</i> | <i>End date</i> | <i>Length</i> |
|----------------|-----------------|-------------------|-----------------|----------------|
| Brockville | Ontario | early July | late August | up to 2 mths |
| Chicoutimi | Quebec | 2 May | 26 September | 4 mths 24 days |
| Guelph | Ontario | 9 May | 6 September | 3 mths 28 days |
| Halifax | Nova Scotia | 2 May | 27 September | 4 mths 25 days |
| Hamilton | Ontario | 1 May | 26 September | 4 mths 25 days |
| Kingston | Ontario | 25 April | 26 September | 5 mths 1 day |
| Lévis | Quebec | 25 April | 26 September | 5 mths 1 day |
| Moncton | New Brunswick | 6 June | 5 September | 2 mths 30 days |
| Montreal | Quebec | 25 April | 26 September | 5 mths 1 day |
| Niagara Falls | Ontario | 25 April | 26 September | 5 mths 1 day |
| Ottawa | Ontario | 25 April | 26 September | 5 mths 1 day |
| Peterborough | Ontario | 29 May | 6 September | 3 mths 8 days |
| Quebec City | Quebec | 25 April | 26 September | 5 mths 1 day |
| Regina | Saskatchewan | 11 April | 10 October | 5 mths 29 days |
| Saint John | New Brunswick | 22 May | 26 September | 4 mths 4 days |
| Sherbrooke | Quebec | 25 April | 26 September | 5 mths 1 day |
| St. Catharines | Ontario | 25 April | 26 September | 5 mths 1 day |
| St. John's | Newfoundland* | 10 May | 4 October | 4 mths 25 days |
| Sudbury | Ontario | 6 June | 26 September | 3 mths 20 days |
| Toronto | Ontario | 25 April | 26 September | 5 mths 1 day |
| Winnipeg | Manitoba | 16 May | 26 September | 4 mths 10 days |

* Newfoundland was a separate country until 1949.

Sources: “18 [sic] cities in dominion to start daylight saving midnight tomorrow [sic]”, *The Ottawa Evening Journal*, Ottawa, Ontario, Canada, 23 April 1937, p. 1, Newspapers.com (subscription only), at <https://www.newspapers.com/image/48195570>; Time and Date AS, at <https://www.timeanddate.com>; and other sites

A total of 74 cities and towns in eastern Canada, and hardly any in the west, had daylight saving in 1938. In Ontario alone, 86 municipalities used advanced time in 1939. Whether a place could be said to be on daylight saving wasn't always easily determined as many only partly adopted the scheme. Fergus, to the west of Toronto, was mainly on standard time in 1938 although at least one factory used daylight saving and another put its clocks half an hour ahead. One family in this community was known to have members on all three times.

The *Brantford Expositor* felt that Ontario should either have daylight saving or standard time but not both and described the situation as:

This Alice-in-Wonderful, hit-and-miss “individualism” now being practised ... For the sake of the business economy and the soothing of frayed tempers either Ottawa or Toronto, or both, ought to make up the people's minds for them one way or the other.⁹²

⁹² The *Brantford Expositor*, in “Daylight saving”, *The Ottawa Journal*, Ottawa, Ontario, Canada, 23 May 1939, p. 6, Newspapers.com (subscription only), at <https://www.newspapers.com/image/48536714>

But *The Ottawa Journal* disagreed, believing that time should be up to municipalities rather than provinces or the national government as city people liked daylight saving and rural people didn't. A dominion or provincial administration that tried to impose it or abolish it, argued the newspaper, "is going to find itself in a surprising lot of trouble".⁹³

Canada played an important role in World War II, sending large numbers of troops to the European battlefields. A tenth of the dominion's population served in the forces during the war. The country was aware of the need to save energy for the war effort. Instead of returning to standard time in September 1940, all cities and towns in Quebec and Ontario that had used daylight saving that summer were instructed under a national government order in council to keep the scheme going in winter, including those municipalities that had recently put their clocks back. Other provinces weren't part of this policy and either finished daylight saving at the usual time or continued on standard time. Newfoundland, still a separate dominion, had two hours of daylight saving from 1 July and extended the original end date of 1 September at least twice, to 6 October and to 3 November.

By February 1941, the munitions minister indicated that daylight saving might be extended to all Canada to meet the power requirements of war industries. For the first time since the early 1920s, British Columbia introduced daylight saving by order in council from 7 July until 31 October the following year. Vancouver had threatened in June to have daylight saving if the provincial government didn't act soon. Rural interests protested the time change. Chilliwack farmers said they lost two working hours a day: an hour in the midmorning waiting for the dew to lift and an hour at day's end because farmers and workers had to get to the shops before they closed an hour earlier. A request that farming areas go back to standard time was dismissed by the premier. Meanwhile, several councils and school boards resolved to return to standard time on 1 September.

In Chilliwack, the post office was on standard time but mail moved by daylight saving hours. The vehicle licence office operated on daylight time. Most trains and buses kept clocks ahead although the Canadian National Railway was on standard time. Service stations were on daylight saving time, as were the telephone office and the court house, although the police courts used both times, the paperwork for each case stating which one. Schools used standard time, as did the Canadian Legion and the government liquor store. Milk runs for a major plant were half an hour later but the office was on standard time. The city clerk, P. J. Brown, wore two watches to cater for both times. Local protests convinced Chilliwack and some surrounding areas to return to standard time on 31 August 1941 after less than two months of daylight saving. But most of the province, including Vancouver, didn't revert until four weeks later.

A United States decision on year round daylight saving for the whole country from 9 February 1942 was quickly followed by Canada by order in council from the same date. The railways agreed and even many farmers. Post offices, banks, customs houses and government offices all changed over. People seemed relieved because at last everyone was on the same time.

⁹³ As above.

Port Arthur and Fort William in Ontario were the only two places to remain on standard time. They had changed from Central to Eastern time in 1909 and 1910, putting them 57 minutes ahead of the sun and the two cities considered themselves to be already on daylight saving time. Nevertheless, they joined the rest of the dominion on 6 April and 4 May 1942, before going back an hour in autumn. With daylight time, sunrise would have been at about 9:50 a.m. by late December and difficult for war industries, school children, farmers and most others. Both cities had daylight saving in the summer of 1943 but went back to standard time on 29 August ready for the new school year.

Winter daylight saving was hard on country schools in Manitoba too, where sunrise in December and January was around 9:30 a.m. or later. Children often had to help with the morning jobs before school as farm labour was scarce with so many men away at war. With not much daylight before about 9 a.m. with fast time, many youngsters would have been lucky to get to school by midmorning. The provincial education department preferred advanced time but let rural school boards have the final say.

All year daylight saving was just one of many measures used in Canada to try and save fuel and other resources for the war effort. Some of the others included:

- ☼ no neon signs at night
- ☼ garages dark after 7 p.m.
- ☼ no new cars or tyres
- ☼ passenger auto travel, except for short runs, almost eliminated
- ☼ record number of bikes
- ☼ occasional horse and buggy
- ☼ bus and truck distances regulated
- ☼ gasoline ration reduced from five to three gallons a week
- ☼ restrictions, rationing or unavailability of all sorts of food and other items.⁹⁴

A survey on people's opinions of daylight saving in July 1943 found that 36 per cent favoured it all year and a further 36 per cent supported it in summer only (see table) for a total of 72 per cent. A quarter preferred no daylight saving. The scheme was more popular in the cities and towns than in rural areas. Approval was higher among younger people, with 83 per cent of 21-29 year olds happy to have daylight time, falling to 65 per cent for those aged 50 years and over. Only 28 per cent of respondents wanted year round advanced time to continue after the war. Another poll in December 1944 gave virtually the same results.

Gallup poll on daylight saving, Canada, July 1943

| <i>Preference</i> | <i>Cities and towns</i> | <i>Rural areas</i> | <i>Total</i> |
|-------------------|-------------------------|--------------------|--------------|
| | | — % — | |
| All year | 41 | 21 | 36 |
| Summer only | 38 | 32 | 36 |
| Not at all | 17 | 45 | 25 |
| Undecided | 4 | 2 | 3 |
| Total | 100 | 100 | 100 |

⁹⁴ "Certainly Chilliwack has changed", *The Chilliwack Progress*, Chilliwack, British Columbia, Canada, 4 November 1942, p. 3, Newspapers.com (subscription only), at <https://www.newspapers.com/image/43157746>

Source: Canadian Institute of Public Opinion, "Majority in favor of daylight saving", *The Winnipeg Tribune*, Winnipeg, Manitoba, Canada, 28 July 1943, p. 7, Newspapers.com (subscription only), at <https://www.newspapers.com/image/37367671>

After the Japanese surrendered on 15 August 1945, Ottawa indicated that daylight saving might end in coming months and that the decision in future summers would be left to municipalities. Canada went back to standard time on 30 September, the same day as the United States, after more than three and a half years of continuous daylight saving across most of the country and nearly five and a half years for many cities and towns in Quebec and Ontario who had the measure from 1940.

Once again, daylight saving time was left up to provinces and communities. "Canada back on patchwork time", announced *The Winnipeg Tribune* on 29 April 1946, as most eastern cities, a number of western cities, and various towns, but few rural areas, put timepieces forward for the summer. Daylight saving was adopted in nearly all Ontario cities as well as major centres of Quebec, New Brunswick, Nova Scotia and British Columbia. Large cities in most other provinces used it although not in Alberta. The railways stayed on standard time.

After having daylight saving for just one year in the interwar period, 1937, Winnipeg Council voted 12 to 3 to have the measure in 1946 although two weeks were sliced off the scheduled end date. A referendum was held later that year to decide whether the city would have automatic daylight time in future summers and both sides came out in force in the lead up. The result was clearcut, with 70 per cent of voters who cast a valid vote wanting daylight saving, reversing the outcome of two previous ballots in 1927 and 1937.

In Alberta, Calgary's city charter enabled it to have daylight saving time but a motion to go ahead with the scheme was defeated by the council in April 1946. The city wanted daylight saving in 1947 but was prevented by the state's Legislative Assembly when the municipal laws committee voted to take authority for the measure out of the charter as rural members were opposed to any change in time. An initial vote of 13-13 after vigorous debate was followed a few minutes later by a 14 to 13 vote after an amendment. Government members were split between the two sides. Norman James of the governing Social Credit Party and from Edmonton called the decision the "most outrageous proposal" and "the worst threat to democratic government I've heard of".

Edmonton too requested daylight saving in 1947 after a plebiscite found that 58 per cent of voters favoured it and the council had voted unanimously for it. Pressure was brought by rural groups against the proposal. The Alberta Farmers' Union felt there would be "intolerable confusion" if the province had two times. The Alberta Federation of Agriculture pointed out that daylight saving in the city would mean milk had to be delivered an hour earlier and farmers would have to be up and working well before dawn. A municipal laws committee meeting became so heated on 15 March that it was adjourned until the following week when the application was rejected by members. The full house voted 30 to 16 on 28 March against an amendment to the city's charter to allow daylight saving.

A bill to prohibit daylight saving in Alberta, except if national or if the province got agreement from two other provinces, was passed in 1948. The Daylight Saving Time Act stated: "No person shall use or observe within the province any time other than

Mountain Standard Time”, and anyone who broke that law could be fined up to \$25 and costs although the Edmonton and Calgary stock exchanges were allowed to operate on daylight time. By contrast, advanced time was legally required in British Columbia between the last Sunday in April and last one in September. In the rest of Canada, daylight saving was up to individual municipalities. Most cities and towns in Saskatchewan, Manitoba, Ontario, Quebec and New Brunswick used the measure. Halifax had daylight saving and quite possibly some other areas of Nova Scotia.

Most if not all of Prince Edward Island stayed on standard time. The Time Uniformity Act was passed by the Legislative Assembly in early 1947 making standard time the only legal option throughout the province. Regardless, Charlottetown decided it would have daylight saving that year, similar to 1946. Premier Walter Jones said he “would not oppose it”. Mayor Earle MacDonald admitted that the council’s move “might not be strictly in accordance with the recent legislation” but he felt that most residents would welcome daylight saving. But the city didn’t put its clocks forward for a number of years after 1947.

Daylight saving remained controversial in Manitoba. A bill to ban the measure reignited the debate in Winnipeg and other areas of the province in 1949. But the law amendments committee of the Legislative Assembly voted 17 to 10 not to make standard time compulsory and the city had daylight saving again that year before a plebiscite to decide the issue on 26 October. A movie shown by the Standard Time League at the Capitol Theatre, Winnipeg on 7 October encouraging people to vote against daylight saving was met with boos and hisses. Nearly half of the electorate voted and 55 per cent of valid votes were cast in favour of daylight time.

Ontario and Quebec had lengthy debates in their legislatures in 1949 over what to do about daylight saving. Sherbrooke, Quebec had winter daylight time in 1948-49 to save energy. Many places in both provinces extended the scheme in 1949 due to power shortages, such as Toronto and Ottawa by two months and Montreal by a month.

Tussles over the measure continued. In 1950, the railways finally planned to adopt daylight saving time, but it didn’t happen and the actual move would still be years away. Soon after the announcement, the Ottawa Board of Control recommended that the Canadian Federation of Mayors and Municipalities approach the federal authorities to make the scheme nationwide. The Ontario Municipal Association also urged daylight saving for all of the country. But the British Columbia Farmers’ Institute sought to outlaw the measure. Quebec ruled that municipalities on daylight time had to use uniform dates from 1951: last Sunday in April to last Sunday in September, which seemed to be gradually becoming the standard in most places that put clocks ahead. The Saskatchewan Association of Rural Municipalities described daylight saving in the province as “haphazard” and called for uniform time.

In British Columbia, major cities had daylight saving each year. To see if this was what the populace wanted, a plebiscite was announced by the government in March 1952 to be held in June with the general election. Farmer and member for Delta, Alexander Hope of the Conservative Party, believed that farmers would stop protesting about daylight saving if the ballot found that people wanted the measure. On the day, 56 per cent of valid votes favoured it. Daylight saving stayed but,

ironically, Hope lost his seat although he was right about the farmers – they complained less.

The daylight saving question erupted in Prince Edward Island again in the mid 1950s when a number of cities and towns defied the province's Time Uniformity Act and put their clocks forward. Charlottetown Council passed a resolution by 5 votes to 3 in 1954 to circumvent the Act and have unofficial or non-legally binding daylight saving in the city from 20 June to 15 September. The town of Montague made a similar decision. More centres followed in 1955, including Summerside, Souris and Alberton.

The PEI Federation of Agriculture was particularly upset with these cities and towns and in early March 1956 wanted to add "necessary disciplinary sections" to the Act. Rural representatives in the legislature made sure that a move to allow urban centres to have daylight saving was defeated on 15 March. Two weeks later, members passed An Act to Amend the Time Uniformity Act, prohibiting any other time except Atlantic Standard Time and threatening that any municipality that disobeyed may not get any money from the legislature. Section 4 of the amended Act stated:

If the governing authority of any city, town or village declared any time effective within its corporate limits other than the time in force under this Act, the Lieutenant-Governor-in-Council may withhold from such corporation any per capita grants voted by the Legislature to such city, town or village.⁹⁵

Opponents of daylight saving in Prince Edward Island gradually softened their view. The province had what it called "advanced summer hours" probably from 1958, with government offices opening and closing an hour earlier during the six months that daylight time operated in other provinces. Most businesses and individuals in the cities and towns put their clocks and watches an hour ahead but not in the rural areas. The Federation of Agriculture had been opposed to daylight saving but its annual brief to the government in March 1963 made no mention of time and the province officially had the scheme that year for the first time since 1947. The island has had daylight saving every year since then. Curiously, government offices still have "summer hours", opening and closing half an hour earlier in the months of June to September in addition to daylight saving but without further change to the clocks themselves.

Time was even more complex in Saskatchewan. Early federal and provincial legislation had put the province in Mountain time but many areas still used Central time. Daylight saving was often used by certain places in both zones. Time was up to municipalities and many held plebiscites to decide on daylight saving. A province-wide ballot was held under the Time Question Plebiscite Act, 1956. Just over a third of eligible voters cast a vote. For standard time, about 55 per cent of them favoured Central time, popular with city residents, and 45 per cent preferred Mountain time, liked by rural dwellers. Whether to have daylight saving time was about 50:50.

The government was undecided on what to do and sent the matter to a committee, which recommended Mountain Standard Time in winter and Central Standard Time in summer. This was accepted by the government as a compromise and implemented in 1958 but the government didn't enforce the plan. Most areas kept using the same time

⁹⁵ Peter Rukavina, "Charlottetown's war on time uniformity", 2016, at <http://ruk.ca/content/charlottetowns-war-time-uniformity>

as before: mainly Central Standard Time in the east and Mountain Standard Time in the west, and a few used daylight saving. An Act allowing communities to hold public votes to decide time was repealed in 1959. Regina shifted from Mountain to Central time on 24 April 1960 and stayed there, effectively putting it on year round daylight saving with clocks 58 minutes ahead of local mean time. By 1962, all of the province except the south-east was officially supposed to be on Mountain Standard Time although the major communities ignored this and used Central Standard Time.

A Time Committee of urban and rural municipalities and schools was formed in mid 1962 to try and sort out the “Time Question” as it was called in Saskatchewan. In April 1964, preliminary recommendations were repudiated by school trustees, who had appointed officials to the study group. After a protracted investigation, the committee handed its report to the government in May 1965. One of the conclusions was that “the observance of one uniform time throughout the province all year ... would work, except that the people of the province will never agree on whether it should be Mountain or Central Time.” There was no resolution.

Local astronomer Earl Milton, a physics professor at the University of Saskatchewan, chipped in and offered a report to the government in February 1966. He argued that the whole province should be on Mountain Standard Time or GMT-7 as it is located between 110 and 102 degrees west longitude, extending closer to 101 degrees in the south. He noted that the business sector wanted a continent-wide change from standard time to daylight saving each summer and that Saskatchewan would need to be on Mountain time for this to be feasible.

Despite the two reports, the provincial government went its own way and came up with The Time Act, 1966, drawing a line through the middle of the province at 106 degrees west. Areas to the east would have Central Standard Time all year, while those to the west would also use this time in summer but Mountain Standard Time in winter except school districts in the populated south which could remain on Central Standard Time year round and Lloydminster on the border with Alberta which would stay on Mountain Standard Time all year. But before long, most of the province was on Central Standard Time all year, putting clocks about 45 minutes or more ahead of sun time in the east and up to one hour 20 minutes in the west. The north-west moved to Central time later, except where a community voted in favour of some other time.

Canada still had a mishmash of times in the early 1960s. A survey by The Canadian Press in 1962 found that British Columbia and Newfoundland and Labrador had province-wide daylight saving. Alberta was still on standard time. Most municipalities in Saskatchewan were on Central Standard Time and there was less daylight saving than in earlier decades. The other six provinces left daylight saving to municipalities. Manitoba was mainly on standard time although Winnipeg and several communities to its west used daylight saving. Most of the cities and towns in the Maritime provinces put clocks forward. Much of Quebec and Ontario had the scheme.

The southern tip of Ontario “offers bewildering variety” of times according to *The Brandon Sun* of 25 April 1962.⁹⁶ The city of Windsor followed Detroit, which is just

⁹⁶ Carl Mollins, “Daylight saving hassle on once more”, *The Brandon Sun*, Brandon, Manitoba, Canada, 25 April 1962, p. 12, Newspapers.com (subscription only), at <https://www.newspapers.com/image/66571182>

across the river and had no daylight saving after 1948 until 1967, as did most of the rest of Essex County. Just to the east, Kent County (and the city of Chatham) had daylight saving from 29 April to 3 September, except the communities of Wallaceburg with six months of fast time and Tilbury on standard time. In the next county, Middlesex, Glencoe village ended daylight saving a month earlier than nearby municipalities after the local high school decided to return to standard time in late September from 1961 and the village followed suit in 1962. At certain times of the year, a two hour drive could mean about half a dozen time changes.

Manitoba had legislation for province-wide daylight saving from 1963, sparing many municipalities, such as Brandon, from the headache of deciding whether to have the scheme each year. Not everyone was budging though. The hardware shop owner in Killarney in the province's south-west put a sign on his front door: "This store is on standard time." End dates still varied, with rural areas finishing the week after Labour Day in early September and several larger cities continuing until late October.

In Newfoundland and Labrador, the government was going to change standard time by half an hour in 1963, from GMT-3:30 to GMT-4, but the plan was met with strong resistance from the public and wasn't carried through. The province had used this half-hour deviation since 1935, which is just one minute ahead of local time at St. John's, and most people seemed happy with it and with daylight saving.

Much larger changes in time were put in place in the capitals of the three territories in 1965 when Whitehorse, Yellowknife and Iqaluit all had two hours of daylight saving for six months. Double daylight saving in Whitehorse meant sunset after 11:30 p.m. in mid June but sunrise still before 4:30 a.m., and civil twilight lasted through the rest of the night in any case at that time of year. After a plebiscite in Yukon in January 1966, some southern areas, including Whitehorse, had daylight time that year but the rest of the territory remained on standard time. A change in time zone for Whitehorse from GMT-9 to GMT-8 in that year put standard time in the city an hour ahead of the sun.

Long distance transport gradually changed over to daylight saving time. In 1966, the Canadian National Railway used advanced time but the Canadian Pacific Railway was still on standard time all year although Canadian Pacific Air Lines used the measure as did Air Canada. A CPR spokesman said: "It has been this way with us since time immemorial. We haven't changed because we believe that it would create too much confusion." The main clock at Toronto's Union Station showed both times. CPR first used daylight saving in 1968, three years after CNR.

Daylight saving, which had been outlawed in Alberta since 1948, was put to the people in a plebiscite at the four-yearly provincial election in May 1967. The "no" campaign was headed by R. H. Barron, QC and his Alberta Council for Standard Time, which ran large advertisements in major newspapers. Calgary salesman Bill Creighton was the main force behind the "yes" campaign. The scheme was narrowly rejected, with 51 per cent of voters not wanting it, although Calgary supported it by a ratio of 2 to 1 and Edmonton by 6 to 5 while the rural population was against the idea. In 1969, Edmonton Council wanted a one year trial and the Daylight Time Society wanted the same in Calgary, but the Alberta government rejected both.

In other parts of Canada, daylight saving was gaining ever wider acceptance. Manitoba had province-wide advanced time under its Official Time Act from 1967. All of British Columbia, Quebec, New Brunswick, Prince Edward Island, Ontario except Port Arthur and Fort William, and Newfoundland and Labrador apart from a few remote fishing villages, as well as Manitoba and much of Nova Scotia, were using daylight saving in 1969. Start and end dates were the same in nearly all places that used it, from the last Sunday in April to the last Sunday in October. Alberta would soon join those provinces on daylight saving. That would leave Saskatchewan as the only province with year round standard time, except for a few western areas.

Another plebiscite was arranged in Alberta at the August 1971 election and the mood of the electorate had changed greatly over the previous four years. Bill Creighton again led the “yes” drive along with his Yes for Daylight Saving Society, this time against weaker opposition. Unifarm president W. D. Lea indicated farmers were too busy to worry. Support for daylight time carried easily, with 62 per cent voting in its favour. In the election, the Progressive Conservatives were swept into office with a swing of over 20 per cent, replacing the Social Credit Party after 36 years as Alberta moved from a community dominated by agriculture and religious fundamentalism to an industrial society with a burgeoning oil sector, cosmopolitan cities, and daylight saving. The province observed the scheme for the first time other than during the two world wars from April 1972.

Part of British Columbia had a time plebiscite in 1972. Voters in four electoral districts, Columbia River, Kootenay, North Peace River and South Peace River, and part of a fifth, Nelson-Creston, were asked: “Are you in favour of Pacific Standard time, including Pacific Daylight Saving time, as it is applicable now throughout the province?” Most people in this rural mountainous region didn’t want to be on this time schedule, with 65 per cent of voters opposing it. British Columbia was officially on Pacific time but many eastern areas were more economically and geographically tied to large population centres in Alberta and this was confirmed by the results of the plebiscite. These districts likely kept observing Mountain time or UTC–7 in winter and UTC–6 in summer.

New Brunswick didn’t have daylight saving in 1973 after one of the worst floods to ever hit the area. Advanced time was due to start on 29 April, but two days earlier on Friday a large storm hit and by Sunday the Saint John River had risen 25 feet above its usual summer level causing widespread flooding in many areas, including outside the Legislative Building in Fredericton. There was damage to thousands of homes and businesses and people were in no mood for daylight saving, nor was the government.

In late 1973, the United States was considering daylight saving in winter to help ease the effects of the international oil crisis brought on by the embargo that started in October. Canada’s energy minister Donald Macdonald stated that the country had no such plans due to the cooler climate. He said more energy would be used in the mornings with people getting up in the dark at the coldest time of day and using more heating and lighting, offsetting savings in the late afternoon and evening. As the crisis worsened, America went on year round daylight saving on 6 January 1974 (later abandoning it), but Canada didn’t follow. British Columbia had planned in December to put clocks forward on that date, against the advice of the federal government. The move was postponed until 3 February and was then delayed again due to opposition

from rural areas, schools, banks, and the forestry industry, and the fact that no other province had taken up daylight saving in winter although several had considered it, including Ontario in particular and also Quebec, Alberta, Manitoba and Saskatchewan. In the end, all provinces except Saskatchewan started their normal period of daylight saving on the last Sunday of April.

Canada followed the United States in 1987 by shifting the start date of daylight saving three weeks forward from the last Sunday in April to the first Sunday, which was still two weeks after the equinox. Farmers weren't happy but complaints from other people seemed minimal. The extended period became a permanent move. The end date remained the same at the last Sunday in October.

In the following year, Newfoundland and Labrador experimented with double daylight saving time. The government promised energy savings and cheaper electricity bills, fewer traffic accidents and less crime. But in midsummer, it got dark very late and people didn't go to bed on time or couldn't sleep. Popular television shows from cities like Toronto didn't come on until quite late as Newfoundland was now two and a half hours ahead of most of the rest of eastern Canada. In autumn, children had to go to school in the dark as sunrise wasn't until about 8:40 a.m. by late October. After one season of double daylight time, the province reverted to one hour of daylight saving from 1989.

A study by Professor Stanley Coren of the University of British Columbia in 1991 and 1992 found that the number of traffic accidents in Canada increased by 8 per cent on the Monday after the start of daylight saving in April and that the time change could affect sleep for up to five days. Other researchers pointed to darker mornings as a reason for an increase in accidents. In a later study, the Insurance Corporation of British Columbia reported a 23 per cent increase in crash incidents on the first Monday of daylight saving compared with the previous Monday in the years 2005 to 2009.

The United States again decided to extend its period of daylight saving to further conserve power under its new Energy Policy Act, from 2007, starting three weeks earlier on the second Sunday in March and finishing a week later on the first Sunday in November. Most of Canada's eastern provinces quickly opted to be in unison with America and the others soon followed. The British Columbia government conducted a four week consultation on whether the province should change dates and received 4,296 submissions from individuals and organisations. More than 90 per cent were in favour. Nearly all of Canada adopted the same dates as the US. The exceptions were Saskatchewan and a few other places that stayed on standard time.

As of 2016, Saskatchewan is the only province or territory that doesn't have daylight saving and is unlikely to reintroduce it in the foreseeable future given that standard time in its major cities is around an hour ahead of local mean time. Also, an experiment with 450 students at the University of Regina in 2014 found that 86 per cent of those who put their clocks an hour ahead in March were less productive the next week. The only place in Saskatchewan that isn't on Central Standard Time or UTC-6 all year is Lloydminster and the surrounding area on the western border. About two-thirds of the city's population live on the Alberta side. The city uses Mountain Standard Time or UTC-7 in winter and Mountain Daylight Time or UTC-6

in summer along with the rest of Alberta and therefore has the same time as the rest of Saskatchewan in the warmer months. In the east, the town of Creighton and the village of Denare Beach unofficially have Central Daylight Time in summer to align with the nearby Manitoba mining city of Flin Flon.

A few other places in Canada don't have daylight saving:

- ☀ Quebec's North Shore east of 63 degrees west longitude is officially in the Atlantic time zone and doesn't have daylight time although areas from this meridian east to Natashquan River in practice use Eastern time and put clocks forward in summer.
- ☀ The Ontario communities of Pickle Lake, New Osnaburgh and Atikokan are in the Central time zone but use Eastern Standard Time all year.
- ☀ In British Columbia, part of the Peace River Regional District in the east uses Mountain Standard Time all year, putting it on the same time as most of the rest of the province in summer and Alberta in winter. Further north, 75 per cent of voters in the Fort Nelson community approved a shift from Pacific time with daylight saving to Mountain Standard Time from 2015. East Kootenay Regional District in the south-east of the province is also on Mountain time but has daylight saving (except the town of Creston, which keeps to standard time), putting it on the same time all year as nearby Calgary, Alberta, where the district gets most of its television from.
- ☀ Nunavut's Southampton Island, Hudson Bay doesn't have daylight saving.

There doesn't appear to be any major pushes to abandon daylight saving in Canada and one or two provinces would be unlikely to move without the others. Daylight time will probably continue into the foreseeable future so long as the United States keeps going with it and this seems likely. None of the 25 or so states that have introduced bills over the last couple of years to dump daylight saving is anywhere close to joining the only two states, Arizona and Hawaii, that don't use the measure. Canada will keep saving daylight.

16 Saving daylight in deserts and on tropical islands

This chapter covers daylight saving experiences of the rest of North America, including Mexico, Central America, the Caribbean and Greenland. Despite most of this region being in the tropics, a large number of the countries and territories have at least tried daylight saving. Again, the usual reason has traditionally been to try and save energy although boosting tourism and other industries have been common reasons in more recent times. The following table shows that few countries and territories in this part of the globe had daylight saving during or between the world wars. Nineteen of them have had daylight time in the postwar period but only six were still using it in 2016: Bahamas, Bermuda, Cuba, Greenland, Mexico, and Saint Pierre and Miquelon (for more, see Appendix). Uniform daylight saving policies between neighbouring countries and territories in this region have been few.

Years of daylight saving, North America except United States and Canada*

| Country/territory | Had daylight saving in one or more years | | | | 2016 |
|------------------------------------|--|----------|------|---------|------|
| | WWI | Interwar | WWII | Postwar | |
| Anguilla (British) | | | | | |
| Antigua and Barbuda | | | | | |
| Bahamas | | | | ✓ | ✓ |
| Barbados | | | | ✓ | |
| Belize (ex British Honduras) | ✓ | ✓ | ✓ | ✓ | |
| Bermuda (British) | | | | ✓ | ✓ |
| Cayman Islands (British) | | | | | |
| Costa Rica | | | | ✓ | |
| Cuba | | ✓ | ✓ | ✓ | ✓ |
| Dominica | | | | | |
| Dominican Republic | | | | ✓ | |
| El Salvador | | | | ✓ | |
| Greenland (Danish) | | | | ✓ | ✓ |
| Grenada | | | | | |
| Guadeloupe (French) | | | | ✓ | |
| Guatemala | | | | ✓ | |
| Haiti | | | | ✓ | |
| Honduras | | | | ✓ | |
| Jamaica | | | | ✓ | |
| Martinique (French) | | | | ✓ | |
| Mexico | | ✓ | ✓ | ✓ | ✓ |
| Montserrat (British) | | | | | |
| Nicaragua | | | | ✓ | |
| Panama | | | | | |
| Puerto Rico (US) | | | ✓ | | |
| Saba (Dutch) | | | | | |
| Saint Barthélemy (French) | | | | | |
| Saint Kitts and Nevis | | | | | |
| Saint Lucia | | | | | |
| Saint Martin (French) | | | | | |
| Saint Pierre and Miquelon (French) | | | | ✓ | ✓ |
| Saint Vincent and the Grenadines | | | | | |
| Sint Eustatius (Dutch) | | | | | |
| Sint Maarten (Dutch) | | | | | |
| Turks and Caicos Islands (British) | | | | ✓ | |
| Virgin Islands (British) | | | | | |
| Virgin Islands (US) | | | | | |

* Includes Mexico, Central America, Caribbean and Greenland.

Note: For more detail, see Appendix.

Sources: Time and Date AS, at <https://www.timeanddate.com>; Horloge Parlante, at <http://www.horlogeparlante.com>; and other sites

The first country in this part of North America to have daylight saving was British Honduras, now Belize. The country initially adopted the scheme on 6 October 1918, about five weeks before the end of World War I. Two intriguing aspects of daylight saving in this country were that it put its clocks forward only half an hour and it did so in the winter months. Belize is about 16-18 degrees north of the equator, yet it had daylight saving from early October to early February each year from 1918-19 to 1942-43. Local time was a few minutes ahead of standard time and around 25 minutes behind daylight time. Both sunrise and sunset times only differ by about an hour through the year and temperatures are warm and vary little. The country was a British crown colony and reasons the government ordered half an hour of daylight saving in winter are obscure.

British Honduras had daylight saving in 1952-53, 1954-55 and 1955-56 according to newspaper reports, and maybe other years around this time. A government directive for half an hour of daylight saving was included in a report in October 1958. Self-government was achieved in 1964 and the country was renamed Belize on 1 June 1973. It had a full hour of daylight saving in 1973-74 but only for a little over two months. The nation gained full independence on 21 September 1981 and, after a new government and constitution in 1982, had daylight time again in 1982-83 but for less than two months. Belize has had no further daylight saving.

Mexico was the second country in this region to have daylight saving. Following a decision to ration lighting and water due to protracted drought, Mexico City commenced daylight saving of an hour for the first time on 6 February 1921 to further conserve fuel. The council was pleased with the power savings and announced in July that the measure would be extended to 1 January 1922 but later abandoned the plan and went back to local time on 5 October 1921. The whole country moved to standard time less than three months later on 1 January, using the GMT-7 time zone in the west and GMT-6 in the east. Mexico City was in GMT-7 and, after a season of daylight saving the previous year, clocks went back about 23 minutes behind the sun.

There was no daylight saving in Mexico City or probably anywhere else in the country for several years, before the national government decreed “permanent daylight saving time” putting virtually the whole country in the GMT-6 zone from 9 June 1927. Areas that had been in the GMT-7 zone moved to GMT-6. The time in the capital was now 37 minutes *ahead* of the sun. Most western regions of Mexico were already forward of solar time and were now up to one and a half hours ahead of it. In Hermosillo, capital of the state of Sonora, the sun didn't set until nearly 8:30 p.m. in June and July making long, hot days even longer with average daytime maximum temperatures of close to 40 degrees Celsius or over 100 degrees Fahrenheit. The state of Baja California, which had gone to GMT-8 in 1924, moved back to GMT-7. Eastern areas stayed on GMT-6. This meant that the states of Yucatán and Quintana Roo effectively had no daylight saving under the policy.

This “permanent” time arrangement lasted three years. In 1930, most of the western part of Mexico, including the capital, shifted back to GMT-7 where it had been before the change in 1927. Baja California went back to GMT-8. Eastern states again

remained at GMT–6, where time was seemingly settled. Over the next two years, western areas of the country (except Baja California) bounced forward once more, then back, and then forward again, between GMT–7 and GMT–6 time zones in moves that were no different from daylight saving. These shifts are shown in the table below. The states of Sonora and Sinaloa went through three further adjustments in time zone. Eastern areas changed fewer times and later. From 1981, when Quintana Roo and Yucatán went to UTC–5, Mexico had four time zones, until 1998. Since 2015, the country has again had this many zones. Virtually all time zone changes over the years in any single state involved jumping back and forth between two zones (see table).

Time zone changes, selected states, Mexico

| <i>Selected states, and capital/ largest/other city*</i> | Baja California – Tijuana | Sonora – Hermosillo | Sinaloa – Mazatlán | Chihuahua – Chihuahua | Mexico City | Nuevo León – Monterrey | Tamaulipas – Matamoros | Yucatán – Mérida | Quintana Roo – Cancún |
|--|------------------------------|------------------------|-----------------------|--------------------------|-------------|---------------------------|---------------------------|---------------------|--------------------------|
| Mean solar time | –7:48 | –7:24 | –7:06 | –7:04 | –6:37 | –6:41 | –6:30 | –5:58 | –5:47 |
| Standard time: | | | | | | | | | |
| 1 Jan 1922 | –7 | –7 | –7 | –7 | –7 | –6 | –6 | –6 | –6 |
| 1 Jan 1924 | –8 | | | | | | | | |
| 10 Jun 1927 | –7 | –6 | –6 | –6 | –6 | | | | |
| 15 Nov 1930 | –8 | –7 | –7 | –7 | –7 | | | | |
| 1 May 1931 | | –6 | –6 | –6 | –6 | | | | |
| 1 Oct 1931 | | –7 | –7 | –7 | –7 | | | | |
| 1 Apr 1932 | | –6 | –6 | –6 | –6 | | | | |
| 24 Apr 1942 | | –7 | –7 | | | | | | |
| 14 Jan 1949 | | –8 | –8 | | | | | | |
| 1 Jan 1970 | | –7 | –7 | | | | | | |
| 23 Dec 1981 | | | | | | | | –5 | –5 |
| 2 Dec 1982 | | | | | | | | –6 | |
| 5 Apr 1998 | | | | –7 | | | | | |
| 25 Oct 1998 | | | | | | | | | –6 |
| 1 Feb 2015 | | | | | | | | | –5 |

* Depending on availability of data throughout period.

Source: mainly Time and Date AS, at <https://www.timeanddate.com>

While the rest of western Mexico was constantly changing time zones in the early 1930s, Baja California had daylight saving from 1 April to 30 September 1931. The Baja California Peninsula had been split into two territories, Baja California Norte and Baja California Sur, on 7 February. The northern territory adopted daylight saving. Standard time was 18 minutes and 12 minutes behind the sun in capital city Mexicali in the north-east and largest city Tijuana in the north-west, so adding an hour to clock time was an advantage especially in the burgeoning tourism city of Tijuana. But daylight saving only lasted a season.

Mexico City used daylight saving for a second time in 1939 due to a power shortage in a period of severe drought and lack of water for the hydroelectric plants. Clocks went forward on 5 February, still winter. The move was disliked as time was already 37 minutes forward of the sun and daylight saving added another hour. Sunrise wasn't until after 8 a.m. Electricity savings were only 10-15 per cent of expected levels as reductions in lighting and heating in the evening were offset against increases in the morning. Daylight saving continued until 25 June when the rainy season was

underway relieving the pressure on electricity supply. The drought continued for much of the next 20 years and was probably the reason for daylight saving in Mexico City from 9 December 1940, about two months into the dry season, until 1 April 1941 rather than World War II. The city again had the scheme from 16 December 1943 to 1 May 1944.

Baja California also had daylight saving during this period. The state was suffering from drought too but the main reason for advanced time was the war and wanting to be on the same time as neighbouring US states. Daylight time was continuous from spring 1942 until autumn 1945, the same as the United States although the start and end dates were a little later. Severe drought prompted Baja California to recommence daylight saving on 5 April 1948, a few weeks after California took it up again. Both states retained it into the winter, which was cold and rainy that year, before returning to standard time.

Drought worsened once more in the Mexico City area and daylight saving was used in 1950 from 12 February to 30 July, by which time the wet season had provided some relief. Baja California was still dry in the 1950s but the main reason the state reintroduced daylight saving from 1954 was to synchronise with California, using the same dates of last Sunday in April to last Sunday in September. The rest of Mexico continued to shun daylight saving for several reasons, including the country's tropical and subtropical location, standard time being well ahead of the sun in many areas, and the other US states bordering it, Arizona, New Mexico and Texas, not changing their clocks. Baja California cancelled the scheme after 1960 and Mexico had no daylight saving for the next 16 years.

Baja California reinstated daylight time in 1976, probably due to drought, and again was the only place in Mexico to put clocks forward. Rainfall was more plentiful in coming years with more frequent El Niño events, but the state kept using daylight saving due largely to the benefits for tourism.

Four other states in a band across central Mexico, Durango, Coahuila de Zaragoza, Nuevo León and Tamaulipas, had daylight saving in 1988 to make better use of sunlight, save energy, benefit family and social life, and improve the economy. The dates used were 3 April to 30 October, the same as the United States. Coahuila and Durango pulled out after one year. Tamaulipas and Nuevo León intended to use the measure in 1989 but the decree was cancelled a week later. The main reason for the failure of the scheme was that the four states were on a different time to most of the rest of the country. After this, Baja California was once again the only state to have daylight saving time.

The Mexican government began a study in 1992 on whether the country should have daylight saving on a national basis. Many advantages were put forward, such as conserving fuel, boosting tourism, better coordination of transport, trade benefits and lighter evenings. Energy savings became the main consideration. Letters of support were received from 229 organisations and the government held more than 1,400 hearings on daylight saving across the country.

In January 1996, the government announced that all of Mexico would have daylight saving by annual presidential decree to conserve energy and to synchronise with the

United States. *Horario de verano* or summer schedule would run from the first Sunday in April to the last Sunday in October, the same as the country's major trading partners of the United States and Canada. Electricity savings of 1 per cent were predicted. Productivity improvements were expected as were reductions in crime and road accidents.

The catalyst for introducing nationwide daylight saving was probably the peso crisis of 1994 and subsequent economic collapse. According to World Bank data, real gross domestic product fell by 5.8 per cent in 1995 after six years of 4-5 per cent growth. Despite a strong economy, the government had undertaken expansionary fiscal and monetary policy in the lead up to the 1994 election. It issued short term debt instruments to be repaid in US dollars to raise funds. But unrest in the state of Chiapas and the assassination of a presidential candidate unsettled investors and they demanded a risk premium. The Bank of Mexico propped up the peso but funds flowed out of the country and the currency was devalued in December 1994. The outflow continued and the peso kept depreciating. Lifting interest rates to try and stem the flow reduced borrowing and economic growth. The peso was floated but it fell in value again and hyperinflation led to a further outflow of funds. A \$50 billion bailout was arranged by the United States and the International Monetary Fund in January 1995. Several Mexican banks collapsed and the economy went into severe recession.

The changeover to daylight saving time in April 1996 caused confusion as publicity campaigns and news releases by the government kept stating that clocks had to be set *back* an hour. Travellers arrived at the wrong time at airports and bus terminals. Many people turned up late for work, and classrooms and restaurants were empty early in the day. Workers were unhappy that the government had taken an hour off their weekend and that it had promised large savings in energy yet no one could expect a lower electricity bill. About two-thirds through the first season of daylight time, estimated energy savings were revised down to 0.7 per cent for the year. Later studies estimated savings in artificial light of 0.65 per cent to 1.1 per cent. The economy picked up but whether daylight saving was a significant factor is uncertain.

Daylight saving remained unpopular with many Mexicans and the government churned out statistics to try and convince people it was worthwhile. According to the National Commission for Energy Conservation, 1 billion megawatts of electricity would be saved in 1999, the equivalent of the power used in more than three million homes during the daylight saving period. The commission also claimed the country saved \$1.583 billion pesos or US\$166 million over the three years since implementation of the scheme.

But residents were concerned about health and safety. A survey by the University of Guadalajara, Jalisco found that over half of respondents said the time change caused "some type of biological alteration, including drowsiness, headaches, and increased stress levels".⁹⁷ Nearly three-quarters said they would prefer to use the same time all year. Daylight saving meant that children in a number of areas had to go to school in the dark in spring and autumn. Many people resented daylight time because they

⁹⁷ Carlos Navarro, "Legislatures & labor groups seek repeal of daylight-saving time", Latin America Data Base, The University of New Mexico, 7 April 1999, at <http://ladb.unm.edu/source/mex/1999/04/07-054359>

thought there was a secret clause in the North American Free Trade Agreement forcing them to use the scheme.

Whether to keep abiding by federal daylight saving time was debated in nine of 31 state legislatures in March 1999, namely Baja California Sur, Chiapas, Coahuila, Jalisco, México, Michoacán, Nuevo León, Tabasco and Tamaulipas, as well as the Federal District, covering a large part of Mexico City. Some areas, including the capital, almost didn't have daylight saving that year. The Jalisco legislature voted to stay on standard time but reversed the decision after pressure from the national government. At least nine states passed resolutions to defy the federal law in future years. Tens of thousands of people in some states signed petitions against daylight saving and politicians on both sides were opposed to the measure, as was the National Council of Organized Workers. Meanwhile, Sonora was exempted from daylight saving due to ties with neighbouring US state Arizona, which doesn't use it.

Opposition to daylight saving in Mexico intensified in 2000. A poll of more than 1,500 people across all states in March found that only 33 per cent supported the measure, while 48 per cent didn't want it and 19 per cent were neutral. About 15 states passed resolutions against daylight time, including Chiapas, Coahuila, Colima, Guerrero, Jalisco, Michoacán, Oaxaca, Quintana Roo, San Luis Potosi, Sinaloa, Sonora and Tabasco. Most of the resolutions asked the president, Ernesto Zedillo, to suspend daylight saving for a year or hold a referendum. Baja California Sur, Tlaxcala and Zacatecas governors and the Mexico City mayor threatened to ignore the federal government's daylight saving decree. But the Zedillo administration confirmed its commitment to the scheme as a means to conserve energy and better manage peak demand without the need for rationing in a time of strong economic growth.

A change of government in late 2000, ending the 70 year reign of the centrist Institutional Revolutionary Party, made little difference to the country's position on daylight saving. New president Vicente Fox of the centre right National Action Party came out in early 2001 quoting figures on how much energy Mexico had saved using advanced time and how the scheme would ease electricity shortages from lack of power infrastructure. Well aware of opposition to daylight saving, he proposed to reduce the period by a month at each end.

A number of states and many citizens were against daylight time in any form and wanted a referendum, no doubt knowing that the measure would almost certainly be defeated at the polls. Rural areas often didn't use daylight saving, calling it "government time". Business supported the measure but not the suggestion to reduce it to five months. Confederation of National Chambers of Commerce, Services and Tourism president Jose Yamil Hallal Zepeda emphasised the importance of being on the same time as the United States, claiming that 70 per cent of the country's international business was done with the northern neighbour.

A meeting between Vicente Fox and Mexico City mayor and daylight saving opponent Andrés Manuel López Obrador failed to reach a compromise. Fox no longer wanted a referendum on the issue despite having agreed to a national vote during his presidential campaign. The mayor, who had been in office less than a year, declared that the Federal District wouldn't have daylight saving in 2001. He referred to daylight saving as:

“... a commitment made by the technocracy to international financial groups. The stock exchange cannot be more important than the lives of the citizens. ... They cannot, from abroad, impose on us what time we must wake up, what time we must go to work, what time we must go to sleep.” ... His [mayoral] campaign [had] exploited the daylight saving time issue in class terms, noting that the poor are the ones who have to get up in the dark to get to work and whose children have to walk to school before sunrise.⁹⁸

But the president advised that federal offices, banks and hospitals, and the airport, would be on daylight time in 2001 anyway. Also, four of Mexico City’s 16 district leaders, members of Fox’s party, said their areas would be putting clocks forward. Fox’s education secretary, Reyes Tamez, stated that all schools would be on daylight time too. Further, more than half the 18 million people in the metropolitan area of Mexico City didn’t live in the Federal District but in the state of México where daylight saving would run as usual. To add to the confusion, some of the states bordering the United States, such as Baja California, Chihuahua and Nuevo León, gained permission to have daylight saving for seven months along with the US rather than Fox’s five months.

López Obrador took the matter to the Supreme Court, arguing that time is a congressional responsibility rather than presidential. Fox’s staff countered by saying the states didn’t have the constitutional power to set time and it therefore fell to the president. But law expert Diego Valades pointed out that the constitution allowed only the Mexican Congress to decide on electrical energy issues (and the clocks were forward to save electricity). In a preliminary ruling in April, the court decided that Mexico City had to have daylight saving time that year. Then in September, the court ruled unanimously that Congress could alter the time but the president couldn’t do so, nor could a mayor set the time in his or her city.

Various daylight saving bills were introduced into the Congress in late 2001, including one in each house by the centre left Party of the Democratic Revolution seeking to eliminate the scheme. Most of the other parties favoured the measure and a bill passed both houses in early 2002 for seven months of daylight saving throughout Mexico (except Sonora), once again aligning with the United States. López Obrador kept grumbling though:

It’s all a front for their desire to keep Mexico’s stock exchange on the same schedule as the New York stock market. ... It’s all done for the convenience of a bunch of yuppies in the financial industry, who don’t want to get up an hour earlier.⁹⁹

All of Mexico except Sonora continued to have daylight saving but it remained controversial. Three years later in 2005, the United States announced an extension to daylight time. The change took place from 2007, with the scheme starting three weeks earlier on the second Sunday in March and finishing a week later on the first Sunday

⁹⁸ James F. Smith, “Mexico: Dispute may put nation out of sync”, *Los Angeles Times*, Los Angeles, California, United States, 3 March 2001, p. A9, Newspapers.com (subscription only), at <https://www.newspapers.com/image/188014371>

⁹⁹ “Mexico goes quietly to daylight-saving”, *The Arizona Republic*, Phoenix, Arizona, United States, 8 April 2002, p. A9, Newspapers.com (subscription only), at <https://www.newspapers.com/image/126350756>

in November. Mexico didn't follow suit, except the stock exchange, and once again the country was out of kilter with its northern neighbour for four weeks a year.

Thousands of workers and students who lived on one side of the border and worked or studied on the other side had to use two times. Particularly affected were residents of the San Diego–Tijuana, El Paso–Ciudad Juárez and Laredo–Nuevo Laredo metropolitan areas. People had to clarify appointment and meeting times with, for example, “Juárez time” or “El Paso time”. Mexicans studying at university on the American side of the border had to arrange with employers to start and finish early so they could make it to classes. Customs and border patrols on both sides had to standardise their hours so that check points would be open together. There were also difficulties for transport and banking.

Legislation was passed by Mexico's Congress in December 2009 allowing all of Baja California, cities along the border, and other areas within 20 kilometres (about 12 miles) of the border to use the same daylight saving start and end dates as the United States from 2010. The rest of the country stayed with the shorter, seven month period.

In 2015, Quintana Roo joined Sonora in abandoning daylight saving. Instead, the western-most state shifted time zone from UTC–6 to UTC–5 on 1 February, putting time in capital city Cancún 47 minutes ahead of the sun all year, not just in the summer months. It now gets dark in winter around 6:30 p.m. rather than 5:30 p.m., making tourism more competitive in a market that includes the Bahamas, Cuba and Jamaica. The state government and hoteliers had been lobbying Congress for two years before the change was approved.

Sinaloa may join them. A citizens' initiative to end daylight saving in the state got over 260,000 signatures, twice the number necessary to put the case before the Mexican government. The petition was presented to the nation's Senate in November 2016. The proposal will go before several committees before a decision is made.

The third country in this region after Belize and Mexico to have daylight saving was Cuba, which used the scheme in 1928 for four months from 10 June to conserve energy at a time when the economy was suffering. Cuba relied on the sugar industry and world prices had tumbled in that year. Also, the US president, Calvin Coolidge, had visited the country in January and may have discussed daylight saving. But the measure wasn't widely accepted and was abandoned after one season. Cuba played an active role in World War II and used daylight saving from 1940 to 1942 and in 1945 (and maybe in 1943 and 1944) but only for three months from early June to early September each year.

After the war, Cuba had daylight saving in 1946 but didn't use it again until 1963, taking it up in response to an oil shortage according to American newspapers. Many items were scarce or of poor quality in the post-Cuban Revolution years. The country has used daylight time ever since although start and end dates have varied greatly, as shown in the next table. After 1965, when the scheme ran for four months from 1 June to 30 September, the start date has changed 19 times and the end date nine times. Dates were the same as America in the years 1969 to 1971, 1976, 1977, 2000 to 2003, and from 2013. Duration of daylight saving in Cuba has nearly doubled since the mid 1960s.

Changes in daylight saving dates, Cuba, 1966 to 2016

| <i>Year</i> | <i>Start date</i> | <i>End date</i> | <i>Number of weeks</i> |
|-------------|--------------------------|----------------------------|------------------------|
| 1966 | last Sunday in May | first Sunday in October | 18 |
| 1967 | second Saturday in April | second Sunday in September | 22 |
| 1968 | second Sunday in April | | 21 |
| 1969 | last Sunday in April | last Sunday in October | 26 |
| 1972 | | 8 October* | 23 |
| 1975 | | last Sunday in October | 26 |
| 1978 | first Sunday in May | second Sunday in October | 22 |
| 1979 | third Sunday in March | | 30 |
| 1981 | second Sunday in May | | 22 |
| 1984 | first Sunday in May | | 23 |
| 1986 | third Sunday in March | | 28 |
| 1990 | first Sunday in April | | 28 |
| 1998 | last Sunday in March | last Sunday in October | 30 |
| 2000 | first Sunday in April | | 30 |
| 2004 | last Sunday in March | | 31 |
| 2007 | second Sunday in March | | 33 |
| 2008 | third Sunday in March | | 32 |
| 2009 | second Sunday in March | | 33 |
| 2011 | third Sunday in March | second Sunday in November | 34 |
| 2012 | first Sunday in April | first Sunday in November | 31 |
| 2013 | second Sunday in March | | 34 |

* 8 October was a Sunday in 1972, Monday in 1973 and Tuesday in 1974.

Sources: Time and Date AS, at <https://www.timeanddate.com>; and mm.icann.org, at <https://mm.icann.org/pipermail/tz/2005-November/013197.html>

Cuba had continuous daylight saving from March 2004 to October 2006. A malfunction with the country's largest power station, the Antonio Guiteras thermoelectric plant, had put it out of action in May 2004 resulting in widespread power cuts of up to 12 hours a day. The problem was rectified in October but rationing continued as maintenance then had to be carried out on other plants, and a decision was made to continue daylight saving to conserve energy. Cuba was enjoying a period of strong economic growth and this put extra pressure on fuel supplies. Next October, the measure was extended for another 12 months to make further power savings. The working day started half an hour later in both winters, probably as compensation, although electricity demand was highest in winter in the evening.

Not all Cubans like daylight saving. Some claim there are no benefits or that it upsets their body clock. Others just want consistency with start and end dates. In October 2007, a Cuban Electric Union official said daylight saving could increase energy consumption. Ironically, per capita energy use reached its lowest level in 2007, down 6.5 per cent on 2006 and a massive 49 per cent since peaking in 1989, according to World Bank figures. Daylight saving was delayed in Cuba in 2012 until 1 April due to Pope Benedict's visit on 26-29 March.

Puerto Rico was the only other place in this region to have daylight saving before the postwar era. This unincorporated territory of the United States had continuous daylight time from 1942 to 1945 starting about three months later than the US and finishing on the same day: 30 September. It hasn't used the measure again.

The territory obtained an exemption from complying with the Uniform Time Act of 1966 and its daylight saving provision. A daylight saving bill was signed by the

island's governor Pedro Rosselló in 2000, only to be overturned by new governor Sila María Calderón in 2001 due to doubts that the measure would save energy or help the economy. Senator Margarita Nolasco presented a bill for daylight saving in 2013 emphasising benefits such as energy conservation, health, safety, productivity and recreation, as well as putting the country "in a better position to compete commercially and industrially". The bill was sent to the Committee on Energy Affairs and Water Resources, which sought advice from various government and other bodies. None of them was convinced by the arguments put forward. The committee filed a negative report and the bill went no further.

Another 16 countries and territories in the region have only had daylight saving since World War II although 12 of them no longer use the scheme. Many of them have used daylight saving on just a few occasions, often well apart and for only a year or two at a time.

Guatemala has had daylight saving four times, each lasting only one season. The country first used the measure in 1973-74 as one of a number of policies introduced to try and conserve energy during the world oil crisis. Clocks went forward in November but the move wasn't liked and only lasted three months. A number of other countries in the region also started daylight saving at this time or were already using it. Guatemala next used the scheme in 1983 after a particularly difficult period for the nation politically and economically. The early 1980s were perhaps the height of the civil war that started more than two decades earlier. The economy contracted by 3.5 per cent in 1982 and a further 2.6 per cent in 1983 according to World Bank data. Daylight saving was again used in 1991 after energy consumption per capita rose by 4.3 per cent in the previous year. The measure helped keep the increase to 0.3 per cent, while economic growth improved from 3.1 per cent to 3.7 per cent.

Rising international oil prices were the reason for daylight saving in Guatemala in 2006. The value of energy imports had increased from 24 per cent of total energy use in 2003 to 31 per cent in 2005. The government estimated energy savings would be 4 per cent in 2006, made up of an 8 per cent reduction in the afternoon and evening but a 4 per cent rise in the morning. However, the experiment was unpopular especially with rural people who only used official time or *hora oficial* when they had to and otherwise abided by "God's time" or *hora de Dios*. Daylight saving wasn't used in 2007 due to worries about safety and many workers and school children leaving home in the dark when crime was high. However, sunrise would never have been later than about 6:50 a.m. with an hour of daylight saving during the scheduled period of late April to late September.

Plans to reintroduce daylight time in 2008 to save energy came shortly after the election of new president Álvaro Colom on 14 January. He wanted the scheme to be a permanent annual arrangement and the Guatemala government sent invitations to El Salvador, Honduras, Nicaragua, Costa Rica and Panama to join in and establish a daylight saving standard for the region. But by early March, the president announced that the government wouldn't be pursuing the idea, again due to safety concerns. As for these other five Central American countries, none has had daylight saving since 2006 or ever practised it on a regular basis. Panama, which is just 9 degrees north of the equator, has never had it. Any regional daylight saving plan might have been a tall order.

Newspaper reports in April and October 1955 stated that El Salvador had northern winter daylight saving, which means that clocks probably went forward in 1954-55 and 1955-56. The country then stayed on standard time for three decades until a severe drought hit in 1987. Most energy at that time came from hydroelectric dams and the dry spell led to electricity cuts of two hours a day and then three hours, before the president, José Napoleón Duarte of the centre left Christian Democratic Party, put the nation on daylight saving time on 3 May to try and conserve water. To the general populace, the move was about as welcome as the civil war that had raged for more than seven years. People were late for work, complained they had to get the children up in the dark, and missed buses and appointments. Many residents in rural areas simply weren't using the new time. An American missionary in a small town noted:

“People refuse to reset their watches. The priest still says mass at 6 o'clock – the old time – and the bells ring the same time they always did.” ... “The only problem”, he adds, “comes with buses and schools which run on the new time”. Then people do some mental calculations to convert “the new time” or “Duarte’s time” back to “the old time” that they still go by.¹⁰⁰

Neither side of politics liked the change. The business sector and the right wing opposition party, the Nationalist Republican Alliance, argued that daylight time wouldn't save much energy, while the socialist parties protested that the government would simply divert resources into fighting the civil war. Nevertheless, El Salvador had daylight saving until late September and used it again for a similar period in 1988. Energy use per capita rose 10.2 per cent in 1987 before falling 7.9 per cent the following year although consumption was much lower than in the decade to 1985.

El Salvador considered joining Guatemala, Honduras and Nicaragua on daylight saving in 2006 in response to higher oil prices. Business felt there would be advantages being on the same time as neighbouring countries. But the government estimated that energy savings would be barely 1 per cent and, in the end, this was the reason for dropping the proposal, along with people's security concerns in the morning. Other programs were put in place to save power. And daylight saving was discarded in all three other countries after 2006.

Honduras first used the scheme in 1952-53, putting clocks on half an hour from October to January or February despite being in the northern hemisphere. Daylight saving was used in the summer months of 1987 and 1988. It was again applied in 1994, due to a power shortage. Honduras last experimented with daylight saving in 2006 between May and August although apparently not all of the country put its clocks ahead. Energy savings of 4 per cent or nearly US\$5 million encouraged the government to think about revisiting the measure as early as November but nothing came of it. The country also proposed to have daylight saving in years 2007 to 2009 but shelved the idea.

Similarly, Nicaragua tried daylight saving on several occasions but soon abandoned it each time. The first was in 1973 when clocks went ahead on 4 January due to a

¹⁰⁰ Chris Norton, “Salvadoreans long for the good old times. Switch to daylight saving draws protests from many”, *The Christian Science Monitor*, 21 May 1987, at <http://www.csmonitor.com/1987/0521/oday.html>

devastating earthquake that hit capital city Managua 12 days earlier. Daylight saving allowed an extra hour of light for construction workers involved in rebuilding and the scheme was continuous for more than two years until 16 February 1975. But misappropriation of foreign aid by then president Anastasio Somoza DeBayle and his cronies and the ongoing Nicaraguan Revolution and civil war delayed most of the rebuilding until the 1990s.

By the late 1970s, Nicaragua was tearing itself apart. The economy plummeted by 7.8 per cent in 1978 and by a further 26.5 per cent in 1979, not helped by the second world oil crisis. Daylight saving was implemented from mid March to late June in 1979 and 1980. Somoza was overthrown by the Sandinistas in July 1979 and the “revolution” continued, or another part of it. The economy recovered somewhat but went into recession from 1984 although energy use per person increased by 7.2 per cent in that year and stayed high. However, there was no daylight saving.

A contraction in the economy of 12.5 per cent in 1988 coincided with a 7.5 per cent fall in per capita fuel consumption. Gross domestic product was then flat for several years but energy use climbed steadily. Violeta Chamorro was elected president in 1990 ending the revolution. Peace reforms were initiated, relations with the United States improved and the economy picked up. Daylight saving was used continuously from 1 January 1992 to 20 February 1994 and energy usage fell.

Next use of daylight saving in Nicaragua was in 2005. Strong economic growth of 5.3 per cent in 2004 had pushed energy use per capita up 3.2 per cent to levels not seen since the wasteful days of the 1970s. This together with a jump in oil prices persuaded the government to bring back daylight saving the following year. Once again, many people didn't like the scheme and either ignored it or operated on dual times. The government claimed energy savings of 5 per cent although fuel consumption figures from the World Bank suggested a very slight increase per person. Daylight time was repeated in 2006 and the government was happy with electricity use patterns. The measure hasn't been used again but Nicaragua has embarked on an ambitious program of renewable energy, getting 54 per cent of its electricity from clean sources in 2015 and aiming for 90 per cent by 2020.

Costa Rica is typical of Central American countries, using daylight saving on a handful of occasions for short periods. The scheme was first used in 1954, the year after José Figueres Ferrer won the country's presidency in the first democratic election in quite a while. Daylight saving wasn't used again until 25 years later, when new president and economics professor, Rodrigo Carazo Odio, gave the country daylight saving in 1979. The economy had been hit by falling coffee prices, a bushfire that destroyed most of the cotton crop, a monilinia fungus that ruined the cocoa industry, higher oil prices due to the second oil crisis, and the driest January on record. Hydroelectricity supplied 85 per cent of the nation's power and many plants had to close, causing blackouts in capital city San José two days a week. Daylight saving was one of the measures put in place to try and ease the crisis.

Clocks were wound forward again in 1980 but daylight time was then abandoned despite the worsening economic situation, with gross domestic product declining 2.3 per cent in 1981 and 7.3 per cent in 1982. The first half of the 1990s was another dry period and daylight time was applied in 1991 and 1992. Drought hit again in 2012 to

2016 but there was no daylight saving. All five daylight saving periods in Costa Rica have been in the first half of the year, coinciding with the dry season. The country is close to the equator and has little variation in length of day and night through the year or in maximum and minimum temperatures. Daylight saving might not have had much impact on the economy or energy use.

Caribbean country, the Bahamas, off the coast of Florida, has had daylight time since 1964, the year Britain granted it internal self-government. It has followed US daylight saving start and end dates every year except 1974 when America put its clocks ahead on 6 January to try and ease the effects of the world oil crisis. Aligning its times with the United States makes economic sense as 60 per cent of the Bahamas' gross domestic product comes from tourism with most of the visitors coming from America. A further 15 per cent of GDP is from financial services, much of it international and another good reason to keep time with US eastern states.

Neighbouring Turks and Caicos Islands began daylight saving in 1979 to help the tourism sector, using the same start and end dates as the United States, the source of most visitors. In August 2014, the government decided to put the islands on permanent daylight time to further boost tourism, the British territory's main industry. Initially, the time zone change was delayed a year until 2015 so that airlines and resorts had time to make necessary adjustments. Winter is the busiest period and sunsets are now an hour later at around 6-7 p.m. Mexican state Quintana Roo made a similar move that year.

Jamaica was another country to follow US daylight saving times. Clocks were first moved forward in midwinter on 6 January 1974, the same as America, which had responded to the first oil shock. The prime minister, Michael Manley, announced the change just five days earlier in his New Year's Day message. Daylight saving in Jamaica got off to a bad start as sunrise was at 7:40 a.m. and many people had to get up and leave for work and school in the dark. But the country had to reduce its heavy reliance on imported oil, which had risen sharply in price. And per capita energy use had increased by 11.9 per cent in 1973 despite the economy shrinking by 5.5 per cent. Fuel consumption fell steadily with daylight saving but the economy remained in the doldrums until 1981 when it grew for the first time in nine years.

Daylight saving in Jamaica was abandoned after 1983 despite energy use per head declining by 40 per cent over 10 years. Usage steadily increased after the mid 1980s and exceeded the 1973 level by 2006 (although recent years have been much lower again), while the economy has mainly struggled. Calls for a return to daylight saving appear unlikely to come to fruition. The country has plans to shift to renewables although oil still accounted for 93 per cent of electricity in 2014. Tourism is less affected by sunset times with the earliest being 5:30 p.m.

In neighbouring Haiti, on the island of Hispaniola, the government was looking for ways to save electricity in 1977 when it banned night soccer matches and considered daylight saving. The country didn't take up the measure until six years later, the same year that Jamaica ditched it. A government official said that the country "wants to be up to date" and it introduced the scheme on 6 May 1983. The actual reason for adopting daylight saving was probably to conserve fuel, given that the U.S. Energy Information Administration estimated that electricity usage in Haiti increased by 39

per cent in 1982. By 1995, the level had fallen 44 per cent from the 1986 peak and daylight saving was discontinued after 1997.

The government announced it was reintroducing the measure in 2005, giving just three days' notice but didn't give a reason. Haiti had been hit by a devastating hurricane in September 2004 and daylight saving would have helped save power during rebuilding. The scheme was also used in 2006 before it was dropped again. It was brought back in 2012 to save energy, the government making the announcement only four days before its start. Daylight saving is a year to year proposition in Haiti and in 2015 the government issued a decree on 7 March for clocks to change next day. After four years of daylight saving, two days before it was due to commence on 13 March 2016, the Haitian government led by new president Jocelerme Privert announced without explanation that it was cancelling the measure, putting out airlines, telecommunication companies, and 10 million people. Whenever it has used daylight saving, Haiti has followed US start and end dates.

Newspaper reports suggest that the Dominican Republic, the other nation on Hispaniola, used daylight saving in 1954-55 and 1955-56. The country next had the scheme in 1966-67 after the economy slumped by 12.5 per cent in 1965. Similarly, the measure was reintroduced in 1969-70 following economic growth of just 0.2 per cent in 1968 although clocks went forward only half an hour. With a move from GMT-5 to GMT-4:30 and mean solar time of GMT-4:40 in capital city Santo Domingo, energy consumption was probably little different. Daylight saving was used in this manner each year until 1973-74. In October 1974, the country shifted its time zone from UTC-5 to UTC-4, giving it year round daylight saving.

It went back to UTC-5 on 29 October 2000, aligning with US Eastern Standard Time, and intended to start daylight saving on 1 April 2001. Neighbouring Puerto Rico was planning to do similar but changed its mind and the Dominican Republic decided to revert to UTC-4, making the adjustment on 3 December, five weeks after moving to UTC-5. The Dominican Republic and Haiti have never had daylight saving at the same time and use time zones an hour apart despite sharing an island and having a local time difference of just nine minutes between their capitals.

The Cayman Islands, a British overseas territory, has never had daylight saving but it had planned to adopt the measure from 2016, with the aim of attracting more tourists in summer due to lighter evenings. As a tax haven, the islands have a large finance industry and daylight saving would put them on the same time all year as eastern United States and Canada and their financial centres. But the government announced in January that it was shelving the plan due to opposition from the general public. Premier Alden McLaughlin also admitted that daylight saving would have been unlikely to be passed by the Legislative Assembly.

Most of the islands of the Lesser Antilles have never had daylight saving time, the exceptions being Barbados, Martinique and Guadeloupe. Barbados used the scheme in the years 1977 to 1980. Apart from start and end dates of around mid April to late September or early October, details are sketchy. The country has traditionally depended on sugar, but manufacturing and tourism were growing strongly by the late 1970s and daylight saving may have been used to assist these new industries. The

Barbados Labour Party, which came into office after the September 1976 election, introduced the measure but then abandoned it after 1980.

Nearby Martinique and also Guadeloupe have had daylight saving only in 1980. Residents had been asking France for many years if they could go an hour ahead when the metropole did as they felt it was otherwise “a mark of discrimination against the islands”. But within days of the measure being put in place, French newspaper *Le Matin* on 14 April reported a “great number of hostile reactions among the population”, mainly over having to get children up early to go to school or that they were outside in the hot afternoon sun. The territory governments asked France to cancel daylight saving on the islands. Permission was quickly granted and they went back to standard time¹⁰¹ although Martinique, at least, seemed to officially be on daylight saving until late September.

Off the eastern coast of the United States, the British overseas territory of Bermuda rejected daylight saving in 1941 when the House of Assembly decided the scheme would be cruel to animals and deprive them of an hour’s sleep. The island first had daylight saving in April 1974 in the wake of the first oil crisis. Annual economic growth was less than 1 per cent and the island had to import all of its energy needs. Tourism, the largest industry, was helped by daylight saving. Bermuda has had the measure every year since then and has followed the US schedule, which makes sense due to its proximity to America and because over 70 per cent of its tourists come from there.

Saint Pierre and Miquelon, a French overseas collectivity near Newfoundland, has had daylight saving since 1987, using the same start and end dates as Canada and the United States. Its economy struggled from around this time due to depletion of fish stocks. A newspaper report in 1953 indicated that the islands had daylight saving “geared to” Newfoundland.¹⁰² This is quite possible given the nearness of, and the interaction between, the two places although any daylight time at Saint Pierre and Miquelon before 1987 was probably unofficial and not used by everyone.

Even Greenland puts clocks forward although more for the purpose of aligning with Europe and North America rather than to save daylight, given the very long days in the summer months. Nearly all the country, including capital city Nuuk, is in the UTC–3 time zone and has had daylight saving since 1980 and follows the European schedule. Some areas in the north and east of this large region unofficially use UTC as they are serviced by aircraft from Iceland, which is in this time zone.

In the east, the settlement of Ittoqqortoormiit (previously Scoresbysund) and surrounding area use UTC–1 and has also had daylight time from 1980. Just to its north, Danmarkshavn weather station and area had daylight saving from 1980 to 1995 before moving its time zone forward by three hours from UTC–3 to UTC in 1996. Its

¹⁰¹ Kristen Stromberg Childers, *Seeking Imperialism’s Embrace: National Identity, Decolonization, and Assimilation in the French Caribbean*, Oxford University Press, New York, NY, United States, 2016, pp. 100-101, at https://books.google.com.au/books/about/Seeking_Imperialism_s_Embrace.html?id=5P9YjwEACAAJ&redir_esc=y

¹⁰² “Saint-Pierre”, *Kerrville Mountain Sun*, Ingleside, Texas, United States, 12 March 1953, p. 12, Newspapers.com (subscription only), at <https://www.newspapers.com/image/5907589>

local mean time is UTC−1:15. In the north-west, the town of Qaanaaq (formerly Thule) and the area around it is in UTC−3 and has been on daylight saving each year since 1991 despite the sun being up continuously for four months in summer. The town started as an American air base and, unlike other areas of Greenland, uses US start and end dates.

Daylight saving is currently used by a minority of countries in the region covered by this chapter and this will be unlikely to change. Use of the measure can be unpredictable in this part of the world and may well be taken up by countries where tourism is important or dumped in other places where people don't like the scheme.

Part IV

Daylight saving in Australia and NZ

17 Apple Isle leads the way

Tasmania was the first Australian state to introduce daylight saving time. This took place in October 1916, three months before federal legislation put the other five states, New South Wales, Victoria, Queensland, Western Australia and South Australia, on daylight saving in January 1917. The Apple Isle turned its clocks forward for three summers during World War I, 1916-17, 1917-18 and 1918-19, whereas the other states opted out as soon as the federal government allowed them to in March 1917. Tasmania was also first with daylight saving in the post-World War II period, readopting it in 1967-68, four years ahead of other states.

The location and size of Tasmania probably makes it more suited to daylight saving than other Australian states, which are larger and warmer. The Apple Isle has a cool temperate climate, not unlike the United Kingdom and parts of Europe and North America. It is small, covering an area of around 68,000 square kilometres (26,000 square miles) or about half the size of England and, excluding small islands, extends roughly from latitude 40.7 degrees to 43.6 degrees south and from longitude 144.6 degrees to 148.3 degrees east. The state doesn't have to worry about large differences in solar time between west and east or warm evenings. Sunrise and sunset times in capital city Hobart in midsummer would be about 4:30 a.m. and 7:50 p.m. without daylight saving.

Tasmania wasn't the first Australian state to introduce a daylight saving bill into its parliament. Victoria brought in eight bills between 1908 and 1916 and New South Wales three from 1909 to 1916 before the Commonwealth government moved to bring in nationwide daylight saving. Initially, Tasmania seemed less than enthusiastic about the concept. During a discussion on daylight saving at the May 1915 Premiers' Conference in Sydney, Tasmanian premier John Earle of the Labor Party quipped: "We anticipate in our state having shortly an electrical system that will be better and cheaper than daylight!"¹⁰³

Despite Earle's comment, a Daylight Saving Bill to "promote the earlier use of daylight in summer" was brought into the Tasmanian Parliament on 1 July 1915. It would apply for six months each year from September to March. Charles Howroyd, Labor member for Bass, was opposed to the bill as he felt it would be used as an excuse to extend overtime and wanted a committee to inquire into and report on it.

A select committee of five members, including Howroyd, was set up on 30 September. It sent a circular to 100 businesses, trade unions, government bodies, and individuals, seeking their views and pointing out what it saw as the advantages of moving the clock hands:

- ☼ increased time in daylight for recreation
- ☼ saving of cost for artificial light
- ☼ daylight for military training without trenching so much on Saturday afternoon
- ☼ less use of licensed houses

¹⁰³ Victorian Parliament, *Report of the Resolutions, Proceedings, and Debates of the Premiers' Conference held at Sydney, May, 1915*, Melbourne, Victoria, Australia, 1915, p. 65, at <http://www.parliament.vic.gov.au/papers/govpub/VPARL1915No24.pdf>

☀ general benefit to health on account of greater time spent in the open air, and less time in artificially lighted rooms.¹⁰⁴

The committee met six times and examined 20 witnesses. Support for daylight saving was strong. The transport sector, post office and education department were in favour as were large businesses and unions. Objections were considered from occupational groups who already rose early although the committee felt this affected only a small minority of the community. Also, theatres were worried that people wouldn't attend while it was still light outside, but this concern was brushed off by the committee. It admitted that it thought the saving in artificial lighting would be small and any advantages for licensed houses minor. The committee saw the benefits relating to recreation and military training as significant but better general health from lower use of artificial light as less important.

An amendment to shift the start time to October was proposed as the weather was still quite wintry in Tasmania in September. Howroyd tried unsuccessfully to get the committee to reject the whole idea. A favourable report was released on 23 December 1915, much later than the scheduled date of 2 November. But the bill went no further.

It was followed up by a Daylight Saving Bill introduced by treasurer Neil Lewis on 2 August 1916. The bill passed through the House of Assembly on 18 August but was held up in the Legislative Council as John Hope of the Anti-Socialist Party and member for the rural electorate of Meander wanted it stopped. However, the motion was lost 12 votes to 4 and the bill was passed, becoming the Daylight Saving Act 1916 on 22 September.

This was Australia's first daylight saving time legislation. It was to apply from the first Sunday in October until the last Sunday in March each year. Newspapers reported: "Practically everybody is welcoming the innovation. Only farmers and milkmen are growling, because it will shorten their early morning." Clocks were advanced one hour at 2 a.m. on Sunday 1 October 1916. Daylight saving was applied in all Australian states and territories from 1 January 1917 under federal legislation (see chapter 18: Southern states in and out of sync). This ended on 25 March, the same day that Tasmania reverted to standard time under its own Act.

Many people, especially in the country, were opposed to daylight saving. Frederick Burbury, Nationalist Party member for Franklin, introduced a daylight saving repeal bill into the state parliament on 14 August 1917 while the premier, Walter Lee, of the same party, said he only wanted to reduce the duration of daylight saving, not abolish it. The repeal bill didn't progress, while an amendment bill reducing the period from up to six months to a little over four months, from the last Sunday in October to the first Sunday in March, was passed by a vote of 12 to 10 in the Assembly on 23 August. In the Council, a motion to ignore the amendment bill was defeated and it was finally passed. Tasmania had daylight saving in 1917-18, the only Australian state to do so.

Feelings towards daylight saving in Tasmania continued to be mixed. In May 1918, St Leonards Council in Launceston, northern Tasmania described it as "that extreme

¹⁰⁴ The Royal Society of Tasmania, *About Time: Daylight Saving in Tasmania*, by T. A. Newman, 1984, p. 25, at <http://www.parliament.tas.gov.au/php/Daylight%20Savings/dls84.pdf>

piece of legislation which is unsuitable to Australian climatic conditions, and causes inconvenience and annoyance, and makes visitors from the other States express their indignation".¹⁰⁵ But a public meeting in Hobart favoured the continuation of the measure.

A letter to the editor of Hobart's *The Mercury* on 19 July 1918 by "Early Riser" opposed daylight saving, saying: "It is almost solely a whip for lazy people ... These people can't get out of bed in the mornings unless you tell them the untruth that it is 7 o'clock, whereas it is really only 6." He added that "our children are out of bed in evenings an hour longer whilst this Act operates, and that we have to wake them out of childhood's sound and healthful sleep in the mornings because the clock is an hour wrong". He was also of the view that: "Medical men state that the alarming increase in insanity is largely due to the decreased hours of rest and sleep the children of this period are getting." He complained about an hour lost in the morning "for gardening and other pleasant duties". According to "Early Riser": "The only valid argument for the Daylight Saving Act is the saving in cost of artificial light, but even this is greatly exaggerated."

Two other letters on the same day favoured daylight saving. "A Country Office Woman" argued that most country people work indoors rather than in the fields and that: "In these days of improved machinery, labour troubles, etc., the number of men employed on a farm has been reduced to a minimum." She suggested that people use "dark window blinds" so that children can sleep despite it being still light outside. She enjoyed her "allowance of fresh air" at the end of a day in the office, which daylight saving let her do. A letter from "Daylight", who also lived in the country, said there wasn't "a single rational argument against daylight saving" and his children got "an extra hour's playtime in the afternoon, and they love it". However, in another letter, H. D. Calvert was opposed to the scheme, stating that farmers had "to shear wet sheep, to reap wet grain, spray wet trees, to pick wet fruit, and fell wet scrub".

The Tasmanian government announced on 20 July 1918 that daylight saving would run again in the summer of 1918-19 for four and a bit months. Launceston's *The Daily Telegraph* declared that it was "difficult to discover amongst the contention of its opponents sound and tenable reasons why it should not continue to be a source of convenience, economy, and pleasure to the people of Tasmania". The newspaper noted, however, that discussion and voting at council meetings in country districts indicated that people in these areas were "certainly nothing but unanimous against daylight saving".

But *The Mercury* reported that a meeting of the Daylight Saving Committee in Hobart on 8 August 1918 claimed the opposite – that a large number of country people, including farmers, were in favour and that extra petition forms had to be sent out for signing. However, petitions against daylight saving signed by 7,116 people were presented to parliament on 2 October. In the end, a repeal bill was defeated on 30 October and Tasmania had daylight saving time in 1918-19. At the finish of the period on 2 March, *The Mercury* reported that daylight saving had resulted in "the lighting

¹⁰⁵ "Daylight saving", *The Mercury*, Hobart, Tasmania, Australia, 21 May 1918, p. 4, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/11394071>

bill in practically every establishment having been reduced by something like 25 per cent”.

The following winter, the two sides were at it again, arguing for and against daylight saving. A bill to abolish it was introduced into the parliament and, in early October 1919, the Assembly passed it. This resulted in a flurry of letters to *The Mercury* supporting daylight saving, with six totalling more than 2,000 words published on 11 October alone. It was all in vain. On 17 October, the Council voted to end daylight saving. The Act was repealed on 24 October and that was the end of daylight saving in Tasmania until World War II.

Interwar, there were few moves to reintroduce daylight saving. John McPhee of the Nationalist Party, a member for Hobart electoral division Denison and later premier, proposed a daylight saving bill in October 1924. Cricketers rejoiced but pressure from country members thwarted the idea. Daylight saving was raised at a meeting of the Hobart Chamber of Commerce in June 1928 but the general mood at the session was that any attempt to bring it back would fail. It came up again in October 1935 when the premier, Albert Ogilvie of the Labor Party, said that Cabinet considered daylight saving but that new legislation had to be minimised due to statute revision measures.

With daylight saving being used increasingly overseas to save energy during World War II, the issue came up in Australia and Tasmania again. In a poll by Australian Public Opinion Polls, or Gallup poll, in November 1941, 53 per cent of Tasmanians wanted daylight saving (slightly above the national average of 50 per cent) while 39 per cent didn't and 8 per cent had no opinion. The Launceston Fifty Thousand League asked in October that the state government reintroduce daylight saving, but the premier, Robert Cosgrove of the Labor Party, rejected the request saying it failed years ago and would only work if it was applied nationwide. The league and other supporters wouldn't have long to wait though.

The state premiers agreed to national daylight saving at a Premiers' Conference on 20 December 1941 and the new federal government under Labor prime minister John Curtin moved quickly. Under the National Security Act 1939, the government brought in a regulation for daylight saving to apply from 1 January to 29 March 1942. This was followed by a further period in 1942-43, and in 1943-44 except Western Australia. For more detail on daylight saving in Australia during World War II, see chapter 18.

Tasmanians reacted favourably to daylight saving during the war, with over 70 per cent backing it according to Gallup polls in March 1942 and March 1943. This compared with national approval of 69 per cent and 65 per cent. By August 1943, nationwide acceptance fell to 54 per cent but Apple Isle support was still high at 66 per cent and highest in Australia. In a quaint letter to Launceston's *The Examiner* on 30 September 1942, "Vitamin" was of the view that: "Daylight saving is an accomplished fact. I have not read a sound argument against it. To workers who cannot stand the strain I suggest a change of diet. Eat the food containing vitamins – the Oslo lunch – wholemeal bread, etc. Tonics will not be needed. Even country bakers will deliver wholemeal bread if customers demand it." His advice to another letter writer, "Drawback", was that "she feeds her children properly and see that they

get adequate rest. Perhaps they should be taken to the doctor. It is a matter of adaptability and parental control.”

Daylight saving in Australia finished on 26 March 1944 and clocks wouldn't be turned forward in any part of the country for more than 20 years. Antagonism towards the measure that had built up during the war gradually gave way to acceptance once more. Tasmania again led the way but it was a long, hard slog.

The scheme was nearly brought back in 1951 when drought meant Tasmania's Hydro-Electric Commission couldn't produce enough power. The state relies on hydroelectricity, which is cheap but supply is vulnerable in extended dry periods. Electricity rationing was put in place from 4 March and people had to cut their consumption by 25 per cent and businesses by 18 per cent although it was sometimes more for those on contracts. Australian Newspaper Mills at Boyer outside Hobart had their planned consumption reduced by more than 50 per cent in the three months to May, with a new paper machine costing £4 million that could produce 50,000 tons of newsprint a year lying idle. A business could be subject to a penalty of up to £500, or £50 daily, and supply could be cut off if reductions weren't met.

In September, a select parliamentary committee recommended daylight saving to reduce power usage while opinion polls also favoured its return. Cabinet, however, decided against the move as Tasmania would be out of kilter with the other states and because the commission calculated a saving in electricity of only 0.1 per cent. Strong public reaction to the restrictions led to a parliamentary inquiry, but rationing wasn't eased until 1953 before finally finishing in 1955 with the completion of the Tungatinah and Trevallyn power stations.

Just as England had its daylight saving hero in William Willett, the cause's Tasmanian champion was John Steer. After losing a leg at El Alamein, Egypt in 1942, Steer was determined to stay active in community life. He returned to his career in banking and was an administrator with several sporting bodies, including as the Northern Tasmanian Lawn Tennis Association tournament manager. Steer was a member of the Liberal Party and in August 1948 he unsuccessfully campaigned for a seat in state parliament. He tried again in May 1950 and won a seat in the Assembly representing Bass.

Steer was in parliament for over seven years before his first daylight saving bill in November 1957. Robert Cosgrove was still premier and he gave the same line as in 1941 – that daylight saving wouldn't work unless the whole country had it. Labor voted against the bill as did all but two Liberals, Horace Strutt and Rex Townley, both longstanding members for Denison and the latter a previous state cricketer so his support was not a surprise. Steer wasn't deterred, declaring that this was just the first shot of his crusade.

A year later, Steer introduced another bill and although Cosgrove had retired and Labor's Eric Reece was premier, the government still decided that its members would oppose the bill. Nevertheless, Steer gained another supporter, Bill Hodgman of the Liberal Party and a member for Denison. Reece said he had received no correspondence favourable to daylight saving, to which Townley retorted that “the

only thing he could see against daylight saving was that it meant a shorter period of sleep for owls”.

Next year in November, Steer brought in a third daylight saving bill and was encouraged when the Assembly decided that members didn't have to vote on party lines. But the bill was defeated 17 votes to 11. He received support from seven Liberal Party members and an independent, Bill Wedd, a member for Denison, but just two from the Labor Party, while four Liberals voted with the government. Labor's Harry McLoughlin, another Denison member, proposed a referendum.

Steer resigned from the Assembly in November 1961 to contest Cornwall division in the Council but lost and became a company representative. Meanwhile, his friend Bill Hodgman, who had resigned from the Liberal Party in 1960 and became an independent, took up the daylight saving cause. He introduced a bill in November 1962 but parliament finished early for the year and the bill lapsed. He brought in another bill in March 1963 but was the only member to speak in support of it while two members, the Liberals' (Mr) Carrol Bramich and Labor's Mac Le Fevre, spoke against it. The bill was defeated. With opinion polls showing support for daylight saving, Hodgman challenged Reece to arrange a referendum but the premier declined saying it was the parliament's job to decide.

Drought hit Tasmania again in 1963 and 1964 and more power restrictions were put in place. Daylight saving to reduce electricity consumption was discussed in December 1963 but the premier wasn't interested and the commission claimed that savings would amount to only 0.25 per cent in homes and not much at all for businesses. Instead, Reece went overseas to try and attract more industry to the state despite power shortages, and the commission kept building more dams despite a lack of water to fill them.

At the state election in May 1964, the first in five years, John Steer regained his Bass seat. He soon brought in a daylight saving bill but it failed. He made a further attempt in September although he was the only speaker. His third daylight saving bill since returning and his sixth all up was introduced in November 1965, but it was voted down 19 to 11 even though the government allowed members a free vote with eight Liberal and three Labor members in favour. Steer didn't give up, introducing yet another bill in December 1966 but it lapsed as there were no other speakers. By then, nine daylight saving bills had been brought into the house in nine years, seven by Steer and two by Hodgman.

Severe drought hit Tasmania in 1967 with record low rainfall in the six months to June in all areas except the west coast. Dam levels fell to 22 per cent of capacity while electricity usage kept steadily growing. Power rationing started in April. The situation got worse and by September special legislation allowed the commission to implement further restrictions. Industry had to cut back by 20 per cent (and by 35 per cent in December). Businesses were supplementing their power supplies with their own generators using oil or gas. Mining projects were on hold. The commission was busy constructing more power stations, including one using oil. It also had turbo generators on a ship, the *George H. Evans*, and on an old car ferry, the *Hinemoa*, from New Zealand, and three gas turbines from Britain, such was the desperate need to produce more electricity to meet ever-increasing demand.

A Hobart correspondent writing in *The Canberra Times* presented a picture of the state capital by night:

These nights the Hobart business area is in the grip of a voluntary semi-blackout. Shops usually ablaze with light are dark and the HEC [Hydro-Electric Commission], which appeared to the layman to squander power by massive lighting of its headquarters building[,] has switched off all but a few lights. Even the spectacular strip lighting on the 4,650 foot-long Tasman Bridge, pointed out with pride to visitors, has been doused.¹⁰⁶

There was public outcry about the power restrictions and on the need for daylight saving as a way of reducing consumption. Business estimated that daylight saving would reduce power use by 2-6 per cent. On 7 August, the headline in *The Mercury* was "Save Daylight – Move to Offset H.E.C. Power Cut". On the same day, after discussion between Cabinet and Hydro-Electric Commissioner Allan Knight, the premier announced that Tasmania would use daylight saving in the summer of 1967-68 as an "emergency measure". The Labor government had bowed to public pressure after years of dismissing the scheme. The Retail Traders' Association rejoiced, but the commission seemed less keen fearing a loss of revenue and came up with a savings estimate of less than 1 per cent. Through all this, the last increase in the unit price of electricity was six years earlier.

Steer had indicated that he would like to introduce another daylight saving bill. The emergency situation allowed him to do this and after discussions with Eric Reece, he brought a bill into the Assembly on 22 August, his eighth. It was quickly passed in both houses and became the Daylight Saving Act 1967 on 22 September. The preamble stated that the Act will "promote the greater use of daylight in certain months of the years 1967 and 1968, in order to reduce the usage of electric power during the present shortage". Clocks were advanced one hour on Sunday 1 October 1967 and would go back six months later on Sunday 31 March. After 10 years and eight daylight saving bills (plus two by Hodgman), Steer saw his aspiration come true albeit due to drought.

The temporary daylight saving measure proved popular and, by January 1968, the premier hoped it would become an annual event and that other states would adopt it. In May, Steer had returned from a trip to the mainland promoting daylight saving, when Reece permitted him to introduce a bill for permanent daylight time. Fifteen members including Steer spoke on the bill that would give the state five months of daylight saving each year, from the second Sunday in October to the second Sunday in March.

His ninth daylight saving bill progressed through both houses although some rural members in the Council viewed the bill unfavourably, including independent Lloyd Carins of South Esk electorate who believed that only 30 per cent of the state's population wanted it. Fellow independent Michael Hodgman (son of Bill Hodgman) from Huon district said it was more like 85 per cent. Reece, a keen lawn bowler, claimed that 95 per cent of people either wanted it or weren't actively opposed to it

¹⁰⁶ "Industry hit by H-E cuts", *The Canberra Times*, Canberra, Australia, 16 August 1967, p. 17, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/106971876>

and that the Tasmanian Farmers and Graziers Association, commerce chambers, and the Housewives Association of Tasmania were all onside.

The Legislative Council wanted the period reduced to four months, from the first Sunday in November to the first Sunday in March, and a further trial rather than a permanent change. These proposed amendments were sticking points for the Assembly. So the Council voted 9 to 6 to form a select committee, which comprised Carins, Hodgman, other independents Charles Best of Meander and Kenneth Lowrie of Buckingham, and Liberal John Orchard of Launceston electorate.

Following its first meeting in June 1968, the committee held 17 meetings in Hobart and regional area and interviewed about 200 witnesses. As usual, businesses and sporting groups liked the idea while the agricultural sector and cinemas didn't. Drive-in theatres reported that attendance was down 30 per cent in the 1967-68 summer. The committee considered disadvantages to farmers and their families, such as having to get up in the dark, a longer work day, school children travelling by bus leaving home very early, getting children to bed in daylight, housewives preparing two evening meals, and the stress of long hours. It also pointed out that daylight saving favours city dwellers but not country folk.

A report went back to the Assembly on 17 September with the recommendation that daylight saving go ahead but for four months rather than five months and for a trial period of two years before a referendum. Thus the Council's position hadn't changed. The Assembly still argued for five months of daylight saving and no trial period. Each house formed a "reasons committee" and felt that their version was what Tasmanians wanted. A stalemate developed between the two houses.

The Assembly called for a secret meeting, or "conference of managers", of four members from each house to try and resolve the impasse. On 19 September 1968, Carins, Best, Lowrie and Charles Fenton (all independents) from the Council and Douglas Cashion (Labor), Bill Neilson (Labor), Robert Mather (Liberal) and Bill Young (Liberal) from the Assembly met for two hours. Mather was standing in for Steer who was ill. The meeting couldn't come to an agreement. All it did was suggest that the Council give further thought to its proposed amendments.

In the end, the Council wouldn't budge and the Assembly agreed to a two year trial but not to reducing daylight saving to four months. The Council came to a compromise and voted 10 to 6 for four and a half months of daylight saving. Initially, the Assembly still wanted five months but it relented and agreed to four and a half as it was already October and time was running out to organise daylight saving at all for that summer. The bill was assented to on 15 October and became the Daylight Saving Act 1968. Tasmanian clocks would go forward an hour from the last Sunday in October until the second Sunday in March for 1968-69 and 1969-70. It was perhaps ironic that the parliament had kept pursuing with the bill given that the drought broke in the winter of 1968 and power restrictions ended in October.

Sadly, John Steer died in office on 10 October 1968 aged just 49, five days before the bill for another two years of daylight saving became an Act. Unlike Willett, who didn't see the results of his work come to fruition, Steer did at least see one year of daylight saving in 1967-68 and saw his 1968 bill finally passed by both houses. His

efforts helped daylight saving become a reality in Tasmania and contributed to the move in other states soon after.

New Liberal party premier Angus Bethune came out in support of daylight saving in September 1969 saying that it was “here to stay” as he believed most locals and tourists liked it and there was no need for an expensive referendum. The two year trial would end next autumn and new legislation was required for daylight saving to continue. Acting premier Kevin Lyons introduced a bill in June 1970 for permanent daylight saving in Tasmania for four and a half months each year, but it was held up in the Council where independents Carins, Fenton and Louis Bisdee were critical of it. The debate went for nine hours, during which Carins’ request for another two year trial was lost by 8 votes to 6 before the bill was passed and legislation enacted on 30 June 1970. This meant daylight saving on a permanent basis from 1970-71 onwards.

Other states were due to start daylight saving time in 1971-72 but for four months. At a chief secretaries’ meeting in July 1971, Lyons agreed to reduce the period for Tasmania to this length. Many members weren’t happy but a bill to effect the change was passed. In the following year, mainland states added a week at the end of the period and Tasmania again followed suit, this time with little dissent. Daylight saving was certainly popular, with 81 per cent of the state’s residents approving it according to a Gallup poll in October 1971. Support increased to 86 per cent in February 1972 and it was 84 per cent in March 1973.

Talk continued about the duration of daylight saving. Eric Reece, who was premier again, approached the other premiers in July 1974 to try and get agreement to extend it to almost six months, from the first Sunday in October to the last Sunday in March. In 1976, Tasmanian Apex Clubs favoured five months of daylight saving but new premier Bill Neilson wasn’t interested. In 1978, the Tasmanian Tourist Council pushed for at least six months of daylight saving after a survey of its 500 members found that 31 per cent wanted it all year, 44 per cent would like it for six months and 25 per cent were happy with the existing arrangement of just over four months.¹⁰⁷

Petitions relating to daylight saving kept coming. In March 1980, Apex members sent the government 700 petitions for a longer period. In July, a petition with 7,000 signatures from the Launceston area asked for six months of daylight saving. Another petition with 481 signatures came from the rural north-west praying for no extension. More petitions either for or against daylight saving or extending it were presented in 1981. Rural groups kept up their opposition to daylight saving, especially any increase in it.

The government decided in 1981 to extend daylight saving. After three meetings to determine dates, it finally came up with a period of up to six months, from the first Sunday in October to the last Sunday in March, announced by Labor premier Doug Lowe on 4 March. This was the same as 1967-68 and would move the start of daylight saving from late to early October and the finish from early to late March.

¹⁰⁷ The Royal Society of Tasmania, *About Time: Daylight Saving in Tasmania*, by T. A. Newman, 1984, pp. 32-33, at <http://www.parliament.tas.gov.au/php/Daylight%20Savings/dls84.pdf>

The Daylight Saving Amendment Bill 1981 of about two lines was introduced into the Council by Labor's Brian Miller of Newdegate electorate in the Hobart area on 18 March and read a first time. Amid plenty of jokes and laughter, and disagreement, the second reading debate took place on 2 April. With 13 members out of a total of 25 speaking against the bill, it was thrown out. As petitions supporting both sides of the argument kept coming in, the bill was brought into the Assembly by Labor's Michael Barnard, a member for Bass and tourism minister, on 8 September. At the second reading on 23 September, Barnard gave his thoughts on God and time and paid tribute to John Steer who:

... consistently and persistently endeavoured to persuade the members of the House of Assembly that the Tasmanian public would enjoy some benefit if we were to accept the concept that we had not necessarily been absolutely correct when we, the people of this country, decided what time it would be. There are some people in the community who believe – ill advisedly I think – that God made time. God made many things but he was not responsible for determining what time we would adopt in the various time zones.¹⁰⁸

He went on to explain how England had made a “mistake” with its time and now had two hours of daylight saving in summer and an hour the rest of the year.¹⁰⁹ A long and lively debate was adjourned around midnight. After another noisy session next day, 24 September, the bill was passed 24 votes to 8, thanks to Liberal Party members being allowed a free vote. But it was now too late to start daylight saving in early October, so any change would be delayed until the following year.

The bill came into the Council on 6 October and was passed by 9 votes to 7 at the end of a long and rowdy second reading debate on 14 October at about 9:30 p.m. A committee session started straightaway and several changes were made to the bill. A sunset clause to end the extended period of daylight saving after two years was introduced by Peter Hodgman, and the start date wouldn't be altered from the last Sunday in October. The bill was returned to the Assembly with amendments on 20 October and, after a half hour debate next day, the changes were accepted. Tasmania would have a few weeks of extra daylight saving in March 1982 and 1983 but no change in October dates. As usual, some people were happy and others weren't.

An amendment bill in April 1983 by Geoff Pearsall of the new Liberal government sought to remove the sunset clause and continue to end daylight saving in late March on a permanent basis, with recreation, tourism and fewer road accidents as reasons. The opposition supported the amendment. But in the independent dominated Council, members were concerned for rural areas, which wanted less not more daylight saving, and for large businesses, who wanted to be on the same hours as Victoria and New South Wales. At the time, Hodgman presented a petition with 481 signatures to keep to the same times as other states. The bill was defeated by 8 votes to 4 and the end of the daylight saving period reverted to early March.

Two years later, independent Hank Petrusma tried to get daylight saving extended through March. At the start of the second reading of the Daylight Saving Amendment

¹⁰⁸ Parliament of Tasmania, *Hansard*, House of Assembly, 23 September 1981, p. 922, at <http://www.parliament.tas.gov.au/HansardArchive>

¹⁰⁹ The UK did this during World War II and in 1947 but not since. It was in the UTC+1 time zone from 1968 to 1971 but didn't have daylight saving.

Bill 1985 in the Council on sitting day 24 September at about 12:50 a.m., he said he was “very happy to debate this issue at this time of the night” but noted that others might not and moved an adjournment. A long and lively discussion on 1 October resulted in a 9 to 8 vote against the bill at 12:30 a.m. In 1985, phone-in polls showed around 90 per cent support for daylight saving.

The following year, Pearsall presented the Daylight Saving Amendment Bill 1986 at a joint sitting of the houses on 12 March. Tasmania had been synchronised with New South Wales, Victoria and South Australia for the previous two years, but the mainland states had recently shifted their end date to the third Sunday in March, two weeks later than Tasmania. The latest bill sought to change the 1981 amendment to allow daylight saving dates to be changed by an order in council, meaning that the governor could approve a change in dates, within parameters, a simpler and quicker process than to keep changing the Act with specific dates.

After a second reading debate in the Assembly on 19 March 1986, the bill went to the Council where it was presented by independent Tony Fletcher on 25 March. A second amendment bill, introduced into the Council by Petrusma on the same day, called for a specific change to the Act to align Tasmania with the period then used by the other states. Both bills were debated at length. In the Assembly on 26 March, the second bill didn’t make it to the first reading. The first bill was returned to the Assembly with amendments and was eventually passed by both houses and the Daylight Saving Act 1968 was amended accordingly.

A meeting with the governor, James Plimsoll, on 22 September 1986 allowed Tasmania to make quick changes to the duration of daylight saving in 1986-87 to align with the other states. The governor authorised a start date of the third Sunday in October 1986 as South Australia had moved to this date with Adelaide hosting the Grand Prix the following weekend, and New South Wales and Victoria had shifted to that date too. He also approved a change in the finish date to the third Sunday in March 1987, the same as the other states since 1986.

Another amendment bill was introduced in October 1990 to extend daylight saving time to the third Sunday in April. The 1986 amendment had only allowed the end date to be changed by an order in council within March. The new bill went nowhere. But Tasmania did push its end date out to the last Sunday in March 1991 while the other states finished on the first Sunday in March.

The state also shifted its start date from the last Sunday in October to the first Sunday in 1991. Thus in 1991-92, Tasmania started its daylight saving three weeks before New South Wales and Victoria and ended it four weeks later than those states. Tasmania’s electricity consumption was estimated to be \$1.1 million a year lower due to daylight saving. In August 1993, the government approached the other states to see if they intended changing their daylight saving period to coincide with Tasmania, but they all made it clear that they had no such plans. The government decided to continue with up to six months of daylight saving time each year. The start date was maintained several weeks ahead of mainland states for the rest of the decade. Other states moved their finish time to the last Sunday in March, coinciding with Tasmania in the mid 1990s.

Veteran independent George Shaw wanted to bring a bill into the Council on 28 April 1998 to amend the Daylight Saving Act 1968 to bring the duration of daylight saving in Tasmania into line with that in Victoria, being the closest state and a major source of the Apple Isle's tourism. At the time, New South Wales, Victoria and South Australia had a start date of the last Sunday in October whereas Tasmania started on the first Sunday. Finish dates had been the same in all four states since 1996.

The 1986 amendment to the Daylight Saving Act had been repealed in 1991 and Shaw, and no doubt many others, thought that the governor no longer had the power by order in council to approve changes in start and finish dates. But an obscure clause in a Statute Law Revision Act meant that the amendment part of an Act wasn't actually repealed when it was embodied in the Act. The Parliamentary Research Service was also tricked as it too thought the amendment was gone and Shaw was taken to task for not insisting on advice from Parliamentary Counsel. What had originally been a bill to amend the 1968 Act became a motion to get Cabinet to ask the governor to authorise the change.

Despite this, a protracted debate took place on 28 April, or as *The Examiner* put it: "The Legislative Council ran around in circles and tied itself in knots ... trying to get to the bottom of the merits of daylight saving."¹¹⁰ The Council spent considerable time talking about the alleged pluses and minuses of daylight saving, such as energy conservation, benefits for tourism, communication difficulties between Tasmania and the mainland, farmers getting up even earlier on cold mornings, and children setting off to school before daybreak. There were the usual jokes about upset cows and faded curtains. Issues relating to the one hour time difference for three weeks were discussed, such as transport timetables and television and radio shows from the mainland being out by an hour.

The main reason for the proposed change was to boost the economy, including tourism, although it was pointed out that no cost-benefit analysis had been done. Shaw admitted he had done little consultation or negotiation with Victoria to try and get it to align its time with Tasmania, but perhaps this is understandable given that Victoria used the same dates as New South Wales and South Australia and would be unlikely to want to change. In the end, the motion was agreed to by 12 votes to 5.

But the process didn't seem to go any further. On 7 October 1998 in the Assembly, Liberal member Marinus Hidding asked what was being done to standardise daylight saving dates between Tasmania and the mainland. Paul Lennon, deputy premier of the month old Labor government, said there was "nothing on the agenda". The premier, Jim Bacon, confirmed the ongoing policy of trying to convince the other states to fall into line with Tasmania's times.

The Daylight Saving Amendment Bill 1999 was introduced into the Assembly in October in response to a request by New South Wales to shift the start date of daylight saving in the following year to 27 August, two months earlier than usual and still winter. This was because Sydney was hosting the 2000 Olympic Games in the second

¹¹⁰ Gemma Daley, "Call for uniform daylight saving times nationwide", *The Examiner*, Launceston, Tasmania, Australia, 30 April 1998, at <http://www.examiner.com.au/story/640328/call-for-uniform-daylight-saving-times-nationwide>

half of September and there would be less confusion for visitors and business if daylight saving times were the same among states. The bill went through both houses and was passed, becoming the Daylight Saving Amendment Act 1999. The Daylight Saving Act 1968 remained as the principal Act and the amendment was inserted into it. After the Games year, the start of daylight saving reverted to the first Sunday in October in Tasmania and the last Sunday in New South Wales and Victoria (South Australia hadn't moved). A study by US academics Ryan Kellogg and Hendrik Wolff found that the earlier start to daylight saving in relevant Australian states in 2000 resulted in an increase in electricity usage in the morning, due to the cold and dark, which exceeded the decrease in the evening.

Next change in the daylight saving period was in 2005-06 due to Melbourne holding the 2006 Commonwealth Games on 15-26 March. The states agreed to a finish date of Sunday 2 April, one week later than usual. In Tasmania, the Daylight Saving Amendment Act 2005 was incorporated into the Daylight Saving Act.

On 27 June 2007, Tasmanian premier Paul Lennon advised that agreement had been reached with New South Wales, Victoria, South Australia and the Australian Capital Territory to use the same dates for daylight saving. The new period would extend to six months from early October to early April. The state's Daylight Saving Bill 2007 went through both houses and it became the Daylight Saving Act 2007, replacing the 1968 Act. The changes took effect from 2008. This meant that the other states moved their start date from the last Sunday in October, which they had mainly used since 1971, to the first Sunday in October, which Tasmania had used from 1991. There had been unison on the end date since the mid 1990s with the other states shifting to the date Tasmania had used since 1991, that is, the last Sunday in March. This date would now move to a week later to the first Sunday in April.

Tasmania was the first Australian state to introduce daylight saving, in 1916. It was first to have it in peacetime, in 1967. In more recent times, it was first to shift its end date to late March and its start date to early October, in 1991. As at 2016, Tasmania and the other daylight saving states turn the clocks forward for six months from the first Sunday in October until the first Sunday in April, almost the same period as Tasmania's first year of daylight saving back in 1916-17 except it had an end date a week sooner.

18 Southern states in and out of sync

Australia, like many countries, first had daylight saving time during World War I. As with the United Kingdom and the United States, there were many attempts to introduce it before the war by politicians and business people. Daylight saving is a state issue in Australia, as it was in America. Most of the early moves towards daylight saving were in Victoria and to a lesser extent New South Wales. In general, little interest was shown initially by the other states although, as we've seen, Tasmania was the first state to introduce it, in 1916. This chapter looks at daylight saving chiefly in the mainland southern states of New South Wales, Victoria and South Australia. Tasmania was covered in the previous chapter. Separate chapters on Queensland and Western Australia follow.

A Daylight Saving Bill was first introduced into the Victorian Parliament on 27 November 1908 but it was shelved due to dissolution of parliament in January 1909. It was reintroduced in July of that year by Labor's Alfred Outtrim. A select committee first met on 22 September. In all, it had 12 meetings and heard 62 witnesses across a range of business, education, religious, health and sporting groups, and trade unions.

Evidence was heard from the inspector of factories who said that 303 of the 343 employers he had spoken with favoured the bill. The Storekeepers' Association of 1,500 members supported the proposal. Prominent businessman Frederick Heath also liked the idea. Workers would start in the cooler part of the day and have more time for recreation later. However, trade unions made the point that people in certain occupations already rose before dawn and would need to get up even earlier. The unions also felt that some employers might extend the hours of work. Rural communities were generally against the proposal, claiming they would have to start an hour earlier and still work until sunset.

Head railway commissioner Thomas Tait said the railways were in favour of daylight saving. He preferred four 20 minute changes, like Willett in Britain, rather than an hour all at once and felt that the adjoining states of New South Wales and South Australia would have to make the change too. An estimated £1,700 a year would be saved in lighting at stations and in carriages. Victorian government astronomer Pietro Baracchi liked the idea too although in July 1908 he had remarked on Britain's daylight saving bill: "I think it is a clumsy expedient to attain a good object. It seems to me farcical for men to think to change their habits by putting on or back the hands of the clock".¹¹¹

The committee released a favourable report in December 1909. It discussed economic, health, recreation and military training benefits. It also aimed to address concerns raised by various groups. The report concluded that the benefits greatly outweighed any disadvantages and urged the state to move its clocks an hour ahead from 1 October to 31 March. It recommended the other states make the move too, and if they didn't, the committee thought Victoria would be at such an advantage that other states would be obliged to follow its lead. In the end, the bill failed.

¹¹¹ "Daylight saving", *The Advertiser*, Adelaide, South Australia, 4 July 1908, p. 9, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/5157901>

Outtrim brought in another Daylight Saving Bill in 1910. Victorian premier John Murray felt it would be “absurd” to go it alone and on 7 April said he would raise the daylight saving issue at the next Premiers’ Conference, but there wasn’t much interest at that stage. The bill was reintroduced in August 1911 but lapsed.

A further Daylight Saving Bill, introduced into the Victorian Parliament in July 1912, was reported on favourably by a parliamentary committee. The bill was supported by the railway commissioners, stock exchange, Chamber of Commerce, and again by the government astronomer. The chief inspector of factories interviewed 319 factory owners and shopkeepers and found that 278 or 87 per cent wanted daylight saving. The bill was opposed by the postmaster-general, the government meteorologist, and several trade unions that were against the early starting hour. The banks were neutral. Once again, the bill was defeated.

A 1913 bill was supported by the premier, William Watt, while ex-premier Murray said it was “the most sensible proposal ever presented to the House”.¹¹² The bill reached the select committee stage but lapsed. It was restored in July 1914 by Outtrim and again went to a committee but didn’t proceed further.

The first Daylight Saving Bill brought into the New South Wales Parliament was in early 1909. A parliamentary committee approved the proposal as it would:

- ☼ promote the greater use of daylight for recreative purposes
- ☼ facilitate the training of the Territorial forces
- ☼ benefit the physique, general health, and welfare of all classes of the community
- ☼ reduce the industrial, commercial, and domestic expenditure on artificial light.

But the Labor Congress held in the state’s capital, Sydney, in April was opposed to the bill, believing it would be used as an excuse to lengthen hours. *The Evening Star*, New Zealand, 16 April 1909 wasn’t sure why: “How this result can be achieved in the face of Arbitration Court awards, vigilant trade unions, a hostile public, and the trend of the times we do not know.” The editorial noted that the state Labor Party was in support of the idea. Acting premier Charles Lee indicated in December that the bill wouldn’t go through while the coal miners’ strike was still on.

The next Daylight Saving Bill introduced into the New South Wales Parliament was in 1911. A select committee was appointed in July. Most witnesses were in favour of the scheme with the usual arguments offered in its support. It was reported that some factories were already using a form of daylight saving by starting an hour earlier in summer. The Labor Council of New South Wales told the committee in December that the advantages were more outdoor recreation and more overtime, which was in contrast to the Labor conference view two years earlier. Archdeacon Boyce was of the view that the scheme would “improve the people’s morals and lessen the consumption of liquor”. But the bill failed.

The South Australian Parliament briefly discussed daylight saving in 1909 and it came up again in July 1911 when a delegation from the Australian Natives’

¹¹² “State Parliament”, *The Argus*, Melbourne, Victoria, Australia, 2 October 1913, p. 4, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/7255440>

Association requested that a bill be brought into the Legislative Assembly. Premier John Verran promised to initiate a daylight saving bill. He was known to favour the idea and said if it was up to him, the measure would be introduced. He said he would try and persuade other members. Two months later, the association lobbied the Victorian Parliament.

Daylight saving was debated at the 1912 Premiers' Conference in Victoria's capital, Melbourne, in January, where general agreement of the premiers was reached on the merit of the scheme. There was a feeling that if it was to be a success all states would have to do it together, similar to standard time in 1895. As well as Victoria and New South Wales, the South Australian premier said the issue had also been considered in his state. The conference recommended that each state look into it further and share information. Daylight saving was one of scores of subjects listed to be raised at the week-long Premiers' Conference in Melbourne in April 1914, but the issue didn't come up.

The topic was next considered at the May 1915 Premiers' Conference in Sydney. Victoria remained enthusiastic while New South Wales was positive. Nothing had been done in the other states. South Australia and Western Australia suggested that Victoria goes ahead and tries daylight saving, but conference president and New South Wales premier William Holman was keen for his state and South Australia, at least, to be involved too. In the end, the conference simply reaffirmed the resolution of the 1912 conference that the states look into the matter.

As discussed in the previous chapter, Tasmania introduced daylight saving on 1 October 1916. Victoria wasn't far behind. A Daylight Saving Bill came into the Legislative Assembly on 24 August and passed through both houses by 28 September. The bill became that state's Daylight Saving Act 1916 on 6 November, with a time change to apply from the first Sunday in October until the first Sunday in March although the earliest it could have started in 1916 was mid November. But its operation was made dependent on similar Acts in New South Wales and South Australia, a proviso that had been raised often during the daylight saving debate in Victoria. In September 1916, the Actuarial Society estimated that daylight saving would reduce Australia's lighting expenses by £140,000 a year.

The New South Wales Parliament brought in a Daylight Saving Bill for the same period as Victoria on 22 November and suspended standing orders so that it could pass all stages in the one sitting. But the government dropped the bill on 1 December due to objections from country areas.

Daylight saving is normally a matter for the states in Australia. However, section 51 (vi) of the Constitution of the Commonwealth of Australia allows the federal government to legislate in the areas of, among many others, "the naval and military defence of the Commonwealth and of the several States, and the control of the forces to execute and maintain the laws of the Commonwealth". This is interpreted fairly broadly to include such things as daylight saving legislation in wartime.

Labor prime minister Billy Hughes announced on 30 November 1916 that he was considering uniform daylight saving throughout the country. He wanted to move quickly, the main trigger being a coal shortage. A Daylight Saving Bill was

introduced into the federal parliament on 15 December. It was approved by the House of Representatives within minutes on 19 December under National Security Regulations. It went through the Senate quite easily the next day and the national Daylight Saving Act 1916 was passed on 21 December. The starting date was proclaimed as Monday 1 January 1917 although Hughes had initially suggested 2 January. The whole of Australia was now on daylight saving time, joining Tasmania which had been on it for three months. It was scheduled to finish on the last Sunday in March and recommence on the last Sunday in September each year for the duration of the war.

The changeover went smoothly enough. Clockmakers did the rounds adjusting office and factory clocks. *The Sydney Morning Herald* of 2 January reported: “A few stragglers, after seeing in the new year, gave a weak cheer at 2 a.m., otherwise people took very little notice of the change.” That evening, the beaches were popular and: “Children were overjoyed to find that they were able to remain until comparatively late in the evening making sand-castles, playing hide-and-seek, and indulging in the hundred-and-one holiday amusements.”¹¹³ There were no problems with trains or traffic.

A week into daylight saving, reactions were mixed. Holidaymakers enjoyed the longer evenings although outdoor picture theatres, very popular at the time, were making losses as shows couldn't start until mid evening and most people had found something else to do by then or were back indoors. Sydney's Electric Light Department hadn't noticed any saving in electricity so far. Farmers weren't happy as much of their lives were ruled by the sun, and shops and banks weren't open and trains for their produce weren't running at appropriate times. People in various occupations were compelled to rise early. Miners at Broken Hill, New South Wales chose to ignore it. Residents of the Victorian town of Mildura turned back their town clock within a month. There were a number of local protests around the country. Overall, the change in time proved unpopular.

On 8 February 1917, Labor's Frank Tudor, federal member for Yarra, Victoria, noted the “widespread dissatisfaction” and asked if the government intended to repeal the bill. But Hughes still supported the scheme. The issue was raised again by the Commonwealth Liberal Party's Elliot Johnson, member for Lang, New South Wales, who spoke of the “general dissatisfaction” with daylight saving on 14 February. Hughes said he would “consider the matter”. More pressure came from other members and senators over coming weeks.

At a national meeting of the chambers of commerce in Adelaide on 22 March, a Western Australian representative moved that the federal government repeal daylight saving legislation, saying the idea emanated from Germany [sic] and wasn't suitable for Australia. Another delegate from the west said the “saving” was humbug. A Victorian representative said it was no argument against daylight saving to call it humbug and pointed to the financial savings made. Another representative from Victoria said daylight saving should have started earlier and that most complaints were from mothers unable to get children to bed. The motion to repeal was lost.

¹¹³ “Daylight saving”, *The Sydney Morning Herald*, Sydney, New South Wales, Australia, 2 January 1917, p. 6, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/15718418>

Clocks were turned back as scheduled on 25 March. Just two months later, the government announced that it would end the scheme although Hughes felt it had been successful and seemed hesitant to let it go. The Senate voted 22 to 4 to abandon it and the Daylight Saving Repeal Act was assented to on 25 September 1917. Australia had been due to go onto daylight saving time again five days later. The only state to continue using it was Tasmania under its own Daylight Saving Act.

Some folk were glad to see daylight saving gone while others were angry, such as “W. A.” who wrote this letter to the editor of *The Argus* in Melbourne:

We allowed our legislators to repeal the Daylight Saving Bill [Act] like lambs, with not a kick against it. Everywhere we hear of shortage of coal and restrictions on lighting. Thousands are out of employment, and there is no power for machinery. Strikes will always be with us, and what would we give to have the coal and power wasted last summer now?¹¹⁴

Between the wars, not much interest was shown in daylight saving in Australia. At the Associated Chambers of Commerce conference in Adelaide in May 1924, W. H. Swanston, president of the Melbourne chamber, moved that the federal government be approached to renew daylight saving. A. W. Courtney-Pratt from Hobart seconded the motion but J. Allen from Brisbane opposed it saying that daylight saving was quite unsuitable in Queensland, as did L. S. Barnett from Sydney due to the disruption to farmers, and W. Bruce of Adelaide. The motion was lost.

Sporting bodies were keen for a return to daylight saving, including cricket, tennis and lawn bowls. The Victorian Bowling Association wanted daylight saving in 1926 as games were often played under lights and electricity cost money. At a Queensland State Service Union conference in July 1933, a motion was carried for federal daylight saving.

In Sydney in 1936 the clergy, worried about the desecration of the Sabbath, was keen to reignite daylight saving arguing that if children got an extra hour outdoors six days a week they might rest on the seventh and even attend church. But a New South Wales Public Service Association conference in April 1936 rejected daylight saving as they felt it had been a failure. In the same month, Manly Council, Sydney, which was in favour of the scheme, wrote to 96 councils in metropolitan Sydney and other urban areas in New South Wales seeking support. Of the 58 councils who replied, only 15 responded positively. On the other hand, a number of sporting and other organisations backed a move by the New South Wales Cricket Association in November 1937 to push for daylight saving. The following month, a meeting in Sydney of the Housewives Association supported it.

In November 1938, prime minister Joseph Lyons of the United Australia Party agreed to consider daylight saving. Nearly a year later, in October 1939, health minister Frederick Stewart, assistant treasurer, and later treasurer, Percy Spender, and interior minister Harry Foll gave their nod of approval to it. With World War II six weeks old, Foll thought daylight saving should be introduced as a measure of national

¹¹⁴ “Daylight saving”, *The Argus*, Melbourne, Victoria, Australia, 21 July 1919, p. 7, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/4714331>

emergency. Support also came from business, doctors and various organisations in Melbourne although Victoria's Country Party premier Albert Dunstan disagreed as the scheme was unpopular among farmers. Federal Cabinet considered daylight saving on 18 October but it went no further.

Prime minister Robert Menzies of the United Australia Party said in January 1940 that daylight saving was unlikely to happen. Army minister Geoffrey Street felt that current daylight hours were plenty for training. By March 1941 though, Cabinet was becoming more sympathetic to daylight saving.

A Gallup poll by Australian Public Opinion Polls in September 1941 asked respondents: "Would you favour advancing the clock an hour in summer?" Fifty per cent of people approved of daylight saving and 34 per cent were against it, with 16 per cent undecided. Middle and lower income groups showed strong support as did those under the age of 50. City residents were two to one in favour while those in regional centres also wanted it. Farmers were less keen with 36 per cent for and 49 per cent against. Support was strongest in Victoria, Tasmania and New South Wales (see table). Approval was weaker but still positive in Western Australia and South Australia. Queensland was the only state where fewer people wanted it than were opposed to it.

Opinion on daylight saving, Australia, 1941

| <i>State</i> | <i>For</i> | <i>Against</i> | <i>Undecided</i> |
|-------------------|------------|----------------|------------------|
| | | — % — | |
| New South Wales | 52 | 30 | 18 |
| Victoria | 54 | 30 | 16 |
| Queensland | 41 | 46 | 13 |
| Western Australia | 48 | 37 | 15 |
| South Australia | 43 | 38 | 19 |
| Tasmania | 53 | 39 | 8 |
| Australia | 50 | 34 | 16 |

Source: Australian Public Opinion Polls, "Poll findings announced during Oct. 1941", p. 5, at <http://www.roymorgan.com/~media/files/papers/pre-2010/19411201.pdf?la=en>

Whether to have nationwide daylight saving again as a wartime measure after its failure in 1917 was raised in federal parliament on 17 December 1941. New Labor prime minister John Curtin met with the state premiers on 19-20 December and, with the exception of Albert Dunstan, they agreed that Australia should introduce daylight saving under National Security Regulations. Reasons included the need for a general blackout due to security considerations and to conserve power. On 23 December, the War Cabinet announced the start of daylight saving on 1 January 1942. The Primary Producers' Union secretary said he was happy with the arrangement as it would help with the war effort despite the workday of farmers increasing an hour to 17 hours by his reckoning.

A week into daylight saving time, people in Melbourne seemed quite happy with it. *The Argus* spoke to 24 people in a city street and no one was critical. Three-quarters of them wanted it in the winter months too and for it to continue after the war. "Housewives" were keen, and one "shopgirl" said: "At least the Japs have done 2 good things for us – they've brought in early closing on Friday nights and they've

given us daylight saving.”¹¹⁵ The newspaper had been promoting the possibility of daylight saving in winter as peak hour traffic in the blacked-out central city area would clear before nightfall and most people would get home by dark. All year daylight saving was practised by many countries around the world during the war.

There was a high level of acceptance of daylight saving in South Australia too, including in rural areas such as Ardrossan, Murray Bridge, Peterborough and Renmark. The main complaint was getting children to bed. The South Australian Dairymen’s Association secretary had received only one objection to the earlier milking of cows. *The Mail*, Adelaide noted the contrast in views on daylight saving with those during World War I.

An Australian Gallup poll in March 1942 showed that support for daylight saving jumped to 69 per cent while only 23 per cent of people were dissatisfied with it and 8 per cent were undecided. Approval was over 70 per cent in New South Wales, Victoria and Tasmania and about 60 per cent in the other three states. Three out of five farmers were in support although miners and factory workers complained of having to get up early. The poll found that income level made little difference to views on daylight saving.

Adelaide mayor Arden Hawker believed daylight saving should continue all year as people were now used to the new time. In Melbourne, railways and health chairmen wanted it to extend into winter as did Victorian state opposition leader and later premier, Labor’s John Cain. A number of suburban mayors in Melbourne also came out in favour. New South Wales Labor premier William McKell admitted to the success of daylight saving but he didn’t think it would be as useful in winter. Despite the popularity of the measure and plenty of support for it to continue over the cooler months, the War Cabinet in Canberra decided on 17 March 1942 that clocks would be wound back on the last Sunday in the month. Ministers were worried about workers getting up in the dark as the days got shorter.

Four months later, on 24 July, Cabinet announced that daylight saving would start again around September under a National Security (Daylight Saving) Regulation due to the urgent need to conserve coal. The government was thinking of starting with half an hour of daylight saving from mid September and then an hour from mid November, to be reversed in February and April 1943. Daylight saving was reintroduced on 27 September 1942 although not in half hour stages.

Some of the 650 miners at Burwood Colliery, Newcastle, New South Wales went on strike the next day over having to start an hour earlier by the sun. Instead of a 7 a.m. start, they wanted to make it 8 a.m. daylight saving time, or the same time in real terms as before. Those who lived a fair distance from the mine would have to get up before 4 a.m. standard time to get to work by 6 a.m., or 7 a.m. daylight saving time. They would have to finish an hour earlier in the heat of the day and go to bed while it was still quite warm. The dispute wasn’t resolved and the mine, which produced 3,200 tons of coal a day, was idle. But a later start would delay the transporting of coal and Curtin warned in the House of Representatives on 29 September that the

¹¹⁵ “Daylight saving popular”, *The Argus*, Melbourne, Victoria, Australia, 8 January 1942, p. 2, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/8226657>

government “would not tolerate for one moment an interruption of war industries”. The striking miners returned to work. Other coal miner strikes at the time were over dust, the width of the wheeling road, wheelers, and a potato shortage, and the prime minister had become fed up.

By March 1943, satisfaction with daylight saving had fallen slightly to 65 per cent with opposition at 29 per cent. Opinions of males and females were almost the same and there was little difference between age groups except those aged 21-30 years with 72 per cent satisfied and 21 per cent against. Farmers were now evenly divided. On a state basis, Victoria and Tasmania still led the way with 71 per cent in favour, followed by New South Wales, South Australia and Western Australia all with 64 per cent and Queensland with 55 per cent.

Several months later, in August 1943, support fell sharply although, among those with a view, it was still above half, with 56 per cent agreeing to daylight saving again in 1943-44 and 44 per cent opposed to it. Males and females again showed a similar pattern. Younger people were more likely to favour it, with 66 per cent of the under 30s supporting it, but only 45 per cent of the over 60s. Farmers were now two to one against the scheme. Tasmania had the highest proportion of people wanting daylight saving with 66 per cent, followed by Western Australia with 65 per cent, Victoria 61 per cent, New South Wales 54 per cent, South Australia 48 per cent and Queensland 41 per cent.

Prime minister Curtin asked the state governments their views on whether Australia should have daylight saving time again in 1943-44. New South Wales and Tasmania were in favour while Victoria and South Australia were against it mainly due to protests from rural areas. The Victorian government wrote to 71 local councils and got just three replies supporting daylight saving and 61 against. Queensland responded in the form of submissions from various organisations that were generally averse to daylight saving. Western Australia initially indicated its acceptance on 24 August but changed its mind two weeks later in the face of opposition from rural interests.

Federal Cabinet also took into account the need to save coal, reports that factory workers were healthier and more productive under natural light, and that daylight saving led to slightly higher agricultural production. Consequently, the federal government decided on 22 September 1943 that the nation would have daylight saving again from 3 October, except for Western Australia.

Straightaway, 500 miners at the Bellbird Colliery, Maitland, New South Wales went on strike against daylight saving time. Other coal mines were already idle due to industrial disputes over various issues. A number of mines decided to ignore the time change. One mine gave the federal government a 14 day ultimatum to allow standard time in mining. Curtin was adamant though that coal miners would abide by daylight saving. Five mines defied the government and workers arrived for an 8 a.m. start rather than 7 a.m. Many farms ignored the clock change too.

There were coal shortages around the country. South Australia had only three weeks' supply and premier Thomas Playford travelled to Canberra to see the prime minister about coal and daylight saving. He argued that if the state had to have daylight saving,

it should be half an hour. The Chamber of Manufactures supported the proposal but the Adelaide Chamber of Commerce wanted the state to stay on standard time like Western Australia.

Daylight saving finished on 26 March 1944 and the federal government announced a review on 8 May. Ministers were predicting that the scheme would be abandoned as it had become disliked although the decision would depend on fuel stocks. The Premiers' Conference in Canberra in August 1944 decided unanimously not to support daylight saving in 1944-45 despite the war still being well and truly on and the need to conserve coal, but the federal government didn't push the issue. On 11 September, Curtin announced there would be no daylight saving in 1944-45. After three months of daylight saving in 1942, six months in 1942-43 and close to six months in 1943-44, that was it for a while.

By late 1949, people's opinion of daylight saving had become more favourable again. A Gallup poll found that 54 per cent supported it, up from 41 per cent in 1946. The proportion opposed fell to 37 per cent from 51 per cent over this period. Daylight saving was supported by both men and women in 1949 and all age groups except 60 and over. It was approved by people in all states except Queensland, and South Australia which was evenly divided. Farmers continued to be against daylight saving with 68 per cent not wanting it.

A need to conserve energy put daylight saving back in the spotlight in Victoria in February 1951. The state depended largely on New South Wales coal and Joint Coal Board chairman Samuel Cochran told Victoria's Country Party premier John McDonald that the board could only provide the state with 21,000 tons a week instead of the 25,000 tons asked for. McDonald said Cabinet would consider daylight saving. In May of that year, the New South Wales government considered the possibility of winter daylight saving to reduce demand for power. Neither idea got beyond the informal discussion stage.

Support for daylight saving increased further to 58 per cent in Gallup polls in 1956 and 1960, with about a third opposed to it in each survey. In 1960, Tasmania led the way with 68 per cent approval and 25 per cent against (see following table). In all states, more people wanted daylight saving than didn't. In New South Wales, the Retail Traders' Association was lobbying the state government over the scheme from the late 1950s. Other employer groups were advocating daylight saving by the early 1960s.

Opinion on daylight saving, Australia, 1960

| <i>State</i> | <i>For</i> | <i>Against</i> | <i>Undecided</i> |
|-------------------|------------|----------------|------------------|
| | | — % — | |
| New South Wales | 66 | 28 | 6 |
| Victoria | 55 | 35 | 10 |
| Queensland | 49 | 40 | 11 |
| Western Australia | 46 | 33 | 21 |
| South Australia | 51 | 43 | 6 |
| Tasmania | 68 | 25 | 7 |
| Australia | 58 | 33 | 9 |

Source: Gallup poll results, Parliament of Australia, *Hansard*, Senate, 14 August 1963, p. 45, at <http://parlinfo.aph.gov.au/parlInfo/download/hansard80/hansards80/1963-08->

The Australian Senate had a protracted debate over daylight saving on 14 August 1963. Leader of the government in the Senate, Liberal senator Kenneth Anderson from New South Wales, moved that the nation should go on daylight saving from December to March each year. The leader of the opposition, Tasmania's Labor senator Nick McKenna, argued that it wasn't a matter for the federal government except in wartime and spoke at length against the concept although he personally liked it. Other senators spoke for or against daylight saving before the debate was adjourned after about three and a half hours.

Apart from Tasmania, there wasn't much support for daylight saving among the states in the mid 1960s. From time to time, a few employer and other organisations indicated they would push for it although rural groups kept up their opposition. Victorian premier and farmer Henry Bolte of the Liberal Party said in February 1966 that his state wouldn't be initiating daylight saving. Prime minister Harold Holt liked the idea and asked state premiers in May of that year to consider it but at the Premiers' Conference the following month all had doubts about the scheme.

In the weeks after Tasmania started a one season trial of daylight saving in October 1967, New South Wales premier Robert Askin contacted other state premiers about a similar measure, maintaining that the states would need to do it together. But the views of the states were mixed and there seemed little chance of agreement. A Daylight Saving Association was formed in New South Wales in 1968 and there were various other groups in most states pressuring their respective governments to introduce or forget about daylight saving. Film distributors and cinema operators opposed daylight saving, as did the rural sector. Many rural groups made representations to government about their dislike of the measure. The cinema industry in New South Wales tried to partner other opponents of daylight saving in an attempt to build a stronger case, including the United Farmers' and Woolgrowers' Association of New South Wales, the Country Women's Association of NSW, pollution control organisations, dermatologists and eye specialists.

Meanwhile, a select committee of the Tasmanian Parliament was investigating the feasibility of annual daylight saving and the mainland states agreed to await the outcome before putting any plans of their own in place. While Tasmania went ahead with two more years of daylight saving, progress on the mainland was slow although the topic was discussed at premiers' conferences and other meetings.

At a conference to try and get agreement between the states on daylight saving in 1970, a compromise proposal for half an hour of daylight saving in 1970-71 was agreed to by New South Wales and Victoria while Queensland would consider it but later rejected it and the plan lapsed. Then, at a conference of state governments and the Commonwealth on 16 July 1971, there was agreement that New South Wales, Victoria, Queensland, Tasmania and the Australian Capital Territory would trial daylight saving in 1971-72, from 31 October to 27 February. South Australia and Western Australia didn't commit at the time but later announced they would join the experiment although Western Australia soon reversed its decision.

Bills were quickly passed although not without the usual debates on various aspects of daylight saving and its pros and cons. Each state had its own Act: the Daylight Saving Act 1971 in Victoria, South Australia and Queensland, and the Standard Time Act 1971 in New South Wales which included details of temporary daylight saving. The change was made by ordinance in the Australian Capital Territory. The Northern Territory had a bill but it was defeated although Alice Springs in the southern part of the territory used daylight saving in 1971-72. Tasmania had already used the scheme since 1967-68. Thus all of Australia except Western Australia and most of the Northern Territory had daylight saving in 1971-72.

Queensland abandoned the measure after one summer. Victoria, South Australia and the Australian Capital Territory initiated permanent daylight saving from 1972-73. Tasmania had this from 1970-71. Victoria's Summer Time Act 1972¹¹⁶ repealed the Daylight Saving Act 1971 and is still current with amendments. Similarly, South Australia's Daylight Saving Act 1971 is current but with changes. The Australian Capital Territory has the Standard Time and Summer Time Act 1972 with amendments. New South Wales had its Standard Time Act 1971 until repealed by the Standard Time Act 1987.

Support for daylight saving was high in the early 1970s as shown in the next table. While 70 per cent wanted it in September 1971, only 19 per cent were opposed and 11 per cent were undecided. In the next survey in February 1972, 67 per cent were in favour, but 32 per cent weren't and 1 per cent hadn't decided. A high 74 per cent supported it in August 1972 although this fell to 64 per cent in March 1973. It remained very popular in Tasmania and least liked in Queensland. Daylight saving was found to be more favoured by males and younger people. Surveys taken in winter or spring showed higher approval of the measure than those run in summer or autumn.

Proportion of people in favour of daylight saving, Australia

| <i>State</i> | <i>Sep 1971</i> | <i>Feb 1972</i> | <i>Aug 1972</i> | <i>Mar 1973</i> |
|-------------------|-----------------|-----------------|-----------------|-----------------|
| | — % — | | | |
| New South Wales | 77 | 69 | 78 | 67 |
| Victoria | 73 | 78 | 81 | 73 |
| Queensland | 52 | 41 | 49 | 39 |
| Western Australia | 56 | 49 | 58 | 56 |
| South Australia | 66 | 75 | 78 | 68 |
| Tasmania | 81 | 86 | 96 | 84 |
| Australia | 70 | 67 | 74 | 64 |

Source: Gallup poll results, *The Canberra Times*, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/110681492>, <http://trove.nla.gov.au/ndp/del/article/101758469>, <http://trove.nla.gov.au/ndp/del/article/102004269> and <http://trove.nla.gov.au/ndp/del/article/136968491>

At that stage, Norfolk Island, an external territory off the eastern coast of Australia, decided to have daylight saving but the experiment only lasted one year, 1974-75, under the island's Standard Time and Daylight Saving Act 1974. A similar Act in 1971 was never implemented and was repealed by the 1974 Act. There was no provision in the 1974 Act for daylight saving to go beyond 1974-75. In October 2015, Norfolk changed its time zone from UTC+11:30 to UTC+11, putting it just an hour ahead of standard time in Australia's eastern states and on the same time during daylight saving.

¹¹⁶ Despite the name, daylight saving has rarely been referred to as summer time in Australia.

Once legislation was in place for daylight saving and polls showed its popularity, less interest was shown by the New South Wales media, business groups and trade unions, and the Daylight Saving Association was quieter. Opposition fell away to some extent, at least from the cinema industry as noted by the University of New England's Keith Richmond:

One group to become strangely passive was the cinema industry. Once daylight saving became permanent, its opposition dissipated – never again did it conduct a public campaign on this issue.¹¹⁷

The rural sector, on the other hand, stepped up its attack on the proponents of daylight saving, targeting urban newspapers and politicians supporting the scheme. Many rural groups made representations to government about their dislike of the measure. The United Farmers' and Woolgrowers' Association of NSW claimed that 99.7 per cent of its members were opposed to daylight saving in a 1972 survey and proposed a referendum to decide if the state should continue with the scheme. Daylight saving was called "daylight slaving" and "midsummer madness". Next year the Country Party, which was in coalition with the Liberal Party and together held 49 seats in the 96 seat state Legislative Assembly, promised a referendum. But when the Labor Party drew attention to the \$500,000 estimated cost of the exercise, the Country Party changed its mind. The Coalition gained three seats in the November 1973 election and in 1974 the party got the Liberals to agree to a referendum, but the cost had risen to \$650,000 and the plan was again shelved.

In 1975, the United Farmers' and Woolgrowers' Association organised a petition and obtained over 40,000 signatures, one of the state's largest ever petitions. Also in that year, about 100 organisations calling for daylight saving to be abolished had been formed with claims of 100,000 members, far more than the action groups in 1974 against the Vietnam War. In October, Premier Askin announced a referendum to be held on 1 May 1976 at the same time as the state election and parliament quickly passed the Daylight Saving (Referendum) Act 1975. A Morgan Gallup poll at the time found that approval of daylight saving was 75 per cent among city people and 20 per cent were opposed, while 55 per cent of rural dwellers liked it and 41 per cent didn't.

Thus after five years of daylight saving, New South Wales voters were to decide whether the scheme should become permanent or be discarded (voting is compulsory in Australia). The ballot paper contained a statement and a question: "At present there is a period commonly called 'daylight saving' by which time is advanced by one hour for the period commencing on the last Sunday in October in each year and ending on the first Sunday in March in the following year. Are you in favour of daylight saving?" Electors had to write "yes" or "no" in the box next to the question. Daylight saving received overwhelming endorsement with 68 per cent of voters wanting it, 31

¹¹⁷ Keith Richmond, "Daylight saving in New South Wales: A case of emotive symbolic politics?", *Australian Journal of Public Administration*, vol. XXXVII, no. 4, December 1978, p. 378, at <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8500.1978.tb00449.x/abstract>

per cent against it and 1 per cent voting informal. Support in the Sydney area was above the state average while the percentage fell away in country regions.¹¹⁸

Another island off Australia's east coast, Lord Howe Island, part of New South Wales, started daylight saving in 1981-82. It had been in the UTC+10 time zone since 1895 despite local time being UTC+10:36. In March 1981, it changed to UTC+10:30 and commenced daylight saving later that year. Clocks were wound forward one hour from 1981-82 to 1984-85. Since 1985-86, the daylight saving time change has been 30 minutes, putting it on the same time as New South Wales in summer months. Not all of the island's residents were happy with this arrangement and a number of community consultations took place. Referendums in 1988 and 2000 resulted in the island staying with the half hour change.

Over in South Australia, residents in the western areas didn't like daylight saving as it put their clocks about one and a half to two hours ahead of their solar time, whereas people in the state's far more populous south-east, which includes capital city Adelaide, seemed quite happy with it and some wanted it for longer. Main advantages of daylight saving were seen as the following:

- ☀ It let people enjoy increased leisure time after work.
- ☀ It allowed the state to stay 30 minutes behind the eastern states, giving South Australia an advantage over Western Australia in the alignment of business hours.
- ☀ It was beneficial to energy conservation.

Disadvantages of daylight saving for residents in the state's west were as follows:

- ☀ Young children had to leave for school in the dark.
- ☀ The established opening and closing times of silos created difficulties for grain handlers to meet deadlines without incurring penalty rates for labour.
- ☀ Cows had to be milked in the heat of the afternoon delaying collection by milk carriers.¹¹⁹

In 1977, the Liberal Party in South Australia promised a referendum when they won government. They were elected in September 1979 with a swing of 8 per cent although it took nearly three years before a Referendum (Daylight Saving) Bill was brought into the House of Assembly by the premier, David Tonkin, on 11 August 1982. Before the bill came in, Labor's Anne Levy had wanted to extend the end date of daylight saving an extra month from the first Sunday in March to the first Sunday in April to save power. After the bill was introduced, Peter Blacker of the Nationals South Australia was critical of the then system of daylight saving and wanted to amend the bill with the following questions to be asked at the referendum:

- ☀ Are you in favour of daylight saving beginning on the last Sunday in October each year and continuing until the first Sunday in March of the following year?

¹¹⁸ Details by electoral district for the 1 May 1976 referendum are not online but are available in the form of "loose papers" from the State Records Authority of New South Wales at their Western Sydney Records Centre (see <http://search.records.nsw.gov.au/series/16072>).

¹¹⁹ South Australian Parliament Research Library, "South Australian Referenda, 1896-1991", 2008, pp. 55-56, at http://www.parliament.sa.gov.au/Library/ReferenceShare/Documents/ResearchPaper7_2008.pdf

- ☀ Are you in favour of daylight saving beginning at the beginning of the summer school holidays in each year and continuing until the end of those holidays in the following year?
- ☀ Are you in favour of daylight saving if standard time in South Australia is moved back by half an hour?
- ☀ Are you against daylight saving and in favour of moving standard time in South Australia back by half an hour?¹²⁰

Only one member supported this proposed amendment to the bill, presumably Blacker himself. The bill was passed and became the Referendum (Daylight Saving) Act 1982 on 9 September. The referendum question simply asked: “Are you in favour of daylight saving?” Voters had to write “yes” or “no” in the box next to the question. The referendum was held at the same time as the election on 6 November 1982.

The results of the referendum were quite conclusive with 70 per cent of votes in favour of daylight saving, 28 per cent opposed to it and 2 per cent informal. A breakdown by electoral district is shown in the following table. All metropolitan seats were strongly in favour of daylight saving. Most rural areas also preferred the measure. Four of the five rural seats that didn’t want daylight saving were west of Adelaide. The election was won by the Labor Party under John Bannon over the Liberal Party government led by David Tonkin with a swing of 6 per cent. Various factors went against the government but daylight saving didn’t seem to be one of them as the scheme had already been in place for 11 years and was popular in both Labor and Liberal seats. All seats that changed hands were in the metropolitan area.

Results of daylight saving referendum, South Australia, 1982

| <i>Electoral district</i> | <i>Yes</i> | <i>No</i> | <i>Informal</i> | <i>Election result</i> |
|---------------------------|------------|-----------|-----------------|--------------------------|
| | — % — | | | |
| Metropolitan | | | | |
| Adelaide | 71.7 | 24.2 | 4.1 | Labor |
| Albert Park | 75.0 | 21.6 | 3.5 | Labor |
| Ascot Park | 73.5 | 24.7 | 1.8 | Labor |
| Baudin | 82.1 | 16.4 | 1.5 | Labor |
| Bragg | 72.5 | 26.1 | 1.4 | Liberal |
| Brighton | 80.1 | 18.6 | 1.2 | Labor (from Liberal) |
| Coles | 73.4 | 23.3 | 3.4 | Liberal |
| Davenport | 77.8 | 21.0 | 1.2 | Liberal |
| Elizabeth | 79.2 | 18.8 | 2.0 | Labor |
| Fisher | 80.7 | 18.4 | 0.9 | Liberal |
| Florey | 75.6 | 22.5 | 1.9 | Labor |
| Gilles | 74.0 | 23.7 | 2.3 | Labor |
| Glenelg | 75.4 | 23.4 | 1.3 | Liberal |
| Hanson | 75.8 | 22.5 | 1.7 | Liberal |
| Hartley | 69.3 | 25.7 | 5.0 | Labor |
| Henley Beach | 74.5 | 22.6 | 2.9 | Labor (from Liberal) |
| Mawson | 83.1 | 15.9 | 1.1 | Labor (from Liberal) |
| Mitcham | 73.8 | 24.8 | 1.4 | Liberal (from Democrats) |
| Mitchell | 73.7 | 24.5 | 1.7 | Labor |
| Morphett | 74.4 | 24.1 | 1.6 | Liberal |
| Napier | 78.0 | 20.2 | 1.8 | Labor |
| Newland | 83.7 | 15.2 | 1.1 | Labor (from Liberal) |
| Norwood | 73.7 | 22.7 | 3.6 | Labor |

¹²⁰ Parliament of South Australia, *Hansard*, House of Assembly, 24 August 1982, p. 669, in South Australian Parliament Research Library, *South Australian Referenda, 1896-1991*, p. 56, at http://www.parliament.sa.gov.au/Library/ReferenceShare/Documents/ResearchPaper7_2008.pdf

| <i>Electoral district</i> | <i>Yes</i> | <i>No</i> | <i>Informal</i> | <i>Election result</i> |
|---------------------------|-------------|-------------|-----------------|---------------------------|
| Peake | 72.1 | 24.1 | 3.8 | Labor |
| Playford | 81.2 | 16.9 | 1.9 | Labor |
| Price | 69.3 | 26.2 | 4.5 | Labor |
| Ross Smith | 69.8 | 26.1 | 4.1 | Labor |
| Salisbury | 77.4 | 20.1 | 2.5 | Labor |
| Semaphore | 74.2 | 23.5 | 2.3 | Independent |
| Spence | 69.9 | 25.6 | 4.5 | Labor |
| Todd | 79.1 | 19.3 | 1.6 | Liberal |
| Torrens | 73.4 | 25.0 | 1.5 | Liberal |
| Unley | 75.1 | 22.6 | 2.3 | Labor |
| <i>Total</i> | <i>76.0</i> | <i>21.7</i> | <i>2.3</i> | |
| Rural | | | | |
| Alexandra | 60.3 | 38.1 | 1.5 | Liberal |
| Chaffey | 56.8 | 41.1 | 2.0 | Liberal |
| Eyre | 47.3 | 49.9 | 2.9 | Liberal |
| Flinders | 43.0 | 55.3 | 1.8 | Nationals South Australia |
| Goyder | 41.5 | 56.7 | 1.8 | Liberal |
| Kavel | 58.7 | 40.2 | 1.1 | Liberal |
| Light | 52.4 | 46.0 | 1.6 | Liberal |
| Mallee | 43.9 | 54.7 | 1.4 | Liberal |
| Mt Gambier | 70.6 | 27.4 | 2.0 | Liberal |
| Murray | 60.7 | 37.4 | 1.9 | Liberal |
| Rocky River | 45.0 | 54.0 | 1.0 | Liberal |
| Stuart | 59.8 | 38.1 | 2.1 | Labor |
| Victoria | 55.5 | 42.8 | 1.7 | Liberal |
| Whyalla | 73.5 | 23.8 | 2.7 | Labor |
| <i>Total</i> | <i>55.3</i> | <i>42.9</i> | <i>1.8</i> | |
| South Australia | 70.1 | 27.8 | 2.1 | |

Note: Components may not add to 100 due to rounding.

Source: *The South Australian Government Gazette*, 10 March 1983, p. 562, at

http://www.austlii.edu.au/au/other/sa_gazette/1983/11.pdf

Start and end dates for daylight saving were the same in New South Wales, Victoria, South Australia and Tasmania from 1971-72 to 1980-81. New South Wales extended its end date in 1981-82 by a month to 4 April. A study by the Energy Authority of New South Wales predicted significant power savings and the state energy minister subsequently reported a saving of 1 per cent, but in the following year the state brought its end date back a month. In Tasmania, there had been talk about lengthening the daylight saving period for some years and in 1981-82, the end date was pushed out to 28 March, but two years later, the end date was again the first Sunday in March.

By the early 1990s, the federal government was becoming frustrated with the lack of uniform daylight saving dates among the states. Those states with existing arrangements were chopping and changing end dates. Queensland had started daylight saving again from 1989-90 and aligned with New South Wales times. That left Western Australia as the only state without daylight saving, although when it did join the other states in 1991-92, this was the only year since World War II that all six states had daylight saving. And this is still the case as Queensland and Western Australia opted out of daylight saving after 1991-92 although the west had it again in 2006-07 to 2008-09.

The Australian government indicated it would consider federal legislation to bring about some uniformity. Section 51 (xv) of the Australian Constitution states that the federal parliament can make laws relating to “weights and measures”. These usually

refer to quantities, capacity, volume and dimensions, and their regulation is important in science, industry and commerce. Also, there is no mention in the National Measurement Act 1960 of time in the sense of standard time or daylight saving time. Despite this, in December 1990, federal Labor minister John Dawkins sent a letter to the Western Australian government indicating he was willing to use section 51 of the Australian Constitution to get the state to use daylight saving. Australia's attorney-general in the Gough Whitlam Labor government, Lionel Murphy, had said on 30 June 1974 that the federal parliament could legislate for daylight saving across Australia under the Constitution's "weights and measures" provision, overriding inconsistent state laws.

Whether the federal government could indeed use section 51 of the Constitution to enforce nationwide daylight saving remained unclear. As a result, the National Measurement (Standard Time) Amendment Bill was introduced into the House of Representatives by Labor's Ron Edwards, member for Stirling, Western Australia, on 18 April 1991. Clause 1 of the bill stated: "The Bill provides for the specification of standard time zones and the regulation of summer time in Australia and the external territories using the weights and measures power conferred by Section 51 (XV) of the Constitution." Clause 4 proposed that new sections (15A to 15E) be inserted into the National Measurement Act to give the federal government responsibility for Australia's standard time zones and daylight saving time.

Edwards drew an analogy of the different dates for daylight saving with the various rail gauges between the states. Uniform daylight saving, he argued, would mean lower energy usage, more recreation opportunities and reduced business costs. At the second reading, various members spoke for and against daylight saving and the bill itself before it passed this stage. It progressed through the committee stage and the third reading and went to the Senate.

However, at a meeting of the Labor caucus, Queensland Labor senator Mal Colston motioned to withdraw the bill in the wake of a lack of support for daylight saving in that state as shown by the result of a referendum on 22 February 1992 where just 45 per cent of voters were in favour of winding the clocks forward. A majority of members supported the motion and the bill was removed from the Senate notice paper on 4 March 1992. The decision was perhaps vindicated by the outcome of a daylight saving referendum in Western Australia a month later on 4 April where there was only 47 per cent support.

The Australia government remained concerned about the different end dates for daylight saving among the states, especially in 1995 when Victoria shifted to the last Sunday in March and New South Wales stayed with the first Sunday, meaning that the two largest states were out of synchronisation. On 6 March, Labor member Harry Jenkins from Victoria felt that if the states that chose to use daylight saving couldn't agree on an end date, constitutional power should be used to determine a common date. New South Wales moved its end date to the last Sunday in March in 1996 and all four daylight saving states had the same finish date. Start dates still differed though, with Tasmania keeping its early start date of the first Sunday in October whereas the other states stayed with the last Sunday.

An amendment relating to Coordinated Universal Time was added to the National Measurement Act in 1997 and amended in 2004. Part II, section 8AA Co-ordinated Universal Time states: “The Chief Metrologist is to maintain, or cause to be maintained, Co-ordinated Universal Time (UTC) as determined by the International Bureau of Weights and Measures.” There remains no mention of daylight saving time in the Act.

Senate president Paul Calvert of the Liberal Party wrote to the prime minister, John Howard, in November 2005 urging him to use constitutional powers to impose uniform daylight saving across Australia. The Tasmanian senator suggested consistent times be discussed at the next Council of Australian Governments meeting. He described the “maze of different times” as a “real shackle on the economy, as well as causing interruptions to work and family balance”. Tasmania still had a different start date to the other states on daylight saving, and Queensland, Western Australia and the Northern Territory didn’t use the scheme. Howard was sympathetic and thought the mainland states should shift their start date from late to early October in line with Tasmania. He had mentioned the need for a shake-up of time zones in 1999. Peter Conway of the Canberra Institute in November 2006 also encouraged the government to use its powers to force consistent daylight saving times.

Following discussions over many years, the states of New South Wales, Victoria, South Australia and Tasmania and the Australian Capital Territory agreed on common start and end dates for daylight saving in April 2007: from the first Sunday in October to the first Sunday in April which sometimes falls in the middle of Easter. Uniform times for these states took effect from 2008 and respective state legislation was updated to reflect this change. The last occasion these jurisdictions had used the same daylight saving dates was 1988-89. Western Australia, which didn’t change its start and end dates, last had daylight saving in 2008-09 and Queensland hasn’t had it since 1991-92. Neither state looks likely to reintroduce it in the foreseeable future.

The following table shows all daylight saving start and finish dates to 2016-17 for the four states that have used the measure each year since 1971-72.

Daylight saving dates, Australia

| <i>Year</i> | <i>Start date</i> | | | | <i>End date</i> | | | |
|-------------|-------------------|------------|-----------|------------|-----------------|------------|-----------|------------|
| | <i>NSW</i> | <i>Vic</i> | <i>SA</i> | <i>Tas</i> | <i>NSW</i> | <i>Vic</i> | <i>SA</i> | <i>Tas</i> |
| 1916-17 | Jan 1 | Jan 1 | Jan 1 | Oct 1 | Mar 25 | Mar 25 | Mar 25 | Mar 25 |
| 1917-18 | – | – | – | Oct 28 | – | – | – | Mar 3 |
| 1918-19 | – | – | – | Oct 27 | – | – | – | Mar 2 |
| 1942 | Jan 1 | Jan 1 | Jan 1 | Jan 1 | Mar 29 | Mar 29 | Mar 29 | Mar 29 |
| 1942-43 | Sep 27 | Sep 27 | Sep 27 | Sep 27 | Mar 28 | Mar 28 | Mar 28 | Mar 28 |
| 1943-44 | Oct 3 | Oct 3 | Oct 3 | Oct 3 | Mar 26 | Mar 26 | Mar 26 | Mar 26 |
| 1967-68 | – | – | – | Oct 1 | – | – | – | Mar 31 |
| 1968-69 | – | – | – | Oct 27 | – | – | – | Mar 9 |
| 1969-70 | – | – | – | Oct 26 | – | – | – | Mar 8 |
| 1970-71 | – | – | – | Oct 25 | – | – | – | Mar 14 |
| 1971-72 | Oct 31 | Oct 31 | Oct 31 | Oct 31 | Feb 27 | Feb 27 | Feb 27 | Feb 27 |
| 1972-73 | Oct 29 | Oct 29 | Oct 29 | Oct 29 | Mar 4 | Mar 4 | Mar 4 | Mar 4 |
| 1973-74 | Oct 28 | Oct 28 | Oct 28 | Oct 28 | Mar 3 | Mar 3 | Mar 3 | Mar 3 |
| 1974-75 | Oct 27 | Oct 27 | Oct 27 | Oct 27 | Mar 2 | Mar 2 | Mar 2 | Mar 2 |
| 1975-76 | Oct 26 | Oct 26 | Oct 26 | Oct 26 | Mar 7 | Mar 7 | Mar 7 | Mar 7 |
| 1976-77 | Oct 31 | Oct 31 | Oct 31 | Oct 31 | Mar 6 | Mar 6 | Mar 6 | Mar 6 |
| 1977-78 | Oct 30 | Oct 30 | Oct 30 | Oct 30 | Mar 5 | Mar 5 | Mar 5 | Mar 5 |

| Year | Start date | | | | End date | | | |
|---------|------------|--------|--------|--------|----------|--------|--------|--------|
| | NSW | Vic | SA | Tas | NSW | Vic | SA | Tas |
| 1978-79 | Oct 29 | Oct 29 | Oct 29 | Oct 29 | Mar 4 | Mar 4 | Mar 4 | Mar 4 |
| 1979-80 | Oct 28 | Oct 28 | Oct 28 | Oct 28 | Mar 2 | Mar 2 | Mar 2 | Mar 2 |
| 1980-81 | Oct 26 | Oct 26 | Oct 26 | Oct 26 | Mar 1 | Mar 1 | Mar 1 | Mar 1 |
| 1981-82 | Oct 25 | Oct 25 | Oct 25 | Oct 25 | Apr 4 | Mar 7 | Mar 7 | Mar 28 |
| 1982-83 | Oct 31 | Oct 31 | Oct 31 | Oct 31 | Mar 6 | Mar 6 | Mar 6 | Mar 27 |
| 1983-84 | Oct 30 | Oct 30 | Oct 30 | Oct 30 | Mar 4 | Mar 4 | Mar 4 | Mar 4 |
| 1984-85 | Oct 28 | Oct 28 | Oct 28 | Oct 28 | Mar 3 | Mar 3 | Mar 3 | Mar 3 |
| 1985-86 | Oct 27 | Oct 27 | Oct 27 | Oct 27 | Mar 16 | Mar 16 | Mar 16 | Mar 2 |
| 1986-87 | Oct 19 | Oct 19 | Oct 19 | Oct 19 | Mar 15 | Mar 15 | Mar 15 | Mar 15 |
| 1987-88 | Oct 25 | Oct 25 | Oct 25 | Oct 25 | Mar 20 | Mar 20 | Mar 20 | Mar 20 |
| 1988-89 | Oct 30 | Oct 30 | Oct 30 | Oct 30 | Mar 19 | Mar 19 | Mar 19 | Mar 19 |
| 1989-90 | Oct 29 | Oct 29 | Oct 29 | Oct 29 | Mar 4 | Mar 18 | Mar 18 | Mar 18 |
| 1990-91 | Oct 28 | Oct 28 | Oct 28 | Oct 28 | Mar 3 | Mar 3 | Mar 3 | Mar 31 |
| 1991-92 | Oct 27 | Oct 27 | Oct 27 | Oct 27 | Mar 1 | Mar 1 | Mar 22 | Mar 29 |
| 1992-93 | Oct 25 | Oct 25 | Oct 25 | Oct 4 | Mar 7 | Mar 7 | Mar 7 | Mar 28 |
| 1993-94 | Oct 31 | Oct 31 | Oct 31 | Oct 3 | Mar 6 | Mar 6 | Mar 20 | Mar 27 |
| 1994-95 | Oct 30 | Oct 30 | Oct 30 | Oct 2 | Mar 5 | Mar 26 | Mar 26 | Mar 26 |
| 1995-96 | Oct 29 | Oct 29 | Oct 29 | Oct 1 | Mar 31 | Mar 31 | Mar 31 | Mar 31 |
| 1996-97 | Oct 27 | Oct 27 | Oct 27 | Oct 6 | Mar 30 | Mar 30 | Mar 30 | Mar 30 |
| 1997-98 | Oct 26 | Oct 26 | Oct 26 | Oct 5 | Mar 29 | Mar 29 | Mar 29 | Mar 29 |
| 1998-99 | Oct 25 | Oct 25 | Oct 25 | Oct 4 | Mar 28 | Mar 28 | Mar 28 | Mar 28 |
| 1999-00 | Oct 31 | Oct 31 | Oct 31 | Oct 3 | Mar 26 | Mar 26 | Mar 26 | Mar 26 |
| 2000-01 | Aug 27 | Aug 27 | Oct 29 | Aug 27 | Mar 25 | Mar 25 | Mar 25 | Mar 25 |
| 2001-02 | Oct 28 | Oct 28 | Oct 28 | Oct 7 | Mar 31 | Mar 31 | Mar 31 | Mar 31 |
| 2002-03 | Oct 27 | Oct 27 | Oct 27 | Oct 6 | Mar 30 | Mar 30 | Mar 30 | Mar 30 |
| 2003-04 | Oct 26 | Oct 26 | Oct 26 | Oct 5 | Mar 28 | Mar 28 | Mar 28 | Mar 28 |
| 2004-05 | Oct 31 | Oct 31 | Oct 31 | Oct 3 | Mar 27 | Mar 27 | Mar 27 | Mar 27 |
| 2005-06 | Oct 30 | Oct 30 | Oct 30 | Oct 2 | Apr 2 | Apr 2 | Apr 2 | Apr 2 |
| 2006-07 | Oct 29 | Oct 29 | Oct 29 | Oct 1 | Mar 25 | Mar 25 | Mar 25 | Mar 25 |
| 2007-08 | Oct 28 | Oct 28 | Oct 28 | Oct 7 | Apr 6 | Apr 6 | Apr 6 | Apr 6 |
| 2008-09 | Oct 5 | Oct 5 | Oct 5 | Oct 5 | Apr 5 | Apr 5 | Apr 5 | Apr 5 |
| 2009-10 | Oct 4 | Oct 4 | Oct 4 | Oct 4 | Apr 4 | Apr 4 | Apr 4 | Apr 4 |
| 2010-11 | Oct 3 | Oct 3 | Oct 3 | Oct 3 | Apr 3 | Apr 3 | Apr 3 | Apr 3 |
| 2011-12 | Oct 2 | Oct 2 | Oct 2 | Oct 2 | Apr 1 | Apr 1 | Apr 1 | Apr 1 |
| 2012-13 | Oct 7 | Oct 7 | Oct 7 | Oct 7 | Apr 7 | Apr 7 | Apr 7 | Apr 7 |
| 2013-14 | Oct 6 | Oct 6 | Oct 6 | Oct 6 | Apr 6 | Apr 6 | Apr 6 | Apr 6 |
| 2014-15 | Oct 5 | Oct 5 | Oct 5 | Oct 5 | Apr 5 | Apr 5 | Apr 5 | Apr 5 |
| 2015-16 | Oct 4 | Oct 4 | Oct 4 | Oct 4 | Apr 3 | Apr 3 | Apr 3 | Apr 3 |
| 2016-17 | Oct 2 | Oct 2 | Oct 2 | Oct 2 | Apr 2 | Apr 2 | Apr 2 | Apr 2 |

Notes:

- Table shows New South Wales, Victoria, South Australia and Tasmania. Not shown are Queensland, Western Australia, Northern Territory and Australian Capital Territory.
- Queensland has only had daylight saving in 1971-72 when it used the same dates as the other states, and 1989-90 to 1991-92 when it used the same dates as the adjoining state of New South Wales.
- Western Australia has only had it in 1974-75 and 1983-84 when it used the same dates as the other states, 1991-92 when it started later than the other states on 17 November, and 2006-07 to 2008-09 when it mainly used different dates from the other states, namely 3 December to 25 March, 28 October to 30 March, and 26 October to 29 March.
- Northern Territory has only ever had daylight saving under federal legislation during the world wars, except Alice Springs in 1971-72.
- Australian Capital Territory has had daylight saving during wartime and each year since 1971-72 with dates the same as New South Wales (which surrounds it), except 1981-82 when its end date was 7 March, which coincided with Victoria and South Australia.

Sources: mainly Time and Date AS, at <https://www.timeanddate.com>; and Australian Government, Bureau of Meteorology, "Daylight saving times," at http://www.bom.gov.au/climate/averages/tables/dst_times.shtml

A proposal in 2015 to alter standard time in South Australia from UTC+9:30 to UTC+10 would have put clocks in Adelaide 46 minutes ahead of mean solar time in winter and a further hour forward in summer with daylight saving. The state government supported the plan after a report indicated the economy could benefit by \$2.5 billion as the state would be on the same time as the eastern states. But only 15 per cent of responses in a public consultation favoured the move, while 41 per cent wanted to shift half an hour the other way and 42 per cent preferred the status quo. The opposition and independents were also against the change and the government didn't have the numbers in the Legislative Council and dropped the idea. In 2016, minor party Family First introduced a bill to shift the state back half an hour to UTC+9 but it didn't get the support of the government or opposition.

19 Contentious in the Sunshine State

The issue of daylight saving time comes up in Queensland twice a year, when most other Australian states move their clocks forward in spring and back again in autumn. On each occasion, there are newspaper articles, letters to the editor and comments on forums for or against daylight saving. Apart from wartime, Queensland has only had daylight saving in four years: one year in the early 1970s and three in the early 1990s.

Queensland is a large and diverse state. To put things in perspective, it is a fraction larger than Alaska, easily the largest of the US states. It is two and a half times bigger than Texas, and seven times the size of the United Kingdom. Queensland is also very diverse, with large areas of desert or semidesert, a hot and humid coastal belt in the north, and a more temperate area in the south which can vary from subtropical to below freezing. Important industries include agriculture, mining and tourism. Just over half the state lies in the tropics. The state extends from longitude 138 degrees to 154 degrees east and from latitude 10 degrees to 29 degrees south. There are bound to be controversies relating to time zones and daylight saving time in a state or country the size and diversity of Queensland.

The whole state uses UTC+10 as its standard time zone. Capital city Brisbane, in the state's south-east corner, has a mean solar time of UTC+10:12. By contrast, in most of Queensland and most places around the world, standard time is later than local time and, in many, an hour of daylight saving is added on in summer. Because south-east Queensland's local time is ahead of its standard time and it doesn't have daylight saving, it starts getting light very early in the warmer months for a subtropical location. The first inkling of daylight in Brisbane in December is before 4 a.m. and the sun is up well before 5 a.m. At the other end of the day, the sun sets quite early, at about 6:45 p.m. and civil twilight ends at about 7:10 p.m.

In other parts of the state, the situation is quite different. In the city of Cairns on the tropical north coast, sunrise is around 5:40 a.m. although sunset is similar to Brisbane at close to 6:50 p.m. at the summer solstice. Cairns has a local time of UTC+9:43, so it already "saves" quite a bit more daylight than Brisbane. In Mount Isa in the state's north-west, the sun rises at about 6 a.m. and sets after 7:20 p.m. in late December. Local time in Mount Isa is UTC+9:18, meaning it "saves" a lot more daylight compared with the state's south-east. Thus there is less need to turn the clocks forward in these areas. If Mount Isa had daylight saving, its clocks would be one hour 42 minutes ahead of solar time and sunrise by early April would be 7:50 a.m. Against this background, plenty of support for daylight saving is always going to be shown in the state's populous and relatively cooler south-east, including Brisbane, Gold Coast and Sunshine Coast, but not generally in the rest of the state.

Unlike Victoria and New South Wales, there seemed to be little interest in daylight saving in Queensland before World War I despite encouragement by these other states at premiers' conferences. Queensland first had daylight saving in 1917, starting on 1 January, along with the rest of Australia under the federal Daylight Saving Act 1916 as a fuel saving measure during World War I. At its quarterly meeting in Brisbane on 22 February, the Queensland Farmers' Union strongly opposed the move "as being inimical to the interests of the man on the land". In both the state's city and rural

areas, there was general dissatisfaction with daylight saving as in the rest of Australia. Clocks were turned back as scheduled on 25 March and the Act soon repealed. Only Tasmania had daylight saving for the rest of the war.

The state had no daylight saving in the interwar period although a number of groups pushed for it. One was the Queensland State Service Union which in August 1933 advocated a return to daylight saving. A Brisbane doctor was also in support of the scheme, pointing out the importance of sunlight and vitamin D to health. But the premier, William Forgan Smith, was cool on the idea and the Taxpayers' Association felt there would be little advantage to industry.

The Queensland Cricket Association and the Queensland Amateur Athletic Association came out in support of daylight saving in October 1938. It would give cricketers an extra hour of practice and athletes wouldn't have to train in the dark or the early morning. But health authorities, including Raphael Cilento, medical practitioner and director-general of the state's Health Department, said the advantages to wellbeing would be slight and not enough to offset the disadvantages for business and that daylight saving became less useful in low latitudes. On this occasion, Forgan Smith said the scheme hadn't been given a fair trial in Australia and noted that it worked well in the United Kingdom and New Zealand. The Chamber of Commerce, Chamber of Manufactures, and Trades and Labour Council weren't particularly keen although the Chamber of Manufactures felt it could be applied in winter so that workers could get home before dark. Again, the idea went no further.

Queensland was the only state where more people were against daylight saving than for it in November 1941, according to a Gallup poll by Australian Public Opinion Polls. Just 41 per cent wanted it and 46 per cent didn't, with 13 per cent unsure. The national figures were 50 per cent, 34 per cent and 16 per cent.

The state had daylight saving during World War II along with the rest of Australia in 1942 (1 January to 29 March), 1942-43 (27 September to 28 March), and 1943-44 (3 October to 26 March) (except Western Australia). Again, there was some vocal opposition despite a national opinion poll taken in March 1942 indicating good support in Queensland with about 60 per cent satisfied with daylight saving and 30 per cent dissatisfied. In 1942, the Queensland branch of the Australian Railway Union argued that fuel wouldn't be saved and that industrial accidents might increase due to fatigue as workers have to get up earlier. The state's dairy farmers and factories were also against daylight saving and threatened to ignore it, strike, or put their clocks forward only half an hour. They said their costs would increase and deliveries would be later. The tower clocks at Brisbane's City Hall had to be put forward by half minute intervals.

Support for daylight saving in Queensland fell to 55 per cent in a March 1943 national Gallup poll and to just 41 per cent in August of that year. In Mossman in the north, a meeting of the local Chamber of Commerce, businesses, sugar cane growers, workers and other residents on 27 September passed a resolution against daylight saving, which was due to start again the following week: "We consider it to be impracticable, and to be injurious to the health of the people; that it does not serve any useful purpose ... We request that this area be exempted ..." and sent it to their federal member William Riordan. The meeting felt that the area's latitude, 16 degrees south,

meant that daylight saving made the mornings dark for farmers and children travelling long distances to school.

At that time, federal member Bernard Corser, also from Queensland, urged the prime minister, John Curtin, to reconsider the state's position as Cabinet had already exempted Western Australia from daylight saving for 1943-44. Corser referred to the protests around the state, particularly by primary producers and industry in rural areas, as well as by people eating tea in the heat of the day in northern and western parts and then having trouble getting children to bed while it was still light.

Curtin didn't change his mind though as standard time was already 17 minutes ahead of sun time in his home state's capital city, Perth, and coal shortages were less critical in the west. Due to severe shortfalls elsewhere, he felt it was important to keep other states on daylight saving time. Also, the government wanted a 5 per cent reduction in electricity usage in Australia's munitions industry. Consequently, Queensland had daylight saving again in 1943-44 along with the southern states. This was the last year the state would turn its clocks forward until 1971. There wasn't much interest in daylight saving in the intervening period although in the late 1950s the state government suggested the scheme be run on a national basis.

In September 1971, a Gallup poll found that 52 per cent of Queenslanders approved of daylight saving while 35 per cent didn't and 13 per cent were undecided. Nationally, 70 per cent supported it. Most states trialled daylight saving in 1971-72, from 31 October to 27 February. With some reluctance, Queensland decided to conduct its own trial largely to align with New South Wales and Victoria and passed the Daylight Saving Act 1971 on 21 October. While most city people seemed to like the longer days, rural areas weren't keen. Cabinet discussed daylight saving five times over summer and the premier, Joh Bjelke-Petersen of the Country Party (later renamed the National Party), clearly didn't like the scheme.

Brisbane's *The Courier-Mail* newspaper said the state shouldn't opt out of daylight saving after just one year when southern states were in support. But Queensland was a conservative state with an autocratic premier who could be quite fiery. Liberal Party member Don Lane noted that in Cabinet meetings, Bjelke-Petersen would "start to yell and threaten" and "go red in the face and become more incoherent".¹²¹ Before the end of the daylight saving period in February 1972, the premier announced that Queensland wouldn't support any continuation of the measure next summer (1972-73). But his comments reflected the mood of the people, with approval of daylight saving in the state falling to 41 per cent (nationally, 67 per cent) in that month.

Despite an electoral redistribution in 1971, the Country-Liberal Coalition won 47 of the 82 seats with 42 per cent of votes and Labor 33 seats with 47 per cent in the unicameral parliament at the May 1972 state election although the two partners fought over how many spots each should have in the Cabinet in a city versus country battle. In July, *The Courier-Mail* warned that the state mustn't go "into its own Twilight Zone" over daylight saving as it would cause economic disruption.

¹²¹ Queensland State Archives, "1972 Cabinet Documents", at <http://www.archives.qld.gov.au/Researchers/CommsDownloads/Documents/1972CabinetDocuments.pdf>

But Cabinet agreed that the premier would oppose daylight saving at the Premiers' Conference on 21 July 1972 although the decision wasn't unanimous, with some Liberal Party members not agreeing with the views of Country Party members. At the conference, Bjelke-Petersen said Queensland didn't want daylight saving as people would be going to work in the dark. While this would be rare outside of a few occupations in the state's south-east where broad daylight is quite early in summer, it would be more common the further north or west.

Some members of the Country Party, the Coalition's senior partner, threatened retaliation against their Liberal colleagues if they supported daylight saving, according to newspaper reports. After a Cabinet meeting on 31 July 1972 that included a two hour discussion on daylight saving, approval for a referendum on the issue was announced the following day. Next week, however, the government decided there would be no referendum by a Cabinet vote of 26 to 18.

The decision was to the relief of the United Graziers' Association and other rural groups, but not to the tourism and finance sectors. There was open revolt on the Gold Coast where the charge was led by mayor Bruce Small who had been recently elected to state parliament as a Country Party member and had abstained from the final vote. Liberal Party leader and treasurer Gordon Chalk also openly dissented the government's decision. The Brisbane Stock Exchange and the State Treasury decided to use daylight saving time. According to Cabinet documents, the daylight saving issue "almost caused a permanent fracture"¹²² in the sometimes fragile Country-Liberal alliance. The Queensland Chamber of Manufactures announced in September that 40 large firms were thinking of operating on daylight saving time over the summer of 1972-73, but plans were abandoned on 11 October.

Next year, on 27 February 1973, the premier and Cabinet set up a committee to review daylight saving. Its purpose wasn't to gauge whether Queensland should turn its clocks forward in subsequent years, or to review the 1971-72 trial, but to:

... examine the effects on all sections of the community of Queensland of the time difference of one hour that existed during the recent period daylight saving was in force in New South Wales, Victoria, South Australia and the Australian Capital Territory.¹²³

Thus the idea was to find out the effect on Queensland of being an hour different from the other states in the summer of 1972-73. Daylight saving time finished in these jurisdictions and Tasmania on 4 March. Committee chairman, Peter Bell, was past president of the United Graziers' Association, an organisation noted for not liking daylight saving. Submissions were called from across the state and there were 10 public meetings. Not surprisingly, the committee found that urban areas liked daylight saving and rural areas didn't. Farmers, women, the elderly and the theatre industry weren't in favour of it. The committee admitted the time difference led to some

¹²² Queensland State Archives, "1972 Cabinet documents", at <http://www.archives.qld.gov.au/Researchers/CommsDownloads/Documents/1972CabinetDocuments.pdf>

¹²³ Queensland Government, "Committee on Daylight Saving, Report", 1973, p. 1, in Queensland Parliamentary Library, *Daylight Saving in Queensland: Daylight Saving for South East Queensland Referendum Bill 2010 (Qld)*, p. 14, at <http://www.parliament.qld.gov.au/documents/explore/researchpublications/researchbriefs/2010/rbr201022.pdf>. It should be noted that Tasmania also had daylight saving time.

inconvenience, but felt that Queensland's geography just wasn't suited. A report was presented on 3 July 1973 recommending that the state "should not adopt daylight saving". The report also addressed the issue to dual time zones, stating:

The Committee sees little merit in proposals for two time zones in Queensland as it believes there would be a greater inconvenience in regard to intra-State trade and communications than existed in relation to interstate during the period the time difference of one hour existed ...¹²⁴

The government accepted the committee's findings. Bjelke-Petersen said: "I think this will settle it for all time. Queensland will not have daylight saving this summer [1973-74] or in the foreseeable future." The Daylight Saving Act 1971 was revoked along with several hundred other old state acts of all descriptions via the Acts Repeal Act 1973, which gained royal assent on 22 October. Jokes by supporters of daylight saving that opponents didn't like it as it fades the curtains and upsets the cows gained momentum and have persisted to some extent to the current day.

Brisbane hosted the Commonwealth Games in 1982 attracting many interstate and overseas visitors. There were suggestions for a period of daylight saving. Dates for the games were 30 September to 9 October, a time when daytime temperatures were about 25 degrees Celsius (high 70s Fahrenheit). But sunset was around 5:50 p.m. and sunrise 5:25 a.m., both early. Rob Akers, Liberal Party member for Pine Rivers, raised the issue in state parliament. He pointed out that:

Thousands of visitors to Brisbane, the Gold Coast and the Sunshine Coast will be deprived of 10 hours of the opportunity to enjoy our hospitality in Queensland, shop in Queensland shops, visit Queensland tourist attractions and spend their money generally in Queensland. I realise that they can get out of bed an hour earlier each day to make use of that time but, because of our trading hours and industrial awards, everything will be closed at that time of the day. They will have to walk along empty streets.¹²⁵

He spoke of the millions of dollars of lost business due to the time difference between Queensland and the southern states. He also referred to a New South Wales study that found a decrease in annual pedestrian and cyclist deaths in that state from 81 to 53 when daylight saving was introduced. But it was 12:40 a.m. and little interest was shown.

In 1987, Labor prime minister Bob Hawke told a conference why he thought there would never be daylight saving in Queensland under Bjelke-Petersen who was still premier: "That's because he reckons the sun shines out of his arse and he's not getting out of bed an hour earlier for anyone."¹²⁶ On 1 December of that year, the premier resigned and quit politics following loss of support within his party and amid

¹²⁴ Queensland Parliamentary Library, *Daylight Saving in Queensland: Daylight Saving for South East Queensland Referendum Bill 2010 (Qld)*, p. 14, at <http://www.parliament.qld.gov.au/documents/explore/researchpublications/researchbriefs/2010/rbr201022.pdf>

¹²⁵ Parliament of Queensland, *Parliamentary Debates [Hansard]*, 23 March 1982, p. 5033, at http://www.parliament.qld.gov.au/documents/hansard/1982/1982_03_23.pdf

¹²⁶ "Sun things never change", *Herald Sun*, Melbourne, Victoria, Australia, 6 October 2007, at <http://www.heraldsun.com.au/news/opinion/sun-things-never-change/story-e6frfiffo-111114579972>

allegations of widespread corruption within the government brought to light by the Fitzgerald Inquiry. The new premier was the National Party's Mike Ahern.

Momentum for daylight saving built in 1988. The Liberal Party, which hadn't been part of government since 1983 when the National Party ended the coalition, led the charge, hoping to gain seats in the state election due in late 1989. The push intensified during that year with the Liberal and Labor parties and the media all supporting daylight saving. The National Party still rejected it and on 9 August, the party's state president Robert Sparkes told Ahern to abide by the position, which he did until 21 August.

On that day, he went against party policy and introduced a Daylight Saving Bill into the Queensland Parliament, announcing a trial for the summer of 1989-90. Pressure from business and Brisbane Liberal mayor Sallyanne Atkinson had led to the backdown. Also, a government survey found that 71 per cent of residents wanted daylight saving although the proportion was much lower outside the south-east. Further, an election was due in a few months and the National Party was keen to hold onto its six seats on the Gold Coast, where support for a time change was high. Twenty minutes after the announcement, the whole state government switchboard became jammed with calls opposing the plan. There were sackloads of mail complaining about the decision for months and death threats against public servants.

Daylight saving was probably the main issue prompting party stalwart Russell Cooper to challenge Ahern for leadership. Ahern survived a spill motion by 26 votes to 21 on 29 August. The Daylight Saving Act 1989 covering just 1989-90 (29 October to 4 March) was passed by parliament on 18 September. But Cooper was voted in by government members as premier a week later.

A possible backlash by the state's north and west over daylight saving prompted the government to set up a Daylight Saving Task Force to receive submissions before and during the time change, to ensure no part of the community was disadvantaged by it, and to monitor the implementation of the trial. The task force was to report the results of the test by 30 April 1990 and recommend whether Queensland should have daylight saving in future years. By the time the task force released its 63 page "Report of the Trial of Daylight Saving" on 27 April, Queensland had a new government, the Labor Party having been swept to power on 7 December 1989 with Wayne Goss as premier. The National Party had been brought undone mainly by the findings of the Fitzgerald Inquiry (1987-1989) into government corruption rather than daylight saving or any other issue.

The task force received 23,399 written submissions from individuals and 760 from organisations, 17,691 phone calls, and 69,735 signatures on petitions. Basically, the south-east liked daylight saving and the rest of the state didn't want it.

Main points found by the task force in favour of daylight saving were:

- ⊗ business hours being aligned with those in the southern states
- ⊗ time being available in the evening for leisure/recreation activities [in good light]
- ⊗ less disruption for tourism and travel
- ⊗ more gardening able to be undertaken in evenings and, therefore, more time available on weekends for other activities

- ☀ parents having more time available to spend with their children in family activities such as barbeques and sport
- ☀ same time all along the east coast
- ☀ being able to sleep longer in the morning.

Main points found against daylight saving were:

- ☀ Queensland does not have an appropriate climate for daylight saving – it is too hot
- ☀ it is too hot to garden [after work]
- ☀ difficulties with children – getting them to bed while it is still light and problems in the morning because they have had insufficient sleep, and issues concerning children eating meals at the normal times
- ☀ children having to catch school buses in the morning in darkness and semi-darkness
- ☀ children having to travel home in the heat of the day
- ☀ sporting activities being held in hot times of the day
- ☀ family life being negatively impacted on, especially in farming families, with the farmer not returning home until late
- ☀ temperatures too hot for meals to be prepared and eaten at normal times, and problems with having later meals
- ☀ country people being unable to watch the television news, weather and market reports because they were working later into the evening
- ☀ days were too long
- ☀ greater risk of developing skin cancer
- ☀ primary production issues: milking times; later burning of cane; harvesting difficulties due to dew on crops; problems with machinery break downs late in the day and difficulty of obtaining parts at that time; increased working hours.

The task force recommended that:

- ☀ daylight saving be introduced for that part of the State east of 151° East longitude for the period adopted by other States and that Eastern Standard Time apply to the rest of the State
- ☀ daylight saving continue for a further two years (only in that part of Queensland to the east of 151° East longitude) and then consider whether a review is necessary
- ☀ the question of whether a referendum should be held be deferred until the end of the further trial period of two years
- ☀ it be proposed, by Queensland, at a Premiers' Conference that daylight saving of half an hour be introduced for the whole year for the eastern States
- ☀ a unit of specialist staff be established to review issues of concern and that necessary funding be provided.¹²⁷

The area to the east of the 151st meridian east covers Gladstone in the north and all coastal areas to its south, as well as Brisbane and the rest of south-east Queensland, Toowoomba and quite a large rural area of many farms and smaller towns. The meridian doesn't run through the middle of any town. However, the task force received nearly three times as many public submissions calling for a simple change to business hours as a dual time zone for the state.

¹²⁷ Queensland Parliamentary Library, *Daylight Saving in Queensland: Daylight Saving for South East Queensland Referendum Bill 2010 (Qld)*, pp. 17-18, at <http://www.parliament.qld.gov.au/documents/explore/researchpublications/researchbriefs/2010/rbr201022.pdf>

Surveys run by local newspapers in the north and west of the state over the 1989-90 summer indicated that almost everyone in these areas was against daylight saving. Business in the north wasn't interested either. In Cairns, a Chamber of Commerce survey found that 74 per cent of its members didn't favour the change. Polls in newspapers in the northern part of the government's preferred daylight saving region showed that a large majority of people in this area opposed it. Even in the state's south-east, people seemed to be changing their minds. A poll in mid March 1990 by *The Sunday Mail* and Channel 7 revealed that 57 per cent of Gold Coast and Sunshine Coast residents didn't want daylight saving. It should be noted that the various media surveys were phone-in or write-in and therefore not necessarily representative of the population.

Despite all this, in August 1990, the government decided to introduce permanent daylight saving for the whole state from November to March each year. According to Goss, this would "settle the issue once and for all so that business and tourism can operate with the minimum of disruption". He wrote to all local councils saying that Cabinet is aware that some districts, particularly in the state's north and west, have "legitimate concerns" about daylight saving and that the government will consider proposals from them to minimise the effects, such as a change in school, work or trading hours. This did little to appease many communities. As the member for the northern electoral district of Mulgrave, Labor's Warren Pitt, said in parliament on 3 October: "... no issue has raised the ire of my constituents as much as the proposal to introduce daylight saving".

The deadline for the Summer Time Bill 1990 to be enacted was 5 October. It was introduced into parliament by Goss two days earlier. With the Speaker calling "Order" numerous times, a lively and often fiery debate on the bill went for two and a half hours on the evening of 4 October and was passed just after midnight. Labor members went with the party preference even though, according to Labor member Ken Davies, only about 60 per cent supported daylight saving. He thought 70 per cent of National Party members were in favour (looks high) although many or all of them abstained from the vote. All Liberal members were known to be in support.

The bill was assented to on 5 October and became the Summer Time Act 1990. The Act provided for an hour of daylight saving from the last Sunday in October to the first Sunday in March each year. Under the Act, a Committee of Advice of 5-7 people with business, trade union, government, transport and education backgrounds was set up to advise on ways to lessen the adverse effects of daylight saving in a locality or region.

In a complex arrangement, anyone who wanted to change the hours of a school or business had to go through their local council who then wrote to the committee with details of consultation and recommendations. The committee conducted any investigations or hearings it deemed appropriate and then advised the minister who in turn notified the governor in council who gave legal authority via an order in council for any acceptable changes. The governor was authorised to change the trading hours of any organisation, work hours of any employee, and school hours, but only for the duration of daylight saving time each year. Notification would then flow back down the line to the minister, the committee, the local council, and the businesses or schools themselves.

Feedback on daylight saving continued to indicate that the south-east corner liked it and the regional and rural areas of the state didn't, often intensely. Pressure had been building within the government for a referendum. An election was due by late 1992 and the government held 16 seats outside the south-east. It couldn't afford to lose more than nine seats statewide out of its 54 seats in an 89 seat unicameral parliament.

Members decided by 43 votes to 40 on about 1 October 1991 to hold a referendum on 22 February 1992. The Electoral Commission noted: "The division of the vote in the Legislative Assembly on the question of a daylight saving referendum indicated that the issue of daylight saving divided Queenslanders as no other single issue has done."¹²⁸ Liberal Party members were unanimous but the position of members of the Labor and National parties was mixed. Without a referendum, the issue may have dominated the election and become a vote on daylight saving rather than which party should govern.

A brochure on the referendum was mailed to all households in Queensland. One question was to be asked: "Are you in favour of daylight saving?" and voters had to tick a box marked "Yes" or one marked "No". The brochure included the "Yes" and "No" cases. The pros and cons were explained quite well and in some detail as follows.

The "Yes" case

1. Since 1972 [1971-72], the eastern states of Australia, excluding Queensland, have operated on daylight saving time each summer [Tasmania since 1967-68]. Queensland has only participated in daylight saving since 1989. Since this time, many of the difficulties experienced by the business community in the period when there was a time difference between the eastern states, such as communication difficulties and operating inefficiencies arising from the need to accommodate the different trading times, have diminished. It has been indicated by businesses operating in south-east Queensland, where the majority of businesses are based, that:-
 - over 75% of these businesses favour daylight saving;
 - nearly 90% believe that all the eastern states should operate on the same time; and
 - nearly 40% of businesses expect to suffer losses if daylight saving were abolished.As daylight saving is seen as a means of promoting commercial efficiency, then it is therefore in the best interests of the State for it to continue.
2. Daylight saving gives you more useable outdoor leisure time at the end of the day during summer. This allows people to spend more time with their families and friends and in the pursuit of recreational and leisure activities.
3. Daylight saving can save energy because more natural light is used during the latter part of the day. This can have consequent cost savings for the community and can be beneficial for the environment if less electricity is consumed. The Queensland Electricity Commission reports that there is a noticeable reduction in electricity demand during daylight saving in the peak period of 6:00 p.m. and [sic] 8:00 p.m. each day.
4. When Queensland operates on the same time as the other eastern states, the tourist and travel industries benefit through not having to alter the schedules and itineraries of

¹²⁸ Electoral Commission Queensland, *Daylight Saving Referendum*, 1992, p. 1, at https://www.ecq.qld.gov.au/data/assets/pdf_file/0016/1708/1992-Statistical>Returns_Daylight-Saving-Summary.pdf

tourists and business people travelling to Queensland from interstate and overseas. Likewise the airlines, railways and bus operators do not have to alter their timetables to accommodate different time zones between the eastern states. Businesses associated with the tourist and hospitality industries may also benefit from the increased daylight leisure time available to their potential customers.

The “No” case

Queensland is such a vast State that the actual hours of sunlight vary considerably between different parts of it. Daylight saving has an adverse impact on Queensland lifestyles and businesses because of this basic geographical fact. Daylight saving is not in the best interests of Queenslanders for the following reasons:

1. Queensland has a typical tropical to sub-tropical climate with the average maximum temperature in any area of the State in January ranging from 30 to 42 degrees celsius [actually about 27 to 39 degrees]. The sun already rises and sets up to one hour later in the northern and western areas of the State, as these areas are located west of the geographical line at which standard time for Queensland is determined.
2. During daylight saving, many people throughout the State who have to travel considerable distances to work or to school have to leave home while it is still dark.
3. For school children, daylight saving also means that they finish school in the hottest part of the day, whereas they would normally still be in the classroom at the time when the sun’s harmful ultra violet (UV) rays are at their most intense.
4. Businesses throughout the State need to operate on the same time as Brisbane in order to maintain contact with suppliers. With daylight saving time, many businesses are not able to service the needs of customers and clients who require access to goods and services during the latter part of the day.
5. For many elderly people, daylight saving is an inconvenience requiring changes to daily living routines.
6. For many people, daylight saving means a denial of the opportunity to access their only source of daily news and current affairs, particularly through evening television programs.
7. Many local authorities are opposed to daylight saving because it interferes with established work practices.
8. Rural industries and some sections of the tourism industry are significantly disadvantaged due to the reduction in the amount of early morning daylight hours available in which to complete critical tasks.
9. The quality of life suffers for many families in the State during periods of daylight saving because of:
 - Meal times - particularly the evening meal - being delayed because it is too hot to prepare and eat meals at normal times. This imposes an increased burden on the parents of young children as it puts the children out of their familiar daily routine, upsetting both study and sleeping patterns.
 - Many people whose hours of work are determined by available sunlight tend to work later in the day during daylight saving. This increases stress on families through less parental contact with children.
 - A reduction in the opportunities available for those people who work later in the day to participate in evening community activities.

10. There is no evidence that the majority of Queenslanders benefit from daylight saving. Rather the minority benefit and the majority suffer a reduced quality of life.
11. There are already three time zones in Australia. Queenslanders and the various industries who operate across time zones have always managed to overcome any difficulties involved. Any perceived disadvantages in this regard are far outweighed by the disadvantages suffered by a majority of Queenslanders during daylight saving periods.

With voting compulsory in Australia, a high 89.6 per cent of the more than 1.8 million people enrolled in Queensland turned out to vote (despite considerably lower percentages in electoral districts just north of Brisbane due to heavy rain and flooding on the day) and 99.6 per cent of them cast a valid vote. The result was quite decisive: 45.5 per cent of residents wanted daylight saving and 54.5 per cent didn't want it.

There were wild variations among districts (see next table). In broad terms, the further a district was located from the very south-east corner of the state, the higher the "no" vote. In several seats in the northern and western parts of the state, the "no" vote was about 90 per cent. For some areas in the south-east, notably Gold Coast districts, the "yes" vote was around 70 per cent or more. Not one of the 36 districts outside the urban south-east wanted daylight saving. In the urban south-east, 51 of 53 districts favoured it. In all, the regional and rural vote was about 23 per cent for and 77 per cent against daylight saving. The urban south-east was 61 per cent for and 39 per cent against. The result in country areas was expected although pundits had predicted greater support for daylight saving in the south-east.

Results of daylight saving referendum, Queensland, 1992

| <i>Electoral district</i> | <i>Held by</i> | <i>Yes</i> %* | <i>No</i> %* | <i>Electoral district</i> | <i>Held by</i> | <i>Yes</i> %* | <i>No</i> %* |
|---------------------------|----------------|------------------|-----------------|---------------------------|----------------|------------------|-----------------|
| Urban south-east | | | | Mooloolah | Libs | 53.4 | 46.6 |
| Merrimac | Libs | 74.2 | 25.8 | Caloundra | Libs | 53.1 | 46.9 |
| Surfers Paradise | Nats | 72.2 | 27.8 | Ipswich | Labor | 52.9 | 47.1 |
| Currumbin | Labor | 71.1 | 28.9 | Ipswich West | Labor | 51.0 | 49.0 |
| Nerang | Libs | 70.5 | 29.5 | Maroochydore | Nats | 50.5 | 49.5 |
| Burleigh | Nats | 69.9 | 30.1 | Caboolture | Labor | 49.8 | 50.2 |
| Springwood | Labor | 69.6 | 30.4 | Nicklin | Nats | 38.4 | 61.6 |
| Logan | Labor | 68.2 | 31.8 | Total | | 60.6 | 39.4 |
| Capalaba | Labor | 67.1 | 32.9 | Regional/rural | | | |
| Southport | Nats | 66.3 | 33.7 | Beaudesert | Nats | 47.0 | 53.0 |
| Woodridge | Labor | 65.7 | 34.3 | Hervey Bay | Labor | 41.1 | 58.9 |
| Albert | Labor | 65.4 | 34.6 | Toowoomba North | Nats | 35.8 | 64.2 |
| Broadwater | Nats | 65.3 | 34.7 | Toowoomba South | Nats | 35.2 | 64.8 |
| Sunnybank | Labor | 65.0 | 35.0 | Gladstone | Labor | 31.8 | 68.2 |
| Moggill | Libs | 64.8 | 35.2 | Bundaberg | Labor | 31.8 | 68.2 |
| Waterford | Labor | 64.8 | 35.2 | Maryborough | Labor | 31.1 | 68.9 |
| Mount Ommaney | Labor | 64.5 | 35.5 | Gympie | Nats | 29.1 | 70.9 |
| Inala | Labor | 63.4 | 36.6 | Burnett | Nats | 27.9 | 72.1 |
| Everton | Labor | 63.3 | 36.7 | Keppel | Nats | 27.4 | 72.6 |
| Mount Coot-tha | Labor | 62.6 | 37.4 | Lockyer | Nats | 27.2 | 72.8 |
| Ferny Grove | Labor | 62.5 | 37.5 | Mackay | Labor | 25.4 | 74.6 |
| Archerfield | Labor | 62.5 | 37.5 | Crows Nest | Nats | 24.9 | 75.1 |
| Chatsworth | Labor | 62.2 | 37.8 | Thuringowa | Labor | 24.9 | 75.1 |
| Mansfield | Labor | 61.8 | 38.2 | Cunningham | Nats | 24.4 | 75.6 |
| Ashgrove | Labor | 61.7 | 38.3 | Townsville | Labor | 24.2 | 75.8 |
| Indooroopilly | Libs | 61.7 | 38.3 | Mundingburra | Labor | 23.4 | 76.6 |
| Redlands | Labor | 61.3 | 38.7 | Barron River | Labor | 23.0 | 77.0 |
| Bundamba | Labor | 60.9 | 39.1 | Rockhampton | Labor | 22.8 | 77.2 |

| <i>Electoral district</i> | <i>Held by</i> | <i>Yes</i> | <i>No</i> | <i>Electoral district</i> | <i>Held by</i> | <i>Yes</i> | <i>No</i> |
|---------------------------|----------------|------------|-----------|---------------------------|----------------|-------------|-------------|
| Kurwongbah | Labor | 60.6 | 39.4 | Whitsunday | Labor | 21.7 | 78.3 |
| Aspley | Libs | 60.6 | 39.4 | Warwick | Nats | 21.3 | 78.7 |
| Mount Gravatt | Labor | 60.3 | 39.7 | Fitzroy | Labor | 21.1 | 78.9 |
| Bulimba | Labor | 59.5 | 40.5 | Mirani | Nats | 20.0 | 80.0 |
| Cleveland | Labor | 59.2 | 40.8 | Barambah | Nats | 19.8 | 80.2 |
| South Brisbane | Labor | 58.9 | 41.1 | Cairns | Labor | 18.5 | 81.5 |
| Greenslopes | Labor | 58.3 | 41.7 | Burdekin | Nats | 16.7 | 83.3 |
| Brisbane Central | Labor | 58.2 | 41.8 | Cook | Labor | 14.7 | 85.3 |
| Murrumba | Labor | 57.8 | 42.2 | Mulgrave | Labor | 14.1 | 85.9 |
| Lytton | Labor | 57.7 | 42.3 | Callide | Nats | 12.7 | 87.3 |
| Kedron | Labor | 57.6 | 42.4 | Mount Isa | Labor | 11.7 | 88.3 |
| Chermside | Labor | 57.5 | 42.5 | Hinchinbrook | Nats | 11.2 | 88.8 |
| Kallangur | Labor | 57.3 | 42.7 | Western Downs | Nats | 11.1 | 88.9 |
| Yeronga | Labor | 57.3 | 42.7 | Charters Towers | Nats | 10.7 | 89.3 |
| Clayfield | Libs | 57.2 | 42.8 | Tablelands | Nats | 10.1 | 89.9 |
| Sandgate | Labor | 57.1 | 42.9 | Gregory | Nats | 9.6 | 90.4 |
| Nudgee | Labor | 56.7 | 43.3 | Warrego | Nats | 8.4 | 91.6 |
| Noosa | Libs | 54.3 | 45.7 | Total | | 22.9 | 77.1 |
| Redcliffe | Labor | 54.0 | 46.0 | Queensland | | 45.5 | 54.5 |

* As a proportion of valid votes (informal votes were only 0.4 per cent of the total)

Labor = Labor Party; Libs = Liberal Party; Nats = National Party

Source: Electoral Commission Queensland, "Daylight Saving Referendum", 1992, pp. 13-14, at https://www.ecq.qld.gov.au/_data/assets/pdf_file/0016/1708/1992-Statistical>Returns_Daylight-Saving-Summary.pdf

On a party basis, all nine electoral districts with Liberal Party members wanted daylight saving. By contrast, 21 of 26 districts held by National Party members were opposed to it. Most districts with Labor members (37 of 54) voted in favour although 16 of those against a time change were in regional and rural areas and in 15 of them, more than two-thirds of people disagreed with the scheme. Labor risked losing many or all of those 15 seats and government at the next election by retaining daylight saving.

Four days after the referendum, on 26 February 1992, Liberal Party senator Ian McDonald from Queensland sought assurance that the federal Labor government wouldn't use the National Measurement (Standard Time) Amendment Bill to force the state onto daylight saving. It seems the only guarantee Labor could give was that one of its senators, Bob McMullan from the Australian Capital Territory, spoke twice on ABC radio in Toowoomba on 19 and 26 February and once on a commercial radio station around this time saying it wouldn't happen. Queensland Labor senator Mal Colston motioned to remove the bill at a Labor caucus meeting. This was supported by most Labor senators and the bill was removed on 4 March 1992.

Even though 51 of the 89 electoral districts favoured the change, the state government wisely decided to end daylight saving time, announced by premier Goss in parliament on 12 March. The Summer Time Repeal Act 1992, assented to on 2 July, was short and to the point. Apart from the enacting clause and the short title, it stated: "The Summer Time Act 1990 is repealed." Daylight saving on a permanent basis in Queensland lasted two summers, 1990-91 and 1991-92, plus the trial in 1989-90. The state election was held on 19 September 1992 and the number of seats won by each of the three parties was virtually unchanged. The policy reversal didn't deter tourism operators at three of the Whitsunday islands, Hayman, Lindeman and Hamilton, from

having daylight saving time, or “island time”, in 1992-93 and 1993-94. They also used it in later years and had done so earlier too.

Queensland hasn't had daylight saving since 1992. Debate on the issue has been ongoing though, with each side pushing its views, sometimes vigorously, at any time but more so when the other states start or finish daylight saving. This is especially the case at the southern end of the Gold Coast near the border with New South Wales in the Coolangatta–Tweed Heads area. Time differences between the two states in summer mean residents and visitors are often an hour early or an hour late for plane flights, bus trips, meetings, appointments, shows, television programs and sporting events. Many children and workers are on different times at school or work and at home. And there are disadvantages for business due to the difference in operating hours, with as little as four hours a day where people are on deck in both states at the same time, taking into account different start and finish times and lunch breaks.

In February 1996, Queensland had a new government with the National Party's Rob Borbidge as premier. The Gold Coast Chamber of Commerce wasted no time in getting him to attend a combined chambers of commerce meeting in April and trying to place daylight saving on the agenda. His electorate, Surfers Paradise, had the state's second highest “yes” vote in the 1992 daylight saving referendum. But he was in office on a knife-edge, only due to a recent by-election going his party's way, and he didn't want to revisit a controversial issue such as daylight saving time that most of the state's residents didn't want.

In federal parliament on 9 December 1999, the Liberal Party's Margaret May, member for McPherson, which covers the southern part of the Gold Coast, was adamant that south-east Queensland should have daylight saving. She mentioned that Peter Beattie, Labor premier from June 1998, intended to hold another referendum if he was reelected.

After Labor won a second term at the February 2001 election in a landslide, the coalition agreement between the National and Liberal parties in Queensland was torn up once more, allowing the Liberals to pursue daylight saving again. They retained only three seats and had nothing to lose.

In parliament on 30 May, new Liberal leader Bob Quinn moved that the government commission a study to determine the social and economic outcomes of daylight saving just in the state's south-east. Various government and opposition members spoke, discussing the pros and cons of two time zones as well as revisiting the results of the 1992 referendum. Beattie was adamant the state should be on the one time zone and that a split system would simply shift the time difference problem further north than the Queensland–New South Wales border. After nearly an hour's debate, Quinn's motion was rejected by 76 votes to 5. The five who voted in favour were the three Liberal Party members, former Gold Coast mayor and newly elected independent Lex Bell who won the Surfers Paradise seat in a by-election after Borbidge resigned, and One Nation Party's Elisa Roberts. There was no sign of another referendum.

A 2002 survey of 708 business people across the state by Commerce Queensland found 60 per cent approval for daylight saving although there was little support

outside the south-east. An analysis of the results by economist A. C. Worthington of the University of Wollongong showed that business wanted daylight saving due to expectations of higher sales and profits and lower costs, but whether this was from being on the same time as other states or from daylight saving itself hadn't been part of the survey. Industries favouring daylight saving were electricity, gas and water; communications; finance and insurance; and arts and recreation. The construction industry didn't like it. Other industries weren't strong either way. Just 26 per cent of respondents supported daylight saving in Brisbane only and 27 per cent on the Gold Coast only.¹²⁹

Beattie said in 2006 that he wasn't going to consider daylight saving as it would increase skin cancer, pointing out that Queensland already had the highest rate of skin cancer in the world. Health authorities quickly denied there would be an increase, stating that the middle hours of the day were the period where skin cancer risks were greatest just the same regardless of what the clock said. Opponents of the measure hit back saying that with daylight saving, school children would walk home an hour earlier real time and be subjected to higher levels of ultraviolet radiation.

Following a number of petitions in 2005 to 2007 to introduce or not introduce daylight saving, the Beattie government commissioned research into the issue. The "Understanding attitudes towards daylight saving in Queensland" project by market research company Nielsen sought current views and attitudes to daylight saving of residents and businesses in the south-east and regional and rural areas of the state. A survey was conducted of 1,000 individuals and 600 businesses in July 2007 plus focus groups and depth interviews.

About 59 per cent of people favoured daylight saving and 30 per cent didn't, with 10 per cent neutral (see table). This was a considerable shift from the 1992 referendum where only 45 per cent wanted it. In south-east Queensland, 69 per cent were supportive in 2007, up from 61 per cent. Some 36 per cent of the rest of the state liked it, up from 23 per cent. The 1992 referendum was in summer and the 2007 survey in winter and whether this had any effect on the change in support is hard to tell. In 2007, around 58 per cent of businesses wanted daylight saving and 26 per cent didn't. Again, there were considerable differences between the south-east and the rest of the state with 72 per cent and 32 per cent support.

Support for daylight saving, Queensland, 2007

| | <i>People</i> | | | <i>Businesses</i> | | |
|------------------------------------|---------------|----------------|----------------|-------------------|----------------|----------------|
| | <i>For</i> | <i>Neutral</i> | <i>Against</i> | <i>For</i> | <i>Neutral</i> | <i>Against</i> |
| | — % — | | | | | |
| Daylight saving for whole state | | | | | | |
| South-east Queensland | 69 | 10 | 20 | 72 | 11 | 16 |
| Rest of state | 36 | 10 | 52 | 32 | 23 | 46 |
| Total | 59 | 10 | 30 | 58 | 15 | 26 |
| Daylight saving in south-east only | | | | | | |
| South-east Queensland | 41 | 14 | 45 | 53 | 12 | 35 |
| Rest of state | 14 | 23 | 63 | 15 | 29 | 57 |
| Total | 33 | 16 | 51 | 40 | 18 | 42 |

Note: Components may not add to 100 due to rounding.

¹²⁹ A. C. Worthington, "Business expectations and preferences regarding the introduction of daylight saving in Queensland", 2005, at <http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1020&context=commpapers>

Source: The Nielsen Company, "Understanding attitudes towards daylight saving in Queensland", 2007, pp. 10-11, at <http://www.daylightsavingseq.com.au/documents/Understanding-Attitudes-Towards-Daylight-Saving-in-Queensland.pdf>

When it came to two time zones, there was far less support. Only 33 per cent of people and 40 per cent of businesses liked the idea while 51 per cent and 42 per cent were opposed to it. Approval was higher in the south-east, at 41 per cent of residents and 53 per cent of businesses, but much lower elsewhere, at 14 per cent and 15 per cent. People felt that split time zones would be divisive between city and country or between north and south, and cause confusion and difficulty. If such a system went ahead, there was some consensus for a time zone border west of Toowoomba, whereas views for a northern border ranged from Hervey Bay to Cairns, a distance of 1,450 kilometres (900 miles) by road.

To some extent, Queenslanders make up for a lack of daylight saving by getting up sooner in a warm climate that has early sunrises in summer, especially in the most populated parts, and by starting and finishing work early. The survey found that 61 per cent of people typically rose before 6:30 a.m., and 69 per cent of workers and students left home before 8 a.m. About 63 per cent got home before 6 p.m.

A 273 page report from the research was released on 1 October 2007.¹³⁰ Staunch resistance to daylight saving in regional and rural areas and a feeling of alienation with dual time zones led to the report's conclusion that no daylight saving time anywhere in the state would "cause the least public backlash" compared with the whole state or a time split. New Labor premier Anna Bligh immediately announced there would be no daylight saving and no referendum on it. The decision prompted Gold Coast mayor Ron Clarke to seek legal advice on the city having its own time zone. A petition was submitted to parliament in November by some 77,000 people calling for a referendum.

In December 2008, the Daylight Saving for South East Queensland (DS4SEQ) Party was formed. It proposed a dual time zone system with local government boundaries as borders, with a separate zone to include councils in the south-east, as well as west to Goondiwindi and north to Fraser Coast. The party wanted a two year trial and then a referendum. It contested 32 seats in the state election in March 2009, picking up just 2.5 per cent of the vote in those seats or 0.9 per cent statewide, with a best result of 4.6 per cent in the Surfers Paradise electorate. The party didn't contest the 2012 election, deregistering as a political party soon after but remaining as a lobby group.

The DS4SEQ Party approached independent member for Nickin, Peter Wellington, in early 2010 to introduce a bill seeking a referendum on daylight saving for the south-east. Wellington agreed and brought in the Daylight Saving for South East Queensland Referendum Bill 2010 on 14 April. A referendum would be held on the same day as the next state election due by 2012. The proposed question to be asked of all voters in the state was: "Are you in favour of daylight saving being introduced into the South East Queensland daylight saving time region only, while the remainder of the State does not change?" This region was to comprise the local government areas

¹³⁰ The Nielsen Company, "Understanding attitudes towards daylight saving in Queensland", 2007, at <http://www.daylightsavingseq.com.au/documents/Understanding-Attitudes-Towards-Daylight-Saving-in-Queensland.pdf>

of Brisbane, Ipswich, Logan, Redland, Gold Coast, Scenic Rim, Moreton Bay and Sunshine Coast (including the now reestablished Noosa shire), thus only a proportion of the south-east and a considerably smaller area than that proposed by DS4SEQ.

At that time, the state government's "Get Involved" website asked people: "Do you think all Queenslanders should have a referendum on daylight saving for South East Queensland only?" and "Should Queensland have a trial of daylight saving in South East Queensland before any referendum?" More than 74,000 people responded with 63 per cent saying "yes" to the first question and 64 per cent to the second one. Figures were 67 per cent and 70 per cent in the south-east but only 35 per cent and 24 per cent in the rest of the state. It wasn't a random sample survey though and no reliance can be placed on the results. Besides, more than 80 per cent of respondents were from the south-east where only about 70 per cent of the state's population live.

In addition, nearly 7,000 people contacted Labor members, with 40 per cent and 47 per cent in the south-east saying "yes" to the two questions and just 14 per cent and 6 per cent in the rest of the state. But again, the proportions aren't reliable as no representative survey was undertaken. More accurate figures for dual time zones came from the 2007 survey where 41 per cent of people in the south-east supported it and 14 per cent outside of this area.

Business didn't like what was proposed by the bill either. The first reaction of the Chamber of Commerce & Industry Queensland was that the government should concentrate on more important things like the economy. The chamber's survey of 2,250 businesses in April 2010 found that 59 per cent were happy with statewide daylight saving although there was a wide difference between the south-east with 78 per cent and regional and rural areas with 35 per cent. Split time was far less popular, with only 34 per cent favouring it, including 51 per cent in the south-east and just 12 per cent elsewhere. Other business groups such as AgForce and the United Retail Federation didn't want any form of daylight saving citing, among other reasons, different operating hours of head offices and regional outlets.

Such was the opposition in the north to split time zones that the bill reignited the debate over northern Queensland becoming a separate state, an issue that has come up now and then for various reasons since as far back as 1882. Federal member for Kennedy, Bob Katter, pushes it from time to time. At a local government association meeting in the state's north in August 2010, just two of the 100 delegates were against separation, the mayors of Cairns and Charters Towers.

The government announced on 7 June 2010 that it wouldn't back the bill due to a lack of support outside the south-east. The opposition, now one party after the Nationals and the Liberals got together to form the Liberal National Party, was also against the bill. It came back into the parliament for debate over a year later, on the evening of 15 June 2011. The old Liberals, known to like daylight saving, weren't in the chamber that night, presumably to avoid embarrassing the new party. The debate lasted about an hour but there was little support from either side and the bill was thrown out.

It should be noted that in the United States 14 states officially straddle two time zones 12 months of the year due to the practicalities of having standard time close to solar time or of localities keeping the same time as larger population centres not far across

the border. Parts of Michigan, Indiana, Kentucky, Tennessee and Florida are in the Central and Eastern time zones; North Dakota, South Dakota, Nebraska, Kansas and Texas cross both Central and Mountain time zones; Idaho, Oregon and Nevada sit in the Mountain and Pacific time zones; and for Alaska, the Aleutian Islands are in a different time zone to the rest of the state. Similarly, six Canadian provinces and territories cross time zones: Quebec, Ontario, Newfoundland and Labrador, Saskatchewan, British Columbia, and Nunavut. In the Australian state of New South Wales, Broken Hill in the far west uses South Australian time.

DS4SEQ claimed it found no problems with dual time zones in the United States and Canada when it searched the web on “two time zones” + name of state/province + controversy / debate / argument. Perhaps the difference is that all these places have dual time zones 12 months a year whereas Queensland would be changing from two time zones to one and back to two again each year.

Meanwhile, petitions both for and against daylight saving kept coming in. One of them, organised by Dr Allan Clarke in February 2011, asked for 30 minutes of daylight saving all year round and for other states to be encouraged to do the same. His arguments were that this would eliminate time changes and time differences, give lighter evenings, save energy and reduce road accidents. Clarke led another petition in March 2014 of over 20,000 signatures for daylight saving in the south-east. As with other petitions over the years, the government replied in the negative. Premier Campbell Newman wrote back saying:

The problem with the issue of daylight saving is that it divides Queenslanders. I have received many letters and emails detailing different viewpoints from all across the State and I think it's fair to say that, generally, many people living in south-east Queensland support daylight saving, while the majority of people in other regions oppose it. Whatever side of the argument you believe in, this issue is one that many Queenslanders are very passionate about.

The Government believes that there are far greater priorities facing our State that need our urgent attention. ...¹³¹

The Chamber of Commerce & Industry Queensland surveyed 2,300 businesses across the state in 2013. The proportion in support of daylight saving was 57 per cent, roughly the same as previous surveys (60 per cent and 59 per cent by the chamber in 2002 and 2010, and 58 per cent by Nielsen in 2007). A quarter of companies said they were affected financially by the time difference with other states in summer, costing an estimated \$4.35 billion a year in lost sales and higher costs. Also, Travel Victoria was promoting that state's much lighter evenings as incentive for tourists to holiday there rather than in Queensland, with a clock difference in sunset times in and near the capital cities of around two hours in summer.

There seems little chance of Queensland having daylight saving in the foreseeable future, including in the south-east only, with the 2007 Nielsen survey finding that a system of split time zones was unpopular across the state. Neither major political party is interested in any form of daylight saving time. It's one of the few issues that

¹³¹ Queensland Parliament, Letter from Premier of Queensland, 27 March 2014, at <http://www.parliament.qld.gov.au/documents/tableOffice/TabledPapers/2014/5414T4755.pdf>

both sides of politics in Queensland agree on. The two major parties realise they would potentially lose many regional and rural votes and seats by supporting daylight saving given the bush's loathing of it, and neither party can afford this outcome. After the state election in January 2015, the Labor Party had 14 of its 44 Legislative Assembly seats outside the urban south-east and the Liberal National Party 16 of its 42 seats. The Greens support daylight saving but hold no seats despite obtaining 8.4 per cent of the vote, and there is no upper house in Queensland.

In spite of all this, the push for daylight saving persists, especially on the Gold Coast where local government and business lobby the state government. A poll in Toowoomba in September 2015 showed that 52 per cent of residents were in favour of daylight saving and 30 per cent were opposed to it.

A new promotion for another referendum was launched by Allan Clarke in October 2015. It includes an online campaign, "Get the light right for Queensland", which points to the 2007 survey that found 59 per cent of residents in support of daylight saving, and to the advantages for business, tourism, health and lifestyle, as well as energy savings, and no 4:30 a.m. [sic] sunrises. As part of the campaign, an e-petition on the state parliament website got 21,468 signatures before it closed in February 2016. The response by the premier, Annastacia Palaszczuk, on 29 March was that the government had "no plans" to introduce daylight saving and that there were "other priorities". A few months later, in June, another e-petition requested that standard time be advanced half an hour and that the other eastern states be asked to do the same and abandon daylight saving. The petition closed in November with just 284 signatures.

One way daylight saving might happen in this part of Australia is if the states are abolished.¹³² This can be done by federal referendum and needs a majority of voters in a majority of states. Local governments might then be amalgamated into around 30 regional governments across Australia with about six in what is now Queensland, including perhaps three in the south-east, which could opt for daylight saving. But without the states, time might become a federal issue.

¹³² A study in 2007 by Dr Mark Drummond estimated that savings from abolishing the states would be about \$50 billion a year by avoiding duplication and other inefficiencies. At the moment, there are eight governments (of six states and two territories) at the second level of a three-tier government system all basically doing the same thing. Most of the current state functions would be carried out by the federal government and some by regional governments that would be formed out of the current local governments.

20 Daylight saving sets in the west

The state of Western Australia has had four referendums on daylight saving time, in 1975, 1984, 1992 and 2009. Each referendum followed a period of daylight saving, one year for each of the first three referendums and three years for the last one. Residents rejected daylight saving each time and legislation was rescinded.

Western Australia is even larger geographically than Queensland, extending from latitude 14 degrees to 35 degrees south and from longitude 113 degrees to 129 degrees east. The Greater Perth area has about 80 per cent of the state's population, and around 92 per cent of the state total live in the south-west corner. Local mean time in Perth is 17 minutes behind the state's standard time of UTC+8. This gives it an automatic daylight saving advantage of about half an hour over Brisbane whose local time is 12 minutes ahead of its standard time of UTC+10. Daylight saving is no more popular in Western Australia than in Queensland.

The west had daylight saving along with the rest of Australia during World War I from 1 January to 25 March 1917. It was largely disliked in Western Australia just as it was elsewhere in the country. A meeting of the Perth Plumbers' Union on 10 January called it a "gross misuse of power" for the federal government to change time without going to the people. Conflicting views came out of a Perth Chamber of Commerce meeting on 23 January. W. W. Garner described it as "the most useless and unnecessary piece of legislation passed in Australia for the last fifty years".¹³³ But he was met with cries of "No! One of the best!" Vigorous discussion ensued on the pros and cons of the policy. The chamber resolved on 28 February to ask the federal government to immediately revoke the Daylight Saving Act 1917. Western Australian representatives at a combined chambers of commerce meeting in Adelaide on 22 March were clearly not in favour of daylight saving with Garner declaring it came from Germany and another calling it humbug.

The Bunbury Chamber of Commerce wanted to find out more about the usefulness of daylight saving, writing to the federal government meteorologist in 1935 for more information. Overall, there was little interest in or opposition to daylight saving in Western Australia in the interwar period. This changed during World War II.

According to a survey in September 1941 by Australian Public Opinion Polls, 48 per cent of Western Australians wanted daylight saving while 37 per cent didn't and 15 per cent were undecided. This was similar to the results for Australia overall, with 50 per cent supporting the idea, 34 per cent against it and 16 per cent unsure. After daylight saving was introduced nationally in January 1942, support for it in the west increased to about 60 per cent in a Gallup poll in March. Following another summer of national daylight saving in 1942-43, approval in Western Australia rose further to 64 per cent in March 1943 and 65 per cent in August of that year.

Concerns raised in the Western Australian Parliament in 1942 about daylight saving were mainly over liquor trading hours and how six o'clock closing had effectively

¹³³ "Daylight saving bill", *The West Australian*, 24 January 1917, p. 7, Trove, National Library of Australia, at <http://trove.nla.gov.au/ndp/del/article/27288240>

become five o'clock closing. The government thought that it should be extended to seven o'clock daylight saving time in the metropolitan area. Other states had similar issues. It was raised by the states at the Premiers' Conference in Melbourne in August 1942 but the Commonwealth government wouldn't budge. Subsequent letters between Perth and Canberra proved fruitless.

Western Australia was initially happy to go with federal daylight saving again in 1943-44, with the premier, John Willcock, writing to the prime minister, John Curtin, to this effect on 24 August 1943. He was perhaps encouraged by the positive poll results. But the state government's decision set off a round of protests among the community. The premier again wrote to the prime minister, on 6 September, saying the state now didn't want daylight saving. He pointed out that standard time in Perth was already 17 minutes ahead of solar time and that savings in electricity and coal were negligible, a conclusion of the state government's Electricity Advisory Committee. But it had been unable to come up with an estimate of electricity or coal saved and admitted its findings were based on the opinions of two electricity supply industry managers.

After plenty of discussion in parliament, both sides agreed unanimously around 8 September that the state didn't want daylight saving and notified the prime minister accordingly. Willcock wrote to Curtin several more times expressing regret that the state hadn't been exempted from daylight saving. Finally, the prime minister spared Western Australia from the measure in 1943-44 due to what he called its "distinctiveness" compared with other states and the relation between local and standard time. Interestingly, standard time is 20 minutes ahead of local time in Melbourne, 16 minutes in Adelaide and 11 minutes in Hobart. Also, both Curtin and Willcock were Labor, and the prime minister's home city was Perth, although he was known to support the scheme.

After daylight saving in wartime was long gone, the Western Australian Parliament quickly passed a Daylight Saving Bill in November 1946 due to a two week old railway strike that was disrupting coal supplies and causing electricity shortages. Many residences had no power, and lamps and candles had almost sold out. The Daylight Saving Act 1946 was flexible in that it would "provide for the time within a certain area of the state being, in certain circumstances, in advance of standard time during certain periods". It could be applied to an area within 35 miles (56 kilometres) of Perth's General Post Office (the approximate extent of the city's electricity network) and up to two hours ahead of standard time.

Curiously, the Act stated that it was assented to on 13 November, but the bill didn't come into either house until about a week later, and was perhaps a typographical error. Meanwhile, typists at the Australian Broadcasting Commission in Perth moved their desks and typewriters to the veranda to make use of natural light and save power. Daylight saving was to start on Sunday 24 November, but the strike ended on the previous Friday. The Act was never used although it wasn't repealed until 1974.

The daylight saving debate got underway again in the west in 1971 in the lead up to its introduction in the eastern states. The Western Australian government conducted research into whether it should be implemented in its own state. A bill was introduced into the Legislative Council by Labor's Claude Stubbs in September for daylight

saving in the summer of 1971-72. The issue was debated at length twice, including at a second reading for over four hours. A division was taken and the bill scraped through by 14 votes to 13, taking it to the committee stage. Here, the vote was 14 to 15 against and the bill lapsed. A long and lively discussion on daylight saving had also taken place in the Legislative Assembly although the bill didn't come into that chamber.

There was opposition to daylight saving from the agricultural sector, country people, trade unions, women's associations, the Education Department and drive-in theatres. Support came from manufacturers and the business community in general, transport, the stock exchange, lawyers, and health and sporting bodies. About 300 letters were received by the government in favour of daylight saving and 600 opposing it. In a Gallup poll in September 1971, 56 per cent of Western Australians approved of daylight saving, while the national figure was 70 per cent. By February 1972, support in the west had fallen to 49 per cent.

The government's view against daylight saving was influenced in 1972 by Queensland's decision to abandon it after one summer, 1971-72, although a committee was formed to look into its pros and cons for the west. Most support for daylight saving was found among members of the Chamber of Manufactures where 75 per cent favoured it and 17 per cent were against it. Opposed to the scheme at that time were Farmers' Union branches, country women's associations, local government associations, and country parents and citizens associations.

Another bill came into the parliament in September 1972, this time into the Assembly via member Hywel Evans. Lengthy discussions on the bill followed, including on a possible referendum on the subject. The division was 28 to 18 in support of the bill and it went through the committee stage before being read a third time and forwarded to the Council. After many hours of debate over several sessions in the upper house, the bill was defeated by 22 votes to 15. A further Daylight Saving Bill was introduced, into the Council in September 1973, this time by Stubbs again. But it too was rejected, 14 to 11, after a sometimes rowdy three hour second reading debate.

A Daylight Saving (Referendum) Bill was brought into the Assembly by John Harman in November 1973. It related to a trial period of daylight saving over the 1974-75 summer but only if electors were in favour of it via a referendum beforehand. The bill passed the second reading after noisy deliberation. After a third reading, it was sent to the Council where opposition member Arthur Griffith argued for a referendum after the trial rather than before it, otherwise two referendums might be needed. A vigorous discussion followed on which should come first: the trial or the referendum. A proposed amendment for a trial first was defeated by 13 votes to 9. Other amendments were passed or lost and the bill went back to the Assembly where it presumably lapsed.

Yet another Daylight Saving Bill was introduced, in August 1974, the fifth in three years. Previous bills came in under John Tonkin's Labor government which favoured daylight saving but held only 10 of the 30 seats in the Council and 26 of 51 in the Assembly. This latest bill was brought in under the new Charles Court Coalition government which had 29 seats in the Assembly and 18 in the Council, making the passage of bills somewhat easier. The bill was for a one year trial in 1974-75 followed

by a referendum to see if people wanted to continue with daylight saving in future years. This is what Griffith, who was now part of the new government, had wanted for the previous bill. In the Assembly on 20 August 1974, heated debate over the new bill, whether and how it differed from previous bills, the pros and cons of daylight saving time, and whether a referendum was needed at all went from 8:30 p.m. to after midnight.

In the middle of this session, the second reading vote was 33 to 13 in favour of the bill. The votes of government members were split 13-13, with three abstentions, while 20 Labor members said “yes” and two abstained. This prompted comments from Labor that many Coalition members had apparently changed their minds about daylight saving since the last parliament and were now in favour of it. Intriguingly, the government member who introduced the bill, Matt Stephens, voted against it, causing ex-premier Tonkin to say: “I did not think I would live to see the day when a Minister who introduced a bill would vote against it. I think it deserves to go down on record as being a record and making history.”¹³⁴

The bill became the Daylight Saving Act 1974 on 27 September. It provided for daylight saving from 27 October 1974 to 2 March 1975, as well as finally repealing the 1946 Act, providing for a referendum on daylight saving, and allowing for further periods of daylight saving depending on the results of the referendum.

The referendum on daylight saving for Western Australia was held on 8 March 1975. Voters were asked: “Are you in favour of the standard time in the State being advanced one hour from the last Sunday in October in each year until the first Sunday in March next following?” People had to write “yes” or “no” in the box. Having experienced daylight saving in 1974-75, only 46 per cent of the electorate wanted it in future years, and the matter was settled. In the metropolitan area, 51 per cent favoured daylight saving, while just 36 per cent of country people approved it. The “yes” vote was lowest in the Agricultural region with 32 per cent. North and South Metropolitan were the only regions where more than half the residents wanted daylight saving, recording 52 per cent in each, although nine of the 26 metropolitan districts were below half. In all, 30 of the state’s 51 districts in 1975 didn’t want daylight saving.

The following table shows the results of the four referendums. Names and boundaries of electoral districts have changed frequently and no attempt has been made here to provide a concordance over time. Boundaries of electoral regions have changed too. Thus results aren’t strictly comparable over time, except at state level.

¹³⁴ Parliament of Western Australia, *Hansard*, Legislative Assembly, 20 August 1974, p. 752, at [http://www.parliament.wa.gov.au/Hansard/hansard1870to1995.nsf/vwMainBackground/19740820_Assembly.pdf/\\$File/19740820_Assembly.pdf](http://www.parliament.wa.gov.au/Hansard/hansard1870to1995.nsf/vwMainBackground/19740820_Assembly.pdf/$File/19740820_Assembly.pdf)

Results of daylight saving referendums, Western Australia

| Electoral region and electoral district* | Yes votes as a percentage of valid votes | | | |
|--|--|-------------|-------------|-------------|
| | 1975 | 1984 | 1992 | 2009 |
| | — % — | | | |
| North Metropolitan | | | | |
| Balcatta | | 48.0 | 52.8 | 50.8 |
| Balga | 53.7 | 53.2 | | |
| Carine | | | | 55.0 |
| Churchlands | | | | 54.7 |
| Cottesloe | 52.1 | 47.9 | 49.5 | 51.9 |
| Dianella | | | 51.3 | |
| Floreat | 55.4 | 50.9 | 52.9 | |
| Girrawheen | | | | 45.8 |
| Glendalough | | | 52.1 | |
| Hillarys | | | | 58.3 |
| Joondalup | | 58.0 | | 59.2 |
| Karrinyup | 57.0 | 55.1 | | |
| Kingsley | | | 61.0 | 56.7 |
| Marangaroo | | | 55.0 | |
| Marmion | | | 61.1 | |
| Mindarie | | | | 54.8 |
| Mount Hawthorn | 46.3 | | | |
| Nedlands | 51.1 | 48.1 | 52.5 | 55.2 |
| Ocean Reef | | | | 63.0 |
| Perth | 45.5 | 47.1 | 50.7 | 60.0 |
| Scarborough | 54.6 | 50.5 | 53.7 | 55.4 |
| Subiaco | 50.6 | 48.1 | | |
| Wanneroo | | | 60.1 | 55.1 |
| Whitford | | 62.0 | 64.2 | |
| Total | 52.3 | 52.2 | 55.4 | 55.5 |
| East Metropolitan | | | | |
| Armadale | | 49.8 | 48.9 | 41.2 |
| Ascot | 46.9 | 44.2 | | |
| Bassendean | | | | 44.9 |
| Belmont | | | 47.1 | 43.8 |
| Darling Range | | 47.4 | 50.0 | 40.6 |
| Forrestfield | | | | 42.9 |
| Gosnells | | 53.9 | | 42.4 |
| Helena | | 44.5 | 47.8 | |
| Kalamunda | 50.7 | 47.3 | | 43.3 |
| Kenwick | | | 49.5 | |
| Maylands | 46.4 | 46.1 | 47.4 | 51.3 |
| Midland | | | | 38.4 |
| Morley | 55.3 | | 51.7 | 49.3 |
| Morley-Swan | | 49.6 | | |
| Mount Lawley | 50.1 | 48.8 | | 52.4 |
| Mundaring | 47.2 | 38.9 | | |
| Nollamara | | 52.0 | 52.9 | 46.5 |
| Roleystone | | | 50.8 | |
| Swan | 43.2 | | | |
| Swan Hills | | | 40.6 | 42.8 |
| Thornlie | | | 58.0 | |
| West Swan | | | | 49.9 |
| Total | 48.7 | 48.0 | 49.4 | 44.9 |
| South Metropolitan | | | | |
| Alfred Cove | | | | 53.2 |
| Applecross | | | 54.5 | |
| Bateman | | | | 53.0 |
| Canning | 57.1 | 51.7 | | |
| Cannington | | | | 42.8 |

| <i>Electoral region and electoral district*</i> | <i>Yes votes as a percentage of valid votes</i> | | | |
|---|---|-------------|-------------|-------------|
| | <i>1975</i> | <i>1984</i> | <i>1992</i> | <i>2009</i> |
| Clontarf | 51.9 | 46.6 | | |
| Cockburn | 55.1 | 52.8 | 53.1 | 51.4 |
| East Melville | 54.9 | 50.3 | | |
| Fremantle | 47.9 | 48.5 | 50.9 | 51.4 |
| Jandakot | | | 60.3 | 55.3 |
| Kwinana | | | | 47.8 |
| Melville | 51.1 | 49.6 | 49.7 | |
| Murdoch | | 57.5 | | |
| Peel | | | 54.4 | |
| Riverton | | | 56.8 | 51.0 |
| Rockingham | 51.9 | 57.4 | 57.4 | 48.4 |
| South Perth | 50.6 | 47.2 | 49.3 | 54.5 |
| Southern River | | | | 54.2 |
| Victoria Park | 46.2 | 46.9 | 47.1 | 50.0 |
| Warnbro | | | | 55.7 |
| Welshpool | 49.8 | 47.6 | | |
| Willagee | | | | 49.0 |
| Total | 52.0 | 50.9 | 53.5 | 51.4 |
| Total metropolitan | 51.3 | 50.5 | 52.9 | 50.6 |
| South West | | | | |
| Albany | 54.4 | 54.5 | 48.0 | 40.5 |
| Blackwood-Stirling | | | | 24.9 |
| Bunbury | 47.3 | 43.1 | 41.2 | 35.9 |
| Collie | 28.9 | 29.4 | 24.9 | |
| Collie-Preston | | | | 29.0 |
| Dawesville | | | | 43.2 |
| Mandurah | | 37.4 | 38.6 | 38.7 |
| Mitchell | | 40.3 | 37.2 | |
| Murray | 32.1 | | 39.7 | |
| Murray-Wellington | | 32.0 | | 31.5 |
| Stirling | 32.5 | 39.0 | 29.9 | |
| Vasse | 31.7 | 29.0 | 27.9 | 33.9 |
| Warren | 32.0 | 30.5 | 24.4 | |
| Wellington | 38.8 | | 25.4 | |
| Total | 37.2 | 37.1 | 33.9 | 34.6 |
| Agricultural | | | | |
| Avon | 24.2 | 20.6 | 19.2 | |
| Central Wheatbelt | | | | 15.6 |
| Dale | 49.9 | 42.3 | | |
| Geraldton | 33.2 | 31.3 | 26.1 | 20.1 |
| Greenough | 18.4 | 19.1 | 17.8 | |
| Katanning | 23.2 | | | |
| Katanning-Roe | | 19.9 | | |
| Merredin | | 13.8 | 11.1 | |
| Merredin-Yilgarn | 18.8 | | | |
| Moore | 16.1 | 23.2 | 15.2 | 18.0 |
| Mount Marshall | 13.8 | 11.2 | | |
| Narrogin | 19.8 | 18.3 | | |
| Roe | 31.9 | | 25.5 | |
| Toodyay | 53.2 | | | |
| Wagin | | | 16.9 | 14.6 |
| Total | 31.8 | 22.7 | 18.8 | 17.1 |
| Mining and Pastoral | | | | |
| Ashburton | | | 38.3 | |
| Boulder-Dundas | 47.2 | | | |
| Esperance-Dundas | | 48.5 | | |
| Eyre | | | 45.3 | 35.9 |
| Gascoyne | 35.8 | 25.0 | | |

| Electoral region and electoral district* | Yes votes as a percentage of valid votes | | | |
|--|--|-------------|-------------|-------------|
| | 1975 | 1984 | 1992 | 2009 |
| Kalgoorlie | 45.9 | 48.0 | 48.8 | 44.1 |
| Kimberley | 50.4 | 46.3 | 35.1 | 33.0 |
| Murchison-Eyre | 31.2 | 35.5 | | |
| North West Central | | | | 25.9 |
| Northern Rivers | | | 28.3 | |
| Pilbara | 54.5 | 43.7 | 33.3 | 30.9 |
| Total | 47.2 | 44.3 | 38.6 | 34.1 |
| Total non-metropolitan | 36.0 | 33.0 | 29.8 | 30.0 |
| Western Australia | 46.3 | 45.6 | 46.9 | 45.4 |

* Boundary changes mean that results aren't strictly comparable over time, except state totals. Source: Western Australian Electoral Commission, "2009 Daylight Saving Referendum", at <https://www.elections.wa.gov.au/elections/referendums/past-referendums/sr2009> and equivalent pages for 1992, 1984 and 1975

An editorial in Perth's *The Sunday Times* in November 1979 noted that the west was once again out of step with the eastern states, which had just gone onto daylight saving time for the summer, and suggested another referendum was due.

The newspaper got its wish although not straightaway. In September 1983, less than a decade after Western Australians had rejected daylight saving, a bill was brought into parliament by Labor premier Brian Burke. It asked for a trial period followed by a referendum. After nine years in government, the Liberal-National Coalition had lost office in February of that year to the Labor Party who felt it was time to give daylight saving another go. The Coalition supported the bill. As usual, business was in favour as were people who wanted more light in the evening but farmers were opposed. The bill was passed in both houses and became the Daylight Saving Act 1983 with clocks to be turned forward an hour from 30 October 1983 until 4 March 1984.

The referendum was held on 7 April 1984 with the question asked of voters very similar to the last one: "Are you in favour of the standard time in the State being advanced one hour from the last Sunday in October in each year until the first Sunday in the following March?" The results were also very similar. The proportion wanting daylight saving fell slightly to 45.6 per cent in 1984 from 46.3 per cent in 1975 (see table above). Although comparisons are tricky due to boundary changes, the pattern of voting was very similar, except perhaps in the Agricultural electoral region where the "yes" vote fell from around 32 per cent to 23 per cent. Only about a third of people in country areas wanted daylight saving and half of those in the metropolitan area. Albany was the only non-metropolitan district in support. Statewide, 43 of the 57 districts didn't want it.

Just five years later, in August 1989, another Daylight Saving Bill came into the Assembly. This time, the Labor government wanted to introduce daylight saving on a permanent basis and without a referendum, believing that community attitudes towards the scheme had shifted significantly and noting the continued support of business. The policy would also coincide with Queensland's planned move to daylight saving time in 1989-90, meaning Western Australia would be the only state without it. Two petitions against daylight saving with 1,576 and 333 signatures were presented to the House on 5 September (and two more with 50 and 170 signatures followed in the next two days).

The second reading of premier Peter Dowding's bill resumed later that day and the whole daylight saving debate was underway once again. The bill went to the committee stage and a third reading and got through the Assembly by 25 votes to 22 on party lines. But the government didn't have the numbers in the Council, holding only 16 of the 34 seats, and the bill was defeated. Business wasn't happy. The opposition told the sector's leaders it didn't want to press for daylight saving that year but might consider it next year.

The government tried to introduce a daylight saving bill into the Council in October 1990 but was denied in a 14 to 13 vote. In December, federal minister John Dawkins wrote a letter to the Western Australian government that he was willing to use section 51 of the Australian Constitution to get the state to use daylight saving, but apparently the government didn't receive it and only knew about it from media reports. Meanwhile, business groups continued their push for daylight saving.

A daylight saving bill came into the Council in August 1991. It was initially called the Summer Time Bill and proposed a two year trial in 1991-92 and 1992-93 followed by a referendum to see if the state should have daylight saving automatically each year. After much discussion and various amendments, Reg Davies' bill went to the Assembly. The lower house decided to deal with all stages of the bill in a single sitting day, 5 November. Discussion started in the afternoon and resumed in the evening at 7:30 p.m., taking until 4:35 a.m. before the bill was passed by 25 votes to 10 and sent back to the Council. Three petitions were presented on this day, including two against daylight saving with 1,117 and 29 signatures and one in favour with 53 signatures. The following day, the Council debated the bill and passed it 17 to 7 at 12:30 a.m. Government members (Labor) supported the bill whereas some opposition members (Coalition) did and some didn't.

The Daylight Saving Act 1991 provided for daylight saving in Western Australia from 17 November 1991 to 1 March 1992 and then a referendum to decide if people wanted the measure in future years. The Act included an additional part this time, called "Moderation of effect of summer time", which involved an Advisory Committee with a similar role to the Committee of Advice set up under Queensland's Summer Time Act 1990. It consisted of people with trade union, commercial, government, education and transport backgrounds and received representations from local governments about any need to change the hours of businesses or schools. The main point of difference was that the process in Western Australia related only to non-metropolitan areas.

A booklet on the referendum was inserted in *The West Australian*, *The Sunday Times* and most country newspapers. Among other information, it included a "Yes" case written by the Chamber of Commerce and Industry and a "No" case by the National Party. The referendum was on 4 April 1992 and asked: "Are you in favour of the standard time in the State being advanced one hour from the last Sunday in October 1992 until the first Sunday in March 1993 and in similar fashion for each year thereafter?" Cost of the referendum was \$4 million.

Results of the 1992 referendum were very similar to the previous two referendums. The proportion of people wanting daylight saving to continue each year increased slightly to 46.9 per cent compared with 45.6 per cent in 1984 and 46.3 per cent in 1975. The metropolitan vote rose slightly to about 53 per cent but the country vote fell

to around 30 per cent from 33 per cent in 1984 and 36 per cent in 1975. Sharpest decrease was in the Agricultural region, down to about 19 per cent after 32 per cent support in 1975.

An increase in energy consumption was reported with daylight saving in the west. The State Energy Commission of Western Australia supplied 3,214 gigawatt hours of electricity to the state's south-west including Perth in the four months to February 1992 with daylight saving, up 3 per cent on the same period of the previous year without the scheme. The commission rightly pointed out that electricity demand varies with changes in economic activity, population size, household characteristics, income, energy prices, technology, conservation measures, the weather, and daylight saving, and that it's hard to isolate the effects of individual factors. With daylight saving, less artificial light is used in the evening but more in the morning, while air-conditioning in the afternoon might increase as people are home earlier. Any savings in carbon emissions are difficult to determine too.

Perhaps noting that a referendum had been held on daylight saving in Western Australia every 8-9 years, 37 people signed a petition that was presented to parliament in October 2000 urging another one. But it was a further six years before the next daylight saving bill was introduced into the parliament.

A bill was brought in jointly in October 2006 by the Labor Party's John D'Orazio, member for Ballajura in the East Metropolitan region, and the Liberal Party's Matt Birney, member for Kalgoorlie in the Mining and Pastoral region. The bill provided for a three year trial of daylight saving, from 2006-07 to 2008-09, followed by a referendum. Both the government and opposition decided to allow their members a free vote on the bill. After standing orders were suspended, the bill was debated in the Assembly at great length on 31 October. All sorts of issues relating to daylight saving time were raised. Various members reported its level of support based on emails received and comments at functions attended. Television stations and newspapers ran polls with high support for daylight saving but these were usually phone in or web based rather than using a representative sample of the population.

Well into the debate, the member for Greenough in the Agricultural region, the National Party's Grant Woodhams, who was obviously opposed to daylight saving, broke into verse. His poem was a kind of pastiche of one of Australia's best known poems, "My Country", written by Dorothea Mackellar in 1908. Its second verse starts, "I love a sunburnt country ...". Woodhams called his poem "I love a sunburn daily" and he proceeded to read it out as part of his comments on the bill:

The love of beaches and stubbies
Of chardonnays by the pool
And doing deals in Sydney
With Coles and Woolies too
Strong love of wearing Raybans
While driving in your govvie car
I know but cannot share it
Because this time you've gone too far

See I love a sunburn daily
An extra hour will not work

The last time we were asked to try it
We were still recovering from Premier Burke
I love my faded curtains
And cows producing latte
My clock on Western Standard Time
And more bloody hours at Bunnings on Sunday

The tragic Labor government
And those swingers Matt and Johnny D
Long lunches with revenge intent
Giving Eric an extra hour to spend our surplus, free
Let the Greens tangle in the upper house
Where the Ljiljannas coil
And trendies deck the lounges
After a hard day's toil

Core of my heart, my Rolex
Her ticking body so sweet
Mum and Dad rolling around in the morning
There's a scene hard to beat [Labor's Dianne Guise interjected: "That's too much information!"]
But then the clockheads gather
And we can bless again
The dopey daylight savers
Who haven't got a brain

Core of my heart, my cheap imitation bought in Thailand Rolex
In this land that time forgot
An extra hour every day
And Carpy wants the lot
We now have one fat time zone
All lined up with the Congo
Even the Mandurah line can run on time
With Alannah the Station Master keeping time on the bongo

The filmy veil of woopy weed
That thickens in the air
Pot smokers another hour to burn and indulge in vacant stare
A summer of endless daytime
No clock to hold her back
This wilful, lavish land sucking mid strength
Can't catch a taxi, mate they're enjoying the sunset at Cottesloe
And the flag fall will set you back

All you who have not loved her
Daylight savers you don't understand
Though sunburn holds many splendours
And of it when I die
I know to what time zone
My homing thoughts will fly.¹³⁵

¹³⁵ Parliament of Western Australia, *Hansard*, Legislative Assembly, 31 October 2006, pp. 56-58, at [http://www.parliament.wa.gov.au/Hansard/hansard.nsf/0/77cd29102f22259fc825757e003309a8/\\$FILE/A37+S1+20061031+p7886b-7952a.pdf](http://www.parliament.wa.gov.au/Hansard/hansard.nsf/0/77cd29102f22259fc825757e003309a8/$FILE/A37+S1+20061031+p7886b-7952a.pdf). The names in the poem refer to his fellow politicians.

The session lasted from 3:30 p.m. to nearly midnight, less an hour for tea, before the bill finally passed by 37 votes to 14 and went to the Council, with Woodhams' poem seemingly having little influence on the result. Many more hours of discussion over several sessions then took place in the upper house. Labor member Graham Gifford reported that he ran a sample survey of 300 people in North Metropolitan finding that 65 per cent of people favoured daylight saving, 28 per cent were opposed and 7 per cent were undecided. The Liberal's Helen Morton surveyed 600 East Metropolitan voters and found roughly half in support. A statewide poll by *The West Australian* showed that 56 per cent of people supported a three year trial. The Council passed the bill 21 votes to 10 and on 24 November it became the Daylight Saving Act 2006.

Daylight saving in 2006-07 ran from 3 December to 25 March and proved unpopular with a large number of people. In the early months of 2007, there was a lot of public debate, talk on radio, phone calls and correspondence with politicians' offices, letters to newspapers, and about two dozen petitions with some 50,000 signatures opposing daylight saving and asking for an early referendum. The state was yet to have an e-petition system; otherwise, the number signing petitions may have been much greater.

The National Party's Brendon Grylls, member for Merredin, introduced the Daylight Saving Amendment Bill 2007 into the Assembly in February seeking to bring the referendum forward to 20 October of that year, eight days before the scheduled start of the second summer of the three year daylight saving trial. His electoral district, in the Agricultural region, had a "yes" vote of 11 per cent at the 1992 referendum, easily the lowest in the state.

During the debate, his colleague Terry Waldron, member for Wagin, also in the Agricultural region, commented that "during my seven years in Parliament, I do not think there has been another issue that has caused such intense lobbying. ... It has been the number one point raised at the meetings, functions and social events that I have attended. ... I was virtually accosted at a ladies' bowling day in Kojonup ... they were really angry and upset and made that point in no uncertain manner." After a lively two hour discussion, the bill was defeated 26 votes to 19 on party lines. Meanwhile, another amendment bill had been brought in, by Matt Birney, asking for March to be removed from the rest of the trial.

The government conducted a study on the physical activity of people during the 2006-07 daylight saving period. A survey of 1,300 adults found that 27 per cent exercised more and 22 per cent less, while 47 per cent reported no change. Those who usually exercised in the morning were likely to cut back due to darker mornings. Women were more likely than men to reduce their physical activity, especially in the morning. Country people tended to exercise less than previously compared with city people. Thus from a fitness point of view, the main beneficiaries of daylight saving were males, city dwellers, and people who exercised in the evening.

One member felt that alcohol consumption increased with daylight saving. Kim Hames of Dawesville district said: "My impression, from the younger group, has been that they knock off work early and start down at the pub earlier and drink more."

In October 2007, another amendment bill was introduced, this time into the Council, by Norman Moore of the Liberal Party. He wanted to bring forward the referendum to

April or May 2008, after the second year of the trial, so that daylight saving could be sorted out sooner rather than later and before the next state election due in 2009. The bill didn't come back up until April 2008, when it was passed and sent to the Assembly. A further amendment bill was brought in by the Nationals' Wendy Duncan in March 2008. Neither bill went any further.

An early election was called for 6 September 2008, not due to daylight saving but because the opposition had just appointed its fourth leader since the 2005 election and the government felt the other side was in disarray. The Labor Party, which had governed since 2001, and the Coalition each won 28 seats in the 59 seat lower house. The Coalition was able to form government with the support of the three independents. The Daylight Saving Party, registered as a political party in Western Australia in April 2005, contested a Council seat in each of five electoral regions, the exception being the Agricultural region. It gained only 0.6 per cent of the statewide vote, including 0.4 per cent in South West, 0.6 per cent in East Metropolitan and 0.7 per cent in the other three regions it contested. The party no longer exists.

Despite the numerous petitions and string of amendment bills seeking an early referendum, Western Australians again put their clocks forward an hour in the summers of 2007-08 and 2008-09 from the last Sunday in October to the last Sunday in March. The third year of the three year trial finished on 29 March 2009 and the referendum was held on 16 May. The world and therefore Australia and Western Australia were feeling the after-effects of the 2008 Global Financial Crisis and the state government's budget was tight. There was limited advertising of the referendum in newspapers and none on television or radio.

"Yes" and "no" cases, prepared by political parties and interest groups, appeared in newspapers.¹³⁶ The "yes" case of about 1,700 words revolved around spending more time with family, lifestyle issues, and supporting small business and jobs. The "no" case of around 2,000 words was based on "good science and plain common sense" as the authors put it, and argued that technology and workplace flexibility had made daylight saving obsolete. Both cases included a number of anecdotes from residents.

It was felt that the arguments presented by each side made little difference to the result as most people already had strong views on the issue one way or the other. There were 776 polling places as well as voting at 240 hospitals and institutions plus early voting and postal voting, and 6,400 casual staff were hired. Well over a million voters answered the question: "Are you in favour of daylight saving being introduced in Western Australia by standard time in the State being advanced one hour from the last Sunday in October 2009 until the last Sunday in March 2010 and in similar fashion for each following year?"

Only 45.4 per cent of the electorate voted for daylight saving to continue, slightly lower than the previous three referendums. About 50 per cent of people in the metropolitan area wanted daylight saving, but this fell to 30 per cent in the country. Support was particularly low in agricultural areas, down to 17 per cent, and this had steadily fallen from 32 per cent in 1975. Similarly, pastoral and mining areas fell from

¹³⁶ Western Australian Electoral Commission, "2009 Western Australian Referendum on Daylight Saving", pp. 11-12, at https://www.elections.wa.gov.au/sites/default/files/content/documents/2009_DSR_%20Report.pdf

47 per cent to 34 per cent at the latest referendum. Approval in the South West region was also low at 35 per cent. Even in Perth, only 45 per cent of residents in the eastern suburbs favoured it, while support in the southern part of the city fell slightly to 51 per cent. Only in the North Metropolitan region did a clear majority want daylight saving, with a “yes” vote of 55 per cent, and it was the only one of the state’s six electoral regions showing greater support in 2009 than back in 1975. The referendum cost \$10 million.

Western Australia has now had four periods of daylight saving since the 1970s and a referendum after each trial. The latest result prompted the premier, Colin Barnett, to declare that another referendum wouldn’t be needed for at least 20 years. In 2013, federal Liberal senator for Western Australia, Mathias Cormann, said the matter was “well and truly settled”, while federal member for Perth, Labor’s Alannah MacTiernan, said it didn’t need looking at until at least after the 2017 state election. There have been no bills on the issue since 2008. Perth’s mayor Lisa Scaffidi supports daylight saving but points to the advantages of being in the same time zone as China and other parts of Asia. But one man hasn’t given up. Wilson Tucker formed the Daylight Savings [sic] Party WA in 2016 and wants another referendum. He plans to run for a Council seat at the next election in 2017.

21 The long road to daylight saving across the ditch

Just as people in Europe and North America talk about “across the pond” to mean the other side of the Atlantic Ocean, “across the ditch” refers to the other side of the Tasman Sea which separates Australia and New Zealand. The country or dominion of New Zealand was the first to officially adopt standard time, in 1868, and was at the forefront of daylight saving with George Vernon Hudson the first person known to advocate it, in 1895. Legislating for it would take longer. Politician Thomas Kay Sidey pursued with daylight saving bills for nearly two decades before New Zealand finally put its clocks forward in summer.

Benjamin Franklin of the United States is credited with sparking the idea of daylight saving and William Willett of the United Kingdom is regarded as the father of the scheme, but New Zealand postal clerk, entomologist and astronomer George Hudson was the first to propose it. On 15 October 1895, he presented a paper, “On seasonal time-adjustment in countries south of lat. 30°”, to the Wellington Philosophical Society. He suggested a two hour change in clock time between 1 October and 1 March. Standard time in New Zealand was then GMT+11:30, half an hour earlier than now.

Many of the benefits Hudson described of advancing the clocks were broadly similar to those used later by Willett and others, as were some of the concerns he addressed. He pointed out that “the early-morning daylight would be utilised, and a long period of daylight leisure would be made available in the evening for cricket, gardening, cycling, or any other outdoor pursuit desired”.¹³⁷ Instead of getting up around 7 a.m. and retiring at 11 p.m., his idea was that people would rise at the equivalent of 5 a.m. and go to bed at about 9 p.m., saving two hours of artificial light. But the proposal was met with similar negativity and ridicule often experienced later by Willett. Society members called the idea unscientific and impracticable and the paper wasn’t published in the society’s journal.

Encouraged by positive comments from Christchurch though, where 1,000 copies of his paper were printed and circulated in 1896, Hudson followed this paper with an update, “On seasonal time”, which he delivered to the society on 18 October 1898. He reiterated the main thrust of his argument and then expanded on the benefits of daylight saving and addressed the potential problems.

He felt it was easier to alter the clocks, and to do this in the middle of the night, rather than to expect people to change their hours in the summer months as the measure would involve different work and meal times, adjusting transport timetables and changing business opening hours. Hudson was aware of employees’ concerns that shopkeepers and others might make them work longer, but he said there was legislation already dealing with working hours. He knew that milkmen and people in certain other occupations would have to get up even earlier by clock time but that they were a small minority. He thought the disadvantage to electricity and gas companies

¹³⁷ George Hudson, “On seasonal time”, *Transactions and Proceedings of the Royal Society of New Zealand*, vol. 31, 1898, pp. 577-583, Royal Society of New Zealand, National Library of New Zealand, at http://rsnz.natlib.govt.nz/volume/rsnz_31/rsnz_31_00_008570.html

would be more than offset by community savings on power. And he knew that theatres and concert halls would suffer as many people would remain outdoors.

But he was sure that the benefits of better health and happiness brought about by extra time spent outside by working people and school children would outweigh any of the alleged drawbacks of turning the clock hands forward in the summer months. He didn't use the term daylight saving but used "seasonal time" which is perhaps a more accurate description. Unlike Willett, Hudson didn't seem to pursue with his interest in seasonal time and nor did anyone else in New Zealand as far as we know, including in parliament.

The *Oamaru Mail* reported on 17 August 1909 that the practice of advancing the time by one hour in summer in isolated areas of New Zealand happened "years ago". At Mercury Bay, for example, the large timber mills that employed most local people directly or indirectly put their clocks forward to give workers more time for recreation after work. Some sawmills turned clocks ahead by as much as three hours, according to *The Dominion* on 3 November. Similarly, *The Poverty Bay Herald* of 27 October said that at "up-country stations where daylight saving has long been an established custom, the day's work is well advanced by the time the sleepy folk in the town have thrown off the bedclothes".

Six months after the first daylight saving bill was introduced into the British Parliament, an Alteration of Time Bill was brought into the New Zealand House of Representatives by Charles Izard of the governing Liberal Party and member for Wellington North on 6 August 1908. It was read a second time on 26 August. The bill proposed that standard time be advanced one hour at midnight on the last Saturday in September and go back at midnight on the last Saturday in March each year. But he didn't expect the bill to pass that year and felt it unnecessary to make a speech on the subject.

Charles Lewis, independent conservative, believed there was no reasonable chance of the bill being passed in a short session and was therefore a waste of time. Prime minister Joseph Ward disagreed and felt that the House should pass the second reading of the bill and send it to a committee. The Liberal Party's William Tanner sided with Lewis. Independent Charles Gray wanted to know why the bill was introduced. He asked if the intention was for people to "go to bed one hour earlier and get up an hour earlier, or indulge an hour longer in bed".¹³⁸ He also asked what its effect would be on trade and commerce. Francis Fisher of the New Liberal Party explained that Izard was "studying the time of the House" and "simply desired to have evidence taken so that it might be discussed intelligently next session". The second reading was passed on the voices and the bill went to the committee stage.

An election was held in November 1908 and the committee didn't have time to finalise its report. Izard lost his seat but Thomas Sidey of the Liberal Party's left and member for Dunedin South advised in February 1909 that he would continue the move to try and get daylight saving introduced in New Zealand. Sidey, a solicitor, had been in the parliament from 1901 as member for Caversham before it was abolished

¹³⁸ "Parliament day by day", *The Poverty Bay Herald*, 27 August 1908, p. 7, Papers Past, National Library of New Zealand, at <http://paperspast.natlib.govt.nz/cgi-bin/paperspast?a=d&d=PBH19080827.2.63>

in an electoral redistribution in 1908 and had been mayor of the suburb by the same name within Dunedin city from 1894.

The daylight saving idea was getting a lot of support, with a number of businesses and schools already putting their clocks forward over the summer months of 1908-09. The Canterbury Agricultural and Pastoral Association in May 1909 favoured it as an early start would mean more leisure time later in the day although an Agricultural and Pastoral Societies Conference in August voted narrowly against supporting such a scheme. The *Taranaka Herald* didn't think much of the proposal and made the following comment on 11 June: "Mr Sidey has designs on time. He wants to make people get up earlier in the morning on the days when the sun rises early and go to bed earlier [sic] on the days when the cows wake up late, but no one takes these propositions seriously."

Sidey introduced his New Zealand Local Time Bill into the House on 7 October 1909. Daylight saving would apply from the end of September to the end of March each year. The bill was read a second time on 21 October. He spoke about the savings on artificial light, the additional time for recreation and sport, and the support the bill was receiving from government and private bodies in Britain and from businesses in New Zealand. The Education Board liked the idea too.

Reform Party member for Dunedin North George Thomson opposed the bill, preferring that people simply got up earlier. Others supported it, including Liberal Thomas Wilford who wanted factories to close at the earlier hour of 5 p.m. and pointed to health advantages. Prime minister Ward was also in favour, opining that the proposals in the bill would eventually be practised all around the world. The bill was referred to a select committee on the same day.

The committee spoke to various witnesses, including from business, government departments, the media and sports bodies, and reported favourably in late December. The only objection was from the media concerned that cable news from Australia would be received an hour later for part of the year. To overcome this disadvantage, the committee suggested working with the Australian states to get uniformity of time during the summer months and mentioned that Victoria already had a daylight saving bill. The committee didn't interview anyone from the dairy industry, which was against daylight saving. Nor did it talk to trade union representatives. It recommended the matter be legislated next year.

In 1910, Thomas Sidey reintroduced his bill as the Daylight Saving Bill for a five month period instead of the six months under his New Zealand Local Time Bill of the previous year. The new bill proposed daylight saving from the first Sunday in October until the first Sunday in March to align it with bills in Australia. He estimated that £50,000 a year would be saved in artificial light. Outside parliament, George Hudson spoke strongly in support of the proposal, highlighting recreational benefits. Dairymen firmly opposed the scheme as milking would need to start an hour earlier, and by lamplight, in order for produce to reach the markets and towns on time.

Overall, there was a lot of support, especially from sporting bodies, and a lot of criticism in the community over the proposal. But the last day for private members' bills to progress was 25 August, with the rest of the session being devoted to

government measures. In November, Joseph Ward stated that the government would consider the issue during the break but that there were many practical difficulties with it.

Sidey's 1911 bill, this time called the New Zealand Mean Time Bill (although it was usually referred to as the daylight saving bill), was for six months of daylight saving, from late September to late March. At the second reading on 17 August, he said the measure should at least be tried for a year or two. He estimated the annual savings in artificial light to be more than £60,000 and up to £100,000. Several members supported the bill, but George Thomson was still against it and wanted to know the views of milkmen and other early risers. However, he felt that if "New Zealand was exceedingly anxious to lead the world he would support a trial of the scheme for a year" according to the *Auckland Star* on 17 August. The bill passed the second reading and went to the committee stage.

As usual Sidey spoke at business, sporting and public meetings to promote his bill. Hudson spoke at one of the gatherings and maybe more. Several petitions supporting daylight saving were presented to parliament, including one organised by Sidey that attracted 6,550 signatures. By October, Ward said there wouldn't be time to deal further with the bill that session, especially as an election was due in December 1911.

The Liberal Party government lost 17 seats in a 14 per cent swing against it and there was no clear winner. Substantial gains were made by William Massey's Reform Party, which took a more conservative view than the Liberals and consisted of a group who had broken away from them in 1909 and some previous independents. They won 37 seats to the Liberals 33, although Ward hoped to hang on with the help of the four Labour Party members plus some independents. In the end, the two sides were locked at 39 each and the speaker decided to vote with the government. But Ward had already resigned as prime minister on 28 March 1912. The Liberal's Thomas MacKenzie became the new prime minister but a no confidence motion in the government on 5 July resulted in Massey and his Reform Party gaining office. Massey, who was often known as "Farmer Bill", represented the rural electorate of Franklin and would be prime minister until 1925. Getting a daylight saving bill through parliament would now be much harder.

Sidey retained his seat and was now on the opposition benches, but he didn't give up the cause he was passionate about. He reintroduced the New Zealand Mean Time Bill in 1912, with a reduction in the period of daylight saving back to five months as the only difference. Bills in Australia proposed this timeframe. The bill passed the second reading on 8 August, but at committee stage it was criticised by country members on 5 September when debate finished around 1:30 a.m. It struck further trouble on 18 September when Massey opposed the bill saying it was "far too drastic" and "would produce a revolution". Sidey felt that most members favoured daylight saving but were being coerced into voting otherwise. He wanted to withdraw the bill due to lack of support by the prime minister and felt there was no chance of it getting to legislation. The bill lapsed.

Controversial journalist Frank Morton took members opposing the bill to task, but then suggested that Sidey wasn't up to it anyway:

... certain members more marked by their stupidity than their intelligence apparently thought that the idea was a jest or insolent trick of Mr Sidey's. These sluggish-minded representatives of the people talked an amazing lot of rubbish about interfering with the sun. They even said that the suggested change would increase women's work. Every idiotic thing that human stupidity could devise was said in disparagement of this Bill. ... Unfortunately, Mr Sidey has no magnetism. He is one of those perfectly earnest men who are fated to go through life seeming always rather comic and quaint. His voice is a squeak, and his manner would scarcely convince a dry duck of the desirableness of water.¹³⁹

At Blenheim, near the northern end of the south island, 17 representatives from commerce and the professions weren't bothered by parliament's rejection of Sidey's bill. They met on 17 October to consider adopting daylight saving in their businesses, specifically whether to change their office hours to 8 a.m. to 4 p.m. from 9 a.m. to 5 p.m. and to do so from November to March. Approval was unanimous. In Wellington, petitions from staff at five large government departments requested similar changes to hours of work. Some New Zealand schools were turning their clocks forward in the warmer months. Certain businesses included their support for daylight saving in their advertising.

Thomas Sidey reduced the proposed duration of daylight saving to three months, from early November to early February, in his new Definition of Time Bill in 1913, as he now called it. The bill easily passed the second reading on 24 July by 36 votes to 23. A month later, a large deputation of representatives from business, trade unions and sport, as well as members, visited the prime minister on 25 August to talk about the bill. Sidey pleaded that the idea be trialled.

But Massey declared that he had to consider daylight saving from the point of view of the whole dominion, including primary industry, the railways, international relations, and the inconvenience of changing the clocks twice a year. He said that any change would have to apply all year, not just for a few months, and argued that South Australia did this in 1899 with apparent success (although the state shifted its time zone by only half an hour). He also felt that a time change would work in the cities but not in agricultural areas. The bill came up again on 10 September, but at the end of a long and rowdy evening session in the House, with plenty of insults from both sides, the bill was killed at about 1 a.m. by a vote of 38 to 25.

In May 1914, Sidey wrote to all members who supported his bill the previous year as follows:

You may remember that last year's Bill limited the operation of the measure to the three months of the year when the days are longest – namely, November, December, and January, and I agreed to insert, when in committee, a provision that the Bill should operate for one season only. This would have ensured a trial of the proposal, and as there is so much daylight at this season of the year of summer (daylight commencing in the height of summer at about 3 a.m. [although not even nautical twilight at the southern end of New Zealand started this early]), the possibility of inconvenience to any section of the community was reduced to a minimum. Now some of those who

¹³⁹ Frank Morton, "The week, the world, and Wellington", *The Wanganui Chronicle*, 14 September 1912, p. 3, Papers Past, National Library of New Zealand, at <http://paperspast.natlib.govt.nz/cgi-bin/paperspast?a=d&d=WC19120914.2.6.1>

voted for a trial of the proposal last year might think it inadvisable this year owing to the general election [10 December] ... Further, when in committee obstruction is sure to be met with from the same source as formerly, and before I reintroduce the Bill I am anxious to know upon how many members of the House I can rely on to stand by the Bill in committee until the obstruction is overcome, even if it means sitting up all night or longer.¹⁴⁰

A daylight saving bill does seem to have been introduced into parliament in 1914, presumably by Sidey, but it went no further. The only evidence of a bill is in a newspaper article in *The Waikato Argus* on 13 October.¹⁴¹ It indicates that a copy of the Definition of Time Bill was sent to the Hamilton Chamber of Commerce by Alexander Young of the governing Reform Party but that parliament didn't intend to proceed with it.

World War I started in July and William Massey wanted to minimise contentious issues in the House although when questioned he didn't mention specific topics. Sidey still actively promoted daylight saving in the community. In December, he announced a petition with 7,000 signatures to be presented to parliament. There was the usual support for daylight saving from business. The morning newspapers didn't like it as it would delay cable news.

Another Definition of Time Bill was introduced into parliament in 1915, still proposing just three months of daylight saving. The bill passed the second reading by 41 votes to 26 on 14 July in a lively "town versus country squabble", as several newspapers described the debate that lasted through the evening. In committee on 22 July, where various clauses of the bill were discussed at length, the House sat all evening and all night, not rising until 8:20 a.m. Sidey and his bill were subject to plenty of criticism from rural members as the night wore on, but he was unfazed. He agreed to a proposal to delay the bill three years so long as it got through the committee stage, which it did. The bill passed a third reading by 42 votes to 30 on 28 July and progressed to the Council but a second reading was defeated by 12 to 9. One member called it the "Confusion of Time Bill". Another said it was "nonsensical and dangerous". There was also a call for any time change to be optional.

With the introduction of daylight saving in Europe in 1916 and reports of its success, chambers of commerce, trade unions and sporting bodies pushed the New Zealand government harder than ever to introduce daylight saving, pointing to health benefits and lower costs. Some local governments were keen too. Sidey introduced his latest Definition of Time Bill on 23 May. It extended the duration of daylight saving to five months, from early October to early March each summer. Although the bill lapsed, he was able to get a daylight saving clause added to the War Legislation Bill by a vote of 29 to 26 on 1 August. Massey was unimpressed and after further heated debate, members voted 29 to 23 against the clause and the House rose at 12.10 a.m.

¹⁴⁰ "Daylight saving – Mr. Sidey seeks support", *The Hawke's Bay Tribune*, 21 May 1914, p. 6, Papers Past, National Library of New Zealand, at <http://paperspast.natlib.govt.nz/cgi-bin/paperspast?a=d&d=HAST19140521.2.81>

¹⁴¹ "Hamilton Chamber of Commerce", *The Waikato Argus*, 13 October 1914, p. 2, Papers Past, National Library of New Zealand, at <http://paperspast.natlib.govt.nz/cgi-bin/paperspast?a=d&cl=search&d=WAIGUS19141013.2.6>. In other years, a fairly large number of newspaper articles (in the Papers Past series of the National Library of New Zealand) reported on the progress of daylight saving bills in parliament but only one appeared in 1914.

The Education Department implemented its own daylight saving system in 1916-17 and many businesses put their clocks on 30 minutes or an hour. Government departments in Wellington were starting and finishing half an hour earlier from April to save fuel and cope with a tram strike. Chambers of commerce kept lobbying the government to introduce daylight saving. But widespread opposition to the scheme in Australia in early 1917 and its withdrawal after less than three months didn't help its cause in New Zealand.

Nevertheless, Sidey brought yet another Definition of Time Bill into the parliament in 1917 emphasising potential coal savings. He was called "the hero of a hundred fights" by members supporting him as he talked about the success of daylight saving in Tasmania and Britain at the second reading on 12 September. But much of the House's time was taken up with war related legislation that year and the bill didn't proceed. In November, Sidey was still urging the government to consider daylight saving. Massey advised that the National Efficiency Board had prepared a report and the government was considering it.

Sidey introduced a daylight saving bill again in 1918, on 24 October, the first day of a new parliamentary session, but it didn't seem to come up for discussion. There had been talk of advancing standard time by half an hour in New Zealand, and this gained momentum in 1919, although it didn't happen until 1946.

On 20 July 1919, Sidey told the media he was keen to introduce another daylight saving bill due to the coal shortage and as the measure was used in Britain, France, America and Canada. He brought in his Definition of Time Bill on 2 September and eight days later members sat up all night debating it. Chambers of commerce and sporting bodies continued to endorse it and many businesses were adopting their own scheme without changing the clock. Doctors were in favour due to the health advantages. But Massey advised the House on 8 October that the government didn't intend introducing daylight saving as it hadn't worked in Australia, Canada and the United States.

Both men were correct at the time they spoke. The four countries mentioned by Sidey had daylight saving time, but it wasn't particularly successful in the three countries referred to by Massey. It had been dropped in Australia and, on a national basis, was being ditched in America and Canada although it would continue in a number of areas. It was popular in Britain and many European countries, places with a broadly similar climate to New Zealand. Most members were known to be in favour of daylight saving. In August, Sidey announced he wasn't contesting the next election in December, but he changed his mind and retained his seat. The Reform Party gained a second term winning 43 of the 80 seats in the House despite getting only 36 per cent of the vote.

A Standard Time Bill was introduced by the Reform Party's George Anderson, member for the rural electorate of Matura, on 29 June 1920. It was based on the work of government astronomer Dr Charles Adams and the Wellington Philosophical Institute. The government bill proposed to advance New Zealand's standard time half an hour year round, from GMT+11:30 to GMT+12, to save coal and electricity at times of peak demand. Businesses would close in daylight in winter and people would

have an extra half hour for recreation after work, although in Wellington and Auckland, local mean time was already GMT+11:39.

The bill was seen as an alternative to daylight saving where clocks would be wound forward an hour just over the summer months. It was on the order paper for several months, but mounting opposition from country areas and Anderson being ill meant it didn't progress. Farmers were no happier with it than they were with suggestions of daylight saving as they would still have to get up even earlier than usual. Sidey didn't bring in a bill that year.

The government reintroduced its Standard Time Bill on 18 October 1921, but it didn't go any further. Again there was no bill from Sidey although many businesses and government offices continued their own daylight saving scheme by opening and closing earlier, usually half an hour, in the warmer months. In 1922, James McCombs of the Labour Party gave notice on 20 July to bring in his Daylight Saving Bill but it lapsed.

Thomas Sidey asked the government on 3 July 1923 if it would legislate for a daylight saving trial next summer to be followed by a study on how it affected various parts of the community. Massey wasn't keen. He was worried about the effects of daylight saving on primary industry, but would be willing to consider a half hour change to standard time. This was also the preference of power companies although business and sport wanted daylight saving and were quite active, especially in Christchurch, in urging the government to introduce it. Churches favoured daylight saving too. Sidey wrote to the mayor that there was little chance of even a trial while Massey was prime minister. By 1923-24, government departments in Wellington had put their clocks on each summer for six years. There was no daylight saving bill in 1923.

On 27 June 1924, Sidey introduced his first daylight saving bill in five years. He called the current one the Summer Time Bill rather than the Definition of Time Bill. A large deputation visited Massey on 17 July to present the case for daylight saving and to ask him to support Sidey's bill. It comprised representatives from a number of councils, commerce chambers, various sporting bodies, the public service, unions, and even a few farmers including at least one dairyman. Many members of the House were also present in listening roles. The prime minister empathised with sports people and accepted that many businesses already put their clocks forward in summer, but he said daylight saving wasn't fair on the agricultural industry. Instead, he was happy to support moving standard time to GMT+12 for a trial period.

A lively debate on the Summer Time Bill took all evening in parliament on 24 July. Reform Party member Frank Hockly wanted to get rid of the bill and suggested it be read in six months' time. This proposal was defeated 36 votes to 24 and the bill passed the second reading at five minutes to midnight. Sidey had his committee ready but Massey rejected the line up. A new committee was finally formed and it reported favourably to the House on 16 September. The report included a view by the railways that the effect on them would be minimal. After a four hour wrangle on 13 October, the bill was thrown out by a vote of 22 to 20 in another midnight sitting.

Amid laughter from the government benches, the indefatigable Mr Sidey announced his Summer Time Bill again on 25 June 1925. It was debated and read a second time

on 16 July, after which the House rose at the early hour of 9:35 p.m., conserving electricity and perhaps practising daylight saving type hours in case the scheme ever came to fruition. But the latest bill was voted down by the narrowest of margins, 30 to 29, in committee on 19 August.

William Massey fell ill in 1924 and died in 1925. New prime minister Gordon Coates, who like Massey was a farmer, led the Reform Party to a resounding victory at the November 1925 election, winning 55 of the 80 seats. Getting a daylight saving bill through the new parliament still seemed unlikely. Undaunted, the Sports Protection League wrote to 500 industry, union, sporting and local government bodies in March 1926 for support in promoting the daylight saving cause. Nor did it discourage Sidey who said on 17 June that he would introduce another summer time bill, for a four month trial.

Meanwhile, in a three month period, 112 bodies had passed resolutions supporting daylight saving and a large deputation of representatives from across the community met Coates on 7 July to discuss the subject. He said he was happy for the matter to go through parliament and he assured the meeting that daylight saving would remain a non-party issue although he would personally vote against it. That night, after a rowdy debate, the second reading of the latest Summer Time Bill was carried 35 to 18 at 1:05 a.m. and the House went straight into committee. After further discussion, the bill passed the third reading by the same vote at 2:20 a.m. Both sides of the House applauded Sidey on his success and persistence. He had introduced 13 daylight saving bills in 18 years and 1926 was only the second time his bill got through all stages in the House, the other being in 1915.

Sidey's bill went to the Council and was read a second time on 21 July before being referred to a select committee which heard from various witnesses. At the same time, the Council discussed the possibility of exemptions for a number of occupations, such as miners, farmers, and picture theatre owners, but the proposed amendment was defeated on the voices. Following lengthy debates, the bill got to the third reading but the vote was tied at 16 each, with Auckland members voting in a block against it. This meant that the Speaker, Walter Carncross of the Liberal Party and a newspaper proprietor, had the casting vote and he gave it against the bill, which was all he could do under the New Zealand Constitution. At least four of the five Council members who had been absent from the vote were known to support daylight saving. "Sidey goes down with colours flying" bellowed *The Auckland Star* of 26 August 1926. Undeterred, he immediately said he would reintroduce his bill next year.

True to his word, Sidey notified the House on 23 June 1927 that he would introduce yet another summer time bill. The second reading debate on 14 July was another city versus country tussle. Many members were either strongly for or very much against the measure, with the main opposition as usual coming from representatives of rural electorates. The vote, at 12:45 a.m., was 33 to 21 in favour of the bill and it advanced to the committee stage.

In an all night session on 24 August, Sidey was happy to exempt several occupations from daylight saving, namely grain threshers, shearers and coal miners. Member Albert Samuel wanted an exemption for dairy farmers and Douglas Lysnar one for the railways. Sidey also agreed to a two week reduction in the length of the daylight

saving period to three and a half months. Coates was opposed to the scheme, believing it would work in the cities but not in the country. In the same week, a meeting of a large number of business associations, trade unions, sports bodies, local councils, community groups, and doctors were unanimous in their support of the Summer Time Bill.

Railway officials met with the prime minister on 30 August to discuss difficulties of revising timetables so that milk could be delivered to factories and then to the breakfast table an hour earlier real time. There were problems with cream and butter production too, as well as complaints that dairy farmers would have to rise well before dawn. Coates delayed progress of the bill for a fortnight while further enquiries with the railways and the dairy industry were made.



Thomas Sidey checking his watch, 1927

Source: Photo by Edward Thomas Robson, probably Wellington, courtesy Alexander Turnbull Library, National Library of New Zealand, ref: PAColl-7171-04 (originally published in *New Zealand Free Lance*, 9 November 1927), at <http://www.teara.govt.nz/en/photograph/1857/thomas-kay-sidey>

Despite these issues not being resolved, debate on the Summer Time Bill resumed on 14 September. The galleries were full and people were queuing outside. The discussion dragged on into the night. By 4:30 a.m., the prime minister was fast asleep

and he wasn't the only one. The bill finally passed the committee stage at 7 a.m. and clapping broke out for Sidey who stood up and bowed in acknowledgment. It passed a third reading that night at 12:40 a.m. by a vote of 29 to 14.

The Council spent just half an hour debating the bill on 21 September and it passed the second reading on the voices. In committee, Richard Moore moved to exempt dairy farmers but the amendment was defeated 21 to 9. The third reading was a formality and the bill had passed all stages. Word quickly got back to the House and Sidey received a round of applause. New Zealand was getting daylight saving at last. He hosted members of both houses at supper that night and the prime minister called a toast. Celebrations broke out at sporting clubs, including bowls, cricket and tennis, and at business associations, while reaction in the farming community was largely neutral. As for the railways, an exemption meant they weren't changing their timetables.

The Summer Time Act 1927, assented to on 30 September, provided for a daylight saving trial in New Zealand from 6 November 1927 to 4 March 1928, with clocks advanced one hour, at a time when the scheme was almost solely confined to a minority of places in Europe and North America. Daylight saving was generally well received although some rural areas remained strongly opposed. The Act was only for 1927-28 and Sidey introduced a new Summer Time Bill on 29 June 1928. But with an election coming up later in the year, the feeling in the House was that the new bill wouldn't get as much support as last year. After 27 years in parliament, Sidey announced his retirement on 11 July and wouldn't seek reelection.

Meanwhile, dairy farmers sent two petitions with nearly 10,000 signatures to parliament asking that daylight saving be abandoned, complaining of having to sort out the cows in the early morning dark, families not getting enough sleep as they had to go to bed when still light, and dew still on crops at harvest time when work was supposed to be underway.

The bill was rejected by 33 votes to 28 at its second reading on 25 July. Among many reasons given by members wanting to scrap daylight saving, John Hamilton offered the following story: "I know of one woman who dreamt about Mr. Sidey getting up early in the morning and trying to bail up the cows. It was pitch dark, and there was a tremendous scuffle. She saw Mr. Sidey light a match, and he found that he had bailed up a bull!"¹⁴² This was met with loud laughter. But Sidey believed the reversal of support for daylight saving in the House was because of the election due in November and members worrying about losing votes particularly in country areas. He suggested a referendum on daylight saving.

Sidey introduced another bill on 8 August 1928, the Summer Time (Local Empowering) Bill, giving councils the choice of adopting daylight saving. Railways and the post office would retain standard time. A large deputation representing councils as well as chambers of commerce, employer groups, trade unions, the health profession, education and women saw the prime minister to get his support for the new bill. The bill passed the second reading with virtually no opposition. But at the

¹⁴² "A slight mistake!", *The Evening Post*, 26 July 1928, p. 10, Papers Past, National Library of New Zealand, at <http://paperspast.natlib.govt.nz/cgi-bin/paperspast?a=d&d=EP19280726.2.44>

committee stage, many practical difficulties were raised with the bill and it was dropped. One of the committee's recommendations was to move clocks forward half an hour throughout the country just in that summer rather than one hour. The government accepted the recommendation and brought in a Summer Time Bill on 5 October for a five month trial in 1928-29. Threshers and shearers were exempt. The bill quickly passed all stages in both houses and became the Summer Time Act 1928 on 9 October. Clocks were put forward half an hour five days later.

Against a deteriorating economic situation before the Great Depression, Coates' Reform Party lost the November 1928 election in a surprise landslide to Joseph Ward's United Party which had come out of the Liberal Party. Ward, who had been prime minister in 1906 to 1912, and was out of parliament from 1919 to 1925, returned to that role 16 years later. Sidey was brought back as leader of the government in the Legislative Council and became attorney-general. What influence his daylight saving efforts had on the election result isn't clear although it probably wasn't insignificant. Daylight saving seemed to be well liked and the electorate might have felt there was a better chance of a permanent arrangement under the new United Party than the Reform Party. Voters were perhaps reluctant to move earlier as the old Liberal Party had been decaying for years and the Labour Party at that time was probably regarded as too socialist by most people.

Daylight saving in its various forms remained a popular but controversial topic in New Zealand. Some people and groups wanted half an hour and others one hour. Some wanted permanent summer time whereas others preferred another trial. Some folk suggested putting the clocks on half an hour in summer and then putting them half an hour behind standard time in the cooler months, or "winter time", while others advocated a shift in standard time of half an hour as per bills in 1920 and 1921. A large number of residents, mainly in agricultural districts, didn't want any fiddling with the clock. Summer time was often referred to as "Sidey time".

Against this background, Sidey introduced a Summer Time Bill for permanent daylight saving on 29 August 1929, the first daylight saving bill to start off in the Council. The rest of the bill was the same as the previous year. It passed a second reading unanimously next day to applause and quickly went to the House where it passed all stages by 12:45 a.m. on the sitting day of 9 October. There had been various proposed amendments but all of them were lost. The Summer Time Act 1929, assented to on 11 October, now gave New Zealand permanent daylight saving of half an hour from the second Sunday in October to the third Sunday in March although local mean time in Auckland and Wellington was already nine minutes ahead of standard time.

Thomas Sidey died on 20 May 1933, aged 69, after 32 years in parliament. His role in attaining daylight saving for New Zealand is remarkable. He introduced 18 bills on the scheme over the period 1909 to 1929 before it became permanent, as shown in the following table.

The road to permanent daylight saving, New Zealand, 1908 to 1929

| <i>Year</i> | <i>Name of bill</i> | <i>Introduced by</i> | <i>Stage reached*</i> |
|-------------|-------------------------------------|----------------------|-------------------------------------|
| 1908 | Alteration of Time Bill | Charles Izard | Committee; report not completed |
| 1909 | New Zealand Local Time Bill | Thomas Sidey | Committee; report completed; lapsed |
| 1910 | Daylight Saving Bill | Thomas Sidey | Passed first reading; lapsed |
| 1911 | New Zealand Mean Time Bill | Thomas Sidey | Committee; lapsed |
| 1912 | New Zealand Mean Time Bill | Thomas Sidey | Committee; lapsed |
| 1913 | Definition of Time Bill | Thomas Sidey | Committee; defeated |
| 1914 | Definition of Time Bill | Thomas Sidey | First reading?; lapsed |
| 1915 | Definition of Time Bill | Thomas Sidey | Second reading, Council; defeated |
| 1916 | Definition of Time Bill | Thomas Sidey | Passed first reading; lapsed |
| 1917 | Definition of Time Bill | Thomas Sidey | Second reading; lapsed |
| 1918 | Definition of Time Bill | Thomas Sidey | Passed first reading; lapsed |
| 1919 | Definition of Time Bill | Thomas Sidey | Second reading; lapsed |
| 1920 | Standard Time Bill | George Anderson | Passed first reading; lapsed |
| 1921 | Standard Time Bill | Government | Passed first reading; lapsed |
| 1922 | Daylight Saving Bill | James McCombs | First reading?; lapsed |
| 1923 | — | — | — |
| 1924 | Summer Time Bill | Thomas Sidey | Committee; defeated |
| 1925 | Summer Time Bill | Thomas Sidey | Committee; defeated |
| 1926 | Summer Time Bill | Thomas Sidey | Third reading, Council; defeated |
| 1927 | Summer Time Bill | Thomas Sidey | Passed all stages, both houses; Act |
| 1928 | Summer Time Bill | Thomas Sidey | Second reading; defeated |
| 1928 | Summer Time (Local Empowering) Bill | Thomas Sidey | Committee; defeated |
| 1928 | Summer Time Bill | Government | Passed all stages, both houses; Act |
| 1929 | Summer Time Bill | Thomas Sidey | Passed all stages, both houses; Act |

* Stages are usually first reading, second reading, committee (which can be select committee and report or discussing the various clauses in-house) and third reading.

Sources: various, including Papers Past, National Library of New Zealand, at <https://paperspast.natlib.govt.nz>

A Summer Time Amendment Bill was introduced by Labour's Robert McKeen on 3 October 1933 to extend daylight saving to one hour and the end date by a month. At the second reading debate on 18 October, it was agreed to run with the longer duration but keep the time change to half an hour. McKeen had to withdraw his bill as the government was introducing one where the daylight saving period would be seven weeks longer, extending from the last Sunday in September to the last Sunday in April, or seven months, and always including Easter. Needless to say, farmers and other opponents of daylight saving weren't happy. But the bill passed both houses and became the Summer Time Amendment Act 1933 on 15 December and applied from 1934.

Farmers kept up their protests against daylight saving, wanting the Act repealed altogether or at least the duration reduced by a few weeks or months. Power companies complained about the cost of changing the clock time on hot water systems and wanted daylight saving throughout the year or not at all.

By 1940, large increases in power usage in homes and businesses over the previous decade due to technological advances, together with delays in building extra capacity due to World War II, meant power shortages in winter of that year, especially on the north island. There was insufficient coal too. The view by January 1941 was that the situation might be worse next winter. Options included year round daylight saving of half an hour or an hour, or one hour in summer and half an hour in winter, or rationing. The Public Works Department estimated a decrease in the winter peak from

300,000 kilowatt hours to 280,000 with the half hour option and to 260,000 with one hour although the agency felt that the reduction in usage over the year would be negligible.

The Labour government's preference was to keep the clocks half an hour advanced all year and to do this by regulation. There seemed to be general agreement in the parliament and the prime minister, Peter Fraser, announced on 27 March 1941 that this would be the policy. The advantages of easing the pressure on power plants and the hydroelectric system, and workers going home in daylight, were stressed by internal affairs minister Bill Parry. Instead of reverting to standard time on 27 April, clocks stayed a half hour ahead in the winter months by regulation. This policy contrasted with Britain's two hours during the northern summer and one hour in winter.

McKeen still wanted New Zealand to go an hour ahead all year, but the government made it clear this wouldn't happen, perhaps making farmers slightly less upset than otherwise. By early 1942, some businesses were making a similar suggestion and certain power companies were in favour of such a move too. But the push for an hour of daylight saving all year didn't seem to go beyond 1942.

Each year from 1941 to 1945, the government extended daylight saving through winter by regulation. On 26 September 1945, less than a month after the end of the war, the government announced that year round daylight saving would be made permanent via a change in New Zealand standard time to GMT+12 from GMT+11:30. The Standard Time Bill was passed in both houses and became the Standard Time Act 1945 which took effect from 1 January 1946. Strictly, the country didn't have daylight saving in the immediate postwar years.

The Standard Time Amendment Act 1956 related only to the Chatham Islands, two small islands east of New Zealand's south island. These islands had been part of New Zealand since 1842 and officially on the same standard time as the rest of the country from 1868. But in practice, residents had been setting their clocks 45 minutes ahead of the rest of the country since sometime before 1945 (and quite likely used their own local time in earlier years). Chatham Islanders voted almost unanimously in 1955 to keep using this time rather than New Zealand time. Under the Act, standard time became GMT+12:45 from 1 January 1957, about half an hour ahead of local time.

A bill was introduced by the Labour government on 6 June 1974 allowing it to implement daylight saving if there was a power shortage. Under the Time Act 1974, the governor-general could decide on periods of daylight saving, and a trial for 1974-75 from 3 November to 23 February was announced on 18 September, including for the Chatham Islands. This meant that clock time in summer was about one hour 20 minutes ahead of local mean time in Wellington and Auckland. Dairy farmers, in particular, weren't impressed by having to rise even earlier to get their milk to market. The dairying community of Ararua, north of Auckland, ignored the change and kept to "Ararua time". Locals put up a sign, "Welcome to Ararua time. Drive slowly. You're an hour early anyway."¹⁴³ In general though, daylight saving seemed popular

¹⁴³ See "Ararua time", *The New Zealand Herald*, Auckland, New Zealand, 29 October 1984, in *The Encyclopedia of New Zealand*, at <http://www.teara.govt.nz/en/photograph/6707/ararua-time>

and, with the New Zealand Time Order 1975, the government declared it a permanent feature from 1975-76.

In 1985, the Internal Affairs Department undertook a survey of people's attitudes to daylight saving and how it affected work and recreation. The survey found that 76 per cent of people wanted daylight saving continued or extended, with support even higher in urban areas. After further public feedback, the duration of daylight saving was extended by three weeks at the start and two at the end for a total of 23 weeks on a trial basis in 1989-90. The minister invited comments. These were mainly favourable and the five week addition was made permanent from 1990-91 by the New Zealand Daylight Time Order 1990.

To the north-east, the Cook Islands, which are in free association with New Zealand, shifted their time zone from UTC-10:30 to UTC-10 in 1978 and had half an hour of daylight saving from 1978-79 until 1990-91. New Zealand start and finish dates were used except in the last two years when the island country kept to the 18 week schedule. The Cook Islands effectively have daylight saving all year as standard time is 39 minutes ahead of mean solar time.

New Zealand considered an early start to daylight saving in 2001 after M-Co, an electricity market service company, estimated that power consumption fell by 3.5 per cent in the first week of daylight saving in 2000, with usage between 5 p.m. and 8 p.m. declining by 7.5 per cent. ACT Energy suggested a starting date of 1 September. Federated Farmers complained they were busy with calving and didn't want to get up in the dark. In the end, the start remained at the first Sunday in October.

A survey by New Zealand Tourism Online in March 2006 found that 92 per cent of tourism operators favoured a further three weeks added to the end of the daylight saving period. United Future party leader Peter Dunne had for some years wanted to extend daylight saving but the government wasn't interested. In 2006, Nelson city councillor Mark Holmes was campaigning for a three week extension. By about April or May, he was talking with Dunne about organising a national petition in support of lengthening the duration of daylight saving. They spent months on the petition and it was finally presented to parliament on 26 March 2007 with 42,034 signatures.

Meanwhile, Internal Affairs noted that more people were talking about a longer duration of daylight saving and in May 2006 the department decided to undertake a study. Consultation took place with industry and government agencies about any benefits in lengthening the period and how much longer it should be. The government found that people were concerned that the start date of daylight saving clashed with the beginning of the fourth school term. Also, the community wanted a later end date for extra recreation and to help tourism. The department noted that the United States and Canada were extending daylight saving by four weeks to 34 weeks in 2007. Other factors taken into account in the study included electricity savings, weather, daylight saving dates in Australia, the effect on farmers and other early starters, compliance costs for business and government, and sunrise and sunset times.

Analyses of the issues and alternative extensions to the daylight saving period, together with a preference for an extra week at the beginning and two weeks at the end, were included in a Regulatory Impact Statement dated 19 April 2007 for

consideration by Cabinet.¹⁴⁴ The government accepted the recommendations and announced on 30 April that from 2007-08, daylight saving would extend from the last Sunday in September to the first Sunday in April under the New Zealand Daylight Time Order 2007.

The government was keen to get feedback on the extended term and commissioned Research New Zealand to survey about 1,000 members of the general public and 500 dairy farmers in April 2008 to find out people's attitudes to daylight saving. The survey found that 90 per cent of the general public approved of the measure while only 6 per cent disapproved. Similarly, 82 per cent liked the extension and 6 per cent didn't. In an age where refrigerated milk lasted a couple of weeks and no longer had to get from the cow to the breakfast table as quickly as possible, 82 per cent of dairy farmers approved daylight saving and 15 per cent didn't like it, while 54 per cent supported the extended period and 41 per cent opposed it.¹⁴⁵

For the general public, the survey found that older people were slightly less likely to be in favour of the extension to daylight saving with 77 per cent approving it, compared with 85 per cent of both the 16-24 and 25-39 years age groups. The extra daylight saving was liked by 73 per cent of rural dwellers and 83 per cent of city residents. For dairy farmers, only 18 per cent of those aged 60 years and over approved of extended daylight saving, in contrast to 73 per cent of the 16-24 years age group.

Respondents were asked to identify the positive and negative personal impacts of the longer daylight saving period. The greatest benefits were that people had extra daylight hours and could do more in the evening. The worst aspects were the cold, dark mornings and difficulty getting out of bed. The results are shown in the following table.

Personal impacts of extended daylight saving, New Zealand, 2008

| <i>Indicator</i> | <i>General public</i> | | <i>Dairy farmers</i> | |
|--|-----------------------------------|----------------------------------|-----------------------------------|---------------------------------|
| | <i>unprompted</i> <i>n=507</i> | <i>prompted</i> <i>n=1006</i> | <i>unprompted</i> <i>n=246</i> | <i>prompted</i> <i>n=494</i> |
| | * | ** | * | ** |
| | — % — | | | |
| Positive impact | | | | |
| More daylight hours in general | 34 | | 18 | |
| Liked/enjoyed the extra daylight | 28 | | 16 | |
| Did more evening leisure activities | 19 | 72 | 12 | 60 |
| Did more gardening and outdoor work | 17 | | 3 | |
| Did more exercise, etc. in the evening | 13 | | 4 | |
| Used less electricity | | 69 | | 53 |
| Did more outdoor activities at home | | 67 | | 61 |
| Got home from work, study, etc. in light | | 65 | | 64 |
| Spent more time with children/family | | 60 | | 54 |

¹⁴⁴ New Zealand government, "Regulatory Impact Statement", Proposed extension to the period of daylight saving, 2007, at [http://www.dia.govt.nz/Pubforms.nsf/URL/DaylightSavingCBCpaper.pdf/\\$file/DaylightSavingCBCpaper.pdf](http://www.dia.govt.nz/Pubforms.nsf/URL/DaylightSavingCBCpaper.pdf/$file/DaylightSavingCBCpaper.pdf)

¹⁴⁵ Research New Zealand, "Attitudes towards the daylight saving extension: General public & dairy farmers", for the New Zealand government, at [http://www.dia.govt.nz/Pubforms.nsf/URL/DaylightSavingPublicAttitudeSurvey.pdf/\\$file/DaylightSavingPublicAttitudeSurvey.pdf](http://www.dia.govt.nz/Pubforms.nsf/URL/DaylightSavingPublicAttitudeSurvey.pdf/$file/DaylightSavingPublicAttitudeSurvey.pdf)

| <i>Indicator</i> | <i>General public</i> | | <i>Dairy farmers</i> | |
|---|--|--|--|---------------------------------------|
| | <i>unprompted</i> <i>n=507</i> * | <i>prompted</i> <i>n=1006</i> ** | <i>unprompted</i> <i>n=246</i> * | <i>prompted</i> <i>n=494</i> ** |
| Longer days to do more work | 5 | | 9 | |
| Did more relaxing/socialising outside | | | 8 | |
| Negative impact | | | | |
| Too cold/dark in the morning | 17 | | 47 | |
| Harder to get up earlier in the morning | 10 | 28 | 15 | 39 |
| Harder getting children to bed and asleep | 6 | 11 | 9 | 26 |
| Left for work in dark | 1 | | 10 | |
| Harder getting children up in the morning | | 16 | | 27 |
| Difficult to adjust when clocks went back | | 15 | | 22 |
| Dairy/milk production disrupted | | | 9 | 14 |
| Hard to change routine | | | | 16 |

* Percentages based on the number of respondents who said that the extended daylight saving period had a personal impact.

** Percentages based on all respondents.

Source: Research New Zealand, “Attitudes towards the daylight saving extension: General public & dairy farmers”, for the New Zealand government, at

[http://www.dia.govt.nz/Pubforms.nsf/URL/DaylightSavingPublicAttitudeSurvey.pdf/\\$file/DaylightSavingPublicAttitudeSurvey.pdf](http://www.dia.govt.nz/Pubforms.nsf/URL/DaylightSavingPublicAttitudeSurvey.pdf/$file/DaylightSavingPublicAttitudeSurvey.pdf). Figures shown in the table are those published in the source document.

New Zealand continues to have one hour of daylight saving from the last Sunday in September to the first Sunday in April or for about 27 weeks a year. Online polls suggest most people are happy with it. A poll in 2011 found that only 15 per cent of people were opposed to daylight saving and another in 2015 showed the figure to be just under 30 per cent although these polls didn’t use random sampling and weren’t necessarily accurate.

The hero of daylight saving in New Zealand is Thomas Sidey. The Royal Society of New Zealand awards the T. K. Sidey Medal for outstanding scientific research into electromagnetic radiation. Daylight saving pioneer George Hudson received a special T. K. Sidey medal on 16 May 1934. Next winner was New Zealand born physicist Ernest Rutherford, often regarded as the father of nuclear physics, on 8 December 1934. The medal was awarded irregularly over the years although since 2001 it has been presented three yearly, with professors Jim McQuillan and Rick Millane winning it in 2013 and 2016.

Further out from the ditch, some Pacific island nations and territories have, or have had, daylight saving time, including the Cook Islands, Fiji, New Caledonia, Samoa, Tonga and Vanuatu. Only Fiji and Samoa have been using it in recent years although Tonga started again in 2016-17.

King Taufa’ahau Tupou IV of Tonga decided to introduce daylight saving in 1999-00, putting the country at UTC+14, so that it would be the first, or at least equal first, to see in the new millennium. The reason for the move was that Kiribati had changed the time zone of its eastern islands, the Line Islands, from UTC–10 to UTC+14 in 1995. A few years later, the president, Teburoro Tito, realised he was onto something and started promoting Kiribati as the first place to celebrate the new millennium on 1 January 2000. But other countries, including New Zealand, Fiji and Tonga, wanted the party of the millennium.

Fiji, which hadn't had daylight saving since 1942, used it in 1998-99 and 1999-00, putting it at UTC+13, the same as New Zealand when on daylight saving although the Chatham Islands were on UTC+13:45. Standard time in Tonga had been UTC+13 since 1941, and an hour of daylight saving would put it ahead of these places and equal to Kiribati's remote eastern islands. Tonga was better equipped for a tourist rush than its northern neighbour. Its largest hotel had been booked out for the final week of 1999 several years earlier and a number of new hotels were built. Kiribati wasn't a noted tourist destination receiving just 4,000 visitors a year, but it attracted cruise ships at the end of 1999 to its eastern-most island, uninhabited Caroline Island, now called Millennium Island, and hosted onshore festivities at Kiritimati, or Christmas Island. From all reports, celebrations in both nations went well.

Officially, Fiji wasn't in the new millennium race, but its third largest island, Taveuni, is on the 180 degree meridian and therefore the first hospitable place on the planet where people could see in the new millennium in terms of local or real time. Some 500 Americans, Australians, Germans, Koreans and Fijians descended on Millennium Park to be the first people to leap into the third millennium.¹⁴⁶

The reasons Fiji gave for adopting daylight saving were in a press release by the labour and industrial relations minister, Vincent Lobendahn, on 5 October 1998:

... more time for sport, family recreation, gardening and other outdoor activities, savings in respect of electricity, reduction in nighttime [sic] road accidents, increase in economic activity, with longer daylight hours for productive work activities, benefits to tourism by making best use of available daylight.¹⁴⁷

Despite these stated advantages, Fiji dropped daylight saving after 1999-00 due to opposition from business and the education ministry. However, the country reintroduced it in 2009-10, amending its Daylight Saving Act 1998 to allow the period for advancing clocks to lengthen from November-February to October-April. Cabinet highlighted the expected benefits for the economy, and tourism in particular, as well as extra time for sport, leisure and shopping. But the longer span was never used and by 2014-15, the period was reduced to about two and a half months from November to January and is expected to continue at this shortened length.

As for Tonga, it had two more years of daylight saving, 2000-01 and 2001-02. The measure was rejected in 2002-03, although at the start of what would have been another period of daylight saving, the mini-market clock was an hour later than the bank across the road while the watch repairer had instruments showing various times. Residents convinced the king in mid 2003 to abandon the scheme altogether. However, daylight saving has made a comeback in 2016-17 "to allow for more time for economic and social activities" according to the information and communications ministry.

¹⁴⁶ There are differing views as to whether the third millennium started with 2000 or 2001, with many people arguing that it began at 2001 as there was no year 0, given that zero wasn't in common use back then. But contemporary studies have concluded that Dionysius probably miscalculated Jesus' birth by a few years (and a few months), so the choice of 2000 or 2001 perhaps becomes somewhat subjective, and neither is probably correct in any case. The whole argument assumes the historicity of Jesus in the first place.

¹⁴⁷ Minister for Labour and Industrial Relations, Fiji, Press release, 5 October 1998, at <https://mm.icann.org/pipermail/tz/1998-December/010485.html>

Another country that could have joined the millennium competition was Samoa. Previously in the UTC−11 zone, the country changed to UTC+13 but not until late 2011. Prime minister Tuilaepa Malielegaoi was concerned that under the old time, Samoa had only three business days a week common with its major trading partners of New Zealand, Australia and China. Daylight saving was considered by the Samoan Parliament in 2007 before being rejected. A Daylight Saving Bill was introduced in 2009 in response to rising fuel and food prices. The government argued that daylight saving would help energy efficiency, leisure activities, public health and economic growth. The bill became the Daylight Saving Act 2009 but the planned 2009-10 trial was cancelled due to a severe earthquake and tsunami on 29 September. Samoa has had daylight saving since 2010-11, with start and end dates the same as New Zealand.

New Caledonia had summer time in 1977-78, 1978-79 and 1996-97. France used daylight saving in 1976 for the first time since World War II, due to the oil crisis, and this may have influenced the French territory to adopt it. Daylight saving was unified across European Union countries in 1996 and this may have encouraged New Caledonia to try it again in 1996-97 but it lasted only a year.

Vanuatu is another country that tried and discarded daylight saving. Under its Summer Time Act 1982, clocks were advanced an hour from 1983-84 to 1992-93. The six month period was reduced to four months in the second last year and to three months in the final year before the Summer Time (Repeal) Act 1993 abolished daylight saving. The *Pacific Islands Monthly* of May 1993 noted the “confusion” over the termination of daylight saving.

Part V

Daylight saving in the rest of the world

22 Asian countries opting out

Most Asian countries have had daylight saving time at some stage. The most common reason given for introducing it was to conserve energy whether during wartime or some other period of fuel or electricity shortage. Those that have never used daylight saving are generally smaller nations with warm climates. Many countries in Asia have opted out of daylight saving. Of the 30 countries that have had it at sometime, 21 have discontinued it. Eight of the nine countries that used daylight saving in 2016 are in or near the Middle East, with the only exception being Mongolia. See next table. This chapter looks at Asia's experience with daylight saving. For details of daylight saving in Russia, both west and east, see the chapters on Europe.

Years of daylight saving, Asia

| Country | Had daylight saving in one or more years | | | | 2016 |
|------------------------|--|----------|------|---------|------|
| | WWI | Interwar | WWII | Postwar | |
| Afghanistan | | | | | |
| Armenia | | | | ✓ | |
| Azerbaijan | | | | ✓ | |
| Bahrain | | | | | |
| Bangladesh | | | | ✓ | |
| Bhutan | | | | | |
| Brunei | | | | ✓ | |
| Cambodia | | | | | |
| China | | | ✓ | ✓ | |
| Hong Kong | | | ✓ | ✓ | |
| Macau/Macao | | | | ✓ | |
| Tibet | | | | ✓ | |
| Cyprus | | | | ✓ | ✓ |
| East Timor/Timor-Leste | | | | | |
| Georgia | | | | ✓ | |
| India | | | ✓ | ✓ | |
| Indonesia | | | | | |
| Iran | | | | ✓ | ✓ |
| Iraq | | | | ✓ | |
| Israel | | | ✓ | ✓ | ✓ |
| Japan | | | | ✓ | |
| Jordan | | | | ✓ | ✓ |
| Kazakhstan | | | | ✓ | |
| Kuwait | | | | | |
| Kyrgyzstan | | | | ✓ | |
| Laos | | | | | |
| Lebanon | | ✓ | | ✓ | ✓ |
| Malaysia | | ✓ | | | |
| Sarawak | | ✓ | ✓ | ✓ | |
| Maldives | | | | | |
| Mongolia | | | | ✓ | ✓ |
| Myanmar/Burma | | | | | |
| Nepal | | | | | |
| North Korea | | | | | |
| Oman | | | | | |
| Pakistan | | | ✓ | ✓ | |
| Palestine | | | ✓ | ✓ | ✓ |
| Philippines | | ✓ | ✓ | ✓ | |
| Qatar | | | | | |
| Saudi Arabia | | | | | |
| Singapore | | ✓ | | | |

| Country | Had daylight saving in one or more years | | | | 2016 |
|----------------------|--|----------|------|---------|------|
| | WWI | Interwar | WWII | Postwar | |
| South Korea | | | | ✓ | |
| Sri Lanka | | | ✓ | | |
| Syria | | ✓ | | ✓ | ✓ |
| Taiwan | | | | ✓ | |
| Tajikistan | | | | ✓ | |
| Thailand | | | | | |
| Turkey* | ✓ | ✓ | ✓ | ✓ | ✓ |
| Turkmenistan | | | | ✓ | |
| United Arab Emirates | | | | | |
| Uzbekistan | | | | ✓ | |
| Vietnam | | | | | |
| Yemen | | | | | |

* Turkey is abandoning daylight saving after 2016, keeping clocks ahead permanently.

Note: For more detail, see Appendix.

Sources: Time and Date AS, at <https://www.timeanddate.com>; Horloge Parlante, at <http://www.horlogeparlante.com>; and other sites

The only Asian country to use daylight saving time in World War I was Turkey, starting at 12 a.m. on 1 May 1916. This was exactly the same time as Germany and other members of the Central Powers, given the one hour difference in time zones making it 11 p.m. on 30 April in Europe. Turkey finished daylight saving on 1 October along with its partners but didn't rejoin them in 1917 or 1918.

Turkey and the Ottoman Empire was in turmoil in the years following World War I, with the Turkish War of Independence fought between the Nationalists and neighbouring countries on most sides from 1919 to 1923. Daylight saving was practised in 1920 to 1922, probably to conserve fuel. Turkey also had daylight saving in 1924 and 1925. It then put its clocks on in the World War II years of 1940 to 1942 and 1945 despite taking a neutral stance and having little involvement in the war although it sold chromite to both sides. Turkey supplied large quantities of manufactured goods to Germany under the Turco-German Trade Agreement signed in late July 1940 (but not chromite at that stage) and this might have been the impetus for daylight saving from 30 June 1940 to save power.

The country had daylight saving in the immediate postwar period from 1946 to 1951. Clocks were turned forward again in 1962 and 1964 and then from 1970 onwards except 1984. The start date has been the last Sunday in March since 1986. The end date changed from the last Sunday in September to the last Sunday in October in 1996. Turkey moved to the UTC+3 time zone in 1978, effectively giving it an extra hour of daylight saving until 1983. It didn't advance its clocks in 1984 and went back to UTC+2 in 1985 but with daylight saving.

In March 2008, Turkey's energy ministry announced it wanted to abandon daylight saving from 29 March 2009 and shift the country into the UTC+2:30 zone, arguing that the change would conserve energy and improve quality of life, especially in eastern areas. The foreign ministry was against the move, worried that it would upset trade with Europe. When banks, the stock exchange and airports complained, the energy ministry deferred the change for two years.

The plan was probably abandoned by October 2011 when the energy ministry stated that it was carrying out a study to estimate cuts in energy usage with year round

daylight saving. The foreign ministry remained opposed. Health officials were concerned about the twice yearly clock change causing “lack of sleep, exhaustion, yawning, difficulty in concentration, stress, pessimism and adaptation troubles”.¹⁴⁸ A plan to keep clocks one hour forward from the start of daylight saving time in 2012 onwards didn’t come to fruition. In September 2016, Turkey decided to abandon the scheme and use UTC+3 all year, effectively putting the country on permanent daylight time.

Cyprus, just to the south of Turkey, is physically in Asia, has belonged to the European Union since 2004, and is divided between the Greek south and Turkish north. The country has had daylight saving since 1975 and has followed Europe’s start and end dates nearly every year. The twice yearly clock change seems to have been one of the island’s less controversial issues although the north followed Turkey in 2016 and cancelled daylight saving, keeping its clocks an hour ahead all year.

In addition to Turkey, five more Asian countries adopted daylight saving in certain years in the interwar period. Lebanon and Syria, both under French control after the break up of the Ottoman Empire following the end of World War I, had daylight saving from 1920 to 1923. The change to GMT+3 in summer still only put most of the area 30-40 minutes ahead of local mean time. Each country used different start and finish dates.

Neither country had daylight saving during World War II. Lebanon put its clocks on in 1957 to 1961, 1972 to 1978 and since 1984. Syria moved in 1962 to 1978, 1983, 1984 and from 1986. The only period daylight saving dates in Lebanon and Syria coincided was from 1973 to 1977, starting on 1 May and ending on 1 October. Dates in both countries have changed frequently, although Lebanon has stuck with the last Sunday in March to the last Sunday in October since 1998, and Syria has settled on the last Friday in March to the last Friday in October from 2012, Friday being a rest day, and holy day for Muslims. Therefore, the changeover date usually differs by two days but sometimes by five days. Both countries have a mainly Muslim population.

The other three Asian countries to first use daylight saving between the world wars were Malaysia, Singapore and the Philippines. Malaysia and Singapore would have had daylight saving when the Straits Settlements Legislative Council introduced a daylight saving bill in 1920 to advance the clocks by 30 minutes year round to increase the time available for outdoor recreation after work. The proposal came in for some criticism though. One member felt it was contrary to the “natural course of things” while another thought that people “would start playing games too early and would get sunstroke”.¹⁴⁹ Some members believed half an hour was excessive. The bill passed the second reading by 8 votes to 7 but was withdrawn at the committee stage due to problems raised by various members. The Singapore and Penang chambers of commerce and the Straits Settlements Association were also opposed to the idea. Despite the rejection, many offices started and finished half an hour earlier although shops didn’t generally change their hours.

¹⁴⁸ “Turkish Ministry suggesting year-long summer time”, *Hurriyet Daily News*, 30 October 2011, at <http://www.hurriyetdailynews.com/default.aspx?pageid=438&n=turkish-ministry-suggesting-year-long-summer-time-2011-10-30>

¹⁴⁹ “Daylight saving”, *The Straits Times*, 2 September 1926, p. 8, at <http://eresources.nlb.gov.sg/newspapers/Digitised/Article/straitstimes19260902-1.2.20.1.aspx>

Twelve years later, in 1932, another daylight saving bill came into the Legislative Council. This one was for 20 minutes of daylight saving instead of the 30 minutes under the previous bill. Members were happier with the smaller time change and the bill was passed after two debating sessions, becoming the Daylight Saving Ordinance 1932. The region moved to GMT+7:20 for the whole of 1933. The period was extended to all of 1934 and 1935 by governor approval each year. The ordinance was altered in 1935 to become the Daylight Saving (Amendment) Ordinance 1935, giving the region a permanent time change. In 1936, the ordinance was added to the Laws of the Straits Settlements. It was amended again in 1941 with 10 minutes added to the previous change of 20 minutes, effective from 1 September, making the time adjustment the same as the original bill in 1920.

That was the end of daylight saving in the region, except for Sarawak and Sabah (now states of Malaysia) which put clocks on 20 minutes from 14 September to 14 December in 1935 to 1941. With the Japanese occupation of Malaya, and the fall of Singapore on 15 February 1942, the region had to use Japan Standard Time or GMT+9. After the war, the area went back to GMT+7:30. The Daylight Saving Ordinance survived until well after the war, in Singapore at least, but in practice, the time changes were to standard time from 1936. British Borneo, which included Sarawak, had daylight saving in 1955 and maybe other years. In 1982, standard time was changed to UTC+8, which means that Singapore and Kuala Lumpur effectively have more than an hour of daylight saving all year.

In the Philippines, there have been six separate periods of daylight saving but none lasted more than a few months. A law was passed on 26 October 1936, Commonwealth Act No. 91, which allowed the president to prescribe daylight saving anytime from March to June and from November to January “when the public interest so requires”. Four days later, the president, Manuel Quezon, signed a proclamation to establish daylight saving from 1 November 1936 to 31 January 1937 so that “employees and laborers may be afforded sunlight for recreation purposes and ... to effect savings in the use of light”. However, another proclamation dated 15 January 1937 revoked daylight saving as from that date and the country returned to standard time. No reason was given in the document.

The next daylight saving proclamation, signed by Quezon on 13 December 1941, was due to wartime emergency, with dates of 16 December 1941 to 31 January 1942 and from 1 March to 30 June 1942. It presumably finished on 30 April as the Philippines went onto Japan Standard Time on 1 May although this was the same as the country’s daylight saving time. Occupation ended on 5 July 1945 and the Philippines returned to its own standard time on 1 December.

A proclamation was signed by the president, Ramon Magsaysay, in 1954 for daylight saving from 12 April to 1 July in that year, giving very similar reasons to the 1936 proclamation. But another proclamation cancelled it, with daylight saving finishing nearly a month early on 4 June. Again, no explanation was given in the proclamation.

Next period of daylight saving in the Philippines was in 1977, with a proclamation signed by the president, Ferdinand Marcos, on 25 March. Dates were 28 March to 7 June. The reason given was “to conserve power and energy during summer”. A

further proclamation on 26 May extended the scheme to 21 September due to lower energy consumption being achieved in the period to 7 June. The extension was outside that permitted under Act No. 91, but the president was able to make the change under the 1973 Constitution.

Daylight saving was last implemented under the National Emergency Memorandum Order No. 17 signed by the president, Corazon Aquino, on 2 May 1990. Clocks went forward an hour from 21 May to 31 August due to power shortages. The document restricted neon lighting for advertising to 6-9 p.m., with the promise of “criminal action against any person who willfully violates” this rule. There were limitations on other lighting, air-conditioning, and opening hours of shops and cinemas. All government agencies, including the police and other law enforcement bodies, were to “strictly implement” the order. The daylight saving period was cut short by Executive Order No. 415, 1990 and ended on 28 July due to “the onset of the rainy season and the early nighttime darkness”.

Four Asian countries first took up daylight saving during World War II: China in 1940, 1941 and 1945, India (including what is now Pakistan) and Sri Lanka from 1942 to 1945, and Israel from 1940 to 1945. According to *The International Atlas of 2005* by Shanks and Pottenger, the only part of China to have daylight saving in 1940 was Shanghai, which also had it in 1941 along with the four cities of Suzhou, Hangzhou, Nanjing and Wuhan. The Supreme National Defence Council ordered daylight saving in free China in 1945 when Chongqing was provisional capital, although western regions of the country may not have used it, while much of the east was occupied by Japan.

All of China had daylight saving from 1986 to 1991 to conserve power. The country saved an estimated 700 million kilowatt hours of energy in 1986, down from earlier forecasts of up to 2 billion kilowatt hours. The Communist Party announced on 18 April 1986 that the whole country would run on Peking Summer Time from 4 May to 14 September to save energy and ran an intensive campaign on television and radio and in newspapers to prepare people. But the authorities created more confusion than clarity. The state airline, CAAC, said it was changing all flights by an hour and then said planes departing at 3 p.m. standard time will now leave at 4 p.m. summer time (same real time) to meet international carriers. The government also said that train, bus and boat timetables would be unchanged, with a service leaving at 3 p.m. standard time now departing at 3 p.m. summer time (an hour different).

Adding to the uncertainty, the *People's Daily* said: “During the whole period of summer time, all the trains will work according to the summer time schedule, but passengers will take their trains at the present time schedule.” Also, the communications ministry announced that “nothing would be done to alter the schedules of China’s inland waterway services and long-distance buses to meet daylight saving time”.¹⁵⁰ No doubt many people arrived an hour early or an hour late for their plane, bus, train or ferry in the initial days and weeks of daylight saving.

¹⁵⁰ “Fuel saving throws off China’s timing”, *Chicago Tribune*, Chicago, Illinois, United States, 4 May 1986, at http://articles.chicagotribune.com/1986-05-04/news/8602010127_1_daylight-summer-time-saving

In some areas of China, businesses, schools and government offices started and finished an hour later by the clock, meaning that everything happened at the same real time as before. Many people preferred to start an hour earlier in the warmer months without changing the clock. The power shortage problem wasn't resolved and in 1991 drought and heat led to an increase in power outages and in the number of complaints about the electricity supply and daylight saving. The scheme was discontinued after the end of the 1991 summer time period. Energy consumption has soared in more recent years and fuel shortages remain a problem, as does the level of carbon emissions.

In Hong Kong, the Chamber of Commerce was opposed to daylight saving in 1932. By 1936, the media favoured the idea and the governor of the colony came out in support of it in the Legislative Council on 2 December suggesting an extra half an hour of daylight after work all year, but the proposal went no further. The colony had three months of daylight saving via the Hong Kong Daylight-Saving Regulations 1941 under the Emergency Powers (Defence) Acts 1939 and 1940, with clocks put forward one hour. Japan Standard Time, which was one hour 23 minutes ahead of Hong Kong local time, was used from 1942 to 1945.

The Summer Time Bill 1946, introduced into the Council on 27 August, aimed to formalise the process of daylight saving that had started on 20 April and would enable the governor to approve it in future years. The bill quickly passed the other stages on 5 September and became the Summer Time Ordinance. Hong Kong had daylight saving each year until 1976. Arguments against the measure included the need to adjust timepieces twice a year, the preference of some people for an extra hour of light in the morning, and difficulties for airline schedules. The government dropped daylight saving for 1977 and a survey found that most people wanted standard time all year. Summer time returned briefly in 1979 due to the second oil crisis.

According to the Macau Official Gazette,¹⁵¹ Macau had summer time in years 1946 to 1948, 1951 to 1976 and 1979. A notice in the form of a decree was printed in the weekly gazette each time Macau started or finished daylight saving. The reason for the last year of summer time in 1979 was the same as that for Hong Kong. Most other sources state, evidently incorrectly, that Macau had daylight saving between 1961 and 1980.

Taiwan was another area on Japan Standard Time during World War II, until 21 September 1945, and had daylight saving postwar in the years 1946 to 1961, 1974, 1975 and 1979. It was called summer time from 1946 to 1951, daylight saving time from 1952 to 1956, summer time from 1957 to 1961, and daylight saving time in the 1970s.

India was still under British rule during World War II and had its first taste of daylight saving, or War Time, in a continuous stretch from 1942 to 1945. Since then, the only occasions of daylight saving were to conserve energy during short wars with neighbouring countries, namely the Sino-Indian War of 1962 and the Indo-Pakistani Wars of 1965 and 1971. Each of these wars lasted a matter of weeks. A committee

¹⁵¹ "Summer Time", Macao Meteorological and Geophysical Bureau, 2014, at http://www.smg.gov.mo/smg/geophysics/e_t_Summer%20Time.htm

was set up by the science and technology ministry in 2001 to look at a multiple time zone system and daylight saving for India. The findings, presented to the parliament in 2004 by the minister, Kapil Sibal, recommended no changes.

In the state of Assam in the country's north-east, the chief minister, Tarun Gigo, announced in January 2014 that the state had shifted its time zone an hour ahead of Indian Standard Time to UTC+6:30 to save power and boost productivity. This moved the state to the old *chai bagaan* (black tea) time, or *bagaan* time, or "Tea Garden Time", a form of daylight saving introduced by the British to save energy at tea plantations from about 1860. Standard time in the state's capital, Dispur, is now 23 minutes ahead of local mean time instead of 37 minutes behind. The move remains unofficial as the Indian government hasn't approved or rejected it.

Except for 1942 to 1945 when it was still part of India, the only other years of daylight saving in Pakistan were 2002, 2008 and 2009. The country embarked on a one year daylight saving trial in 2002 which, according to the government, was "to make maximum use of daylight and to save energy". Organisations and institutions followed the new time but many of the general public, especially in rural areas, kept to standard time, which they called "real time", often calling the new time "Musharraf time" after the president. The scheme was abandoned after six months.

Pakistan suffered an energy crisis in 2008 with lengthy daily power cuts, forcing the government to again use daylight saving. There hadn't been much publicity about the change and many people were late for work and prayers on the first day. At Lahore railway station, clocks hadn't been altered but trains were running to the new timetable. As part of the policy, government offices couldn't use air-conditioning during the hours 8-11 a.m. and markets shut early catching shoppers by surprise. Power load shedding in the mornings meant that people rose and got ready for work and school in the dark. The country also observed daylight saving in 2009. Controversy and public resistance in these two years was similar to that in 2002. A study on energy efficiency in Pakistan in 2010 didn't include recommendations for further daylight saving.

As part of British India, the area that is now Bangladesh had several time zone changes in World War II but didn't have daylight saving. The country shifted from GMT+6:30 to GMT+6 in 1951, very close to capital city Dhaka's local mean time. Bangladesh had daylight saving in 2009 to conserve fuel during an energy crisis. The change wasn't popular with the public, and many businesses ignored it. Hot weather and the increased availability of power led to higher consumption, which meant no reduction in outages. Plans for daylight saving in 2010 were cancelled due to "public interest" and because school children had to get up before dawn.

The only occasion Sri Lanka had daylight saving was for a continuous period from 1942 to 1945. A shift in time zone to UTC+6:30 in May 1996 due to a power shortage caused by drought put Colombo's clock time 70 minutes ahead of sun time. Standard time was changed again to UTC+6 in October of that year. Ten years later, the country went back to its old time zone of UTC+5:30 to once again align with India.

Daylight saving in Israel has been surrounded by controversy. The area known as the British Mandate for Palestine had continuous daylight saving from 1940 to 1942 and

then each year from 1943 to 1946. Part of that region became Israel on 14 May 1948 and nine days later it put its clocks on two hours to conserve energy as it fought with Arab armies from the second day of its existence. Neighbours Jordan, which took the West Bank, and Egypt, which occupied Gaza, didn't use daylight saving. Israel finished daylight saving after 1957 but used it again in 1974 and 1975 following the global energy crisis caused by the Yom Kippur War.

Israel has had summer time each year since 1985, but in the following year the interior minister, Yitzhak Peretz, who was opposed to daylight saving, wouldn't sign the annual order. Ultra-Orthodox rabbis such as Peretz feared that daylight saving would mean poor attendance at morning prayers and that shops and other establishments would open before sundown on Saturday, desecrating the Sabbath. There was public uproar over his non-signing that included a demonstration outside his house and a legal battle that nearly got to the High Court. The communications minister, Amnon Rubenstein, said his department would use daylight saving in any case. Energy minister Moshe Shahal stated that the scheme saved Israel up to US\$6 million a year in energy and reduced traffic fatalities. In a fiery Cabinet meeting on 20 April 1986, Peretz yelled at Shahal, a supporter of daylight saving: "You have been shedding my blood! You have been organizing a public lynch campaign against me! I would not be surprised if what you have done will lead to attempts on my life!"¹⁵² Cabinet voted 11 to 6 to continue with daylight saving.

The start and end dates of the summer time period were the subject of much contention over many years. Most of the secular population preferred daylight saving to extend as long as possible, whereas most religious people didn't want it to start until after Passover and wanted it finished before Yom Kippur. Dates for each of these events can vary by a month or so, which means the daylight saving span could be quite different from year to year. This made it difficult for trade, computer systems, and society in general. Economists estimated that Israel would save US\$80 million a year by standardising its calendar.

In 2013, after plenty of haggling, disagreements and compromises over the decades, Israel set its daylight saving period as the Friday before the last Sunday in March until the last Sunday in October to align closely with Europe. The move hasn't stopped the opponents of daylight saving, with member Yifat Kariv introducing a bill in October 2014 to cancel the measure. The interior ministry estimated in 2015 that summer time saved the Israeli economy NIS 300 million or US\$75 million a year. The ministry also believed that people's physical and mental health was improved and road safety was better.

Confusion still reigns over daylight saving times in the region as the Palestinian National Authority, formed in 1994, has set different start and finish dates to Israel. On one occasion, the disparity was a blessing. In September 1999, four young Israeli Arabs received two packages of explosives set by Palestinian bomb makers to blow up on 5 September at 6:30 p.m. Two of the men drove a car with one of the devices to Haifa and the other pair with the second package in another car to Tiberias. One man from each team was to board a bus from each city to Jerusalem with the bomb

¹⁵² Michael Ross, "Daylight time provokes Israel's religious right", *Los Angeles Times*, Los Angeles, California, United States, 18 May 1986, at http://articles.latimes.com/1986-05-18/news/mn-20958_1_daylight-saving-time

package to go off during the trip, but to disembark part way and rejoin their accomplice in the car, leaving the bag on the bus. The first pair had parked their car, and one man had got out, while the other two were still driving to their initial destination when the bombs exploded, at 5:30 p.m., killing three of the terrorists. They had been operating on Israeli time, which had gone back an hour after daylight saving finished on 3 September, but the bomb makers had used Palestinian time, which was still an hour ahead until 15 October. The lives of perhaps several dozen innocent passengers on two buses were spared.

Effective ceasefires between Israel and Palestine can be made more difficult because of the different start and end dates for daylight saving, although from 2014, the variance is less, usually a day or two but can be eight or nine days. Clocks are currently turned forward on Friday in Israel and Saturday in Palestine, and they are put back on Sunday in Israel and Saturday in Palestine, although both states have used various days of the week over the decades. A lot of damage, both physical and to relations between the two states, can be done in one hour on a day when the times differ and if there is confusion over whose clock time is used. Even if the day of the changeover was the same, the time of day that it happens remains different, with Israel changing at 2 a.m. and Palestine at 12 midnight.

Neighbouring Jordan first had summer time in 1973 due to an energy shortage. It stopped daylight saving after 1978 despite the world oil crisis of 1979 and didn't reinstate it until 1985. In 1999, the government initially decided not to use daylight saving again but by midyear it announced permanent daylight saving. The government changed its mind again, moving the country back to standard time in late September as before. A study by Mohammad Momani of the University of Jordan found that the nation's electricity usage fell by 0.7 per cent in 2000 due to daylight saving.

In late 2012, the government cancelled the usual change back to standard time in the wake of fuel shortages and financial problems, but only gave three days' notice. Jordan continued with daylight saving, calling the new period over the cooler months "winter time". The National Electric Power Company estimated that the country saved \$7 million in electricity over the winter. Clocks were going to remain an hour ahead permanently. But as the country entered a second year of winter time in late 2013, there was strong opposition to year round daylight saving, including from those who argued that the financial benefits were less than the government claimed and from the Jordanian Teachers Association who complained that students had to leave home before sunrise. The government was forced to reverse its decision on continuous daylight saving.

A survey of 263 respondents by Hiba Abu-zagheh of the Jordan University of Science and Technology in 2014 found that 41 per cent of people were happy with the change in time over the warmer months while the same percentage preferred continuous daylight saving. Only 5 per cent wanted standard time all year and 13 per cent weren't fussed. Opposition to daylight saving increased significantly with age. The change in time positively affected the mood status of 20 per cent of participants and negatively affected 48 per cent. A large 74 per cent said it made them fatigued or sluggish and 78 per cent reported it disturbed their biological clock. Time taken to adjust to the change was more than a week for 42 per cent of respondents and 7 per

cent said they didn't adapt at all. Only 54 per cent said they knew why the government made the change, with most of them citing economic reasons such as conserving energy.

Since 2014, Jordan has had seven months of daylight saving each year, from around late March to late October, as it did before 2012. The duration is the same as in Europe except for the Friday changeovers at start and end rather than Sunday. Note that local mean time in capital city Amman is 24 minutes ahead of standard time and 36 minutes behind daylight saving time, which means that the effects of putting the clocks on might not be as great as they would be in places where standard time is already well ahead of local time.

Iraq began daylight saving in 1982 when it was in the middle of a war with Iran. The Iran-Iraq War finished in 1988 after six years but Iraq kept going with the measure until 2007. From 1991, the period commenced on 1 April and ended on 1 October regardless of the day of the week these dates fell on. Kurdish residents often ignored the change and called it "Saddam time". In March 2008, the government announced it was cancelling daylight saving to cut back on the daytime use of air-conditioning. Average daily maximum temperature in midsummer in Baghdad is around 44 degrees Celsius or 111 degrees Fahrenheit, with no rain.

Daylight saving in Iran started four years earlier than in Iraq, in 1978, but it ended after 1980, coinciding with the start of the Iran-Iraq War. Abolishing daylight saving at the beginning of a war is unusual. The scheme was reintroduced in 1991 to save power. Iran again dropped it after 2005, due to findings that little energy was saved and because the time change caused confusion in many areas. Critics claimed the measure was abandoned for religious reasons, but the government denied this was the case. It was recommenced in 2008. Iran starts and ends daylight saving each year at the equinoxes as calculated by the country's Solar Hijri calendar.

Muslim countries often suspend daylight saving during Ramadan, the ninth month of the Islamic calendar, where people don't eat or drink during daylight hours. Putting clocks forward in this month would mean an extra hour of fasting. As the calendar follows the lunar cycle, Ramadan is about 11 days earlier each solar year and falls within the usual daylight saving period of northern hemisphere countries from about 2005 to 2024. Palestine adjusted its end date for the holy month in 2006 to 2011 and Syria in 2006. The practice of suspending daylight saving or delaying it or finishing it early for Ramadan is more common in northern Africa than Asia.

The mainly Islamic countries of Central Asia, Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan, started using daylight saving time in 1981 when all of the Soviet Union puts its clocks forward. The USSR was dissolved in December 1991 and this was the last year that Turkmenistan, Uzbekistan and Tajikistan had daylight saving. Tajikistan finished it the day they gained independence on 9 September and had made a time zone change earlier in the year from UTC+6 to UTC+5. Standard time in capital city Dushanbe was now 25 minutes ahead of local time all year rather than one hour 25 minutes ahead in winter and two hours 25 minutes ahead with daylight saving.

Kazakhstan became a sovereign republic within the USSR in October 1990 and didn't have daylight saving in 1991 but resumed it in 1992. The country eliminated daylight saving after 2004 when a survey found that it adversely affected the health of 52 per cent of respondents, including sleep problems and biological disturbances. Other research concluded that it increased traffic accidents, reduced productivity, and had few economic benefits. Standard time was well ahead of local mean time in any case, by one hour 14 minutes in capital city Astana, 52 minutes in largest city Almaty, one hour 35 minutes in western city Oral with the region moving from UTC+4 to UTC+5 in 2005, and one hour 38 minutes in southern city Kyzylorda with a move from UTC+5 to UTC+6 in 1992.

Kyrgyzstan retained daylight saving after the fall of the Soviet empire although it shifted its time zone back an hour to UTC+5 in 1991 so that standard time and local time in capital city Bishkek were about the same. The country ended its annual clock changes in 2005, returning to standard time two and a half months earlier than usual, but it moved its time zone forward to UTC+6 again, effectively giving it an hour of daylight saving year round.

The three smaller countries on the western side of the Caspian Sea, Georgia, Armenia and Azerbaijan, were also Soviet republics and started daylight saving in 1981. Georgia continued with it until 2004, including over a year and a half of continuous daylight saving in 1996 and 1997. The country went back and forth between UTC+3 and UTC+4 several times and has been in the latter time zone since 2005, about an hour ahead of local time in capital city Tbilisi.

Armenia had daylight saving from 1981 to 1995 and again from 1997 to 2011 before the government scrapped it to try and improve the economy. The country's economic minister, Tigran Davtyan, announced on 27 December 2011 that the country was too far out of its geographic time zone in summer. Cancelling daylight saving would benefit business and the public, he argued. The economy was already doing well in 2011, was quite strong in 2012, but fell away in 2013. Armenia's capital and largest city, Yerevan, has a local mean time of UTC+2:58 but standard time is UTC+4, which meant that with daylight saving, its clock time was about two hours ahead of sun time in summer.

Davtyan mentioned on 26 January 2012 the possibility of Armenia moving to UTC+3 in several years' time. The country first moved to this time zone from local time in 1924, before moving to UTC+4 in 1957, back to UTC+3 in 1991 and then to UTC+4 again in 1995. In essence, the country now practises year round daylight saving of just over one hour in its capital city.

Azerbaijan was the only one of the eight ex-USSR republics in western and central Asia still using daylight saving in 2015 although the country didn't have it from 1993 to 1995. A time zone change in 1991 to UTC+3 was reversed back to UTC+4 the following year, putting standard time in capital city Baku 40 minutes ahead of local time. Politician Elmira Akhundova recommended to parliament in 2011 that daylight saving should be abolished, claiming that scientists have shown it to be harmful to

human health and that it upsets the body's biorhythm.¹⁵³ Arif Hashimov, first vice president of the Azerbaijan National Academy of Sciences, recommended in 2012 that the country stays on winter time. After a meeting of the body in March 2016 with experts in energy, economics, information technology, zoology, geography, geophysics and astrophysics, the government cancelled daylight saving 10 days before its scheduled start mainly for health and technical reasons.

Unlike many other Asian countries, Mongolia has taken up daylight saving again after a nine year break. It first used the measure in 1983 when, as a Soviet satellite state, it used the same start and end dates as the USSR. The country scrapped daylight saving after 1998 despite a study in that year that found an annual reduction of 23 million kilowatt hours in energy usage due to the clock change. Daylight saving was reintroduced in 2001 but it was dropped after 2006, due to a strong economy and energy industry and a finding of an adverse impact on health. Against a background of falling economic growth in recent years, Mongolia restarted daylight saving in 2015, citing economic benefits. Many people were unaware of the change. Standard time is already 52 minutes ahead of local time in capital city Ulan Bator.

Further east, Korea was part of the Empire of Japan from 1910 to 1945 and had no daylight saving. After World War II, the country was split into North Korea and South Korea. The north has never had daylight saving whereas the south first adopted it in 1948, a month after the new country's first election. South Korea put forward the clocks each summer for four years before deciding against daylight saving in 1952 and 1953 although it was still at war with North Korea. A change in time zone from GMT+9 to GMT+8:30 by South Korea in 1954 was followed by more daylight saving from 1955 to 1960. It was abandoned when Park Chung-hee came to power in 1961 in a military coup and the country reverted to GMT+9.

South Korea again had daylight saving in 1987, and in 1988 when it hosted the Olympic Games. The main purpose of daylight saving in 1988 was so that America could watch more of the games live on prime time television, which had financial advantages for both countries. Advancing the clocks an hour in 1987 may have been a trial run for the Olympics although South Korea didn't have daylight saving in 1986 for the Asian Games.

Daylight saving wasn't an advantage for one particular Korean household. Roh Ki Hwa committed suicide after she forgot to put her watch ahead and was an hour late making her husband's midday meal. The family was at a company picnic with about 70 other people on Sunday 10 May 1987, the first day of daylight saving. She went for a walk with her six year old daughter and got back late to prepare lunch. She hanged herself at home two days later, deeply embarrassed about her mistake in front of her husband's colleagues.

The issue of daylight saving resurfaced in South Korea in 2006 when the government conducted research and held public discussions. A plan to reintroduce it was discarded as polls showed that residents felt they would be asked to work longer hours given

¹⁵³ Emil Guliyev, "Azerbaijani MP proposes to abolish daylight saving time in the country", *News.Az*, Azerbaijan, 8 April 2011, at <http://news.az/articles/society/34036>

that unpaid overtime is common in Korea. Trade unions were opposed to the move for the same reason.

In June 2007, the commerce, industry and energy ministry estimated that daylight saving would reduce electricity consumption by 0.3 per cent, saving South Korea about US\$100 million in oil imports each year, and would boost the travel, retail and recreation industries by US\$90 million. Business groups promoted the benefits of daylight saving at gatherings through the summer and environmental groups were keen too. But a report by several of the nation's economic institutes in October concluded that benefits were difficult to prove and questioned the government's figures. The only advantage of daylight saving, the study claimed, was in reducing traffic accidents. An opinion poll by the *Dong-A Ilbo* newspaper of 1,000 respondents in July found that 50 per cent favoured daylight saving while 44 per cent didn't and 6 per cent had no view.

There were talks with Japan from about 2007 on simultaneously bringing in daylight saving with the same start and end dates. The business sectors of both countries urged their respective governments to take action. The push for daylight saving in South Korea became part of its green growth policy which started in 2008. A task force was set up in 2009 to examine various aspects of daylight saving, including public opinion and the implications of the measure on transport and technology, with the view to putting clocks forward in 2010.

But a survey by Career of 1,158 salaried workers in South Korea in July 2009 only showed 30 per cent supported daylight saving and 61 per cent were opposed to it. Of those against the proposal, 55 per cent thought it would increase work hours, 19 per cent felt it would upset their biorhythm and 13 per cent said it failed in 1987 and 1988. Of those in favour of the scheme, 48 per cent liked the idea of more time for self-improvement activities after work, 24 per cent pointed to higher work efficiency in the mornings and 11 per cent would spend more time with family and friends.

The plan to use daylight saving in Korea in 2010 was cancelled in December 2009, apparently due to a lukewarm response from the Japanese government. The South Korean government didn't give up and discussions continued between the two countries. In February 2010, South Korea still hadn't abandoned hope of reintroducing the scheme that year. Since then, there has been little talk of daylight saving.

Japan had daylight saving from 1948 to 1951 during the American occupation after World War II. The move was due to a fuel shortage and people were given just three days' notice of its introduction in the first year. It was unpopular and some Japanese politicians moved to get daylight saving abandoned just before it was due to start again in 1949. A poll in 1951 found that just 30 per cent of residents wanted it and 53 per cent didn't. People complained their sleep was disrupted and that the scheme was an excuse for employers to get more hours out of workers. It was disliked by farmers too. By coincidence, clocks were put back as scheduled after a fourth year of daylight saving on the same day, 8 September, the Peace Treaty with Japan was signed in San Francisco by 48 nations. Next month, a bill was passed by the National Diet to abolish the measure.

The country hasn't had daylight saving since 1951, which is perhaps surprising as Japan is one of the few advanced nations without it and as local time in capital city Tokyo is 19 minutes ahead of standard time resulting in quite early sunrises and sunsets in summer. However, there has been quite a bit of agitation for daylight saving in recent decades. The idea was considered in 1973 and 1980 due to the global energy crises around those times, but it was met with firm opposition. The world recession of the early 1990s hit Japan's economy hard, which triggered further calls to conserve fuel and find ways to do this, including through daylight saving. The ministry of international trade and industry tried to get a summer time bill passed in 1993 and 1994 but was frustrated by political uncertainty, with the Liberal Democratic Party losing office to an eight party coalition and then regaining power 10 months later.

Another bill was drawn up by a cross-party group backed by MITI in 1995 to be introduced into the Diet in 1996. Support came from some industries, particularly the Japanese leisure industry which would increase its revenue by \$15 billion a year with daylight saving according to the Leisure Development Centre. The Sakura Research Institute estimated a 0.3 per cent rise in personal consumption and a 0.2 per cent boost to gross domestic product with summer time. And the Energy Conservation Centre calculated that the country would save 555,000 kilolitres of oil a year if clocks went forward. But there was little interest from other ministries, while unions were opposed and public opinion was mixed. The ministry of education was worried that children would stay outside late and not do their homework.

Japan remained under pressure to reduce fuel use and cut greenhouse gases, especially with the Kyoto Protocol adopted in December 1997. With the economy near collapse, several government agencies met in April 1998 to discuss daylight saving as a means of cutting energy consumption. Takashi Ohara of MITI said the government needed "the understanding of the Japanese people before we go ahead".¹⁵⁴ But the Japanese Trade Union Confederation said employees would be hesitant to leave their office before nightfall and would end up working even longer hours.

Further debate on daylight saving was conducted at the National Conference on the Global Environment and Summer Time held in Japan in September 1998. The conference looked at the following main issues:

- ☀ effects on energy saving and reduction in greenhouse gas emissions. Energy saved was estimated at 500,000 kilolitres a year, equal to the amount used for domestic lighting in a month, or 77 billion yen in value. Carbon emissions would be reduced by 440,000 tons a year.
- ☀ effects on working conditions. The conference found little evidence from overseas studies that working hours increased with daylight saving although a study of hours worked in Japan in 1947 to 1953 indicated an increase during the daylight saving years.
- ☀ effects on lifestyles. In a survey by the prime minister's office in 1998, 30 per cent of people commented on less lighting needed, 26 per cent on less air-conditioning, 22 per cent on going to and starting school when cooler, 21 per cent on better family

¹⁵⁴ Chisaki Watanabe, "Divided Japan debates merits of daylight saving time", *Sarasota Herald-Tribune*, Sarasota, Florida, United States, 3 April 1998, p. 8D, at <https://news.google.com/newspapers?nid=1755&dat=19980403&id=yoAfAAAAIBAJ&sjid=h30EAAAIBAJ&pg=6879,3254482&hl=en>

communication, 18 per cent on better safety for women going home in the light and 14 per cent on reduced traffic accidents. But 19 per cent said there would be disturbances to daily life, 11 per cent that bedtime might be later, 9 per cent that leaving work in daylight would be hard, 9 per cent that spending on entertainment and outings would increase with the extra light and 9 per cent that adjusting clocks twice a year was troublesome.

- ☀ costs of enforcement. The cost of system changes to power meters, traffic lights and computer software was estimated at about 100 billion yen or US\$800 million. Major changes to transport timetables would be required. Times for international flights were set about two years in advance, which meant that any daylight saving scheme would need notice of this length of time.
- ☀ other issues. The government felt that people's health wouldn't be affected by a one hour change in clock time. The conference report also commented on overseas findings from Germany that a cow's physiology takes about a week to adjust to the time change.¹⁵⁵

The report was quite firm in its recommendation that the government should introduce daylight saving in view of the need to save energy and due to favourable opinion polls. A poll in November 1998 showed that 54 per cent of people approved of daylight saving and 25 per cent were opposed to it. Support had climbed steadily in the 1990s from 35 per cent at the start of the decade (see next table).

Opinion poll results, daylight saving, Japan

| <i>Year</i> | <i>Approve</i> | <i>Disapprove</i> | <i>Don't know/mind</i> |
|-------------|----------------|-------------------|------------------------|
| | | — % — | |
| 1951 | 30 | 53 | 17 |
| 1980 | 42 | 35 | 23 |
| 1990 | 35 | 31 | 34 |
| 1992 | 43 | 34 | 23 |
| 1996 | 47 | 30 | 23 |
| 1998 | 54 | 25 | 21 |

Source: "Outline of the Report on the National Conference on the Global Environment and Summer Time", 1998, via Wayback Machine, at http://web.archive.org/web/20070409115501/http://www.eccj.or.jp/SummerTime/conf/index_e.html

Despite all the apparent positives, Japan didn't undertake daylight saving at that time although the debate continued. By 2004, the latest research found that the economy would grow by an additional US\$12 billion a year with daylight saving, due largely to extra spending on leisure activities, a reduction in bag snatching from women by 4 per cent and a fall in traffic accidents by 10,000.

In that year, on the northern island of Hokkaido, the Sapporo Chamber of Commerce started a trial whereby clocks didn't change but workers at certain local governments and companies started an hour earlier in the summer to help save energy and improve the economy. Initial results showed that two-thirds of participants were happy while opponents complained about more overtime and losing sleep. The program lasted five years and was discontinued after 2008. Many businesses and government agencies participated in the scheme but many others weren't in it, and schools and banks hadn't joined in, causing confusion in the community. Employees who started early often finished late in any case, and little or no energy was saved. The rest of Japan didn't

¹⁵⁵ "Outline of the Report on the National Conference on the Global Environment and Summer Time", Japan, 1998, via Wayback Machine, at http://web.archive.org/web/20070409115501/http://www.eccj.or.jp/SummerTime/conf/index_e.html

get involved in the trial although discussions to adopt formal daylight saving were ongoing.

Politicians from several parties, including the governing Liberal Democratic Party, plus representatives from various community groups held a rally on daylight saving near the parliament in March 2005. They were determined to get a daylight saving bill passed in that session. Concern for the environment and the need to cut emissions was their main reason for wanting to adopt the measure, as well as more family time and extra spending. Barriers remained, such as longer working hours, health concerns, and memories of daylight saving under US occupation.

A Summer Time Bill was drafted in April 2005 by the multiparty Federation of Diet Members for the Introduction of a Summer Time System. There was increasing support for daylight saving from business, trade unions and local government for environmental, economic and lifestyle reasons, and the Japanese government was eager to promote the compatibility of energy saving measures with economic growth. But the Diet postponed the bill and other legislation in late July due to a postal privatisation dispute. Bills to privatise the massive Japan Post corporation, the country's largest employer with its huge banking, life insurance and postal arms, were being knocked back by the upper house so the prime minister, Junichiro Koizumi, called an early election. His Liberal Democratic Party was returned to power in a landslide victory on 11 September. He was known to be uninterested in daylight saving.

In June 2007, the Council on Economic and Fiscal Policy, headed by new prime minister Shinzō Abe, added daylight saving to its list of ways to tackle global warming. The government estimated that daylight saving would reduce emissions by 1.4 million tons a year although this was only 0.1 per cent of the annual total. Opponents said the proposal was an attempt by the government to increase working hours, given the Japanese work ethic of not heading home before dark or quite a bit later, and they called it "daylight slaving". In a 2007 study, Fong et al. found that electricity consumption from household lighting in Japan would fall slightly with daylight saving. However, Shimoda et al. added in air-conditioning and concluded that power usage would increase by 0.13 per cent.

Nevertheless, another Summer Time Bill was drafted by 250 Diet members from both government and opposition sides in May 2008, with the aim of starting daylight saving in 2010. Once again, the business sector was in support. But a Japanese Society of Sleep Research study in 2008 claimed that daylight saving would disrupt sleep patterns and cause health problems, including an increase in depression and suicide, for an annual economic loss of 1.2 trillion yen or about US\$11 billion at the time.

By contrast, the Dai-Ichi Life Research Institute estimated in 2010 that daylight saving would add 1.2 trillion yen a year to gross domestic product or around US\$15 billion using 2010 exchange rates. The Japan Productivity Centre calculated that the scheme would create 100,000 jobs. Morgan Stanley's John Alkire believed that spending would increase as folk shopped, drank and ate out after work, fuel consumption would be cut and people's health would improve with more vitamin D,

while traffic accidents and crime would be down. Polls showed that support for daylight saving among residents had risen to about 60 per cent.

Japan's magnitude 9.0 earthquake and tsunami in March 2011 added to calls to adopt daylight saving to conserve fuel and reduce electricity consumption. But as Jerzy Grynblat of Scandpower AB pointed out, the reduction might not have been much compared with Europe as Asia and the United States used more air-conditioning. In April, the government decided against introducing daylight saving due to likely confusion in society and the cost of clock changes for computers and industrial machinery. However, by late June, as Tokyo sweltered through a hot and humid summer with temperatures up to 39 degrees Celsius (102 degrees Fahrenheit), and with the risk of power outages due to the Fukushima nuclear disaster, the government was reconsidering daylight saving. A bill had already been drafted by a multiparty group. The problem was that Japan's frequent changes in prime minister made it hard when the lead time for introducing daylight saving was a couple of years.

Meanwhile, the Tokyo Metropolitan Government launched a Summertime scheme in 2011 where some employees could start and finish work an hour earlier than usual. Corporations such as Sony, Toshiba and Morinaga Milk put plans in place. Certain car manufacturers intended to work weekends when power consumption was low rather than on Thursdays and Fridays. More firms joined the program.

A similar nationwide initiative was launched by Shinzō Abe, enjoying his second stint as prime minister, in July 2015, after a proposal in February. Government departments, businesses and other organisations were encouraged to start and finish an hour or two earlier than usual in summer months. The aim was to achieve a better work-life balance for employees and give them more opportunity later in the day to be with family and friends and spend time and money on leisure activities. An Oricon Style survey in March found that about 70 per cent of people aged 20 to 40 years liked the idea, but this figure fell to less than half if the initiative was brought into their own workplace. After the plan got underway, some people complained about adverse health effects. Others have said they have less time to get children to childcare in the morning. There were positive signs for the scheme though. Large trading company Itochu reported that the number of employees leaving work after 8 p.m. fell from 30 per cent to 7 per cent. Automotive parts manufacturer Denso was providing free breakfasts each day.

The hardest thing to change might be the emphasis on long hours that has been part of the nation's culture for so long. Many people are worried that their hours will actually increase under the program. OECD data reveals that the average hours worked in Japan increased from 1,714 in 2009 to 1,729 in 2014. According to Koji Morioka, a professor at Kansai University, a survey showed that 16 per cent of workers took no holidays during the year and that this rose to 28 per cent for people who worked more than 60 hours a week.

As far as the prime minister is concerned, daylight saving is no longer on the drawing board in 2016 or beyond. The reason given is Japan's large latitude range, extending from 24 to 46 degrees north. Instead, the government hopes that earlier starts and finishes will help the environment and the economy, and people's lifestyles.

23 No longer popular in South America

Daylight saving has been used by eight of the 13 South American countries although only three used it in 2015-16 (and 2016-17): Brazil, Chile and Paraguay (see following table). Bolivia and Columbia had it in one year only. The tropical location of many of the continent's nations doesn't lend itself to daylight saving. Of countries that have used it extensively, most are some distance from the equator. The exception is Brazil although the northern states have stopped using the scheme. Four countries are on permanent daylight saving of sorts as their standard time is more than half an hour ahead of sun time in their capital cities: Argentina, Chile, Suriname and Uruguay.

Years of daylight saving, South America

| Country | Had daylight saving in one or more years | | | | 2015-16 |
|--|--|----------|------|---------|---------|
| | WWI | Interwar | WWII | Postwar | |
| Argentina | | ✓ | ✓ | ✓ | |
| Bolivia | | ✓ | | | |
| Brazil | | ✓ | | ✓ | ✓ |
| Chile | | ✓ | | ✓ | ✓ |
| Colombia | | | | ✓ | |
| Ecuador | | | | | |
| Falkland Islands or Islas Malvinas (territory) | | ✓ | ✓ | ✓ | ✓ |
| Guyana | | | | | |
| Paraguay | | | | ✓ | ✓ |
| Peru | | ✓ | ✓ | ✓ | |
| Suriname | | | | | |
| Trinidad and Tobago | | | | | |
| Uruguay | | ✓ | ✓ | ✓ | |
| Venezuela | | | | | |

Note: For more detail, see Appendix.

Sources: Time and Date AS, at <https://www.timeanddate.com>; and other sites

Argentina first adopted daylight saving in 1930. After a period of economic prosperity, the Great Depression hit the country hard, leading to a military coup on 6 September of that year. A summer time, or *horario de verano* (literally, summer schedule), policy started on 1 December, probably to save energy. Daylight saving took place each year until 1968-69. It was continuous from 1941 to 1943, then from 1943 to 1946 to cope with wartime shortages, and again from 1946 to 1963. Thus in 22 years from 1941, Argentina had standard time for nine and a half months, and had three more coups.

In 1969, at the usual start of daylight saving in October, the government instead changed the country's time zone from GMT-4 to GMT-3. This meant that clock time was nearly an hour ahead of sun time in capital city Buenos Aires and more than an hour and a half ahead in western parts of the country. The 1973-74 oil shock prompted the reintroduction of daylight saving in 1974, adding another hour to the difference between clock time and local mean time in summer. This resulted in some very late sunrises. In the western city of Neuquén, sunrise was 9:15 a.m. on April 30, the day before daylight saving ended, and later in places further west or south.

Daylight saving was again implemented in 1988-89 to 1992-93. This round of summer time was due to drought and lack of maintenance to thermal power plants leading to rolling blackouts in late 1988. Energy reforms in 1991-92 meant extra capacity and daylight saving was cancelled after 1992-93.

It was reintroduced briefly in 1999-00. Argentina's time zone went from UTC-3 to UTC-4 on 3 October 1999, coinciding with the start of daylight saving, thus there was no clock change. UTC-4 is arguably the country's correct zone given that Buenos Aires has a local mean time of UTC-3:54 and western areas are around UTC-4:30. However, time was altered again on 3 March 2000 to UTC-2, supposedly as a further daylight saving time change, before the scheme finished two days later on 5 March with a move back to UTC-3.

Argentina experienced another energy crisis in 2004 as the power system had once again reached its capacity. Daylight saving wasn't considered as an option. Instead, gas exports were reduced, which affected trading partners, especially Chile and to a lesser extent Uruguay and Brazil. The shortage continued and there was pressure on the government to use daylight saving to ease the problem but the president, Néstor Kirchner, was unwilling to try it. However, 10 days after his wife, Cristina Fernández de Kirchner, succeeded him as president on 10 December 2007, she announced the National Program for the Rational and Efficient Use of Energy. It comprised a range of initiatives, including daylight saving. Getting it through parliament was a formality, with the Senate passing it 57 votes to 3 and the Chamber of Deputies 192 to 2. Néstor Kirchner wasn't involved in the launch of the program as "he considered that consume [consumption] was a key factor to energize economy and increase working classes self-esteem"¹⁵⁶ and that cutting back on power wouldn't help. Daylight saving started on 30 December.

Studies by the government found that power usage fell by 5-7 per cent during the 2007-08 daylight saving period and gave economic and environmental benefits although private research estimated the savings to be 0.5-1.5 per cent. But summer time didn't prove popular, with public protests in some regions and people complaining that it affected their health and mood and upset their schedules. San Luis province to the west of Buenos Aires pulled out of daylight saving on 21 January 2008 after just three weeks. Perhaps paradoxically, the province achieved better energy savings than most areas of the country in the last week of that month. San Luis then turned its clocks back a further hour on 9 March, a week before the nation was due to finish daylight saving, putting the province in UTC-4, a time zone it had used on several occasions over the previous two decades.

The Argentine government consulted with various officials, scientists, academics and energy sector executives before deciding to retain daylight saving in 2008-09 and to set a starting date of 19 October. Provinces could choose whether to observe the measure and 13 out of the country's 23 provinces decided not to use it. Those opting

¹⁵⁶ Paula Alvarado, "Argentina announces energy saving plan, takes back DST after 14 [sic] years", *Treehugger*, 24 December 2007, at <http://www.treehugger.com/corporate-responsibility/argentina-announces-energy-saving-plan-takes-back-dst-after-14-years.html>, from Mario Wainfeld, "Dos protagonistas con nuevos roles", *Pagina/12*, 23 December 2007, at <http://www.pagina12.com.ar/diario/elpais/1-96570-2007-12-23.html> (in Spanish)

out were all of the western and southern provinces where standard time was already roughly an hour and a half ahead of sun time.

Daylight saving met with even greater opposition in the following year when 16 provinces decided not to use it and about four more were considering not supporting it. Many businesses, community groups and power companies were also against the continuation of the scheme. The government finally abandoned it shortly before it was due to start again on 18 October 2009. Planning minister Julio de Vido said there was no need for it as dams were at about 90 per cent capacity (hydropower provided Argentina with around 40 per cent of its electricity) and power consumption had increased by only 2 per cent in the previous two years.

There are no further plans for daylight saving time in Argentina. Most areas have a mean local time of around UTC-4 to UTC-4:30 and in effect have plenty of daylight saving without changing the clock, given that standard time is UTC-3. When the country did advance the clocks, it was more like double summer time. As for San Luis province, after it moved to standard time of UTC-4 on 9 March 2008, it had daylight saving in 2008-09, starting and finishing a week earlier than other provinces that still used the scheme that year. San Luis shifted its time zone back to UTC-3 on 11 October 2009 to once more be in unison with the rest of the country.

Summer time was first used on the Falkland Islands or Islas Malvinas off the Argentine coast in 1936-37.¹⁵⁷ The scheme continued each year until 1942, before it was reestablished in 1983-84 following the Falklands War in 1982, probably to reduce the time difference between the islands and the United Kingdom. An initial time zone change in May 1983 took the island from UTC-4 to UTC-3 and then daylight saving took it to UTC-2 in September. This meant that clocks were close to an hour ahead of local time in winter and nearly two hours in summer, until standard time was moved back to UTC-4 in September 1985.

The Falklands have had daylight saving ever since and it has been continuous from 5 September 2010. Rather than switching back after the summer of 2010-11, the government decided to trial year round daylight saving in 2011 to give residents more daytime contact hours with the United Kingdom and Europe and lighter evenings in winter. The trial was extended into 2012. After a survey found that 53 per cent of people wanted clocks to stay an hour ahead, the government decided in July that the islands should have indefinite daylight saving.

Interestingly, the only place on the islands where everyone has traditionally used daylight saving time is the main town of Stanley, home to three-quarters of the Falklands' population. The rest of the territory, or Camp (*campo* is Spanish for countryside), mainly uses standard time, or "Camp time" as distinct from "Stanley time", all year round. Quite a few Camp residents do go by summer time although some of these people tend to change from year to year.

Other South American countries to have used daylight saving often are Brazil, Chile, Paraguay and Uruguay. Brazil first had daylight saving or summer time, or *horário de*

¹⁵⁷ Bryan Collier, "Daylight time", *Middletown Times Herald*, Middletown, New York, United States, 23 April 1937, p. 4, Newspapers.com (subscription only), at <https://www.newspapers.com/image/40186116>

verão, in 1931-32 and 1932-33, implemented by new president Getúlio Vargas who was installed by the military in November 1930 after a revolution and coup. A decree was put in place just two days before daylight saving started throughout the country on Saturday 3 October 1931 at 11 a.m. Late morning is an unusual changeover time. The language in the decree was quite general, but the underlying reasons for adopting daylight saving were the economy and drought. Brazil was hit hard by the Great Depression, which resulted in coffee prices falling by close to two-thirds, and one of the country's worst droughts was in 1930. But the industry, commerce and banking sectors didn't like the scheme and it was revoked by a decree dated 10 October 1933.

Low coffee prices in the 1930s followed by several droughts in the 1940s hurt Brazil's coffee industry and therefore the economy as the country was still very reliant on its major crop. Tree numbers increased by just 2 per cent between 1942 and 1949 and crops were small through to the mid 1950s. But daylight saving wasn't reintroduced until 1949-50, probably to save energy and as part of a program to try and boost secondary industry. After the fourth year of the scheme, clocks went back on 1 March 1953 and it was cancelled on 30 November despite 1953 being another drought year and a severe one at that.

A further prolonged drought was the reason daylight saving was restored in 1963. Initially, the measure only applied to the Southeast Region, or the states of São Paulo, Rio de Janeiro, Guanabara (part of Rio de Janeiro since 1975), Espírito Santo and Minas Gerais, when it started on 23 October, but it was extended to the rest of the nation on 9 December. The end date for 1963-64 was 1 March. There was a military coup a month later and the next period of daylight saving was February and March 1965. Daylight saving was then used from 1965-66 to 1967-68, before it was revoked on 15 October 1968 on advice from the mines and energy ministry that it was no longer necessary.

Twenty-one years of military rule ended in Brazil on 15 March 1985 and the country had daylight saving for the first time since 1968 to save energy, with a 1985-86 start date of 2 November. Daylight saving proved to be unsuitable and unpopular in the North and Northeast regions located in the middle of the tropics. The measure was abandoned in most states in the North Region (which lies on the equator) after three years and in the Northeast region after five years. See the following table.

Daylight saving, Brazil, 1985-86 to 2015-16

| <i>Region, State</i> | <i>1985-86 to 1989-90</i> | | | <i>1990-91 to 1994-95</i> | | | <i>1995-96 to 1999-00</i> | | | <i>2000-01 to 2004-05</i> | | | <i>2005-06 to 2009-10</i> | | | <i>2010-11 to 2015-16</i> | | |
|----------------------|---------------------------|--|--|---------------------------|--|--|---------------------------|--|--|---------------------------|--|--|---------------------------|--|--|---------------------------|--|--|
| North | | | | | | | | | | | | | | | | | | |
| Acre | | | | | | | | | | | | | | | | | | |
| Amapá | | | | | | | | | | | | | | | | | | |
| Amazonas | | | | | | | | | | | | | | | | | | |
| Pará | | | | | | | | | | | | | | | | | | |
| Rondônia | | | | | | | | | | | | | | | | | | |
| Roraima | | | | | | | | | | | | | | | | | | |
| Tocantins | | | | | | | | | | | | | | | | | | |
| Northeast | | | | | | | | | | | | | | | | | | |
| Alagoas | | | | | | | | | | | | | | | | | | |
| Bahia | | | | | | | | | | | | | | | | | | |
| Ceará | | | | | | | | | | | | | | | | | | |
| Maranhão | | | | | | | | | | | | | | | | | | |

| <i>Region, State</i> | <i>1985-86 to 1989-90</i> | <i>1990-91 to 1994-95</i> | <i>1995-96 to 1999-00</i> | <i>2000-01 to 2004-05</i> | <i>2005-06 to 2009-10</i> | <i>2010-11 to 2015-16</i> |
|----------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Paraíba | | | | | | |
| Pernambuco | | | | | | |
| Piauí | | | | | | |
| Rio Grande do Norte | | | | | | |
| Sergipe | | | | | | |
| Central-West | | | | | | |
| Federal District | | | | | | |
| Goiás | | | | | | |
| Mato Grosso | | | | | | |
| Mato Grosso do Sul | | | | | | |
| Southeast | | | | | | |
| Espírito Santo | | | | | | |
| Minas Gerais | | | | | | |
| Rio de Janeiro | | | | | | |
| São Paulo | | | | | | |
| South | | | | | | |
| Paraná | | | | | | |
| Rio Grande do Sul | | | | | | |
| Santa Catarina | | | | | | |

Shaded square – the state had daylight saving in that year

Blank square – no daylight saving in that year

Sources: Time and Date AS, at <https://www.timeanddate.com>; and “Decretos sobre o Horário de Verão no Brasil” [Daylight saving time decrees in Brazil], at <http://pcdsh01.on.br/DecHV.html>

Daylight saving was generally accepted in the other three regions. The mayor of Rio de Janeiro, Cesar Maia, a former economics professor, liked it so much he tried to get Brazil to extend daylight saving to the end of February in 1993 rather than the scheduled end of Sunday 31 January, a little earlier than usual and still the middle of summer. When that failed, he got the city government to stay on daylight saving and asked businesses and residents to do the same, arguing that the tourism industry depended on it. But the banks, airports, buses, stock market and most shops and other businesses put their clocks back, and his order didn't apply to the suburbs in any case. People were left wondering what time they should go by and were worried that children would be walking to school in the dark by later in the month. He met with the president, Itamar Franco, on Monday afternoon and reluctantly agreed to put the city's clocks back to standard time.

A severe drought in the Northeast region in 1998 and 1999 together with Brazil's financial crisis of 1997 to 1999 was probably the catalyst for the states in that region to reintroduce daylight saving in 1999. They had summer time in three years, 1999-00 to 2001-02, although in 2000-01 it only lasted two weeks in Alagoas, Ceará, Maranhão, Paraíba, Piauí, Rio Grande do Norte and Sergipe, and one week in Pernambuco, in October 2000. Roraima in the North region also had just a week of daylight saving in that month and hasn't used it since.

A nationwide drought in 2001 convinced the Northeast states to continue with daylight saving in 2001-02 along with most of the rest of the country. Hydroelectric dams provided 88 per cent of generating capacity in Brazil and energy supplies were rationed for eight months. Households and businesses had to cut their electricity consumption by a fifth, street lighting was dimmed, and outside lights and fridges at the presidential palace were turned off.

Start and finish dates for daylight saving in Brazil varied each year and were often made public at quite short notice. Commencement dates were delayed until November in 2002, 2004 and 2006 due to elections in October of those years as the electronic voting equipment couldn't be altered to summer time. A decree of 8 September 2008 set future daylight saving periods as the third Sunday in October until the third Sunday in February, except if the end Sunday was in the middle of the Brazilian Carnival. In that case, daylight saving was extended to the following Sunday. Carnival starts on the Friday and finishes five days later on Ash Wednesday, meaning that the end date of daylight saving was pushed back a week in 2012 and 2015. Conserving electricity, and reducing shortages and blackouts, remained the fundamental reason for daylight saving. The scheme was part of a wider national policy to save energy.

Estimated savings in electricity due to daylight saving in Brazil are about 5 per cent each year, based on government reports. Due to severe drought in 2015, summer time was going to be extended by a month but the plan was reversed in February and clocks went back the week after Carnival as originally intended. President Dilma Rousseff and mines and energy minister Eduardo Braga felt that darker mornings in March would have meant an increase in electricity usage at the start of the day. Since the 2001 drought, Brazil has built a number of thermoelectric power plants, reducing its reliance on hydroelectricity although it still makes up two-thirds of generating capacity, rising to over 80 per cent in the Southeast Region where the 2015 drought was worst. Estimated savings in energy from putting clocks on in 2015-16 were 7 billion reais or US\$1.84 billion, according to the mines and energy ministry.

Daylight saving has been implemented in isolated instances in certain states in the North and Northeast regions in recent decades. For example, Amazonas had daylight saving in 1993-94. The state has a population of 3.8 million, including 2.0 million in capital city Manaus which is three degrees south of the equator. Average temperatures in the city hardly vary through the year (it's warm to hot all the time) and the difference between the longest and shortest days is 22 minutes. A US resident who was in the city at the time recollected what happened with daylight saving:

... the government of the state of Amazonas decided to implement daylight savings time ... ostensibly because banks located in Rio de Janeiro and São Paulo and government agencies in Brasília were on daylight savings time.

Talk about mass confusion. Easily more than half the population ignored the decree. When scheduling an appointment you would have to clarify whether the other party was using "old time" or "new time". Banks and government agencies and a few small businesses all used "new time" but most everyone else used "old time". Who knows what time busses used (since they came ... whenever they wanted), but the result was temporal chaos. It was fairly disruptive to Church meetings on Sunday when half the congregation would show up an hour into the services.¹⁵⁸

Bahia and Tocantins have had daylight saving more often than other states in the Northeast and North regions (see table above) in an effort to conserve power. Bahia tried it once more in 2011-12. The governor, Jaques Wagner, said the purpose was to

¹⁵⁸ Michael Cleverly, "Seasonal temporal chaos: Daylight savings time in the Amazon", 17 April 2006, at <http://blog.cleverly.com/permalinks/222.html>

simplify trade with the rest of the country and to put Bahia on the same time as the large cities to its south. Surveys found that most residents were opposed to daylight saving and its reintroduction was cancelled after one summer. Likewise, Tocantins had daylight saving again in 2012-13 but it was abolished after one season when a government poll found that 77 per cent of people didn't want it. The capital cities of these states are just 13 degrees and 10 degrees south of the equator.

Nearly a quarter of municipalities in the state of Mato Grosso opted out of daylight saving from October 2011. Then in January 2013, deputy Heuler Cruvinel of the Brazilian Social Democracy Party wanted the neighbouring state of Goiás to stop using daylight saving due to its proximity to the equator. Clocks in both states were still being advanced in the summer of 2016-17 and there are no plans to abolish the scheme.

Brazil scrapped its UTC-5 time zone in June 2008, shifting the far western state of Acre and south-west Amazonas to UTC-4. The government claimed that putting this area into the UTC-5 zone was a historical mistake that had lasted nearly 100 years and the removal of the zone would put standard time in Acre's capital city, Rio Branco, half an hour ahead of sun time rather than 30 minutes behind it. Another reason for the change was the difficulties television stations had in broadcasting programs of different classifications at appropriate times across the country. But residents didn't like the new time. The federal government decided in 2009 on a referendum in Acre at the October 2010 election, where 58 per cent of voters wanted to revert to the old time. Finally, in November 2013, the UTC-5 zone was reinstated.

A proposal in June 2009 to have a single time zone in Brazil of UTC-3 aimed to save further energy and synchronise business times throughout the country (and would have added another hour to clock time for residents of Acre and south-west Amazonas who didn't like the 2008 change). But the public was concerned that taxpayers' money would be wasted and that a nation the geographic size of Brazil needed several time zones. The move would have been an enforced form of year round daylight saving in the western areas. A single time bill prepared by then senator Arthur Neto, now mayor of Manaus, was withdrawn in July when he confirmed that a television network owner had requested the change.

Like Brazil, Chile has also used daylight saving a lot over the years although not before it made up its mind between standard time and local time, bobbing from one to the other in the early part of the twentieth century. Initially adopting standard time of GMT-5 in 1910, it returned to mean solar time (GMT-4:43 in capital city Santiago) in 1916. The country moved to GMT-4 in 1918, and then back to local time in 1919, before settling on GMT-5 in 1927.

Chile first used daylight saving several years before Brazil or Argentina, in 1927-28, under the presidency of army general Carlos del Campo who rose to power after military coups in 1924 and 1925. Clocks went forward and back each year until 1931-32. Constitutional rule was restored from December 1932 with Arturo Alessandri as president and a decision was made not to return to the old standard time of GMT-5 at the end of the 1932-33 summer but to remain at GMT-4, probably due to the state of the economy and the need to save fuel. A League of Nations study found that Chile suffered from the 1930s depression more than any other country. The new time was

maintained until 1946, apart from a brief return to GMT−5 for two months in 1942. The country then used daylight saving for the first time in 13 years, putting time another hour ahead of the sun, but only for seven weeks. In 1947, Chile again shifted to GMT−5 and then back to GMT−4 less than two months later, a shorter period than in 1942.

The country brought back daylight saving in the summer of 1968-69 and this meant that time in the capital was an hour and 43 minutes ahead of the sun. Chile suffered one of its worst droughts, the Great Drought of 1968, resulting in less hydroelectric power. Thermoelectric plants were cranked up to full capacity although 50,000 tons of coal had to be imported from the United States and Europe. The reintroduction of daylight saving reduced the demand for electricity.

A decree dated 6 October 1970 set the summer time period as the end of the second Saturday in October to the end of the second Saturday in March. The span had some flexibility and dates could be changed if necessary. In 1973, an economic crisis, including food and fuel shortages, as well as social and political unrest led to a coup on 11 September, and the start of daylight saving was brought forward two weeks. The next alteration was in 1987 when the end date was extended by five weeks until after Pope John Paul II's visit on 1-6 April. In 1988, the start date was a week early so voters had more light for the national plebiscite on 5 October where a majority wanted an end to military rule.

Daylight saving ended a week later than scheduled in 1989-90 as new president Patricio Aylwin came to office the previous weekend. In 1990-91, clocks went forward four weeks early to conserve energy after a dry winter. A three week delay to the end of daylight saving in March 1997 was also because of dry weather although the El Niño of that year brought significant rainfall a few months later. Drought soon returned and daylight saving in 1998-99 began two weeks early and finished three weeks later than usual. Another severe drought in 2007 postponed the end of daylight saving for three weeks in March 2008.

A devastating earthquake hit Chile on 27 February 2010 and daylight saving continued three weeks beyond the planned finish date of 14 March as many people were without electricity. Daylight saving was extended an extra eight weeks in 2011 and then started seven weeks early later in the year, mainly to conserve energy. Similarly, the government kept summer time hours going for a further seven weeks in 2012, but the reasons were broadened to include reduction in road accidents and crime, based on research in both areas, as well as in energy consumption. The government estimated that 0.7 per cent less power was used in those seven weeks, or 51 gigawatt hours, equal to five million households not turning on four lights for one hour daily during this period. Opinion polls showed that more than 60 per cent of residents approved of the shorter winter time or its elimination altogether.

The trend towards longer periods of daylight saving was maintained in 2012-13 to 2014-15, running from early September to late April or nearly three months more than the previous years that had no extensions. In January 2015, the government decided to keep the clocks ahead on a permanent basis, leaving them unchanged from summer time. Energy minister Mázimo Pacheco Matte declared: "This is the best way to

ensure the quality of life of Chileans and promotes good energy use.”¹⁵⁹ What had been the country’s daylight saving time zone of UTC–3 became its standard time on 26 April, putting Santiago one hour 43 minutes ahead of local mean time all year.

This policy was reversed just over 12 months later and Chile went back to annual clock changes from 2016-17, with the period September 2014 to May 2016 now regarded as one of continuous daylight saving. Energy savings amounted to about 1 per cent with daylight time all year in 2015 and there was a drop in crime. The new daylight saving period runs for about nine months, more than a month longer than before. Reasons for the about-face included:

- ☀ a survey by the energy ministry showing that 45 per cent of people preferred two clock changes a year, 39 per cent wanted year round summer time and 11 per cent favoured winter time all year
- ☀ an increase in school absenteeism in winter months due to darker mornings
- ☀ people complaining about computers and other devices displaying the wrong time
- ☀ fruit growers suffering a 15 per cent loss in productivity with darker mornings.

Along with Chile and Brazil, Paraguay is the only other South American country to be currently using daylight saving. In 1972, the nation moved its time zone from UTC–4 to UTC–3, but reversed this change in 1974. The country expanded rapidly in the 1970s and may have developed a fuel shortage, first adopting daylight saving in 1975-76. After the hydroelectric dam Itaipú was built in 1975 to 1984, energy was abundant. Nearly all of Paraguay’s electricity now comes from hydropower and about 90 per cent is exported, mainly to Brazil and Argentina.

Local supply isn’t particularly reliable though, due to lack of investment in transmission and distribution, and this may be the reason Paraguay has retained daylight saving. Initially, the period was set as 1 October to 1 March. The end date was extended to 1 April in 1979 as the second world energy crisis took hold, before coming back to mainly late February or early March from 1992. Various dates were used from 2002. Since 2013, the end date has been late March. The start date hasn’t changed as much and has been early October since 2010, giving the country close to six months of daylight saving each year.

By contrast, Uruguay has had a far less settled time with daylight saving, with 10 separate episodes since 1923-24, the most of any country in the world. Details are shown in the next table. The underlying reason for many or most of the changes is probably the frequent droughts that hit Uruguay and the need to save energy in a country where a high proportion of electricity comes from hydropower.

¹⁵⁹ Government of Chile, “Announcement: The time change is suspended indefinitely”, 28 January 2015, at <http://www.gob.cl/2015/01/28/ministerio-de-energia-da-conocer-modificaciones-al-cambio-de-hora-en-chile-continental-e-insular> (translated version used)

Daylight saving episodes, Uruguay

| <i>Episode</i> | <i>Start date</i> | <i>Period</i> | <i>End date</i> |
|----------------|--------------------------|--------------------|---------------------------|
| 1 | Tuesday 2 October 1923 | 1923-24 to 1925-26 | Thursday 1 April 1926 |
| 2 | Sunday 29 October 1933 | 1933-34 to 1942-43 | Sunday 14 March 1943 |
| 3 | Sunday 24 May 1959 | 1959 to 1960 | Sunday 6 March 1960 |
| 4 | Sunday 4 April 1965 | 1965 to 1970 | Wednesday 2 December 1970 |
| 5 | Monday 24 April 1972 | 1972 | Tuesday 15 August 1972 |
| 6 | Sunday 10 March 1974 | 1974 to 1976* | Friday 1 October 1976 |
| 7 | Sunday 4 December 1977 | 1977-78 | Saturday 1 April 1978 |
| 8 | Monday 1 October 1979 | 1979-80 | Thursday 1 May 1980 |
| 9 | Monday 14 December 1987 | 1987-88 to 1992-93 | Sunday 28 February 1993 |
| 10 | Sunday 19 September 2004 | 2004-05 to 2014-15 | Sunday 8 March 2015 |

* continuous

Sources: Time and Date AS, at <https://www.timeanddate.com>; and Horloge Parlante, at <http://www.horlogeparlante.com>

The country had three years of daylight saving from 1923-24, possibly due to drought although the catalyst might have been the 1923 South American Championship in soccer held in Uruguay. Daylight saving started on 2 October and the tournament commenced four weeks later. The next period of daylight time started in 1933-34 and was probably due to the poor economic and financial situation of the country, which also led to a coup in March 1933. A change in government in November 1942 was followed by a move to a new time zone two weeks later, from GMT-3:30 to GMT-3. Added to this was an hour of daylight saving, putting clock time in capital city Montevideo an hour and three-quarters ahead of local time. Earlier daylight saving periods had involved a half hour change. Subsequent changes were an hour except 1968 to 1970 and part of 1974 which were 30 minutes.

In the southern hemisphere, daylight saving normally extends from the latter months of one year to the early months of the following year. But in certain years, Uruguay had its summer time schedule in the cooler months such as in 1959, when clocks went forward from May to November, as well as 1965 to 1970, and 1972. Ironically, a month before the start of daylight saving in 1959, the country suffered one of its worst ever floods. The 1960s through to the early 1970s featured drought, flood, economic decline and social unrest, and daylight saving was used in most years from 1965.

Another coup in 1973 didn't help the economy, and daylight saving was implemented a number of times in subsequent years to save energy, especially during drought. The summer time schedule was abandoned for a while after 1979-80. Uruguay boosted its hydroelectric capacity in the 1980s but a severe drought late in the decade convinced the government to reintroduce daylight saving.

When drought hit Uruguay in 2004, electricity imported from Argentina and Brazil increased more than fivefold compared with 2003 and stayed high in future years. Daylight saving was reestablished from 2004-05 to try and conserve power and a decree signed by the president, Tabaré Vázquez, in September 2006 made the change automatic each year. This decree was overturned when the same president signed another decree on 29 June 2015 abolishing daylight saving. This was despite an estimated reduction in energy consumption of 39,500 megawatt hours or about 1 per cent during the five months of daylight saving in 2014-15, equating to US\$8-10 million. His decision was also made in spite of research concluding that robberies in Uruguay fell by 27 per cent and thefts by 11 per cent with daylight saving in place.

There had been talk for a year or more of 2014-15 being the last season of daylight saving in Uruguay. Energy minister Carolina Cosse said on radio after the decree was signed that daylight saving was being dropped as electricity was now coming from a greater variety of sources and supply was adequate. But the clincher may have been the plight of tourism. The president had met with representatives of the Chamber of Tourism on 22 June, headed by Luis Borsari, who advised him that daylight saving had been harming the industry, especially restaurants, for the last decade. Restaurateurs claimed that they lost the dinner shift, presumably because people were outside later and by the time it got dark they were ready to go home or back to their hotel. The loss of tourism business was costing the country US\$12 million in taxes forgone a season, according to Borsari, more than the saving in electricity. The sector is worth over US\$500 million a year to the Uruguayan economy. Montevideo still “saves” 45 minutes of daylight as standard time, UTC−3, is 45 minutes ahead of sun time, UTC−3:45.

Other countries in South America are solely in the tropics and don't use daylight saving although three of them have done so in the past: Bolivia, Colombia and Peru. Bolivia's only year of daylight saving was 1931-32 at the depths of the economic depression. Some of the media carried a story in 2009 of how the Bolivian president, Evo Morales, accused the United States of being about to force daylight saving on his country. He was reported as saying: “We have seen the government of the U.S. try to undermine our democracy, block us from the lawful export of coca products, and smuggle in munitions. But now we see that these conspirators also have their sights set on changing our clocks. We denounce this before the world community.” But it turned out to be an April Fools' Day joke by the Democracy Center.

Bolivia was planning to adopt daylight saving in 2011 to conserve electricity and reduce power cuts. The government announced on 25 August that the country would go onto summer time on 1 September, claiming a 3 per cent saving in electricity and that 80 per cent of the population favoured the idea. While industry supported the measure, criticism came from the education, health and energy sectors as well as community groups, and the government postponed the scheme the day before its planned introduction. In October, the government decided to delay daylight saving until 2012 as consensus hadn't been reached on the proposal, but there had been no further word in 2016.

Like Bolivia, Colombia has had just the one year of daylight saving, turning its clocks forward in 1992-93 for 11 months due to drought. About 70 per cent of energy came from hydropower and dry weather lowered dam levels which reduced capacity and resulted in rationing from February 1992. Rolling blackouts lasted up to 10 hours a day. The government ran a “Turn off the tap” campaign and heavy users of water could be jailed for six days. Daylight saving started on 3 May, but most of the country's 1,024 municipalities didn't make the change.

People in Colombian cities tended to accept the new time, often called *hora Gaviria* after the president, César Gaviria, but those in smaller towns and rural areas preferred the old time, as did schools and families in most areas. Feelings about daylight saving among the community were mixed although there seemed to be more support for a return to the old time. The power situation improved by 1993 and the blackouts ended

in March. Clocks went back in April. The introduction of private investment and other reforms in the energy sector from 1994 increased capacity and improved the reliability of supply to some extent.

Peru had daylight saving in the first three months of 1938, again in 1938-39 and 1939-40, and in 1986, 1987, 1990 and 1994. A newspaper report in 1952 indicated that capital city Lima and nearby Callao had daylight time annually from 1 January to 15 March based on reports of ship captains although this is hard to confirm. Hydropower has provided a large percentage of the country's energy needs since the early twentieth century. A La Niña event in 1938-39, bringing drought to Peru, may have encouraged daylight saving at this time. The country developed energy conservation measures in response to the world oil crises of the 1970s and didn't use daylight saving. In the 1980s, clocks went forward in two years to help save power. Another La Niña in 1988-89 might have influenced the decision to use daylight saving in 1990. Strong economic growth leading to a substantial increase in demand for electricity was the reason for a summer time schedule in 1994.

By this time, a comprehensive program of energy conservation that continues to the present day was being put in place in Peru, including information, advertising, education and technology across household, business, school and government sectors, plus a policy of encouraging renewable energy sources.¹⁶⁰ All this was seen as preferable to daylight saving. The reduction in electricity use per household was 17 per cent between 1995 and 2001, probably far more than would have been achieved through daylight saving in a country near the equator. However, usage has since increased sharply.

¹⁶⁰ Friedrich Ebert Stiftung, *Matriz Energetica en el peru y energias renovables*, 2012, at <http://library.fes.de/pdf-files/bueros/peru/09003.pdf> (translated version used)

24 Never favoured in Africa

More than three-quarters of Africa is in the tropics and not particularly suited to daylight saving time. That hasn't stopped some of the countries from at least trying the measure although most of those that have used it are in the far north or south of the continent. No African country on or near the equator has ever used it. In all, 18 of the 55 countries have had daylight saving but only three were using it in 2016: Morocco, Namibia and Western Sahara (see table). Nineteen countries have chosen a standard time zone that is over half an hour ahead of local time in their capital city and, in a sense, have year round daylight saving: Algeria, Benin, Cape Verde, Gambia, Guinea, Guinea-Bissau, Kenya, Liberia, Libya, Mali, Mauritania, Niger, Senegal, Sierra Leone, South Sudan, Sudan, Tanzania, Uganda and Western Sahara. Seven of them have had seasonal daylight saving.

Years of daylight saving, Africa

| Country | Had daylight saving in one or more years | | | | 2015-16/ 2016 |
|--------------------------------------|--|----------|------|---------|------------------|
| | WWI | Interwar | WWII | Postwar | |
| Algeria | ✓ | ✓ | ✓ | ✓ | |
| Angola | | | | | |
| Benin | | | | | |
| Botswana | | | ✓ | | |
| Burkina Faso | | | | | |
| Burundi | | | | | |
| Cameroon | | | | | |
| Cape Verde | | | ✓ | | |
| Central African Republic | | | | | |
| Chad | | | | ✓ | |
| Comoros | | | | | |
| Congo, Democratic Republic of the | | | | | |
| Congo, Republic of the | | | | | |
| Djibouti | | | | | |
| Egypt | | | ✓ | ✓ | |
| Equatorial Guinea | | | | | |
| Eritrea | | | | | |
| Ethiopia | | | | | |
| Gabon | | | | | |
| Gambia | | | | | |
| Ghana | | ✓ | ✓ | ✓ | |
| Guinea | | | | | |
| Guinea-Bissau | | | | | |
| Ivory Coast | | | | | |
| Kenya | | | | | |
| Lesotho | | | ✓ | | |
| Liberia | | | | | |
| Libya | | | | | ✓ |
| Madagascar | | | | | ✓ |
| Malawi | | | | | |
| Mali | | | | | |
| Mauritania | | | | | |
| Mauritius | | | | | ✓ |
| Morocco | | | ✓ | ✓ | ✓ |
| Mozambique | | | | | |
| Namibia | | | ✓ | ✓ | ✓ |
| Niger | | | | | |
| Nigeria | | | | | |

| Country | Had daylight saving in one or more years | | | | 2015-16/ 2016 |
|-----------------------|--|----------|------|---------|------------------|
| | WWI | Interwar | WWII | Postwar | |
| Rwanda | | | | | |
| São Tomé and Príncipe | | | | | |
| Senegal | | | | | |
| Seychelles | | | | | |
| Sierra Leone | | ✓ | ✓ | ✓ | |
| Somalia | | | | | |
| South Africa | | | ✓ | | |
| South Sudan | | | | ✓ | |
| Sudan | | | | ✓ | |
| Swaziland | | | | | |
| Tanzania | | | | | |
| Togo | | | | | |
| Tunisia | | | ✓ | ✓ | |
| Uganda | | | | | |
| Western Sahara | | | | ✓ | ✓ |
| Zambia | | | | | |
| Zimbabwe | | | | | |

Note: For more detail, see Appendix.

Sources: Time and Date AS, at <https://www.timeanddate.com>; and other sites

The only African country to have daylight saving in World War I was Algeria (apart from probably a small part of Morocco around Tangier). As a French overseas territory, it started observing summer time on the same day as France, on 14 June 1916. Before this, Algeria had to use Paris local mean time from 1891 although this was just four minutes different from its own local time. The country then had to change to GMT along with its French rulers in 1911. Algeria had the same daylight saving start and end dates as France from 1916 to 1920, usually from March to October. The scheme was abandoned in the colony in 1921, on 22 June, the northern hemisphere's longest day.

Algeria next had daylight saving in 1939, starting on 11 September, 10 days after the outbreak of World War II. The decision was probably a French one to put the territory on the same time as its own and to save fuel. France continued with daylight saving in 1940 but in Algeria there was a time zone change to GMT+1 instead. Daylight saving was used again in 1944 and 1945 before the country moved back to GMT in 1946.

Daylight saving wasn't used again in Algeria until 1971 although it changed time zone twice in the interim, shifting to GMT+1 in 1956 and back to GMT in 1963, a year after its independence, putting it in a different time zone to France. By the late 1960s though, gross domestic product growth was around 9 per cent a year and energy consumption rose rapidly, prompting Algeria to reintroduce daylight saving in 1971. A recession in 1972 reduced the demand for power and clocks were kept on standard time. Economic growth was back up to 8 per cent by 1976 and energy use per capita had climbed 59 per cent in five years. Daylight saving was used again in 1977, and at the end of the period a time zone change meant that Algeria stayed at UTC+1. A further year of daylight saving in 1978 placed the country in the UTC+2 zone in summer months. The scheme wasn't used in 1979 and in October the nation went back to a standard time of UTC.

With economic growth remaining high and energy use increasing strongly, Algeria had daylight saving again in 1980 but not in 1981 although another shift in standard

time in that year took it to UTC+1, its eighth time zone change in 70 years, moving back and forth between UTC and UTC+1. The country then finally seemed satisfied with a clock time 47 minutes ahead of local mean time in capital city Algiers and there has been no more daylight saving or time zone changes.

All other African countries on the Mediterranean Sea have had daylight saving although only Morocco still has it. Several European countries, especially Spain and France, were squabbling over Morocco or parts of it during World War I and the city of Tangier probably had daylight saving, and maybe nearby areas opposite Gibraltar too, in 1917 and 1918. The rest of Morocco didn't have daylight saving until World War II.

Morocco was under French control in the second war and started daylight saving on 12 September 1939, one day after Algeria. Clocks went back on 19 November, the same day as France, and were put forward again on 25 February 1940, in line with the ruling country's move. Morocco then had continuous daylight saving until late 1945, but it didn't have the periods of double daylight saving that France had during the war years. France stopped using daylight saving after the war although Morocco had it once more while a French protectorate, in 1950, more than likely to conserve energy.

Daylight saving was implemented again in 1967, a year when the economy grew by 10 per cent and demand for energy was high. Further periods of daylight saving in 1974 and 1976 to 1978 were against a background of rapidly increasing power consumption, which rose 66 per cent between 1971 and 1979. But the measure was unpopular with the public who felt there were few benefits and it was dropped. In the 1980s and 1990s, economic growth was, on average, lower than earlier and so was the increase in energy use. Morocco had no daylight saving in these decades although the country shifted its time zone an hour forward to UTC+1 in 1984, which put clock time in capital city Rabat and largest city Casablanca about an hour and a half ahead of local time. The move was reversed in 1986.

Prompted by escalating energy costs, a study by Morocco's energy and mining ministry in 2008 concluded that turning the clock forward one hour in summer would reduce energy consumption by 1 per cent. The government's communication minister, Khalid Naciri, announced that a daylight saving trial would start on 1 June to save power, boost tourism, and increase trade by being on the same time as most of Europe. The planned end date was 28 September but the modernization of public sectors ministry declared in late August that this would be brought forward four weeks as Ramadan started on 1 September that year. Many people and businesses were surprised by the sudden decision to change the date.

A study of the trial period by the energy ministry showed a reduction in power use and the Moroccan government announced in early 2009 that daylight saving would run again from 1 June to 21 August. This period was even shorter than in 2008 as Ramadan began the following day. In 2010, daylight saving started early, 2 May, but no decision was made on an end date. The government eventually resolved in late July to finish the scheme on 8 August, just before the start of the holy month.

Ramadan starts about 11 days earlier each year by the Gregorian calendar and the government couldn't decide what to do in 2011 about daylight saving. Just four days'

notice was given when authorities finally decided to put clocks forward from 3 April and the short timeframe annoyed many people. At the same time, an end date was provided of 31 July, before Ramadan but still in the middle of summer. The government knew it would soon have to decide between the following options:

- ☀ change the time zone to UTC+1 and not have daylight saving
- ☀ use the current daylight saving scheme but interrupt it for Ramadan as Egypt did in 2010
- ☀ change the time zone to UTC+1 and retain daylight saving, thereby using UTC+1 in winter and UTC+2 in summer, the same as most of Europe, including the country's two major trading partners, France and Spain, but allow for Ramadan
- ☀ drop daylight saving and stay at UTC.

Morocco went with the second option, announcing on 9 March 2012 that daylight saving would run from the last Sunday in March to the last Sunday in September each year except during Ramadan when clocks would revert to standard time so that people could end their fast each day an hour earlier. This meant four clock changes a year. A week later, the intended start date was changed to the last Sunday in April. On 11 July, the government announced that the break from daylight saving would apply from 20 July to 20 August to allow for the holy month.

In 2013, daylight saving started on the last Sunday of April, and the suspension for Ramadan was 7 July to August 10, but the end date was pushed out by a month to the last Sunday in October at one day's notice. According to a government official, the late change was due to recent information on daylight saving's "positive impact on the national economy". A new decree declared that future daylight saving periods would be from the last Sunday in March to the last one in October minus the month of Ramadan. This rule was followed in 2014 to 2016. By 2022, Ramadan begins on 3 April and the start of daylight saving may be delayed until after the fasting month. By 2026, this month will be outside the daylight saving span set by the Moroccan government in 2013.

The part of Western Sahara that Morocco regards as its Southern Provinces area or Moroccan Sahara since the Spanish left in 1975 has had daylight saving time in the same years as Morocco, that is, from 1976 to 1978 and since 2008. It has also had the same start and finish dates and uses standard time during Ramadan. The region of Western Sahara that is known as the Sahrawi Arab Democratic Republic doesn't appear to have daylight saving.

Egypt is the other African nation that has postponed daylight saving during Ramadan although it no longer uses the scheme. The country was under British control more or less from 1882 to 1952 and was invaded by German and Italian armies in World War II to fight British soldiers. Britain established summer time in Egypt from 1940 to 1945 to conserve fuel. The last British troops withdrew in 1956 and Gamal Nasser became president. Two factors probably led to the reintroduction of daylight saving on 10 May 1957: a program of industrialisation including heavy industry that used a lot of energy and an earlier finish to Ramadan that by then ended in early May. In 1958, daylight saving began on 1 May as the holy month finished three weeks into April.

Daylight saving operated from the start of May to the end of September in the 1970s, with no adjournment for Ramadan when it fell in the latter months of summer. The scheme was delayed in 1982 and 1983, starting just after the end of Ramadan, but dates went back to 1 May to 1 October in subsequent years despite the fast being totally or partly within this period until after 1989. Law no. 141 of 1988 allowed for dates to change for the holy month and a daylight saving start date of 6 May in 1989 was right at the end of the fasting period. After that, Ramadan was in the winter months once again and the previous schedule resumed.

From 1995, start and end dates for daylight saving in Egypt were moved to the last Friday in April and September under law no. 14 of that year. Previously, the dates had usually been whichever day of the week 1 May or 1 October fell on. These new dates worked well until 2006 when Ramadan commenced on 24 September and the end of daylight saving was brought forward a week to Friday 22 September. Daylight saving had to finish on Friday 7 September in 2007, 29 August in 2008, and 21 August in 2009 which is still very much in the summer.

In the following year, 2010, Ramadan would cut even further into summer. Daylight saving started at the usual time, the last Friday in April, but the Egyptian government decided on 19 July to go back to standard time from 11 August to 10 September for the sacred month, and then return to daylight saving for another three weeks until 1 October. Some tourist operators felt it was disruptive for their industry and didn't turn their clocks back for Ramadan but instead maintained "resort time".

Residents weren't happy with all the changes either. In fact, a government poll found that 79 per cent of people didn't want daylight saving. Also, a study by the electricity and energy ministry found that the scheme had little impact on power consumption. As a result, the new transitional government following the January 2011 revolution abolished daylight saving on 20 April, nine days before its scheduled recommencement. The previous government of Hosni Mubarak had intended to do the same. Certain Red Sea holiday destinations ignored the decree and ran on "resort time", putting clocks forward as usual.

Egypt didn't officially have daylight saving in 2011 to 2013. But in 2014, an energy crisis with blackouts in Cairo caused largely by a sharp fall in oil production persuaded the government to reinstate the scheme. This was despite the 2010 study that found negligible energy savings and survey where four-fifths of respondents didn't want it. A decision was announced on 7 May to start daylight saving nine days later and to break for Ramadan although no dates were given for this or an end date until later. In mid May 2014, the government decided to have daylight saving in future years.

The 2015 schedule was announced on 8 April. Daylight saving was to start on 1 May, be lifted for Ramadan around mid June to mid July, and presumably finish on the last Friday of September. On 13 April, the prime minister, Ibrahim Mahlab, said the government was conducting a survey to gauge people's support for daylight time. A week later, the government advised there would be no daylight saving in Egypt in 2015. The State Information Service said that the poll results had shown that most citizens didn't want the measure and this was the reason for the decision although no statistics on the number or percentage of respondents for and against were released.

Also, the electricity ministry again said energy savings were negligible. Ministers were to examine the benefits and disadvantages of daylight saving and recommend if it should be applied in future years. However, a few days later, on 24 April, President Abdel Fattah el-Sisi decided to abandon the scheme permanently.

But daylight saving became an issue in Egypt once more in 2016. The government announced in late April that the measure was to be reintroduced on 7 July, which probably meant 8 July, a Friday, given that start and end dates had been on this day of the week since 1995. It was to run until “the end of October”, which likely meant 28 October, a Friday. The deliberately late start came just after the end of Ramadan so there would be no need to have a break in the daylight saving period. But the plan was defeated in parliament on 28 June and the government declared on 4 July that it was abandoning the scheme, just a few days before its scheduled commencement. Transport companies had to redo their timetables. EgyptAir expected the cancellation of daylight saving to cost it up to \$2 million. Also, Egypt paid \$8 million to the International Air Transport Association after the country discarded the measure.

Neighbouring Libya was under Italian rule from 1912 until 1943 and then British and French administration until 24 December 1951 when it gained its independence. It first had daylight saving from 14 October of that year, a week after the Libyan Constitution took effect. The new kingdom had strong links with the West and this may have influenced its decision to have daylight saving. But the scheme finished at the end of the year. The pattern of winding the clocks forward for the last few months of 1951, 1953 and 1955 is puzzling. The daylight saving period was well away from Ramadan and there is little or no information on the economic or energy situation in Libya in the 1950s. Significant quantities of oil weren’t discovered there until 1959.

A time zone change from GMT+1 to GMT+2 on 1 January 1959 meant that standard time in the country’s capital city, Tripoli, was more than an hour ahead of its local mean time. There was no further daylight saving until the 1980s, well over a decade after the coup that brought Muammar Gaddafi to power. The collapse of oil prices and sanctions against Libya in the early 1980s caused considerable economic hardship for the country. Nevertheless, it changed its time zone back to UTC+1 on 1 January 1982 although this was followed by yearly daylight saving through to 1989, mainly from 1 April to 1 October, and with no breaks for Ramadan.

Instead of having daylight saving in 1990, Libya moved to UTC+2 again. But it shifted back to UTC+1 in 1996 before using daylight saving in 1997. At the end of this period, time remained at UTC+2. Yet another change to standard time on 10 November 2012, to UTC+1, coincided with a government announcement that “summer timing” would apply from 2013. It ran from 29 March to 25 October in that year, similar to Europe except for the Friday changeover.

On the afternoon before the 2 a.m. scheduled end of daylight saving in 2013, the government cancelled the time change and the country stayed at UTC+2. No reason was given for the decision or the short notice. Nor was there any indication whether the country was on continuous daylight saving or had shifted time zones and, if the latter, whether summer time would apply in future years. The *Libya Herald* reported the announcement as follows:

CORRECTION: no time change tomorrow

Tripoli, 24 October 2013:

Contrary to widespread reports that the clocks would go back an hour at two o'clock in the morning tomorrow, according to the government website the decision to change the clocks is now void.

There will be no change to the clocks and wintertime will be the same as summertime said the statement, which appears to have been posted today shortly after midday.

The Libya Herald apologises for misinforming its readers.¹⁶¹

For some reason, others said sorry too. The Portuguese Embassy in Libya apologised on its Facebook page for providing “wrong information”. Whether any apology came from the Libyan government for its sudden policy reversal isn't known although there doesn't seem to be anything online in newspaper articles or elsewhere. Also unknown is whether the country has changed its time zone or is on continuous daylight saving. The latter hasn't been common outside of World War II and Libya has had seven previous time zone changes. Assume it's a change in time zone.

Another country that has found it hard to decide whether to have daylight saving is Tunisia. The area became a French protectorate in 1881 and was on Paris local mean time which is more than half an hour behind sun time in Tunis. Standard time of GMT+1 commenced in 1911, the same year as France. Tunisia first had daylight saving on 15 April 1939, and start and end dates in the war years were the same as France although the protectorate didn't have double daylight saving. The other exception was for eight days in 1943, from 17 April to 25 April, when Tunisia reverted to standard time. The reason wasn't Ramadan as it was in September. A likely explanation was that the Allies wanted earlier dawn times during a period of heavy fighting with German and Italian troops.

Tunisia achieved independence in 1956 but didn't have daylight saving again until 1977. Gross domestic product was growing at 6-8 per cent a year by the mid 1970s and energy use was increasing at a similar rate. However, oil revenue had fallen from its 1974 peak. The government implemented daylight saving for about five months in each of 1977 and 1978, with no adjustment for Ramadan. In 1979, oil revenue more than doubled and stayed high for a number of years. By the late 1980s, it was much lower again and GDP growth had slipped but power consumption remained fairly high and Tunisia had daylight saving again from 1988 to 1990. Late starts allowed for Ramadan in the first and last years but not in 1989.

After Tunisia's per capita power usage grew by 4.4 per cent in 2004, the government reintroduced daylight saving in 2005 as part of a campaign to promote energy conservation. The scheme finished five days before Ramadan in 2005 but followed European schedules in 2006 to 2008.

In mid March 2009, the government announced that daylight saving was cancelled for that year because Ramadan now started in the hot, dry summer months. Views had

¹⁶¹ “Correction: No time change tomorrow”, *Libya Herald*, Tripoli, Libya, 24 October 2013 (now subscription only), at <https://www.libyaherald.com/2013/10/24/correction-no-time-change-tomorrow>

been sought from the public before the decision was made. Some people felt daylight saving was bad for their health or they lost sleep, or that it didn't save energy. Others thought less artificial light was used. The opinions of some people were neutral. The government decided in March 2010 to scrap daylight saving altogether and keep the clocks at UTC+1 all year, 19 minutes ahead of mean solar time in Tunis.

Elsewhere in Africa, daylight saving hasn't been used often, even in the southern part of the continent where the latitude and climate are suitable. Before the Boer War of 1899 to 1902, miners in the Johannesburg area were on daylight saving time. All Witwatersrand mines were continuously an hour to an hour and a half ahead of town time to give miners extra recreation opportunities. South Africa was a British dominion from 1910 to 1953 and had summer time from September to March in 1942-43 and 1943-44 to assist with the war effort and conserve fuel but the nation as a whole hasn't used it since then.

Johannesburg's city council planned to introduce daylight saving in 1952 but didn't go ahead with it. Plettenberg Bay had "Plett time" briefly in 1985 but some locals didn't like it and there were difficulties with nearby towns not being on the same time. The Association of Chambers of Commerce of South Africa made representations to parliament for daylight saving in 1986. Durban city councillor Malcolm Prentice set up the National Action Committee on Summer Time in 1991 and got some support from the public.

The Astronomical Society of Southern Africa undertook an investigation in 1993 into various things that daylight saving can affect, such as productivity, tourism, lighting, recreation, impact on families, safety, and traffic accidents. Most submissions were from affluent groups, with low response from poorer groups. The study found that eastern areas favoured the scheme while the west opposed it and that overall the case for daylight saving wasn't strong. Standard time, UTC+2, was already 46 minutes ahead of local mean time in Cape Town in the country's west.

Talk of a possible reintroduction of daylight saving in South Africa in recent years has been due to power shortages. A lack of maintenance and planning and an increase in demand for electricity led to an energy crisis with rolling blackouts from late 2007 to mid 2008. The issue and possible solutions were discussed at length in the South African Parliament. In early May, the Public Enterprises Department asked Eskom, a public utility that generates nearly all the country's electricity, to conduct a study on daylight saving. But other studies by Eskom had concluded that little energy would be saved. Later that month, the minerals and energy minister, Buyelwa Sonjica, announced there would be no daylight saving.

Several suggestions for a dual time zone system in South Africa have been made over the years, such as shifting eastern areas to UTC+3. A proposal in March 2008 for a split system to spread the power load was met with public opposition by those who argued it would be difficult for business and costly for the transport industry having to revise timetables. Some thought the country wasn't big enough for two time zones, with the difference in sun time between Cape Town and Durban being only 50 minutes.

Instead of daylight saving or time zone changes, the government came up with a range of supply and demand side measures to alleviate the power situation as outlined in its 2008 document, “National response to South Africa’s electricity shortage”. These included:

- ☼ adding capacity to existing power plants and building new ones
- ☼ power reduction quotas for industry, with incentives and penalties
- ☼ rollout of fluorescent lights in businesses and homes and restricting the sale of incandescent lights
- ☼ installing one million solar water heaters over three years
- ☼ hospitality industry to convert to solar for water heating
- ☼ new buildings to have insulation to ceilings and hot water pipes, and double glazing and weatherstripping of windows and doors
- ☼ smart metering allowing consumption to be measured remotely, reducing costs
- ☼ fuel switching from electricity to liquefied petroleum gas
- ☼ using solar power for public lighting and traffic lights.¹⁶²

Energy conservation measures and tax incentives helped reduce per capita power consumption by 8 per cent in South Africa between 2008 and 2011 after a 12 per cent increase from 2006 to 2008. But it seemed that the government hadn’t completely given up on the idea of daylight saving. Eric Lucas of the Inkatha Freedom Party mentioned in parliament on 23 June 2009 that the new Energy Department “will be looking into daylight saving” to see if it could help ease South Africa’s electricity woes.

Demand for electricity caught up and sometimes exceeded supply again in 2014 and 2015 and another power crisis emerged. Supply had plateaued due to lengthy delays getting new power stations built and operational. There are plans for six new nuclear plants but the lead time is about 20 years. Energy from renewable sources, including solar and wind, is increasing but most of the country’s generating capacity remains coal based. Load shedding has been common despite annual economic growth falling from 2.2 per cent in the first quarter of 2015 to 1.3 per cent in the second and 1.0 per cent in the third, although the lights have stayed on since August, perhaps because of lower growth. Severe drought has added to the problems of meeting demand for electricity. However, most of the recent interest in daylight saving as a way of helping to ease South Africa’s power shortage has come from business, academia and the media rather than the government.

Apart from Morocco and Western Sahara, the only other African nation to currently have daylight saving is South Africa’s neighbour Namibia who has used it since 1994. A time zone change to GMT+2 from 1903 put the clocks in capital city Windhoek 52 minutes ahead of local mean time. Namibia was administered by South Africa from 1915 and had daylight saving in 1942-43. The country gained its independence on 21 March 1990 although Walvis Bay city and offshore islands were still under South African control until 1 March 1994. Namibia changed its time zone from UTC+2 to UTC+1 a month later on 3 April and proceeded with daylight saving on 4 September. A contractor who was there at the time wrote later:

¹⁶² South African Government, “National response to South Africa’s electricity shortage”, 2008, at http://www.gov.za/sites/www.gov.za/files/resp_elec.pdf

The sense of excitement at this prospect was palpable, and the advertising was endearingly nationalistic: I forget the exact wording, but something along the lines of, “First we achieved our independence, and now we have our very own time!”¹⁶³

Namibia was experiencing a rapid increase in per capita energy use at the time, despite a recession in 1993, and this may have encouraged the government to usher in daylight saving. A *Windhoek Observer* writer suggests the original reason was to help retailers and improve traffic safety. But it seems that the underlying reason was national pride of being allowed to have a time system different from their long-time overseers. The start date of daylight saving in Namibia each year has always been the first Sunday in September and the end date the anniversary of its 1994 time zone change or the first Sunday in April.

Not everyone is happy with the present arrangement. Some businesses and individuals have been saying that two clock changes a year are unproductive. Employees have complained that it is dark at 5 p.m. in winter in some places and unsafe to travel home after work. They would prefer UTC+2 all year. But others have said that school children would go to school in the dark in winter and that this was a reason for shifting to UTC+1 back in 1994. Also, the Zambezi region in the country’s north-east, with its earlier sunrises, stays on summer time, or UTC+2, all year, 23 minutes ahead of local mean time in the area’s capital city of Katima Mulilo. In October 2015, the Namibian government announced that it would hold public consultations on whether to keep or abandon daylight saving, but there had been no updates by late 2016.

Adjoining country Botswana and Lesotho were British protectorates from the 1880s to 1966 and had daylight saving from September to March in 1943-44. Neither country has altered its clocks since then.

In colonial times, it was usually the imperial powers that decided issues of time in their territories. But in the central part of Africa, the British protectorate of Sierra Leone was keen to adopt daylight saving. Governor Arnold Hodson introduced a daylight saving bill into the country’s Legislative Council in 1932 for a 20 minute clock change from 1 October to 31 March each year despite being in the northern hemisphere. There was plenty of support in parliament. The Chamber of Commerce and local council in capital city Freetown also liked the idea. The government wrote to England with its intentions. But the Colonial Office didn’t think the proposal was worth the effort for just 20 minutes of extra light at the end of the day. After much correspondence, Sierra Leone settled for summer time from 1935 but for 40 minutes and from 1 June to 1 October. It finished in 1942.

While still under British control, Sierra Leone moved from GMT–1 to GMT on 1 January 1957, the same time zone as the United Kingdom, which meant that standard time in Freetown was 53 minutes ahead of local mean time. The country’s first full election in May 1957 was followed by daylight saving from 1 June, putting clock time almost two hours ahead of sun time throughout the country. Sierra Leone had six years of daylight saving through to 1962, from 1 June to 1 September, with the last two years coming after independence on 27 April 1961, the process for which started

¹⁶³ Catherine Reichardt, “Unlike its neighbours, Namibia has daylight saving”, *Virtual Tourist*, 17 February 2012, at <https://www.virtualtourist.com/2148722-2172403/Windhoek-Tips/unlike-its-neighbours-namibia-has-daylight-saving>

with a new constitution in 1951. Thus daylight saving was presumably the choice of the colony, Sierra Leone, and not England.

The other central African country to have daylight saving before World War II was Ghana. Another British colony, known as the Gold Coast, the country went onto standard time of GMT in 1918 and began 20 minutes of daylight saving in 1920. It did this for 23 years to 1942 from 1 September to 31 December each year. It probably had the scheme in 1954-55 and 1955-56 too, as indicated in newspaper reports in April and October 1955. The country gained its independence in 1957 and hasn't put its clocks forward since then.

Chad used daylight saving on one occasion, 1979-80, from 14 October to 8 March. By the late 1970s, the country's civil war meant that the political and economic systems were collapsing. A transitional government ended a period of military rule and daylight saving was introduced to help the economy, which shrank by 21 per cent in 1979 and a further 6 per cent in 1980 before returning to positive growth. Fighting had reduced oil production but consumption remained about the same. The nation didn't have daylight saving again.

Sudan had daylight saving from 1970 to 1985, a period that coincided with the presidency of Gaafar Nimeiry who came to power in a military coup in 1969. Economic growth picked up and daylight saving may have been implemented to conserve fuel. The economy was a roller coaster over the next 14 years, before contracting by 5 per cent in 1984 and 6 per cent in 1985 with strikes over high prices crippling the country and leading to another coup and the end of daylight saving. Energy use per capita in Sudan shot up 8 per cent in 1999 despite economic growth of only 3 per cent and the country changed its time zone from UTC+2 to UTC+3 in 2000. The move was a form of daylight saving as clock time in capital city Khartoum was now 50 minutes ahead of sun time.

Islands off Africa that have had daylight saving are Madagascar for three months in 1954, Mauritius in 1982-83 and 2008-09, and Cape Verde from 1942 to 1945. No details appear to be available for Madagascar's experience with daylight saving, except that it ran from 27 February to 30 May. The country was still a French colony at the time but France didn't readopted summer time until much later, in 1976.

Daylight saving was introduced in Mauritius in 1982 by a new government under prime minister Anerood Jignauth of the Mauritian Militant Movement party. There was plenty of political unrest over the next year and daylight saving only lasted one season although electricity consumption fell slightly. Energy minister Swalay Kasenally later said that while the government had consulted with the community over daylight saving, an information campaign was lacking.

Mauritius used daylight saving again in 2008-09. Electricity consumption had doubled in a decade, well ahead of economic growth. Reasons given by the government for the reintroduction of daylight saving after 26 years were to cut fuel production and consumption, lower the evening peak for electricity use, reduce emissions, and give people more daylight time for sport, leisure and shopping. A program to encourage renewable energy was also put in place. Business was worried that opening hours would have less overlap with Europe. The Muslim community was concerned about

prayer times. Various groups said they would have been happier working on other proposals to save energy.

Whether Mauritius would have daylight saving in future years was to mainly depend on how much energy was saved in 2008-09. A subsequent report by the Central Electricity Board was favourable but the government decided not to continue with daylight saving due to opposition from business, community groups, and individuals. Power consumption rose 4.5 per cent in 2007 and 4.3 per cent in 2008 but only 1.4 per cent in 2009. The state of the economy might not have helped the case for daylight saving although the decline in growth from around 6 per cent in 2007 and in 2008 to 3 per cent in 2009 probably had more to do with the global financial crisis than anything Mauritius was doing. The increase in electricity use was above 4 per cent again in 2010.

Cape Verde had continuous daylight saving from 1942 until 1945, finishing it two weeks after the end of World War II. The island group was a Portuguese colony during the war. It achieved independence on 5 July 1975 and changed its time zone on 25 November from UTC-2 to UTC-1, putting capital city Praia 34 minutes ahead of local time.

One country that has never had daylight saving but has changed time zones as a way of shifting its daylight hours is Kenya. It is right on the equator and sunrise and sunset times hardly vary. In the 1920s, the nation still used local time but the parliament on a number of occasions considered whether to introduce what members called daylight saving time or summer time. What they were actually discussing was a time zone change that would apply all year but, back then, any change to the clocks that resulted in darker mornings and lighter evenings was regarded by politicians and the general public in Kenya as daylight saving.

A “daylight saving” change was first discussed in Kenya’s Legislative Council in 1920 after a motion by Rift Valley member Mr Dawson following representations by chambers of commerce and the Nairobi local council. The proposal was lost by a small margin. Member for Nairobi South, Helmuth Schwartze, wanted a daylight saving ordinance in 1922 but it too was defeated. He tried again in most or all subsequent years before succeeding in 1928. Following lengthy discussions, a committee was formed to further examine the issue. A lot of support for “daylight saving” was garnered, including from business and public bodies. Members voted 19 to 12 in favour of an Alteration of Time Ordinance that resulted in Kenya moving to GMT+3 on 1 July 1928, a shift of about half an hour from local time, which was GMT+2:27 in Nairobi.

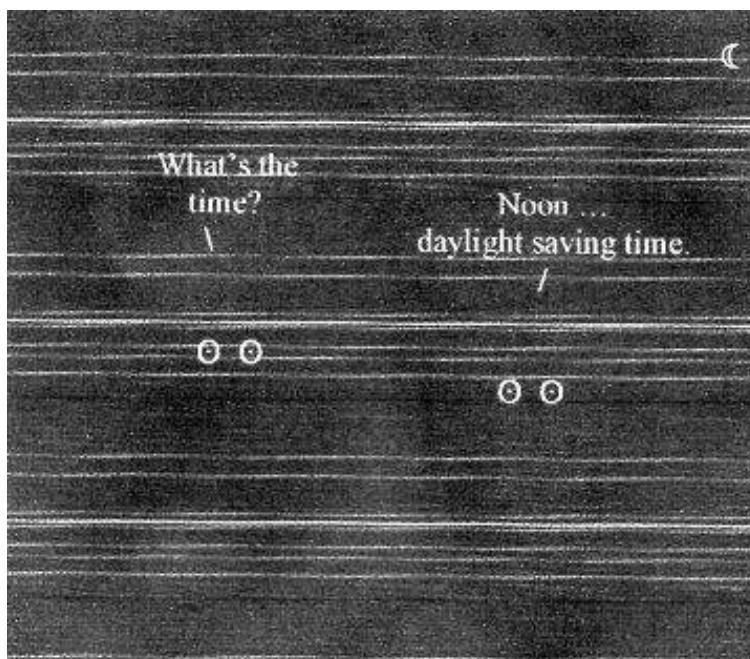
A year later, in June 1929, Plateau North member James Kirkwood motioned to repeal the ordinance and return to local time. He said the time change was no good for many people. Children finished school half an hour earlier in real time and had to walk home when it was even hotter. Workers had to get up before daylight. Ports and harbours wanted to go back to sun time. He conceded that the new time was fine for golf but that agriculture was more important. The change might be good for towns, Kirkwood argued, but not in country areas and he suggested that Nairobi keeps it but the rest of Kenya goes back to local time. He complained that the new time:

... has been found most inconvenient to the producers of the country. The difference between the official time and the time they work by (the sun) creates a great deal of anomalies, and arouses suspicions in the minds of the natives, and you get P.W.D. gangs, working on the roads, completing their tasks earlier than the time fixed on the adjoining farms.¹⁶⁴

Others backed up his argument. Lake district member Conway Harvey said that the new time was opposed by residents, farmers, missionaries, railways and ports and that another committee should be formed to investigate the effects on the public with the view to making any necessary changes to the ordinance. A new committee found that “daylight saving” was unpopular and the ordinance was amended. Kenya moved back half an hour to GMT+2:30 on 1 January 1930, just three minutes ahead of local time in Nairobi. But a decade later, in 1940, the country moved to GMT+2:45. Twenty years after that, in 1960, it moved to GMT+3, the same as in 1928, and it is still in this time zone today.

¹⁶⁴ Colony and Protectorate of Kenya, *Kenya National Assembly Official Record (Hansard), Legislative Council Debates*, 1929, vol. 1, p. 149, at https://books.google.com.au/books?id=HUqOp91yw8oC&printsec=frontcover&source=gb_s_ge_summ ary_r&cad=0#v=onepage&q&f=false

25 Antarctica: Daylight saving without daylight



Drawn by Chris Pearce, 2015

Even Antarctica has daylight saving time. The various research stations determine their time zone in different ways. Some use the same time as their home country, and if it has daylight saving, the station will often use it too, making communication, administration and travel arrangements easier. Others use the time zone, including daylight saving, of nearby stations or a city or port where its supplies come from. Several choose a time zone that is near the local mean time of the station, which might differ from that of the owner country or the origin of supplies. A few pick a zone where noon is the warmest time although this may vary during the year. Most stations are open all year although quite a few are summer only. See Appendix for details of local mean time, standard time and years of daylight saving for each station.

Argentina's Orcadas Base is the oldest station in Antarctica still in operation, opening at the South Orkney Islands in 1903. It was the first station to use daylight saving time, starting on 1 December 1930 when Argentina adopted the scheme. Years of daylight saving at the base were 1930-31 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2007-08 and 2008-09. All or most of the other 13 Argentine bases, Belgrano II, Brown, Cámara, Carlini, Decepción, Esperanza, Marambio, Matienzo, Melchior, Petrel, Primavera, San Martín and Sobral, use the same time as Ushuaia, UTC-3, and its daylight saving times. This Argentine city and port is at the southern tip of South America and directly north of the Antarctic Peninsula, the location of many of the bases. Daylight saving for the city and the stations differed from the rest of Argentina and Orcadas in the 2000s, with clocks put forward in 2004 and not in 2008-09.

The British claimed this whole area of the Antarctic bounded by latitude 60 degrees south and longitudes 20 and 80 degrees west in letters patent of 1908 and 1917. The United Kingdom set up Signy Research Station in 1947 on the South Orkney Islands, likely using GMT and no daylight saving. While the Antarctic Treaty was being

negotiated, the country established Halley Research Station on the Brunt Ice Shelf opposite the Antarctic Peninsula in 1956, probably on the same time as Signy. The treaty was finally signed in 1959 by 12 countries but there were large overlaps between the British, Argentine and Chilean claims. Signy and Halley were both inside the British area but also the Argentine.

Largest of the three British stations in Antarctica, Rothera Research Station, opened in 1975 on the Antarctic Peninsula among Argentine and other bases and uses the same time as Ushuaia. The station had daylight saving in 1988-89 to 1992-93, 1999-00, 2004 and 2007-08. Probably since 1975, Signy and Halley have moved to UTC-3 time zone in the Antarctic summer to more easily and safely coordinate plane flights between the three stations. When Rothera had daylight saving, Halley and Signy likely used it too. The changes between time zones at Halley don't occur on set days but depend on the weather, or more specifically when planes from Rothera can land at and depart Halley, which is generally around early December to late March. Signy has shut in the winter since 1996 and is on UTC-3 when open, which is around early November to mid April or when ships can get through.

Strictly, Macquarie Island was the first place in the Antarctic region to have daylight saving as the island comes under Tasmanian administration and the southern Australian state initially put its clocks forward on 1 October 1916. But the island wasn't inhabited at the time, after a station that had operated since 1911 closed down in 1915. A new station opened in 1948 and used the same daylight saving times as Tasmania from 1967-68 until 2009-10. From 4 April 2010, it has stayed at UTC+11 to get more daylight in winter for its helicopter operations.

Australia's other three Antarctic stations don't have daylight saving either although two of them, Casey Station and Davis Station, have been subject to a number of time zone changes in recent years. Casey, at local mean time of UTC+7:22, went from UTC+8 in 1969 to +11 in October 2009, +8 in March 2010, +11 in October 2011, +8 in February 2012, +11 in October 2015 and +8 in February 2016, in practice being on daylight saving in 2009-10, 2011-12 and 2015-16. The station again moved to UTC+11 in October 2016. Davis, with a local time of UTC+5:12, followed a different pattern, moving from UTC+7 to +5 in October 2009, +7 in March 2010, +5 in October 2011 and +7 in October 2015. Mawson Station moved from UTC+6 to +5 in 2009 and has had no further changes.

The time alterations at the Australian bases are for administrative and practical reasons rather than anything to do with the sun. Deputy director of the Department of the Environment's Australian Antarctic Division, Virginia Mudie, explained that the change in 2009 at Casey was to align station working hours with plane arrival times: "Over summer the flights from Hobart to Casey station were resulting in employees working long hours, from very early in the morning to meet incoming planes."¹⁶⁵ At Davis, strong winds had prevented flying until after 10 a.m., so its time zone was put back two hours. The division has since made various seasonal time zone changes at both stations, as shown in the previous paragraph.

¹⁶⁵ "Time zone changes in Antarctica", Time and Date AS, 3 November 2009, at <http://www.timeanddate.com/news/time/antarctica-new-times.html>

The United States has five Antarctic stations, Amundsen-Scott, Byrd, McMurdo, Palmer and WAIS Divide, and all except Palmer are on New Zealand time, UTC+12, as this is where their supplies come from. Amundsen-Scott South Pole Station, located at 90 degrees south, opened in 1957. Although time zones aren't applicable at this spot, the station uses UTC+12 as all flights to it depart from Christchurch, often going via McMurdo Station. Daylight saving has been used at Amundsen-Scott since 1974-75, which was the first year New Zealand used the scheme since World War II. The current period is from the last Sunday in September until the first Sunday in April. This means that by the time daylight saving ends at this station, the sun has already disappeared for the winter.

McMurdo Station, operational since 1956, is also on New Zealand time and has used daylight saving since 1974-75, as has New Zealand's nearby Scott Base which opened in 1957. Italy's Zucchelli Station, which commenced in 1986, uses New Zealand time and its daylight saving schedule too.

America's Byrd Station was commissioned in 1957 and used US Pacific Standard Time or GMT-8. It had daylight saving, probably first advancing clocks by two hours when the Little America exploration base started doing it. This camp was established in 1929 and abandoned in 1987 when the land it was on became Iceberg B-9. It probably also used Pacific time. It adopted daylight saving of two hours around February or March 1957 to better utilise remaining light before the winter. Byrd probably had double daylight saving each year until it closed in 2004-05. Reopening in 2009, it may have used UTC initially before moving to UTC+12 or New Zealand time. It now has one hour of daylight saving. The situation is similar for the nearby West Antarctic Ice Sheet (WAIS) Divide camp, which was set up in 2005 and perhaps used UTC and then UTC+12. It also has an hour of daylight saving. Palmer Station opened in 1968 on the Antarctic Peninsula and uses Chile time, including daylight saving time since 1968-69.

Palmer is one of 18 Antarctic stations that go by Chile time. They are owned by 13 different countries as shown in the next table. All are located on the Antarctic Peninsula, have a similar local mean time, and have had daylight saving when Chile has used it in the post-World War II era, that is, from 1968-69 (or from year of opening, if later). They had continuous daylight saving from 2014 to 2016 before resuming the normal pattern from 2016-17, the same as Chile.

Antarctic stations on Chile time

| <i>Station</i> | <i>Country</i> | <i>Year opened</i> | <i>Local mean time</i> |
|--|-----------------|--------------------|------------------------|
| Artigas Base | Uruguay | 1984 | -3:55 |
| Base General Bernardo O'Higgins Riquelme | Chile & Germany | 1948 | -3:52 |
| Base Presidente Eduardo Frei Montalva | Chile | 1969 | -3:56 |
| Bellingshausen Station | Russia | 1968 | -3:56 |
| Captain Arturo Prat Base | Chile | 1947 | -3:59 |
| Comandante Ferraz Antarctic Station | Brazil | 1984 | -3:54 |
| Estación Científica Antártica Ruperto Elichiribehety | Uruguay | 1997 | -3:48 |
| Gabriel de Castilla Spanish Antarctic Station | Spain | 1989 | -4:02 |
| González Videla Antarctic Base | Chile | 1951 | -4:11 |
| Great Wall Station | China | 1985 | -3:56 |
| Henryk Arctowski Polish Antarctic Station | Poland | 1977 | -3:54 |
| Juan Carlos I Antarctic Base | Spain | 1988 | -4:02 |

| <i>Station</i> | <i>Country</i> | <i>Year opened</i> | <i>Local mean time</i> |
|------------------------------|----------------|--------------------|------------------------|
| King Sejong Station | South Korea | 1988 | -3:55 |
| Machu Picchu Base | Peru | 1988 | -3:54 |
| Mendel Polar Station | Czech Republic | 2006 | -3:52 |
| Palmer Station | United States | 1968 | -4:16 |
| Profesor Julio Escudero Base | Chile | 1994 | -3:56 |
| St. Kliment Ohridski Base | Bulgaria | 1988 | -4:01 |

Note: For more detail, see Appendix.

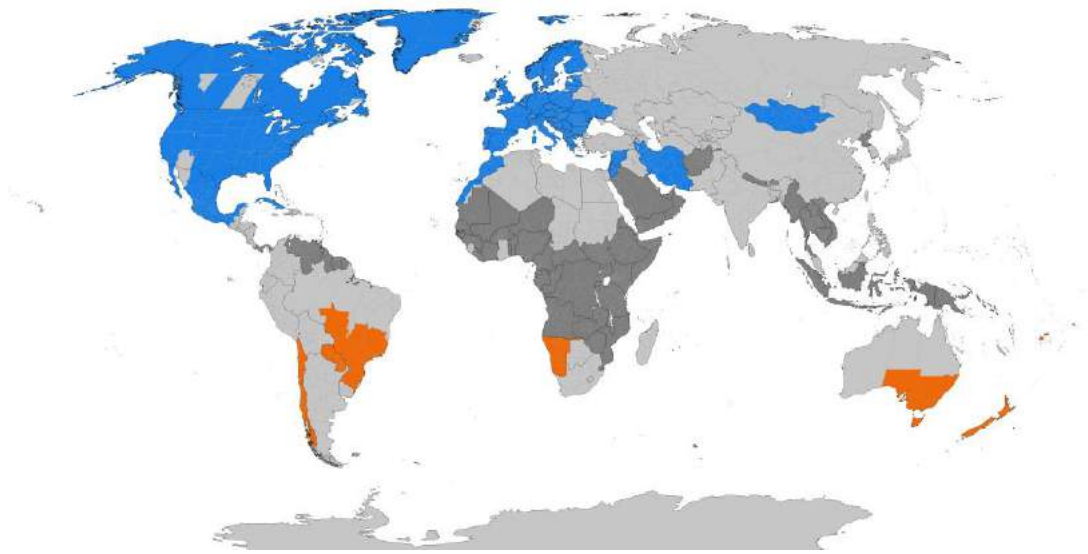
Sources: Time and Date AS, at <https://www.timeanddate.com>; Wikipedia, at <https://en.wikipedia.org>; and other sites

Norwegian research stations Troll and Tor began in 1990 and 1993, initially using UTC. They now use three different time zones each year. Troll has done this since 2005, and probably also Tor although it is a summer only station. They use UTC in the Antarctic summer of around early November to late February or early March to coordinate with providers of supplies. For the rest of the year, they use the same time as Norway to make communication easier. This means that from about early March, they use UTC+1 for a few weeks. From late March to late October, they use UTC+2 or European Central Summer Time despite this period being the Antarctic winter. They then use UTC+1 for a week or two around late October and early November, before moving to UTC again for the Antarctic summer months.

Despite Argentina no longer having daylight saving, 26 Antarctic stations still use the measure: the 18 stations that use Chile time (see previous table), plus Amundsen-Scott South Pole Station (US), Byrd Station (US), McMurdo Station (US), Scott Base (NZ), Tor (Norwegian), Troll (Norwegian), WAIS Divide camp (US) and Zucchelli Station (Italian). See Appendix for more detail.

Future of daylight saving time

This concluding section looks at the prospects for daylight saving into the foreseeable future. The map below shows the countries that had daylight saving as at December 2016 (in colour). They are concentrated in Europe and North America. Only a minority of the geographic areas of South America, Africa, Asia and Australia use the measure. Many parts of these continents had daylight saving at some stage but don't currently use it (light grey). Almost all the countries that have never used the scheme (dark grey) are located in tropical or subtropical regions, mainly in Africa and Asia.



Map of world showing areas that have or had daylight saving, by TimeZonesBoy, December 2016, reproduced under the Creative Commons Attribution-ShareAlike 3.0 Unported licence

Legend: colour = daylight saving in 2016 (blue for northern hemisphere; orange for southern hemisphere); light grey = had it in past; dark grey = never had it

Source: Wikimedia Commons, at https://commons.wikimedia.org/wiki/File:DST_Countries_Map.png

On a capital city basis, 63 countries had daylight saving in 2016 out of a total of 197 (see the following table), which excludes territories, and nations with limited recognition. (Five of these countries don't have daylight saving nationwide: the United States, Canada, Mexico, Australia and Brazil.) This was down from 67 countries in 2000 and 2010. The number grew steadily in the 1970s and 1980s due largely to the oil crises, increasing from 16 in 1970 to 48 in 1980 and 75 in 1990 as most European countries reintroduced daylight saving and many in Asia took it up for the first time. Use of the measure also peaked during the world wars, with 27 countries putting clocks forward in 1918 (23 in 1916) and 62 in 1942. Fewer nations had daylight saving between the wars (14 in 1922 and 19 in 1932) and in the post-World War II period (13 in 1950 and 14 in 1960).

*** Countries with daylight saving in years 1918 (first column), 1922, 1932, 1942, 1950, 1960, 1970, 1980, 1990, 2000, 2010 and 2016 (last column).

Note: For more detail, see Appendix.

Sources: Time and Date AS, at <https://www.timeanddate.com>; Newspapers.com (subscription only), at <https://www.newspapers.com>; and other sites

In 2016, 41 of the 44 European countries had daylight saving. The only exceptions were Russia, Belarus and Iceland. Russia stopped using the scheme after 2010 and shifted the time zone in all regions an hour forward in 2011, putting standard time 1-2 hours ahead of mean solar time in most areas. Even after the time zone change was reversed in most regions in 2014, clock time was usually well ahead of the sun, for example, by half an hour in Moscow. Belarus also dropped daylight saving in 2010 and moved its clocks an hour forward all year from 2011, putting time in its capital city 70 minutes ahead of sun time. Iceland last used daylight saving in 1967 but advanced its time zone an hour the following year, which means its capital effectively has about an hour and a half of daylight saving year round. Only 12 of the capitals of the other 41 countries have standard time behind solar time. There are plenty of rumblings in a number of countries about ending daylight saving. However, most of Europe is locked in by a European Union directive, while other countries are unlikely to move unilaterally.

In the United States, bills have been brought into many state legislatures in recent years seeking exemption from daylight saving but, so far, none has been passed. Arizona and Hawaii continue to be the only states that don't use it although standard time is about half an hour ahead of solar time in their capitals. Other North American countries that have daylight saving seem unlikely to stop using it, and similarly in Oceania.

Daylight saving seems less popular in Asia, South America and Africa. The countries that have abandoned the measure in recent decades are mainly in Asia, where the number putting clocks on fell from 18 in 1990 to seven in 2016. Most of them shifted their time zone an hour forward all year when they discarded daylight saving, or their standard time was already well ahead of local mean time. In Armenia, which last used the scheme in 2011, standard time is 62 minutes ahead of solar time in the capital city. Similarly, Azerbaijan's capital is 40 minutes ahead, Georgia 61 minutes, Kazakhstan 74 minutes, Kyrgyzstan 62 minutes, Tajikistan 25 minutes, Turkmenistan 67 minutes and Uzbekistan 23 minutes. Standard time is behind local time in the capital cities of only 15 of the 47 Asian countries. Seventeen Asian countries have adjusted their time zone forward since they first used standard time. Overall, standard time is, on average, 14 minutes ahead of mean solar time in the 47 capitals.

The only other continent with fewer countries using daylight saving in 2016 than 1990 is South America, falling from six to three. Of the three nations that dropped the scheme, standard time is 54 minutes ahead of the sun in the capital of Argentina, 45 minutes in Uruguay and eight minutes in Peru. Standard time is ahead of solar time by an average of 20 minutes across the continent's 14 countries, with only three being behind, by a few minutes.

Many countries in Africa also have what is in effect year round daylight saving. Standard time is more than half an hour ahead of solar time in 18 countries: Algeria, Benin, Cape Verde, Gambia, Guinea, Guinea Bissau, Kenya, Liberia, Libya, Mali,

Mauritania, Niger, Senegal, Sierra Leone, South Sudan, Sudan, Tanzania and Uganda. Time in the capital city of only 13 of Africa's 54 countries is behind the sun, with the difference being more than 10 minutes in just three of them. Standard time is now further ahead than the initial time zone used in 14 African nations. On average, standard time in all the continent's capital cities is 21 minutes ahead of local mean time.

Daylight saving appears to be here to stay. Controversy will no doubt persist in many countries and states over whether to put the clocks forward all year, just in the warmer months, or not at all. Most people have firmly entrenched views, often depending on their lifestyle and where they live. The scheme is likely to remain largely a city versus country issue and revolve around factors such as energy savings, more light for evening activities, unsuitability in farming areas, children going to school in the dark, and climate. The amount of time and money spent by parliaments, councils, organisations and individuals in trying to decide the time or influence the process over more than a century across most countries and states would be impossible to calculate. Daylight saving has been one of the most controversial issues of the modern era and this looks set to continue into the foreseeable future and quite likely beyond.

Notes

(or endnotes, in Mobi and ePub versions; footnotes here in pdf version)

Appendix: Daylight saving by country and state by year

The table below shows all years that daylight saving time was used to 2016 or 2016-17, as well as the years standard time was introduced or changed and local mean time, for all countries by continent. Details for states or other regions of larger countries are also shown, especially where there are significant differences within a country. The order is Europe, North America, Oceania, Asia, South America, Africa and Antarctica.

Daylight saving time by country, territory and state by year, local mean time, and standard time by year

| Country, territory or state – capital and largest city or town ¹ | Local mean time ² | Standard time and year started, changed ³ | Years daylight saving time used ⁴ | | | |
|---|------------------------------|--|--|-----------|-------------------------------|--|
| | | | WWI | Interwar | WWII | Postwar |
| Europe | | | | | | |
| Albania – Tirana | +1:19 | 1914 +1:00 | | | 1940-1942*, 1943 | 1974 to present |
| Andorra – Andorra la Vella | +0:06 | 1901 0:00; 1946 +1:00 | | | | 1985 to present |
| Austria – Vienna | +1:05 | 1893 +1:00 | 1916-1918 | 1920 | 1940-1942*, 1943-1945 | 1946-1948, 1980 to present |
| Belarus – Minsk | +1:50 | 1924 +2:00; 1930 +3:00; 1941 +2:00; 1944 +3:00; 1991 +2:00; 2011 +3:00 | | | 1941-1942*, 1943-1944 | 1981-1989, 1991-2010 |
| Belgium – Brussels | +0:17 | 1892 0:00; 1914 +1:00; 1918 0:00; 1946? +1:00 | 1916-1918 | 1919-1938 | 1939, 1940-1946* ** | 1946, 1977 to present |
| Bosnia and Herzegovina – Sarajevo | +1:14 | 1884 +1:00 | | | 1941-1942*, 1943-1945 | 1983 to present |
| Bulgaria – Sofia | +1:33; 1880 +1:57 | 1894 +2:00; 1942 +1:00; 1945 +2:00 | | | 1943-1944 | 1979 to present |
| Croatia – Zagreb | +1:04 | 1884 +1:00 | | | 1941-1942*, 1943-1945 | 1983 to present |
| Czech Republic – Prague | +0:58 | 1891 +1:00 | 1916-1918 | | 1940-1942*, 1943-1945 | 1946-1949, 1979 to present |
| Denmark – Copenhagen | +0:50 | 1894 +1:00 | 1916 | | 1940-1942*, 1943-1945 | 1946-1948, 1980 to present |
| Faroe Islands – Tórshavn | -0:27 | 1908 0:00 | | | | 1981 to present |
| Estonia – Tallinn | +1:39 | 1918 +1:00; (1919 +1:39); 1921 +2:00; 1940 +3:00; 1941 +1:00; 1944 +3:00; 1989 +2:00 | 1918 | | 1941-1942*, 1943- 1944 | 1981-1999, 2002 to present |
| Finland – Helsinki | +1:40 | 1921 +2:00 | | 1934? | 1942 | 1981 to present |
| Åland Islands or Åland – Mariehamn | +1:20; by 1800 +1:40 | 1921 +2:00 | | | 1942 | 1981 to present |
| France – Paris | +0:09 | 1911 0:00; 1945 +1:00 | 1916-1918 | 1919-1938 | 1939, 1940-1945* ** | 1976 to present |
| Germany – Berlin | +0:54 | 1893 +1:00 | 1916-1918 | | 1940-1942*, 1943-1944, 1945** | 1946, 1947**, 1948-1949, 1980 to present |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|-------------------------------------|--|--|--|-------------------------------|---------------------------------------|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Greece – Athens | +1:35 | 1916 +2:00; 1941 +1:00; 1944 +2:00 | | 1931?, 1932 | 1941-1942*, 1943-1944 | 1952, 1975 to present |
| Hungary – Budapest | +1:16 | 1890 +1:00 | 1916-1918 | 1919 | 1941-1942*, 1943-1945 | 1946-1950, 1954-1957, 1980 to present |
| Iceland – Reykjavik | -1:28 | 1908 -1:00; 1968 0:00 | 1917-1918 | | 1939-1945 | 1946-1967 |
| Ireland – Dublin | -0:25 | 1916 0:00; 1968 +1:00; 1971 0:00 | 1916-1918 | 1919-1938 | 1939, 1940-1946* | 1946-1968, 1972 to present |
| Italy – Rome | +0:50 | 1893 +1:00 | 1916-1918 | 1919-1920 | 1940-1942*, 1943-1945 | 1946-1948, 1966 to present |
| Kosovo (disputed) – Pristina or Prishtina | +1:25 | 1884 +1:00 | | | 1941-1942*, 1943-1945 | 1983 to present |
| Latvia – Riga | +1:36 | 1926 +2:00; 1940 +3:00; 1941 +1:00; 1944 +3:00; 1989 +2:00 | 1918 | 1919 | 1941-1942*, 1943-1944 | 1981-1999, 2001 to present |
| Liechtenstein – Vaduz | +0:38 | 1894 +1:00 | | | 1941-1942 | 1981 to present |
| Lithuania – Vilnius | +1:41; 1880 +1:24; 1917 +1:36 | 1919 +1:00; 1920 +2:00; 1920 +1:00; 1940 +3:00; 1941 +1:00; 1944 +3:00; 1991 +2:00; 1998 +1:00; 1999 +2:00 | | | 1941-1942*, 1943-1944 | 1981-1999, 2003 to present |
| Luxembourg – Luxembourg City | +0:25 | 1904 +1:00; 1918 0:00; 1940 +1:00 | 1916-1918 | 1919-1938 | 1939, 1940-1942*, 1943-1945 | 1946, 1977 to present |
| Macedonia – Skopje | +1:26 | 1884 +1:00 | | | 1941-1942*, 1943-1945 | 1983 to present |
| Malta – Valletta | +0:58 | 1893 +1:00 | 1916-1918 | 1919-1920 | 1940-1942*, 1943-1945 | 1946-1948, 1966 to present |
| Moldova – Chişinău | +1:56; 1918 +1:44 | 1931 +2:00; 1941 +1:00; 1944 +3:00; 1990 +2:00 | | 1932-1938 | 1939, 1940-1942*, 1943-1944 | 1981-1989, 1991 to present |
| Monaco | +0:30; 1891 +0:09 | 1911 0:00; 1945 +1:00 | 1916-1918 | 1919-1938 | 1939, 1940-1945*, 1941-1945** | 1976 to present |
| Montenegro – Podgorica | +1:17 | 1884 +1:00 | | | 1941-1942*, 1943-1945 | 1983 to present |
| Netherlands – Amsterdam ⁵ | +0:20 | 1937 +0:20; 1940 +1:00 | 1916-1918 | 1919-1938 | 1939, 1940-1942*, 1943-1945 | 1977 to present |
| Norway – Oslo | +0:43 | 1895 +1:00 | 1916 | | 1940-1942*, 1943-1945 | 1959-1965, 1980 to present |
| Svalbard – Longyearbyen | +1:02 | 1895? +1:00 | 1916 | | 1940-1942*, 1943-1945 | 1959-1965, 1980 to present |
| Poland – Warsaw | +1:24 | 1915 +1:00; 1918 +2:00; 1922 +1:00 | 1916-1918 | 1919 | 1940-1942*, 1943-1945 | 1946-1949, 1957-1964, 1977 to present |
| Portugal – Lisbon | -0:37 | 1912 0:00; 1966 +1:00; 1976 0:00; 1992 +1:00; 1996 0:00 | 1916-1918 | 1919-1921, 1924, 1926-1929, 1931-1932, 1934- | 1939-1941, 1942-1945** | 1946-1965, 1977 to present |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|---|--|---|------------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| | | | | 1938 | | |
| Azores – Ponta Delgada | -1:43; 1884 -1:55 | 1912 -2:00; 1966 -1:00; 1992 0:00; 1993 -1:00 | 1916-1918 | 1919-1921, 1924, 1926- 1929, 1931- 1932, 1934- 1938 | 1939-1941, 1942-1945** | 1946-1949, 1951-1965, 1977 to present |
| Madeira – Funchal | -1:08 | 1912 -1:00; 1966 0:00 | 1916-1918 | 1919-1921, 1924, 1926- 1929, 1931- 1932, 1934- 1938 | 1939-1941, 1942-1945** | 1946-1949, 1951-1965, 1977 to present |
| Romania – Bucharest | +1:44 | 1931 +2:00 | | 1932-1938 | 1939-1940 | 1979 to present |
| Russia ⁶ – Moscow | +2:30; 1916 +2:31 | 1919 +3:00; 1922 +2:00; 1930 +3:00; 1991 +2:00; 1992 +3:00; 2011 +4:00; 2014 +3:00 | 1917, 1918- 1919* ** | 1919** 1921** | | 1981-2010 |
| Kaliningrad | +1:22 | 1893 +1:00; 1945 +2:00; 1946 +3:00; 1991 +2:00; 2011 +3:00; 2014 +2:00 | 1916-1918 | | 1940-1942*, 1943-1945 | 1981-2010 |
| Samara | +3:21 | 1919 +3:00; 1930 +4:00; 1989 +3:00; 1991 +4:00; 2010 +3:00; 2011 +4:00 | | | | 1981-2010 |
| Yekaterinburg | +4:02; 1916 +3:45 | 1919 +4:00; 1930 +5:00; 1991 +4:00; 1992 +5:00; 2011 +6:00; 2014 +5:00 | | | | 1981-2010 |
| Omsk | +4:53 | 1919 +5:00; 1930 +6:00; 1991 +5:00; 1992 +6:00; 2011 +7:00; 2014 +6:00 | | | | 1981-2010 |
| Krasnoyarsk | +6:12 | 1920 +6:00; 1930 +7:00; 1991 +6:00; 1992 +7:00; 2011 +8:00; 2014 +7:00 | | | | 1981-2010 |
| Irkutsk | +6:57 | 1920 +7:00; 1930 +8:00; 1991 +7:00; 1992 +8:00; 2011 +9:00; 2014 +8:00 | | | | 1981-2010 |
| Yakutsk | +8:39 | 1919 +8:00; 1930 +9:00; 1991 +8:00; 1992 +9:00; 2011 +10:00; 2014 +9:00 | | | | 1981-2010 |
| Vladivostok | +8:48 | 1922 +9:00; 1930 +10:00; 1991 +9:00; 1992 +10:00; | | | | 1981-2010 |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|----------------------------------|-------------------------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| | | 2011 +11:00; 2014 +10:00 | | | | |
| Srednekolymsk | +10:15 | 1924 +10:00; 1930 +11:00; 1991 +10:00; 1992 +11:00; 2011 +12:00; 2014 +11:00 | | | | 1981-2010 |
| Petropavlovsk-Kamchatsky | +10:35 | 1922 +11:00; 1930 +12:00; 1991 +11:00; 1992 +12:00; 2010 +11:00; 2011 +12:00 | | | | 1981-2010 |
| San Marino – City of San Marino / Dogana | +0:50 | 1893 +1:00 | 1916-1918 | 1919-1920 | 1940-1942*, 1943-1945 | 1946-1948, 1966 to present |
| Serbia – Belgrade ⁷ | +1:22 | 1884 +1:00 | | | 1941-1942*, 1943-1945 | 1983 to present |
| Slovakia – Bratislava | +1:08/+0:58 | 1891 +1:00 | 1916-1918 | | 1940-1942*, 1943-1945 | 1946-1949, 1979 to present |
| Slovenia – Ljubljana | +0:58 | 1884 +1:00 | | | 1941-1942*, 1943-1945 | 1983 to present |
| Spain – Madrid | -0:15 | 1901 0:00; 1938 +1:00; 1939: 0:00; 1946 +1:00 | 1917-1918 | 1919, 1924, 1926-1929, 1937-1938 | 1939, 1940-1946*, 1942-1945** | 1946**, 1949, 1974 to present |
| Canary Islands – Las Palmas | -1:02 | 1922 -1:00; 1946 0:00 | | | | 1980 to present |
| Sweden – Stockholm | +1:12; 1879 +1:00 | 1900 +1:00 | 1916 | | | 1980 to present |
| Switzerland – Bern or Berne | +0:30 | 1894 +1:00 | | | 1941-1942 | 1981 to present |
| Zürich | +0:34; 1853 +0:30 | 1894 +1:00 | | | 1941-1942 | 1981 to present |
| Transnistria (disputed) – Tiraspol | +1:58/+1:55; 1918 +1:44 | 1931 +2:00; 1941 +1:00; 1944 +3:00; 1990 +2:00 | | 1932-1938 | 1939, 1940-1942*, 1943-1944 | 1981-1989, 1991 to present |
| Ukraine – Kiev or Kyiv | +2:02 | 1924 +2:00; 1930 +3:00; 1941 +1:00; 1943 +3:00; 1990 +2:00 | | | 1941-1942*, 1943 | 1981-1989, 1990-1991*, 1992 to present |
| United Kingdom ⁸ – London | -0:01 | 1847/1880 0:00; 1968 +1:00; 1971 0:00 | 1916-1918 | 1919-1938 | 1939, 1940-1945*, 1941-1945** | 1946, 1947**, 1948-1968, 1972 to present |
| Gibraltar (British) | -0:21 | 1880 0:00; 1957 +1:00 | 1916-1918 | 1919-1938 | 1939, 1940-1945*, 1941-1945** | 1946, 1947**, 1948-1956, 1982 to present |
| Guernsey ⁹ – St Peter Port | -0:10/-0:01 | 1847/1880 0:00; 1940 +1:00; 1945 0:00; 1968 +1:00; 1971 0:00 | 1916-1918 | 1919-1938 | 1939, 1940-1942*, 1943-1945, 1945** | 1946, 1947**, 1948-1968, 1972 to present |
| Isle of Man – Douglas | -0:18/-0:01 | 1847/1880 0:00; 1968 +1:00; 1971 0:00 | 1916-1918 | 1919-1938 | 1939, 1940-1945*, 1941-1945** | 1946, 1947**, 1948-1968, 1972 to present |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|---|-------------------------------------|---|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Jersey ¹⁰ – Saint Helier | –0:08/–0:01 | 1847/1880 0:00; 1940 +1:00; 1945 0:00; 1968 +1:00; 1971 0:00 | 1916-1918 | 1919-1938 | 1939, 1940-1942*, 1943-1945, 1945** | 1946, 1947**, 1948-1968, 1972 to present |
| Northern Ireland – Belfast | –0:24; 1880 –0:25 | 1916 0:00; 1968 +1:00; 1971 0:00 | 1916-1918 | 1919-1938 | 1939, 1940-1945*, 1941-1945** | 1946, 1947**, 1948-1968, 1972 to present |
| Scotland – Edinburgh | –0:13/–0:01 | 1847/1880 0:00; 1968 +1:00; 1971 0:00 | 1916-1918 | 1919-1938 | 1939, 1940-1945*, 1941-1945** | 1946, 1947**, 1948-1968, 1972 to present |
| Wales – Cardiff | –0:13/–0:01 | 1847/1880 0:00; 1968 +1:00; 1971 0:00 | 1916-1918 | 1919-1938 | 1939, 1940-1945*, 1941-1945** | 1946, 1947**, 1948-1968, 1972 to present |
| Vatican City | +0:50 | 1893 +1:00 | 1916-1918 | 1919-1920 | 1940-1942*, 1943-1945 | 1946-1948, 1966 to present |
| North America | | | | | | |
| Anguilla (British) – The Valley | –4:12 | 1912 –4:00 | | | | |
| Antigua and Barbuda – St. John's | –4:07 | 1912 –5:00; 1951 –4:00 | | | | |
| Bahamas – Nassau | –5:09 | 1912 –5:00 | | | | 1964 to present |
| Barbados – Bridgetown | –3:58 | 1932 –4:00 | | | | 1977-1980 |
| Belize ¹¹ – Belmopan | –5:55 | 1912 –6:00 | 1918-19 | 1919-20 to 1938-39 | 1939-40 to 1942-43 | 1952-53, 1954-55 to 1955-56, 1958-59, 1973-74, 1982-83 |
| Belize City | –5:53 | 1912 –6:00 | 1918-19 | 1919-20 to 1938-39 | 1939-40 to 1942-43 | 1952-53, 1954-55 to 1955-56, 1958-59, 1973-74, 1982-83 |
| Bermuda (British) – Hamilton | –4:19 | 1930 –4:00 | | | | 1974 to present |
| Canada ¹² – Ottawa (Ontario) | –5:03 | 1883/1895? –5:00 | 1918 | 1919-1938 | 1939, 1940-1945* | 1946 to present |
| Alberta – Edmonton | –7:34 | 1883/1906 –7:00 | 1918 | | 1942-1945* | 1972 to present |
| Calgary | –7:36 | 1883/1906? –7:00 | 1916, 1918 | | 1942-1945* | 1972 to present |
| British Columbia – Victoria | –8:13 | 1883/1884? –8:00 | 1918 | 1919-1923 | 1941, 1942-1945* | 1946 to present |
| Vancouver | –8:12 | 1883/1884 –8:00 | 1918 | 1919-1920, 1922 | 1941, 1942-1945* | 1946 to present |
| Manitoba – Winnipeg | –6:29 | 1883/1887 –6:00 | 1916, 1918 | 1937 | 1942-1945* | 1946 to present |
| New Brunswick ¹³ – Fredericton | –4:27 | 1883 –5:00; 1902 –4:00 | 1918 | 1921, 1929 | 1942-1945* | 1946-1948, 1949?-1952?, 1953, 1954?, 1955-1972, 1974 to present |
| Saint John | –4:24 | 1883 –5:00; 1902 –4:00 | 1916, 1918 | 1921-1922, 1925, 1927-1931, 1934, 1936-1938 | 1940, 1942-1945* | 1946-1948, 1949?-1952?, 1953, 1954?, 1955-1972, 1974 to present |
| Moncton | –4:19 | 1883 –5:00; 1902 –4:00 | 1918 | 1929, 1933-1938 | 1939-1941, 1942-1945* | 1946-1972, 1974 to present |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|---------------------------------------|--------------------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Newfoundland and Labrador ¹⁴ – St. John's | -3:31 | 1883 -4:00; 1935 -3:30 | 1917-1918 | 1919-1938 | 1939, 1940**, 1941, 1942-1945* | 1946-1987, 1988**, 1989 to present |
| Northwest Territories – Yellowknife | -7:38 | 1935 -7:00 | | | 1942-1945* | 1965**, 1980 to present |
| Nova Scotia ¹⁵ – Halifax | -4:14 | 1883 -5:00; 1902 -4:00 | 1916, 1918 | 1920-1938 | 1939-1941, 1942-1945* | 1946-1949, 1951-1954, 1956-1959, 1962 to present |
| Nunavut – Iqaluit | -4:34 | 1942 -4:00; 1945 -5:00; 1999 -6:00; 2000 -5:00 | | | 1942-1945* | 1965**, 1980 to present |
| Ontario – Toronto | -5:18 | 1883/1895 -5:00 | 1918 | 1919-1938 | 1939, 1940-1945* | 1946 to present |
| Prince Edward Island – Charlottetown ¹⁶ | -4:13 | 1883/1902? -4:00 | 1916, 1918 | 1929 | 1939-1941, 1942-1945* | 1946-1947, 1954-1955, 1958 to present |
| Quebec – Quebec City ¹⁷ | -4:45 | 1883/1884? -5:00 | 1917?-1918 | 1919-1922, 1924-1938 | 1939, 1940-1945* | 1946 to present |
| Montreal | -4:54 | 1883/1884 -5:00 | 1917-1918 | 1919-1922, 1924-1938 | 1939, 1940-1945* | 1946 to present |
| Saskatchewan – Regina ¹⁸ | -6:58 | 1883/1905 -7:00; 1960 -6:00 | 1914-1918 | 1920-1922, 1924, 1928-1934, 1937-1938 | 1939-1941, 1942-1945* | 1946-1957, 1959 |
| Saskatoon ¹⁹ | -7:07 | 1883/1905? -7:00; 1966? -6:00 | 1914, 1918 | 1919, 1921, 1932-1933 | 1941, 1942-1945* | 1946-1952, 1955-1957, 1959 |
| Yukon – Whitehorse | -9:00 | 1900 -9:00; 1966 -8:00 | 1918 | 1919 | 1942-1945* | 1965**, 1966, 1980 to present |
| Cayman Islands (British) – George Town | -5:26; 1890 -5:07 | 1912 -5:00 | | | | |
| Costa Rica – San José | -5:36 | 1921 -6:00 | | | | 1954, 1979-1980, 1991-1992 |
| Cuba – Havana | -5:29; 1890 -5:30 | 1925 -5:00 | | 1928 | 1940-1942, 1945 | 1946, 1963-2003, 2004-2006*, 2007 to present |
| Dominica – Roseau | -4:06 | 1911 -4:00 | | | | |
| Dominican Republic – Santo Domingo ²⁰ | -4:40 | 1933 -5:00; 1974 -4:00; 2000 -5:00; 2000 -4:00 | | | | 1954-55 to 1955-56, 1966-67, 1969-70 to 1973-74 |
| El Salvador – San Salvador | -5:57 | 1921 -6:00 | | | | 1954-55 to 1955-56, 1987-1988 |
| Greenland (Danish) – Nuuk | -3:27 | 1916 -3:00 | | | | 1980 to present |
| Danmarkshavn | -1:15 | 1916 -3:00; 1996 0:00 | | | | 1980-1995 |
| Ittoqqortoormiit | -1:28 | 1916 -2:00; 1981 -1:00 | | | | 1980 to present |
| Qaanaaq | -4:37 | 1916 -3:00 | | | | 1980 to present |
| Grenada – St. George's | -4:07 | 1911 -4:00 | | | | |
| Guadeloupe (French) – Basse- | -4:07 | 1911 -4:00 | | | | 1980 |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|------------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Terre | | | | | | |
| Guatemala – Guatemala City | –6:02 | 1918 –6:00 | | | | 1973-74, 1983, 1991, 2006 |
| Haiti – Port-au-Prince | –4:49 | 1917 –5:00 | | | | 1983-1997, 2005-2006, 2012-2015 |
| Honduras – Tegucigalpa or Tegus | –5:49 | 1921 –6:00 | | | | 1952-53, 1987-1988, 1994, 2006 |
| Jamaica – Kingston | –5:07 | 1912 –5:00 | | | | 1974-1983 |
| Martinique (French) – Fort-de-France | –4:04 | 1911 –4:00 | | | | 1980 |
| Mexico ²¹ – Mexico City | –6:37 | 1922 –7:00; 1927 –6:00; 1930 –7:00; 1931 –6:00; 1931 –7:00; 1932 –6:00 | | 1921 | 1939, 1940-41, 1943-44 | 1950, 1996 to present |
| Baja California – Tijuana | –7:48 | 1922 –7:00; 1924 –8:00; 1927 –7:00; 1930 –8:00 | | 1931 | 1942-1945* | 1948-49, 1954-1960, 1976 to present |
| Sonora – Hermosillo | –7:24 | 1922 –7:00; 1927 –6:00; 1930 –7:00; 1931 –6:00; 1931 –7:00; 1932 –6:00; 1942 –7:00; 1949 –8:00; 1970 –7:00 | | | | 1996-1998 |
| Chihuahua – Chihuahua | –7:04 | 1922 –7:00; 1927 –6:00; 1930 –7:00; 1931 –6:00; 1931 –7:00; 1932 –6:00; 1998 –7:00 | | | | 1996 to present |
| Quintana Roo – Cancún | –5:47 | 1922 –6:00; 1981 –5:00; 1998 –6:00; 2015 –5:00 | | | | 1996-2014 |
| Montserrat (British) – Plymouth & Brades | –4:09 | 1911 –4:00 | | | | |
| Nicaragua – Managua | –5:45 | 1934 –6:00 | | | | 1973-1975*, 1979-1980, 1992-1994*, 2005-2006 |
| Panama – Panama City | –5:18; 1890 –5:20 | 1908 –5:00 | | | | |
| Puerto Rico (United States) – San Juan | –4:24 | 1899 –4:00 | | | 1942-1945* | |
| Saba (Dutch) – The Bottom | –4:13 | 1912 –4:30; 1965 –4:00 | | | | |
| Saint Barthélemy (French) – Gustavia | –4:11 | 1911 –4:00 | | | | |
| Saint Kitts and Nevis – Basseterre | –4:11 | 1912 –4:00 | | | | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------------------------|-----------------------|----------------------------|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Saint Lucia – Castries | -4:04 | 1912 -4:00 | | | | |
| Saint Martin (French) – Marigot | -4:12 | 1911 -4:00 | | | | |
| Saint Pierre and Miquelon (French) – Saint-Pierre | -3:45 | 1911 -4:00; 1980 -3:00 | | | | 1987 to present |
| Saint Vincent and the Grenadines – Kingstown | -4:05 | 1912 -4:00 | | | | |
| Sint Eustatius (Dutch) – Oranjestad | -4:12 | 1912 -4:30; 1965 -4:00 | | | | |
| Sint Maarten (Dutch) – Philipsburg | -4:12 | 1912 -4:30; 1965 -4:00 | | | | |
| Turks and Caicos Islands (British) – Cockburn Town | -4:45; 1890 -5:07 | 1912 -5:00; 2015 -4:00 | | | | 1979-2015 |
| United States ²² , District of Columbia – Washington, D.C. | -5:08 | 1883/1918 -5:00 | 1918 | 1919, 1922 | 1942-1945* | 1947 to present |
| Alabama – Montgomery | -5:45 | 1883/1918/1920 -6:00 | 1918 | 1919, 1935 | 1940, 1942-1945* | 1967 to present |
| Birmingham | -5:47 | 1883/1918/1920 -6:00 | 1918 | 1919 | 1940, 1942-1945* | 1967 to present |
| Alaska ²³ – Juneau | +15:02; 1867 -8:58 | 1900 - 9:00; 1940 -8:00; 1983 -9:00 | | 1933 | 1942-1945* | 1968-1979, 1981 to present |
| Anchorage | +14:00; 1867 -10:00 | 1900 -10:00; 1983 -9:00 | | | 1942-1945* | 1968 to present |
| Arizona – Phoenix ²⁴ | -7:28 | 1883/1918 -7:00 | 1918 | 1919 | 1942-1943*, 1944 | 1967 |
| Arkansas – Little Rock | -6:09 | 1883/1918 -6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| California – Sacramento | -8:06 | 1883/1918 -8:00 | 1918 | 1919 | 1942-1945* | 1948, 1950 to present |
| Los Angeles | -7:53 | 1883/1918 -8:00 | 1918 | 1919 | 1942-1945* | 1948, 1950 to present |
| Colorado – Denver | -7:00 | 1883/1918 -7:00 | 1918 | 1919-1921 | 1942-1945* | 1965 to present |
| Connecticut – Hartford | -4:51 | 1883/1884/1918 -5:00 | 1918 | 1919-1923, 1925, 1928- 1938 | 1939-1941, 1942-1945* | 1946 to present |
| Bridgeport | -4:53 | 1883/1918 -5:00 | 1918 | 1919-1938 | 1939-1941, 1942-1945* | 1946 to present |
| Delaware – Dover | -5:02 | 1883/1918 -5:00 | 1918 | 1919, 1937- 1938 | 1939-1941, 1942-1945* | 1946 to present |
| Wilmington | -5:02 | 1883/1918 -5:00 | 1918 | 1919-1938 | 1939-1941, 1942-1945* | 1946 to present |
| Florida – Tallahassee | -5:37 | 1883/1889 -6:00; 1918 - 5:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Jacksonville | -5:27 | 1883/1889 -6:00; 1918 - 5:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Georgia ²⁵ – Atlanta | -5:38 | 1883/1890s -6:00; 1918 - | 1918 | 1919, 1935- | 1939-1941, 1942-1943* | 1967 to present |

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|---|------------------------------------|--|--|---------------------------------------|-----------------------|---|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| | | 5:00 | | 1938 | | |
| Hawaii ²⁶ – Honolulu | –10:31 | 1896 –10:30; 1947 –10:00 | 1918 | 1933, 1936 | 1942-1945* | |
| Idaho – Boise | –7:45 | 1883/1918 –8:00; 1923 – 7:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Illinois – Springfield | –5:58/–5:51 | 1883/1918 –6:00; 1935 – 5:00?; 1936? –6:00 | 1918 | 1919 | 1940, 1942-1945* | 1946-1949, 1951 to present |
| Chicago | –5:51 | 1883/1918 –6:00; 1935 – 5:00; 1936 –6:00 | 1918 | 1919-1935, 1937-1938 | 1939-1941, 1942-1945* | 1946 to present |
| Indiana – Indianapolis | –5:45 | 1883/1918 –6:00; 1955 – 5:00; 1957 –6:00; 1958 – 5:00 | 1918 | 1919, 1928 | 1941, 1942-1945* | 1946-1954, 1969-1970, 2006 to present |
| Iowa – Des Moines | –6:14 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1964 to present |
| Kansas – Topeka | –6:23 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Wichita | –6:29 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Kentucky – Frankfort | –5:39 | 1883/1918 –6:00; 1957 – 5:00 | 1918 | 1919 | 1941, 1942-1945* | 1946, 1950-1951, 1968 to present |
| Louisville ²⁷ | –5:43 | 1883/1890s/1918 –6:00; 1961 –5:00 | 1918 | 1919, 1921 | 1941, 1942-1945* | 1946, 1950-1961, 1968-1973, 1975 to present |
| Louisiana – Baton Rouge | –6:05 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| New Orleans | –6:00 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1946, 1967 to present |
| Maine – Augusta ²⁸ | –4:39 | 1890s/1918 –5:00 | 1918 | 1919, 1922, 1930-1938 | 1939-1941, 1942-1945* | 1946 to present |
| Portland | –4:41 | 1883/1887/1918 –5:00 | 1918 | 1919-1925, 1927, 1929-1932, 1934-1938 | 1939-1941, 1942-1945* | 1946 to present |
| Maryland – Annapolis | –5:06 | 1883/1884/1918 –5:00 | 1918 | 1919, 1922 | 1942-1945* | 1947 to present |
| Baltimore | –5:06 | 1883/1884/1918 –5:00 | 1918 | 1919, 1922 | 1942-1945* | 1947 to present |
| Massachusetts – Boston | –4:44 | 1883/1918 –5:00 | 1918 | 1919-1938 | 1939-1941, 1942-1945* | 1946 to present |
| Michigan – Lansing | –5:38 | 1883/1885 –6:00; 1918 – 5:00 | 1918 | 1919, 1922-1923 | 1942-1945* | 1967-1968, 1973 to present |
| Detroit ²⁹ | –5:32 | 1900 –6:00; (1900 –5:32); 1905 –6:00; 1915 –5:00; 1918 –6:00; 1918 –5:00; 1919 –6:00; 1919 –5:00 | | | 1942-1945* | 1948, 1967-1968, 1973 to present |
| Minnesota – Saint Paul | –6:12 | 1883/1901/1918 –6:00 | 1918 | 1919, 1932 | 1942-1945* | 1957 to present |
| Minneapolis | –6:13 | 1883/1901/1918 –6:00 | 1918 | 1919, 1932 | 1941, 1942-1945* | 1957 to present |
| Mississippi – Jackson | –6:01 | 1883/1918 –6:00 | 1918 | 1919, 1935 | 1942-1945* | 1967 to present |

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|---|------------------------------------|--|--|-----------------------------|-----------------------|----------------------------|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Missouri – Jefferson City | –6:09 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1946, 1966 to present |
| Kansas City | –6:18 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Montana – Helena | –7:28 | 1883/1918 –7:00 | 1918 | 1919, 1935 | 1942-1945* | 1967 to present |
| Billings | –7:14 | 1883/1918 –7:00 | 1918 | 1919, 1935 | 1942-1945* | 1967 to present |
| Navajo Nation – Window Rock (AZ) | –7:16 | 1883/1918 –7:00 | 1918 | 1919(-1921?) | 1942-1945* | 1965 to present |
| Tuba City (AZ) | –7:25 | 1883/1918 –7:00 | 1918 | 1919(-1921?) | 1942-1945* | 1965 to present |
| Shiprock (NM) | –7:15 | 1883/1918 –7:00 | 1918 | 1919-1921 | 1942-1945* | 1965 to present |
| Nebraska – Lincoln | –6:27 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Omaha | –6:24 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Nevada – Carson City | –7:59 | 1883/1918 –8:00 | 1918 | 1919 | 1942-1945* | 1948, 1950 to present |
| Las Vegas | –7:41 | 1883/1918 –8:00 | 1918 | 1919 | 1942-1945* | 1948, 1950 to present |
| New Hampshire – Concord | –4:46 | 1883/1918 –5:00 | 1918 | 1919, 1922, 1930-1931, 1938 | 1939-1941, 1942-1945* | 1946 to present |
| Manchester | –4:46 | 1883/1918 –5:00 | 1918 | 1919-1920, 1922, 1938 | 1939-1941, 1942-1945* | 1946 to present |
| New Jersey – Trenton | –4:59 | 1883/1884/1918 –5:00 | 1918 | 1919-1938 | 1939-1941, 1942-1945* | 1946 to present |
| Newark | –4:57 | 1883/1884/1918 –5:00 | 1918 | 1919, 1922, 1927-1938 | 1939-1941, 1942-1945* | 1946 to present |
| New Mexico – Santa Fe | –7:04 | 1883/1918 –7:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Albuquerque | –7:06 | 1883/1918 –7:00 | 1918 | 1919, 1933 | 1942-1945* | 1967 to present |
| New York – Albany | –4:55 | 1883/1884/1918 –5:00 | 1918 | 1919-1938 | 1939-1941, 1942-1945* | 1946 to present |
| New York City | –4:56 | 1883/1884/1918 –5:00 | 1918 | 1919-1938 | 1939-1941, 1942-1945* | 1946 to present |
| North Carolina – Raleigh | –5:15 | 1883/1918 –5:00 | 1918 | 1919, 1932 | 1942-1945* | 1967 to present |
| Charlotte | –5:23 | 1883/1918 –5:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| North Dakota – Bismarck | –6:43 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Fargo | –6:27 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1957-1960, 1967 to present |
| Ohio – Columbus ³⁰ | –5:32 | 1890s/1893 –6:00; 1914/1918/1924 –5:00 | 1918 | 1919-1923 | 1942-1943*, 1943-1945 | 1967 to present |
| Oklahoma – Oklahoma City | –6:30 | 1883/1918 –6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Oregon – Salem | –8:12 | 1883/1918 –8:00 | 1918 | 1919 | 1942-1945* | 1948-1951, 1963 to present |
| Portland | –8:11 | 1883/1918 –8:00 | 1918 | 1919 | 1942-1945* | 1948-1953, 1961 to present |
| Pennsylvania – Harrisburg | –5:08 | 1883/1887/1918 –5:00 | 1918 | 1919-1921, 1931-1932 | 1939-1941, 1942-1945* | 1946 to present |
| Philadelphia | –5:01 | 1883/1887/1918 –5:00 | 1918 | 1919, 1921-1938 | 1939-1941, 1942-1945* | 1946 to present |
| Rhode Island – Providence | –4:46 | 1883/1918 –5:00 | 1918 | 1919-1938 | 1939-1941, 1942-1945* | 1946 to present |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|--------------------------|---|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| South Carolina – Columbia | -5:24 | 1883/1918 -5:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| South Dakota – Pierre | -6:41 | 1883/1909/1918 -6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Sioux Falls | -6:27 | 1883/1909/1918 -6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Tennessee – Nashville | -5:47 | 1883/1918 -6:00 | 1918 | 1919 | 1941, 1942-1945* | 1946-1948, 1967 to present |
| Memphis | -6:00 | 1883/1918 -6:00 | 1918 | 1919 | 1940, 1942-1945* | 1967 to present |
| Texas – Austin | -6:31 | 1883/1918 -6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Houston | -6:22 | 1883/1918 -6:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Utah – Salt Lake City | -7:28 | 1883/1918 -7:00 | 1918 | 1919 | 1942-1945* | 1965 to present |
| Vermont – Montpelier | -4:50 | 1883/1918 -5:00 | 1918 | 1919 | 1940-1941, 1942-1945* | 1946-1949, 1951 to present |
| Burlington | -4:53 | 1883/1918 -5:00 | 1918 | 1919, 1928 | 1940-1941, 1942-1945* | 1946-1949, 1951 to present |
| Virginia – Richmond | -5:10 | 1883/1918 -5:00 | 1918 | 1919 | 1942-1945* | 1961 to present |
| Virginia Beach | -5:04 | 1883/1918 -5:00 | 1918 | 1919 | 1942-1945* | 1962 to present |
| Washington – Olympia | -8:12 | 1883/1918 -8:00 | 1918 | 1919, 1933 | 1942-1945* | 1948-1952, 1961 to present |
| Seattle | -8:09 | 1883/1918 -8:00 | 1918 | 1919, 1933 | 1942-1945* | 1948-1952, 1961 to present |
| West Virginia – Charleston | -5:27 | 1883/1918 -5:00 | 1918 | 1919, 1937 | 1942-1945* | 1957, 1963 to present |
| Wisconsin – Madison | -5:58 | 1883/1885/1918 -6:00 | 1918 | 1919 | 1942-1945* | 1957 to present |
| Milwaukee | -5:52 | 1883/1885/1918 -6:00 | 1918 | 1919, 1921-1922 | 1942-1945* | 1957 to present |
| Wyoming – Cheyenne | -6:59 | 1883/1884/1918 -7:00 | 1918 | 1919 | 1942-1945* | 1967 to present |
| Virgin Islands (British) – Road Town | -4:18 | 1911 -4:00 | | | | |
| Virgin Islands (United States) – Charlotte Amalie | -4:20 | 1911 -4:00 | | | | |
| | | | | | | |
| Oceania | | | | | | |
| American Samoa – Pago Pago | +12:37; 1879 -11:23 | 1911 -11:00 | | | | |
| Australia ³¹ , Australian Capital Territory ³² – Canberra | +9:56 | 1895 +10:00 | 1917 | | 1942, 1942-43 to 1943-44 | 1971-72 to present |
| New South Wales – Sydney | +10:05 | 1895 +10:00 | 1917 | | 1942, 1942-43 to 1943-44 | 1971-72 to present |
| Northern Territory – Darwin | +8:43 | 1895 +9:00; 1899 +9:30 | 1917 | | 1942, 1942-43 to 1943-44 | |
| Queensland – Brisbane | +10:12 | 1895 +10:00 | 1917 | | 1942, 1942-43 to 1943-44 | 1971-72, 1989-90 to 1991-92 |
| South Australia – Adelaide | +9:14 | 1895 +9:00; 1899 +9:30 | 1917 | | 1942, 1942-43 to 1943-44 | 1971-72 to present |
| Tasmania – Hobart | +9:49 | 1895 +10:00 | 1916-17 to 1918-19 | | 1942, 1942-43 to 1943-44 | 1967-68 to present |
| Victoria – Melbourne | +9:40 | 1895 +10:00 | 1917 | | 1942, 1942-43 to 1943-44 | 1971-72 to present |
| Western Australia – Perth | +7:43 | 1895 +8:00 | 1917 | | 1942, 1942-43 | 1974-75, 1983-84, 1991-92, 2006-07 to 2008-09 |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|--------------------|---------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Lord Howe Island ³³ | +10:36 | 1895 +10:00; 1981 +10:30 | | | | 1981-82 to present |
| Norfolk Island – Kingston | +11:12 | 1951 +11:30; 2015 +11:00 | | | | 1974-75 |
| Willis Island | +10:00 | 1921+10:00 | | | | |
| Fiji – Suva | +11:54 | 1915 +12:00 | | | 1942 | 1998-99 to 1999-00, 2009-10 to present |
| French Polynesia – Papeete | -9:58 | 1912 -10:00 | | | | |
| Guam (United States) – Hagåtña | -14:21; 1844 +9:39 | 1901 +10:00 | | | | |
| Kiribati – South Tarawa | +11:32 | 1901 +12:00 | | | | |
| Marshall Islands – Majuro | +11:25 | 1901 +11:00; 1969 +12:00 | | | | |
| Micronesia, Federated States of – Palikir | +10:33 | 1901 +11:00 | | | | |
| Weno | +10:07 | 1901 +10:00 | | | | |
| Nauru – Yaren | +11:08 | 1921 +11:30; 1942 +9:00; 1944 +11:30; 1979 +12:00 | | | | |
| New Caledonia (French) – Nouméa | +11:06 | 1912 +11:00 | | | | 1977-78 to 1978-79, 1996-97 |
| New Zealand ³⁴ – Wellington / Auckland | +11:39 | 1868 +11:30; 1946 +12:00 | | 1927-28 to 1938-39 | 1939-40, 1940-1945* | 1974-75 to present |
| Chatham Islands – Waitangi | +12:14 | c.1945/1957 +12:45 | | | | 1974-75 to present |
| Cook Islands ³⁵ – Avarua | -10:39 | 1901 -10:30; 1978 -10:00 | | | | 1978-79 to 1990-91 |
| Niue – Alofi | -11:19:40 | 1901 -11:20; 1951 -11:30; 1978 -11:00 | | | | |
| Tokelau –Atafu | -11:30 | 1901 -11:00; 2011 +13:00 | | | | |
| Northern Mariana Islands (United States) – Saipan | -14:17; 1844 +9:43 | 1901 +9:00; 1969 +10:00 | | | | |
| Palau or Belau – Ngerulmud | +8:58 | 1901 +9:00 | | | | |
| Papua New Guinea – Port Moresby | +9:49 | 1895 +10:00 | | | | |
| Bougainville – Buka | +10:19 | 1895 +10:00; 2014 +11:00 | | | | |
| Pitcairn Islands (British) – Adamstown | -8:40 | 1901 -8:30; 1998 -8:00 | | | | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Samoa – Apia | +12:33; 1879 –11:27 | 1911 –11:30; 1950 – 11:00; 2011 +13:00 | | | | 2010-11 to present |
| Solomon Islands – Honiara | +10:40 | 1912 +11:00 | | | | |
| Tonga – Nuku'alofa | +12:19 | 1901 +12:20; 1941 +13:00 | | | | 1999-00 to 2001-02, 2016-17 onwards |
| Tuvalu – Funafuti | +11:57 | 1901 +12:00 | | | | |
| United States Minor Outlying Islands | | | | | | |
| Midway Atoll/Island | –11:49 | 1901 –11:00 | | | | 1956 |
| Wake Island/Atoll | +11:07 | 1901 +12:00 | | | | |
| Vanuatu – Port Vila | +11:13 | 1912 +11:00 | | | | 1983-84 to 1992-93 |
| Wallis and Futuna Islands (French) – Mata-Utu | +12:15 | 1901 +12:00 | | | | |
| | | | | | | |
| Asia | | | | | | |
| Abkhazia (disputed) – Sukhumi | +2:44 | 1924 +2:00; 1930 +3:00; 1941 +1:00; 1943 +3:00; 1990 +2:00; 2014 +3:00 | | | 1941-1942*, 1943 | 1981-1989, 1990-1991*, 1992-2014 |
| Afghanistan – Kabul | +4:37 | 1890 +4:00; 1945 +4:30 | | | | |
| Akrotiri and Dhekelia (British) – Episkopi Cantonment ³⁶ | +2:11 | 1960 +2:00 | | | | 1975 to present |
| Armenia – Yerevan | +2:58 | 1924 +3:00; 1957 +4:00; 1991 +3:00; 1995 +4:00 | | | | 1981-1995, 1997-2011 |
| Azerbaijan – Baku | +3:20 | 1924 +3:00; 1957 +4:00; 1991 +3:00; 1992 +4:00 | | | | 1981-1992, 1996-2015 |
| Bahrain – Manama | +3:22 | 1920 +4:00; 1972 +3:00 | | | | |
| Bangladesh – Dhaka | +6:02; 1890 +5:53 | 1905 +5:30; 1941 +6:30; 1942 +5:30; 1942 +6:30; 1951 +6:00 | | | | 2009 |
| Bhutan – Thimphu | +5:59 | 1947 +5:30; 1987 +6:00 | | | | |
| British Indian Ocean Territory – Diego Garcia | +4:50 | 1907 +5:00; 1996 +6:00 | | | | |
| Brunei – Bandar Seri Begawan | +7:40 | 1926 +7:30; 1933 +8:00 | | | | 1955 |
| Cambodia – Phnom Penh | +7:00; 1906 +7:06 | 1911 +7:00; 1912 +8:00; 1931 +7:00 | | | | |
| China ³⁷ – Beijing | +7:46 | 1912/1928 +8:00 | | | | 1986-1991 |
| Asia/Kashgar | +5:04 | 1912/1928 +5:30; 1940 +5:00; 1949/1980 +8:00; | | | | 1986-1991 |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|-------------|----------------------------------|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| | | (c.1966 +6:00) | | | | |
| Asia/Ürümqi | +5:50 | 1912/1928 +6:00; 1949/1980 +8:00; (c.1966 +6:00) | | | | 1986-1991 |
| Asia/Chongqing | +7:06 | 1912/1928 +7:00; 1949/1980 +8:00 | | | 1945 | 1986-1991 |
| Asia/Shanghai | +8:06 | 1901/1912/1928 +8:00 | | | 1940-1941 | 1986-1991 |
| Asia/Harbin | +8:27 | 1912/1928 +8:30; 1932 +8:00; 1940 +9:00; 1966 +8:30; 1949/1980 +8:00 | | | | 1986-1991 |
| Hong Kong ³⁸ | +7:37 | 1904 +8:00; 1942 +9:00; 1945 +8:00 | | | 1941 | 1946-1976, 1979 |
| Macau or Macao | +7:34 | 1912 +8:00 | | | | 1946-1948, 1951-1976, 1979 |
| Tibet – Lhasa | +6:04 | 1912/1928 +6:00; 1949/1980 +8:00; (c.1966 +6:00) | | | | 1986-1991 |
| Christmas Island (Aust) – The Settlement / Flying Fish Cove | +7:03 | 1895 +7:00 | | | | |
| Cocos (Keeling) Islands (Aust) – West Island / Bantam | +6:28 | 1900 +6:30 | | | | |
| Cyprus – Nicosia | +2:13 | 1921 +2:00 | | | | 1975 to present |
| East Timor or Timor-Leste – Dili | +8:22 | 1912 +8:00; 1942 +9:00; 1976 +8:00; 2000 +9:00 | | | | |
| Georgia – Tbilisi | +2:59 | 1924 +3:00; 1957 +4:00; 1991 +3:00; 1994 +4:00; 2004 +3:00; 2005 +4:00 | | | | 1981-1995, 1996-1997*, 1998-2004 |
| India ³⁹ – New Delhi | +5:09 | 1905/1947 +5:30 | | | 1942-1945* | 1962, 1965, 1971 |
| Mumbai (formerly Bombay) | +4:51 | 1905/1947 +5:30 | | | 1942-1945* | 1962, 1965, 1971 |
| Kolkata (formerly Calcutta) | +5:53 | 1941+6:30?; 1942?/1948 +5:30 | | | 1942-1945* | 1962, 1965, 1971 |
| Indonesia ⁴⁰ – Jakarta | +7:07 | 1924 +7:20; 1932 +7:30; 1942 +9:00; 1945 +7:30; 1948 +8:00; 1950 +7:30; 1964 +7:00 | | | | |
| Makassar or Macassar or Mangkasara | +7:58 | 1932 +8:00; 1942 +9:00; 1945 +8:00 | | | | |
| Jayapura City | +9:23 | 1932 +9:00; 1944 +9:30; 1964 +9:00 | | | | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|-----------------------|---|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Iran – Teheran | +3:26 | 1946 +3:30; 1977 +4:00; 1979 +3:30 | | | | 1978-1980, 1991-2005, 2008 to present |
| Iraq – Baghdad | +2:58 | 1918 +3:00 | | | | 1982-2007 |
| Israel – Jerusalem | +2:21 | 1918 +2:00 | | | 1940-1942*, 1943-1945 | 1946, 1948**, 1949-1957, 1974-1975, 1985 to present |
| Japan – Tokyo | +9:19 | 1888 +9:00 | | | | 1948-1951 |
| Jordan – Amman | +2:24 | 1931 +2:00 | | | | 1973-1978, 1985-2011, 2012-2013*, 2014 to present |
| Kazakhstan ⁴¹ – Astana | +4:46 | 1924 +5:00; 1930 +6:00 | | | | 1981-1990, 1992-2004 |
| Oral | +3:25 | 1924 +4:00; 1930 +5:00; 1981 +6:00; 1982 +5:00; 1989 +4:00; 2005 +5:00 | | | | 1981-1990, 1992-2004 |
| Kyzylorda | +4:22 | 1924 +4:00; 1930 +5:00; 1981 +6:00; 1982 +5:00; 1992 +6:00 | | | | 1981-1990, 1992-2004 |
| Almaty | +5:08 | 1924 +5:00; 1930 +6:00 | | | | 1981-1990, 1992-2004 |
| Kuwait – Kuwait City | +3:12 | 1950 +3:00 | | | | |
| Kyrgyzstan – Bishkek | +4:58 | 1924 +5:00; 1930 +6:00; 1991 +5:00; 2005 +6:00 | | | | 1981-2005 |
| Laos – Vientiane | +6:50; 1906 +7:06 | 1911 +7:00; 1912 +8:00; 1931 +7:00 | | | | |
| Lebanon – Beirut | +2:22 | 1880 +2:00 | | 1920-1923 | | 1957-1961, 1972-1978, 1984 to present |
| Malaysia ⁴² – Kuala Lumpur | +6:47; 1901 +6:55 | 1905 +7:00; 1936 +7:20; 1941 +7:30; 1942 +9:00; 1945 +7:30; 1982 +8:00 | | 1933-1935* | | |
| Sarawak – Kuching ⁴³ | +7:21 | 1926 +7:30; 1933 +8:00; 1942 +9:00; 1945 +8:00 | | 1935-1938 | 1939-1941 | 1955 |
| Maldives – Malé | +4:54 | 1960 +5:00 | | | | |
| Mongolia ⁴⁴ – Ulan Bator or Ulaanbaatar | +7:08 | 1905 +7:00; 1978 +8:00 | | | | 1983-1998, 2001-2006, 2015 to present |
| Khovd or Hovd | +6:07 | 1905 +6:00; 1978 +7:00 | | | | 1983-1998, 2001-2006, 2015 to present |
| Choibalsan | +7:38 | 1905 +7:00; 1978 +8:00; 1983 +9:00; 2008 +8:00 | | | | 1983-1998, 2001-2006, 2015 to present |
| Myanmar or Burma – Naypyidaw ⁴⁵ | +6:24 | 1905 +5:30; 1920 +6:30; 1942 +9:00; 1945 +6:30 | | | | |
| Yangon or Rangoon | +6:25 | 1905 +5:30; 1920 +6:30; | | | | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|-----------------------|---|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| | | 1942 +9:00; 1945 +6:30 | | | | |
| Nagorno-Karabakh (disputed) – Stepanakert or Khankendi | +3:07 | 1924 +3:00; 1957 +4:00; 1991 +3:00; 1992 +4:00 | | | | 1981-1992, 1996-2011 |
| Nepal – Kathmandu | +5:41 | 1920 +5:30; 1986 +5:45 | | | | |
| North Korea ⁴⁶ – Pyongyang | +8:23 | 1890 +8:30; 1904 +9:00; 1928 +8:30; 1932 +9:00; 1954 +8:00; 1961 +9:00; 2015 +8:30 | | | | |
| Northern Cyprus (disputed) – North Nicosia | +2:13 | 1921 +2:00; 2016 +3:00 | | | | 1975-2016 |
| Oman – Muscat | +3:54 | 1920 +4:00 | | | | |
| Pakistan – Islamabad | +4:52 | 1905/1907 +5:30; 1951 +5:00 | | | 1942-1945* | 2002, 2008-2009 |
| Karachi | +4:28 | 1905/1907 +5:30; 1951 +5:00 | | | 1942-1945* | 2002, 2008-2009 |
| Palestine (disputed) – Jerusalem | +2:21 | 1918 +2:00 | | | 1940-1942*, 1943-1945 | 1946, 1948**, 1949-1957, 1974-1975, 1985 to present |
| Gaza | +2:18 | 1900 +2:00 | | | 1940-1942*, 1943-1945 | 1946, 1957-1967, 1974-1975, 1985 to present |
| Philippines – Manila ⁴⁷ | -15:56; 1844 +8:04 | 1899 +8:00; 1942 +9:00; 1944 +8:00 | | 1936-37 | 1941-42, 1942 | 1954, 1977, 1990 |
| Qatar – Doha | +3:26 | 1920 +4:00; 1972 +3:00 | | | | |
| Russia (see under Europe, above) | | | | | | |
| Saudi Arabia – Riyadh | +3:07 | 1950 +3:00 | | | | |
| Singapore ⁴⁸ | +6:55 | 1905 +7:00; 1936 +7:20; 1941 +7:30; 1942 +9:00; 1945 +7:30; 1982 +8:00 | | 1933-1935* | | |
| South Korea – Seoul | +8:28 | 1890 +9:00; 1908 +8:30; 1912 +9:00; 1954 +8:30; 1961 +9:00 | | | | 1948-1951, 1955-1960, 1987-1988 |
| South Ossetia (disputed) – Tskhinvali ⁴⁹ | +2:56; 1880 +2:59 | 1924 +3:00; 1957 +4:00; 1991 +3:00; 1994 +4:00; 2004 +3:00; 2005 +4:00; 2014 +3:00 | | | | 1981-1995, 1996-1997*, 1998-2004 |
| Sri Lanka – Sri Jayawardenepura Kotte or Kotte ⁵⁰ | +5:20 | 1905/1906 +5:30; 1996 +6:30; 1996 +6:00; 2006 +5:30 | | | 1942-1945* | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|----------------------|--|---|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Colombo | +5:19 | 1905/1906 +5:30; 1996 +6:30; 1996 +6:00; 2006 +5:30 | | | 1942-1945* | |
| Syria – Damascus | +2:25 | 1920 +2:00 | | 1920-1923 | | 1962-1978, 1983-1984, 1986 to present |
| Taiwan (disputed) – Taipei | +8:07 | 1896 +8:00; 1937 +9:00; 1945 +8:00 | | | | 1946-1961, 1974-1975, 1979 |
| Tajikistan – Dushanbe | +4:35 | 1924 +5:00; 1930 +6:00; 1991 +5:00 | | | | 1981-1991 |
| Thailand – Bangkok | +6:42 | 1920 +7:00 | | | | |
| Turkey – Ankara | +2:11 | 1910 +2:00; 1978 +3:00; 1985 +2:00; 2016 +3:00 | 1916 | 1920-1922, 1924-1925 | 1940, 1940-1941*, 1942, 1945 | 1946-1951, 1962, 1964, 1970-1983, 1985-2016 |
| Istanbul | +1:56; 1880 +1:57 | 1910 +2:00; 1978 +3:00; 1985 +2:00; 2016 +3:00 | 1916 | 1920-1922, 1924-1925 | 1940, 1940-1941*, 1942, 1945 | 1946-1951, 1962, 1964, 1970-1983, 1985-2016 |
| Turkmenistan – Ashgabat | +3:53 | 1924 +4:00; 1930 +5:00; 1991 +4:00; 1992 +5:00 | | | | 1981-1991 |
| United Arab Emirates – Abu Dhabi | +3:37 | 1920 +4:00 | | | | |
| Dubai | +3:41 | 1920 +4:00 | | | | |
| Uzbekistan – Tashkent | +4:37 | 1924 +5:00; 1930 +6:00; 1991 +5:00 | | | | 1981-1991 |
| Vietnam – Hanoi | +7:03 | 1911 +7:00; 1912 +8:00; 1931 +7:00 | | | | |
| Ho Chi Minh City | +7:07; 1906 +7:06 | 1911 +7:00; 1912 +8:00; 1931 +7:00 | | | | |
| Yemen – Sana'a or Sanaa or Sana | +2:57 | 1950? +3:00 | | | | |
| Aden | +3:00 | 1950 +3:00 | | | | |
| | | | | | | |
| South America | | | | | | |
| Argentina – Buenos Aires | -3:54; 1894 -4:17 | 1920 -4:00; 1969 -3:00; 1999 -4:00; 2000 -3:00 | | 1930-31 to 1938-39 | 1939-40 to 1940-41, 1941-1943*, 1943-1946* | 1946-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2007-08 to 2008-09 |
| Aruba (Dutch) – Oranjestad | -4:40 | 1912 -4:30; 1965 -4:00 | | | | |
| Bolivia – Sucre | -4:21 | 1932 -4:00 | | 1931-32 | | |
| Santa Cruz | -4:13 | 1932 -4:00 | | 1931-32 | | |
| Bonaire (Dutch) – Kralendijk | -4:33 | 1912 -4:30; 1965 -4:00 | | | | |
| Brazil ⁵¹ , Distrito Federal – | -3:12 | 1914 -3:00 | | 1931-32 to | | 1949-50 to 1952-53, 1963-64, |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|--------------------|-------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Brasília | | | | 1932-33 | | 1965, 1965-66 to 1967-68, 1985-86 to present |
| Acre – Rio Branco | -4:31 | 1914 -5:00; 2008 -4:00; 2013 -5:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1987-88 |
| Alagoas – Maceió | -2:23 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1995-96, 1999-00, 2000, 2001-02 |
| Amapá – Macapá | -3:24 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1987-88 |
| Amazonas – Manaus | -4:00 | 1914 -4:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1987-88, 1993-94 |
| Bahia – Salvador | -2:34 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 2002-03, 2011-12 |
| Ceará – Fortaleza | -2:34 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1999-00, 2000, 2001-02 |
| Espírito Santo – Vitória | -2:41 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to present |
| Goiás – Goiânia | -3:17 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to present |
| Maranhão – São Luís | -2:57 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1999-00, 2000, 2001-02 |
| Mato Grosso – Cuiabá | -3:44 | 1914 -4:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 2002-03, 2004-05 to present |
| Mato Grosso do Sul – Campo Grande | -3:38 | 1914 -4:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to present |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|--------------------|-------------|---|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Minas Gerais – Belo Horizonte | -2:56 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to present |
| Pará – Belém | -3:14 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1987-88 |
| Paraíba – João Pessoa | -2:19 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1999-00, 2000, 2001-02 |
| Paraná – Curitiba | -3:17 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to present |
| Pernambuco – Recife | -2:20 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1999-00, 2000, 2001-02 |
| Piauí – Teresina | -2:51 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1999-00, 2000, 2001-02 |
| Rio de Janeiro – Rio de Janeiro | -2:53 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to present |
| Rio Grande do Norte – Natal | -2:21 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1999-00, 2000, 2001-02 |
| Rio Grande do Sul – Porto Alegre | -3:25 | 1914 –3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to present |
| Rondônia – Porto Velho | -4:16 | 1914 –4:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1987-88 |
| Roraima – Boa Vista | -4:03 | 1914 –4:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1987-88, 1999-00, 2000 |
| Santa Catarina – | -3:15 | 1914 –3:00 | | 1931-32 to | | 1949-50 to 1952-53, 1963-64, |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|---|--|--------------------|--------------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Florianópolis | | | | 1932-33 | | 1965, 1965-66 to 1967-68, 1985-86 to present |
| São Paulo – São Paulo | -3:07 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to present |
| Sergipe – Aracaju | -2:28 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1995-96, 1999-00, 2000, 2001-02 |
| Tocantins – Palmas | -3:13 | 1914 -3:00 | | 1931-32 to 1932-33 | | 1949-50 to 1952-53, 1963-64, 1965, 1965-66 to 1967-68, 1985-86 to 1989-90, 1995-96 to 2002-03, 2012-13 |
| Chile – Santiago ⁵² | -4:43 | 1910 -5:00; (1916 -4:43); 1918 -4:00; (1919 -4:43); 1927 -5:00; 1932 -4:00; 1942 -5:00; 1942-4:00; 1947 -5:00; 1947 -4:00 | | 1927-28 to 1931-32 | | 1946, 1968-69 to 2013-14, 2014-2016*, 2016-17 onwards |
| Easter Island | -7:17 | 1932 -7:00; 1982 -6:00 | | | | 1968-69 to 2013-14, 2014-2016*, 2016-17 onwards |
| Colombia – Bogotá | -4:56 | 1914 -5:00 | | | | 1992-93 |
| Curaçao (Dutch) – Willemstad | -4:36 | 1912 -4:30; 1965 -4:00 | | | | |
| Ecuador – Quito | -5:14 | 1931 -5:00 | | | | |
| Guayaquil | -5:20; 1890 -5:14 | 1931 -5:00 | | | | |
| Galápagos Islands – Puerto Baquerizo Moreno | -5:58 | 1931 -5:00; 1986 -6:00 | | | | |
| Falkland Islands or Islas Malvinas (British/Argentine - disputed) – Stanley | -3:51 | 1912 -4:00; 1983 -3:00; 1985 -4:00 | | 1936-37 to 1938-39 | 1939-40 to 1941-42, 1942 | 1983-84 to 2009-10, 2010-11 to present* |
| French Guiana or Guiana – Cayenne | -3:29 | 1911 -4:00; 1967 -3:00 | | | | |
| Guyana – Georgetown | -3:53 | 1915 -3:45; 1975 -3:00; 1991 -4:00 | | | | |
| Paraguay – Asunción | -3:51 | 1931 -4:00; 1972 -3:00; 1974 -4:00 | | | | 1975-76 to present |
| Peru – Lima | -5:08; 1890 -5:09 | 1908 -5:00 | | 1938, 1938-39 | 1939-40 | 1986-1987, 1990, 1994 |
| South Georgia and the South | -2:26 | 1890 -2:00 | | | | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|--|-----------------------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Sandwich Islands (British/Argentine - disputed) – King Edward Point | | | | | | |
| Suriname – Paramaribo | –3:41 | 1945 –3:30; 1984 –3:00 | | | | |
| Trinidad and Tobago – Port of Spain / Chaguanas | –4:06 | 1912 –4:00 | | | | |
| Uruguay – Montevideo ⁵³ | –3:45 | 1920 –3:30; 1942 –3:00 | | 1923-24 to 1925-26, 1933-34 to 1938-39 | 1939-40 to 1940-41, 1941, 1942-43 | 1959-1960, 1965-1970, 1972, 1974-1976*, 1977-78, 1979-80, 1987-88 to 1992-93, 2004-05 to 2014-15 |
| Venezuela – Caracas | –4:28 | 1912 –4:30; 1965 –4:00; 2007 –4:30; 2016 –4:00 | | | | |
| | | | | | | |
| Africa | | | | | | |
| Algeria – Algiers ⁵⁴ | +0:13; 1891 +0:09 | 1911 0:00; 1940 +1:00; 1946 0:00; 1956 +1:00; 1963 0:00; 1977 +1:00; 1979 0:00; 1981 +1:00 | 1916-1918 | 1919-1921 | 1939, 1944-1945 | 1971, 1977- 1978, 1980 |
| Amsterdam Island ⁵⁵ (French) | +5:10 | 1949? +5:00 | | | | |
| Angola – Luanda | +0:53 | 1911 +1:00 | | | | |
| Benin – Porto-Novo | +0:10 | 1912 0:00; 1934 +1:00 | | | | |
| Cotonou | +0:10 | 1912? 0:00; 1934? +1:00 | | | | |
| Botswana – Gaborone | +1:44 | 1885 +1:30; 1903 +2:00 | | | 1943-44 | |
| Burkina Faso – Ouagadougou | –0:06 | 1912 0:00 | | | | |
| Burundi – Bujumbura | +1:57 | 1890 +2:00 | | | | |
| Cameroon – Yaoundé | +0:46 | 1912 +1:00 | | | | |
| Douala | +0:39 | 1912 +1:00 | | | | |
| Cape Verde – Praia | –1:34 | 1907 –2:00; 1975 –1:00 | | | 1942-1945* | |
| Central African Republic – Bangui | +1:14 | 1912 +1:00 | | | | |
| Chad – N’Djamena | +1:00 | 1912 +1:00 | | | | 1979-80 |
| Comoros – Moroni | +2:53 | 1911 +3:00 | | | | |
| Congo, Democratic Republic of the – Kinshasa | +1:01 | 1897 +1:00 | | | | |
| Congo, Republic of the – Brazzaville | +1:01 | 1912 +1:00 | | | | |
| Crozet Islands ⁵⁶ (French) – Alfred Faure | +3:27 | 1961? +5:00 | | | | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|-------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Djibouti – Djibouti City | +2:53 | 1911 +3:00 | | | | |
| Egypt – Cairo ⁵⁷ | +2:05 | 1900 +2:00 | | | 1940-1945 | 1957-2010, 2014 |
| Equatorial Guinea – Malabo | +0:35 | 1912 0:00; 1963 +1:00 | | | | |
| Eritrea – Asmara | +2:36 | 1936 +3:00 | | | | |
| Ethiopia – Addis Ababa | +2:35 | 1936 +3:00 | | | | |
| Gabon – Libreville | +0:38 | 1912 +1:00 | | | | |
| Gambia – Banjul | -1:06 | 1935 -1:00; 1964 0:00 | | | | |
| Serekunda | -1:07 | 1935? -1:00; 1964? 0:00 | | | | |
| Ghana – Accra ⁵⁸ | -0:01 | 1918 0:00 | | 1920-1938 | 1939-1942 | 1954-55 to 1955-56 |
| Guinea – Conakry | -0:55 | 1912 0:00; 1934 -1:00; 1960 0:00 | | | | |
| Guinea-Bissau – Bissau | -1:02 | 1912 -1:00; 1975 0:00 | | | | |
| Ivory Coast or Côte D'Ivoire – Yamoussoukro | -0:21 | 1912 0:00 | | | | |
| Abidjan | -0:16 | 1912 0:00 | | | | |
| Kenya – Nairobi | +2:27 | 1928 +3:00; 1930 +2:30; 1940 +2:45; 1960 +3:00 | | | | |
| Kerguelen Islands (French) – Port-aux-Français | +4:41 | 1950 +5:00 | | | | |
| Lesotho – Maseru | +1:52 | 1903 +2:00 | | | 1943-44 | |
| Liberia – Monrovia | -0:43 | 1972 0:00 | | | | |
| Libya – Tripoli | +0:53 | 1920 +1:00; 1959 +2:00; 1982 +1:00; 1990 +2:00; 1996 +1:00; 1997 +2:00; 2012 +1:00; 2013 +2:00 | | | | 1951, 1953, 1955, 1982-1989, 1997, 2013 |
| Madagascar – Antananarivo | +3:10 | 1911 +3:00 | | | | 1954 |
| Malawi – Lilongwe | +2:15 | 1903 +2:00 | | | | |
| Mali – Bamako | -0:32 | 1912 0:00; 1934 -1:00; 1960 0:00 | | | | |
| Mauritania – Nouakchott | -1:04 | 1912 0:00; 1934 -1:00; 1960 0:00 | | | | |
| Mauritius – Port Louis | +3:50 | 1907 +4:00 | | | | 1982-83, 2008-09 |
| Mayotte (French) – Mamoudzou | +3:01 | 1911 +3:00 | | | | |
| Morocco – Rabat ⁵⁹ | -0:27 | 1913? 0:00; 1984 +1:00; 1986 0:00 | | | 1939, 1940-1945*? | 1950, 1967, 1974, 1976-1978, 2008 to present |
| Casablanca ⁶⁰ | -0:30 | 1913 0:00; 1984 +1:00; 1986 0:00 | | | 1939, 1940-1945* | 1950, 1967, 1974, 1976-1978, 2008 to present |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|--------------------|--------------------|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Mozambique – Maputo | +2:10 | 1903 +2:00 | | | | |
| Namibia – Windhoek | +1:08 | 1892 +1:30; 1903 +2:00; 1994 +1:00 | | | 1942-43 | 1994-95 to present |
| Niger – Niamey | +0:08 | 1912 –1:00; 1934 0:00; 1960 +1:00 | | | | |
| Nigeria – Abuja | +0:30 | 1919 +1:00 | | | | |
| Lagos | +0:14 | 1919 +1:00 | | | | |
| Réunion (French) – Saint-Denis | +3:42 | 1911 +4:00 | | | | |
| Rwanda – Kigali | +2:00 | 1935 +2:00 | | | | |
| Saint Helena, Ascension and Tristan da Cunha (British) – Jamestown | –0:23 | 1951 0:00 | | | | |
| Half Tree Hollow (Saint Helena) | –0:23 | 1951 0:00 | | | | |
| Ascension Island – Georgetown | –0:58 | 1951? 0:00 | | | | |
| Tristan da Cunha – Edinburgh of the Seven Seas | –0:49 | 1951? 0:00 | | | | |
| São Tomé and Príncipe – São Tomé | +0:27; 1884 –0:36 | 1912 0:00 | | | | |
| Scattered Islands (French) | | | | | | |
| Europa Island ⁶¹ | +2:41 | 1911? +3:00 | | | | |
| Juan de Nova Island ⁶² | +2:51 | 1911? +3:00 | | | | |
| Glorioso Islands ⁶³ | +3:09 | 1911? +4:00 | | | | |
| Tromelin Island ⁶⁴ | +3:38 | 1954? +4:00 | | | | |
| Senegal – Dakar | –1:10 | 1912 –1:00; 1941 0:00 | | | | |
| Seychelles – Victoria | +3:42 | 1906 +4:00 | | | | |
| Sierra Leone – Freetown ⁶⁵ | –0:53 | 1913 –1:00; 1957 0:00 | | 1935-1938 | 1939-1942 | 1957-1962 |
| Somalia – Mogadishu | +3:01 | 1893 +3:00; 1931 +2:30; 1957 +3:00 | | | | |
| Somaliland (disputed) – Hargeisa | +2:56 | 1893? +3:00; 1931? +2:30; 1957? +3:00 | | | | |
| South Africa – Pretoria | +1:53 | 1892 +1:30; 1903 +2:00 | | | 1942-43 to 1943-44 | |
| Johannesburg | +1:52 | 1892 +1:30; 1903 +2:00 | | | 1942-43 to 1943-44 | |
| South Sudan – Juba | +2:06 | 1931 +2:00; 2000 +3:00 | | | | 1970-1985 |
| Sudan – Khartoum | +2:10 | 1931 +2:00; 2000 +3:00 | | | | 1970-1985 |
| Omdurman | +2:10 | 1931 +2:00; 2000 +3:00 | | | | 1970-1985 |
| Swaziland – Mbabane | +2:05 | 1903 +2:00 | | | | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|-----------------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Manzini | +2:05 | 1903? +2:00 | | | | |
| Tanzania – Dodoma | +2:23 | 1931? +3:00; 1948? +2:45; 1961? +3:00 | | | | |
| Dar es Salaam | +2:37 | 1931 +3:00; 1948 +2:45; 1961 +3:00 | | | | |
| Togo – Lomé | +0:05 | 1893 0:00 | | | | |
| Tunisia – Tunis ⁶⁶ | +0:41; 1881 +0:09 | 1911 +1:00 | | | 1939, 1940-1941*, 1942-1945 | 1977-1978, 1988-1990, 2005-2008 |
| Uganda – Kampala | +2:10 | 1928 +3:00; 1930 +2:30; 1948 +2:45; 1957 +3:00 | | | | |
| Western Sahara (disputed) – Laayoune ⁶⁷ | -0:53 | 1934 -1:00; 1976 0:00 | | | | 1976-1978, 2008 to present |
| Zambia – Lusaka | +1:53 | 1903 +2:00 | | | | |
| Zimbabwe – Harare | +2:04 | 1903 +2:00 | | | | |
| | | | | | | |
| Antarctica⁶⁸ | | | | | | |
| Aboa (Finnish) | -0:54 | 1988 0:00 | | | | |
| Amundsen-Scott South Pole Station (United States) | . . | 1957 +12:00 | | | | 1974-75 to present |
| Artigas Base (Uruguayan) | -3:55 | 1984 -4:00 | | | | 1984-85 to 2013-14, 2014-2016*, 2016-17 onwards |
| Base General Bernardo O'Higgins Riquelme (Chilean 1948 & German 1991) | -3:52 | 1948 -4:00 | | | | 1968-69 to 2013-14, 2014-2016*, 2016-17 onwards |
| Base Presidente Eduardo Frei Montalva (Chilean) | -3:56 | 1969 -4:00 | | | | 1969-70 to 2013-14, 2014-2016*, 2016-17 onwards |
| Belgrano II Base (Argentine) | -2:19 | 1979 -3:00 | | | | 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Bellingshausen Station (Russian) | -3:56 | 1968 -4:00 | | | | 1968-69 to 2013-14, 2014-2016*, 2016-17 onwards |
| Bharati (Indian) | +5:05 | 2012 +5:00 or +5:30? | | | | |
| Brown Station (Argentine) | -4:11 | 1951 -4:00; 1969 -3:00 | | | | 1951-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Byrd Station (United States) | -7:58 | 1957 -8:00; 2009 0.00?; ? +12:00 | | | | 1957**, 1957-58 to 2004-05**, 2009-10 to present |
| Cámara Base (Argentine) | -4:00 | 1953 -4:00; 1969 -3:00 | | | | 1953-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|-------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| | | | | | | 1999-00, 2004, 2007-08 |
| Captain Arturo Prat Base (Chilean) | -3:59 | 1947 -4:00 | | | | 1968-69 to 2013-14, 2014-2016*, 2016-17 onwards |
| Carlini Base (previously Jubany Base) (Argentine) | -3:55 | 1953 -4:00; 1969 -3:00 | | | | 1953-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Casey Station (Australian) | +7:22 | 1969 +8:00; 2009 +11:00; 2010 +8:00; 2011 +11:00; 2012 +8:00; 2015 +11:00; 2016 +8:00; 2016 +11:00 | | | | |
| Comandante Ferraz Antarctic Station (Brazilian) | -3:54 | 1984 -4:00 | | | | 1984, 1984-85 to 2013-14, 2014-2016*, 2016-17 onwards |
| Concordia Station (French & Italian) | +8:13 | 2005 +8:00; 2009 +11:00; 2010 +8:00; 2011 +11:00; 2012 +8:00; 2015 +11:00; 2016 +8:00 | | | | |
| Davis Station (Australian) | +5:12 | 1957 +7:00; 1964 0:00; 1969 +7:00; 2009 +5:00; 2010 +7:00; 2011 +5:00; 2015 +7:00 | | | | |
| Decepción Base (Argentine) | -4:03 | 1948 -4:00; 1969 -3:00 | | | | 1948-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Dome Fuji Station (Japanese) | +2:39 | 1995 +3:00 | | | | |
| Dumont d'Urville Station (French) | +9:20 | 1956 +10:00 | | | | |
| Esperanza Base (Argentine) | -3:48 | 1952 -4:00; 1969 -3:00 | | | | 1952-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Estación Científica Antártica Ruperto Elichiribehety (Uruguayan) | -3:48 | 1997 -4:00 | | | | 1997-98 to 2013-14, 2014-2016*, 2016-17 onwards |
| Gabriel de Castilla Spanish Antarctic Station | -4:02 | 1989 -4:00 | | | | 1989-90 to 2013-14, 2014-2016*, 2016-17 onwards |
| González Videla Antarctic Base (Chilean) | -4:11 | 1951 -4:00 | | | | 1968-69 to 2013-14, 2014-2016*, 2016-17 onwards |
| Great Wall Station (Chinese) | -3:56 | 1985 -4:00 | | | | 1985, 1985-86 to 2013-14, 2014-2016*, 2016-17 onwards |
| Halley Research Station | -1:46 | 1956 0:00?; 1975? 0:00 | | | | 1988-89 to 1992-93, 1999-00, |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|--------------------------|--|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| (British) | | and –3:00 | | | | 2004, 2007-08 |
| Heard Island and McDonald Islands (Australian) | +4:54 | 1947 +5:00 | | | | |
| Henryk Arctowski Polish Antarctic Station | –3:54 | 1977 –4:00 | | | | 1977, 1977-78 to 2013-14, 2014-2016*, 2016-17 onwards |
| Jang Bogo Station (South Korean) | +10:57 | 2014 +11:00 | | | | |
| Jinnah Antarctic Station (Pakistani) | +1:43 | 1991 +3:00 | | | | |
| Juan Carlos I Antarctic Base (Spanish) | –4:02 | 1988 –4:00 | | | | 1988, 1988-89 to 2013-14, 2014-2016*, 2016-17 onwards |
| King Sejong Station (South Korean) | –3:55 | 1988 –4:00 | | | | 1988, 1988-89 to 2013-14, 2014-2016*, 2016-17 onwards |
| Kohnen-Station (German) | 0:00 | 2001 0:00 | | | | |
| Kunlun Station (Chinese) | +5:08 | 2009 +5:00 | | | | |
| Law-Racovița Station (Romanian) | +5:06 | 1986 +7:00 | | | | |
| Machu Picchu Base (Peruvian) | –3:54 | 1989 –4:00 | | | | 1989, 1989-90 to 2013-14, 2014-2016*, 2016-17 onwards |
| Macquarie Island (Australian) | +10:35 | 1911 +10:00; 2010 +11:00 | 1916-17 to 1918-19 | | 1942, 1942-43 to 1943-44 | 1967-68 to 2009-10 |
| Maitri (Indian) | +0:47 | 1989 0:00 | | | | |
| Maldonado Base (Ecuadorian) | –3:59 | 1990 0:00 | | | | |
| Marambio Base (Argentine) | –3:47 | 1969 –3:00 | | | | 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Matienzo Base (Argentine) | –4:00 | 1961 –4:00; 1969 –3:00 | | | | 1961-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Mawson Station (Australian) | +4:11 | 1954 +6:00; 2009 +5:00 | | | | |
| McMurdo Station (United States) | +11:07 | 1956 +12:00 | | | | 1974-75 to present |
| Melchior Base (Argentine) | –4:12 | 1947 –4:00; 1969 –3:00 | | | | 1947-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Mendel Polar Station (Czech) | –3:52 | 2006 –4:00 | | | | 2006, 2006-07 to 2013-14, 2014-2016*, 2016-17 onwards |
| Mirny Station (Russian) | +6:12 | 1956 +6:00 | | | | |
| Neumayer-Station III (German) | –0:33 | 2009 +1:00 | | | | |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|--------------------|--|---|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Novolazarevskaya Station (Russian) | +0:47 | 1961 +0:00 | | | | |
| Orcadas Base (Argentine) | -2:59 | 1920 -4:00; 1969 -3:00 | | 1930-31 to 1938-39 | 1939-40 to 1940-41, 1941-1943*, 1943-1946* | 1946-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2007-08 to 2008-09 |
| Palmer Station (United States) | -4:16 | 1965 -4:00 | | | | 1968-69 to 2013-14, 2014-2016*, 2016-17 onwards |
| Petrel Base (Argentine) | -3:45 | 1967 -4:00; 1969 -3:00 | | | | 1967, 1967-68 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Primavera Base (Argentine) | -4:04 | 1954 -4:00; 1969-3:00 | | | | 1954-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Princess Elisabeth Antarctica (Belgian) | +1:33 | 2009 +3:00 | | | | |
| Profesor Julio Escudero Base (Chilean) | -3:56 | 1994 -4:00 | | | | 1994, 1995-96 to 2013-14, 2014-2016*, 2016-17 onwards |
| Progress Station (Russian) | +5:06 | 1988 +7:00 | | | | |
| Rothera Research Station (British) | -4:32 | 1975 -3:00 | | | | 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| St. Kliment Ohridski Base (Bulgarian) | -4:01 | 1988 -4:00 | | | | 1988-89 to 2013-14, 2014-2016*, 2016-17 onwards |
| San Martín Base (Argentine) | -4:28 | 1951 -4:00; 1969 -3:00 | | | | 1951-1963*, 1963-64 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Sanae IV (South African) | -0:11 | 1997 +3:00 | | | | |
| Scott Base (New Zealand) | +11:07 | 1957 +12:00 | | | | 1974-75 to present |
| Showa Station (Japanese) | +2:38 | 1957 +3:00 | | | | |
| Signy Research Station (British) | -3:02 | 1947 0:00?; 1975? 0:00 and -3:00; 1995 -3:00 | | | | 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Sobral Base (Argentine) | -2:42 | 1965 -4:00; 1969 -3:00 | | | | 1965-66 to 1968-69, 1974, 1988-89 to 1992-93, 1999-00, 2004, 2007-08 |
| Svea Research Station (Swedish) | -0:45 | 1988 +1:00 | | | | |
| Taishan Station (Chinese) | +5:08 | 2014 +8:00 | | | | |
| Tor (Norwegian) | +0:21 | 1993 0:00 and +1:00 | | | | 2005? to present |
| Troll (Norwegian) | +0:10 | 1990 0:00 and +1:00 | | | | 2005 to present |

| <i>Country, territory or state – capital and largest city or town¹</i> | <i>Local mean time²</i> | <i>Standard time and year started, changed³</i> | <i>Years daylight saving time used⁴</i> | | | |
|---|------------------------------------|--|--|-----------------|-------------|--------------------|
| | | | <i>WWI</i> | <i>Interwar</i> | <i>WWII</i> | <i>Postwar</i> |
| Vernadsky Research Base (Ukrainian) | −4:17 | 1994 −4:00; 2015 −3:00 | | | | |
| Vostok Station (Russian) | +7:07 | 1957 +6:00 | | | | |
| WAIS Divide camp (United States) | −7:12 | 2005 0.00?; ? +12:00 | | | | 2005-06 to present |
| Wasa Research Station (Swedish) | −0:54 | 1989 +1:00 | | | | |
| Zhongshan Station (Chinese) | +5:05 | 1989 +6:00; 2009 +5:00 | | | | |
| Zucchelli Station (Italian) | +10:56 | 1986 +12:00 | | | | 1986-87 to present |

* continuous. Daylight saving time was continuous across these years and across seasons, from sometime in the first-mentioned year to sometime in the second-mentioned year. It was common in World War II; in the United States, it was called War Time.

** double daylight saving time or double summer time (United Kingdom) or midsummer time (Europe), where two hours of daylight saving time were used in the summer months of these years and one hour in winter, or sometimes two hours in the middle of summer and one hour in the shoulder period and standard time in the winter. This was common in World War II.

. . . not applicable

Main sources:

- Time and Date AS, at www.timeanddate.com
- Horloge Parlante, at www.horlogeparlante.com
- Buleganteng, TimeGenie, at <https://encyclopedia.timegenie.com>
- Newspapers.com, at www.newspapers.com (by subscription)
- Weather Spark, at www.weatherspark.com
- Klaus Marten Teltow, World Time Clock, at www.weltzeituhr.com/start_e.shtml
- Oscar van Vlijmen, kpn.nl, at <http://home.kpn.nl/vanadovv/time/TZworld.html>
- World Time Zones, at www.worldtimezoneslocal.com/index.html
- Internet Engineering Task Force, at www.ietf.org/timezones/data; and similar tz (time zone) database type sites contributed to by Paul Eggert and others, as well as old sites that these people contributed to such as cvsup.pt.freebsd.org/cgi-bin/cvsweb/cvsweb.cgi/src/share/zoneinfo (old) and www.acad.bg/ftp/usr/share/lib/zoneinfo (old)
- Astrodienst, at www.astro.com/cgi/ade.cgi
- Gwillim Law, Statoids, at www.statoids.com/statoids.html
- Matthew W. White, *The Economics of Time Zones*, 2004, at http://ibrarian.net/navon/paper/The_Economics_of_Time_Zones.pdf?paperid=6446634
- Papershake, at <http://papershake.blogspot.com.au/2011/09/us-time-zones-in-1918.html>
- Wikipedia, at <http://en.wikipedia.org>

¹ Details of daylight saving, standard time and local time in the table relate to capital cities. When the capital is not the largest city or town, the largest city or town has also been included or one where more definite data is available. For Russia, Mexico and China, selected regions/cities. Where a country uses several time zones, a major city in each zone has been included. States/provinces have been included for Canada, the United States, Australia and Brazil. Island states and territories have been included, but not uninhabited islands although those with research stations or the like are generally included. Currently used Antarctic bases have been included. Disputed territories have been included.

² Local mean time (or mean solar time or mean local time) as calculated by the longitude of the city or town is shown here to the nearest minute. Each city, town, locality, etc. has its own local mean time. Every 15 degrees of longitude represents one hour in time. Thus a place at longitude 45 degrees east of Greenwich will be at GMT/UTC+3 hours.

A place that is 81°49' west of Greenwich will be at GMT/UTC−5:27 to the nearest minute. Local mean time is usually calculated to the nearest second, although this wasn't usually practical or necessary in the nineteenth century. Some places rounded their local mean time to the nearest minute or part minute. Where two times are given, the first one is usually the local mean time of that place and the second one is usually the local mean time of the capital city either of that country or of the country the place was part of in the nineteenth century or of another country that colonised that place. Occasionally, a place's local mean time changed by seconds, perhaps when government offices shifted across town or to some nearby town; only those that changed by a minute or more when rounded have been included here.

³ The main thing that forced the introduction of standard time was the railways. Trains had to run to a timetable and this wasn't possible if every city and town used its own local mean time. Also, trains were much more likely to crash if drivers and other staff had their watches set on different times. British railways introduced a system of standard time in 1847 and by 1855 nearly all of Britain used it. Similarly, United States and Canadian railroads used a standardised time system from 1883, although with four time zones. Meanwhile, there was a push for a worldwide system of standard time. Time zones for the world were recommended in 1884 at the International Meridian Conference in Washington, D.C. Some countries changed to standard time straight away or within a few years, but elsewhere the change was often slow, and its acceptance even slower, especially in smaller cities and towns and rural areas not near a railway. By 1930, all major countries used it rather than their old local mean time. Many places changed their standard time, some on a number of occasions. Most changes have involved a shift to a more easterly time zone (for example, from UTC+3 to UTC+4 or from UTC−7 to UTC−6), which can be construed as a form of daylight saving. Standard time at the location of the various Antarctic bases is presumed to have started when the station was set up.

⁴ Years given here usually relate to the capital city (and largest city or town if not the capital) of a country, state or territory, although the rest of the country or state usually followed suit. There were variations to this pattern, especially in the United States, where many counties and cities went their own way in deciding whether to use daylight saving time, mainly before the federal Uniform Time Act of 1966. Where daylight saving time crosses two years, this is shown as, for example, 1971-72. This usually only applies in the southern hemisphere. A blank cell means no daylight saving for this period. The words 'to present' mean to 2016 or 2016-17.

⁵ Amsterdam, Netherlands set its time at GMT+0:20 in 1937. Before that, it used local mean time, which strictly is GMT+0:19:32.

⁶ All of Russia is included here rather than some here and some under Asia. The 11 cities listed here (from west to east, except Moscow) are in oblasts that cover Russia's 11 time zones although shifting between time zones seems to be ongoing and a number of other oblasts shifted between time zones in 2016.

⁷ Timeanddate.com quote Belgrade, Serbia's local mean time (UTC+1:22) also as the local mean time used in the nineteenth century for Sarajevo, Zagreb, Podgorica and Ljubljana, the capital cities of Bosnia and Herzegovina, Croatia, Montenegro and Slovenia. This would have been unlikely in reality. Most parts of this region were in and out of various empires, kingdoms and other arrangements through the nineteenth century and would have been unlikely to spend much of it aligned with Belgrade local mean time.

⁸ The United Kingdom had a system of railway time from 1847 and nearly everyone used it by 1855, although legislation for standard time didn't come until 1880. The UK switched to Central European Time (GMT+1) in 1968-1971 and didn't have separate daylight saving time in this period. Guernsey, the Isle of Man and Jersey are not actually part of the UK but are Crown dependencies.

⁹ During German occupation from 30 June 1940 to 9 May 1945, Guernsey was on Central European Time.

¹⁰ During German occupation from 30 June 1940 to 9 May 1945, Jersey was on Central European Time.

¹¹ Belize, formerly British Honduras, had half an hour of daylight saving from 1918-19 to 1942-43 and in at least four years in the 1950s, and an hour in 1973-74 and 1982-83. Belmopan was founded in 1970 and time details before this relate to the area it now occupies.

¹² Canada was on railway time from 1883, but its widespread adoption was probably slower than in the United States, especially in areas with few or no railroads. For the year of official adoption of standard time (after the slash) and years of daylight saving, see each province where times are shown for the capital city and largest city if other than the capital; also, there were often variations within a province.

¹³ New Brunswick was in the Intercolonial time zone but the Intercolonial Railway, which serviced the province, adopted Eastern time or GMT−5. Daylight saving in New Brunswick cities can't be determined for some years. Fredericton may not have had much daylight saving in the interwar period. Saint John had it in at least 12 of these years and may have had it in some or all of the other years. Fredericton and Saint John likely had daylight saving in all years since World War II except 1973.

¹⁴ In practice, Newfoundland and Labrador used local time until 1935, using the local mean time of capital city St John's throughout the country from 1884, calling it Newfoundland Standard Time.

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- ¹⁵ Nova Scotia was in the Intercolonial time zone but the Intercolonial Railway, which serviced the province, adopted Eastern time or GMT-5.
- ¹⁶ Data is scarce but Charlottetown, Prince Edward Island probably had little daylight saving in the interwar years.
- ¹⁷ Quebec City, Quebec likely had daylight saving in most or all years that Montreal had it although there is uncertainty over 1917, 1919-1920, 1926, 1928, 1933, 1935-1936, 1938-1940, 1946-1947, 1949-1953, 1955-1956, 1958-1961, 1963, 1965 and 1967.
- ¹⁸ Whether Regina, Saskatchewan had daylight saving in 1919, 1923 and 1925-1927 is unknown.
- ¹⁹ Whether Saskatoon, Saskatchewan had daylight saving in 1953-1954 is unknown.
- ²⁰ Santo Domingo, Dominican Republic had half an hour of daylight saving from 1969-70 to 1973-74.
- ²¹ Mexico has four time zones: Northwest (has daylight saving), Pacific (some areas have daylight saving), Central (has daylight saving) and Southeast (no daylight saving). The table uses the largest city in each, including two in Pacific to represent areas with and without daylight saving: Tijuana in Northwest, Hermosillo (no daylight saving) and Chihuahua (has daylight saving; used instead of the larger Ciudad Juárez as Chihuahua has better historical data) in Pacific, Mexico City in Central and Cancún in Southeast.
- ²² Railway time was introduced by United States railroads in 1883 and was used throughout most of the US by 1884, although it carried no legal standing. Federal legislation for standard time didn't come until 1918 via the Standard Time Act, brought on by the desire to introduce daylight saving and save energy during WWI. Daylight saving in the United States before 1967 was up to the states, counties, cities and towns, except in wartime; thus there were many variations, including within states and counties. Time details for the capital city and largest city if other than the capital are shown for each state.
- ²³ The United States bought Alaska from Russia for \$7.2 million in 1867. It became a US state in 1959. Alaska Standard Time of GMT-9 was put in place by Congress in 1900 and changed to GMT-10 in 1919, but locals took little notice and kept using up to four time zones across the territory. When war time started in 1942, Juneau didn't need to change as it was already using GMT-8 and was an hour ahead of what it needed to be on.
- ²⁴ Arizona used war time in the summer only of 1944 and not at all in 1945. In the post-WWII period, Arizona had daylight saving in 1967 only. However, Navajo Nation, which crosses Arizona, New Mexico and Utah, recognises daylight saving.
- ²⁵ Georgia had a mixture of standard time and local mean time from 1883 to the 1890s. In 1943, the state shifted back from war time to standard time, or officially from Eastern war time to Central war time, and probably stayed there for the rest of the war.
- ²⁶ Apart from war time in 1942-1945, the only other occasions Hawaii used daylight saving were in 1933 when it lasted just three weeks, from 30 April to 21 May, and in 1936 for probably an even shorter period.
- ²⁷ Louisville, Kentucky reverted to local mean time soon after railway time was introduced in 1883 and was still on local time in 1889. Banks used local mean time as late as 1905.
- ²⁸ Augusta, Maine was still using local mean time in 1889 despite state standard time legislation in 1887.
- ²⁹ Despite railway time in 1883 and state legislation for Central Standard Time in 1885, Detroit, Michigan stayed on local mean time until 1900 when the city council decided to go with standard time. Widespread refusal meant the decision was reversed. In 1905, the city moved to standard time again after a public vote, but even then, many residents were slow to make the change. Detroit had to turn its clocks back 28 minutes meaning earlier sunsets and this didn't help. The city shifted to Eastern Standard Time in 1915 although the Interstate Commerce Commission still had it in the Central time zone until 1922 as per railway time in 1883. An ordinance shifted the city from Eastern to Central time in the daylight saving period in 1918 and 1919, meaning that clocks didn't change.
- ³⁰ Columbus, Ohio refused to use railway time. It was still using local mean time in 1889 and may have changed around 1893 when state legislation for standard time led to other Ohio cities changing. In 1943, part of the state, including Columbus, moved back from war time to standard time from 21 February; most areas had returned to war time by May, with the capital moving on 16 May. Standard time was used again in the following two winters.
- ³¹ The Commonwealth of Australia came into being on 1 January 1901. Prior to this, the Australian continent comprised British colonies, which became states on this date. The Commonwealth implemented daylight saving time legislation to apply to the whole country in certain war years. Otherwise, daylight saving is up to each state.
- ³² Australian Capital Territory was set up in 1911 (and Canberra founded in 1913). Before this, the area was part of New South Wales.
- ³³ Lord Howe Island had one hour of daylight saving from 1981-82 to 1984-85 and then half an hour from 1985-86. As its standard time is UTC+10:30, its clocks are half an hour ahead of the rest of New South Wales in winter and on the same time in summer.

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- ³⁴ Wellington and Auckland, New Zealand had an hour of daylight saving in 1927-28 and then half an hour each year to 1939-40 before being continuous from 1940 to end of 1945. They have had one hour of daylight saving each year from 1974-75.
- ³⁵ The Cook Islands had half an hour of daylight saving from 1978-79 to 1990-91.
- ³⁶ Akrotiri and Dhekelia is a British overseas territory on the island of Cyprus. It was established in 1960.
- ³⁷ Time changes in China are difficult to determine and different sources give different dates, such as 1901, 1912 and 1928 as the year China adopted standard time. It seems that China officially adopted standard time and was divided into five time zones in 1912, at the start of the Republic of China era, and officially moved to one time zone (GMT+8) after the end of this era in 1949. In practice, it seems that most of China moved later than these dates, with 1928 often given as the year China shifted to standard time and five time zones and 1980 as the year China adopted a single time zone. Western areas, including Tibet, have unofficially used UTC+6, probably at least since the Cultural Revolution (1966-1976) and maybe before this. Earlier, a mixture of times was probably used in western areas as various parts were ruled at different times through the first two-thirds or so of the twentieth century by various regimes, including the Qing dynasty, East Turkestan, warlords, the USSR, the Kuomintang, the Republic of China and the People's Republic of China. The time zones in the table seem to be the current ones (west to east) used in China (the capital, Beijing, is in Asia/Shanghai); officially all areas use UTC+8.
- ³⁸ Hong Kong had to use Japan Standard Time (GMT+9) from 1941 to 1945.
- ³⁹ In India, railway time was used from around the late 1880s, often using Madras (now Chennai) local mean time (GMT+5:21). India used standard time of GMT+5:30 from 1905 (and this included Burma, now Myanmar; Ceylon, now Sri Lanka; and the areas now known as Pakistan and Bangladesh) although Calcutta (now Kolkata) local mean time (GMT+5:53) was used in that area until 1948 and Bombay (now Mumbai) local mean time (GMT+4:51) was used unofficially in that area until about 1955. Many local people, especially in more remote areas, probably took little notice of standard time or daylight saving time pre-independence. After the "Partition of India" and independence in 1947, all of India used standard time from that year (except Calcutta, which used it from 1948).
- ⁴⁰ Indonesia has three time zones: Western (includes Jakarta), Central (includes Makassar) and Eastern (includes Jayapura City).
- ⁴¹ Kazakhstan uses two time zones. Most of the country uses UTC+6. Far western areas use UTC+5.
- ⁴² Malaysia used Singapore local mean time from 1901 to 1905 and had to use Japan Standard Time from 1942 to 1945. Twenty minutes of continuous daylight saving was used from 1933 to 1935.
- ⁴³ Kuching, Sarawak used 20 minutes of daylight saving between September and December, 1935 and 1941.
- ⁴⁴ Mongolia uses two time zones. Most of the country uses UTC+8. Far western areas use UTC+7.
- ⁴⁵ Pre-2006, the area now occupied by Myanmar's new capital city Naypyidaw.
- ⁴⁶ Various dates for changes in standard time are given for North Korea by different sources. Years given by Time and Date AS (timeanddate.com) have been used as their site provides comprehensive data and seems accurate.
- ⁴⁷ Japan Standard Time was used in Manila, Philippines from 1942 to 1945.
- ⁴⁸ Singapore had 20 minutes of continuous daylight saving from 1933 to 1935. Japan Standard Time was used from 1942 to 1945.
- ⁴⁹ Tskhinvali, South Osseti / Georgia used Tbilisi (capital of Georgia) local mean time from 1880.
- ⁵⁰ Sri Jayawardenepura Kotte is a suburb of Sri Lanka's largest city Colombo.
- ⁵¹ For Brazil, before 1988-89, the years that daylight saving was used were the same across the country, as were dates except for 1963-64 when start dates for the states of São Paulo, Rio de Janeiro, Guanabara, Minas Gerais and Espírito Santo were about a month and a half earlier than the rest of the country, according to summer time decrees for Brazil from 1931 onwards at <http://pcdsh01.on.br/DecHV.html>.
- ⁵² Santiago, Chile reverted to local mean time (GMT-4:43) from 1916 to 1918 and again from 1919 to 1927.
- ⁵³ Montevideo, Uruguay had half an hour of daylight saving in 1923-24 to 1925-26, 1933-34 to 1940-41, 1941, 1968-1970, and 1974 (part).
- ⁵⁴ Algiers, Algeria was on Paris local mean time from 1891 to 1911.
- ⁵⁵ The first research station at Amsterdam Island was set up in 1949.
- ⁵⁶ The first research station on the Crozet Islands was set up in 1961.
- ⁵⁷ Cairo, Egypt suspended daylight saving during Ramadan, the ninth month of the Islamic calendar, in 2010 and 2014.

⁵⁸ Accra, Ghana put clocks forward for 20 minutes from September to December, 1920 to 1942.

⁵⁹ Rabat, Morocco has suspended daylight saving during Ramadan, the ninth month of the Islamic calendar, from 2012.

⁶⁰ Casablanca, Morocco has suspended daylight saving during Ramadan, the ninth month of the Islamic calendar, from 2012.

⁶¹ Europa Island was settled on and off from the 1860s to the 1920s. It has an airstrip and a weather station. Standard time was perhaps used from 1911 when France first used it.

⁶² Phosphate from guano was obtained from Juan de Novo Island from about 1900 to 1970. It has an airstrip and a weather station. Standard time was perhaps used from 1911 when France first used it.

⁶³ Glorioso Islands were settled by Hippolyte Caltaux in 1880 who had coconut and maize plantations. The islands were exploited for phosphate from guano from 1914 to 1958. There is an airstrip and a weather station. Standard time was perhaps used from 1911 when France first used it.

⁶⁴ An airstrip and a weather station were constructed on Tromelin Island in 1954.

⁶⁵ Freetown, Sierra Leone put clocks forward 40 minutes from June to September, 1935 to 1942.

⁶⁶ Tunis, Tunisia was on Paris local mean time from 1881 to 1911.

⁶⁷ Laayoune, Western Sahara has suspended daylight saving during Ramadan, the ninth month of the Islamic calendar, from 2012.

⁶⁸ Antarctica section comprises stations that were open as at 2016.