Digest of United Kingdom Energy Statistics 2011

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Digest of United Kingdom Energy Statistics

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- are well explained and readily accessible
- are produced according to sound methods, and
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Monthly and quarterly data are also available for Energy, Solid fuels and derived gases, Petroleum, Gas and Electricity at:

www.decc.gov.uk/en/content/cms/statistics/source/source.aspx

Information on Energy Prices is available at:

www.decc.gov.uk/en/content/cms/statistics/prices/prices.aspx

A list of tables

Chapter 6 Combined heat and power

Chapter 7 Renewable sources of energy

Annex A Energy and commodity balances, conversion factors and calorific values

Introduction

I This issue of the Digest of United Kingdom Energy Statistics (DUKES) continues a series which commenced with the Ministry of Fuel and Power Statistical Digest for the years 1948 and 1949, published in 1950. The Ministry of Fuel and Power Statistical Digest was previously published as a Command Paper, the first being that for the years 1938 to 1943, published in July 1944 (Cmd. 6538). A publication tracing the history of energy production and use over the past 60 years was produced in 2009 to mark the 60th anniversary of DUKES. The publication is available at: www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

II The current issue updates the figures given in the Department of Energy and Climate Change's (DECC) *Digest of United Kingdom Energy Statistics 2010*, published in July 2010.

III This printed and bound issue consists of seven chapters and four annexes. The first chapter deals with overall energy. The other chapters cover the specific fuels, combined heat and power and renewable sources of energy. The annexes cover conversion factors and calorific values, a glossary of terms, further sources of information and major events in the energy industries.

IV This Digest is also available on the internet. Some additional information appears on the internet only. The tables on the internet are provided in Microsoft Excel format. Most internet versions of the tables include data for earlier years, which are not provided in the printed copy publication. For example commodity and energy balances (see VII and VIII, below) for 1998 to 2007 are included on the internet, and tables that show five years in this printed version show thirteen years in their internet form because page sizes are not a limiting factor. In addition, the following appear on the internet version only:

Long term trends text and tables
Major events from 1990 to 2011 - Annex D
(only Major events for 2009 to 2011 appear in the printed and bound version)
Energy and the environment – Annex E
UK oil and gas resources - Annex F
Foreign trade – Annex G
Flow charts – Annex H
Energy balance: net calorific values – Annex I
Heat reconciliation – Annex J

V Annual information on prices is included in the publication *Quarterly Energy Prices*. This is available together with *Energy Trends* on subscription from the Department of Energy and Climate Change. The data are also available on the DECC website. Further information on these publications can be found in Annex C.

VI Where necessary, data have been converted or adjusted to provide consistent series. However, in some cases changes in methods of data collection have affected the continuity of the series. The presence of remaining discontinuities is indicated in the chapter text or in footnotes to the tables.

VII Chapters 2, 3, 4, 5 and 7 contain production and consumption of individual fuels and are presented using *commodity balances*. A commodity balance illustrates the flows of an individual fuel through from production to final consumption, showing its use in transformation (including heat generation) and energy industry own use. Further details of commodity balances and their use are given in Annex A, paragraphs A.7 to A.42.

VIII The individual commodity balances are combined in an *energy balance,* presented in Chapter 1, *Energy*. The energy balance differs from a commodity balance in that it shows the interactions between different fuels in addition to illustrating their consumption. The energy balance thus gives a fuller picture of the production, transformation and use of energy showing all the flows. Expenditure on energy is also presented in energy balance format in Chapter 1. Further details of the energy balance and its use, including the methodology introduced in the 2003 Digest for heat, are given in Annex A, paragraphs A.43 to A.58.

IX Chapter 1 also covers general energy statistics and includes tables showing energy consumption by final users and an analysis of energy consumption by main industrial groups. Fuel production and consumption statistics are derived mainly from the records of fuel producers and suppliers.

X Chapters 6 and 7 summarise the results of surveys conducted by AEA Energy & Environment on behalf of DECC which complement work undertaken by DECC. These chapters estimate the contribution made by combined heat and power (CHP) and renewable energy sources to energy production and consumption in the United Kingdom.

XI Some of the data shown in this Digest may contain previously unpublished revisions and estimates of trade from HM Revenue and Customs and the Office for National Statistics. These data are included in Annex G.

Definitions

XII The text at the beginning of each chapter explains the main features of the tables. Technical notes and definitions, given at the end of this text, provide detailed explanations of the figures in the tables and how they are derived. Further information on methodologies are also provided on the DECC website for each fuel at www.decc.gov.uk/en/content/cms/statistics/source/source.aspx.

XIII Most chapters contain some information on 'oil' or 'petroleum'; these terms are used in a general sense and vary according to usage in the field examined. In their widest sense they are used to include all mineral oil and related hydrocarbons (except methane) and any derived products.

XIV An explanation of the terms used to describe electricity generating companies is given in Chapter 5, paragraphs 5.66 to 5.72.

XV Data in this issue have been prepared on the basis of the Standard Industrial Classification (SIC 2007) as far as is practicable. For further details of classification of consumers see Chapter 1, paragraphs 1.56 to 1.60.

XVI Where appropriate, further explanations and qualifications are given in footnotes to the tables.

Proposed change to use net calorific values when producing energy statistics

XVII A consultation was launched in the 2005 edition of the Digest seeking views of users as to whether Net Calorific Values (NCVs) should be used in place of Gross Calorific Values (GCVs). As a result of this consultation, DECC recognised that there are good arguments both for and against moving from GCV to NCV. However at present it has been concluded that there would be no demonstrable advantage to changing the method of presenting UK Energy statistics, and so GCVs continue to be used in this edition and will be used in future editions of the Digest. The fuel specific NCVs will continue to be published, and are shown in Annex A. The total energy balances on a net calorifc basis are now being produced as part of the internet version of the Digest, Annex I.

Geographical coverage

XVIII The geographical coverage of the statistics is the United Kingdom. Shipments to the Channel Islands and the Isle of Man from the United Kingdom are not classed as exports. Supplies of solid fuel and petroleum to these islands are therefore included as part of United Kingdom inland consumption or deliveries.

Periods

XIX Data in this Digest are for calendar years or periods of 52 weeks, depending on the reporting procedures within the fuel industry concerned. Actual periods covered are given in the notes to the individual fuel chapters

Revisions

XX The tables contain revisions to some of the previously published figures, and where practicable the revised data have been indicated by an 'r'. The 'r' marker is used whenever the figure has been revised from that published in the printed copy of the 2010 Digest, even though some figures may have been amended on the internet version of the tables. Statistics on energy in this Digest are

classified as National Statistics. This means that they are produced to high professional standards as set out in the UK Statistics Authority's Code of Practice for Official Statistics. The Code of Practice requires that all the public bodies that produce official statistics "Publish a revisions policy for those outputs that are subject to scheduled revisions. Provide a statement explaining the nature and extent of revisions at the same time that they are released". The following statement outlines the policy on revisions for energy statistics.

Revisions to data published in the *Digest of UK Energy Statistics*.
It is intended that any revisions should be made to previous years' data only at the time of the publication of the Digest (ie in July 2011 when this Digest is published, revisions can be made to 2009 and earlier years). In exceptional circumstances previous years' data can be amended between Digest publication dates, but this will only take place when quarterly *Energy Trends* is published. The reasons for substantial revisions will be explained in the 'Highlights' sheet of the internet version of the table concerned. Valid reasons for revisions of Digest data include:

- revised and validated data received from a data supplier;
- the figure in the Digest was wrong because of a typographical or similar error.

In addition, when provisional annual data for a new calendar year (eg 2011) are published in *Energy Trends* in March of the following year (eg March 2012), percentage growth rates are liable to be distorted if the prior year (ie 2010) data are constrained to the Digest total, when revisions are known to be required. In these circumstances the prior year (ie 2010) data will be amended for all affected tables in *Energy Trends* and internet versions of all affected Digest tables will be clearly annotated to show that the data has been up-dated in *Energy Trends*.

Revisions to 2011 data published in *Energy Trends* prior to publication in the 2012 edition of the *Digest of UK Energy Statistics.*

- All validated amendments from data suppliers will be updated when received and published in the next statistical release.
- All errors will be amended as soon as identified and published in the next statistical release.
- Data in energy and commodity balances format will be revised on a quarterly basis, to coincide with the publication of *Energy Trends*.

Further details on the UK Statistics Authority's Code of Practice for Official Statistics can be found at: www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html. DECC's statements of compliance with the Code are available at:
www.decc.gov.uk/en/content/cms/statistics/governance/governance.aspx.
The UK Statistics Authority have undertaken as assessment of DECC's energy statistics and their report can be accessed at: www.statisticsauthority.gov.uk/assessment/assessment-reports/index.html. The authority's recommendations have been incorporated into this publication and other DECC energy statistical publications and outputs.

Energy data on the internet

XXI Energy data are held on the energy area of the DECC website, under "statistics". The Digest is available at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx.
Information on further DECC energy publications available both in printed copy format and on the Internet is given in Annex C.

XXII The Department of Energy and Climate Change was created on 3 October 2008. This Department took over energy policy from the former Department for Business, Enterprise and Regulatory Reform (BERR) and climate change policy from the Department for Environment, Food and Rural Affairs (Defra). Within this publication references to DECC's predecessor Departments refer to BERR or Defra.

XXIII Short term statistics are published:

- monthly, by DECC on the Internet at www.decc.gov.uk/en/content/cms/statistics/source/source.aspx
- quarterly, by DECC in paper and on the internet in *Energy Trends,* and *Quarterly Energy Prices*: www.decc.gov.uk/en/content/cms/statistics/publications/publications.aspx
- quarterly, by DECC in a Statistical Press Release which provides a summary of information published in *Energy Trends* and *Quarterly Energy Prices* publications: www.decc.gov.uk/en/content/cms/statistics/publications/publications.aspx

- monthly, by the Office for National Statistics in the Monthly Digest of Statistics.

To subscribe to *Energy Trends* and *Quarterly Energy Prices,* please contact Clive Sarjantson at the address given at paragraph XXIX. Single copies are available from the Publications Orderline, as given in Annex C, priced £6 for Energy Trends and £8 for Quarterly Energy Prices.

Table numbering

XXIV Page 10 contains a list showing the tables in the order in which they appear in this issue, and their corresponding numbers in previous issues.

Symbols used

XXV The following symbols are used in this Digest:

..	not available
-	nil or negligible (less than half the final digit shown)
r	Revised since the previous edition

Rounding convention

XXVI Individual entries in the tables are rounded independently and this can result in totals, which are different from the sum of their constituent items.

Acknowledgements

XXVII Acknowledgement is made to the main coal producing companies, the electricity companies, the oil companies, the gas pipeline operators, the gas suppliers, National Grid, the Institute of Petroleum, the Coal Authority, the United Kingdom Iron and Steel Statistics Bureau, AEA Energy & Environment, the Department for Environment, Food and Rural Affairs, the Department for Transport, OFGEM, Building Research Establishment, HM Revenue and Customs, the Office for National Statistics, and other contributors to the enquiries used in producing this publication.

Cover photograph

XXVIII The cover illustration used for this Digest and other DECC energy statistics publications is from a photograph by Peter Askew. It was a winning entry in the DTI News Photographic Competition in 2002.

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XXX For enquiries concerning particular data series or chapters contact those named on page 9 or at the end of the relevant chapter.

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July 2011

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Tables as they appear in this issue and their corresponding numbers in the previous three issues

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Chapter 1
Energy

Key points

- In 2010 UK energy production was down 5.3 per cent on a year earlier, in line with the general trend seen over the last decade. Oil and gas accounted for 80 per cent of UK production (Tables 1.1 and 1.2).
- Primary energy consumption was up 3.2 per cent. Final energy consumption rose by 4.4 per cent with more energy used for heating (more details are available in Energy Consumption in the UK www.decc.gov.uk/en/content/cms/statistics/publications/ecuk/ecuk.aspx).
- On a temperature adjusted basis, primary energy consumption was down 0.4 per cent continuing the downward trend of the last five years. In 2010 the average UK temperature was 9.0 degrees Celsius, 1.1 degrees lower than in 2009, and 0.7 degrees lower than the average temperature between 1971 and 2000 (Table 1.1.7).
- The UK remained a net importer of energy, with a dependency level of 28 per cent. Fossil fuels remain the dominant source, accounting for 90 per cent of supply. Supply from renewables increased, with its contribution accounting for 3.3 per cent of consumption on the EU agreed basis (see chapter 7).
- In 2010 there were large increases in imports of LNG (liquefied natural gas), and reduced nuclear output due to outages, more details are available in chapters 4 and 5 respectively.

Introduction

1.1 This chapter presents figures on overall energy production and consumption. Figures showing the flow of energy from production, transformation and energy industry use through to final consumption are presented in the format of an energy balance based on the individual commodity balances presented in Chapters 2 to 5 and 7.

1.2 The chapter begins with aggregate energy balances covering the last three years (Tables 1.1 to 1.3) starting with the latest year, 2010. Energy value balances then follow this for the same years (Tables 1.4 to 1.6) and Table 1.7 shows sales of electricity and gas by sector in value terms. Table 1.8 covers final energy consumption by the main industrial sectors over the last five years, followed by Table 1.9, which shows the fuels used for electricity generation by these industrial sectors. The explanation of the principles behind the energy balance and commodity balance presentations, and how this links with the figures presented in other chapters, is set out in Annex A. Information on long term trends (Tables 1.1.1 to 1.1.8) for production, consumption, and expenditure on energy, as well as long term temperature data and analyses such as the relationship between energy consumption and the economy of the UK are available on DECC's energy statistics web site at:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Calorific values when producing energy statistics

1.3 In this publication Gross Calorific Values (GCVs) are used to convert fuel from their original units to tonnes of oil equivalent (toe). An alternative is to use Net Calorific Values (NCVs) as detailed in paragraph XVII of the introduction. The fuel specific NCVs are shown at Annex A. However, as the EU renewables target is calculated on data converted using net calorific values, aggregate energy balances for the most recent years have been calculated using NCVs; these are used in table 7.7, and are available on the internet version, Annex I, of this publication at:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx.

The energy industries

1.4 The energy industries in the UK play a central role in the economy by producing, transforming and supplying energy in its various forms to all sectors. They are also major contributors to the UK's Balance of Payments through the exports of crude oil and oil products. The box below summarises the energy industries' contribution to the economy in 2010:

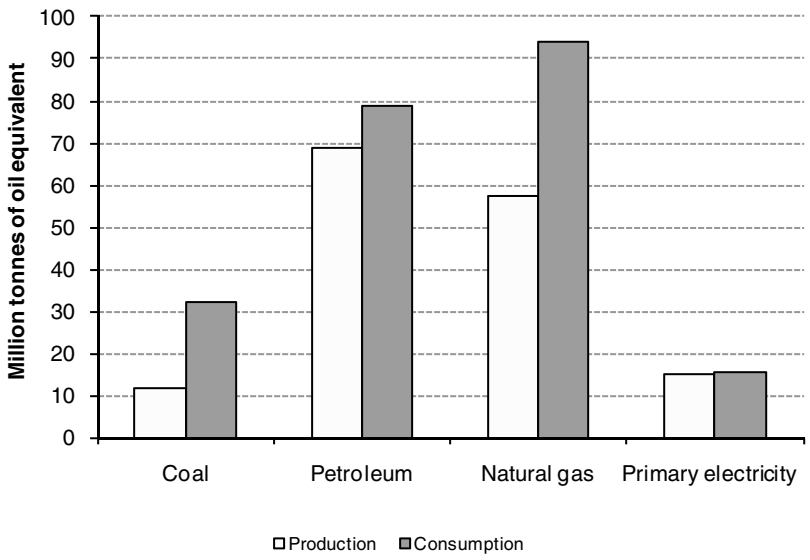
- 3.9 per cent of GDP;
- 9.9 per cent of total investment;
- 51.8 per cent of industrial investment;
- 173,000 people directly employed (7 per cent of industrial employment);
- Many others indirectly employed (eg an estimated 207,000 in support of UK Continental Shelf activities).

Aggregate energy balance (Tables 1.1, 1.2 and 1.3)

1.5 These tables show the flows of energy in the United Kingdom from production to final consumption through conversion into secondary fuels such as coke, petroleum products, secondary electricity and heat sold. The figures are presented on an energy supplied basis, in tonnes of oil equivalent (toe), a unit of energy where 1 toe = 41.868 GJ, see also paragraph 1.26.

1.6 In 2010, the primary supply of fuels was 227.7 million tonnes of oil equivalent, a 3.4 per cent increase compared to 2009. Indigenous production in 2010 was 5.3 per cent lower than in 2009, with output falling in each year since 1999. Chart 1.1 illustrates the figures for the production and consumption of individual primary fuels in 2010. In 2010, aggregate primary fuel consumption was not met by indigenous production; this continues the trend since 2004 when the UK became a net importer of fuel. However, as explained in subsequent chapters, the UK has traded fuels such as oil and gas regardless of whether it has been a net exporter or importer. In 2010 the UK imported more coal, crude oil, electricity and gas than it exported; however, the UK remained a net exporter of petroleum products. There was particularly large growth in gas imports in 2010, particularly of Liquefied Natural Gas (LNG), following the expansion of import facilities in 2009, and an increase in gas exports.

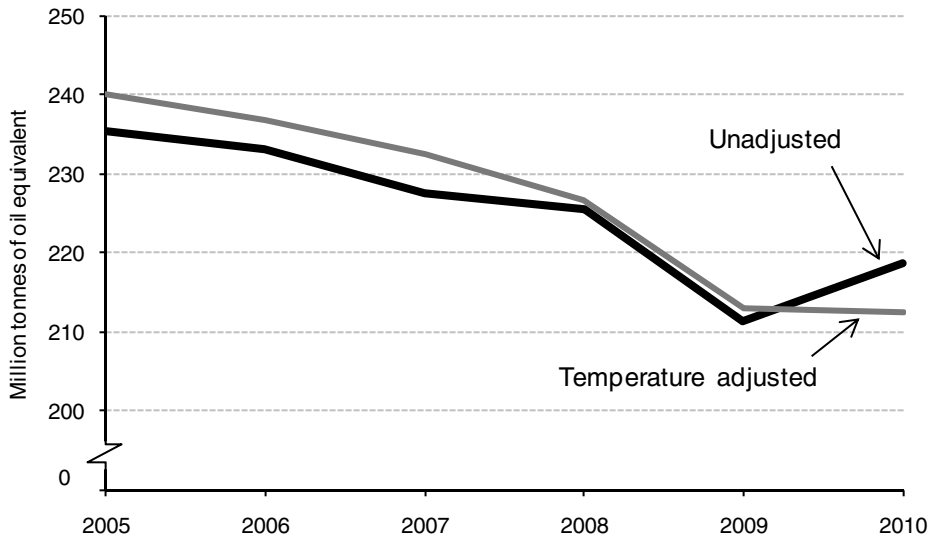
Chart 1.1: Production and consumption of primary fuels 2010



Note: Includes non-energy use of petroleum and gas. Differences between consumption and production are made up by foreign trade, marine bunkers and stock changes.

1.7 Total primary energy demand was 3.2 per cent higher in 2010 than in 2009 at 227.5 million tonnes of oil equivalent. The very small difference between demand and supply is classed as the statistical difference, which is explained in paragraph 1.62. The increase in demand, follows falls in each of the previous four years. This rise was due to the colder weather in 2010, with the average annual temperature in 2010 of 9.0 degrees being 1.1 degree colder than in 2009, and the coldest annual average since 1987. The winter months were particularly cold, with the average temperatures in January – March and October – December 2010 down 2.3 degrees per day on 2009 levels. On a temperature corrected basis, primary energy consumption (primary demand less non-energy use) was estimated to have fallen by 0.4 per cent. A table showing temperature corrected demand is shown in table 1.1.4 in the internet annex on long term trends, with chart 1.2 shown below. Chart 1.3 shows the composition of primary demand in 2010.

Chart 1.2: Primary energy consumption



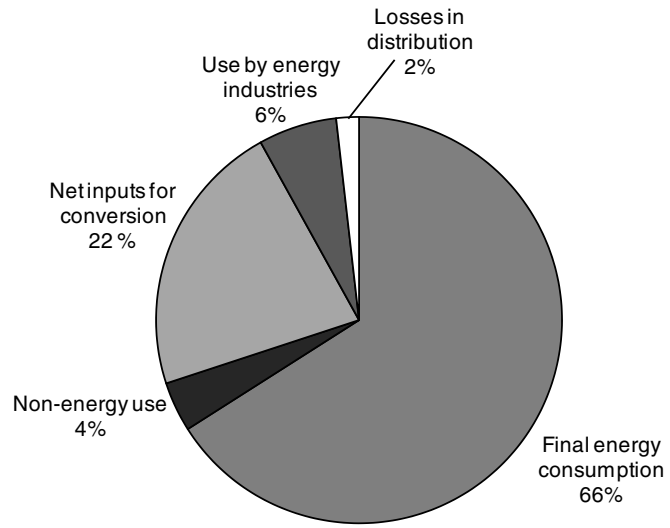
1.8 The transfers row in Tables 1.1 to 1.3 should ideally sum to zero with transfers from primary oils to petroleum products amounting to a net figure of zero. Similarly the manufactured gases and natural gas transfers should sum to zero. However differences in calorific values between the transferred fuels can result in non-zero values.

1.9 The transformation section of the energy balance shows, for each fuel, the net inputs for transformation uses. For example, Table 1.1 shows that 4,124 thousand tonnes of oil equivalent of coal feeds into the production of 3,764 thousand tonnes of oil equivalent of coke, representing a loss of 360 thousand tonnes of oil equivalent in the manufacture of coke in 2010. In 2010, energy losses during the production of electricity and other secondary fuels amounted to just over 50 million tonnes of oil equivalent, shown in the transformation row in Table 1.1.

1.10 In 2010, generation by gas and coal plants both increased, making up for the decline in nuclear production. Generation from coal-fired stations was 3.5 per cent higher in 2010 than in 2009, but was down nearly 30 per cent on levels in 2006. Generation from gas in 2010, was also 3.5 per cent up in 2010, and was just 1.3 per cent below its 2008 peak levels. Generation from nuclear sources decreased by 8.4 per cent due to maintenance outages at several stations. Generation from wind increased marginally despite low average wind speeds, reflecting capacity increases, though hydro output was down sharply due to the low rainfall in 2010.

1.11 The switch from nuclear to more gas and coal fired electricity generation contributed to the increase in carbon dioxide emissions between 2009 and 2010. Provisional DECC estimates suggest that emissions rose by 18 million tonnes of carbon dioxide ($MtCO_2$) (3.8 per cent) to 492 $MtCO_2$ between 2009 and 2010. The main factor contributing to the rise was increased domestic gas use reflecting the colder weather in 2010. More details of carbon dioxide emissions are available in a press notice, published in March, which is available on the DECC website at: www.decc.gov.uk/en/content/cms/statistics/climate_stats/gg_emissions/uk_emissions/2010_prov/2010_prov.aspx

Chart 1.3: Primary demand 2010



Primary demand: 227.5 million tonnes of oil equivalent

1.12 The energy industry use section of the table represents use of fuels by the energy industries themselves. This section also includes consumption by those parts of the iron and steel industry which behave like an energy industry i.e. they are involved in the transformation processes (see paragraph A.29 of Annex A). In 2010, energy industry use amounted to 14.2 million tonnes of oil equivalent of energy, broadly unchanged on 2009 levels.

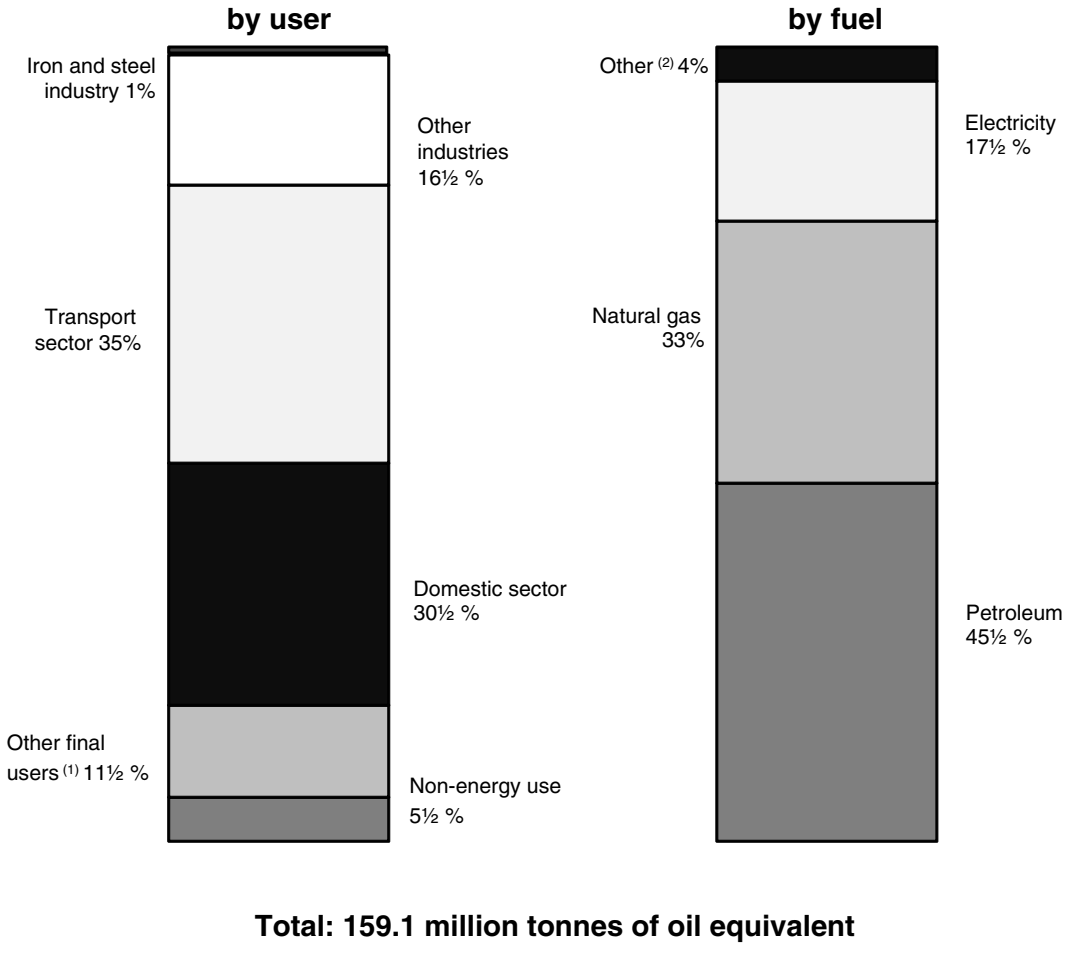
1.13 Losses presented in the energy balance include distribution and transmission losses in the supply of manufactured gases, natural gas, and electricity. Recorded losses increased by 7.9 per cent between 2009 and 2010, driven by an increase in gas losses; this is currently being investigated. Losses in North Sea gas production are no longer separately identified in the simplified Petroleum Product Reporting System, which was introduced in January 2001. This has improved the quality of production data and reduced reported losses. Further details can be found in paragraphs 4.58 in Chapter 4.

1.14 Total final consumption, which includes non-energy use of fuels, in 2010 was 159.1 million tonnes of oil equivalent; this is a 6.8 million tonnes of oil equivalent increase, 4.4 per cent, on the consumption in 2009. The majority of this increase was from the domestic sector, where consumption increased by 12.6 per cent. This sharp rise in consumption was due to the colder weather in 2010, with temperatures on average 1.1 degree Celsius below those of 2009; 2010 was the coldest year since 1987. Final energy consumption in 2010 was mainly accounted for by the transport sector (35.0 per cent), the domestic sector (30.5 per cent), the industrial sector (17.3 per cent), the commercial sector (6.2 per cent) and non-energy use (5.7 per cent). These figures are illustrated in Chart 1.4. Recent trends in industrial consumption are shown in Table 1.8 and are discussed in paragraphs 1.24 to 1.26.

1.15 The main fuels used by final consumers in 2010 were petroleum products (45.3 per cent), natural gas (32.9 per cent) and electricity (17.7 per cent). The amount of heat that was bought for final consumption accounted for 0.8 per cent of the total final energy consumption.

1.16 Of the petroleum products consumed by final users 11.5 per cent was for non-energy purposes; for natural gas 1.4 per cent was consumed for non-energy purposes. Non-energy use of fuels includes use as chemical feedstocks and other uses such as lubricants. Non-energy use of fuels for 2010 are shown in Table 1A. Further details of non-energy use are given in Chapter 3, paragraph 3.40 and Chapter 4, paragraph 4.50.

Chart 1.4: Final energy consumption 2010



Total: 159.1 million tonnes of oil equivalent

(1) Includes services and agricultural sectors.
(2) Includes coal, manufactured fuels, renewables & waste, and heat sold.

Table 1A: Non-energy use of fuels 2010

Thousand tonnes of oil equivalent

	Petroleum	Natural gas
Petrochemical feedstocks	4,769	731
Other	3,527	-
Total	**8,296**	**731**

1.17 The data in the energy balances (Table 1.1), can be viewed in a number of ways, with a number of other statistics derived to produce different descriptions of the UK energy market. Recently greater focus has been given to looking at import dependency and also on fossil fuel dependency. Import dependency is calculated by looking at net imports divided by adjusted primary demand (Table 1B). Net imports is simply imports less exports. This amount is then normally considered as its share of energy demand, however, as energy supplied to marine bunkers may have been imported, this amount is added to the demand figure.

Table 1B: Net import dependency 2008 to 2010

Thousand tonnes of oil equivalent

	2008	2009	2010
Net imports	62,376	59,464	65,451
Primary energy demand + bunkers	237,899	223,045	229,775
Net import dependency	**26.2%**	**26.7%**	**28.5%**

1.18 The energy used in the UK can also be classified by whether its source was from fossil fuels, low-carbon sources or other (Table 1C). The main fossil fuel sources in the UK are coal, gas and oil. The low carbon sources include nuclear and renewables such as wind; hydro; and biofuels. The largest component of this series is currently nuclear; the share of nuclear fell from 7.2 per cent to 6.4 per cent, masking the increase in shares from renewables. The other category, shown for completeness includes net imports of electricity, as imports and exports could come from either of the previous categories, and non-biodegradable wastes. Headline data, taken from Table 7.7 later in this publication, show that renewables had a 3.3 per cent share of energy consumption in 2010. There are a range of measures of renewables contribution to energy and these are discussed in more detail in Chapter 7.

Table 1C: Fossil fuel and low carbon dependencies 2008 to 2010

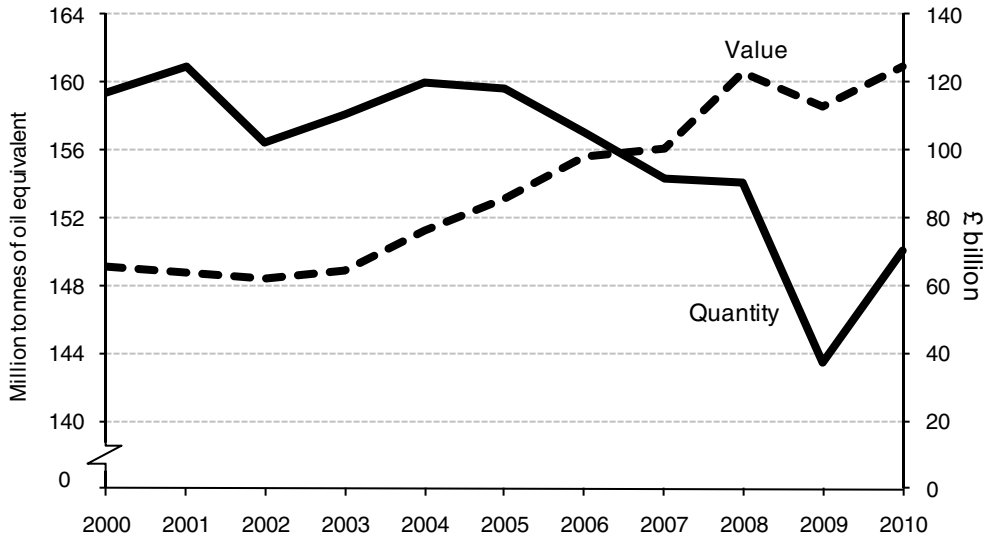
Per cent

	2008	2009	2010
Fossil fuel	91.4%	89.2%	89.8%
Low-carbon	8.0%	10.5%	9.9%
Other	0.6%	0.4%	0.3%

Value balance of traded energy (Tables 1.4, 1.5 and 1.6)

1.19 Tables 1.4 to 1.6 present the value of traded energy in a similar format to the energy balances. The balance shows how the value of inland energy supply is made up from the value of indigenous production, trade, tax and margins (profit and distribution costs). The lower half of the table shows how this value is generated from the final expenditure on energy through transformation processes and other energy sector users as well as from the industrial and domestic sectors. The balances only contain values of energy which are traded, ie where a transparent market price is applicable. Further technical notes are given in paragraphs 1.28 to 1.62. In keeping with the energy balances, the value balances, since 2000, have included data on heat generation and heat sold. Additionally, an estimate of the amount of Climate Change Levy paid is included in Tables 1.4, 1.5 and 1.6. This levy was introduced in April 2001 and is payable by non-domestic final consumers of gas, electricity, coal, coke and LPG.

Chart 1.5: Energy consumption and estimated expenditure on energy by final users



1.20 Total expenditure by final consumers in 2010 is estimated at £124,930 million, (£124,165 million shown as actual final consumption and £765 million of coal consumed by the iron and steel sector in producing coke for their own consumption). This is up by 10.6 per cent on 2009, reflecting a steady increase in energy prices. In 2010, crude oil prices averaged around $80 per barrel, compared to an average price of just over $60 per barrel in 2009. Chart 1.5 shows energy consumption and expenditure by final users.

1.21 The value balance provides a guide on how the value chain works in the production and consumption of energy. For example, in 2010, £23,110 million of crude oil was indigenously produced, of which £14,930 million was exported, and £19,680 million of crude oil was imported. Allowing for stock changes, this provides a total value of UK inland crude oil supply of £27,920 million. This fuel was then completely consumed within the petroleum industry in the process of producing £38,500 million of petroleum products. Again some external trade and stock changes took place before arriving at a basic value of petroleum products of £35,280 million. In supplying the fuel to final consumers distribution costs were incurred and some profit was made amounting to £2,625 million, whilst duty and tax meant a further £37,765 million was added to the basic price to arrive at the final market value of £75,675 million. This was the value of petroleum products purchased, of which industry purchased £2,445 million, domestic consumers for heating purposes purchased £1,730 million, with the vast majority purchased within the transportation sector, £67,680 million.

1.22 Of the total final expenditure on energy in 2010 (£124,930 million), the biggest share, 56 per cent, fell to the transport sector. Of the remaining 44 per cent, industry purchased around a quarter or £13,720 million, with the domestic sector purchasing around a half or £30,575 million.

Sales of electricity and gas by sector (Table 1.7)

1.23 Table 1.7 shows broad estimates for the total value of electricity and gas to final consumption. Net selling values provide some indication of typical prices paid in broad sectors and can be of use to supplement more detailed and accurate information contained in the rest of this chapter. More detailed information on energy prices is available in Quarterly Energy Prices, available on DECC's energy statistics web site at: www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx

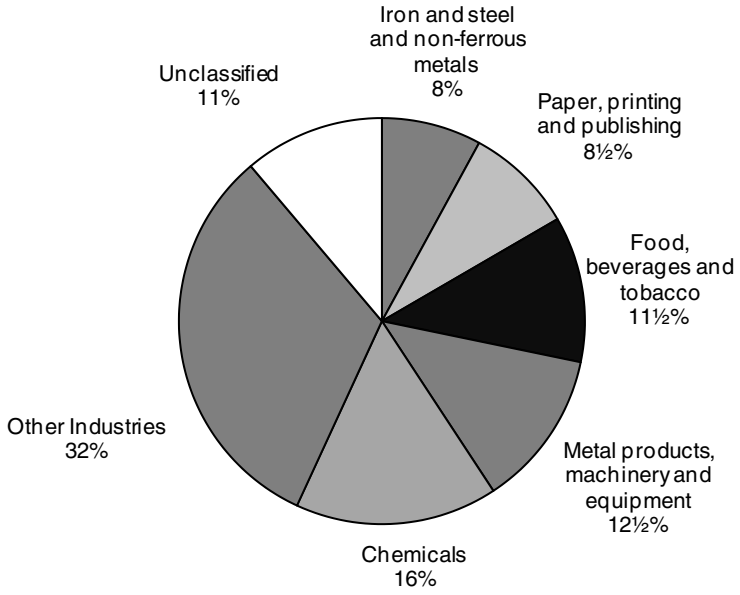
Energy consumption by main industrial groups (Table 1.8)

1.24 This table presents final energy consumption for the main industrial sub-sectors over the last five years.

1.25 So far as is practicable, the user categories have been regrouped this year on the basis of the 2007 Standard Industrial Classification (see paragraphs 1.56 to 1.60). However, some data suppliers have difficulty in classifying consumers to this level of detail and the breakdown presented in these tables must therefore be treated with caution. The groupings used are consistent with those used in Table 1.9 which shows industrial sectors' use of fuels for generation of electricity (autogeneration).

1.26 In 2010, 27.5 million tonnes of oil equivalent were consumed by the main industrial groups. The largest consuming groups were chemicals (16.1 per cent), metal products, machinery and equipment (12.5 per cent), food, beverages and tobacco (11.6 per cent), iron and steel and non-ferrous metals (8.0 per cent), and paper, printing and publishing (8.7 per cent). The figures are illustrated in Chart 1.6. The large other industries sector includes mineral products (10.3 per cent) as well as a number of the smaller energy consuming sectors.

Chart 1.6: Energy consumption by main industrial groups 2010



Total final energy consumption by industry
27.5 million tonnes of oil equivalent

Fuels consumed for electricity generation by main industrial groups (autogeneration) (Table 1.9)

1.27 This table gives details of the amount of each fuel consumed by industries in order to generate electricity for their own use. Fuel consumption is consistent with the figures given for "other generators" in Table 5.4 of Chapter 5. The term autogeneration is explained further in paragraphs 1.33 and 1.34. Electricity produced via autogeneration is included within the figures for electricity consumed by industrial sectors in Table 1.8. Table 1.9 has been produced using the information currently available and shows the same sector detail as Table 1.8, data cannot be given in as much detail as in the individual commodity balances and the energy balance because it could disclose information about individual companies. Table 1.9 allows users to allocate the fuel used for autogeneration to individual industry groups in place of the electricity consumed. Further information on the way Table 1.9 links with the other tables is given in paragraph 1.34.

Technical notes and definitions

I Units and measurement of energy

Units of measurement

1.28 The original units of measurement appropriate to each fuel are used in the individual fuel chapters. A common unit of measurement, the tonne of oil equivalent (toe), which enables different fuels to be compared and aggregated, is used in Chapter 1. In common with the International Energy Agency and with the Statistical Office of the European Communities, the tonne of oil equivalent is defined as follows:

1 tonne of oil equivalent = 10^7 kilocalories
= 396.83 therms
= 41.868 Gigajoules (GJ)
= 11,630 Kilowatt hours (kWh)

1.29 This unit should be regarded as a measure of energy content rather than a physical quantity. One tonne of oil is not equal to one tonne of oil equivalent.

Thermal content - energy supplied basis of measurement

1.30 Tables 1.1 to 1.3, 1.8 and 1.1.1 to 1.1.5 (available on DECC's energy statistics site at www.decc.gov.uk/en/content/cms/statistics/source/total/total.aspx) are compiled on an energy-supplied basis. Detailed data for individual fuels are converted from original units to tonnes of oil equivalent using gross calorific values and conversion factors appropriate to each category of fuel. The results are then aggregated according to the categories used in the tables. Gross calorific values represent the total energy content of the fuel, including the energy needed to evaporate the water present in the fuel (see also paragraph 1.52).

1.31 Estimated gross and net calorific values for 2010 are given on page 231. Calorific values are reviewed each year in collaboration with the fuel industries, and figures for earlier years can be found in Table A.2 and A.3 on pages 232 and 233. This year, some revisions have been made to the net calorific values for certain waste and biofuels. To construct energy balances on an energy supplied basis calorific values are required for production, trade, and stocks, as follows:

Coal The weighted average gross calorific value of all indigenous coal consumed is used to derive the thermal content of coal production and undistributed stocks. Thermal contents of imports and exports allow for the quality of coal. Thermal contents of changes in coal stocks at secondary fuel producers are the average calorific values of indigenous coal consumed.

Petroleum Work carried out in 1997 to revise calorific values for petroleum products did not find any recent work on the subject. In the absence of such work, the gross calorific values, included in Annex A, and used in the construction of these energy balances from 1990 onwards have been calculated using a formula derived by the US Bureau of Standards. This formula estimates the gross calorific value of products according to their density as follows:

$Gj = 51.83 - 8.78 \times d^2$, where d is the density of the product in terms of kilograms per litre.

For crude petroleum and refinery losses, the weighted average calorific value for all petroleum products from UK refineries is used. A notional figure of 42.9 GJ per tonne is used for non-energy petroleum products (industrial and white spirits, lubricants, bitumen, petroleum coke, waxes and miscellaneous products).

Gases Although the original unit for gases is the cubic metre, figures for gases are generally presented in the fuel sections of this Digest in gigawatt hours (GWh), having been converted from cubic metres using gross calorific values provided by the industries concerned. Conversion factors between units of energy are given on the flap inside the back cover and on page 229.

Electricity and heat Unlike other fuels, the original unit used to measure electricity and heat is a measure of energy. The figures for electricity and heat can therefore be converted directly to toe using the conversion factors on the flap inside the back cover and on page 229.

Primary electricity Hydro electricity and net imports of electricity are presented in terms of the energy content of the electricity produced (the energy supplied basis). This is consistent with international practice. Primary inputs for nuclear electricity assume the thermal efficiencies at nuclear stations given in Chapter 5, Table 5.10 (38.3 per cent in 2010). (See Chapter 5, paragraphs 5.74 and 5.81).

Non-energy uses of fuel

1.32 Energy use of fuel mainly comprises use for lighting, heating, motive power and power for appliances. Non-energy use includes use as chemical feedstocks, solvents, lubricants and road making material. It should be noted that the amounts of non-energy use of natural gas included in the Digest are approximate. Further discussion of non-energy uses of lubricating oils and petroleum coke appears in Chapter 3, paragraph 3.40.

Autogeneration of electricity

1.33 Autogeneration is defined as the generation of electricity by companies whose main business is not electricity generation, the electricity being produced mainly for that company's own use. Estimated amounts of fuel used for thermal generation of electricity by such companies, the output of electricity and the thermal losses incurred in generation are included within the Transformation sector in the energy balances shown in Tables 1.1 to 1.3. Electricity used in the power generation process by autogenerators is shown within the Energy Industry Use section. Electricity consumed by industry and commerce from its own generation is included as part of Final consumption. This treatment is in line with the practice in international energy statistics.

1.34 Figures on total amount of fuel used and electricity generated by autogenerators, and the amount of electricity for own consumption is shown in Tables 1.9, 5.1, 5.3 to 5.6. Table 1.9 summarises the figures by broad industrial groups. Much of the power generated is from combined heat and power (CHP) plants and data from Chapter 6 are included within Table 1.9. Differences will occur where CHP plants are classified to major power producers, and this mainly affects the chemicals sector. The method of allocating fuel used in CHP plants between electricity production and heat production is described in Chapter 6 paragraphs 6.35 to 6.37. This method can give rise to high implied conversion efficiencies in some sectors, most notably in the iron and steel sector.

Final consumption, deliveries, stock changes

1.35 Figures for final consumption relate to deliveries, if fuels can be stored by users and data on actual consumption are not available. Final consumption of petroleum and solid fuels is on a deliveries basis throughout, except for the use of solid fuels by the iron and steel industry. Figures for domestic use of coal are based on deliveries to merchants. Figures for stock changes in Tables 1.1 to 1.3 cover stocks held by primary and secondary fuel producers, major distributors of petroleum products, and stocks of coke and breeze held by the iron and steel industry; for coal they also include an estimate of volumes in transit. Figures for stock changes in natural gas represent the net amount put into storage by gas companies operating pipelines.

1.36 Figures for final consumption of electricity include sales by the public distribution system and consumption of electricity produced by generators other than the major electricity producing companies. Thus electricity consumption includes that produced by industry and figures for deliveries of other fuels to industry exclude amounts used to generate electricity (except for years prior to 1987, shown in tables giving long term trends).

Heat sold

1.37 Heat sold is defined as heat that is produced and sold under the provision of a contract. The heat sold figures have been derived from two sources covering CHP plants and community heating schemes without CHP plants. Data for heat sold were supplied by CHP plants to the Combined Heat and Power Quality Assurance Programme and were processed by AEA. Data for heat consumption from community heating schemes were derived from the Building Research Establishment's (BRE) 'Nationwide Survey of Community Heating' that was carried out in 1997, a database of community heating schemes in social housing in 2000, and Community Heating Sales Surveys undertaken between 2003 and 2005. The estimates from these sources have been used to derive heat sold

figures since 1999. When information about where the heat was generated was not available from the BRE sources, it was assumed that domestic sector heat consumption was provided by the commercial sector, public sector heat consumption was provided by the public administration and industrial sectors (using proportions derived from CHP statistics) and that industrial sector heat consumption was provided by the industrial sector. The introduction of heat sold into the energy balances has not affected the individual fuel totals, since the energy used to generate the heat has been deducted from the final consumption section of the energy balance and transferred to the transformation section. The figures that are included in the balances should be treated as indicative of the amount of heat sold. Annex J of the Digest, at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx, shows the quantity of fuel by consuming sector used to produce heat that is subsequently sold.

II Energy balances (Tables 1.1, 1.2 and 1.3)

1.38 Tables 1.1, 1.2 and 1.3 show the energy flows as the primary fuels are processed (or used) and as the consequent secondary fuels are used. The net inputs to transformation are shown in the transformation rows and hence outputs from transformation processes into which primary fuels are input (such as electricity generation, heat generation or petroleum refining) appear as positive figures under the secondary product's heading in the tables. Similarly the net inputs are shown as negative figures under the primary fuel headings.

III Value balances (Tables 1.4, 1.5 and 1.6)

Valuation of energy purchases

1.39 In common with the rest of the chapter, these tables covering energy expenditure follow a balance format. While a user may derive data on a similar basis as that previously published, the balance table allows for more varied use and interpretation of traded energy value data. That said, the table continues to only show values for energy that has to be purchased and therefore does not include estimated values of a sector's internal consumption, such as coal used in the process of coal extraction.

The value balance

1.40 The table balances around **market value of inland consumption**, with the lower half of the table showing the total value of consumption by end users, sub divided into energy sector users and final users both for energy and non-energy use. The top half of the table shows the supply components that go to make up the final market value of inland consumption, namely upstream cost of production, imports, taxes and the margins and costs of delivering and packaging the fuel for the final consumer. The total final consumers' value of energy consumption is represented by the lines 'total non energy sector use' and iron and steel sectors purchases of coal for use in solid fuel manufacture.

1.41 All figures are estimates and have been rounded to the nearest £5 million.

Fuel definitions in value balances

1.42 **Crude oil** includes NGLs (Natural Gas Liquids) and refinery feedstocks. **Natural gas** does not include colliery methane. **Electricity** only includes electricity delivered via the public distribution system and therefore does not value electricity produced and consumed by autogenerators, however the fuels used by autogenerators are included under Transformation. **Manufactured solid fuels** includes coke, breeze and other solid manufactured fuels, mainly products from patent fuel and carbonisation plants. **Other fuels** includes all other fuels not separately listed, where they can be clearly considered as traded and some reasonable valuation can be made. Fuels mainly contributing to this year's values are wood, coke oven and colliery methane gases sold on to other industrial users and some use of waste products such as poultry litter.

Energy end use

1.43 Values represent the cost to the final user including transportation of the fuel. They are derived, except where actual values are available, from the traded element of the volumes presented in aggregate energy balance and end user prices collected from information supplied by users or energy suppliers. The **energy sector** consists of those industries engaged in the production and sale of

energy products, but values are not given for consumption of self-generated fuels eg coke oven gas used by coke producers. Many of the processes in the **iron and steel** industry are considered to be part of the energy sector in the energy balances, but for the purposes of this economic balance their genuine purchases are treated as those of final consumers, except for purchases of coal directly used in coke manufacture, which is shown separately as part of manufacture of solid fuel. Coal used directly in or to heat blast furnaces is shown as iron and steel final use. **Transformation** includes those fuels used directly in producing other fuels eg crude oil in petroleum products. **Electricity generators** keep and use significant stocks of coal, and the stocks used in consumption each year are shown separately. The value and margins for these being assumed to be the same as other coal purchased in the year. **Road transport** includes all motor spirit and DERV use. **Commercial and other users** includes public administration and miscellaneous uses not classified to the industrial sector.

Supply

1.44 The supply side money chain is derived using various methods. **Indigenous production** represents the estimated basic value of in-year sales by the upstream producers. This value is gross of any taxes or cost they must meet. The valuation problems in attributing network losses in gas and electricity between upstream and downstream within this value chain means any costs borne are included in the production value. **Imports and exports** are valued in accordance with data published by HM Revenue and Customs, contained in Annex G (which can be found on the Internet at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx). However, crude oil is treated differently, where the value is formed from price data taken from a census survey of refiners and volume data taken from Table 3.1. These values are considered to reflect the complete money chain more accurately than Tables G.1 to G.4. **Stock changes** are those for undistributed stocks except for coal where coke oven and generators stocks are included. A stock increase takes money out of the money chain and is therefore represented as a negative. **Distribution costs** are arrived at by removing an estimate of producers' value along with any taxes from the end user values shown. For most fuels, the estimate of producer value is derived from the consumption used for end use and the producer price taken from survey of producers. No sector breakdown is given for gas and electricity margins because it is not possible to accurately measure delivery costs for each sector. **Taxes** include VAT where not refundable and duties paid on downstream sales. Excluded are the gas and fossil fuel levies, petroleum revenue tax and production royalties and licence fees. The proceeds from the fossil fuel levy are redistributed across the electricity industry, whilst the rest are treated as part of the production costs.

Sales of electricity and gas by sector (Table 1.7)

1.45 This table provides data on the total value of gas and electricity sold to final consumers. The data are collected from the energy supply companies. The data are useful in indicating relative total expenditure between sectors, but the quality of data provided in terms of industrial classification has been worsening in recent years. Net selling values provide an indication of typical prices paid in broad sectors.

IV Measurement of energy consumption

Primary fuel input basis

1.46 Energy consumption is usually measured in one of three different ways. The first, known as the primary fuel input basis, assesses the total input of primary fuels and their equivalents. This measure includes energy used or lost in the conversion of primary fuels to secondary fuels (for example in power stations and oil refineries), energy lost in the distribution of fuels (for example in transmission lines) and energy conversion losses by final users. Primary demands as in Table 1.1, 1.2 and 1.3 are on this basis.

Final consumption - energy supplied basis

1.47 The second method, known as the energy supplied basis, measures the energy content of the fuels, both primary and secondary, supplied to final users. Thus it is net of fuel industry own use and conversion, transmission and distribution losses, but it includes conversion losses by final users. Table 1D presents shares of final consumption on this basis. The final consumption figures are presented on this basis throughout Chapter 1.

1.48 Although this is the usual and most direct way to measure final energy consumption, it is also possible to present final consumption on a primary fuel input basis. This can be done by allocating the conversion losses, distribution losses and energy industry use to final users. This approach can be used to compare the total primary fuel use which each sector of the economy accounts for. Table 1E presents shares of final consumption on this basis.

Final consumption - useful energy basis

1.49 Thirdly, final consumption may be expressed in the form of useful energy available after deduction of the losses incurred when final users convert energy supplied into space or process heat, motive power or light. Such losses depend on the type and quality of fuel and the equipment used and on the purpose, conditions, duration and intensity of use. Statistics on useful energy are not sufficiently reliable to be given in this Digest; there is a lack of data on utilisation efficiencies and on the purposes for which fuels are used.

Shares of each fuel in energy supply and demand

1.50 The relative importance of the energy consumption of each sector of the economy depends on the method used to measure consumption. Shares of final consumption on an energy supplied basis (that is in terms of the primary and secondary fuels directly consumed) in 2010 are presented in Table 1D. For comparison, Table 1E presents shares of final consumption on a primary fuel input basis.

Table 1D: Primary and secondary fuels consumed by final users in 2010 – energy supplied basis

	Percentage of each fuel						Percentage of each sector					
	Industry	Transport	Domestic	Others	Total		Solid fuels	Petrol-eum	Gas	Secondary electricity	Bio-mass	Total
Solid fuels	68	1	30	1	100	Industry	7	19	39	34	2	100
Petroleum	8	85	5	2	100	Transport	-	97	-	1	2	100
Gas	20	-	65	15	100	Domestic	2	7	69	21	1	100
Electricity	32	1	36	31	100	Others	-	7	42	48	2	100
Biomass	19	47	20	14	100							
All fuels	**18**	**37**	**33**	**12**	**100**	**All users**	**2**	**43**	**35**	**19**	**2**	**100**

Table 1E: Total primary fuel consumption by final users in 2010 - primary input basis

	Percentage of each fuel						Percentage of each sector					
	Industry	Transport	Domestic	Others	Total		Coal	Petrol-eum	Gas	Primary electricity	Bio-mass	Total
Coal	34	1	36	29	100	Industry	24	12	50	10	4	100
Petroleum	8	83	6	3	100	Transport	1	96	1	-	2	100
Gas	26	-	53	21	100	Domestic	16	6	68	8	3	100
Primary electricity	32	1	36	31	100	Others	25	5	53	13	5	100
Biomass	27	18	30	25	100							
All fuels	**22**	**28**	**33**	**17**	**100**	**All users**	**15**	**32**	**43**	**7**	**3**	**100**

1.51 In 2010, every 1 toe of secondary electricity consumed by final users required, on average, 0.8 toe of coal, 1.0 toe of natural gas, 0.4 toe of primary electricity (nuclear, wind, natural flow hydro and imports) and 0.2 toe of oil and renewables combined. The extent of this primary consumption is hidden in Table 1D, which presents final consumption only in terms of the fuels directly consumed. When all such primary consumption is allocated to final users, as in Table 1E, the relative importance of fuels and sectors changes; the transport sector, which uses very little electricity, declines in importance, whilst the true cost of final consumption in terms of coal use can now be seen.

1.52 Another view comes from shares of users' expenditure on each fuel (Table 1F based on Table 1.4). In this case the importance of fuels which require most handling by the user (solids and liquid

fuels) is slightly understated, and the importance of uses taxed at higher rates (transport) is overstated in the "All users" line.

Table 1F: Value of fuels purchased by final users in 2010

Percentage of each sector

	Solid fuels	Petroleum	Gas	Secondary electricity	Heat	Biofuels	Total
Industry	8	18	15	57	1	-	100
Transport	-	97	-	-	-	3	100
Domestic	1	6	47	46	-	-	100
Others	-	6	19	74	1	-	100
All users	**1**	**58**	**15**	**24**	**0**	**2**	**100**

Systems of measurement - international statistics

1.53 The systems of energy measurement used in various international statistics differ from the methods of the Digest as follows:

Net calorific values

1.54 Calorific values (thermal contents) used internationally are net rather than gross. The difference between the net and gross thermal content is the amount of energy necessary to evaporate the water present in the fuel or formed during the combustion process. The differences between gross and net values are generally taken to be 5 per cent for liquid and solid fuels (except for coke and coke breeze where there is no difference), 10 per cent for gases (except for blast furnace gas, 1 per cent), 15 per cent for straw, and 16 per cent for poultry litter. The calorific value of wood is highly dependent on its moisture content. In Annex A, the gross calorific value is given as 10 GJ per tonne at 50 per cent moisture content and this rises to 14.5 GJ at 25 per cent moisture content and 19 GJ for dry wood (equivalent to a net calorific value). Both gross and net calorific values are shown in Annex A. DECC and the Iron and Steel Statistics Bureau are currently reviewing the relationship between net and gross calorific values for fuels used by the Iron and Steel industry.

V Definitions of fuels

1.55 The following paragraphs explain what is covered under the terms "primary" and "secondary" fuels.

Primary fuels

Coal - Production comprises all grades of coal, including slurry.

Primary oils - This includes crude oil, natural gas liquids (NGLs) and feedstock.

Natural gas liquids - Natural gas liquids (NGLs) consist of condensates (C_5 or heavier) and petroleum gases other than methane C_1, that is ethane C_2, propane C_3 and butane C_4, obtained from the onshore processing of associated and non-associated gas. These are treated as primary fuels when looking at primary supply but in the consumption data presented in this chapter these fuels are treated as secondary fuels, being transferred from the primary oils column in Tables 1.1, 1.2 and 1.3.

Natural gas - Production relates to associated or non-associated methane C_1 from land and the United Kingdom sector of the Continental Shelf. It includes that used for drilling production and pumping operations, but excludes gas flared or re-injected. It also includes colliery methane piped to the surface and consumed by collieries or others.

Nuclear electricity - Electricity generated by nuclear power stations belonging to the major power producers. See Chapter 5, paragraphs 5.66 to 5.72.

Natural flow hydro-electricity - Electricity generated by natural flow hydroelectric power stations, whether they belong to major power producers or other generators. Pumped storage stations are not included (see under secondary electricity below).

Renewable energy sources - In this chapter figures are presented for renewables and waste in total. Further details, including a detailed breakdown of the commodities and technologies covered are in Chapter 7.

Secondary fuels

Manufactured fuel - This heading includes manufactured solid fuels such as coke and breeze, other manufactured solid fuels, liquids such as benzole and tars and gases such as coke oven gas and blast furnace gas. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.
Coke and breeze – Coke, oven coke and hard coke breeze. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.
Other manufactured solid fuels – Manufactured solid fuels produced at low temperature carbonisation plants and other manufactured fuel and briquetting plants. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.
Coke oven gas - Gas produced at coke ovens, excluding low temperature carbonisation plants. Gas bled or burnt to waste is included in production and losses. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.
Blast furnace gas - Blast furnace gas is mainly produced and consumed within the iron and steel industry. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.
Petroleum products - Petroleum products produced mainly at refineries, together with inland deliveries of natural gas liquids.
Secondary electricity - Secondary electricity is that generated by the combustion of another fuel, usually coal, natural gas, biofuels or oil. The figure for outputs from transformation in the electricity column of Tables 1.1, 1.2 and 1.3 is the total of primary and secondary electricity, and the subsequent analysis of consumption is based on this total.
Heat sold – Heat sold is heat that is produced and sold under the provision of a contract.

VI Classification of consumers

1.56 The Digest has been prepared, as far as is practicable, on the basis of the *Standard Industrial Classification (SIC)2007* (www.statistics.gov.uk/STATBASE/Product.asp?vlnk=14012). SIC(2007) replaced SIC(2003) on 1 January 2008, with energy statistics being compiled on the new basis from 2010. SIC(2003) was introduced at the start of 2003; the previous classification SIC(1992) was used from 1995. Between 1986 and 1994 data in the Digest were prepared on the basis of SIC(1980). The changes in classification between SIC(1992), SIC(2003) and SIC(2007) are mainly in the very detailed classifications at the four or five digit level. As such the classifications used for energy statistics are unaffected by these changes.

1.57 Table 1G shows the categories of consumers together with their codes in SIC 2007. The coverage varies between tables (eg in some instances the 'other' category is split into major constituents, whereas elsewhere it may include transport). This is because the coverage is dictated by what data suppliers can provide. The table also shows the disaggregation available within industry. This disaggregation forms the basis of virtually all the tables that show a disaggregated industrial breakdown.

Table 1G: SIC 2007 classifications

Fuel producers	05-07, 09, 19, 24.46, 35
Final consumers:	
Industrial	
Unclassified	See paragraph 1.58
Iron and steel	24, (*excluding* 24.4, 24.53, 24.54)
Non-ferrous metals	24.4, (*excluding* 24.46), 24.53, 24.54
Mineral products	08, 23
Chemicals	20-21
Mechanical engineering and metal products	25, 28
Electrical and instrument engineering	26-27
Vehicles	29-30
Food, beverages & tobacco	10-12
Textiles, clothing, leather, & footwear	13-15
Paper, printing & publishing	17-18
Other industries	16, 22, 31-33, 36-39
Construction	41-43
Transport	49-51
Other final users	
Domestic	Not covered by SIC 2007
Public administration	84-88
Commercial	45-47, 52-53, 55-56, 58-66, 68-75, 77-82
Agriculture	01-03
Miscellaneous	90-99

1.58 There is also an 'unclassified' category in the industry sector (see Table 1G). In cases where the data supplier has been unable to allocate an amount between categories, but the Department of Energy and Climate Change has additional information, from other data sources, with which to allocate between categories, then this has been done. Where such additional information is not available the data are included in the 'unclassified' category, enabling the reader to decide whether to accept a residual, pro-rate, or otherwise adjust the figures. The 'miscellaneous' category also contains some unallocated figures for the services sector.

1.59 In Tables 6.8 and 6.9 of Chapter 6 the following abbreviated grouping of industries, based on SIC 2003, is used in order to prevent disclosure of information about individual companies.

Table 1H: Abbreviated grouping of Industry

Iron and steel and non-ferrous metal	24
Chemicals	20-21
Oil refineries	19.2
Paper, printing and publishing	17-18
Food, beverages and tobacco	10-12
Metal products, machinery and equipment	25, 26, 27, 28, 29, 30
Mineral products, extraction, mining and agglomeration of solid fuels	05, 06, 08, 23
Sewage Treatment	(parts of 36 and 37)
Electricity supply	35.1
Other industrial branches	07, 13, 14, 15,16, 19.1, 24.46, 22, 31, 32, 33, 35.2, 36 & 37 (remainder) 41, 42, 43
Transport, commerce, and administration	1, 2, 3, 45 to 99 (except 93)
Other	35.3, 93

1.60 In Tables 1.8 and 1.9 the list above is further condensed and includes only manufacturing industry and construction as follows.

Table 1I: Abbreviated grouping of Industry for Tables 1.8 and 1.9

Iron and steel and non-ferrous metals	24
Chemicals	20-21
Paper, printing and publishing	17-18
Food, beverages and tobacco	10-12
Metal products, machinery and equipment	25-30
Other (including construction)	08, 13-16, 19, 22-23, 31-33, 36-39, 41-43

VII Monthly and quarterly data

1.61 Monthly and quarterly data on energy production and consumption (including on a seasonally adjusted and temperature corrected basis) split by fuel type are provided on the DECC website at www.decc.gov.uk/en/content/cms/statistics/source/total/total.aspx. Quarterly figures are also published in DECC's quarterly statistical bulletin *Energy Trends* and *Quarterly Energy Prices*. See Annex C for more information about these bulletins.

VIII Statistical differences

1.62 Tables 1.1 to 1.3 each contain a statistical difference term covering the difference between recorded supply and recorded demand. These statistical differences arise for a number of reasons. The data within each table are taken from varied sources, as described above and in later chapters, for example producers, intermediate consumers (such as electricity generators), final consumers and HM Revenue and Customs. Also, some of the figures are estimated either because data in the required detail are not readily available within the industry or because the methods of collecting the data do not cover the smallest members of the industry. Typically, the supply of fuels is easier to measure than demand, and thus greater reliance can be made of these numbers.

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1.1 Aggregate energy balance 2010
Gross calorific values

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel *(1)*	Primary oils	Petroleum products	Natural gas *(2)*	Renewable & waste *(3)*	Primary electricity	Electricity	Heat sold	Total
Supply										
Indigenous production	11,470	-	68,983	-	57,187	5,345	15,134	-	-	158,120
Imports	17,401	80	59,613	26,405	50,688	1,744	-	614	-	156,546
Exports	-537	-365	-46,153	-28,381	-15,168	-105	-	-385	-	-91,095
Marine bunkers	-	-	-	-2,251	-	-	-	-	-	-2,251
Stock change *(4)*	+4,605	-142	-41	+655	+1,313	-	-	-	-	+6,390
Primary supply	**32,939**	**-428**	**82,402**	**-3,572**	**94,020**	**6,984**	**15,134**	**229**	**-**	**227,710**
Statistical difference *(5)*	+282	-15	+10	-132	+59	-	-	-18	-	+185
Primary demand	**32,657**	**-413**	**82,393**	**-3,440**	**93,961**	**6,984**	**15,134**	**247**	**-**	**227,525**
Transfers	-	-77	-2,484	+2,478	-23	-	-1,188	+1,188	-	-106
Transformation	**-30,941**	**2,222**	**-79,909**	**78,310**	**-34,018**	**-4,426**	**-13,946**	**31,312**	**1,378**	**-50,018**
Electricity generation	-25,561	-673	-	-1,165	-31,964	-4,426	-13,946	31,312	-	-46,422
Major power producers	-24,775	-	-	-629	-29,420	-1,013	-13,946	28,710	-	-41,072
Autogenerators	-786	-673	-	-536	-2,544	-3,413	-	2,602	-	-5,350
Heat generation	-291	-51	-	-66	-2,054	-	-	-	1,378	-1,084
Petroleum refineries	-	-	-79,909	79,687	-	-	-	-	-	-222
Coke manufacture	-4,124	3,764	-	-	-	-	-	-	-	-360
Blast furnaces	-714	-1,065	-	-147	-	-	-	-	-	-1,925
Patent fuel manufacture	-253	247	-	-	-	-	-	-	-	-5
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	**3**	**680**	**-**	**5,258**	**5,973**	**-**	**-**	**2,192**	**93**	**14,199**
Electricity generation	-	-	-	-	-	-	-	1,359	-	1,359
Oil and gas extraction	-	-	-	529	5,256	-	-	48	-	5,833
Petroleum refineries	-	-	-	4,728	366	-	-	431	93	5,618
Coal extraction	3	-	-	-	7	-	-	82	-	93
Coke manufacture	-	395	-	-	-	-	-	8	-	403
Blast furnaces	-	285	-	-	55	-	-	25	-	366
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	91	-	91
Other	-	-	-	-	288	-	-	148	-	436
Losses	**-**	**168**	**-**	**-**	**1,611**	**-**	**-**	**2,325**	**-**	**4,104**
Final consumption	**1,712**	**885**	**-**	**72,090**	**52,337**	**2,558**	**-**	**28,230**	**1,285**	**159,098**
Industry	**1,135**	**635**	**-**	**4,972**	**10,487**	**484**	**-**	**8,985**	**841**	**27,539**
Unclassified	-	200	-	2,392	2	484	-	-	-	3,078
Iron and steel	43	435	-	58	501	-	-	298	-	1,335
Non-ferrous metals	15	-	-	35	225	-	-	580	-	855
Mineral products	702	-	-	164	1,356	-	-	627	-	2,849
Chemicals	51	-	-	130	2,272	-	-	1,563	423	4,439
Mechanical engineering etc	9	-	-	79	559	-	-	661	-	1,308
Electrical engineering etc	3	-	-	37	292	-	-	574	-	907
Vehicles	36	-	-	92	651	-	-	449	-	1,228
Food, beverages etc	29	-	-	234	1,946	-	-	992	1	3,202
Textiles, leather etc	47	-	-	85	455	-	-	263	-	850
Paper, printing etc	70	-	-	49	1,283	-	-	983	1	2,388
Other industries	127	-	-	1,489	755	-	-	1,854	415	4,641
Construction	3	-	-	128	188	-	-	141	-	460
Transport *(6)*	**14**	**-**	**-**	**54,140**	**-**	**1,214**	**-**	**335**	**-**	**55,704**
Air	-	-	-	12,288	-	-	-	-	-	12,288
Rail	14	-	-	644	-	-	-	334	-	992
Road	-	-	-	39,739	-	1,214	-	2	-	40,955
National navigation	-	-	-	1,469	-	-	-	-	-	1,469
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	**563**	**250**	**-**	**4,682**	**41,120**	**860**	**-**	**18,910**	**445**	**66,828**
Domestic	536	250	-	3,426	33,499	504	-	10,205	52	48,471
Public administration	19	-	-	312	3,301	121	-	1,614	383	5,751
Commercial	2	-	-	379	2,731	59	-	6,744	9	9,926
Agriculture	1	-	-	312	169	176	-	346	-	1,005
Miscellaneous	4	-	-	252	1,419	-	-	-	-	1,676
Non energy use	**-**	**-**	**-**	**8,296**	**731**	**-**	**-**	**-**	**-**	**9,027**

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.
(2) Includes colliery methane.
(3) Includes geothermal and solar heat.
(4) Stock fall (+), stock rise (-).
(5) Primary supply minus primary demand.
(6) See paragraphs 5.11 regarding electricity use in transport and 7.28 regarding renewables use in transport.

1.2 Aggregate energy balance 2009
Gross calorific values

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel *(1)*	Primary oils	Petroleum products	Natural gas *(2)*	Renewable & waste *(3)*	Primary electricity	Electricity	Heat sold	Total
Supply										
Indigenous production	11,039r	-	74,739	-	59,737r	4,992r	16,484	-	-	166,990r
Imports	24,679r	127	59,395r	24,445r	39,191	1,235r	-	568	-	149,641r
Exports	-489r	-122	-49,452	-27,998r	-11,788	-5r	-	-322	-	-90,177r
Marine bunkers	-	-	-	-2,615r	-	-	-	-	-	-2,615r
Stock change *(4)*	-4,208r	-11r	+594r	+365r	-419	-	-	-	-	-3,679r
Primary supply	**31,020r**	**-6r**	**85,276r**	**-5,802r**	**86,720r**	**6,222r**	**16,484**	**246**	**-**	**220,160r**
Statistical difference *(5)*	-467r	-12r	+73r	+113r	+7r	-	-	+16r	-	-270r
Primary demand	**31,487r**	**6r**	**85,204r**	**-5,915r**	**86,713r**	**6,222r**	**16,484**	**230r**	**-**	**220,430r**
Transfers	-	-63	-3,088r	+3,089r	-30	-	-1,254	+1,254	-	-92r
Transformation	**-29,751r**	**1,603r**	**-82,116**	**80,102r**	**-32,851r**	**-4,007r**	**-15,229**	**30,823r**	**1,301r**	**-50,125r**
Electricity generation	-24,697r	-772	-	-1,513r	-30,894r	-4,007r	-15,229	30,823r	-	-46,290r
Major power producers	-23,825r	-	-	-1,014r	-28,224r	-744r	-15,229	28,169r	-	-40,868r
Autogenerators	-872	-772	-	-499r	-2,670r	-3,263r	-	2,654r	-	-5,422
Heat generation	-296r	-51	-	-65r	-1,957r	-	-	-	1,301r	-1,068r
Petroleum refineries	-	-	-82,116	81,848r	-	-	-	-	-	-268r
Coke manufacture	-3,847r	3,441r	-	-	-	-	-	-	-	-406r
Blast furnaces	-664r	-1,250r	-	-168	-	-	-	-	-	-2,082r
Patent fuel manufacture	-247	236	-	-	-	-	-	-	-	-11
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	**3**	**699r**	**-**	**5,112r**	**5,938r**	**-**	**-**	**2,229r**	**94r**	**14,077r**
Electricity generation	-	-	-	-	-	-	-	1,419r	-	1,419r
Oil and gas extraction	-	-	-	486r	5,255	-	-	51r	-	5,792r
Petroleum refineries	-	-	-	4,626r	337	-	-	389r	94r	5,446r
Coal extraction	3	-	-	-	8	-	-	80r	-	91r
Coke manufacture	-	378r	-	-	-	-	-	8	-	385r
Blast furnaces	-	321r	-	-	39	-	-	40	-	400r
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	100	-	100
Other	-	-	-	-	301	-	-	144r	-	445r
Losses	**-**	**69r**	**-**	**-**	**1,406**	**-**	**-**	**2,329r**	**-**	**3,804r**
Final consumption	**1,733r**	**778r**	**-**	**72,164r**	**46,487r**	**2,216r**	**-**	**27,749r**	**1,206r**	**152,333r**
Industry	**1,152r**	**561r**	**-**	**4,948r**	**10,009r**	**447r**	**-**	**8,671r**	**763r**	**26,550r**
Unclassified	-	206	-	2,368r	2	447r	-	-	-	3,024r
Iron and steel	44r	354r	-	54	433	-	-	311r	-	1,196r
Non-ferrous metals	17	-	-	44r	214r	-	-	548	-	823r
Mineral products	711r	-	-	171r	1,302r	-	-	603r	-	2,788r
Chemicals	49r	-	-	140r	2,205r	-	-	1,523r	347r	4,263r
Mechanical engineering etc	10	-	-	87r	552r	-	-	661r	-	1,310r
Electrical engineering etc	3	-	-	41	281r	-	-	555r	-	880r
Vehicles	32	-	-	102r	623r	-	-	431r	-	1,189r
Food, beverages etc	33r	-	-	241r	1,805r	-	-	924r	1	3,004r
Textiles, leather etc	49	-	-	91r	446r	-	-	258r	-	844r
Paper, printing etc	71	-	-	59r	1,239r	-	-	951r	-	2,319r
Other industries	130	-	-	1,412r	723r	-	-	1,771r	415	4,451r
Construction	3	-	-	138r	183r	-	-	136r	-	461r
Transport *(6)*	**13r**	**-**	**-**	**54,760r**	**-**	**1,038r**	**-**	**336r**	**-**	**56,148r**
Air	-	-	-	12,751r	-	-	-	-	-	12,751r
Rail	13r	-	-	641r	-	-	-	334r	-	989r
Road	-	-	-	39,743r	-	1,038r	-	2r	-	40,783r
National navigation	-	-	-	1,625r	-	-	-	-	-	1,625r
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	**568r**	**217**	**-**	**4,254r**	**35,790r**	**730r**	**-**	**18,742r**	**444r**	**60,745r**
Domestic	514r	217	-	3,012r	28,590r	465r	-	10,193r	52	43,043r
Public administration	17	-	-	370r	3,189r	97r	-	1,672r	382r	5,727r
Commercial	35	-	-	359r	2,520r	32r	-	6,551r	9	9,505r
Agriculture	-	-	-	285r	160r	136	-	327r	-	908r
Miscellaneous	2	-	-	228	1,331r	-	-	-	-	1,562r
Non energy use	**-**	**-**	**-**	**8,202r**	**688r**	**-**	**-**	**-**	**-**	**8,890r**

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.
(2) Includes colliery methane.
(3) Includes geothermal and solar heat.
(4) Stock fall (+), stock rise (-).
(5) Primary supply minus primary demand.
(6) See paragraphs 5.11 regarding electricity use in transport and 7.28 regarding renewables use in transport.

1.3 Aggregate energy balance 2008
Gross calorific values

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel *(1)*	Primary oils	Petroleum products	Natural gas *(2)*	Renewable & waste *(3)*	Primary electricity	Electricity	Heat sold	Total
Supply										
Indigenous production	11,305r	-	78,580	-	69,681r	4,516r	12,965	-	-	177,046r
Imports	28,410	500	65,575	26,374r	35,000	980r	-	1,057	-	157,897r
Exports	-457	-142	-52,984	-31,281r	-10,548	-	-	-109	-	-95,521r
Marine bunkers	-	-	-	-2,728r	-	-	-	-	-	-2,728r
Stock change *(4)*	-1,971r	+162r	+259	+162r	-265	-	-	-	-	-1,653r
Primary supply	**37,287r**	**520r**	**91,430**	**-7,472r**	**93,868r**	**5,496r**	**12,965**	**948**	**-**	**235,041r**
Statistical difference *(5)*	-203r	-7r	+196	-124r	+1r	-	-	+7r	-	-130r
Primary demand	**37,490r**	**527r**	**91,235**	**-7,348r**	**93,867r**	**5,496r**	**12,965**	**941r**	**-**	**235,171r**
Transfers	-	-126	-3,098	+3,106r	-6	-	-1,056	+1,056	-	-124r
Transformation	**-35,641r**	**1,671**	**-88,136**	**85,820r**	**-34,586r**	**-3,530r**	**-11,909**	**32,014r**	**1,537r**	**-52,760r**
Electricity generation	-29,943r	-858	-	-1,697r	-32,400	-3,530r	-11,909	32,014r	-	-48,324r
Major power producers	-28,972	-	-	-1,207r	-29,618	-803r	-11,909	29,377r	-	-43,132r
Autogenerators	-971	-858	-	-490	-2,782	-2,727r	-	2,637r	-	-5,192r
Heat generation	-314r	-51	-	-66r	-2,186r	-	-	-	1,537r	-1,080r
Petroleum refineries	-	-	-88,136	87,800r	-	-	-	-	-	-336r
Coke manufacture	-4,280	4,064	-	-	-	-	-	-	-	-217
Blast furnaces	-852	-1,718	-	-217	-	-	-	-	-	-2,787
Patent fuel manufacture	-251	235	-	-	-	-	-	-	-	-16
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	**4**	**849**	**-**	**5,546r**	**6,215**	**-**	**-**	**2,221**	**72**	**14,906r**
Electricity generation	-	-	-	-	-	-	-	1,399	-	1,399
Oil and gas extraction	-	-	-	510r	5,270	-	-	51	-	5,831r
Petroleum refineries	-	-	-	5,036	427	-	-	374	72	5,909
Coal extraction	4	-	-	-	8	-	-	84	-	96
Coke manufacture	-	429	-	-	-	-	-	7	-	436
Blast furnaces	-	420	-	-	62	-	-	39	-	521
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	110	-	110
Other	-	-	-	-	447	-	-	156	-	604
Losses	**-**	**236**	**-**	**-**	**1,171r**	**-**	**-**	**2,369r**	**-**	**3,776r**
Final consumption	**1,845r**	**986r**	**-**	**76,033r**	**51,888r**	**1,966r**	**-**	**29,421r**	**1,465r**	**163,605r**
Industry	**1,296r**	**748r**	**-**	**5,567r**	**11,925r**	**449r**	**-**	**9,846r**	**1,021r**	**30,852r**
Unclassified	-	239	-	2,383r	3	449r	-	-	-	3,074r
Iron and steel	49r	509r	-	62	595	-	-	402r	-	1,617r
Non-ferrous metals	20	-	-	47	257	-	-	636r	-	959r
Mineral products	759	-	-	222r	1,579	-	-	682r	-	3,242r
Chemicals	65	-	-	175r	2,681	-	-	1,745r	592	5,258r
Mechanical engineering etc	10	-	-	98	662	-	-	741r	4	1,515r
Electrical engineering etc	4	-	-	46r	335	-	-	635r	-	1,021r
Vehicles	35r	-	-	115r	741	-	-	500r	-	1,390r
Food, beverages etc	28r	-	-	292r	2,095	-	-	1,054r	10r	3,478r
Textiles, leather etc	53	-	-	104	524	-	-	291r	-	973r
Paper, printing etc	105	-	-	65	1,428r	-	-	1,106r	1	2,704r
Other industries	142	-	-	1,801r	815	-	-	1,899r	413r	5,069r
Construction	27	-	-	158r	211r	-	-	156r	-	552r
Transport *(6)*	**14r**	**-**	**-**	**57,277r**	**-**	**845r**	**-**	**338r**	**-**	**58,474r**
Air	-	-	-	13,507r	-	-	-	-	-	13,507r
Rail	14r	-	-	639r	-	-	-	337r	-	989r
Road	-	-	-	41,374r	-	845r	-	2r	-	42,220r
National navigation	-	-	-	1,757r	-	-	-	-	-	1,757r
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	**536r**	**238**	**-**	**4,446r**	**39,139**	**672r**	**-**	**19,237r**	**445r**	**64,713r**
Domestic	515	238	-	3,032r	30,916	431r	-	10,301r	52	45,485r
Public administration	9	-	-	470r	3,660	89r	-	1,750r	387r	6,365r
Commercial	7	-	-	399r	2,868	16r	-	6,836r	6r	10,134r
Agriculture	3r	-	-	304r	186	134	-	350	-	977r
Miscellaneous	1	-	-	241r	1,509	-	-	-	-	1,752r
Non energy use	**-**	**-**	**-**	**8,743r**	**824r**	**-**	**-**	**-**	**-**	**9,567r**

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.
(2) Includes colliery methane.
(3) Includes geothermal and solar heat.
(4) Stock fall (+), stock rise (-).
(5) Primary supply minus primary demand.
(6) See paragraphs 5.11 regarding electricity use in transport and 7.28 regarding renewables use in transport.

1.4 Value balance of traded energy in 2010[(1)]

£million

	Coal	Manufactured solid fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	915	330	23,110	38,500	7,590	15,015	270	285	86,020
Imports	2,050	20	19,680	12,290	6,650	325	-	510	41,525
Exports	-85	-110	-14,930	-14,950	-1,990	-205	-	-	-32,275
Marine bunkers	-	-	-	-860	-	-	-	-	-860
Stock change	360	-15	65	300	200	-	-	-	905
Basic value of inland consumption	**3,240**	**225**	**27,920**	**35,280**	**12,450**	**15,135**	**270**	**800**	**95,315**
Tax and margins									
Distribution costs and margins	**725**	**25**	**-**	**2,625**	**11,100**	**14,200**	**-**	**100**	**28,775**
Electricity generation	350	-	-	30	-	-	-	-	380
Solid fuel manufacture	200	-	-	-	-	-	-	-	200
of which iron & steel sector	175	-	-	-	-	-	-	-	175
Iron & steel final use	35	5	-	35	-	-	-	-	75
Other industry	-	5	-	440	-	-	-	-	445
Air transport	-	-	-	180	-	-	-	-	180
Rail and national navigation	-	-	-	80	-	-	-	-	80
Road transport	-	-	-	1,240	-	-	-	100	1,340
Domestic	140	15	-	240	-	-	-	-	395
Agriculture	-	-	-	15	-	-	-	-	15
Commercial and other services	-	-	-	50	-	-	-	-	50
Non energy use	-	-	-	315	150	-	-	-	460
VAT and duties	**10**	**5**	**-**	**37,765**	**680**	**675**	**-**	**1,255**	**40,395**
Electricity generation	-	-	-	65	-	-	-	-	65
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	295	-	-	-	-	295
Air transport	-	-	-	10	-	-	-	-	10
Rail and national navigation	-	-	-	240	-	-	-	-	240
Road transport	-	-	-	36,925	-	-	-	1,255	38,180
Domestic	10	5	-	105	680	675	-	5	1,475
Agriculture	-	-	-	20	-	-	-	-	20
Commercial and other services	-	-	-	110	-	-	-	-	110
Climate Change Levy	**5**	**-**	**-**	**-**	**180**	**485**	**-**	**-**	**670**
Total tax and margins	**740**	**30**	**-**	**40,390**	**11,960**	**15,360**	**-**	**1,355**	**69,840**
Market value of inland consumption	**3,980**	**255**	**27,920**	**75,675**	**24,405**	**30,495**	**270**	**2,155**	**165,185**
Energy end use									
Total energy sector	**3,470**	**-**	**27,920**	**675**	**5,885**	**330**	**20**	**90**	**38,390**
Transformation	3,470	-	27,920	465	5,770	-	-	90	37,720
Electricity generation	2,570	-	-	435	5,425	-	-	90	8,520
of which from stocks	85	-	-	-	-	-	-	-	85
Heat Generation	30	-	-	25	350	-	-	-	405
Petroleum refineries	-	-	27,920	-	-	-	-	-	27,920
Solid fuel manufacture	875	-	-	-	-	-	-	-	875
of which iron & steel sector	765	-	-	-	-	-	-	-	765
Other energy sector use	**-**	**-**	**-**	**210**	**110**	**330**	**20**	**-**	**670**
Oil & gas extraction	-	-	-	210	-	40	-	-	255
Petroleum refineries	-	-	-	-	60	220	20	-	300
Coal extraction	-	-	-	-	-	70	-	-	70
Other energy sector	-	-	-	-	50	-	-	-	50
Total non energy sector use	**505**	**255**	**-**	**72,545**	**18,375**	**30,170**	**250**	**2,060**	**124,165**
Industry	**250**	**130**	**-**	**2,455**	**2,125**	**7,875**	**165**	**25**	**13,030**
Iron & steel final use	150	115	-	95	105	85	-	-	545
Other industry	105	15	-	2,365	2,020	7,790	165	25	12,480
Transport	**-**	**-**	**-**	**67,680**	**-**	**280**	**-**	**1,985**	**69,945**
Air	-	-	-	5,940	-	-	-	-	5,940
Rail and national navigation	-	-	-	1,100	-	280	-	-	1,380
Road	-	-	-	60,640	-	-	-	1,985	62,625
Other final users	**255**	**125**	**-**	**2,410**	**16,250**	**22,015**	**85**	**55**	**41,190**
Domestic	250	125	-	1,730	14,250	14,155	10	55	30,575
Agriculture	-	-	-	150	55	420	-	-	625
Commercial and other services	5	-	-	530	1,945	7,440	75	-	9,995
Total value of energy end use	**3,980**	**255**	**27,920**	**73,220**	**24,260**	**30,495**	**270**	**2,155**	**162,555**
Value of non energy end use	**-**	**-**	**-**	**2,450**	**150**	**-**	**-**	**-**	**2,600**
Market value of inland consumption	**3,980**	**255**	**27,920**	**75,675**	**24,405**	**30,495**	**270**	**2,155**	**165,155**

(1) For further information see paragraphs 1.39 to 1.45.

1.5 Value balance of traded energy in 2009[(1)]

£million

	Coal	Manufactured solid fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	560r	200	19,095r	28,970r	7,230r	14,205r	205r	235r	70,705r
Imports	2,710	35	15,055	9,470	4,775	260	-	320r	32,615r
Exports	-85r	-30	-12,220r	-11,375r	-1,420r	-160	-	-	-25,295r
Marine bunkers	-	-	-	-760r	-	-	-	-	-760r
Stock change	-295	10r	115	90	-60r	-	-	-	-130r
Basic value of inland consumption	**2,890r**	**215**	**22,040**	**26,395r**	**10,525r**	**14,305r**	**205r**	**555r**	**77,135r**
Tax and margins									
Distribution costs and margins	**620**	**30**	**-**	**3,200r**	**11,275r**	**16,695r**	**-**	**70**	**31,885r**
Electricity generation	250r	-	-	30	-	-	-	-	280
Solid fuel manufacture	200	-	-	-	-	-	-	-	200
of which iron & steel sector	175	-	-	-	-	-	-	-	175
Iron & steel final use	30	5	-	35	-	-	-	-	75
Other industry	-	10	-	435r	-	-	-	-	445r
Air transport	-	-	-	235	-	-	-	-	235
Rail and national navigation	-	-	-	85r	-	-	-	-	85r
Road transport	-	-	-	1,795	-	-	-	70	1,865
Domestic	135	10	-	225	-	-	-	-	370
Agriculture	-	-	-	15	-	-	-	-	15
Commercial and other services	-	-	-	50	-	-	-	-	50
Non energy use	-	-	-	300r	150r	-	-	-	450r
VAT and duties	**10**	**5**	**-**	**34,285r**	**600r**	**690r**	**-**	**930r**	**36,520r**
Electricity generation	-	-	-	80r	-	-	-	-	80r
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	280r	-	-	-	-	280r
Air transport	-	-	-	10	-	-	-	-	10
Rail and national navigation	-	-	-	245r	-	-	-	-	245r
Road transport	-	-	-	33,470	-	-	-	925r	34,395r
Domestic	10	5	-	75	600r	690r	-	-	1,385r
Agriculture	-	-	-	20	-	-	-	-	20
Commercial and other services	-	-	-	105	-	-	-	-	105
Climate Change Levy	**5**	**-**	**-**	**-**	**170**	**530**	**-**	**-**	**705**
Total tax and margins	**635**	**35**	**-**	**37,485r**	**12,045r**	**17,915r**	**-**	**1,000r**	**69,110r**
Market value of inland consumption	**3,530r**	**250**	**22,040**	**63,880r**	**22,570r**	**32,220r**	**205r**	**1,550r**	**146,245r**
Energy end use									
Total energy sector	**3,035r**	**-**	**22,040**	**590r**	**5,455r**	**390**	**-**	**80**	**31,590r**
Transformation	3,035r	-	22,040	440r	5,350r	-	-	80	30,950r
Electricity generation	2,130r	-	-	425r	5,030r	-	-	80	7,665r
of which from stocks	45	-	-	-	-	-	-	-	45
Heat Generation	25	-	-	20r	320r	-	-	-	365r
Petroleum refineries	-	-	22,040	-	-	-	-	-	22,040
Solid fuel manufacture	880	-	-	-	-	-	-	-	880
of which iron & steel sector	770	-	-	-	-	-	-	-	770
Other energy sector use	**-**	**-**	**-**	**150r**	**105**	**390**	**-**	**-**	**640r**
Oil & gas extraction	-	-	-	150r	-	45	-	-	195r
Petroleum refineries	-	-	-	-	55	275	-	-	330
Coal extraction	-	-	-	-	-	70	-	-	70
Other energy sector	-	-	-	-	50	-	-	-	50
Total non energy sector use	**490r**	**250**	**-**	**60,975r**	**16,960r**	**31,830r**	**205r**	**1,470r**	**112,185r**
Industry	**245r**	**140**	**-**	**2,025r**	**2,225r**	**8,385r**	**130r**	**20r**	**13,170r**
Iron & steel final use	140	120	-	80	95	105r	-	-	540r
Other industry	105	20	-	1,945r	2,130r	8,280r	130r	20r	12,630r
Transport	**-**	**-**	**-**	**57,140r**	**-**	**325r**	**-**	**1,405r**	**58,870r**
Air	-	-	-	4,425r	-	-	-	-	4,425r
Rail and national navigation	-	-	-	970r	-	325r	-	-	1,295r
Road	-	-	-	51,745	-	-	-	1,405r	53,150r
Other final users	**245**	**105**	**-**	**1,810**	**14,735r**	**23,120r**	**75**	**50**	**40,145r**
Domestic	245r	105	-	1,245	12,605r	14,535r	10	50	28,795r
Agriculture	-	-	-	120r	55r	440r	-	-	615r
Commercial and other services	5	-	-	445r	2,075r	8,145r	65	-	10,730r
Total value of energy end use	**3,530r**	**250**	**22,040**	**61,565r**	**22,415r**	**32,220r**	**205r**	**1,550r**	**143,775r**
Value of non energy end use	**-**	**-**	**-**	**2,315r**	**150r**	**-**	**-**	**-**	**2,470r**
Market value of inland consumption	**3,530r**	**250**	**22,040**	**63,880r**	**22,570r**	**32,220r**	**205r**	**1,550r**	**146,245r**

(1) For further information see paragraphs 1.39 to 1.45.

1.6 Value balance of traded energy in 2008[(1)]

£million

	Coal	Manufactured solid fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	385r	110r	26,645r	39,985r	9,755r	10,015r	400r	310	87,605r
Imports	3,545r	165	21,720	13,255	6,425	485	-	300	45,890r
Exports	-55	-30	-17,080r	-14,735	-1,945	-110	-	-	-33,960r
Marine bunkers	-	-	-	-900	-	-	-	-	-900
Stock change	-160	-10	105	10r	-45r	-	-	-	-100r
Basic value of inland consumption	**3,715**	**235**	**31,385**	**37,625r**	**14,190**	**10,390r**	**400r**	**610**	**98,545r**
Tax and margins									
Distribution costs and margins	**690**	**30**	**-**	**3,465r**	**9,330r**	**19,975r**	**-**	**65**	**33,555r**
Electricity generation	360	-	-	30	-	-	-	-	385
Solid fuel manufacture	190	-	-	-	-	-	-	-	190
of which iron & steel sector	170	-	-	-	-	-	-	-	170
Iron & steel final use	35	10	-	15	-	-	-	-	60
Other industry	5	10	-	435r	-	-	-	-	450r
Air transport	-	-	-	125r	-	-	-	-	125r
Rail and national navigation	-	-	-	30	-	-	-	-	30
Road transport	-	-	-	2,095	-	-	-	65	2,155
Domestic	100	10	-	325	-	-	-	-	440
Agriculture	-	-	-	15	-	-	-	-	15
Commercial and other services	-	-	-	65	-	-	-	-	65
Non energy use	-	-	-	335r	205r	-	-	-	540r
VAT and duties	**10**	**5**	**-**	**33,560r**	**575r**	**680r**	**-**	**740**	**35,565r**
Electricity generation	-	-	-	90	-	-	-	-	90
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	320r	-	-	-	-	320r
Air transport	-	-	-	15	-	-	-	-	15
Rail and national navigation	-	-	-	240r	-	-	-	-	240r
Road transport	-	-	-	32,665	-	-	-	740	33,405
Domestic	10	5	-	100	575r	680r	-	-	1,370r
Agriculture	-	-	-	20	-	-	-	-	20
Commercial and other services	-	-	-	115	-	-	-	-	115
Climate Change Levy	**5**	**-**	**-**	**-**	**180**	**540**	**-**	**-**	**730**
Total tax and margins	**705**	**35**	**-**	**37,025r**	**10,085r**	**21,195r**	**-**	**805**	**69,850r**
Market value of inland consumption	**4,420**	**270**	**31,385**	**74,650r**	**24,275r**	**31,585r**	**400r**	**1,410r**	**168,395r**
Energy end use									
Total energy sector	**3,950**	**-**	**31,385**	**760r**	**6,770r**	**360**	**-**	**70**	**43,290r**
Transformation	3,950	-	31,385	510r	6,605r	-	-	70	42,510r
Electricity generation	3,080	-	-	490r	6,185r	-	-	70	9,825r
of which from stocks	70	-	-	-	-	-	-	-	70
Heat Generation	35	-	-	20	420r	-	-	-	470r
Petroleum refineries	-	-	31,385	-	-	-	-	-	31,385
Solid fuel manufacture	835	-	-	-	-	-	-	-	835
of which iron & steel sector	740	-	-	-	-	-	-	-	740
Other energy sector use	**-**	**-**	**-**	**255r**	**165**	**360**	**-**	**-**	**780r**
Oil & gas extraction	-	-	-	255r	-	45	-	-	300r
Petroleum refineries	-	-	-	-	80	240	-	-	320
Coal extraction	-	-	-	-	-	75	-	-	75
Other energy sector	-	-	-	-	85	-	-	-	85
Total non energy sector use	**475**	**270**	**-**	**71,160r**	**17,300r**	**31,225r**	**400r**	**1,340r**	**122,170r**
Industry	**275**	**170**	**-**	**2,735r**	**2,945**	**8,750r**	**280r**	**30**	**15,180r**
Iron & steel final use	155	145	-	95	155	185	-	-	730
Other industry	115	25	-	2,640r	2,790	8,565r	280r	30	14,445r
Transport	**-**	**-**	**-**	**65,950r**	**-**	**290r**	**-**	**1,260**	**67,505r**
Air	-	-	-	7,640r	-	-	-	-	7,640r
Rail and national navigation	-	-	-	1,200r	-	285r	-	-	1,490r
Road	-	-	-	57,115	-	-	-	1,260	58,375
Other final users	**200**	**100**	**-**	**2,470**	**14,360r**	**22,185r**	**120**	**50**	**39,490r**
Domestic	200	100	-	1,695	12,070r	14,245r	15	50	28,380r
Agriculture	-	-	-	145	65	415	-	-	625
Commercial and other services	-	-	-	630	2,225	7,525r	105	-	10,485r
Total value of energy end use	**4,420**	**270**	**31,385**	**71,920r**	**24,070r**	**31,585r**	**400r**	**1,410r**	**165,460r**
Value of non energy end use	**-**	**-**	**-**	**2,730r**	**205r**	**-**	**-**	**-**	**2,935r**
Market value of inland consumption	**4,420**	**270**	**31,385**	**74,650r**	**24,275r**	**31,585r**	**400r**	**1,410r**	**168,395r**

(1) For further information see paragraphs 1.39 to 1.45.

1.7 Sales of electricity and gas by sector

United Kingdom

	2006	2007	2008	2009	2010
Total selling value (£ million)[1]					
Electricity generation - Gas	3,966	4,391	6,185r	5,032r	5,422
Industrial - Gas	2,735	2,020	3,165r	2,288r	2,272
- Electricity	7,071	7,292	9,108r	8,774r	8,202
of which:					
Fuel industries	296	323	359r	389r	329
Industrial sector	6,775	6,969	8,749r	8,385r	7,873
Domestic sector - Gas	9,618	9,475	11,497r	12,007r	13,573
- Electricity	10,799	11,943	13,569r	13,843r	13,481
Other - Gas	2,336	2,145	2,472r	2,305r	2,159
- Electricity	6,720	7,056	8,229r	8,910r	8,141
of which:					
Agricultural sector	340	369	416r	441r	419
Commercial sector	4,776	5,033	6,182r	6,673r	6,162
Transport sector	459	494	288r	324r	281
Public lighting	134	151	177r	179r	155
Public admin. and other services	1,011	1,009	1,165r	1,293r	1,123
Total, all consumers	**43,246**	**44,321**	**54,224r**	**53,159r**	**53,250**
of which gas	**18,656**	**18,030**	**23,320r**	**21,632r**	**23,427**
of which electricity	**24,590**	**26,290**	**30,905r**	**31,527r**	**29,823**
Average net selling value per kWh sold (pence)[1]					
Electricity generation - Gas	1.284	1.236	1.644	1.403	1.461
Industrial - Gas	1.877	1.515	2.283	1.966	1.863
- Electricity	6.707	6.895	8.454r	9.130r	8.267
of which:					
Fuel industries	6.305	6.778	7.564r	8.570r	7.259
Industrial sector	6.726	6.901	8.495r	9.157r	8.315
Domestic sector - Gas	2.629	2.685	3.198r	3.611r	3.484
- Electricity	9.274	9.729	11.326r	11.678r	11.359
Other - Gas	2.264	2.262	2.585r	2.753r	2.437
- Electricity	6.314	6.856	7.861r	8.901r	7.984
of which:					
Agricultural sector	8.224	8.944	10.232r	11.593r	10.399
Commercial sector	6.336	6.891	7.883r	8.932r	8.012
Transport sector	6.109	6.567	7.329r	8.304r	7.208
Public lighting	6.249	6.797	7.775r	8.810r	7.902
Public admin. and other services	5.860	6.373	7.291r	8.260r	7.409
Average, all consumers	**3.454**	**3.497**	**4.164r**	**4.408r**	**4.124**
of which gas	**2.020**	**1.926**	**2.404r**	**2.427r**	**2.412**
of which electricity	**7.490**	**7.937**	**9.303r**	**10.016r**	**9.324**

(1) Excludes VAT where payable - see paragraph 1.45 for a definition of average net selling value.

1.8 Final energy consumption by main industrial groups[(1)]

Thousand tonnes of oil equivalent

	2006	2007	2008	2009	2010
Iron and steel and non-ferrous metals					
Coal	38r	76	69r	60r	58
Manufactured solid fuels *(2)*	434	451	378	277	252
Blast furnace gas	78	48	40	29r	87
Coke oven gas	106	101	92r	49r	97
Natural gas	989	876	852	647r	726
Petroleum	73	115	109	98r	93
Electricity	1,151	1,060r	1,037r	859r	878
Total iron and steel and non-ferrous metals	**2,868r**	**2,727r**	**2,577r**	**2,019r**	**2,190**
Chemicals					
Coal	84	76	65	49r	51
Natural gas	2,952	2,592	2,681	2,205r	2,272
Petroleum	187r	192	175r	140r	130
Electricity	1,753	1,737	1,745r	1,523r	1,563
Heat purchased from other sectors *(3)*	371	480	592	347r	423
Total chemicals	**5,347r**	**5,075r**	**5,258r**	**4,263r**	**4,439**
Metal products, machinery and equipment					
Coal	50	45	48r	45	48
Natural gas	1,855	1,714	1,738	1,457r	1,503
Petroleum	313r	264r	259r	230r	208
Electricity	1,856	1,846	1,876r	1,647r	1,685
Heat purchased from other sectors *(3)*	2	3	4	-	-
Total metal products, machinery and equipment	**4,075r**	**3,873r**	**3,926r**	**3,378r**	**3,443**
Food, beverages and tobacco					
Coal	17	25r	28r	33r	29
Natural gas	2,039	1,975	2,095	1,805r	1,946
Petroleum	281r	282r	292r	241r	234
Electricity	1,042	1,039	1,054r	924r	992
Heat purchased from other sectors *(3)*	1	2	10r	1	1
Total food, beverages and tobacco	**3,380r**	**3,322r**	**3,478r**	**3,004r**	**3,202**

(1) Industrial categories used are described in Table 1I. Data excludes energy used to generate heat for all fuels except manufactured solid fuels and electricity.

(2) Includes tars, benzole, coke and breeze and other manufactured solid fuels.

(3) Data equates to heat sold information in the energy balances.

1.8 Final energy consumption by main industrial groups[1]

Thousand tonnes of oil equivalent

	2006	2007	2008	2009	2010
Paper, printing and publishing					
Coal	99	101	105	71	70
Natural gas	1,420	1,334	1,428r	1,239r	1,283
Petroleum	59	65	65	59r	49
Electricity	1,110	1,096	1,106r	951r	983
Heat purchased from other sectors *(3)*	22	1	1	-	1
Total paper, printing and publishing	**2,710r**	**2,596**	**2,704r**	**2,319r**	**2,388**
Other industries					
Coal	875r	945r	981	893r	879
Natural gas	3,169	2,972	3,129r	2,655r	2,755
Petroleum	2,306r	2,507r	2,284r	1,812r	1,865
Electricity	2,968r	3,008r	3,028r	2,768r	2,885
Heat purchased from other sectors *(3)*	414	411	413r	415	415
Total other industries	**9,733r**	**9,843r**	**9,836r**	**8,543r**	**8,799**
Unclassified					
Manufactured solid fuels *(2)*	231	239	239	206	200
Coke oven gas	-	-	-	-	-
Natural gas	4	3	3	2	2
Petroleum	2,861r	2,647r	2,383r	2,368r	2,392
Renewables & waste	213	276	449r	447r	484
Total unclassified	**3,310r**	**3,166r**	**3,074r**	**3,024r**	**3,078**
Total					
Coal	1,164r	1,268r	1,296r	1,152r	1,135
Manufactured solid fuels *(2)*	665	690	617	483	451
Blast furnace gas	78	48	40	29r	87
Coke oven gas	106	101	92r	49r	97
Natural gas	12,428	11,466	11,925r	10,009r	10,487
Petroleum	6,080r	6,072r	5,567r	4,948r	4,972
Renewables & waste	213	276	449r	447r	484
Electricity	9,879r	9,785r	9,846r	8,671r	8,985
Heat purchased from other sectors *(3)*	809	896	1,021r	763r	841
Total	**31,423r**	**30,603r**	**30,852r**	**26,550r**	**27,539**

1.9 Fuels consumed for electricity generation (autogeneration) by main industrial groups[1]

Thousand tonnes of oil equivalent
(except where shown otherwise)

	2006	2007	2008	2009	2010
Iron and steel and non-ferrous metals					
Coal	768	767	801	706r	633
Blast furnace gas	780	767	664	546	453
Coke oven gas	161	169	168	200	196
Natural gas	39	37	57	43	40
Petroleum	20	28	44	54	9
Other (including renewables) *(2)*	55	56	54	55	51
Total fuel input *(3)*	**1,823**	**1,824**	**1,789**	**1,605r**	**1,381**
Electricity generated by iron & steel and non-ferrous	**481**	**476**	**485**	**459**	**425**
metals *(4)* *(in GWh)*	5,592	5,536	5,637	5,337	4,946
Electricity consumed by iron and steel and non-ferrous	**404**	**399**	**388**	**326**	**335**
metals from own generation *(5)* *(in GWh)*	4,703	4,639	4,509	3,795	3,895
Chemicals					
Coal	111	110	110	109	110
Natural gas	718	759	719	684r	671
Petroleum	15	8	7	6	11
Other (including renewables) *(2)*	147	103	89	94	98
Total fuel input *(3)*	**990**	**979**	**925**	**892r**	**890**
Electricity generated by chemicals *(4)*	**866**	**426**	**402**	**376r**	**375**
(in GWh)	10,067	4,957	4,669	4,372r	4,365
Electricity consumed by chemicals from own generation *(5)*	**627**	**273**	**243**	**170r**	**221**
(in GWh)	7,289	3,179	2,821	1,979r	2,568
Metal products, machinery and equipment					
Coal	-	-	-	-	-
Natural gas	33	77	81	72r	74
Petroleum	6	6	6	6	6
Other (including renewables) *(2)*	-	-	-		
Total fuel input *(3)*	**38**	**83**	**87**	**78r**	**79**
Electricity generated by metal products, machinery	**16**	**44**	**49**	**46**	**46**
and equipment *(4)* *(in GWh)*	189	514	573	530r	529
Electricity consumed by metal products, machinery	**16**	**37**	**47**	**38r**	**38**
and equipment from own generation *(5)* *(in GWh)*	182	433	550	443r	437
Food, beverages and tobacco					
Coal	7	5	3	4	4
Natural gas	335	371	350	374r	355
Petroleum	8	5	3	5	6
Other (including renewables) *(2)*	-	-	-	0	0
Total fuel input *(3)*	**351**	**380**	**356**	**383r**	**365**
Electricity generated by food, beverages and tobacco *(4)*	**170**	**184**	**172**	**186r**	**182**
(in GWh)	1,982	2,141	2,006	2,162r	2,115
Electricity consumed by food, beverages and tobacco	**129**	**117**	**113**	**83r**	**106**
from own generation *(5)* *(in GWh)*	1,497	1,364	1,316	959r	1,230

(1) Industrial categories used are described in Table 1l.
(2) Includes hydro electricity, solid and gaseous renewables and waste.
(3) Total fuels used for generation of electricity. Consistent with figures for fuels used by other generators in Table 5.4.

1.9 Fuels consumed for electricity generation (autogeneration) by main industrial groups[1] (continued)

Thousand tonnes of oil equivalent
(except where shown otherwise)

	2006	2007	2008	2009	2010
Paper, printing and publishing					
Coal	54	41	52	48r	32
Natural gas	781	827	561	503r	386
Petroleum	7	2	1	1	1
Other (including renewables) *(2)*	8	7	5	5	6
Total fuel input *(3)*	**850**	**877**	**619**	**556r**	**424**
Electricity generated by paper, printing and publishing *(4)*	**378**	**386**	**286**	**249r**	**203**
(in GWh)	4,395	4,492	3,320	2,899r	2,358
Electricity consumed by paper, printing and publishing	**279**	**281**	**186**	**163r**	**106**
from own generation *(5)* *(in GWh)*	3,245	3,266	2,168	1,894r	1,229
Other industries					
Coal	-	-	-	-	
Coke oven gas	26	24	26	25r	25
Natural gas	110	147	159	122r	117
Petroleum	3	4	5	4r	3
Other (including renewables) *(2)*	1,601	1,698	1,740	1,820r	1,882
Total fuel input *(3)*	**1,739**	**1,874**	**1,929**	**1,972r**	**2,027**
Electricity generated by other industries *(4)*	**107**	**134**	**138**	**121r**	**126**
(in GWh)	1,240	1,555	1,610	1,412r	1,469
Electricity consumed by other industries from own	**92**	**90**	**71**	**77r**	**83**
generation *(5)* *(in GWh)*	1,075	1,047	827	899r	966
Total					
Coal	940	922	966	867	778
Blast furnace gas	780	767	664	546	453
Coke oven gas	187	194	195	226	221
Natural gas	2,016	2,217	1,927	1,798r	1,642
Petroleum	59	52	66	75r	35
Other (including renewables) *(2)*	1,810	1,864	1,888	1,939r	2,037
Total fuel input *(3)*	**5,791**	**6,015**	**5,705**	**5,485r**	**5,166**
Electricity generated *(4)*	**2,018**	**1,651**	**1,532**	**1,437r**	**1,357**
(in GWh)	23,465	19,196	17,815	16,710r	15,782
Electricity consumed from own generation *(5)*	**1,547**	**1,198**	**1,048**	**857r**	**888**
(in GWh)	17,991	13,926	12,191	9,969r	10,324

(4) Combined heat and power (CHP) generation (ie electrical output from Table 6.8) plus non-chp generation, so that the total electricity generated is consistent with the "other generators" figures in Table 5.6.

(5) This is the electricity consumed by the industrial sector from its own generation and is consistent with the other generators final users figures used within the electricity balances (Tables 5.1 and 5.2). These figures are less than the total generated because some of the electricity is sold to the public distribution system and other users.

(6) The figures presented here are consistent with other figures presented elsewhere in this publication as detailed at (3), (4), and (5) above but are further dissaggregated. Overall totals covering all autogenerators can be derived by adding in figures for transport, services and the fuel industries. These can be summarised as follows:

Thousand tonnes of oil equivalent

Fuel input	**2006**	**2007**	**2008**	**2009**	**2010**
All industry	5,791	6,015	5,705	5,485	5,166
Fuel industries	1,727	1,574	1,253	1,083	1,100
Transport, Commerce and Administration	240	244	237	298	311
Services	1,253	986	1,150	1,566	1,648
Total fuel input	**9,011**	**8,819**	**8,345**	**8,432**	**8,224**
Electricity generated	**3,100**	**3,041**	**2,869**	**2,946**	**2,874**
Electricity consumed	**2,120**	**1,824**	**1,569**	**1,398**	**1,470**
					GWh
Electricity generated	**36,050**	**35,370**	**33,369**	**34,257**	**33,423**
Electricity consumed	**24,659**	**21,216**	**18,243**	**16,255**	**17,097**

Chapter 2
Solid fuels and derived gases

Key points

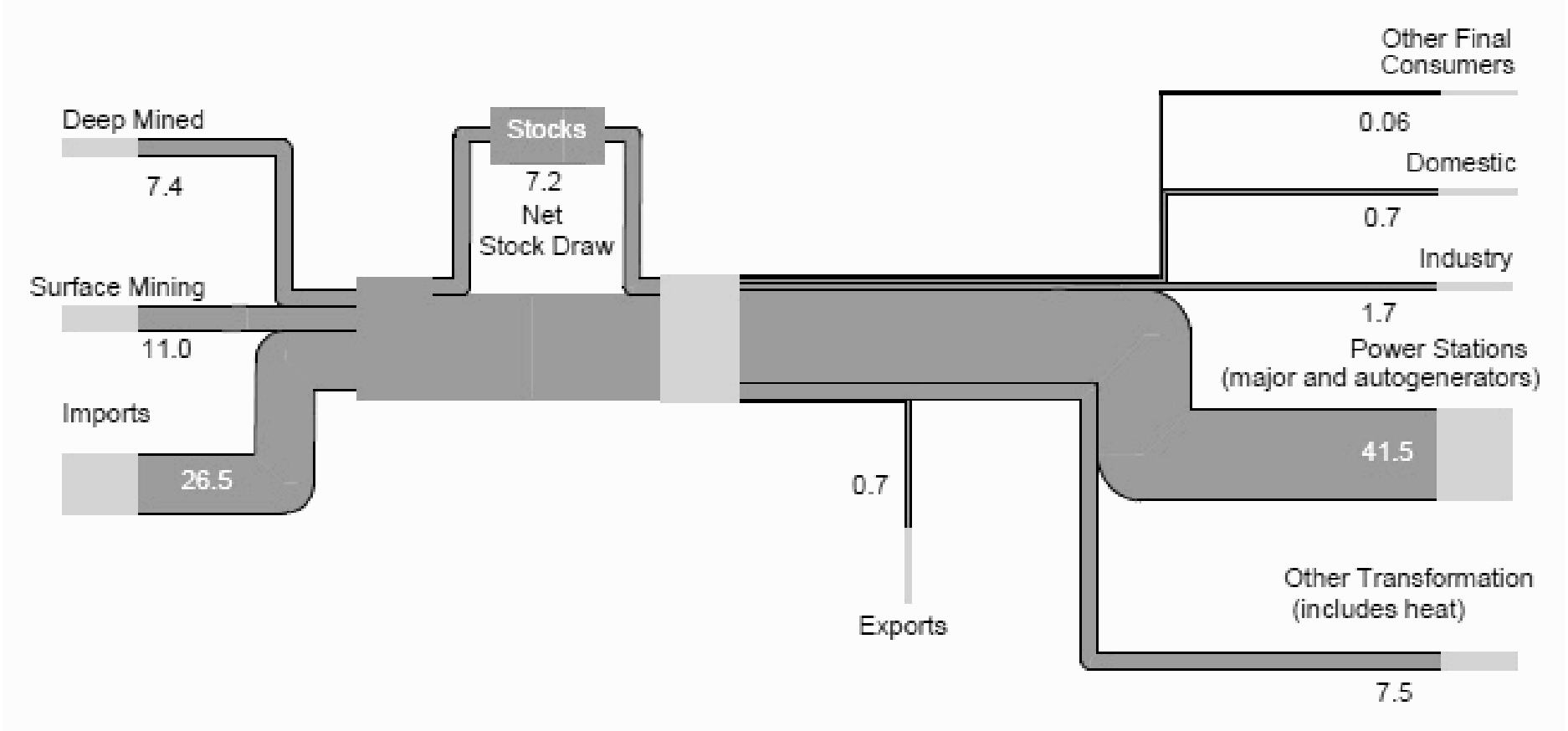
- In 2010 UK coal production increased by 3 per cent on 2009, with an increase in surface mine production (including an estimate for slurry) (6.5 per cent), counteracting a decline in deep mined production (1.7 per cent) (Table 2.7).
- Coal imports have exceeded UK coal production since 2001. Imports have declined from a peak of 51 million tonnes in 2006 to 27 million tonnes in 2010 (Table 2.7).
- Since 2005, nearly half of UK's coal imports (mainly steam coal) have come from Russia, with Australia, Columbia, the USA and South Africa being the other main suppliers (Table 2B).
- Demand for coal in 2010 was 51 million tonnes, 5 per cent increase on 2009, which was the lowest on record (Table 2.7).
- During the last ten years, around 80 per cent of demand for coal has been from major power producers for generation with a further 10 per cent used for the manufacture of coke (Table 2.7).
- Coal stocks decreased by 30 per cent in 2010 compared to 2009. This represents a return to more normal levels, as stocks in 2009 were at their highest since 1994 (Table 2.7).

Introduction

2.1 This chapter covers:

- Supply and demand for coal during the period 2008 to 2010 by grade of coal (steam coal, anthracite and coking coal). These are shown as commodity balances in Tables 2.1 to 2.3.
- Table 2.7 shows the same data as published in Table 2.1 to 2.3 at an aggregated level, i.e. not split by grade of coal but for the latest five years.
- Additional coal statistics have been included in Table 2A to cover UK production and employment categorised by type of mine and devolved administration during 2008 to 2010.
- Table 2B shows imports of coal in 2010 split by grade of coal and country of origin.
- Map 2A presents all UK coal production sites and ports of entry for international trade.
- Energy flow chart for 2010 (page 42), showing the flows of coal from production and imports through to consumption. This is a way of simplifying the figures that can be found in the commodity balance for coal in Table 2.1. It illustrates the flow of coal from the point at which it becomes available from home production or imports (on the left) to the eventual final use of coal (on the right).
- Supply and demand for manufactured solid fuels, including coke oven coke, coke breeze, other manufactured solid fuels (patent fuel), coke oven gas, blast furnace gas and benzole and tar. These are shown in commodity balances in Table 2.4 to 2.6. Table 2.8 to 2.9 shows the same balances as Table 2.4 to 2.6 but for the latest five years.

Coal flow chart 2010 (million tonnes of coal)



Notes:
This flow chart is based on the data that appear in Tables 2.1 and 2.7.
Surface mining includes slurry and recovered coal.

2.2 Information on long-term trends on coal production, consumption and stocks (Tables 2.1.1 and 2.1.2) are available on the DECC energy statistics web site at:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

2.3 Detailed statistics on imports and exports of solid fuels are in Annex G (Table G5), available on the DECC energy statistics web site at:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Coal (Tables 2.1, 2.2, 2.3 and 2.7)

Coal Production and Trade

2.4 UK coal production has seen a general decline since 1952, where levels peaked at 228 million tonnes. Production levels also plummeted in 1984 as a result of the miners' strike before recovering fairly quickly to levels recorded pre-1984, and fell again in the early 1990's. Figures for 2010 show that coal production (including an estimate for slurry) increased by a small amount on 2009 (3.0 per cent) to 18 million tonnes (Chart 2.1).

2.5 **Deep mined** production, which contributed 14 per cent to UK coal supply in 2010, fell by 1.7 per cent on 2009. In contrast, **surface mine** production (including an estimate for **slurry**) increased by 6.5 per cent and contributed 7.1 percentage points more to UK coal supply than deep mined production in 2010.

2.6 **Steam coal**, mainly used by coal-fired power stations accounted for 92 per cent of total production in 2010, with 6.6 per cent **anthracite** production and the remainder **coking coal**.

2.7 Table 2A shows how production of coal is divided between England, Wales and Scotland. In 2010, 56 per cent of coal output was in England, 34 per cent in Scotland and 10 per cent in Wales. There has been no deep mining of coal in Scotland since Longannet mine closed in 2002.

Table 2A: Output from UK coal mines and employment in UK coal mines [1, 2, 3]

		Million tonnes			Number		
		Output			Employment		
		2008	2009	2010	2008	2009	2010
Deep mined	England	7.9	7.4	7.3	3,558	3,436	3,158
	Wales	0.1	0.1	0.1	350	311	388
	Total	8.0	7.5	7.4	3,908	3,747	3,546
Surface mining	England	2.1	2.1	2.7	552	575	775
	Scotland	5.7	6.0	6.0	1,182	1,125	1,149
	Wales	1.6	1.6	1.7	515	465	544
	Total	9.4	9.8	10.4	2,249	2,165	2,468
Total	England	10.1	9.5	10.0	4,110	4,011	3,933
	Scotland	5.7	6.0	6.0	1,182	1,125	1,149
	Wales	1.7	1.7	1.7	865	776	932
	Total	17.5	17.3	17.8	6,157	5,912	6,014

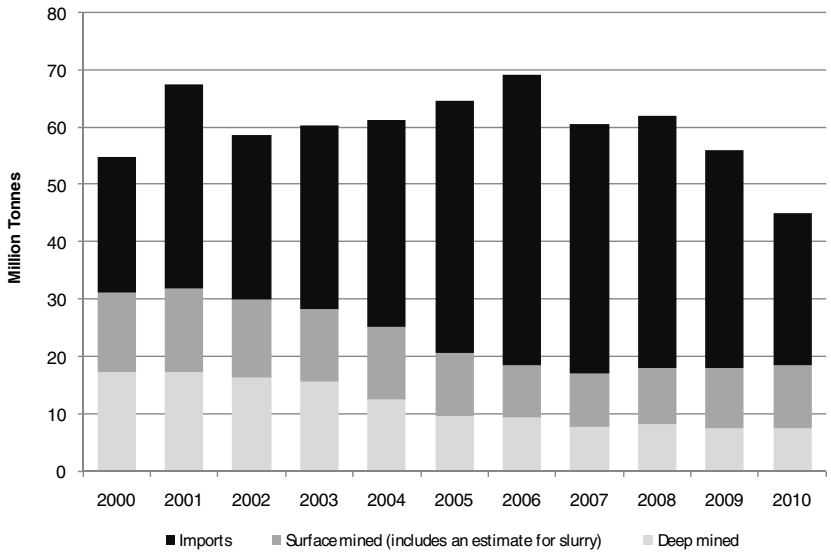
Source: The Coal Authority

1. *Output is the tonnage declared by operators to the Coal Authority, including estimated tonnages. It excludes estimates of slurry recovered from dumps, ponds, rivers, etc.*
2. *Employment includes contractors and is as declared by licensees to the Coal Authority at 31 December each year.*
3. *From 2009, Table 2A is now published on a calendar year basis to be consistent with the rest of the DUKES publication.*

2.8 Employment in the coal industry has followed a similar pattern to UK production levels. Table 2A also shows how numbers employed in the production of coal have changed over the last three years. During 2010 total employment, including contractors, was 1.7 per cent higher than in 2009. At 31 December 2010, 65 per cent of the 6,014 people employed in UK coal mining worked in England, while 19 per cent were employed in Scotland and 16 per cent in Wales.

2.9 Based on statistics for 2009[1], the UK, for the first time was the second largest EU coal producer (out of eight EU producing countries) accounting for 13 per cent of total EU production (129 million tonnes). Poland had the highest production, contributing 60 per cent (77 million tonnes) to this total.

Chart 2.1: Coal production and imports 2000 to 2010



2.10 Since 1970, UK coal imports have grown steadily. This growth increased more rapidly over a short period of time in the early 2000s. This meant in 2001 UK imports (36 million tonnes) exceeded UK production (32 million tonnes) for the first time. This rapid growth in imports continued and in 2006 imports reached a new record of 51 million tonnes. Since then, levels have declined to 27 million tonnes in 2010 (52 per cent of UK coal supply), a decrease of 48 per cent since 2006 and 31 per cent on 2009, when imports made up 78 per cent of supply.

2.11 In 2010, 39 per cent (16 million tonnes) of coal consumed by major power producers was from imports (steam coal).

Table 2B: Imports of coal in 2010[1]

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Russia	9,356	351	43	9,750
Colombia	6,360	66	11	6,437
United States of America	2,390	2,132	-	4,522
Australia	-	3,235	12	3,247
European Union[2]	881	1	72	954
Republic of South Africa	781	-	-	781
Canada	-	434	-	434
Indonesia	275	-	-	275
Other countries	87	16	-	104
People's Republic of China	-	-	17	17
Total all countries	**20,131**	**6,235**	**155**	**26,521**

Source: H M Revenue and Customs, ISSB

1. Country of origin basis.

2. Includes non-EU coal routed through the Netherlands.

[1] *EU statistics for 2010 are not yet available on the Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home. The statistics being referenced refer to hard coal (steam coal, anthracite and coking coal).*

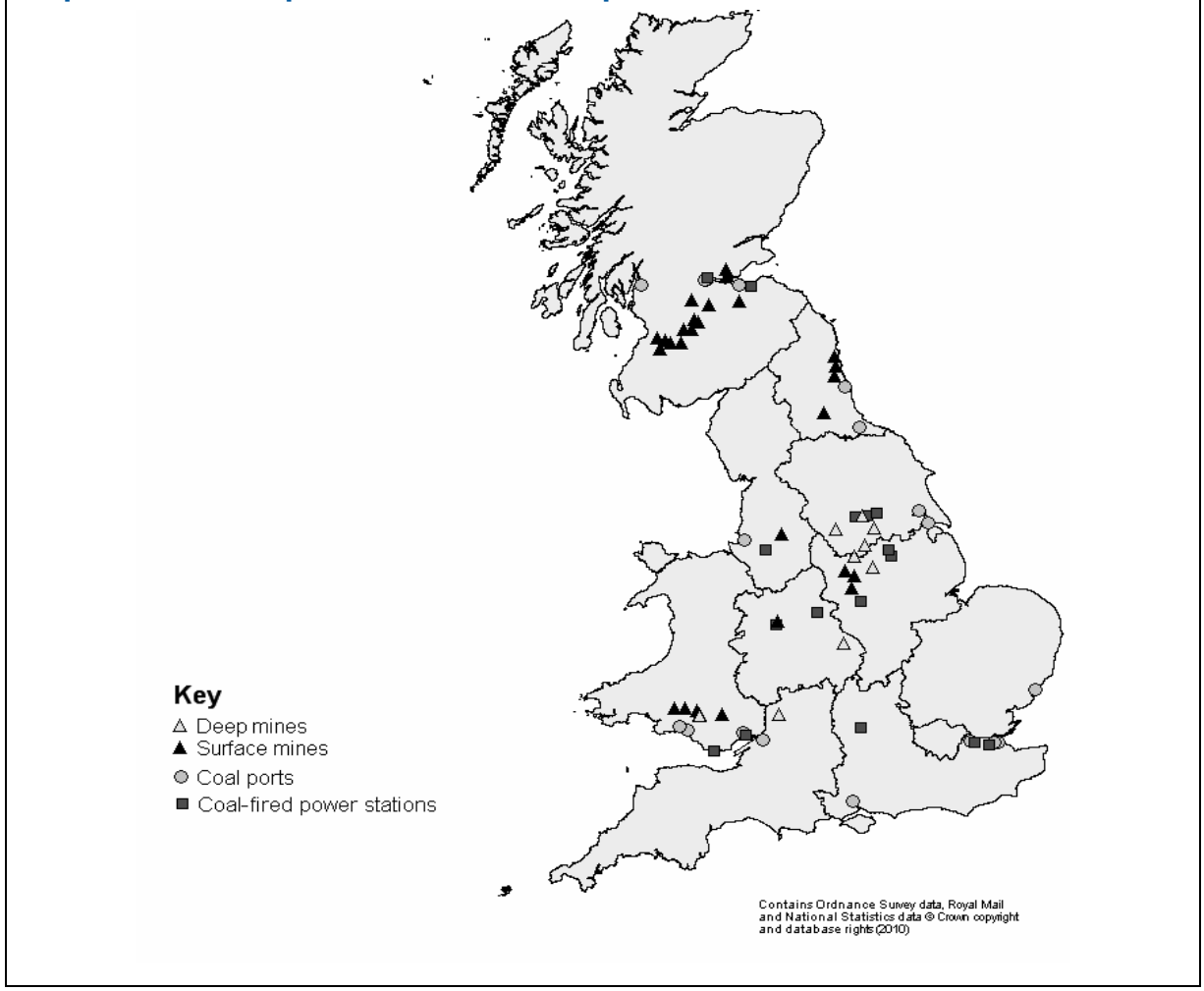
2.12 Table 2B shows that in 2010, 37 per cent (10 million tonnes) of the United Kingdom's coal imports came from Russia and another 54 per cent (14 million tonnes) from Colombia, the USA and Australia combined.

2.13 Steam coal accounted for 76 per cent of the total imports, 24 per cent was coking coal, with anthracite accounting for just a small amount. Coal imports from Russia grew rapidly over the last decade, and in 2006 peaked at around 22 million tonnes. However, imports from Russia fell sharply between 2009 and 2010 (from 19 million tonnes to 10 million tonnes) as total imports fell. In 2010, Russia accounted for 46 per cent (9 million tonnes) of total steam coal imports. A further 52 per cent (10 million tonnes) came from a combination of Colombia, South Africa, the USA and the EU. The United Kingdom imported 52 per cent (3.2 million tonnes) of coking coal from Australia with a further 34 per cent (2.1 million tonnes) from the USA. The small volume of imported anthracite coal (0.2 million tonnes) was mainly from the European Union (46 per cent) and Russia (28 per cent).

2.14 The UK and Germany have consistently been the top two coal import countries in the EU accounting for 19 per cent each of total EU imports (202 million tonnes)[2]. The Netherlands followed with a 10 per cent (20 million tonnes) share of the total.

2.15 Generally, coal exports are less than coal imports and in 2010, were 0.7 million tonnes, 11 per cent higher than in 2009.

Map 2A: UK coal production sites and ports



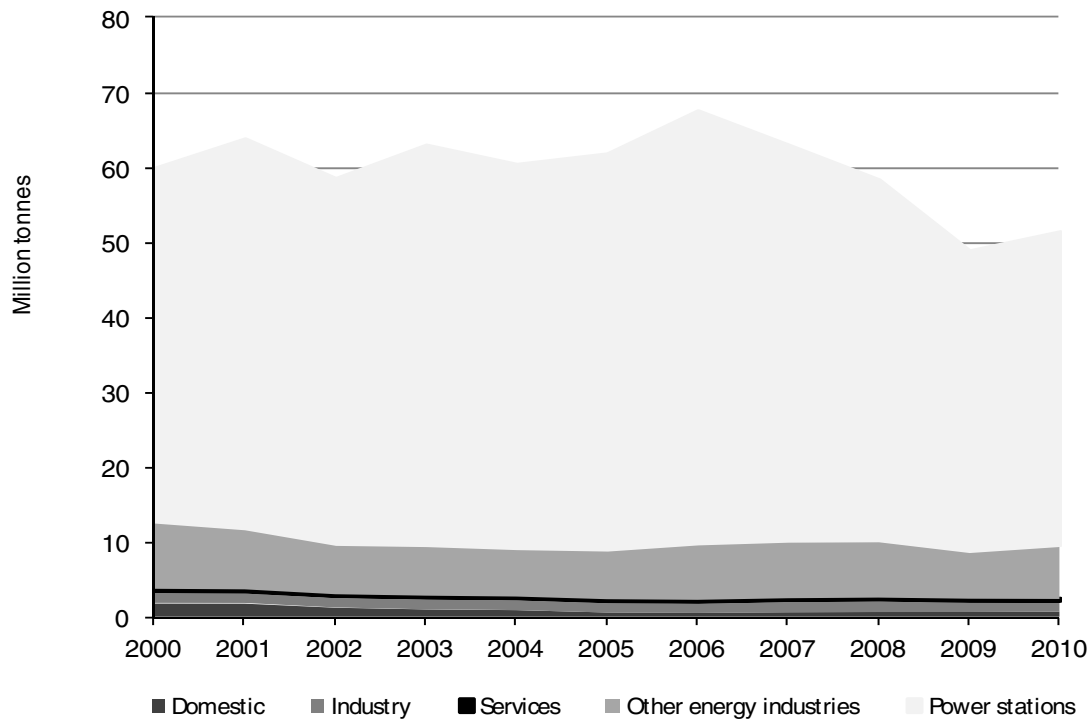
[2] *EU statistics for 2010 are not yet available on the Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home. The statistics being referenced refer to hard coal (steam coal, anthracite and coking coal).*

Coal Consumption

2.16 As with coal production, coal consumption in the UK has also seen a general decline over the last 30 years, as the UK's energy mix has become more diverse, environmental regulations and high coal prices had made natural gas more attractive to purchase for generation use. Despite this general trend, overall demand for coal increased by 5.2 per cent between 2009 and 2010 (Chart 2.2) driven by increased use in electricity generation. Eighty-five per cent (44 million tonnes) of this demand was for steam coal, 12 per cent (6.4 million tonnes) was for coking coal and 2.3 per cent (1.2 million tonnes) was for anthracite.

2.17 The UK was the third largest consumer of coal of EU countries, accounting for 17 per cent (292 million tonnes) of total coal consumption in the EU. The top two consumers were Poland and Germany, accounting for 26 per cent (76 million tonnes) and 18 per cent (52 million tonnes) of total EU consumption, respectively.

Chart 2.2: Coal consumption, 2000 to 2010



2.18 The transformation sector, represented 95 per cent (49 million tonnes) of overall demand for coal in 2010 (51 million tonnes), an increase of 5.6 per cent between 2009 and 2010, as a result of greater use for coal-fired generation. Electricity generation accounted for 94 per cent of demand for steam coal and 23 per cent of demand for anthracite. Coking coal was used in coke ovens (85 per cent) and blast furnaces (15 per cent) in the UK iron and steel industry. These splits remain unchanged from 2009.

2.19 Coal consumption by final consumers accounted for 4.8 per cent (2.5 million tonnes) of total demand in 2010, where it was used for steam raising, space or hot water heating, or heat for processing, a decrease of 1.4 per cent from 2009. Steam coal accounted for 85 per cent of this final consumption (unchanged from 2009).

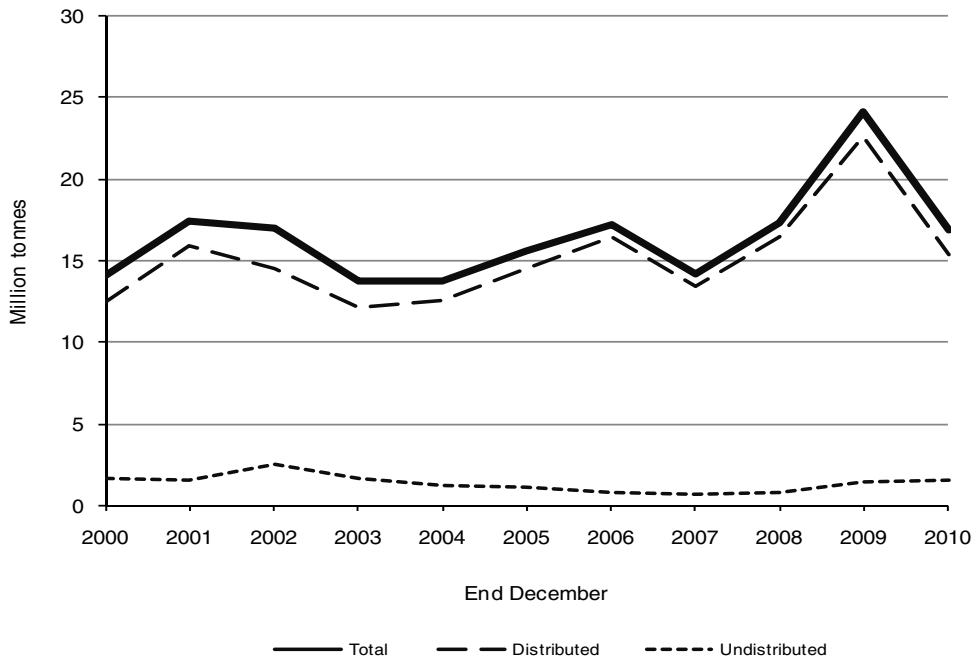
2.20 The industry sector is the largest final consumer (accounting for 69 per cent of total final consumption in 2010), where consumption in 2010 fell by 1.6 per cent from 2009. Ninety-one per cent of coal use in the industrial sector was for steam coal, with mineral products (e.g. cement, glass and brick production) being the largest users.

2.21 The domestic sector accounted for 29 per cent of the final consumption of coal, with 70 per cent of this demand being for steam coal and the remainder for anthracite. Coal use in the commercial and public sector decreased by 57 per cent from 73 thousand tonnes in 2009 to 31 thousand tonnes in 2010. This was because in 2009 the quality of coal was too poor to blend with coal sold to coal-fired power stations and therefore it was sold to the public admin and commercial sectors.

Coal Stocks

2.22 Total coal stocks were less than 20 million tonnes pre-1960. Since then distributed stocks increased substantially (mainly due to electricity generators) and in 1983, total stocks, reached a record high of 58 million tonnes, of which 59 per cent was distributed. Thereafter, although there have been year-on-year fluctuations, stock levels have declined back to under 20 million tonnes a year, with the exception of 2009, where total stocks were 24 million tonnes (Chart 2.3), the highest since 1994 (27 million tonnes). Production and net imports together in 2010 were lower than the demand for coal. Consequently, total stock levels were 7.2 million tonnes lower at the end of 2010 (17 million tonnes) compared to a year earlier. Total stocks at the end of 2010 were equivalent to around a third of the year's coal consumption. Stocks held at collieries and surface mine sites at the end of 2010 were 0.1 million tonnes higher than a year earlier and stocks at major power stations and coke ovens, as a whole fell by 7.9 million tonnes and accounted for 87 per cent of total stocks in 2010.

Chart 2.3: Coal stocks in the UK 2000 to 2010

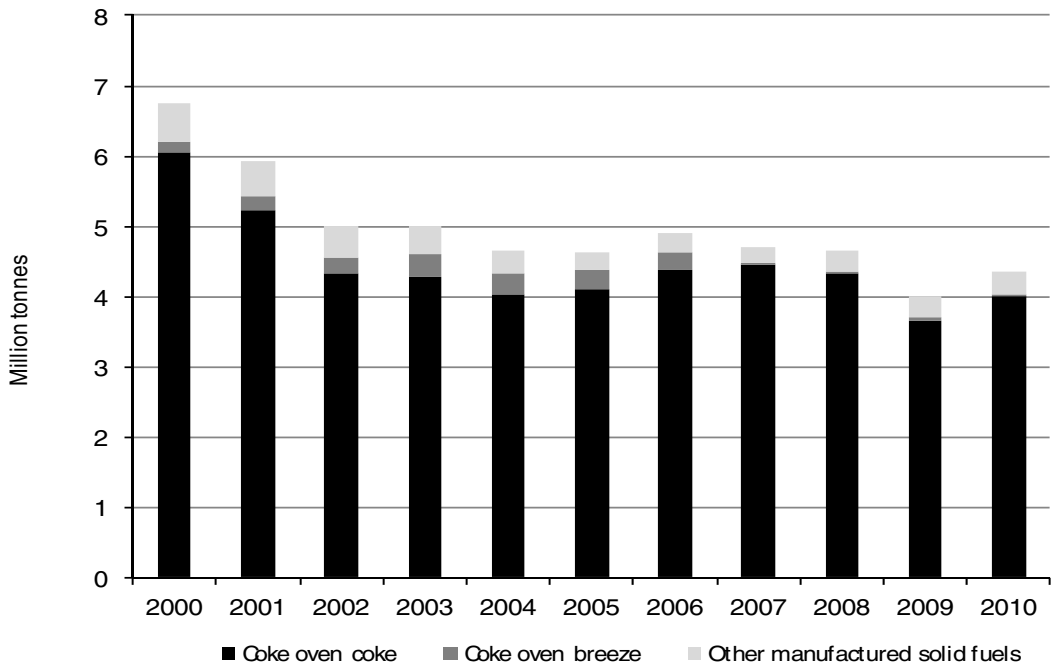


Manufactured Solid Fuels (Tables 2.4, 2.5, 2.6, 2.8 and 2.9)

Production, Trade and Consumption

2.23 In 2010, around 92 per cent of manufactured solid fuel production was **coke oven coke**, a proportion that has remained the same for the past 15 years (Chart 2.4). Virtually, all of UK's supply of coke oven coke is home produced, with around 1 per cent being imported from other countries. Home produced coke oven coke in 2010 was 8.9 per cent higher than in 2009 (4.0 million tonnes). Despite production levels increasing, lower demand by blast furnaces resulted in more coke oven coke being exported (0.4 million tonnes) compared to 2009 (0.1 million tonnes). In contrast, imports of coke oven coke have decreased by 69 per cent from 0.1 million tonnes in 2009 and are now at their lowest level on record.

Chart 2.4: Total manufactured solid fuels production in the UK 2000 to 2010



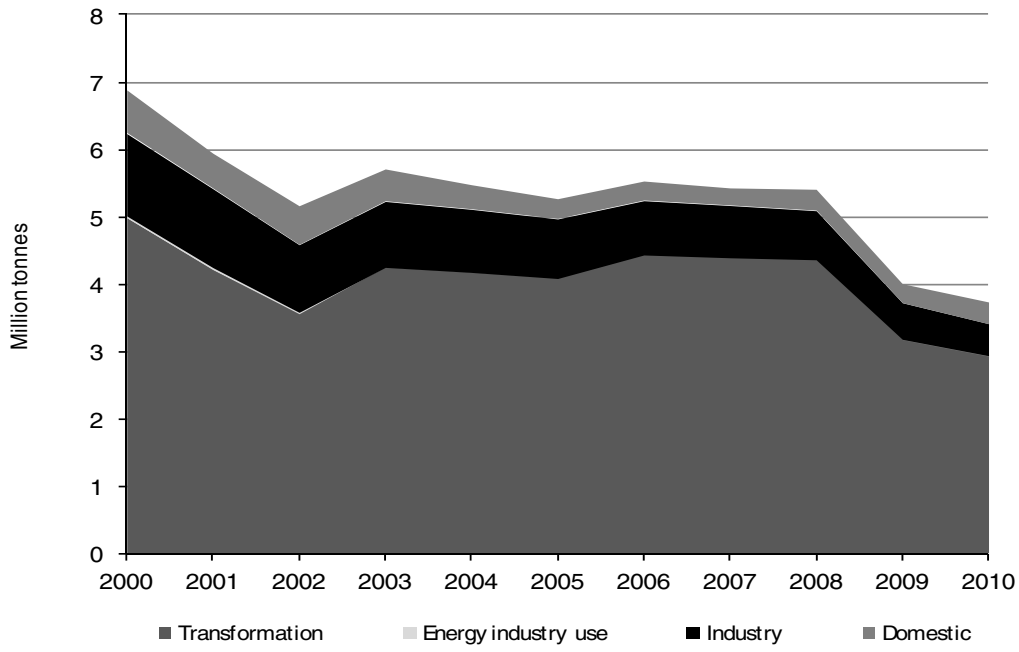
2.24 The main purpose for coke oven coke is for use in blast furnaces in the UK iron and steel industry. In 2010, this represented 97 per cent of total demand (2.6 million tonnes) (Chart 2.5), 7.3 per cent lower than in 2009 (2.8 million tonnes).

2.25 Most of the supply of **coke breeze** is from re-screened coke oven coke, with direct production accounting for only 4.0 per cent of total supply in 2010. In 2010, 48 per cent was used in blast furnaces (0.4 million tonnes) for transformation and 52 per cent used for final consumption.

2.26 Other manufactured solid fuels (patent fuels) are manufactured smokeless fuels, produced mainly for the domestic market, as the balances show. A small amount of these fuels (only 3.2 per cent of total supply in 2010) was imported, but exports generally exceed this. Imports and exports of manufactured smokeless fuels can contain small quantities of non-smokeless fuels.

2.27 The carbonisation and gasification of solid fuels in coke ovens produces **coke oven gas** as a by-product. In 2010, production of coke oven gas increased by 11 per cent on 2009 to 8.8 TWh. Some of this (42 per cent) was used to fuel the coke ovens themselves, of the rest 28 per cent is used for electricity generation, 19 per cent for iron and steel and other industrial processes (including heat production), 4.1 per cent in blast furnaces and 6.7 per cent is lost.

Chart 2.5: Total manufactured solid fuels consumption in the UK 2000 to 2010



2.28 **Blast furnace gas** is a by-product of iron smelting in a blast furnace. A similar product is obtained when steel is made in basic oxygen steel (BOS) converters and "BOS" gas is included in this category. Most of these gases are used in other parts of integrated steel works. The generation of electricity in 2010 used 46 per cent of blast furnace gas and BOS gas, while 32 per cent was used in coke ovens and blast furnaces themselves, 1.6 per cent used in general heat production, 12 per cent was lost or burned as waste and a further 8.8 per cent was used in the iron and steel industry. Demand for **benzole and tars** rose to 1.7 TWh in 2010, a 10 per cent increase on 2009.

2.29 A flow chart showing the use of coal, manufactured fuels and derived gases in the UK Iron and Steel industry can be found in the quarterly publication, Energy Trends for June 2011. This is available on the DECC energy statistics web site, www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx.

Technical notes and definitions

2.30 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.28 to 1.62. Additional guidance on the compilation of the solid fuels and derived gases statistics can be found in the document 'Data Sources and Methodologies', this document is available on the DECC energy statistics web site at: www.decc.gov.uk/en/content/cms/statistics/source/coal/coal.aspx. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A. While the data in the printed and bound copy of this Digest cover only the most recent 5 years, these notes also cover data for earlier years that are available on the DECC web site.

Coal production

2.31 **Deep mined**: The statistics cover saleable output from deep mines including coal obtained from working on both revenue and capital accounts. All licensed collieries (and British Coal collieries prior to 1995) are included, even where coal is only a subsidiary product.

2.32 **Surface** mines: The figures cover saleable output and include the output of sites worked by operators under agency agreements and licences, as well as the output of sites licensed for the production of coal as a subsidiary to the production of other minerals. The term 'surface mining' has now replaced opencast production as defined in DUKES pre-2011. Opencast production is a particular type of surface mining technique.

2.33 **Other sources/Slurry**: Estimates of slurry etc recovered and disposed of from dumps, ponds, rivers, etc.

Steam coal, coking coal and anthracite

2.34 **Steam coal** is coal classified as such by UK coal producers and by importers of coal. It tends to have calorific values at the lower end of the range.

2.35 **Coking coal** is coal sold by producers for use in coke ovens and similar carbonising processes. The definition is not therefore determined by the calorific value or caking qualities of each batch of coal sold, although calorific values tend to be higher than for steam coal.

2.36 **Anthracite** is coal classified as such by UK coal producers and importers of coal. Typically it has a high heat content making it particularly suitable for certain industrial processes and for use as a domestic fuel. Some UK anthracite producers have found a market for their lower calorific value output at power stations.

Allocation of imported coal

2.37 Although data are available on consumption of home produced coal, and also on consumption of imported coal by secondary fuel producers, there is only very limited direct information on consumption of imported coal by final users. Guidance on how DECC allocate imports to final users is outlined in paragraph 3.2.5 of the 'Data Sources and Methodologies' document. This guidance can be found on the DECC web site at: www.decc.gov.uk/en/content/cms/statistics/source/coal/coal.aspx.

Coal consumption

2.38 Figures for actual consumption of coal are available for all fuel and power producers and for final use by the iron and steel industry. The remaining final users consumption figures are based on information on disposals to consumers by producers and on imports.

2.39 Annex A of this Digest outlines the principles of energy and commodity balances and defines the activities that fall within these parts of the balances. However, the following additional notes relevant to solid fuels are given below:

Transformation: Blast furnaces: Coking coal injected into blast furnaces is shown separately within the balance tables.

Transformation: Low temperature carbonisation plants and patent fuel plants: Coal used at these plants for the manufacture of domestic coke such as Coalite and of briquetted fuels such as Phurnacite and Homefire.

Consumption: Industry: The statistics comprise sales of coal by the six main coal producers and a few small producers to the iron and steel industry (excluding that used at coke ovens and blast furnaces) and to other industrial sectors, estimated proportions of anthracite and steam coal imports, and submission made to the EU Emissions Trading Scheme. The figures exclude coal used for industries' own generation of electricity, which appear separately under transformation.

Consumption: Domestic: Some coal is supplied free of charge to retired miners and other retired eligible employees through the National Concessionary Fuel Scheme (NCFS). The concessionary fuel provided in 2009 is estimated at 71.6 thousand tonnes. This estimate is included in the domestic steam coal and domestic anthracite figures.

Stocks of coal

2.40 Undistributed stocks are those held at collieries and surface mine sites. It is not possible to distinguish these two locations in the stock figures. Distributed stocks are those held at power stations and stocking grounds of the major power producing companies (as defined in Chapter 5, paragraphs 5.66 and 5.67), coke ovens, low temperature carbonisation plants and patent fuel plants.

Coke oven coke (hard coke), hard coke breeze and other manufactured fuels

2.41 The statistics cover coke produced at coke ovens owned by Corus plc, Coal Products Ltd and other producers. Low temperature carbonisation plants are not included (see paragraph 2.47, below). Breeze (as defined in paragraph 2.42) is excluded from the figures for coke oven coke.

2.42 Breeze can generally be described as coke screened below 19 mm (¾ inch) with no fines removed, but the screen size may vary in different areas and to meet the requirements of particular markets. Coke that has been transported from one location to another is usually re-screened before use to remove smaller sizes, giving rise to further breeze.

2.43 The coke screened out by producers as breeze and fines appears as transfers in the coke breeze column of the balances. Transfers out of coke oven coke have not always been equal to transfers into coke oven breeze. This was due to differences arising from the timing, location of measurement and the practice adopted by the Iron and Steel works. Since 2000, however, the Iron and Steel Statistics Bureau have been able to reconcile these data. Since 2007, most of the supply of coke breeze was reclassified to coke oven coke following better information received by the Iron and Steel Statistics Bureau.

2.44 Figures are derived from returns made to HM Revenue and Customs and are broken down in greater detail in Annex G on the DECC energy statistics web site at:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

2.45 However, in Tables 2.4, 2.5, 2.6 and 2.8, the export figures used for hard coke, coke breeze and other manufactured solid fuels for the years before 1998 (as reported on the DECC web site) are quantities of fuel exported as reported to DECC or its predecessor Departments by the companies concerned, rather than quantities recorded by HM Revenue and Customs in their Trade Statistics. A long term trend commentary and tables on exports are on the DECC energy statistics web site at:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

2.46 In 1998, an assessment using industry data showed that on average over the previous five years 91 per cent of imports had been coke and 9 per cent breeze and it is these proportions that have been used for 1998 and subsequent years in Tables 2.4, 2.5, 2.6 and 2.8.

2.47 Other manufactured solid fuels are mainly solid smokeless fuels for the domestic market for use in both open fires and in boilers. A smaller quantity is exported (although exports are largely offset by similar quantities of imports in most years). Manufacture takes place in patented fuel plants and low temperature carbonisation plants. The brand names used for these fuels include Homefire, Phurnacite, Ancit and Coalite.

2.48 Consumption of coke and other manufactured solid fuels: These are disposals from coke ovens to merchants. The figures also include estimated proportions of coke imports.

Blast furnace gas, coke oven gas, benzole and tars

2.49 The following definitions are used in the tables that include these fuels:

Blast furnace gas: includes basic oxygen steel furnace (BOS) gas. Blast furnace gas is the gas produced during iron ore smelting when hot air passes over coke within the blast ovens. It contains carbon monoxide, carbon dioxide, hydrogen and nitrogen. In a basic oxygen steel furnace the aim is not to introduce nitrogen or hydrogen into the steel making process, so pure oxygen gas and suitable fluxes are used to remove the carbon and phosphorous from the molten pig iron and steel scrap. A similar fuel gas is thus produced.

Coke oven gas: is a gas produced during the carbonisation of coal to form coke at coke ovens. In 2009, some coke oven gas was produced using a combination of gases other than natural gas and blast furnace gas. This total has been added to the production of coke oven gas rather than transfers because it is specifically defined as the mixture of natural gas, blast furnace gas and BOS gas. The paragraph below on synthetic coke oven gas for a complete definition of this.

Synthetic coke oven gas: is mainly natural gas that is mixed with smaller amounts of blast furnace and BOS gas to produce a gas with almost the same qualities as coke oven gas. The transfers row of Tables 2.4, 2.5, 2.6 and 2.8 show the quantities of blast furnace gas used for this purpose and the total input of gases to the synthetic coke oven gas process. There is a corresponding outward transfer from natural gas in Chapter 4, Table 4.1.

Benzole: a colourless, liquid, flammable, aromatic hydrocarbon by-product of the iron and steel making process. It is used as a solvent in the manufacture of styrenes and phenols but can also be used as a motor fuel.

Tars: viscous materials usually derived from the destructive distillation of coal, which are by-products of the coke and iron making processes.

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2.1 Commodity balances 2010

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	16,397	270	1,150	17,817
Other sources	530	-	70	600
Imports	20,131	6,235	155	26,521
Exports	-624	-1	-90	-715
Marine bunkers	-	-	-	-
Stock change *(1)*	+7,817	-531	-79	+7,206
Transfers	-	-	-	-
Total supply	**44,251**	**5,972**	**1,206**	**51,429**
Statistical difference *(2)*	371	-406	0	-35
Total demand	**43,880**	**6,378**	**1,206**	**51,464**
Transformation	**41,748**	**6,378**	**843**	**48,968**
Electricity generation	41,233	-	272	41,505
Major power producers	39,959	-	272	40,231
Autogenerators	1,274	-	-	1,274
Heat generation	480	-	-	480
Petroleum refineries	-	-	-	-
Coke manufacture	-	5,399	254	5,654
Blast furnaces	-	978	-	978
Patent fuel manufacture and low temperature carbonisation	34	-	317	351
Energy industry use	**5**	**-**	**-**	**5**
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	5	-	-	5
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-	-
Other	-	-	-	-
Losses	**-**	**-**	**-**	**-**
Final consumption	**2,128**	**-**	**363**	**2,490**
Industry	**1,566**	**-**	**149**	**1,715**
Unclassified	-	-	-	-
Iron and steel	2	-	58	60
Non-ferrous metals	24	-	-	24
Mineral products	1,063	-	0	1,063
Chemicals	79	-	-	79
Mechanical engineering etc	13	-	-	13
Electrical engineering etc	5	-	-	5
Vehicles	51	-	-	51
Food, beverages etc	24	-	18	42
Textiles, leather, etc	67	-	-	67
Paper, printing etc	122	-	-	122
Other industries	112	-	73	186
Construction	4	-	-	4
Transport	**19**	**-**	**-**	**19**
Air	-	-	-	-
Rail *(3)*	19	-	-	19
Road	-	-	-	-
National navigation	-	-	-	-
Pipelines	-	-	-	-
Other	**543**	**-**	**214**	**757**
Domestic	504	-	214	718
Public administration	28	-	-	28
Commercial	4	-	-	4
Agriculture	1	-	-	1
Miscellaneous	6	-	-	6
Non energy use	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) Estimate revised following research carried out into heritage railways.

2.2 Commodity balances 2009

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	15,862	246	1,266	17,374
Other sources	430	-	70	500
Imports	32,894	5,164	109	38,167
Exports	-526	-6	-115	-646
Marine bunkers	-	-	-	-
Stock change *(1)*	-6,797	+259	-70	-6,608
Transfers	-	-	-	-
Total supply	**41,863**	**5,663**	**1,260**	**48,786**
Statistical difference *(2)*	31r	-124	-26r	-118r
Total demand	**41,832r**	**5,787**	**1,285r**	**48,904r**
Transformation	**39,657r**	**5,787**	**930**	**46,373r**
Electricity generation	39,164r	-	600	39,764r
Major power producers	37,744r	-	600	38,343r
Autogenerators	1,421r	-	-	1,421r
Heat generation	482r	-	-	482r
Petroleum refineries	-	-	-	-
Coke manufacture	-	4,936	-	4,936
Blast furnaces	-	852	-	852
Patent fuel manufacture and low temperature carbonisation	11r	-	330	341r
Energy industry use	**5r**	**-**	**-**	**5r**
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	5r	-	-	5r
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-	-
Other	-	-	-	-
Losses	**-**	**-**	**-**	**-**
Final consumption	**2,170r**	**-**	**356r**	**2,526r**
Industry	**1,600r**	**-**	**142r**	**1,742r**
Unclassified	-	-	-	-
Iron and steel	2r	-	58r	60r
Non-ferrous metals	28r	-	-	28r
Mineral products	1,076	-	1r	1,077r
Chemicals	77r	-	-	77r
Mechanical engineering etc	14r	-	-	14r
Electrical engineering etc	5r	-	-	5r
Vehicles	46r	-	-	46r
Food, beverages etc	37r	-	11r	48r
Textiles, leather, etc	69r	-	-	69r
Paper, printing etc	124r	-	-	124r
Other industries	119r	-	72	191r
Construction	4r	-	-	4r
Transport	**19r**	**-**	**-**	**19r**
Air	-	-	-	-
Rail *(3)*	19r	-	-	19r
Road	-	-	-	-
National navigation	-	-	-	-
Pipelines	-	-	-	-
Other	**551r**	**-**	**214**	**765r**
Domestic	475r	-	214	689r
Public administration	24r	-	-	24r
Commercial	49r	-	-	49r
Agriculture	-	-	-	-
Miscellaneous	3r	-	-	3r
Non energy use	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) Estimate revised following research carried out into heritage railways.

2.3 Commodity balances 2008

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	16,010	307	1,287	17,604
Other sources	368	-	81	449
Imports	37,382	6,349r	144	43,875r
Exports	-357	-139	-104	-599
Marine bunkers	-	-	-	-
Stock change *(1)*	-3,473	+414	-51r	-3,110r
Transfers	-	-	-	-
Total supply	**49,930**	**6,931r**	**1,358r**	**58,219r**
Statistical difference *(2)*	82r	-114r	-134r	-166r
Total demand	**49,849r**	**7,045**	**1,492r**	**58,385r**
Transformation	**47,498r**	**7,045**	**1,165r**	**55,707r**
Electricity generation	46,990r	-	817r	47,808r
Major power producers	45,435r	-	817r	46,252
Autogenerators	1,555r	-	-	1,555r
Heat generation	503r	-	-	503r
Petroleum refineries	-	-	-	-
Coke manufacture	-	5,875	-	5,875
Blast furnaces	-	1,170	-	1,170
Patent fuel manufacture and low temperature carbonisation	5	-	347	352
Energy industry use	**5r**	**-**	**-**	**5r**
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	5r	-	-	5r
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-	-
Other	-	-	-	-
Losses	**-**	**-**	**-**	**-**
Final consumption	**2,346r**	**-**	**327**	**2,672r**
Industry	**1,779r**	**-**	**162**	**1,940r**
Unclassified	-	-	-	-
Iron and steel	2	-	67	69
Non-ferrous metals	33	-	-	33
Mineral products	1,149	-	1	1,150
Chemicals	102	-	-	102
Mechanical engineering etc	14	-	-	14
Electrical engineering etc	6	-	-	6
Vehicles	49r	-	-	49r
Food, beverages etc	27	-	11	39
Textiles, leather, etc	76	-	-	76
Paper, printing etc	149	-	-	149
Other industries	129	-	82	212
Construction	43	-	-	43
Transport	**19r**	**-**	**-**	**19r**
Air	-	-	-	-
Rail *(3)*	19r	-	-	19r
Road	-	-	-	-
National navigation	-	-	-	-
Pipelines	-	-	-	-
Other	**548r**	**-**	**165**	**713r**
Domestic	520r	-	164	683r
Public administration	13r	-	-	13r
Commercial	10	-	-	10
Agriculture	5r	-	-	5r
Miscellaneous	0	-	1	1
Non energy use	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) Estimate revised following research carried out into heritage railways.

2.4 Commodity balances 2010

Manufactured fuels

	Thousand tonnes				GWh		
	Coke oven coke	Coke breeze	Other manuf. solid fuel	Total manuf. solid fuel	Benzole and tars *(5)*	Coke oven gas	Blast furnace gas
Supply							
Production *(1)*	3,990	32	318	4,340	1,696	8,822	11,404
Other sources	-	-	-	-	-	-	-
Imports	44	69	10	123	-	-	-
Exports	-437	-46	-35	-518	-	-	-
Marine bunkers	-	-	-	-	-	-	-
Stock change *(2)*	-145	-83	+13	-215	-	-	-
Transfers *(3)*	-833	+833	-	-	-	+274	-11
Total supply	**2,620**	**805**	**306**	**3,731**	**1,696**	**9,096**	**11,393**
Statistical difference *(4)*	+1	-0	-5	-5	-	-62	-71
Total demand	**2,619**	**805**	**311**	**3,735**	**1,696**	**9,158**	**11,464**
Transformation	**2,554**	**384**	-	**2,938**	-	**2,984**	**5,444**
Electricity generation	-	-	-	-	-	2,566	5,265
Major power producers	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	2,566	5,265
Heat generation	-	-	-	-	-	418	179
Petroleum refineries	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-
Blast furnaces	2,554	384	-	2,938	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-
Low temperature carbonisation	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	**4,235**	**3,674**
Electricity generation	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	3,861	732
Blast furnaces	-	-	-	-	-	374	2,943
Patent fuel manufacture	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Losses	-	-	-	-	-	**617**	**1,335**
Final consumption	**66**	**421**	**311**	**797**	**1,696**	**1,321**	**1,010**
Industry	**55**	**421**	-	**476**	**1,696**	**1,321**	**1,010**
Unclassified	48	4	-	53	1,696	198	-
Iron and steel	7	416	-	423	-	1,123	1,010
Non-ferrous metals	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-
Other	**10**	-	**311**	**321**	-	-	-
Domestic	10	-	311	321	-	-	-
Public administration	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-
Agriculture	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-

(1) See paragraph 2.41- 2.49

(2) Stock fall (+), stock rise (-).

(3) Coke oven gas and blast furnace gas transfers are for synthetic coke oven gas, see paragraph 2.49.

(4) Total supply minus total demand.

(5) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.

2.5 Commodity balances 2009

Manufactured fuels

	Thousand tonnes				GWh		
	Coke oven coke	Coke breeze	Other manuf. solid fuel	Total manuf. solid fuel	Benzole and tars (5)	Coke oven gas	Blast furnace gas
Supply							
Production (1)	3,663	29	303	3,996	1,536	7,956r	11,199r
Other sources	-	-	-	-	-	-	-
Imports	140	38	6	184	-	-	-
Exports	-97	-49	-31	-177	-	-	-
Marine bunkers	-	-	-	-	-	-	-
Stock change (2)	-79	+89r	-10	1r	-	-	-
Transfers (3)	-784	+784	-	-	-	+366r	-15r
Total supply	**2,843**	**892r**	**268**	**4,003r**	**1,536**	**8,322r**	**11,184r**
Statistical difference (4)	-	-	-1r	-1r	-	-62r	-66r
Total demand	**2,843**	**892**	**269**	**4,004**	**1,536**	**8,383r**	**11,250r**
Transformation	**2,755**	**426**	**-**	**3,180**	**-**	**3,044r**	**6,531**
Electricity generation	-	-	-	-	-	2,626r	6,352
Major power producers	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	2,626r	6,352
Heat generation	-	-	-	-	-	418	179
Petroleum refineries	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-
Blast furnaces	2,755	426	-	3,180	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-
Low temperature carbonisation	-	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**-**	**-**	**4,471r**	**3,657r**
Electricity generation	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	3,888r	506r
Blast furnaces	-	-	-	-	-	583r	3,151r
Patent fuel manufacture	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Losses	-	-	-	-	-	**75r**	**724r**
Final consumption	**88**	**466**	**269**	**824**	**1,536**	**794r**	**337r**
Industry	**78**	**466**	**-**	**544**	**1,536**	**794r**	**337r**
Unclassified	71	7	-	78	1,536	230	-
Iron and steel	7	460	-	466	-	564r	337r
Non-ferrous metals	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-
Other	**10**	**-**	**269**	**280**	**-**	**-**	**-**
Domestic	10	-	269	280	-	-	-
Public administration	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-
Agriculture	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-

(1) See paragraph 2.41- 2.49
(2) Stock fall (+), stock rise (-).
(3) Coke oven gas and blast furnace gas transfers are for synthetic coke oven gas, see paragraph 2.49.
(4) Total supply minus total demand.
(5) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.

2.6 Commodity balances 2008

Manufactured fuels

	Thousand tonnes				GWh		
	Coke oven coke	Coke breeze	Other manuf. solid fuel	Total manuf. solid fuel	Benzole and tars (5)	Coke oven gas	Blast furnace gas
Supply							
Production (1)	4,324	35	302	4,661	1,816	9,410	15,345
Other sources	-	-	-	-	-	-	-
Imports	503	219	16	738	-	-	-
Exports	-111	-74	-25	-210	-	-	-
Marine bunkers	-	-	-	-	-	-	-
Stock change (2)	+287r	-79r	6r	+214r	-	-	-
Transfers (3)	-1,104	+1,104	-	-	-	+71	-3
Total supply	**3,899r**	**1,205r**	**299r**	**5,403r**	**1,816**	**9,481**	**15,342**
Statistical difference (4)	-	-	4r	+5r	-	-8r	-110r
Total demand	**3,900r**	**1,204**	**294**	**5,398r**	**1,816**	**9,489r**	**15,452r**
Transformation	**3,796**	**567**	**-**	**4,363**	**-**	**2,681**	**7,900**
Electricity generation	-	-	-	-	-	2,263	7,721
Major power producers	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	2,263	7,721
Heat generation	-	-	-	-	-	418	179
Petroleum refineries	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-
Blast furnaces	3,796	567	-	4,363	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-
Low temperature carbonisation	-	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**-**	**-**	**5,117r**	**4,759**
Electricity generation	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	4,349	639
Blast furnaces	-	-	-	-	-	768	4,121
Patent fuel manufacture	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Losses	-	-	-	-	-	**413**	**2,332**
Final consumption	**104r**	**638**	**294**	**1,036r**	**1,816**	**1,278r**	**461r**
Industry	**91r**	**638**	**-**	**729r**	**1,816**	**1,278r**	**461r**
Unclassified	78r	16	-	94r	1,816	207	-
Iron and steel	13	621	-	635	-	1,071r	461r
Non-ferrous metals	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-
Other	**12**	**-**	**294**	**307**	-	-	-
Domestic	12	-	294	307	-	-	-
Public administration	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-
Agriculture	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-

(1) See paragraph 2.41- 2.49

(2) Stock fall (+), stock rise (-).

(3) Coke oven gas and blast furnace gas transfers are for synthetic coke oven gas, see paragraph 2.49.

(4) Total supply minus total demand.

(5) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.

2.7 Supply and consumption of coal

Thousand tonnes

	2006	2007	2008	2009	2010
Supply					
Production	18,079	16,540	17,604	17,374	17,817
Deep-mined	9,444	7,674	8,096	7,520	7,390
Surface mining *(1)*	8,635	8,866	9,509	9,854	10,426
Other sources *(2)*	438r	467	449	500	600
Imports	50,528	43,364r	43,875r	38,167	26,521
Exports	-443	-544	-599	-646	-715
Stock change *(3)*	-1,262r	+3,076	-3,110r	-6,608	+7,206
Total supply	**67,340r**	**62,903r**	**58,219r**	**48,786**	**51,429**
Statistical difference *(4)*	-254r	-125r	-166r	-118r	-35
Total demand	**67,594r**	**63,029r**	**58,385r**	**48,904r**	**51,464**
Transformation	**65,220**	**60,434r**	**55,707r**	**46,373r**	**48,968**
Electricity generation	57,438	52,511r	47,808r	39,764r	41,505
Major power producers	55,926	51,031	46,252	38,343r	40,231
Autogenerators	1,511	1,480r	1,555r	1,421r	1,274
Heat generation	457	485	503r	482r	480
Coke manufacture	5,929	5,932	5,875	4,936	5,654
Blast furnaces	1,121	1,242	1,170	852	978
Patent fuel manufacture and low temperature carbonisation	276	265	352r	341r	351
Energy industry use	**4**	**5**	**5r**	**5r**	**5**
Coal extraction	4	5	5r	5r	5
Final consumption	**2,370r**	**2,590r**	**2,672r**	**2,526r**	**2,490**
Industry	**1,756r**	**1,896r**	**1,940r**	**1,742r**	**1,715**
Unclassified	-	-	-	-	-
Iron and steel	1	75	69	60r	60
Non-ferrous metals	62r	36r	33	28r	24
Mineral products	1,047	1,150	1,150	1,077r	1,063
Chemicals	131	119	102	77r	79
Mechanical engineering etc	12r	10	14	14r	13
Electrical engineering etc	6	6	6	5r	5
Vehicles	53r	49	49r	46r	51
Food, beverages etc	25r	34r	39	48r	42
Textiles, clothing, leather, etc	70r	74r	76	69r	67
Pulp, paper, printing etc	141r	144	149	124r	122
Other industries	208r	200r	212	191r	186
Construction	-	-	43	4r	4
Transport ***(5)***	**19r**	**19r**	**19r**	**19r**	**19**
Other	**596r**	**675r**	**713r**	**765r**	**757**
Domestic	561r	648r	683r	689r	718
Public administration	19r	14r	13r	24r	28
Commercial	6	6	10	49r	4
Agriculture	5	4	5r	-	1
Miscellaneous	5	2	1	3r	6
Non energy use	-	-	-	-	-
Stocks at end of year *(6)*					
Distributed stocks	16,427r	13,420	16,408r	22,640	15,366
Of which:					
Major power producers	14,813	11,179	14,863	21,770	13,370
Coke ovens	946r	1,479	1,065	806	1,338
Undistributed stocks	783	734	854	1,450	1,517
Total stocks *(7)*	**17,210r**	**14,155**	**17,262r**	**24,090**	**16,883**

(1) The term 'surface mining' has now replaced opencast production. Opencast production is a surface mining technique.
(2) Estimates of slurry etc. recovered from ponds, dumps, rivers, etc.
(3) Stock fall (+), stock rise (-).
(4) Total supply minus total demand.
(5) Estimate revised following research carried out into heritage railways.
(6) Excludes distributed stocks held in merchants' yards, etc., mainly for the domestic market, and stocks held by the industrial sector.
(7) For some years, closing stocks may not be consistent with stock changes, due to additional stock adjustments

2.8 Supply and consumption of coke oven coke, coke breeze and other manufactured solid fuels

Thousand tonnes

	2006	2007	2008	2009	2010
Coke oven coke					
Supply					
Production	4,384	4,451	4,324	3,663	3,990
Imports	748	745	503	140	44
Exports	-94	-105	-111	-97	-437
Stock change *(1)*	-237	+34	+287r	-79	-145
Transfers	-955	-1,115	-1,104	-784	-833
Total supply	**3,846**	**4,010**	**3,899r**	**2,843**	**2,620**
Statistical difference *(2)*	-1	-14	-	-	+1
Total demand	**3,847**	**4,024**	**3,900r**	**2,843**	**2,619**
Transformation	**3,745**	**3,910**	**3,796**	**2,755**	**2,554**
Blast furnaces	3,745	3,910	3,796	2,755	2,554
Energy industry use	**-**	**-**	**-**	**-**	**-**
Final consumption	**102**	**114**	**104r**	**88**	**66**
Industry	**80**	**99**	**91r**	**78**	**55**
Unclassified	53	76	78r	71	48
Iron and steel	26	23	13	7	7
Non-ferrous metals	**-**	**-**	**-**	**-**	**-**
Other	**22**	**15**	**12**	**10**	**10**
Domestic	22	15	12	10	10
Stocks at end of year *(3)*	**650**	**616**	**326r**	**319r**	**453**
Coke breeze					
Supply					
Production *(4)*	245	25	35	29	32
Imports	261	325	219	38	69
Exports	-74	-152	-74	-49	-46
Stock change *(1)*	+25	-80	-79r	+89r	-83
Transfers	955	1,115	1,104	784	833
Total supply	**1,411**	**1,233**	**1,205r**	**892r**	**805**
Statistical difference *(2)*	-4	+73r	-	-	-0
Total demand	**1,415**	**1,159r**	**1,204**	**892**	**805**
Transformation	**688**	**483**	**567**	**426**	**384**
Coke manufacture	**-**	**-**	**-**	**-**	**-**
Blast furnaces	688	483	567	426	384
Energy industry use	**-**	**-**	**-**	**-**	**-**
Final consumption	**727**	**677r**	**638**	**466**	**421**
Industry	**727**	**677r**	**638**	**466**	**421**
Unclassified	26	13	16	7	4
Iron and steel	701	664r	621	460	416
Stocks at end of year *(3)*	**394**	**473**	**553**	**246r**	**248**
Other manufactured solid fuels					
Supply					
Production	260	227	302	303	318
Imports	10	13	16	6	10
Exports	-12	-7	-25	-31	-35
Stock change *(1)*	+2	+2	+6r	-10	+13
Total supply	**260**	**235**	**299r**	**268**	**306**
Statistical difference *(2)*	+3	+0	+4r	-1	-5
Total demand	**257**	**235**	**294**	**269**	**311**
Transformation	**-**	**-**	**-**	**-**	**-**
Energy industry use	**-**	**-**	**-**	**-**	**-**
Patent fuel manufacture	**-**	**-**	**-**	**-**	**-**
Final consumption	**257**	**235**	**294**	**269**	**311**
Industry	**-**	**-**	**-**	**-**	**-**
Unclassified	-	-	-	-	-
Other	**257**	**235**	**294**	**269**	**311**
Domestic	257	235	294	269	311
Stocks at end of year *(3)*	**25**	**27**	**24r**	**33r**	**18**

(1) Stock fall (+), stock rise (-).
(2) Total supply minus total demand.
(3) Producers stocks and distributed stocks.
(4) See paragraph 2.25

2.9 Supply and consumption of coke oven gas, blast furnace gas, benzole and tars

GWh

	2006	2007	2008	2009	2010
Coke oven gas					
Supply					
Production	9,825	9,651	9,410	7,956r	8,822
Imports	-	-	-	-	-
Exports	-	-	-	-	-
Transfers *(1)*	+57	+81	+71	+366r	+274
Total supply	**9,882**	**9,732**	**9,481**	**8,322r**	**9,096**
Statistical difference *(2)*	+76	+47	-8r	-62r	-62
Total demand	**9,806**	**9,685**	**9,489r**	**8,383r**	**9,158**
Transformation	**2,593**	**2,671**	**2,681**	**3,044r**	**2,984**
Electricity generation	2,175	2,253	2,263	2,626r	2,566
Heat generation	418	418	418	418	418
Other	-	-	-	-	-
Energy industry use	**5,300**	**5,170**	**5,117**	**4,471r**	**4,235**
Coke manufacture	4,282	4,228	4,349	3,888r	3,861
Blast furnaces	1,019	942	768	583r	374
Other	-	-	-	-	-
Losses	**483**	**445**	**413**	**75r**	**617**
Final consumption	**1,430**	**1,399**	**1,278r**	**794r**	**1,321**
Industry	**1,430**	**1,399**	**1,278r**	**794r**	**1,321**
Unclassified	194	221	207	230	198
Iron and steel	1,236	1,178	1,071r	564r	1,123
Blast furnace gas					
Supply					
Production	16,443	16,701	15,345	11,199r	11,404
Imports	-	-	-	-	-
Exports	-	-	-	-	-
Transfers *(1)*	-2	-3	-3	-15r	-11
Total supply	**16,441**	**16,698**	**15,342**	**11,184r**	**11,393**
Statistical difference *(2)*	-119	-113	-110r	-66r	-71
Total demand	**16,560**	**16,811**	**15,452r**	**11,250r**	**11,464**
Transformation	**9,249**	**9,102**	**7,900**	**6,531**	**5,444**
Electricity generation	9,070	8,922	7,721	6,352	5,265
Heat generation	179	179	179	179	179
Other	-	-	-	-	-
Energy industry use	**4,831**	**5,082**	**4,759**	**3,657r**	**3,674**
Coke manufacture	536	703	639	506r	732
Blast furnaces	4,294	4,379	4,121	3,151r	2,943
Other	-	-	-	-	-
Losses	**1,578**	**2,071**	**2,332**	**724r**	**1,335**
Final consumption	**902**	**557**	**461r**	**337r**	**1,010**
Industry	**902**	**557**	**461r**	**337r**	**1,010**
Unclassified	-	-	-	-	-
Iron and steel	902	557	461r	337r	1,010
Benzole and tars *(3)*					
Supply					
Production	1,873	1,838	1,816	1,536	1,696
Final consumption *(4)*	**1,873**	**1,838**	**1,816**	**1,536**	**1,696**
Unclassified	1,873	1,838	1,816	1,536	1,696
Iron and steel	-	-	-	-	-

(1) To and from synthetic coke oven gas, see paragraph 2.49.
(2) Total supply minus total demand.
(3) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.
(4) From 2000, Iron and steel under final consumption has been reclassified due to additional information being received.

2.10 Deep mines in production at 31 December 2010[(1)]

Licensee	Site	Location
Eckington Colliery Partnerships	Eckington Colliery	Derbyshire
Energybuild Mining Ltd	Aberpergwm Colliery	Neath Port Talbot
J Flack Ltd	Hay Royds Colliery	Kirklees
Maltby Colliery Ltd	Maltby Colliery	Rotherham
Powerfuel Mining Ltd	Hatfield Colliery	Doncaster
Ray Ashly, Richard Daniels and Neil Jones	Monument Colliery	Gloucestershire
UK Coal Mining Ltd	Daw Mill Colliery	Warwickshire
	Kellingley Colliery	North Yorkshire
	Thoresby Colliery	Nottinghamshire
Unity Mine Ltd	Unity Mine	Neath Port Talbot

(1) In addition, at 31 December 2010, there were:

3 mines developing -
Ayle Colliery, owned by Ayle Colliery Company Ltd, in Northumberland
Gleison Colliery, owned by MNS Mining Ltd, in Neath Port Talbot
Johnson Mine, owned by Riche UK Mining Ltd, in Torfaen

2.11 Opencast sites in production at 31 December 2010[1]

Licensee	Site Name	Location
Aardvaark TMC Ltd	Glenmuckloch	Dumfries & Galloway
(trading as ATH Resources)	Muir Dean	Fife
	Skares Road	East Ayrshire
Benhar Developments Ltd	Mossband Farm Quarry	North Lanarkshire
Bryn Bach Coal Ltd	Cwm Yr Onen Colliery Reclamation	Neath Port Talbot
Celtic Energy Ltd	East Pit	Neath Port Talbot
	Nant Helen	Powys
H J Banks (Mining) Ltd	Shotton	Northumberland
Hall Construction Services Ltd	Wilsontown	South Lanarkshire
Kier Minerals Ltd	Greenburn Project	East Ayrshire
Miller Argent (South Wales) Ltd	Ffos-y-Fran Land Reclamation Scheme	Merthyr Tydfil
Provectus Remediation Ltd	Former Biwater Works	Derbyshire
Shires Developments (Engine) Ltd	Engine	Derbyshire
The Scottish Coal Company Ltd	Broken Cross	South Lanarkshire
	Chalmerston	East Ayrshire
	Dunstonhill	East Ayrshire
	Glentaggart	South Lanarkshire
	House of Water	East Ayrshire
	Mainshill	South Lanarkshire
	Shewington	Midlothian
	Spireslack Complex (Airdsgreen)	East Ayrshire
	St Ninians	Fife
UK Coal Mining Ltd	Cutacre	Bolton
	Huntington Lane	Telford & Wrekin
	Lodge House	Derbyshire
	Park Wall North	Durham
	Potland Burn	Northumberland
	Steadsburn	Northumberland

(1) In addition, at 31 December 2010, there were:

7 mines developing -
Selar, owned by Celtic Energy Ltd, in Neath Port Talbot
Nant-y-Mynydd Site, owned by Energybuild Ltd, in Neath Port Talbot
Brenkley Lane, owned by H J Banks & Company Ltd, in Northumberland
Temple Quarry, owned by Holgate Aggregates Ltd, in Kirklees
Caughley Quarry, owned by Parkhill Estates Ltd, in Shropshire
Blair House, owned by The Scottish Coal Company Ltd, in Fife
Spireslack Complex (Airdsgreen Ponesk Remainder), owned by The Scottish Coal Company, in East Ayrshire

Source: The Coal Authority

Chapter 3
Petroleum

Key points

- Crude oil production from the UK's North Sea fields decreased by just under 8 per cent, broadly in line with the trend over the decade (table 3.1, chart 3.1);
- Net imports of crude oil and Natural Gas Liquids rose to meet demand with oil exports decreasing by 6 per cent. Net imports increased to just under 9 million tonnes or around 13 per cent of the UK's demand (table 3.1);
- The UK's 8 refineries produced just under 73 million tonnes of petroleum products, 3 per cent less than the previous year. UK production of petroleum products is around 16 per cent lower than 2000; (table 3.2, chart 3.4);
- The UK remains a net exporter of petroleum products, and exports are 26 per cent higher than they were in 2000. In 2010, total exports increased marginally, the first increase since 2007 (table 3.2, chart 3.4);
- The growth of exports was accompanied by a larger growth in imports, up over two thirds since 2000. The UK consumed less motor spirit than it did 10 years ago and exported the excess of production. The UK consumed more aviation and diesel fuel than it produced and imports were used to meet demand (chart 3.5, para 3.21);
- The main use of petroleum products remains concentrated in the transport sector which accounted for three-quarters of final consumption. (chart 3.8).
- Increasingly, deliveries of diesel road fuel (DERV) are rising at the expense of motor spirit. Deliveries of DERV increased by four per cent in 2010, after two consecutive years of contracting deliveries that accompanied the economic downturn (chart 3.9).

Introduction

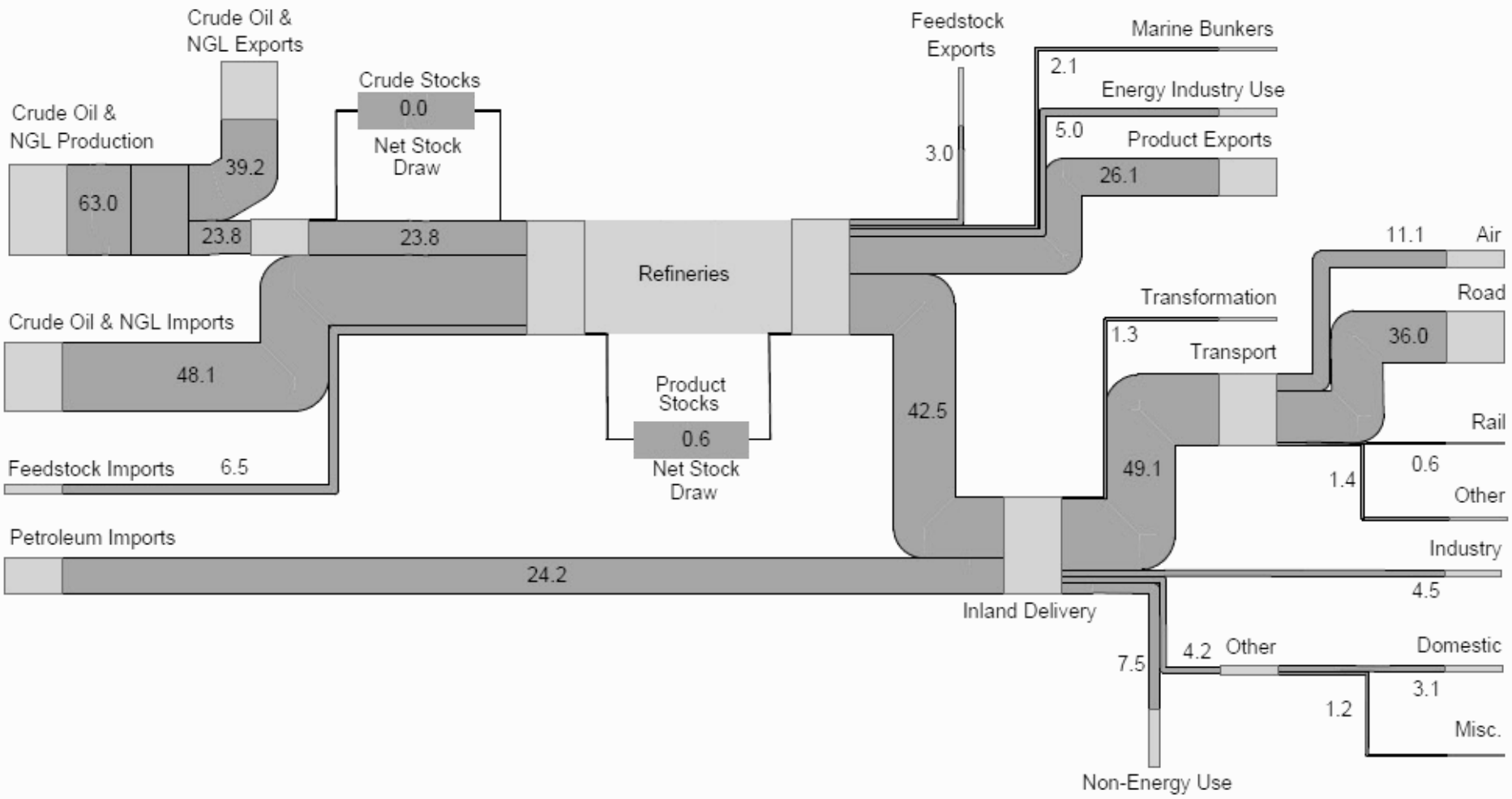
3.1 This chapter covers the supply and demand of primary oils and petroleum products. The first part of the chapter covers the supply and demand of primary oils (crude oils, and Natural Gas Liquids (NGLs) and feedstocks. The second part of the chapter covers supply and demand of petroleum products.

3.2 The supply and demand of primary oils and petroleum products are shown as commodity balances at the end of the chapter, in Tables 3.1 and 3.2 to 3.4 respectively. Additional tables show information on refinery capacity, as well as additional detail on deliveries into consumption.

3.3 In addition to the information in this chapter, there is considerable data on the DECC's website. Information on long-term trends (Tables 3.1.1 and 3.1.2) and the annex on the oil and gas resources in the UK (Annex F) provide a more complete picture of the UK oil and gas production sector. These tables are only available in the internet version of this publication which can be found on the DECC's website at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx.

3.4 A flow chart of the movement of crude oil, other refinery feedstocks and petroleum products for 2010 is provided, showing the flow from indigenous production and imports to eventual uses. The flows are measured in million tonnes and the width of the bands are approximately proportional to the size of the flow they represent.

Petroleum Flow Chart 2010 (million tonnes)



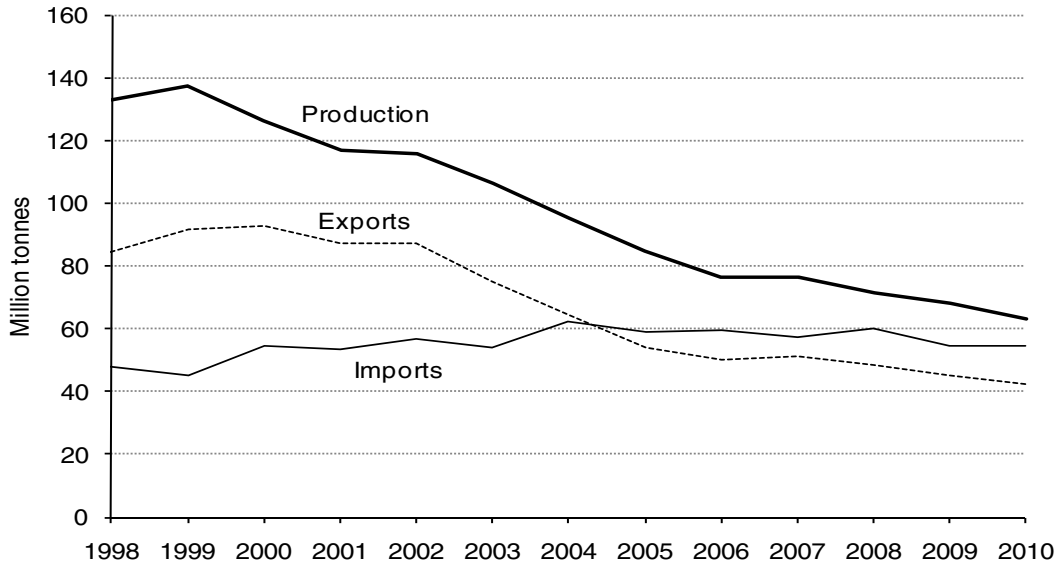
Notes:
This flow chart is based on the data that appear in Tables 3.1 and 3.2.
The numbers on either side of the flow chart will not match due to losses in transformation.
Biofuels are not included.

Supply and demand for primary oil (Table 3.1)

3.5 Table 3.1 shows details of the production, supply and disposals of primary oils (crude oil and natural gas liquids (NGLs)) and feedstocks in 2008, 2009 and 2010. The table examines the supply chain from the production of oil and NGLs, recorded by individual oil terminals and oil fields, to their disposal either to UK refineries or to export. It also covers the use of these primary oils as recorded by the refineries.

3.6 The chart below summarises the main trends since 2000. Production from the United Kingdom Continental Shelf (UKCS) peaked in 1999 and has been in general decline since.

Chart 3.1: Production, imports and exports of primary oils 1998 to 2010



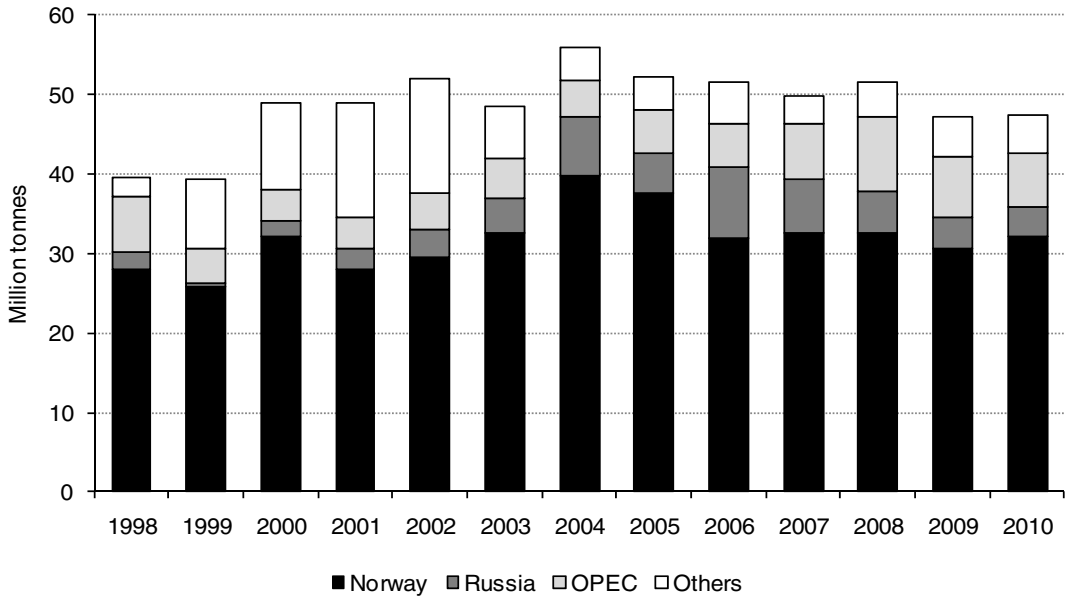
3.7 The decreases over the last 10 years show a sharp rate of decline between 2002 and 2006, with a shallower profile in later years. A principal driver of this flattening effect in the middle of the decade was the development of the Buzzard field which compensated for the sharper falls seen in the existing fields. On average, crude oil production has been decreasing by around 7 per cent a year.

3.8 Whilst the UK is a net importer of crude oils, the North Sea production remains significant. The UK's production capacity is the largest in the EU, and the second largest in the EEA after Norway. It is within the top 20 of oil producers worldwide. Whilst further declines in exports and increases in imports will be seen as indigenous production continues to decline, primary oil will continue to make a significant contribution to the UK economy.

3.9 Whilst the UK's production would be sufficient to meet around 85 per cent of its inland demand, there is an active trade in oil. The UK imports crude oil for various commercial reasons, a principal element of which is the oil's sulphur content. North Sea type crude contains a high proportion of the lighter hydrocarbon fuels resulting in higher yields of products such as motor spirit and other transport fuels.

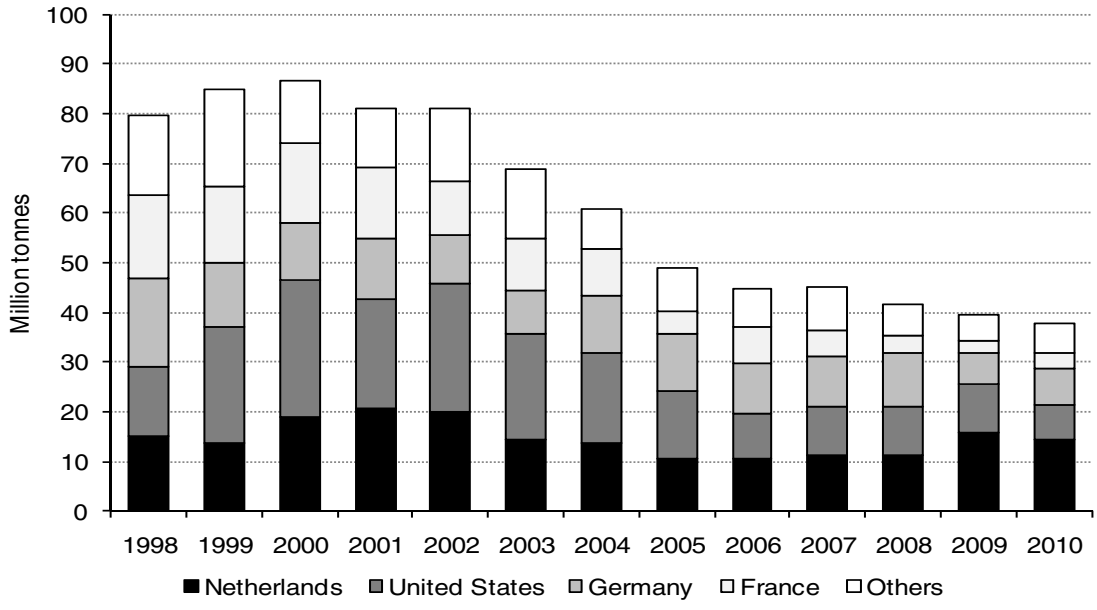
3.10 The sources of crude oil from other countries is shown in Chart 3.2. The principal source of the UK's imports is consistently Norway, given not only its proximity to the UK, but also the similarity in its crude types which match well with the crude oil used in the UK's refineries.

Chart 3.2: Source of UK oil imports 1998 to 2010



3.11 Chart 3.3 shows the decrease in crude oil exports from its peak in 2000, and indicates two quite distinct phases, with a sharp reduction between 2002 and 2005, and a relatively steady level since then. Crude oils and NGLs are principally exported to the Netherlands, Germany and the US with exports to France decreasing in recent years.

Chart 3.3: Destination of UK oil exports 1998 to 2010



UK refineries

3.12 A significant proportion of the UK's primary oil was processed into petroleum products by the UK's 8 refineries. Data for refinery capacity as at the end of 2010 are presented in table 3.A, with the location of these refineries illustrated in Map 3A. These figures are collected annually by DECC from individual oil companies. Capacity per annum is derived by applying the rated capacity of the plant per day when on

stream by the number of days the plant was on stream during the year.

3.13 Refinery capacity in 2010 is similar to 2009, and distillation capacity has been broadly constant over the last ten years with the one closure in the last ten years (the suspension of refinery operations at North Tees) offset by small increases in other refineries.

Map 3A: Distribution of UK refineries active as at end 2010

Symbols relate to refinery details given in Table 3A. White circles denote petrochemical refinery operations.

Table 3A: UK refinery processing capacity as at end 2010

Million tonnes per annum

(Symbols relate to Map 3A)		Distillation	Reforming	Cracking and Conversion
❶	Stanlow – Shell UK Ltd	11.8	1.5	3.9
❷	Fawley – ExxonMobil Co. Ltd	16.8	3	5.2
❸	Coryton – Petroplus International Ltd	8.8	1.8	3.4
❹	Grangemouth – Ineos Refining Ltd	9.8	2	3.3
❺	Lindsey Oil Refinery Ltd – Total (UK)	11.2	1.5	4.4
❻	Pembroke – Chevron Ltd	10.1	1.5	6.1
❼	Killingholme – ConocoPhillips UK	11.1	2.1	9.5
❽	Milford Haven - Murco Pet. Ltd	6.5	0.9	2.0
①	Harwich – Petrochem Carless Ltd	0.4	-	-
②	Eastham – Eastham Refinery Ltd	1.1	-	-
③	Dundee (Camperdown) – Nynas UK AB	0.7	-	-
Total all refineries		**88.3**	**14.3**	**37.8**

Supply and demand for petroleum products (Tables 3.2 to 3.4)

3.14 These tables show details of the production, supply and disposals of petroleum products into the UK market in 2008, 2009 and 2010.

3.15 The upper half of the table represents the supply side and calculates overall availability of the various products in the UK by combining production at refineries with trade (imports and exports), stock changes, product transfers and deliveries to international marine bunkers.

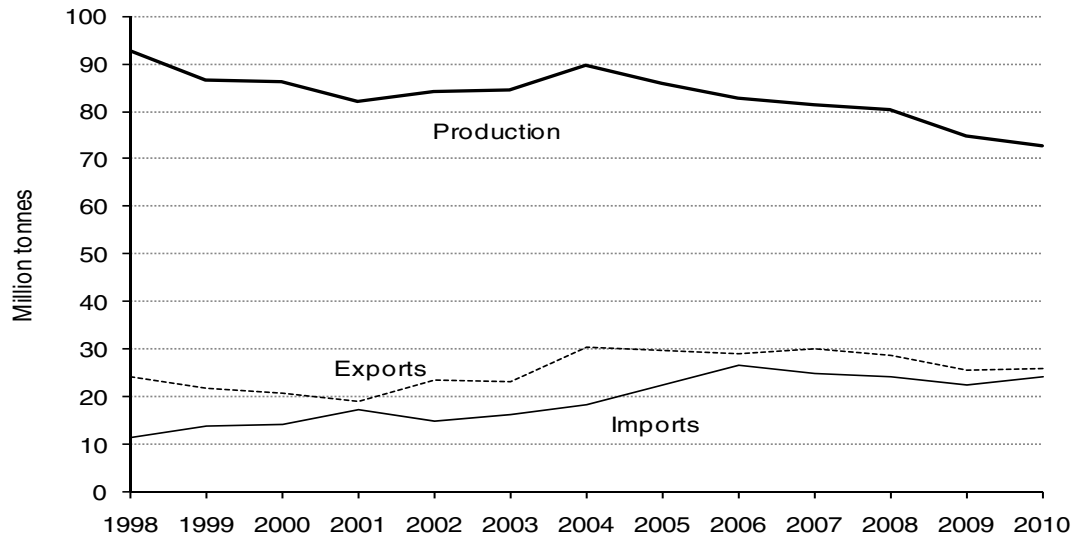
3.16 The lower half of the table reports the demand side and covers the uses made of the different products, including the uses made within refineries of fuels in the refining process, and details of the amounts reported by oil companies within the UK as delivered for final consumption.

Supply of petroleum products

3.17 Chart 3.4 below shows the production output of petroleum products since 2000. In 2010, the UK's refineries produced just under 73 million tonnes, down 3 per cent on last year and around 16 per cent on a decade ago. The UK's refinery capacity remains substantial, ranking 4th within the EU, behind Germany, Italy and France.

3.18 As the chart shows, the UK has been a net exporter of petroleum products over the last decade (indeed, it has been a net exporter in almost every year since 1974). In 2010, exports of petroleum products increased slightly, the first year-on-year increase since 2007.

Chart 3.4: Production, imports and exports of petroleum products 1998 to 2010

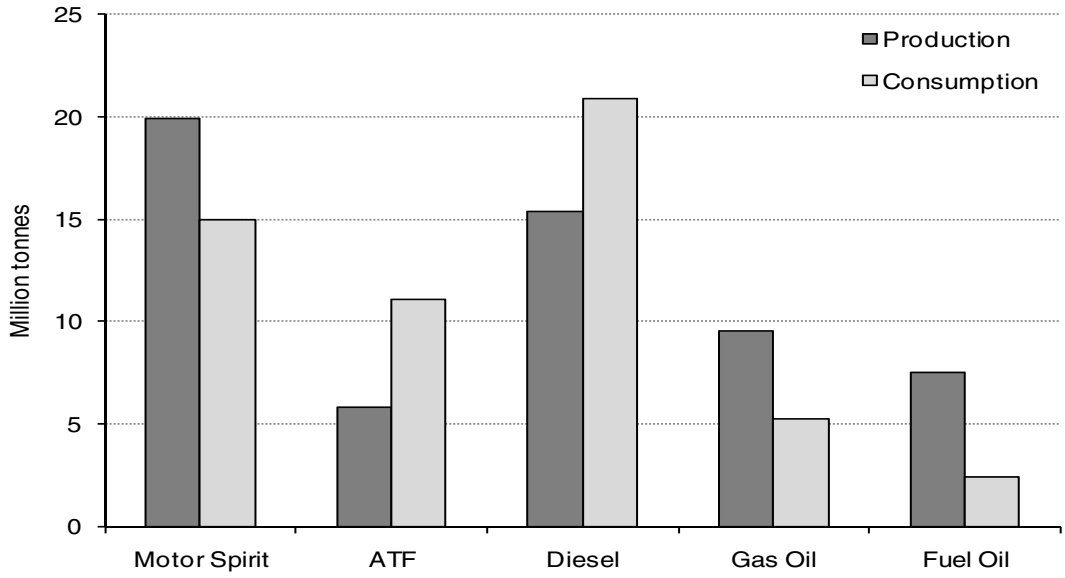


3.19 Whilst UK refinery output outstrips domestic demand, the overall picture of demand and supply is not matched on a product by product basis. The UK's refineries - in common with many other European countries – are geared to produce motor spirit for domestic cars and fuel oil for electricity generation. With the increasing dieselisation of the UK's car fleet, and the switch from fuel oil to other fuels for electricity generation, UK domestic production of individual petroleum products is increasingly no longer aligned with the domestic market demand.

3.20 Accordingly, in an international context, the UK is the largest importer of Aviation Turbine Fuel (ATF) within the OECD, importing about half as much again as Germany. The UK is the OECD's third largest exporter of motor spirit, after the Netherlands and the United States.

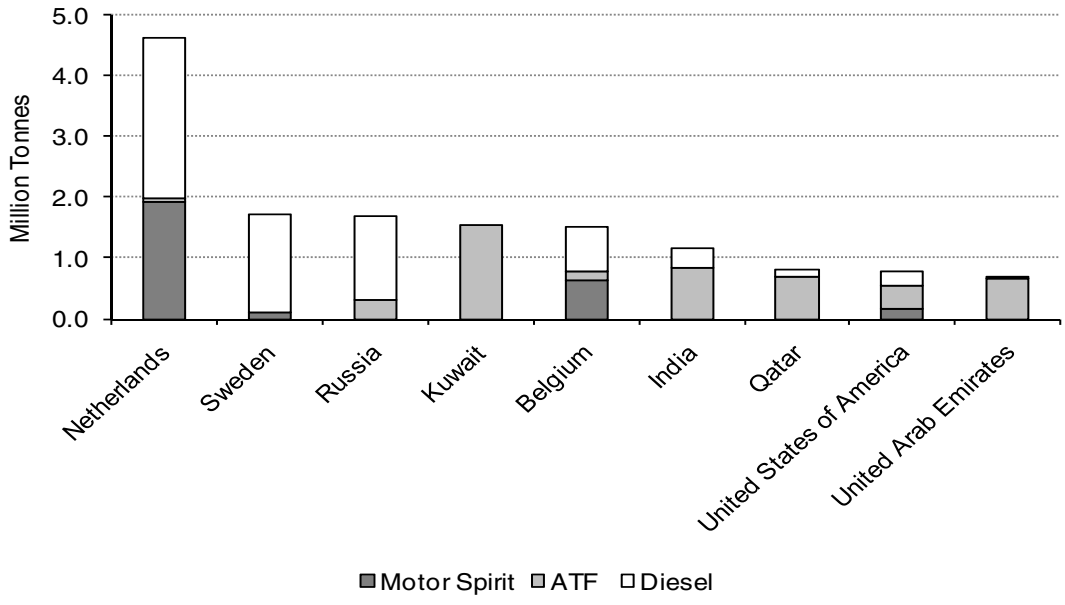
3.21 Chart 3.5 shows the production and consumption figures for the key petroleum products, and illustrates the deficit for ATF and diesel road fuel (DERV), and the surpluses for motor spirit, gas oil, and fuel oil.

Chart 3.5: Production and consumption of key petroleum products 2010



3.22 Chart 3.6 shows the source of transport fuels imported by the UK in 2010. The nine countries shown account for almost 80 per cent of the total volume of imports. The bulk of the products (around 24 per cent) come via the Netherlands, which acts as a major trading hub: the fuel might have originated from elsewhere in Europe or beyond. The chart shows that there is a clear split between imports from European countries (which are mainly transport diesel) and imports from Asia (where the bulk of aviation fuel is sourced from generally more modern refinery operations than seen in Europe).

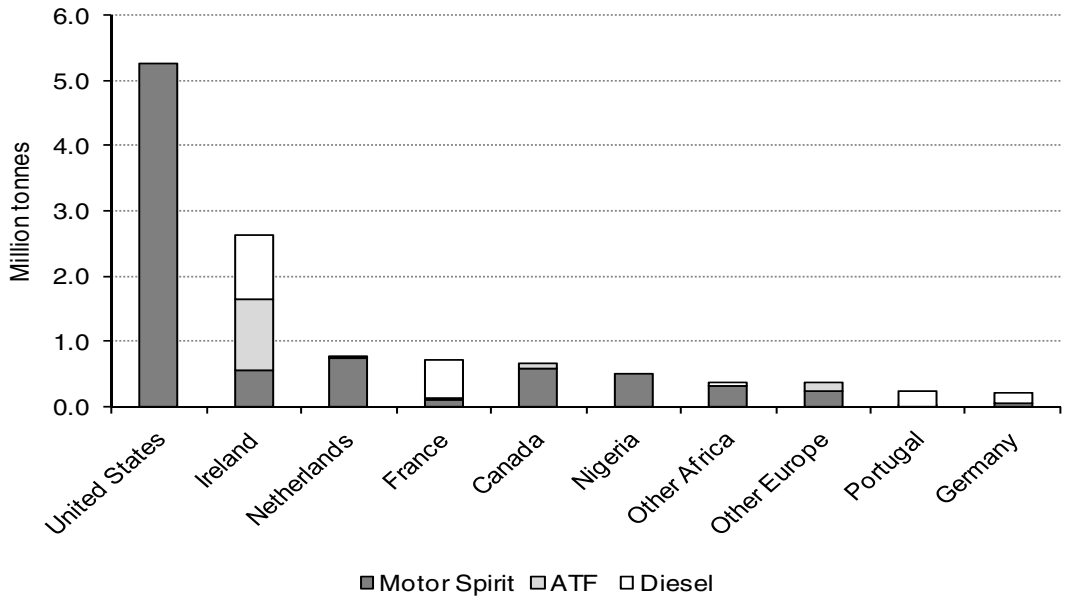
Chart 3.6: Source of transport fuel imports, 2010



3.23 Similarly, the chart overleaf shows the exports by country of despatch for the principal transport fuels in 2010. The nine countries shown cover over 90 per cent of the total volume of exports. A

considerable portion of all of the UK's exports (over 40 per cent) are the volumes of motor spirit exported to the United States. Ireland imports a substantial volume of its products from the UK as it has no indigenous production of aviation fuel.

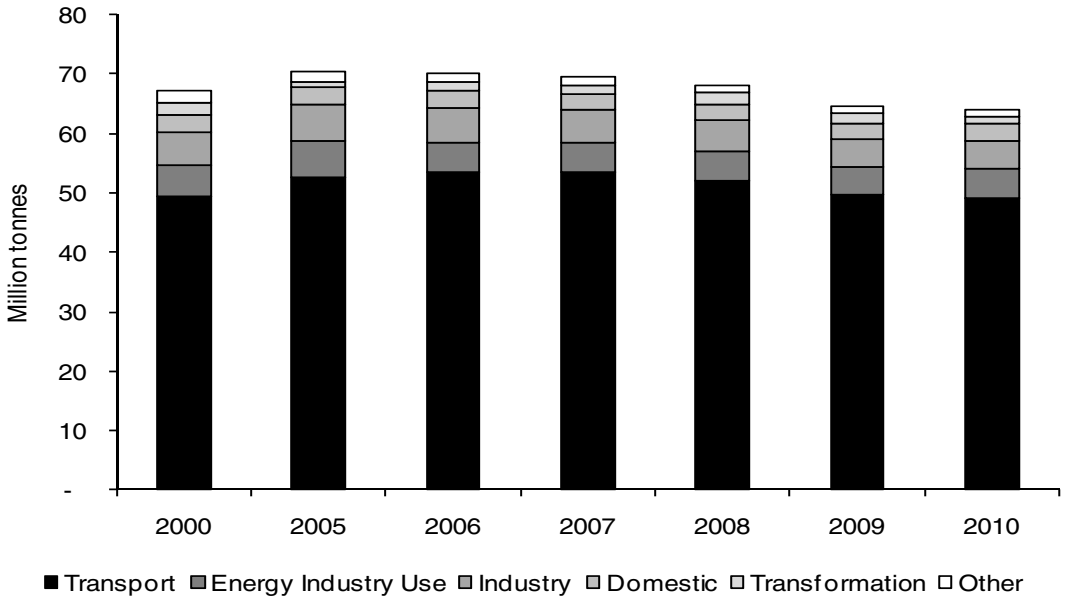
Chart 3.7: Destination of transport fuel exports 2010



Consumption of petroleum products

3.24 Tables 3.2 to 3.4 show the consumption of oil products during the period 2008 to 2010, by consumers and products. The chart below shows that the principal use for petroleum products is for transport use, consuming around 70 per cent of total demand in 2010. Energy use of petroleum products decreased every year between 2005 and 2009 with a total decrease of over ten per cent, but it was broadly flat between 2009 and 2010.

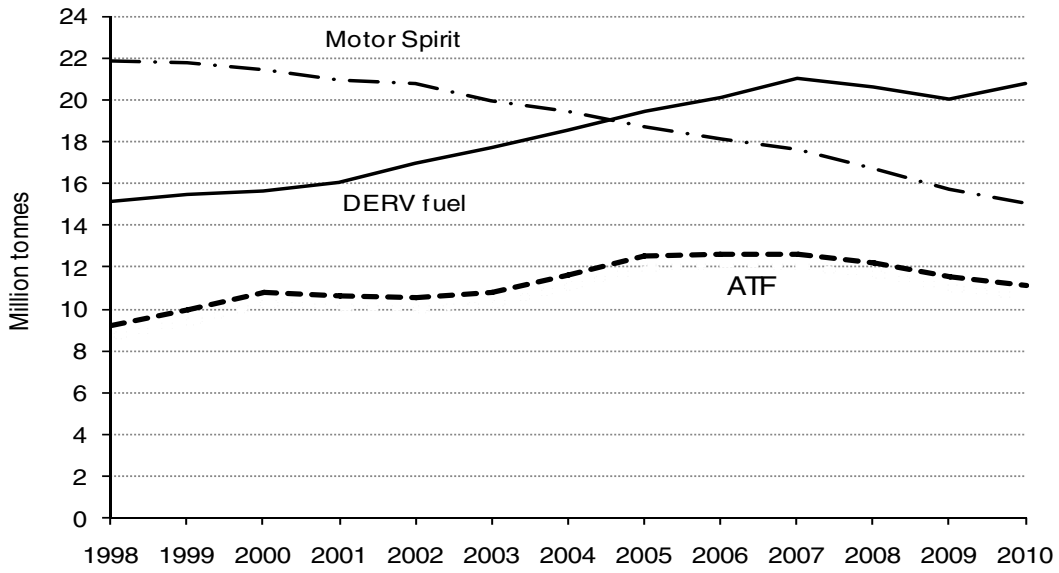
Chart 3.8: Petroleum products used for energy (share by main sector)



3.25 The three main transport fuels - aviation turbine fuel, motor spirit and diesel road fuel – account for two-thirds of the UK's total demand in the petroleum products. Once the energy industry's own use for refining and electricity generation has been discounted, these transport fuels account for 72 per cent of UK's final energy consumption of petroleum products.

3.26 Whilst the overall proportion of petroleum consumed by transport has remained relatively constant over time, the mix of fuels has changed appreciably. The chart below shows that deliveries of motor spirit are decreasing broadly on trend, but that deliveries of DERV fuels have increased following two years of consecutive decreases. The increase of 4 per cent this year reflects the trend between 2000 and 2007, before the slow-down in deliveries that accompanied the recession.

Chart 3.9: Motor Spirit, DERV and ATF fuel deliveries 1998 to 2010



3.27 The increase in diesel sales reflects in part the changing pattern of fuel consumption within the UK. The table below, derived from information provided by AEA, shows that the share of DERV fuel being consumed by cars and taxis has increased by an over 75 per cent between 1995 and 2009.

Table 3B Estimated consumption of road transport fuels by vehicle class

	1995	2000	2005	2009
Motor spirit:				
Cars and taxis	93%	95%	97%	97%
Light goods vehicles	7%	4%	2%	2%
Motor cycles etc	1%	1%	1%	1%
DERV:				
Cars and taxis	21%	27%	32%	37%
Light goods vehicles	14%	20%	22%	22%
Heavy goods vehicles	56%	44%	37%	33%
Buses and coaches	9%	9%	9%	8%

Source: AEA Energy and Environment

3.28 Whilst deliveries of ATF decreased for the fourth consecutive year, deliveries in 2010 were significantly disrupted by inclement weather during February and December 2010, and the ash cloud from the Eyjafjallajokull volcano in April 2010.

Consumption of transport fuels (Table 3.6)

3.29 Table 3.6 provides details of the consumption of motor spirit, gas oil/diesel and fuel oils for the period 2006 to 2010. The table also includes information on retail and commercial deliveries of motor spirit and DERV fuel that are of interest but cannot be accommodated within the commodity balances. The table also includes additional details of the quantities of motor spirit and DERV fuel sold collectively by super/hypermarket companies in the UK.

3.30 Volumes of motor spirit sold by super/hypermarkets decreased by 8 per cent from 2009, whilst their DERV deliveries increased by 4 per cent. Sales by super/hypermarkets have taken a slightly larger share of retail deliveries (i.e. deliveries to final consumers) of motor spirit and DERV fuel since 2005, and accounted for 39 per cent and 36 per cent respectively in 2010.

Table 3C Super/hypermarkets share of retail deliveries, 2006 to 2010

per cent

	Motor spirit		DERV fuel	
	Share of retail	Share of total	Share of retail	Share of total
2006	41	39	34	19
2007	41	39	34	20
2008	44	42	34	21
2009	41	39	35	22
2010	39	38	36	23

Biofuels in transport.

3.31 Biofuels are not been included in the commodity balances or the supplementary tables due to limited information on them, but they are included in overall energy balances in Chapter 1, and in the renewables balances in Chapter 7.

3.32 HMRC data volumes on which excise duty has been paid is shown in Table 3.D. As a percentage of road fuels, biofuels have increased significantly since 2003, and now represent some 3.6 per cent of total road fuels, with the principal component of that being biodiesel. The small mismatches between the DERV and motor spirit volumes produced that are reported in the main tables in Chapter 3 relate mainly to timing issues and other data collection issues.

Table 3D: Consumption of Biodiesel and Bioethanol in the UK

Unit: Million litres

Year	Biodiesel	DERV	Biodiesel as % Diesel share	Bioethanol	Motor Spirit	Bioethanol as % Motor Spirit share	Biofuels as % of road fuels
2003	19	20,906	0.1%	0	27,393	0.0%	0.0%
2004	21	22,181	0.1%	0	27,025	0.0%	0.0%
2005	33	23,233	0.1%	85	25,693	0.3%	0.2%
2006	169	24,286	0.7%	95	24,724	0.4%	0.5%
2007	347	25,501	1.4%	153	24,019	0.6%	1.0%
2008	886	25,686	3.5%	206	22,709	0.9%	2.3%
2009	1044	25,089	4.2%	320	22,029	1.5%	2.9%
2010	1045	25,768	4.1%	631	20,649	3.1%	3.6%

Source: HM Revenue and Customs

Stocks of oil (Table 3.7)

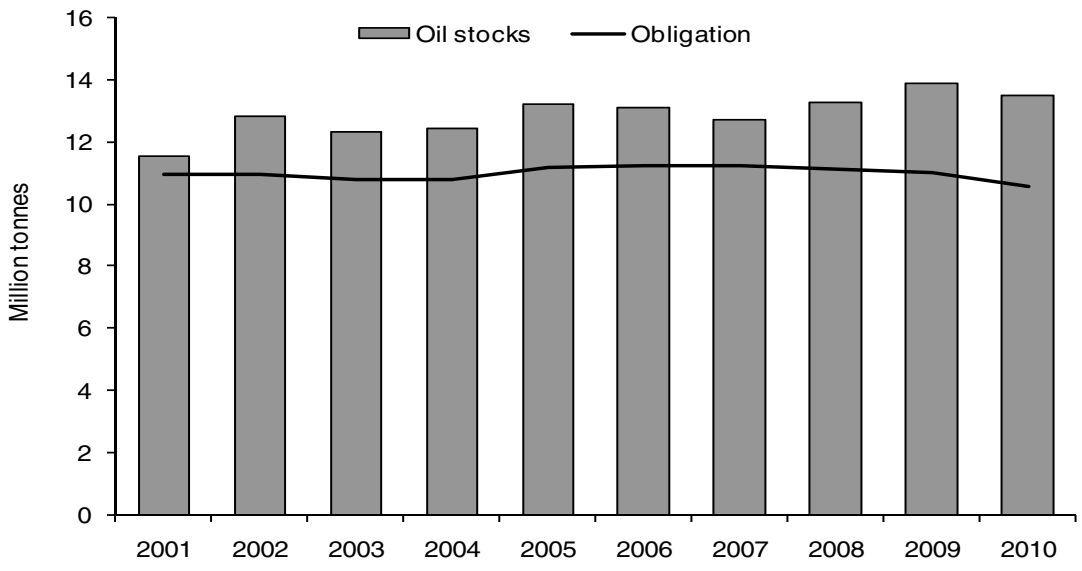
3.33 The UK holds stocks of oil to help reduce the adverse impact on the UK of any disruptions of supplies of oil arising from domestic or international incidents. The UK is required to hold these stocks under EU and IEA qualifying arrangements.

3.34 The EU's requirements are for all member states to hold stocks equivalent to 90 days of worth of annual consumption, whilst the IEA's requirement is to hold stocks equivalent to 90 days of net imports of oil products. As a major oil producing nation, the UK has a derogation which reduces its EU obligation by 25 per cent to 67.5 days of stock. The IEA requirement is currently substantially below the EU's requirement as the UK's overall oil net imports are small. As UK production of oil decreases, the IEA obligation will overtake the EU obligation.

3.35 To meet these obligations, the UK Government requires companies supplying oil products into the UK market (production plus net imports) to maintain emergency stocks of oil products as fuels.

3.36 As part of this, oil companies are allowed to hold stocks in other EU countries subject to bilateral agreements between Governments, and count these stocks towards their stocking obligations. The stock figures in Table 3.7 take account of these stocks to give a true picture of the amount of stocks available to the UK.

Chart 3.10: UK Oil stocks and obligation 2001 to 2010



3.37 The UK held about 13 million tonnes of petroleum products (equivalent to about 84 days of consumption) towards its EU obligation at the end of 2010, about 0.8 million tonnes less than 2009.

3.38 In particular, stocks of motor spirit and middle distillate (mostly DERV, gas oil and jet fuel) products held physically in the UK decreased by 20 per cent and 10 per cent respectively compared to December the previous year. Petroleum companies reduced their stocks during the last quarter of the year as the markets moved into a slight backwardation, when the future price of a product is less than its current price. The amount of stocks held overseas on behalf of the UK decreased by 6 per cent during the period.

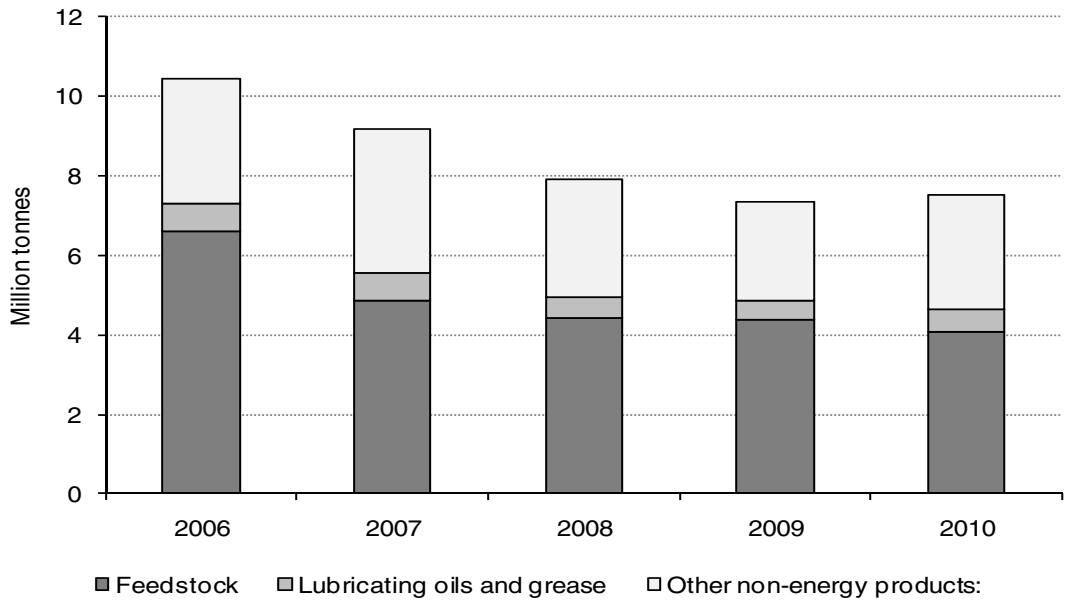
3.39 On the other hand, stocks of crude oil and feedstocks remained constant over the period.

Inland deliveries for non-energy uses (table 3.8)

3.40 Table 3.8 summarises additional data on the non–energy uses made of the total deliveries of oil

products included as the bottom line in the commodity balances in Tables 3.2 to 3.4. It provides extra information on the uses of lubricating oils and greases by use, and details of products used as petro-chemical feedstocks. The chart below shows the principal use of non-energy products over the last 5 years.

Chart 3.11: Use of non-energy products 2006 to 2010



3.41 Overall, the volume of non-energy use of petroleum products declined between 2006 and 2008 and have been broadly stable since.

3.42 The principal product for non-energy use are gases used as feedstocks in petrochemical plants, accounting for around a quarter of total non-energy use in 2010. This has been broadly constant proportion in recent years. Deliveries of Naphtha are also a significant component of inland deliveries for non-energy use, accounting for 14 per cent of total non energy deliveries in 2010.

3.43 Bitumen remains a significant component of non-energy use, accounting for just under a fifth of consumption in 2010. This is a similar figure to 2009 but is down by just under a fifth on the levels seen in 2006 through 2008.

Technical notes and definitions

3.44 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1.

Indigenous production

3.45 The term indigenous is used throughout this chapter and includes oil from the UK Continental Shelf, both offshore and onshore.

Deliveries

3.46 These are deliveries into consumption, as opposed to being estimates of actual consumption or use. They are split between inland deliveries and deliveries to marine bunkers. Inland deliveries will not necessarily be consumed in the UK (e.g. aviation fuels).

Sources of data

3.47 The majority of the data included in the text and tables of this chapter are derived from DECC's Downstream Oil Reporting System (DORS), which replaced the UK Petroleum Industry Association (UKPIA) reporting system in 2005. Data relating to the inland operations of the UK oil industry (i.e. information on the supply, refining and distribution of oil in the UK) are collected from companies. The data format and coverage have been designed to meet most of the needs of both Government and the industry itself. Each member of UKPIA and a number of other contributing companies provides returns on its refining activities and deliveries of various products to the internal UK market. This information is supplemented whenever necessary to allow for complete coverage within the statistics, with separate exercises carried out on special topics (for example, super and hypermarket shares) or with the use of additional data (such as trade data from HM Revenue and Customs to cover import activity by non-reporting companies).

Statistical differences

3.48 In Tables 3.1 to 3.5, there are headings titled "statistical differences". These are differences between the separately observed figures for production and delivery of crude oil and products during the path of their movement from the point of production to the point of consumption.

3.49 The statistical differences headings listed in the primary oil commodity balances (Table 3.1) are differences between the separately observed and reported figures for production from onshore or offshore fields and supply to the UK market that cannot be accounted for by any specific factors. Primarily they result from inaccuracies in the meters at various points along offshore pipelines. These meters vary slightly in their accuracy within accepted tolerances, giving rise to both losses and gains when the volumes of oil flowing are measured. Errors may also occur when non-standard conditions are used to meter the oil flow.

3.50 The statistical difference for primary oils in the table includes own use in onshore terminals and gas separation plants, losses, platform and other field stock changes. Another factor is the time lag that can exist between production and loading onto tankers being reported at an offshore field and the arrival of these tankers at onshore refineries and oil terminals. This gap is usually minimal and works such that any effect of this at the start of a month is balanced by a similar counterpart effect at the end of a month. However, there can be instances where the length of this interval is considerable and, if it happens at the end of a year, there can be significant effects on the statistical differences seen for the years involved.

3.51 Another technical factor that can contribute to the statistical differences relates to the recording of quantities at the producing field (which is the input for the production data) and at oil terminals and refineries, since they are in effect measuring different types of oil. Terminals and refineries are able to measure a standardised, stabilised crude oil, that is, with its water content and content of Natural Gas Liquids (NGLs) at a standard level and with the amounts being measured at standard conditions. However, at the producing field they are dealing with a "live" crude oil that can have a varying level of water and NGLs within it. While offshore companies report live crude at field, the disposals from oil terminals and offshore loading fields are reported as stabilised crude oil. This effectively assumes that terminal disposals are stabilised crude production figures. These changes were introduced in the 2002 edition of this Digest.

3.52 Part of the overall statistical difference may also be due to problems with the correct reporting of individual NGLs at the production site and at terminals and refineries. It is known that there is some mixing of condensate and other NGLs in with what might otherwise be stabilised crude oil before it enters the pipeline. This mixing occurs as it removes the need for separate pipeline systems for transporting the NGLs and it also allows the viscosity of the oil passing down the pipeline to be varied as necessary. While the quantity figures recorded by terminals are in terms of stabilised crude oil, with the NGL component removed, there may be situations where what is being reported does not comply with this requirement.

3.53 With the downstream sector, the statistical differences can similarly be used to assess the validity and consistency of the data. From the tables, these differences are generally a very small proportion of the totals involved.

3.54 Refinery data are collated from details of individual shipments received and made by each refinery and terminal operating company. Each year there are thousands of such shipments, which may be reported separately by two or three different companies involved in the movement. While intensive work is carried out to check these returns, it is possible that some double counting of receipts may occur.

3.55 Temperature, pressure and natural leakage also contribute to the statistical differences. In addition, small discrepancies can occur between the estimated calorific values used at the field and the more accurate values measured at the onshore terminal where data are shown on an energy basis. The statistical differences can also be affected by rounding, clerical errors or unrecorded losses, such as leakage. Other contributory factors are inaccuracies in the reporting of the amounts being disposed of to the various activities listed, including differences between the quantities reported as going to refineries and the actual amounts passing through refineries.

3.56 Similarly, the data under the statistical difference headings in Tables 3.2 to 3.4 are the differences between the deliveries of petroleum products to the inland UK market reported by the supplying companies and estimates for such deliveries. These estimates are calculated by taking the output of products reported by refineries and then adjusting it by the relevant factors (such as imports and exports of the products, changes in the levels of stocks etc.).

3.57 It may be thought that such differences should not exist as the data underlying both the observed deliveries into the UK market and the individual components of the estimates (i.e. production, imports, exports, stocks) come from the same source (the oil companies). While it is true that each oil company provides data on its own activities in each area, there are separate areas of operation within the companies that report their own part of the overall data. Table 3E below illustrates this.

Table 3E Sources of data within oil companies

Area covered	Source
Refinery production	Refinery
Imports and exports	Refinery, logistics departments, oil traders
Stocks	Refinery, crude and product terminals, major storage and distribution sites
Final deliveries	Sales, marketing and accounts departments

3.58 Each individual reporting source will have direct knowledge of its own data. For example, refineries will know what they produce and how much leaves the refinery gate as part of routine monitoring of the refinery operations. Similarly other data such as sales to final consumers or imports and exports will be closely monitored. Companies will ensure that each component set of data reported is as accurate as possible but their reporting systems may not be integrated, meaning that internal consistency checks across all reported data cannot be made. Each part of a company may also work to different timings as well, which may further add to the degree of differences seen.

3.59 The main area where there is known to be a problem is with the “Transfers” heading in the commodity balances. The data reported under this heading have two components. Firstly, there is an allowance for reclassification of products within the refining process. For example, butane can be added to motor spirit to improve the octane rating, aviation turbine fuel could be reclassified as domestic kerosene if its quality deteriorates, and much of the fuel oil imported into the UK is further refined into other petroleum products. Issues can arise with product flows between different reporting companies, for example when company A delivers fuel oil to company B who report a receipt of a feedstock. Secondly, and in addition to these inter-product transfers, the data also include an allowance to cover the receipt of

backflows of products from petrochemical plants that are often very closely integrated with refineries. A deduction for these backflows thus needs to be included under the "Transfers" heading so that calculated estimates reflect net output and are thus more comparable with the basis of the observed deliveries data.

3.60 There is scope for error in the recording of these two components of transfers. With inter-product transfers, the data are recorded within the refinery during the refining and blending processes where the usual units used to record the changes are volumes rather than masses. Different factors apply for each product when converting from a volume to mass basis, as shown by the conversion factors given in Annex A of this Digest. Thus, a balanced transfer in volume terms may not be equivalent when converted to a mass basis. This is thought to be the main source of error within the individual product balances.

3.61 With the backflows data, the scope for error results from the recording of observed deliveries data being derived from sales data on a "net" basis and will therefore exclude the element of backflows data as received at the refinery. For example, these could be seen simply as an input of fuel oils to be used as a feedstock, and thus recorded as an input without their precise nature being recorded – in effect a form of double-counting. This relationship between the petrochemical sector and refineries is thought to be one of the main sources of error in the overall oil commodity balances.

Imports and exports

3.62 The information given under the headings "imports" and "exports" in this chapter are the figures recorded by importers and exporters of oil. They can differ in some cases from the import and export figures provided by HMRC that are given in Annex G on DECC's energy statistics website. Such differences arise from timing differences between actual and declared movements but also result from the Customs figures including re-exports. These are products that may have originally entered the UK as imports from another country and been stored in the UK prior to being exported back out of the UK, as opposed to having been actually produced in the UK.

Marine bunkers

3.63 This covers deliveries to ocean going and coastal vessels under international bunker contracts. Other deliveries to fishing, coastal and inland vessels are excluded. As part of DECC's audit programme, UK refinery contacts have reviewed the provision of fuel to marine bunkers in 2009. As a result, a number of companies have reviewed their methodology. Data for previous years are not available on this basis, and DECC will continue to work with the returning companies to refine and improve these estimates.

3.64 In 2010, 18 per cent of UK production of fuel oil and 8 per cent of gas oil production went into international marine bunkers, totalling 2.1 million tonnes of products; 3 per cent of the total UK refinery production in the year. These are fuel sales destined for consumption on ocean going vessels and therefore cannot be classified as being consumed within the UK. Correspondingly, these quantities are treated in a similar way to exports in the commodity balances. It should be noted that these quantities do not include deliveries of fuels for use in UK coastal waters, which are counted as UK consumption and are given in the figures of the transport section of the commodity balances.

Crude and process oils

3.65 These are all feedstocks, other than distillation benzene, for refining at refinery plants. Gasoline feedstock is any process oil whether clean or dirty which is used as a refinery feedstock for the manufacture of gasoline or naphtha. Other refinery feedstock is any process oil used for the manufacture of any other petroleum products.

Refineries

3.66 Refineries distilling crude and process oils to obtain petroleum products. This excludes petrochemical plants, plants only engaged in re-distilling products to obtain better grades, crude oil stabilisation plants and gas separation plants.

Products used as fuel (energy use)

3.67 The following paragraphs define the product headings used in the text and tables of this chapter. The products are used for energy in some way, either directly as a fuel or as an input into electricity generation.

Refinery fuel - Petroleum products used as fuel at refineries.

Ethane – A naturally gaseous straight-chain hydrocarbon (C_2H_6) in natural gas and refinery gas streams. Primarily used, or intended to be used, as a chemical feedstock.

Propane - Hydrocarbon containing three carbon atoms(C_3H_8), gaseous at normal temperature but generally stored and transported under pressure as a liquid. Used mainly for industrial purposes, but also as transport Liquid Petroleum Gas (LPG), and some domestic heating and cooking.

Butane - Hydrocarbon containing four carbon atoms(C_4H_{10}), otherwise as for propane. Additionally used as a constituent of motor spirit to increase vapour pressure and as a chemical feedstock.

Naphtha (Light distillate feedstock) - Petroleum distillate boiling predominantly below 200°C.

Aviation spirit - All light hydrocarbon oils intended for use in aviation piston-engine power units, including bench testing of aircraft engines.

Motor spirit - Blended light petroleum components used as fuel for spark-ignition internal-combustion engines other than aircraft engines:

(i) Premium unleaded grade - all finished motor spirit, with an octane number (research method) not less than 95.

(ii) Lead Replacement petrol / Super premium unleaded grade - finished motor spirit, with an octane number (research method) not less than 97.

Aviation turbine fuel (ATF) - All other turbine fuel intended for use in aviation gas-turbine power units and including bench testing of aircraft engines.

Burning oil (kerosene or "paraffin") - Refined petroleum fuel, intermediate in volatility between motor spirit and gas oil, used primarily for heating. White spirit and kerosene used for lubricant blends are excluded.

Gas/diesel oil - Petroleum fuel having a distillation range immediately between kerosene and light-lubricating oil:

(i) **DERV (Diesel Engined Road Vehicle) fuel** - automotive diesel fuel for use in high speed, compression ignition engines in vehicles subject to Vehicle Excise Duty.

(ii) **Gas oil** - used as a burner fuel in heating installations, for industrial gas turbines and as for DERV (but in vehicles not subject to Vehicle Excise Duty e.g. agricultural vehicles, fishing vessels, construction equipment used off road and usually coloured with a red marker dye). From this edition of DUKES onwards, gasoil used for oil and gas extraction is included, following the acquisition of new data. The back-series of these data cover from 2005 onwards.

(iii) **Marine diesel oil** - heavier type of gas oil suitable for heavy industrial and marine compression-ignition engines.

Fuel oil - Heavy petroleum residue blends used in atomising burners and for heavy-duty marine engines (marine bunkers, etc.) with heavier grades requiring pre-heating before combustion. Excludes fuel oil for grease making or lubricating oil and fuel oil sold as such for road making.

Products not used as fuel (non-energy use)

3.68 The following paragraphs define the product headings used in the text and tables of this chapter, which are used for non-energy purposes.

Feedstock for petroleum chemical plants - All petroleum products intended for use in the manufacture of petroleum chemicals. This includes middle distillate feedstock of which there are several grades depending on viscosity. The boiling point ranges between 200°C and 400°C. (A deduction has been made from these figures equal to the quantity of feedstock used in making the

conventional petroleum products that are produced during the processing of the feedstock. The output and deliveries of these conventional petroleum products are included elsewhere as appropriate.)

White spirit and specific boiling point (SBP) spirits – These are refined distillate intermediates with a distillation in the naphtha / kerosene range. **White spirit** has a boiling range of about 150°C to 200°C and is used as a paint or commercial solvent. **SBP spirit** is also known as **Industrial spirit** and has a wider boiling range that varies up to 200°C dependent upon its eventual use. It has a variety of uses that vary from use in seed extraction, rubber solvents and perfume.

Lubricating oils (and grease) - Refined heavy distillates obtained from the vacuum distillation of petroleum residues. Includes liquid and solid hydrocarbons sold by the lubricating oil trade, either alone or blended with fixed oils, metallic soaps and other organic and/or inorganic bodies. A certain percentage of inland deliveries are re-used as a fuel, but all inland deliveries of lubricating oils have been classified as non-energy use only. Some deliveries are used for energy purposes, but it is difficult to estimate energy use figures with any degree of accuracy, hence no such estimates appear in the commodity balance tables. DUKES Table 3.8 (prior to 2010, table 3D, within the main text) provides limited information on the use of lubricants and grease. The information which was published under the heading of “Motors” has been amended to now include “Gear Oils and Transmission” to give a full picture of the lubricants used by vehicles.

Bitumen - The residue left after the production of lubricating oil distillates and vacuum gas oil for upgrading plant feedstock. Used mainly for road making and building construction purposes. Includes other petroleum products such as creosote and tar mixed with bitumen for these purposes and fuel oil sold specifically for road making.

Petroleum wax - Includes paraffin wax, which is a white crystalline hydrocarbon material of low oil content normally obtained during the refining of lubricating oil distillate, paraffin scale, slack wax, microcrystalline wax and wax emulsions. Used for candle manufacture, polishes, food containers, wrappings etc.

Petroleum cokes - Carbonaceous material derived from hydrocarbon oils, uses for which include metallurgical electrode manufacture. Quantities of imports of this product are used as a fuel as it has a higher energy content than coal, though a lower energy content than fuel oils.

Miscellaneous products - Includes aromatic extracts, defoament solvents and other minor miscellaneous products.

Main classes of consumer

3.69 The following are definitions of the main groupings of users of petroleum products used in the text and tables of this chapter.

Electricity generators - Petroleum products delivered for use by major power producers and other companies for electricity generation including those deliveries to the other industries listed below which are used for autogeneration of electricity (Tables 3.2 to 3.4). This includes petroleum products used to generate electricity at oil refineries and is recorded in the Transformation sector, as opposed to other uses of refinery fuels that are recorded in the Energy Industry Use sector. From the 2009 chapter of the Digest, data in Chapter 3 (Table 3.2 to 3.4) has been aligned with Chapter 5 (Table 5.4). The data on oil used for electricity generation collected from major power producers and autogenerators is judged to be at least as accurate as the data from refiners on deliveries, and has the advantage of consistency. These data have been revised back to 2005.

Agriculture - Deliveries of fuel oil and gas oil/diesel for use in agricultural power units, dryers and heaters. Burning oil for farm use.

Iron and steel - Deliveries of petroleum products to steel works and iron foundries. This is now based on information from the Iron and Steel Statistics Bureau.

Other industries - The industries covered correspond to the industrial groups shown in Table 1E of Chapter 1, excluding Iron and Steel.

National navigation - Fuel oil and gas/diesel oil delivered, other than under international bunker contracts, for fishing vessels, UK oil and gas exploration and production, coastal and inland shipping and for use in ports and harbours.

Railways - Deliveries of fuel oil, gas/diesel oil and burning oil to railways now based on estimates produced by AEA Energy and Environment as part of their work to compile the UK National Atmospheric Emissions Inventory (NAEI).

Air transport - Total inland deliveries of aviation turbine fuel and aviation spirit. The figures cover deliveries of aviation fuels in the UK to international and other airlines, British and foreign Governments (including armed services) and for private flying. In order to compile the NAEI, AEA Energy and Environment need to estimate how aviation fuel usage splits between domestic and international consumption. Information from AEA Energy and Environment suggests that virtually all aviation spirit is used domestically while just 6 per cent of civilian aviation turbine fuel use is for domestic consumption. A further 5 per cent is estimated to be consumed by the military.

Road transport - Deliveries of motor spirit and DERV fuel for use in road vehicles of all kinds.

Domestic - Fuel oil and gas oil delivered for central heating of private houses and other dwellings and deliveries of kerosene (burning oil) and liquefied petroleum gases for domestic purposes (see Tables 3.2 to 3.4).

Public services - Deliveries to national and local Government premises (including educational, medical and welfare establishments and British and foreign armed forces) of fuel oil and gas oil for central heating and of kerosene (burning oil).

Miscellaneous - Deliveries of fuel oil and gas oil for central heating in premises other than those classified as domestic or public.

Monthly and quarterly data

3.70 Monthly or quarterly aggregate data for certain series presented in this chapter are available. This information can be obtained free of charge by following the links given in the Energy Statistics section of the DECC web site, at: www.decc.gov.uk/en/content/cms/statistics/statistics.aspx

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3.1 Commodity balances 2008 - 2010[(1)]

Primary oil

Thousand tonnes

	Crude oil	Ethane	Propane	Butane	Condensate	Total NGL	Feedstock	Total primary oil
2008								
Supply								
Production	65,497	1,202	1,953	1,439	1,574	6,168	-	71,665
Imports	51,466	180	223	124	122	649	7,926	60,041
Exports	-41,504	-12	-1,369	-683	-975	-3,039	-3,858	-48,401
Stock change (2)	+261	..	..	..	..	+59	-86	+234
Transfers	-	-1,328	-727	-433	-312	-2,800	+208	-2,592
Total supply	**75,720**	..	..	..	..	**1,037**	**4,190**	**80,947**
Statistical difference (3)(4)	-124	..	..	..	..	60	272	208
Total demand (4)	**75,844**	..	..	..	..	**978**	**3,918**	**80,740**
Transformation (Petroleum refineries) (4)	75,844	..	..	..	..	978	3,918	80,740
Energy industry use	-	-	-	-	-	-	-	-
2009								
Supply								
Production	62,820	999	1,692	1,284	1,403	5,378	-	68,199
Imports	47,104	155	198	113	94	561	6,723r	54,387r
Exports	-39,446	-9	-1,015	-589	-743	-2,356	-3,399	-45,202
Stock change (2)	+393	..	..	..	..	-30	+182	+545
Transfers	-	-1,139	-798	-363	-318	-2,618	+16r	-2,601r
Total supply	**70,870**	..	..	..	..	**935**	**3,522r**	**75,327r**
Statistical difference (3)(4)	+155	..	..	..	..	+7	-59r	+102r
Total demand (4)	**70,716**	..	..	..	..	**928**	**3,582**	**75,225**
Transformation (Petroleum refineries) (4)	70,716	..	..	..	..	928	3,582	75,225
Energy industry use	-	-	-	-	-	-	-	-
2010								
Supply								
Production	58,047	866	1,479	1,159	1,412	4,915	-	62,962
Imports	47,497	159	203	123	99	584	6,505	54,587
Exports	-36,986	-9	-950	-439	-855	-2,253	-2,957	-42,196
Stock change (2)	+166	..	..	..	..	+56	-261	-39
Transfers	-	-1,005	-716	-336	-250	-2,306	+232	-2,074
Total supply	**68,724**	..	..	..	..	**996**	**3,519**	**73,239**
Statistical difference (3)(4)	+12	..	..	..	..	+0	+26	+39
Total demand (4)	**68,711**	..	..	..	..	**996**	**3,493**	**73,200**
Transformation (Petroleum refineries) (4)	68,711	..	..	..	..	996	3,493	73,200
Energy industry use	-	-	-	-	-	-	-	-

(1) As there is no use made of primary oils and feedstocks by industries other than the oil and gas extraction and petroleum refining industries, other industry headings have not been included in this table. As such, this table is a summary of the activity of what is known as the Upstream oil industry.

(2) Stock fall (+), stock rise (-).

(3) Total supply minus total demand.

(4) Figures for total demand for the individual NGLs (and thus for the statistical differences as well) are not available.

3.2 Commodity balances 2010

Petroleum products

Thousand tonnes

	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	-	1,607	640	2,980	1,596	0	19,918	66	5,781
Other sources	1,005	716	336	-	250	-	-	-	-
Imports	-	162	199	-	672	17	3,341	181	7,353
Exports	-	-529	-203	-	-1,369	-	-8,619	-25	-1,487
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change *(2)*	-	-46	30	-	-2	2	299	1	116
Transfers	-	-	-	-	-110	6	-30	-1	-649
Total supply	**1,005**	**1,911**	**1,002**	**2,980**	**1,036**	**25**	**14,910**	**223**	**11,114**
Statistical difference *(3)*	**-**	**13**	**-33**	**-1**	**-25**	**4**	**-79**	**-1**	**-2**
Total demand	**1,005**	**1,897**	**1,035**	**2,981**	**1,061**	**21**	**14,988**	**224**	**11,116**
Transformation	**-**	**5**	**-**	**324**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	324	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	324	-	-	-	-	-
Heat generation	-	5	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**2,463**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	2,463	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Final consumption	**1,005**	**1,892**	**1,035**	**194**	**1,061**	**21**	**14,988**	**224**	**11,116**
Industry	**-**	**277**	**362**	**-**	**-**	**-**	**-**	**-**	**-**
Unclassified	-	277	362	-	-	-	-	-	-
Iron & steel	-	-	-	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-	-	-
Paper, printing etc	-	-	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-	-	-
Transport	**-**	**106**	**-**	**-**	**-**	**21**	**14,988**	**-**	**11,116**
Air	-	-	-	-	-	21	-	-	11,116
Rail	-	-	-	-	-	-	-	-	-
Road	-	106	-	-	-	-	14,988	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	**-**	**470**	**45**	**-**	**-**	**-**	**-**	**-**	**-**
Domestic	-	349	45	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	120	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use *(4)*	**1,005**	**1,039**	**628**	**194**	**1,061**	**-**	**-**	**224**	**-**

(1) Includes marine diesel oil.
(2) Stock fall (+), stock rise (-).
(3) Total supply minus total demand.
(4) For further details on non-energy usage see paragraphs 3.40 to 3.43.

3.2 Commodity balances 2010 (continued)

Petroleum products

Thousand tonnes

Burning oil	DERV	Gas Oil [1]	Fuel oils	Lubri -cants	Bitu -men	Petroleum coke	Misc. products	Total Products	
									Supply
2,570	15,332	9,505	7,525	412	1,276	2,106	1,557	72,871	Production
-	-	-	-	-	-	-	-	2,306	Other sources
972	7,738	705	1,020	604	370	755	119	24,210	Imports
-191	-2,121	-4,358	-4,895	-421	-187	-686	-975	-26,065	Exports
-	-	-807	-1,332	-	-	-	-	-2,139	Marine bunkers
-5	61	95	115	-19	-88	51	-8	603	Stock change *(2)*
655	-180	81	-15	-1	18	-	-6	-232	Transfers
4,000	**20,831**	**5,220**	**2,419**	**576**	**1,389**	**2,227**	**687**	**71,555**	**Total supply**
-12	**-42**	**-8**	**16**	**-2**	**19**	**1**	**16**	**-136**	**Statistical difference *(3)***
4,012	**20,873**	**5,228**	**2,403**	**578**	**1,370**	**2,226**	**671**	**71,691**	**Total demand**
-	**-**	**70**	**733**	**-**	**-**	**210**	**-**	**1,343**	**Transformation**
-	-	65	539	-	-	210	-	1,138	Electricity generation
-	-	45	410	-	-	210	-	665	Major power producers
-	-	20	129	-	-	-	-	473	Autogenerators
-	-	5	52	-	-	-	-	63	Heat generation
-	-	-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	142	-	-	-	-	142	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
-	**-**	**490**	**613**	**-**	**-**	**1,401**	**-**	**4,967**	**Energy industry use**
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	490	-	-	-	-	-	490	Oil & gas extraction
-	-	-	613	-	-	1,401	-	4,478	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**Losses**
4,012	**20,873**	**4,669**	**1,056**	**578**	**1,370**	**615**	**671**	**65,380**	**Final Consumption**
1,489	**-**	**2,072**	**329**	**-**	**-**	**-**	**-**	**4,529**	**Industry**
1,489	-	-	-	-	-	-	-	2,128	Unclassified
-	-	-	56	-	-	-	-	56	Iron & steel
-	-	16	17	-	-	-	-	33	Non-ferrous metals
-	-	133	19	-	-	-	-	152	Mineral products
-	-	82	40	-	-	-	-	122	Chemicals
-	-	60	13	-	-	-	-	74	Mechanical engineering etc
-	-	29	5	-	-	-	-	35	Electrical engineering etc
-	-	72	13	-	-	-	-	85	Vehicles
-	-	180	38	-	-	-	-	218	Food, beverages etc
-	-	72	7	-	-	-	-	79	Textiles, leather, etc
-	-	25	21	-	-	-	-	47	Paper, printing etc
-	-	1,295	86	-	-	-	-	1,381	Other industries
-	-	107	12	-	-	-	-	119	Construction
-	**20,873**	**1,370**	**611**	**-**	**-**	**-**	**-**	**49,087**	**Transport**
-	-	-	-	-	-	-	-	11,137	Air
-	-	596	-	-	-	-	-	596	Rail
-	20,873	-	-	-	-	-	-	35,968	Road
-	-	774	611	-	-	-	-	1,385	National navigation
-	-	-	-	-	-	-	-	-	Pipelines
2,523	**-**	**1,084**	**116**	**-**	**-**	**-**	**-**	**4,238**	**Other**
2,523	-	165	-	-	-	-	-	3,083	Domestic
-	-	255	35	-	-	-	-	290	Public administration
-	-	301	52	-	-	-	-	353	Commercial
-	-	147	11	-	-	-	-	278	Agriculture
-	-	216	18	-	-	-	-	234	Miscellaneous
-	**-**	**142**	**-**	**578**	**1,370**	**615**	**671**	**7,527**	**Non energy use *(4)***

3.3 Commodity balances 2009

Petroleum products

Thousand tonnes

	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	-	1,544	569	2,758r	1,529	-	20,404	61	6,022
Other sources	1,139	798	363	-	318	-	-	-	-
Imports	-	230r	283r	-	1,034r	26	2,966r	127r	7,532r
Exports	-	-530	-129	-	-1,812	-1	-7,811	-10	-1,451
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change *(2)*	-	1	13	-0r	83	-2	30	-5	-7r
Transfers	-	-	-	-	-179	-0	198	-0r	-485
Total supply	**1,139**	**2,044r**	**1,098r**	**2,758r**	**973r**	**23**	**15,787r**	**174r**	**11,612r**
Statistical difference *(3)*	-	+10r	+44r	+2r	-38	+1	+25	-0	+79r
Total demand	**1,139**	**2,034r**	**1,054r**	**2,757r**	**1,011r**	**22**	**15,762r**	**174r**	**11,533r**
Transformation	-	5r	-	296	-	-	-	-	-
Electricity generation	-	-	-	296	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	296	-	-	-	-	-
Heat generation	-	5r	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	2,313r	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	2,313r	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-	-
Final consumption	1,139	2,029r	1,054r	148	1,011	22	15,762	174r	11,533r
Industry	-	350r	294	-	-	-	-	-	-
Unclassified	-	350r	294	-	-	-	-	-	-
Iron & steel	-	-	-	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-	-	-
Paper, printing etc	-	-	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-	-	-
Transport	-	107	-	-	-	22	15,762	-	11,533r
Air	-	-	-	-	-	22	-	-	11,533r
Rail	-	-	-	-	-	-	-	-	-
Road	-	107	-	-	-	-	15,762	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	-	376	33	-	-	-	-	-	-
Domestic	-	278	33	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	98	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use *(4)*	1,139	1,195r	728r	148	1,011	-	-	174r	-

(1) Includes marine diesel oil.
(2) Stock fall (+), stock rise (-).
(3) Total supply minus total demand.
(4) For further details on non-energy usage see paragraphs 3.40 to 3.43.

3.3 Commodity balances 2009 (continued)

Petroleum products

Thousand tonnes

Burning oil	DERV	Gas Oil [1]	Fuel oils	Lubri -cants	Bitu -men	Petroleum coke	Misc. products	Total Products	
									Supply
2,830	15,906	9,487	8,641r	530r	1,338	2,070	1,204	74,893r	Production
-	-	-	-	-	-	-	-	2,618	Other sources
668	5,865	751	1,243r	533r	239r	813r	97	22,407r	Imports
-241	-1,850	-4,183	-5,547	-590	-324	-548	-707	-25,733	Exports
-	-	-716	-1,774	-	-	-	-	-2,490	Marine bunkers
4	173	-15	82	10	-11r	-60	24	320r	Stock change *(2)*
487	-4	39	-74	-29	20	-	10	-16	Transfers
3,749	**20,090**	**5,362**	**2,570r**	**455r**	**1,262r**	**2,274r**	**627**	**71,999r**	**Total supply**
+17r	+34	+10	-26r	-55r	-119r	-0	+54	+37r	**Statistical difference *(3)***
3,732r	**20,057**	**5,353**	**2,596r**	**510**	**1,381r**	**2,274r**	**573**	**71,962r**	**Total demand**
-	-	67	913r	-	-	502	-	**1,783r**	**Transformation**
-	-	62	700r	-	-	502	-	1,560r	Electricity generation
-	-	42	575r	-	-	502	-	1,119r	Major power producers
-	-	20	125	-	-	-	-	441r	Autogenerators
-	-	5	52	-	-	-	-	62r	Heat generation
-	-	-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	162	-	-	-	-	162	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
-	-	450	677r	-	-	1,410r	-	**4,849r**	**Energy industry use**
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	450	-	-	-	-	-	450r	Oil & gas extraction
-	-	-	677r	-	-	1,410r	-	4,399r	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	-	-	**Losses**
3,732r	20,057	4,835	1,005r	510r	1,381r	363r	573	65,329r	**Final Consumption**
1,462r	-	2,096	303r	-	-	-	-	**4,505r**	**Industry**
1,462r	-	-	-	-	-	-	-	2,105r	Unclassified
-	-	-	52	-	-	-	-	52	Iron & steel
-	-	16	25r	-	-	-	-	41r	Non-ferrous metals
-	-	136	23r	-	-	-	-	159r	Mineral products
-	-	83	48r	-	-	-	-	131r	Chemicals
-	-	62	19	-	-	-	-	81	Mechanical engineering etc
-	-	30	8	-	-	-	-	38	Electrical engineering etc
-	-	74	21r	-	-	-	-	95r	Vehicles
-	-	187	37r	-	-	-	-	225r	Food, beverages etc
-	-	74	10	-	-	-	-	85	Textiles, leather, etc
-	-	26	30r	-	-	-	-	55r	Paper, printing etc
-	-	1,296	11r	-	-	-	-	1,307r	Other industries
-	-	110	18	-	-	-	-	129	Construction
-	20,057	1,532	588r	-	-	-	-	**49,601r**	**Transport**
-	-	-	-	-	-	-	-	11,555r	Air
-	-	593	-	-	-	-	-	593r	Rail
-	20,057	-	-	-	-	-	-	35,926r	Road
-	-	939	588r	-	-	-	-	1,527r	National navigation
-	-	-	-	-	-	-	-	-	Pipelines
2,270	-	1,064	114r	-	-	-	-	**3,858r**	**Other**
2,270	-	131	-	-	-	-	-	2,713	Domestic
-	-	298	47	-	-	-	-	345	Public administration
-	-	283	51	-	-	-	-	334	Commercial
-	-	148	8r	-	-	-	-	255r	Agriculture
-	-	204	8r	-	-	-	-	211r	Miscellaneous
-	-	143	-	510r	1,381r	363r	573	**7,365r**	**Non energy use *(4)***

3.4 Commodity balances 2008

Petroleum products

Thousand tonnes

	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	-	1,612	636	2,980	1,863	-	20,319	55	6,549
Other sources	1,328	727	433	-	312	-	-	-	-
Imports	12	260r	548r	-	634	22	3,302	92r	8,035r
Exports	-	-565	-495	-	-2,066	-2	-7,017	-4	-1,908
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change *(2)*	-	0	80	0	76	1	27	5	-154
Transfers	-	-	-54	-	-4	1	17	-0	-300
Total supply	**1,340**	**2,034r**	**1,149r**	**2,980**	**814**	**22**	**16,648**	**148r**	**12,222r**
Statistical difference *(3)*	+12	+25	-21	-24	-4	-8	-30	-0	+6
Total demand	**1,328**	**2,008r**	**1,169r**	**3,005**	**818**	**30**	**16,678**	**148r**	**12,216r**
Transformation	-	5r	-	343	-	-	-	-	-
Electricity generation	-	-	-	343	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	343	-	-	-	-	-
Heat generation	-	5r	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	2,532	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	2,532	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-	-
Final consumption	1,328	2,004r	1,169r	130	818	30	16,678	148r	12,216r
Industry	-	356r	312	-	-	-	-	-	-
Unclassified	-	356r	312	-	-	-	-	-	-
Iron & steel	-	-	-	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-	-	-
Paper, printing etc	-	-	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-	-	-
Transport	-	125	-	-	-	30	16,678	-	12,216r
Air	-	-	-	-	-	30	-	-	12,216r
Rail	-	-	-	-	-	-	-	-	-
Road	-	125	-	-	-	-	16,678	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	-	401	33	-	-	-	-	-	-
Domestic	-	297	33	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	104	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use *(4)*	1,328	1,121r	825r	130	818	-	-	148r	-

(1) Includes marine diesel oil.
(2) Stock fall (+), stock rise (-).
(3) Total supply minus total demand.
(4) For further details on non-energy usage see paragraphs 3.40 to 3.43.

3.4 Commodity balances 2008 (continued)

Petroleum products

Thousand tonnes

Burning oil	DERV	Gas Oil [1]	Fuel oils	Lubri -cants	Bitu -men	Petroleum coke	Misc. products	Total Products	
									Supply
3,092	16,194	10,566	11,349	514	1,485	2,029	1,182	80,425	Production
-	-	-	-	-	-	-	-	2,800	Other sources
528	6,777	855	1,215r	452r	422	883	150	24,186r	Imports
-213	-2,362	-4,884	-7,304	-399	-195	-608	-769	-28,791	Exports
-	-	-680	-1,915	-	-	-	-	-2,594	Marine bunkers
5	-115	110	150	-40	-7	-7	14	145	Stock change *(2)*
288	72	-60	-186	-12	5	-	25	-208	Transfers
3,699	**20,567**	**5,907**	**3,309r**	**516r**	**1,710**	**2,296**	**602**	**75,964r**	**Total supply**
+6	-46	-60	+1	+2	-30	+10r	+7	-155r	**Statistical difference *(3)***
3,693	**20,613**	**5,967**	**3,308r**	**514r**	**1,741**	**2,286r**	**596**	**76,119r**	**Total demand**
-	-	59	1,128r	-	-	441r	-	**1,977r**	**Transformation**
-	-	54	868r	-	-	441r	-	1,707r	Electricity generation
-	-	50	790r	-	-	441r	-	1,281r	Major power producers
-	-	4	78	-	-	-	-	426	Autogenerators
-	-	5	52	-	-	-	-	62r	Heat generation
-	-	-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	208	-	-	-	-	208	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
-	-	472	853	-	-	1,367	-	**5,223r**	**Energy industry use**
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	472	-	-	-	-	-	472r	Oil & gas extraction
-	-	-	853	-	-	1,367	-	4,752	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	-	-	**Losses**
3,693	20,613	5,436	1,327r	514r	1,741	478	596	68,919r	**Final Consumption**
1,449r	-	2,465	499r	-	-	-	-	**5,081r**	**Industry**
1,449r	-	-	-	-	-	-	-	2,117r	Unclassified
-	-	-	60	-	-	-	-	60	Iron & steel
-	-	19	25	-	-	-	-	44	Non-ferrous metals
-	-	158	49	-	-	-	-	207	Mineral products
-	-	96	68	-	-	-	-	165	Chemicals
-	-	72	19	-	-	-	-	91	Mechanical engineering etc
-	-	35	8	-	-	-	-	43	Electrical engineering etc
-	-	86	22	-	-	-	-	107	Vehicles
-	-	218	54	-	-	-	-	272	Food, beverages etc
-	-	86	10	-	-	-	-	96	Textiles, leather, etc
-	-	30	31	-	-	-	-	61	Paper, printing etc
-	-	1,537	134r	-	-	-	-	1,671r	Other industries
-	-	128	19	-	-	-	-	147	Construction
-	20,613	1,597	644	-	-	-	-	**51,903r**	**Transport**
-	-	-	-	-	-	-	-	12,246r	Air
-	-	591	-	-	-	-	-	591r	Rail
-	20,613	-	-	-	-	-	-	37,416	Road
-	-	1,005	644	-	-	-	-	1,649	National navigation
-	-	-	-	-	-	-	-	-	Pipelines
2,244	-	1,173	183	-	-	-	-	**4,035**	**Other**
2,236	-	164	-	-	-	-	-	2,730	Domestic
4	-	362	71	-	-	-	-	437	Public administration
-	-	295	77	-	-	-	-	372	Commercial
4	-	140	24	-	-	-	-	272	Agriculture
-	-	212	11	-	-	-	-	223	Miscellaneous
-	-	201	-	514r	1,741	478	596	**7,900r**	**Non energy use *(4)***

3.5 Supply and disposal of petroleum[1]

Thousand tonnes

	2006	2007	2008	2009	2010
Primary oils (Crude oil, NGLs and feedstocks)					
Indigenous production *(2)*	76,578	76,575	71,665	68,199	62,962
Imports	59,443	57,357	60,041	54,387	54,587
Exports *(3)*	-50,195	-50,999	-48,401	-45,202	-42,196
Transfers - Transfers to products *(4)*	-3,024	-2,754	-2,800	-2,618	-2,306
Product rebrands (5)	+683	+547	+208	+16	+232
Stock change *(6)*	-355	+784	+234	+545	-39
Use during production *(7)*	-	-	-	-	-
Calculated refinery throughput *(8)*	83,130	81,509	80,947	75,327	73,239
Overall statistical difference *(9)*	-83	32	208	102	39
Actual refinery throughput	**83,213**	**81,477**	**80,740**	**75,225**	**73,200**
Petroleum products					
Losses in refining process *(10)*	374	199	315	332	329
Refinery gross production *(11)*	82,839	81,278	80,425	74,893	72,871
Transfers - Transfers to products *(4)*	+3,024	2,754	2,800	2,618	2,306
Product rebrands *(5)*	-683	-547	-208	-16	-232
Imports	26,828	25,093	24,186	22,407	24,210
Exports *(12)*	-29,009	-30,017	-28,791	-25,733	-26,065
Marine bunkers	-2,348	-2,371	-2,594	-2,490	-2,139
Stock changes *(6)* - Refineries	-890	1,067	18	421	577
Power generators	+51	+5	+127	-101	+26
Calculated total supply	79,811	77,262	75,964	71,999	71,555
Statistical difference *(9)*	-2	-166	-155	37	-136
Total demand *(4)*	**79,812**	**77,428**	**76,119**	**71,962**	**71,691**
Of which:					
Energy use	70,057	69,461	68,219	64,597	64,164
Of which, for electricity generation *(13)*	1,237	1,126	1,707	1,560	1,138
total refinery fuels *(13)*	4,879	4,682	4,752	4,399	4,478
Non-energy use	9,756	7,967	7,900	7,365	7,527

(1) Aggregate monthly data on oil production, trade, refinery throughput and inland deliveries are available - see paragraph 3.70 and Annex C.
(2) Crude oil plus condensates and petroleum gases derived at onshore treatment plants.
(3) Includes NGLs, process oils and re-exports.
(4) Disposals of NGLs by direct sale (excluding exports) or for blending.
(5) Product rebrands (inter-product blends or transfers) represent petroleum products received at refineries/ plants as process for refinery or cracking unit operations.
(6) Impact of stock changes on supplies. A stock fall is shown as (+) as it increases supplies, and vice-versa for a stock rise (-).
(7) Own use in onshore terminals and gas separation plants. These figures ceased to be available from January 2001 with the advent of the new PPRS system.
(8) Equivalent to the total supplies reported against the upstream transformation sector in Table 3.1.
(9) Supply greater than (+) or less than (-) recorded throughput or disposals.
(10) Calculated as the difference between actual refinery throughput and gross refinery production.
(11) Includes refinery fuels.
(12) Excludes NGLs.
(13) Figures cover petroleum used to generate electricity by all major power producers and by all other generators, including petroleum used to generate electricity at refineries. These quantities are also included in the totals reported as used as refinery fuel, so there is thus some overlap in these figures.

3.6 Additional information on inland deliveries of selected products[(1)(2)(3)]

Thousand tonnes

	2006	2007	2008	2009	2010
Motor spirit					
Retail deliveries (4)					
Hypermarkets (5)					
Lead Replacement Petrol/Super premium unleaded (6)	229	263	196	188	168
Premium unleaded	6,838	6,616	6,818	6,036	5,542
Total hypermarkets	7,067	6,879	7,014	6,223	5,710
Refiners/other traders					
Lead Replacement Petrol/Super premium unleaded (6)	487	548	843	678	492
Premium unleaded	9,888	9,379	8,211	8,293	8,260
Total Refiners/other traders	10,375	9,927	9,054	8,970	8,753
Total retail deliveries					
Lead Replacement Petrol/Super premium unleaded (6)	716	811	1,039	866	661
Premium unleaded	16,725	15,994	15,029	14,328	13,802
Total retail deliveries	17,442	16,806	16,068	15,194	14,463
Commercial consumers (7)					
Lead Replacement Petrol/Super premium unleaded (6)	65	25	41	4	109
Premium unleaded	637	764	570	564	417
Total commercial consumers	702	789	611	568	526
Total motor spirit (10)	**18,144**	**17,594**	**16,678**	**15,762**	**14,989**
Gas oil/diesel oil					
DERV fuel:					
Retail deliveries (4):					
Hypermarkets (5)	3,917	4,161	4,418	4,447	4,781
Refiners/other traders	7,536	8,180	8,452	8,167	8,470
Total retail deliveries	11,453	12,342	12,870	12,614	13,251
Commercial consumers (7)	8,693	8,723	7,743	7,443	7,623
Total DERV fuel	20,146	21,065	20,613	20,057	20,873
Other gas oil (8)	6,569	6,115	5,967	5,353	5,228
Total gas oil/diesel oil	**26,715**	**27,180**	**26,580**	**25,409**	**26,101**
Fuel oils (9)					
Light	311	624	611	374	684
Medium	902	201	313	186	119
Heavy	1,038	1,384	1,531	1,359	987
Total fuel oils	**2,251**	**2,209**	**2,455**	**1,919**	**1,790**

(1) Aggregate monthly data for inland deliveries of oil products are available - see paragraph 3.70 and Annex C. See also Table 3A in the main text.
(2) The end use section analyses are based partly on recorded figures and on estimates. They are intended for general guidance only. See also the main text of this chapter.
(3) This table contains information on hydrocarbons only (no biofuels). For a full breakdown of the end-uses of all oil products, see Tables 3.2 to 3.4.
(4) Retail deliveries - deliveries to garages, etc. mainly for resale to final consumers.
(5) Data for sales by super and hypermarket companies are collected via a separate reporting system, but are consistent with the main data collected from UKPIA member companies - see paragraph 3.30.
(6) Sales of Leaded Petrol ceased on 31 December 1999. Separate breakdowns for lead replacement and super premium unleaded petrol are no longer provided, see Digest of UK Energy Statistics 2007 chapter 3 paragraph 3.47 for details.
(7) Commercial consumers - direct deliveries for use in consumer's business.
(8) Includes marine diesel oil.
(9) Inland deliveries excluding that used as a fuel in refineries, but including that used for electricity generation by major electricity producers and other industries.
(10) Unleaded motor spirit has been 100 per cent of consumption since 2005

3.7 Stocks of crude oil and petroleum products at end of year[1]

Thousand tonnes

	2006	2007	2008	2009	2010
Crude and process oils					
Refineries *(2)*	4,720	4,664	4,616	3,848	4,110
Terminals *(3)*	1,635	1,131	1,092	1,136	1,049
Offshore *(4)*	766	638	664	682	520
Total crude and process oils *(5)*	**7,415**	**6,834**	**6,787**	**6,033**	**5,889**
Petroleum products					
Ethane	8	6	6	6	6
Propane	111	83	83	88	76
Butane	140	143	74	75	67
Other petroleum gases	-	-	-	-	-
Naphtha	543	463	469	430	450
Aviation spirit	10	5	4	6	4
Motor spirit	1,081	865	1,085	1,150	1,140
White spirit & SBP	51	22	18	22	22
Aviation turbine fuel	919	833	1,116	1,429	1,188
Burning oil	397	233	228	224	229
Gas/Diesel oil *(6)*	3,083	3,357	4,339	4,623	4,018
of which, DERV	922	691	790	633	641
Fuel oils	1,264	959	839	927	817
Lubricating oils	84	131	164	153	184
Bitumen	193	166	173	184	151
Petroleum wax	29	10	11	8	8
Petroleum coke	295	420	427	488	436
Miscellaneous products	106	147	121	100	108
Total all products	**8,312**	**7,845**	**9,156**	**9,915**	**8,906**
Of which : net bilateral stocks *(7)*	1,231	886	2,104	2,728	2,563

(1) Aggregate monthly data on the level of stocks of crude oil and oil products are available - see paragraph 3.40 and Annex C.
(2) Stocks of crude oil, NGLs and process oils at UK refineries.
(3) Stocks of crude oil and NGLs at UKCS pipeline terminals.
(4) Stocks of crude oil in tanks and partially loaded tankers at offshore fields.
(5) Includes process oils held abroad for UK use approved by bilateral agreements.
(6) Includes middle distillate feedstock and marine diesel oil.
(7) The difference between stocks held abroad for UK use under approved bilateral agreements and the equivalent stocks held in the UK for foreign use.

3.8 Additional information on inland deliveries for non-energy uses

Thousand tonnes

	2006	2007	2008	2009	2010
Feedstock for petroleum chemical plants:					
Propane	994	811	1,121	1,195	1,039
Butane	737	691	825	728	628
Other gases	1,648	1,514	1,458	1,286	1,199
Total gases	3,379	3,016	3,404	3,209	2,865
Naphtha (LDF)	2,278	1,607	818	1,011	1,061
Middle Distillate Feedstock (MDF)	259	238	201	143	142
Other products	-	-	-	-	-
Total feedstock	5,915	4,861	4,423	4,363	4,069
Lubricating oils and grease:					
Aviation	5	5	4	3	4
Industrial	409	370	287	296	334
Marine	25	22	15	17	19
Other motors, Gear oils & Transmissions	269	271	204	191	216
Agricultural	5	5	3	3	4
Fuel oil sold as lubricant	-	-	-	-	-
Total lubricating oils and grease	713	672	514	510	578
Other non-energy products:					
Industrial spirit/white spirit	156	167	148	174	224
Bitumen	1,610	1,563	1,741	1,381	1,370
Petroleum coke	925	366	478	363	615
Miscellaneous products	437	338	596	573	671
Total other non-energy products	3,127	2,434	2,963	2,492	2,880
Total non-energy use	**9,756**	**7,967**	**7,900**	**7,365**	**7,527**

Chapter 4
Natural gas

Key points

- Overall UK natural gas production has been decreasing since 2000, and in 2010 was down 4 per cent on 2009. This was one of the smaller year-on-year decreases this millennium, though it should be set against a 14 per cent decrease the year before (Chart 4.1, paragraph 4.6); since 2000 gas production has been falling by an average of around 6 per cent a year.

- Imports of natural gas in 2010 were almost a third higher than in 2009, mainly because of lower production and higher demand (Table 4.1).

- LNG is increasingly important as a source of imports to supplement existing ones. In September 2010, imports from shipped LNG surpassed the gas imported via pipeline from Norway for the first time. In 2010 LNG imports accounted for 35 per cent UK's total commercial imports (Chart 4.3).

- The increased import infrastructure coupled with a relatively modest fall in UK production contributed to almost record levels of commercial exports, up 29 per cent and close to those seen in 2003. The total volume of traded gas in 2010 is at its highest level ever (paragraph 4.31).

- Total gas demand increased by 8.4 per cent in 2010, largely a reflection of the cold weather and higher demand from electricity generators compared to 2009 (Table 4.1).

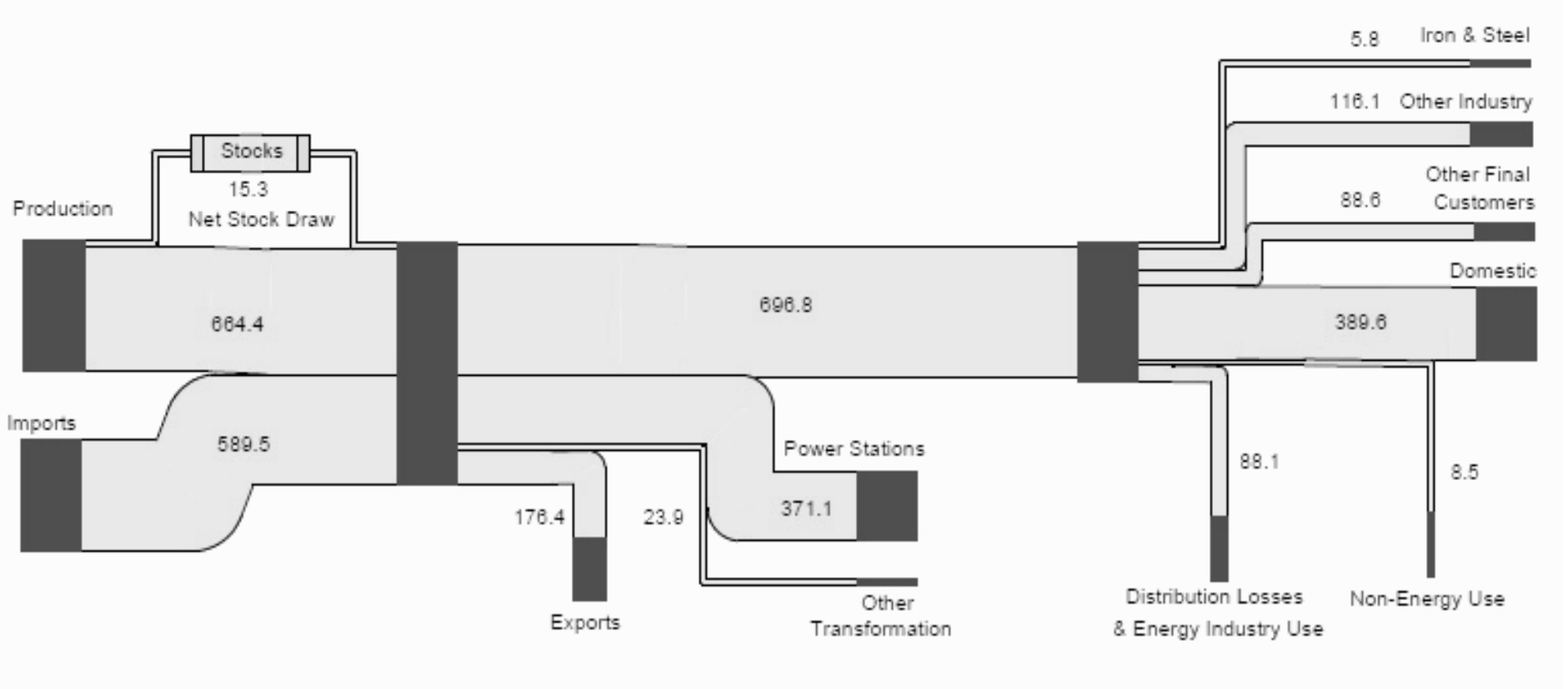
Introduction

4.1 This chapter presents six data tables on the production, transmission and consumption of natural gas and colliery methane, and two maps showing the gas transmission system in the UK and flows of gas in and around Europe (pages 106 & 107).

4.2 An energy flow chart for 2010, showing the flows of natural gas from production and imports through to consumption, is included overleaf, as a way of simplifying the figures that can be found in the commodity balance tables. It illustrates the flow of gas from the point at which it becomes available from home production or imports (on the left) to the eventual final use of gas (on the right) as well as the gas transformed into other forms of energy or exported.

4.3 Table 4.1 shows the commodity balances for natural gas and colliery methane, both separately and in aggregate. In Table 4.2, the two gases are aggregated and presented as a five year time-series, showing supply, transmission and consumption. The natural gas statistics includes bio-methane gas which is being currently being produced by a small number of companies to feed into the national grid. However, at this stage, volumes are small but as this increases we will look to present these in a separate column in Table 4.1. A more detailed examination of the various stages of natural gas from gross production through to consumption is given in Table 4.3. Table 4.4 details the UK's gas storage sites and interconnector pipelines, while Table 4.5 shows the UK's imports and exports of gas and Table 4.6 shows LNG imports by terminal. Long term trends commentary and a table on production and consumption of gas back to 1970 are to be found on DECC's energy statistics web site at: www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Natural gas flow chart 2010 (TWh)



Notes:
This flow chart is based on the data that appear in Table 4.1, excluding colliery methane.

4.4 Petroleum gases are covered in Chapter 3. Gases manufactured in the coke making and iron and steel making processes (coke oven gas and blast furnace gas) appear in Chapter 2. Biogases (landfill gas and sewage gas) are part of Chapter 7. Details of net selling values of gas for the domestic, industrial and other sectors are to be found in Chapter 1.

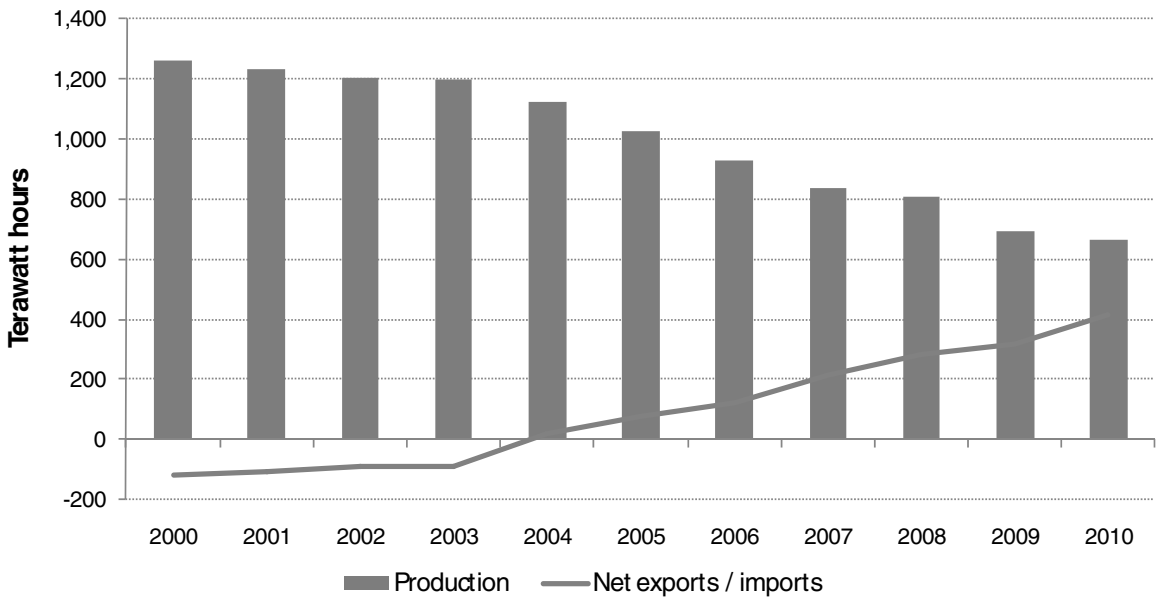
Commodity balances for gas (Tables 4.1 and 4.2)

4.5 Total supply of gas is made up of production, net trade and stock change.

4.6 UK Continental Shelf (UKCS) production of natural gas has been in decline since the turn of the decade and in 2010 (at 664,353 GWh) it was about half the level produced in 2000 (1,260,168 GWh). Since 2000, gas production has fallen off at a rate of about 6 per cent per year. However, the rate of decline varies each year, and in 2010 production was only 4 per cent lower than in 2009, partly as a result of a significant fall – over 14 per cent - in 2009 which resulted from extended maintenance work. The UK is still one of the largest gas producers in the EU, second only to the Netherlands, and remains within the top 20 producers globally, accounting for around 2 per cent of total global production.

4.7 The UK imports natural gas by pipelines from Norway, Belgium and the Netherlands and Liquefied Natural Gas (LNG) by ship. The UK has been a net importer of gas since 2004 with imports of gas in 2010 accounting for just under a half of the UK's gross (consumption *plus* exports) gas demand. In 2009 two new LNG terminals at Milford Haven (Dragon and South Hook) began commissioning gas and contributed to the 29 per increase in natural gas imports over 2009. The pattern of production and trade be seen in Chart 4.1.

Chart 4.1: Natural gas production and net exports/imports 2000 to 2010



4.8 After a decrease of 7.6 per cent in 2009, total gas demand increased by 8.4 per cent in 2010, from 1,008 TWh to 1,093 TWh, largely a reflection of the cold weather and higher demand from electricity generators. Demand is traditionally slightly less than supply because of the various measurement differences described in paragraphs 4.57 to 4.61. In 2010, demand was 0.7 TWh (under 0.1 per cent) less than supply.[1]

[1] The term statistical difference is used to define the difference between total supply and total demand – see paragraph 4.57

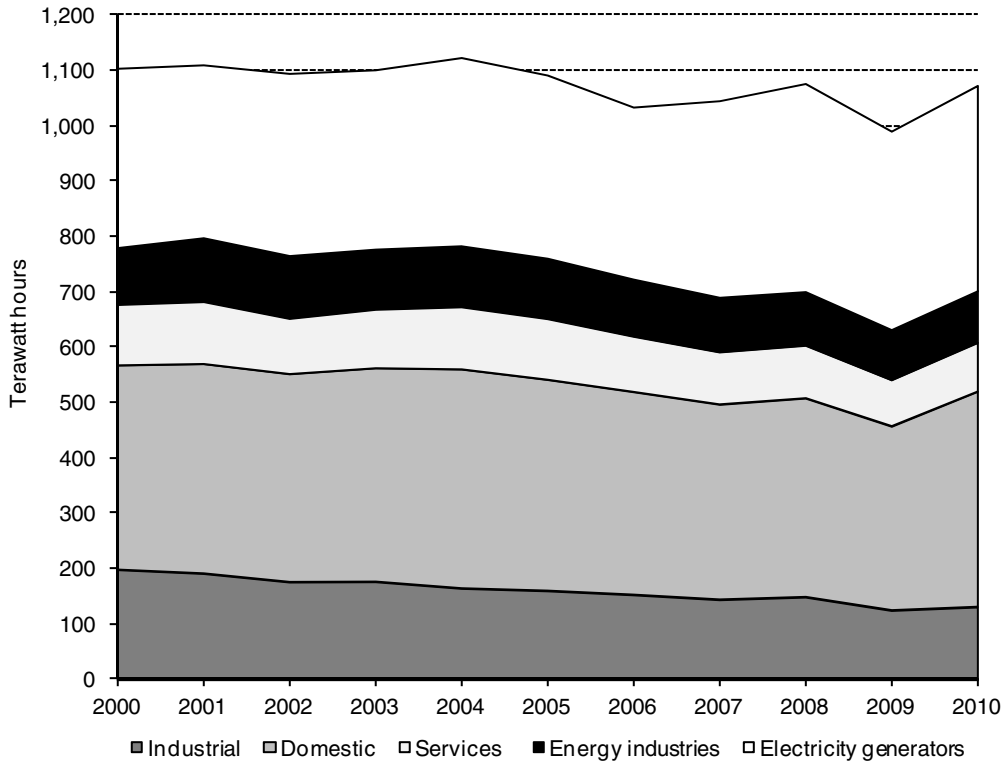
4.9 In 2010, 34 per cent of natural gas demand (371 TWh) was for electricity generation (transformation sector), 1.6 percentage points less than in 2009, although the actual volume was up 3.5 per cent on 2009. A further 6.4 per cent was consumed within the energy industries, while 1.7 per cent was accounted for by distribution losses within the gas network. (For an explanation of the items included under losses, see paragraph 4.16). Of the remaining 58 per cent, 2.2 per cent was transformed into heat for sale to a third party, and 11 per cent was accounted for by the industrial sector, with the chemicals industry (excluding natural gas for petrochemical feedstocks), food, mineral products and paper making industries being the largest consumers. The chemicals sector accounted for a fifth of the industrial consumption of natural gas.

4.10 Sales of gas to households (domestic sector) accounted for over a third of gas demand, while public administration (including schools and hospitals) consumed 3.5 per cent of total demand. The commercial, agriculture and miscellaneous sectors together took up 4.6 per cent. Non-energy use of gas accounted for the remaining 0.8 per cent. (See paragraph 4.50 for more details on non-energy use of gas.)

4.11 Chart 4.2 summarises the points above and shows that, gas consumption is split roughly equally in thirds between electricity generation and domestic use with the remaining third going to a combination of industry/services and energy industries. Most gas for electricity generation was used in Combined Cycle Gas Turbine (CCGT) stations. However, gas use for electricity generation has fluctuated with changes in the relative price of coal and gas. Price increases during 2005 and 2006 saw gas use for generation fall in both years. In 2007, however, gas use by generators rose by 14 per cent and by a further 5.9 per cent in 2008 to a record high of 376 TWh. Gas use for generation fell by 4.6 per cent in 2009 following a decrease in electricity demand, this was followed by an increase of 3.5 per cent in 2010.

4.12 Between 2000 and 2007, industrial use of gas has been on a downward trend apart from a small recovery in 2003. In 2008, however, consumption increased by 4.0 per cent, with most industrial sectors, notably excepting iron and steel, showing increases in demand. With the economic downturn, however, overall industrial demand fell by 16 per cent in 2009, from 139 TWh to 116 TWh, followed by a small growth in 2010 (4.8 per cent to 122 TWh). Use by the public administration sector was 3.5 per cent higher in 2010, at 38 TWh, while the commercial sector was up 8.4 per cent, at 32 TWh. Consumption in the energy industries other than electricity (and heat) generation increased but only by a small amount (0.6 per cent) to 69 TWh in 2010.

Chart 4.2: Consumption of natural gas 2000 to 2010



4.13 Gas use in the domestic sector is particularly dependent on winter temperatures. The average temperature in 2010 was 1.1 degrees celsius cooler than 2009, in particular, the fourth quarter of 2010 was a 2.5 degrees colder than the fourth quarter of 2009, with December being the coldest month with average temperatures below freezing. As a result domestic sector consumption increased by 17 per cent on 2009, up from 332 TWh to 390 TWh, with just a third of this being consumed in the fourth quarter of 2010.

4.14 Maximum daily demand for natural gas through the National Transmission System in winter 2009/2010 was a new record high of 5,798 GWh on 18th February 2011. This total maximum daily demand was 14 per cent higher than the 2009/2010 level, and 17 per cent higher than January 2003's previous record level.

4.15 It is estimated that sales of gas supplied on an interruptible basis accounted for around 13 per cent of total gas sales in 2010, 2.4 percentage points lower than in 2009.

UK continental shelf and onshore natural gas (Table 4.3)

4.16 Table 4.3 shows the flows for natural gas from production through transmission to consumption. The footnotes to the table give more information about each row. This table departs from the standard balance methodology and definitions in order to maintain the link with past data and with monthly data given on DECC's energy statistics web site (see paragraph 4.56). The relationship between total UK gas consumption shown in this table and total demand for gas given in the balance Table 4.1 is illustrated for 2010 as follows:

			GWh
Total UK consumption (Table 4.3)			1,008,705
plus Producers' own use			61,124
plus Operators' own use			3,211
equals			
"Consumption of natural gas"			1,073,040
plus Other losses and metering differences (upstream)			-
plus Downstream losses	- leakage assessment	5,314)	7,889
	- own use gas	429)	
	- theft	2,146)	
plus Metering differences (transmission)			10,848
equals			
Total demand for natural gas (Table 4.1)			1,091,777

4.17 The box below shows how, in 2010, the wastage, losses and metering differences figures in Table 4.3 are related to the losses row in the balance Table 4.1.

	GWh
Table 4.3	
Upstream gas industry:	
Other losses and metering differences	-
Downstream gas industry:	
Transmission system metering differences	10,848
Leakage assessment	5,314
Own use gas	429
Theft	2,146
Table 4.1	
Losses	18,737

4.18 The statistical difference row in Table 4.1 is made up of the following components in 2010:

		GWh
Table 4.3		
	Statistical difference between gas available from upstream and gas input to downstream	68
plus	Downstream gas industry:	
	Distribution losses and metering differences	613
Table 4.1		
	Statistical difference	682

4.19 The gas available at UK terminals has remained fairly constant during the last five years despite a reduction in UKCS production mainly due to the changes in exports and imports described in paragraph 4.7. Gas put into the UK transmission systems rose by 6.7 per cent between 2009 and 2010, while output of natural gas rose by 8.7 per cent. Output from the transmission system was higher than input due to stock changes. Part of the reason for the increase in demand in 2010 was the extremely cold weather at the beginning and end of the year.

4.20 For a discussion of the various statistical difference terms, losses and metering differences in this table, see paragraphs 4.57 to 4.61 in the technical notes and definitions section below.

4.21 Table 4.3 also includes two rows showing gas stocks and gas storage capacity at the end of the year. Storage data are not available before 2004. Stocks data for 2006 onwards have been sourced from the National Grid's weekly brief, and storage data from its 2010 Ten Year Statement.

Gas storage sites and import/export pipelines (Table 4.4)

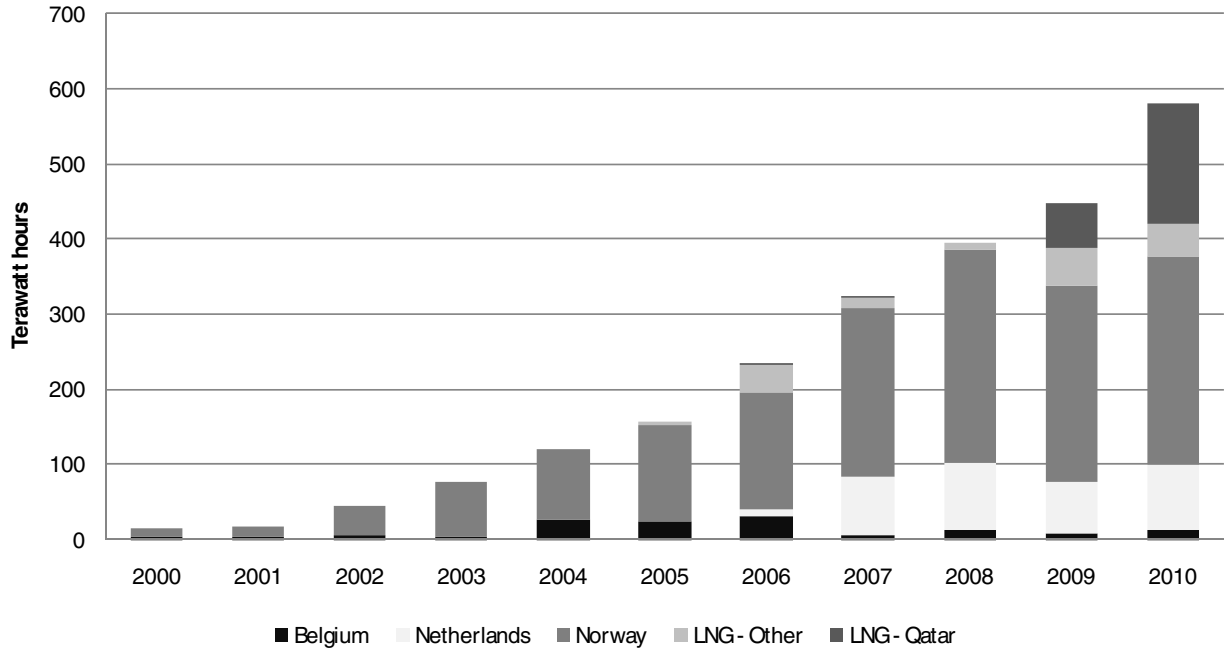
4.22 This table details current gas storage facilities in the UK as at 31 May 2011, and also the two operational pipelines that bring gas to the UK from continental Europe. Significant increases in storage capacity/deliverability are being planned or contemplated at existing or new sites, both onshore and offshore. National Grid's Gas Transportation Ten Year Statement (www.nationalgrid.com/uk/Gas/TYS/) includes public details of such projects in Great Britain.

Natural gas imports and exports (Tables 4.5 and 4.6)

4.23 These tables show how much gas was imported to, and exported from, the UK, via the interconnector pipelines and via ships to the UK's LNG terminals. Norwegian gross gas imports were 48 per cent of total gas imports compared 58 per cent in 2009. However, it should be noted that volume of Norwegian imports were higher than in 2009. In 2010, two thirds of gas exports were to continental Europe, with the remaining third to the Republic of Ireland.

4.24 Chart 4.3 shows the shares of natural gas imports by interconnector pipelines and LNG, while the flows of gas across Europe for 2009 are illustrated in Map 4.1. The chart indicates the growth in imports, but also the increasing importance of LNG to the UK.

Chart 4.3: Imports of Natural Gas 2000 to 2010



4.25 In July 2005, imports of LNG commenced at the Isle of Grain LNG import facility, the first time LNG had been imported to the UK since the early 1980s. In 2009 two new LNG terminals became operational at Milford Haven, South Hook and Dragon, and the second phase of the Isle of Grain expansion was completed at the Isle of Grain terminal. As a result, LNG's share of total gas imports rose from 25 per cent in 2009 to 35 per cent in 2010, and, in the month of September 2010, LNG imports exceeded pipeline imports for the first time.

4.26 The origins of LNG imports can be found in Table 4.5, and the total import volumes by each LNG terminal in Table 4.6. The LNG terminal imports are not shown by country of origin because of the commercial sensitivity of this information.

4.27 Despite the importance of LNG, pipeline imports, particularly from Norway, remain a critical component of the UK's energy mix. Imports of natural gas from the Norwegian sector of the North Sea began to decline in the late 1980s as output from the Frigg field tailed off. Frigg finally ceased production in October 2004. Whilst Frigg production was declining a spur line (Vesterled) from the Norwegian Heimdal field to the existing Frigg pipeline was laid and became operational in October 2001. Other developments since 2001 include:

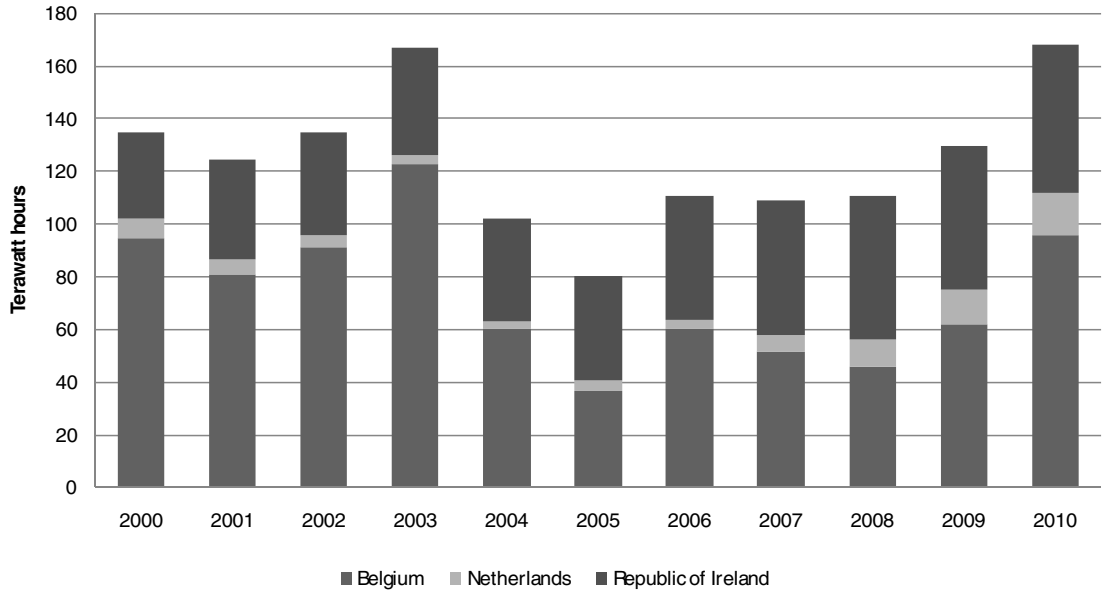
- October 2006 – The southern part of the Langeled pipeline from Sleipner to the UK became operational.
- December 2006 – An interconnector from the Netherlands, the Balgzand-Bacton Line (BBL) begins importing gas to the UK.
- October 2007 – New pipeline from Statfjord B to the UK's FLAGS (Far North Liquids and Associated Gas System) begins delivering gas Norwegian gas to St Fergus in Scotland.
- November 2010 – The Norwegian Gjøa oil and gas field and its satellite Vega began delivering gas to St Fergus in Scotland via the FLAGS pipeline.

4.28 The interconnector linking the UK's transmission network with Belgium via a Bacton to Zeebrugge pipeline began operating in October 1998, allowing both imports from, and exports to, mainland Europe. Whilst the flow was initially to the continent, since 1998 there has been an increase in imports. However, with the increase in LNG imports, exports to Belgium in the summer months increased significantly in 2010 and in October 2010 recorded their highest ever daily export flow.

4.29 Exports to mainland Europe from the UK's share of the Markham field began in 1992 with Windermere's output being added in 1997, Minke, Grove and Chiswick in 2007 and Stamford in 2008. Gas from these field goes straight to Den Helder in the Netherlands. Exports to the Republic of Ireland started in 1995. (See Map 4.2).

4.30 The increased import infrastructure afforded by the new LNG terminals has ensured that UK exports remain robust, despite the decrease in the UK's production. Chart 4.4. shows significant recent increases in UK exports, with exports to Belgium increasing over 50 per cent on 2009, coupled with more modest increases in exports to the Netherlands and the Republic of Ireland. Additionally a small amount of gas is exported to the Norwegian Continental Shelf for injection into the Ula field reservoir, but this accounts for less than 0.1 per cent of total exports.

Chart 4.4: Exports of Natural Gas: 2000 to 2010



4.31 The total volumes of gas traded in 2010 are at their highest levels ever, at almost 750 GWh, some 400% higher than 2000. The scale of the increase is such that the total traded volumes in Quarter 4 of 2010 were broadly similar to the annual traded volumes in the middle part of the decade.

Sub-national gas data

4.32 Table 4A gives the number of consumers with a gas demand below 73,200 kWh per year in gas year 2009 and the total number of gas consumers. The table covers customers receiving gas from the national transmission system. The below 73,200 kWh category covers both domestic and small business customers, and it was this section of the market that was progressively opened up to competition between April 1996 and May 1998. It should be noted that the data are for gas year 2009, is approximately one year in arrears of the other data presented in this chapter, and exclude around 2,000 customers not allocated to a government office region.

4.33 In December 2010, DECC published in *Energy Trends* and on its sub-national energy statistics website (www.decc.gov.uk/en/content/cms/statistics/regional/regional.aspx) gas consumption data at both regional and local level. The local level data are at "LAU1" level (see article in December 2010 *Energy Trends* for definition) and the regional data at "NUTS1" level. Data for earlier years are presented on the web site but only 2009 data appear in the article. Domestic sector sales are shown separately from commercial and industrial sales, along with the numbers of consumers. DECC has produced electricity and gas consumption estimates since 2004 at Middle Layer Super Output Area (MLSOA) level and, for Scotland, intermediate geography zones. MLSOAs are a statistical geography developed by the Office for National Statistics (ONS) as part of the 2001 census. There are 7,193 MLSOAs (plus the Isles of Scilly) which are areas containing a minimum population of 5,000 or around 2,000 households. In addition to this in Scotland there are 1,235 intermediate geography zones which are designed to contain between 2,500 and 6,000 people. Consumption data at Lower Layer Super Output Area (LLSOA) is also available for 2008 and 2009 covering all 34,378 areas within England

and Wales, which contain a minimum population of 1,000 based on the 2001 census. Further details about the MLSOA and LLSOA data can be found on the sub-national energy statistics website www.decc.gov.uk/en/content/cms/statistics/regional/mlsoa_llsoa/mlsoa_llsoa.aspx.

Table 4A: Consumption by gas customers by region in 2009

Government Office Region	Consumption by customers below 73,200 kWh (2,500 therms) annual demand		Consumption by all customers (where regional classification is possible)	
	Number of consumers (thousands)	Gas sales 2009 (GWh)	Number of consumers (thousands)	Gas sales 2009 (GWh)
North West	2,824	44,105	2,859	70,000
South East	3,110	48,311	3,152	67,478
Greater London	2,982	44,939	3,027	67,387
Yorkshire and the Humber	2,074	32,690	2,100	54,822
Scotland	1,882	30,676	1,908	51,034
West Midlands	2,060	31,547	2,085	47,827
East of England	1,993	30,756	2,017	47,720
East Midlands	1,705	26,490	1,726	41,261
South West	1,762	24,048	1,783	35,473
North East	1,077	16,918	1,089	26,384
Wales	1,146	17,450	1,158	28,163
Great Britain[1]	22,621	348,034	22,910	539,617

Source: xoserve and the independent gas transporters

[1] Great Britain includes 7.1 thousand customers (2,096 GWh) that could not be allocated to a region as there was insufficient geographical information to be able to do so.

4.34 By December 2010, 12.4 million gas consumers (57 per cent) were no longer supplied by British Gas. Table 4B gives market penetration in more detail, by local distribution zone (LDZ). For all types of domestic customer, it is in the markets in Northern England and Wales that new suppliers have had most success. Since the market has opened up, British Gas had lost around 42 per cent of the credit market, 66 per cent of the direct debit market, and 54 per cent of the pre-payment market. At the end of May 2011, 34 suppliers were licensed to supply gas to domestic customers.

4.35 Competition in the domestic market remained broadly unchanged between 2007 and 2010, with the largest three suppliers accounting for 70 per cent of sales in 2010. In the industrial sector, after an increase in 2007, the market share of the three largest suppliers fell back to 57 per cent in 2008, before increasing by 2.7 percentage points in 2010. The commercial sector is more competitive, with the three largest suppliers accounting for 48 per cent of sales in 2010, 3.3 percentage points higher than in 2009.

Table 4B: Domestic gas market penetration (in terms of percentage of customers supplied) by local distribution zone and payment type, fourth quarter of 2010

Region	British Gas Trading			Non-British Gas		
	Credit	Direct Debit	Prepayment	Credit	Direct Debit	Prepayment
Northern	49	26	35	51	74	65
Southern	54	30	42	46	70	58
North East	57	32	37	43	68	63
Scotland	60	32	38	40	68	62
Eastern	55	33	46	45	67	54
East Midlands	56	33	51	44	67	49
Wales	52	33	29	48	67	71
South East	58	34	46	42	66	54
West Midlands	63	34	55	37	66	45
North West	62	36	56	38	64	44
South Western	60	36	44	40	64	56
North Thames	63	42	55	37	58	45
Great Britain	58	34	46	42	66	54

The gas supply industry in Great Britain

4.36 When British Gas was privatised in 1986, it was given a statutory monopoly over supplies of natural gas (methane) to premises taking less than 732,000 kWh (25,000 therms) a year. Under the Oil and Gas (Enterprise) Act 1982, contract customers taking more than this were able to buy their gas from other suppliers, but no other suppliers entered the market until 1990.

4.37 In 1991, the Office of Fair Trading (OFT) followed up an examination of the contract market, in 1988, by the Monopolies and Mergers Commission (MMC). It reviewed progress towards a competitive market, and found that the steps taken in 1988 had been ineffective in encouraging self-sustaining competition. British Gas undertook in March 1992: to allow competitors to take, by 1995, at least 60 per cent of the contract market above 732,000 kWh (25,000 therms) a year (subsequently redefined as 45 per cent of the market above 73,200 kWh (2,500 therms)); to release to competitors the gas necessary to achieve this; and to establish a separate transport and storage unit with regulated charges. In the 1992 Competition and Service (Utilities) Act, the Government also took powers to reduce or remove the tariff monopoly, and in July 1992 it lowered the tariff threshold to 73,200 kWh.

4.38 Difficulties in implementing the March 1992 undertakings led to further references to the MMC. As a result of the new recommendations made by the MMC earlier in 1993, the President of the Board of Trade decided in December 1993 to require full internal separation of British Gas's supply and transportation activities, but not divestment, and to accelerate removal of the tariff monopoly to April 1996, with a phased opening of the domestic market by the regulator over the following two years.

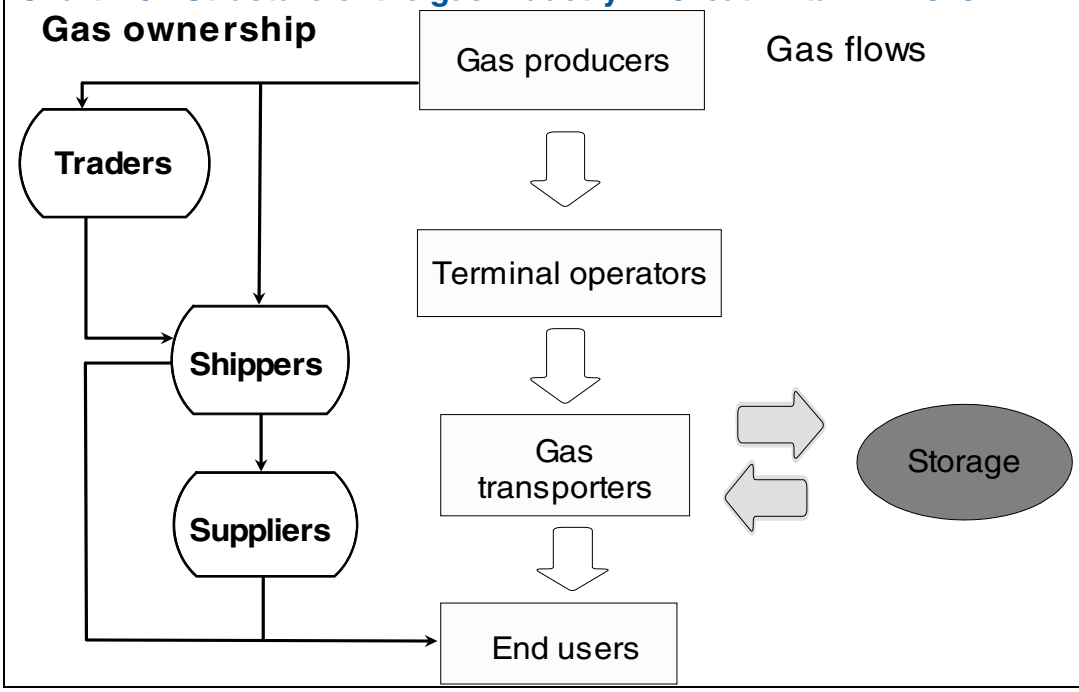
4.39 In November 1995, the Gas Bill received Royal Assent, clearing the way for the extension of competition into the domestic gas supply market on a phased basis between 1996 and 1998. This was carried out in stages between April 1996 and May 1998.

4.40 For the non-domestic market, about three-quarters (by volume) in Great Britain was opened to competition at the end of 1982 and the remainder in August 1992 (with the reduction in the tariff threshold). However, no other suppliers entered the market until 1990. After 1990, there was a rapid increase in the number of independent companies supplying gas, although from 1999 some consolidation started, and in recent years sales of gas have become more concentrated in the hands of the largest companies in the domestic, industrial and commercial sectors. This came about through larger companies absorbing smaller suppliers and through mergers between already significant suppliers.

4.41 Following the 1995 Gas Act, the business of British Gas was fully separated into two corporate entities. The supply and shipping businesses were devolved to a subsidiary, British Gas Trading Limited, while the transportation business (Transco) remained within British Gas plc. In February 1997, Centrica plc was demerged from British Gas plc (which was itself renamed as BG plc) completing the division of the business into two independent entities. Centrica became the holding company for British Gas Trading, British Gas Services, the Retail Energy Centres and the company producing gas from the North and South Morecambe fields. BG plc comprised the gas transportation and storage business of Transco, along with British Gas's other exploration and production, international downstream, research and technology and property activities. In October 2000, BG plc demerged into two separately listed companies, of which Lattice Group plc was the holding company for Transco, while BG Group plc included the international and gas storage businesses. On 21 October 2002, Transco and the National Grid Company merged to form National Grid.

4.42 From 1 October 2001, under the Utilities Act, gas pipeline companies have been able to apply for their own national Gas Transporter Licences so that they can compete with Transco. In some areas, low pressure spur networks had already been developed by new transporters competing with Transco to bring gas supplies to new customers (mainly domestic). In addition, some very large loads (above 60 GWh) are serviced by pipelines operated independently, some by North Sea producers. The structure of the gas industry in Great Britain, as it stood at the end of 2010, is shown in Chart 4.5.

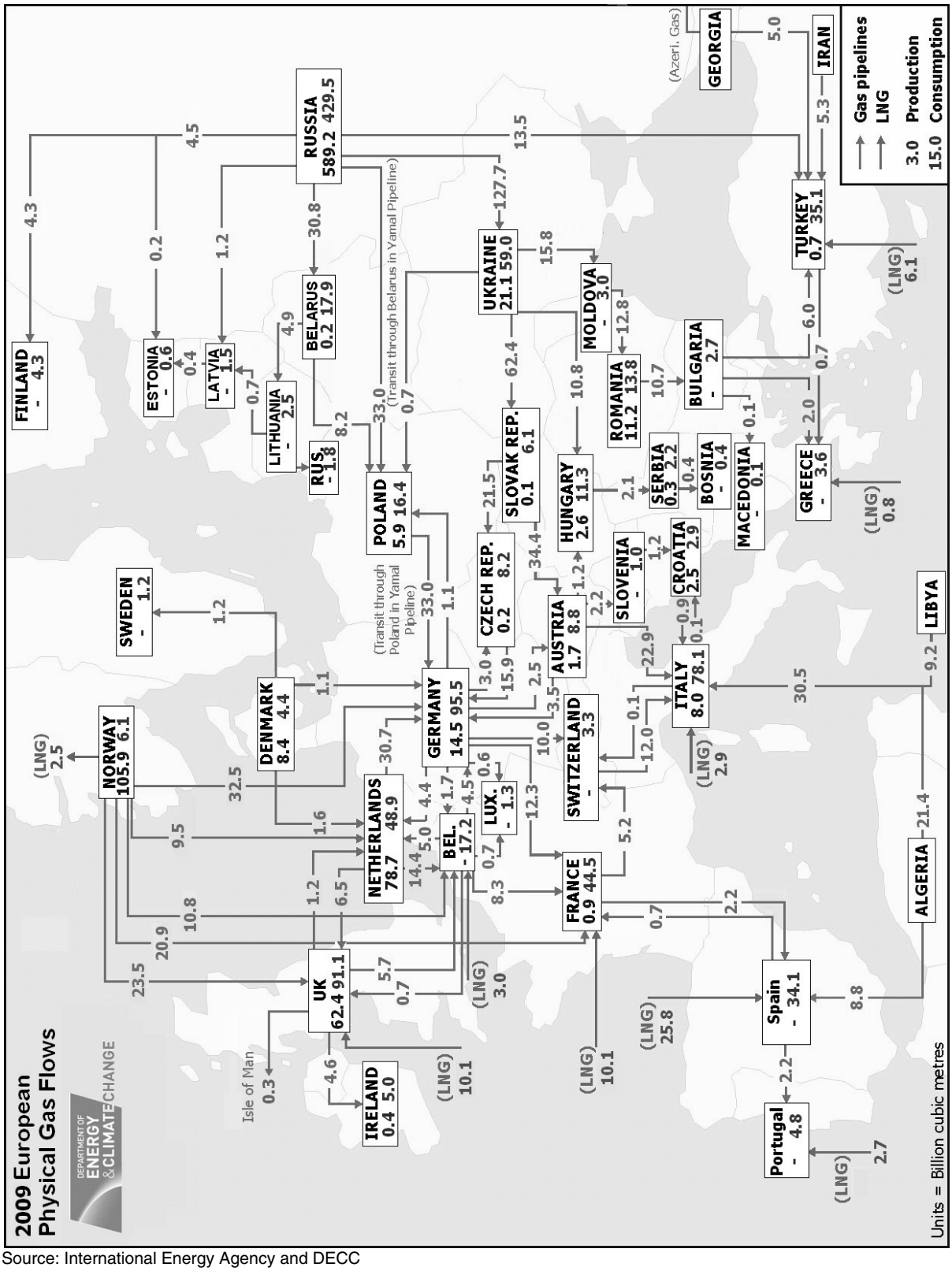
Chart 4.5: Structure of the gas industry in Great Britain in 2010



Northern Ireland

4.43 Before 1997, Northern Ireland did not have a public natural gas supply. The construction of a natural gas pipeline from Portpatrick in Scotland to Northern Ireland was completed in 1996 and provided the means of establishing such a system. The initial market was Ballylumford power station, which was purchased by British Gas in 1992 and converted from oil to gas firing (with a heavy fuel oil back up). A second gas-fired power station was built at Coolkeeragh in 2005. The onshore line has been extended to serve wider industrial, commercial and domestic markets and this extension is continuing. In late 2007, the South-North gas pipeline was completed, to allow gas to be imported to Northern Ireland from the Republic of Ireland. In 2010, 67 per cent of all gas supplies in Northern Ireland were used to generate electricity.

Map 4.1: Gas European Transit System



Source: International Energy Agency and DECC

4.44 Gas data are less transparent at the wider European level given missing information on transit flows and incomplete trade information. The above map was produced using published International Energy Agency data to reconstruct the missing physical gas flow data and was prepared as part of DECC's contribution to a Eurostat project to improve gas data transparency and quality.

Map 4.2: The National Gas Transmission System 2010

Source: International Energy Agency and DECC

Technical notes and definitions

4.45 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.28 to 1.62. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A, paragraphs A.7 to A.42. While the data in the printed and bound copy of this Digest cover only the most recent five years, these notes also cover data for earlier years that are available on the DECC energy statistics web site.

Definitions used for production and consumption

4.46 **Natural gas** production in Tables 4.1 and 4.2 relates to the output of indigenous methane at land terminals and gas separation plants (includes producers' and processors' own use). For further explanation, see Annex F on DECC's energy statistics web site under 'Production of gas' - www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx. Output of the Norwegian share of the Frigg and Murchison fields is included under imports. A small quantity of onshore produced methane (other than colliery methane) is also included.

4.47 Table 4.3 shows production, transmission and consumption figures for UK continental shelf and onshore natural gas. Production includes waste and own use for drilling, production and pumping operations, but excludes gas flared. Gas available in the United Kingdom excludes waste, own use for drilling etc, stock change, and includes imports net of exports. Gas transmitted (input into inland transmission systems) is after stock change, own use, and losses at inland terminals. The amount consumed in the United Kingdom differs from the total gas transmitted by the gas supply industry because of losses in transmission, differences in temperature and pressure between the points at which the gas is measured, delays in reading meters and consumption in the works, offices, shops, etc of the undertakings. The figures include an adjustment to the quantities billed to consumers to allow for the estimated consumption remaining unread at the end of the year.

4.48 **Colliery methane** production is colliery methane piped to the surface and consumed at collieries or transmitted by pipeline to consumers. As the output of deep-mined coal declines so does the production of colliery methane, unless a use can be found for gas that was previously vented. The supply of methane from coal measures that are no longer being worked or from drilling into coal measures is licensed under the same legislation as used for offshore gas production.

4.49 **Transfers** of natural gas include natural gas use within the iron and steel industry for mixing with blast furnace gas to form a synthetic coke oven gas. For further details see paragraph 2.49 in Chapter 2.

4.50 **Non-energy gas**: Non-energy use is gas used as feedstock for petrochemical plants in the chemical industry as raw material for the production of ammonia (an essential intermediate chemical in the production of nitrogen fertilisers) and methanol. The contribution of liquefied petroleum gases (propane and butane) and other petroleum gases is shown in Tables 3.2 to 3.4 of Chapter 3. Firm data for natural gas are not available, but estimates for 2006 to 2010 are shown in Table 4.2 and estimates for 2008 to 2010 in Table 4.1. The estimates for the years up to 2009 have been obtained from AEA's work for the National Atmospheric Emissions Inventory; 2010 data are DECC extrapolations.

Sectors used for sales/consumption

4.51 For definitions of the various sectors used for sales and consumption analyses see Chapter 1 paragraphs 1.56 to 1.60 and Annex A, paragraphs A.31 to A.42. However, **miscellaneous** has a wider coverage than in the commodity balances of other fuels. This is because some gas supply companies are unable to provide a full breakdown of the services sector and the gas they supply to consumers is allocated to miscellaneous when there is no reliable basis for allocating it elsewhere. See also paragraph 4.54, below, for information on the source of the sectoral data for consumption of gas.

Data collection

4.52 Production figures are generally obtained from returns made under DECC's Petroleum Production Reporting System (PPRS) and from other sources. DECC obtain data on the transmission of natural gas from National Grid (who operate the National Transmission System) and from other pipeline operators. Data on consumption are based on returns from gas suppliers and UK Continental Shelf (UKCS) producers who supply gas directly to customers.

4.53 The production data are for the United Kingdom (including natural gas from the UKCS - offshore and onshore). The restoration of a public gas supply to parts of Northern Ireland in 1997 (see paragraph 4.43), means that all tables in this chapter, except Tables 4A and 4B, cover the UK.

4.54 DECC carry out an annual survey of gas suppliers to obtain details of gas sales to the various categories of consumer. Estimates are included for the suppliers with the smallest market share since the DECC inquiry covers only the largest suppliers (ie those with more than about a 0.5 per cent share of the UK market up to 1997 and those known to supply more than 1,750 GWh per year for 1998 onwards). For 2000 and subsequent years, gas consumption for the iron and steel sector is based on data provided by the Iron and Steel Statistics Bureau (ISSB) rather than gas suppliers since gas suppliers were over estimating their sales to this sector. The difference between the ISSB and gas suppliers figures has been re-allocated to other sectors. The data are validated using information on sectors from EU Emissions Trading Scheme (EU-ETS) sources.

Period covered

4.55 Figures generally relate to years ended 31 December. However, before 2004, data for natural gas for electricity generation relate to periods of 52 weeks as set out in Chapter 5, paragraphs 5.82 and 5.83.

Monthly and quarterly data

4.56 Monthly data on natural gas production and supply are available from DECC's energy statistics website www.decc.gov.uk/en/content/cms/statistics/source/gas/gas.aspx in monthly Table 4.2. A quarterly commodity balance for natural gas (which includes consumption data) is published in DECC's quarterly statistical bulletin *Energy Trends* and is also available from quarterly Table 4.1 on DECC's energy statistics web site. See Annex C for more information about *Energy Trends* and DECC's energy statistics web site.

Statistical and metering differences

4.57 In Table 4.3 there are several headings that refer to statistical or metering differences. These arise because measurement of gas flows, in volume and energy terms, takes place at several points along the supply chain. The main sub-headings in the table represent the instances in the supply chain where accurate reports are made of the gas flows at that particular key point in the supply process. It is possible to derive alternative estimates of the flow of gas at any particular point by taking the estimate for the previous point in the supply chain and then applying the known losses and gains in the subsequent part of the supply chain. The differences seen when the actual reported flow of gas at any point and the derived estimate are compared are separately identified in the table wherever possible, under the headings statistical or metering differences.

4.58 Losses and metering differences attributable to the information provided on the upstream gas industry are zero from 2001 onwards because these data are no longer reported in the revised Petroleum Production Reporting System. This simplified system for reporting the production of crude oil, NGLs and natural gas in the UK was implemented from 1 January 2001; it reduced the burden on the respondents and improved the quality of data reported on gas production.

4.59 The differences in the natural gas commodity balances arise from several factors:-

- Limitations in the accuracy of meters used at various points of the supply chain. While standards are in place on the accuracy of meters, there is a degree of error allowed which, when large flows of gas are being recorded, can become significant.
- Differences in the methods used to calculate the flow of gas in energy terms. For example, at the production end, rougher estimates of the calorific value of the gas produced are used which may be revised only periodically, rather than the more accurate and more frequent analyses carried out further down the supply chain. At the supply end, although the calorific value of gas shows day-to-day variations, for the purposes of recording the gas supplied to customers a single calorific value is used. Until 1997 this was the lowest of the range of calorific values for the actual gas being supplied within each LDZ, resulting in a "loss" of gas in energy terms. In 1997 there was a change to a "capped flow-weighted average" algorithm for calculating calorific values resulting in a reduction in the losses shown in the penultimate row of Table 4.3. This change in algorithm, along with improved meter validation and auditing procedures, also reduced the level of the "metering differences" row within the downstream part of Table 4.3.

- Differences in temperature and pressure between the various points at which gas is measured. Until February 1997 British Gas used "uncorrected therms" on their billing system for tariff customers when converting from a volume measure of the gas used to an energy measure. This made their supply figure too small by a factor of 2.2 per cent, equivalent to about 1 per cent of the wholesale market.
- Differences in the timing of reading meters. While National Transmission System meters are read daily, customers' meters are read less frequently (perhaps only annually for some domestic customers) and profiling is used to estimate consumption. Profiling will tend to underestimate consumption in a strongly rising market.
- Other losses from the system, for example theft through meter tampering by consumers.

4.60 The headings in Table 4.3 show where, in the various stages of the supply process, it has been possible to identify these metering differences as having an effect. Usually they are aggregated with other net losses as the two factors cannot be separated. Whilst the factors listed above can give rise to either losses or gains, losses are more common. However, the negative downstream gas metering difference within the transmission system in 2003 was an anomaly that was investigated by National Grid during 2004. They concluded that this unaccounted for element of National Transmission System shrinkage was due to an exceptional run of monthly negative figures between February and June 2003 within what is usually a variable but mainly positive series. However, after a comprehensive investigation of this exceptional period no causal factors were identified. It is probable that the meter error or errors that caused this issue were corrected during the validation of metering.

4.61 Care should be exercised in interpreting the figures for individual industries in these commodity balance tables. As companies switch contracts between gas suppliers, it has not been possible to ensure consistent classification between and within industry sectors and across years. The breakdown of final consumption includes a substantial amount of estimated data. For 2010, the allocation of about 3 per cent of consumption is estimated.

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4.1 Commodity balances

Natural gas

GWh

	2008			2009			2010		
	Natural gas	**Colliery methane**	**Total Natural gas**	**Natural gas**	**Colliery methane**	**Total Natural gas**	**Natural gas**	**Colliery methane**	**Total Natural gas**
Supply									
Production	809,649	736r	810,385r	693,965	775r	694,740r	664,353	730	665,083
Other sources	-	-	-	-	-	-	-	-	-
Imports	407,054	-	407,054	455,789	-	455,789	589,497	-	589,497
Exports	-122,670	-	-122,670	-137,100	-	-137,100	-176,399	-	-176,399
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change *(1)*	-3,087	-	-3,087	-4,876	-	-4,876	+15,271	-	+15,271
Transfers *(2)*	-68	-	-68	-351r	-	-351r	-263	-	-263
Total supply	**1,090,878**	**736r**	**1,091,614r**	**1,007,427r**	**775r**	**1,008,202r**	**1,092,459**	**730**	**1,093,189**
Statistical difference *(3)*	+14r	-	+14r	+78r	-	+78r	+682	-	+682
Total demand	**1,090,865r**	**736r**	**1,091,600r**	**1,007,349r**	**775r**	**1,008,124r**	**1,091,777**	**730**	**1,092,507**
Transformation	**401,630r**	**607r**	**402,236r**	**381,404r**	**657r**	**382,061r**	**395,007**	**618**	**395,625**
Electricity generation	376,204r	607r	376,810	358,646r	657r	359,303r	371,118	618	371,736
Major power producers	344,454	-	344,454	328,249r	-	328,249r	342,150	-	342,150
Autogenerators	31,750r	607r	32,357	30,397r	657r	31,054r	28,968	618	29,586
Heat generation	25,426r	-	25,426r	22,758r	-	22,758r	23,890	-	23,890
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	**72,185**	**95**	**72,280**	**68,976r**	**89**	**69,065r**	**69,375**	**87**	**69,462**
Electricity generation	-	-	-	-	-	-	-	-	-
Oil and gas extraction	61,292	-	61,292	61,110	-	61,110	61,124	-	61,124
Petroleum refineries	4,971	-	4,971	3,916r	-	3,916r	4,255	-	4,255
Coal extraction	-	95	95	-	89	89	-	87	87
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	718	-	718	450	-	450	641	-	641
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	5,204	-	5,204	3,499	-	3,499	3,355	-	3,355
Losses *(4)*	**13,623r**	-	**13,623r**	**16,356r**	-	**16,356r**	**18,737**	-	**18,737**
Final consumption	**603,427r**	**34**	**603,461r**	**540,614r**	**29**	**540,643r**	**608,658**	**25**	**608,683**
Industry	**138,654r**	**34**	**138,688r**	**116,380r**	**29**	**116,409r**	**121,938**	**25**	**121,963**
Unclassified	-	34	34	-	29	29	-	25	25
Iron and steel	6,920	-	6,920	5,037r	-	5,037r	5,826	-	5,826
Non-ferrous metals	2,989r	-	2,989r	2,486r	-	2,486r	2,622	-	2,622
Mineral products	18,363r	-	18,363r	15,148r	-	15,148r	15,773	-	15,773
Chemicals	31,182r	-	31,182r	25,646r	-	25,646r	26,423	-	26,423
Mechanical Engineering, etc	7,704r	-	7,704r	6,422r	-	6,422r	6,503	-	6,503
Electrical engineering, etc	3,895r	-	3,895r	3,267r	-	3,267r	3,395	-	3,395
Vehicles	8,613r	-	8,613r	7,251r	-	7,251r	7,576	-	7,576
Food, beverages, etc	24,361r	-	24,361r	20,990r	-	20,990r	22,628	-	22,628
Textiles, leather, etc	6,099r	-	6,099r	5,192r	-	5,192r	5,288	-	5,288
Paper, printing, etc	16,602r	-	16,602r	14,406r	-	14,406r	14,927	-	14,927
Other industries	9,475r	-	9,475r	8,407r	-	8,407r	8,786	-	8,786
Construction	2,452r	-	2,452r	2,127r	-	2,127r	2,190	-	2,190
Transport	-	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	**455,190**	-	**455,190**	**416,234r**	-	**416,234r**	**478,220**	-	**478,220**
Domestic	359,554	-	359,554	332,499r	-	332,499r	389,595	-	389,595
Public administration	42,565	-	42,565	37,084r	-	37,084r	38,390	-	38,390
Commercial	33,358	-	33,358	29,305r	-	29,305r	31,758	-	31,758
Agriculture	2,161	-	2,161	1,860r	-	1,860r	1,969	-	1,969
Miscellaneous	17,552	-	17,552	15,485r	-	15,485r	16,507	-	16,507
Non energy use	**9,583r**	-	**9,583r**	**8,001r**	-	**8,001r**	**8,499**	-	**8,499**

(1) Stock fall (+), stock rise (-).

(2) Natural gas used in the manufacture of synthetic coke oven gas.

(3) Total supply minus total demand.

(4) For an explanation of what is included under losses, see paragraphs 4.57 to 4.61.

4.2 Supply and consumption of natural gas and colliery methane[1]

GWh

	2006	2007	2008	2009	2010
Supply					
Production	930,538	838,809	810,385r	694,740r	665,083
Imports	244,029	338,026	407,054	455,789	589,497
Exports	-120,591	-123,158	-122,670	-137,100	-176,399
Stock change *(2)*	-6,435	+5,480	-3,087	-4,876	+15,271
Transfers	-55	-78	-68	-351r	-263
Total supply	**1,047,486**	**1,059,080**	**1,091,614r**	**1,008,202r**	**1,093,189**
Statistical difference *(3)*	+148	+186	+14r	+78r	+682
Total demand	**1,047,338**	**1,058,894**	**1,091,600r**	**1,008,124r**	**1,092,507**
Transformation	**333,431**	**379,518**	**402,236r**	**382,061r**	**395,625**
Electricity generation	311,408	355,878	376,810	359,303r	371,736
Major power producers	278,149	319,836	344,454	328,249r	342,150
Autogenerators	33,259	36,042	32,357	31,054r	29,586
Heat generation	22,023	23,640	25,426r	22,758r	23,890
Other	-	-	-	-	-
Energy industry use	**81,859**	**76,025**	**72,280**	**69,065r**	**69,462**
Electricity generation	-	-	-	-	-
Oil and gas extraction	69,252	64,230	61,292	61,110	61,124
Petroleum refineries	5,161	5,206	4,971	3,916r	4,255
Coal extraction	112	91	95	89	87
Coke manufacture	-	-	-	-	-
Blast furnaces	611	719	718	450	641
Other	6,723	5,779	5,204	3,499	3,355
Losses *(4)*	**12,014**	**12,078**	**13,623r**	**16,356r**	**18,737**
Final consumption	**620,035**	**591,274**	**603,461r**	**540,643**	**608,683**
Industry	**144,541**	**133,350**	**138,688r**	**116,409r**	**121,963**
Unclassified	47	40	34	29	25
Iron and steel	8,391	7,323	6,920	5,037r	5,826
Non-ferrous metals	3,106	2,864	2,989r	2,486r	2,622
Mineral products	17,803	16,878	18,363r	15,148r	15,773
Chemicals	34,334	30,140	31,182r	25,646r	26,423
Mechanical engineering, etc	8,180	7,670	7,704r	6,422r	6,503
Electrical engineering, etc	3,922	3,736	3,895r	3,267r	3,395
Vehicles	9,470	8,532	8,613r	7,251r	7,576
Food, beverages, etc	23,714	22,973	24,361r	20,990r	22,628
Textiles, leather, etc	6,637	6,078	6,099r	5,192r	5,288
Paper, printing, etc	16,518	15,511	16,602r	14,406r	14,927
Other industries	9,864	9,229	9,475r	8,407r	8,786
Construction	2,555	2,378	2,452r	2,127r	2,190
Transport	-	-	-	-	-
Road	-	-	-	-	-
Other	**467,582**	**447,695**	**455,190**	**416,234r**	**478,220**
Domestic	366,928	352,868	359,554	332,499r	389,595
Public administration	45,803	42,444	42,565	37,084r	38,390
Commercial	34,273	33,098	33,358	29,305r	31,758
Agriculture	2,013	1,998	2,161	1,860r	1,969
Miscellaneous	18,564	17,286	17,552	15,485r	16,507
Non energy use	**7,913**	**10,228**	**9,583r**	**8,001r**	**8,499**

(1) Colliery methane figures included within these totals are as follows:

	2006	2007	2008	2009	2010
Total production	**754**	**717**	**736r**	**775r**	**730**
Electricity generation	595	586	607r	657r	618
Coal extraction	112	91	95	89	87
Unclassified industries	47	40	34	29	25
Total consumption	**754**	**717**	**736r**	**775r**	**730**

(2) Stock fall (+), stock rise (-).
(3) Total supply minus total demand.
(4) For an explanation of what is included under losses, see paragraphs 4.57 to 4.61.

4.3 UK continental shelf and onshore natural gas production and supply *(1)*

GWh

	2006	2007	2008	2009	2010
Upstream gas industry:					
Gross production *(2)*	929,784	838,092	809,649	693,965	664,353
Minus Producers' own use *(3)*	69,252	64,230	61,292	61,110	61,124
Exports	120,591	123,158	122,670	137,100	176,399
Plus Imports of gas	244,029	338,026	407,054	455,789	589,497
Gas available at terminals *(4)*	983,971	988,731	1,032,742	951,544	1,016,327
Minus Statistical difference *(5)*	147	45	213	-1,173	68
Downstream gas industry:					
Gas input into the national transmission system *(6)*	983,824	988,686	1,032,529	952,717	1,016,259
Minus Operators' own use (7)	5,831	4,698	4,265	2,810	3,211
Stock change (storage sites) *(8)*	6,435	-5,480	3,087	4,876	-15,271
Metering differences *(5)*	4,544	4,472	5,759	9,111	10,848
Gas output from the national transmission system *(9)*	967,014	984,996	1,019,418	935,920	1,017,471
Minus Leakage assessment *(10)*	5,032	5,123	5,297r	4,880r	5,314
Own use gas *(11)*	406	414	428r	394r	429
Theft *(12)*	2,032	2,069	2,139r	1,971r	2,146
Transfers *(13)*	52	78	68	354	263
Statistical difference and metering differences *(5)*	4	141	-199r	1,248r	613
Total UK consumption *(14)*	**959,488**	**977,172**	**1,011,685r**	**927,073r**	**1,008,705**
Stocks of gas (at end year)	41,914	36,434	39,521	44,397	29,126
Storage capacity *(15)*	48,126	48,126	47,530	47,310	47,310

(1) For details of where to find monthly updates of natural gas production and supply see paragraph 4.56.
(2) Includes waste and producers' own use, but excludes gas flared.
(3) Gas used for drilling, production and pumping operations.
(4) The volume of gas available at terminals for consumption in the UK as recorded by the terminal operators.
(5) Measurement of gas flows, in volume and energy terms, occurs at several points along the supply chain. As such, differences are seen between the actual recorded flow through any one point and estimates calculated for the flow of gas at that point. More detail on the reasons for these differences is given in the technical notes and definitions section of this chapter, paragraphs 4.57 to 4.61.
(6) Gas received as reported by the pipeline operators. The pipeline operators include National Grid, who run the national pipeline network, and other pipelines that take North Sea gas supplies direct to consumers.
(7) Gas consumed by pipeline operators in pumping operations and on their own sites.
(8) Stocks of gas held in specific storage sites, either as liquefied natural gas, pumped into salt cavities or stored by pumping the gas back into an offshore field. Stock rise (+), stock fall (-).
(9) Including public gas supply, direct supplies by North Sea producers, third party supplies and stock changes.
(10) This is a National Grid assessment of leakage through the local distribution system based on the National Leakage Reduction Monitoring Model.
(11) Equivalent to about 0.06 per cent of LDZ throughput, this is an assessment of the energy used to counter the effects of gas cooling on pressure reduction.
(12) Calculated by National Grid as 0.3 per cent of LDZ throughput, this is theft before the gas reaches customer meters.
(13) Transfers are the use within the iron and steel industry for the manufacture of synthetic coke oven gas.
(14) See paragraph 4.16 for an explanation of the relationship between these "Total UK consumption" figures and "Total demand" shown within the balance tables.
(15) Data compiled by DECC from individual storage site information. Converted from billion cubic metres to GWh assuming 11.02 kWh per cubic metre. See paragraph 4.21.

4.4 Gas storage sites and import/export pipelines in the United Kingdom at 31 May 2011

Owner	Site	Location	Capacity (Billion m^3)	Max flow rate (Million m^3/day)	Type	Status *(1)*
Operational storage						
Centrica Storage Ltd	Rough	Southern North Sea	3.50	43	Depleted field	Long
National Grid	Avonmouth	Bristol	0.08	13	LNG	Short
	Glenmavis *(2)*	North Lanarkshire	0.05	8	LNG	Short
	Partington *(2)*	Manchester	0.05	14	LNG	Short
Scottish and Southern Energy	Hornsea	East Yorkshire	0.30	18	Salt cavern	Medium
Energy Merchants Gas Storage	Holehouse Farm	Cheshire	0.05	6	Salt cavern	Medium
Scottish Power	Hatfield Moor	South Yorkshire	0.10	2	Depleted field	Medium
Star Energy Ltd	Humbly Grove	Hampshire	0.30	7	Depleted field	Medium
Scottish and Southern Energy & Statoil	Aldbrough	East Yorkshire	0.10	10	Salt cavern	Medium

Pipeline	Owner	Between	Max flow rate (Million m^3/day)
Operational pipelines			
Imports			
Bacton-Zeebrugge Interconnector	Interconnector (UK) Limited	Zeebrugge and Bacton	72
BBL Pipeline	BBL Company	Balgzand and Bacton	41
Vesterled Pipeline	Gassco	Heimdal Riser Platform and St Fergus	36
Tampen Link	Gassco	Links Statfjord to FLAGS (terminating at St Fergus)	18
Gjøa/Vega Pipeline	Gassco	Links Gjøa/Vega to FLAGS (terminating at St Fergus)	17
Langeled Pipeline	Norsk Hydro	Nyhamna and Easington	74
Exports			
Bacton-Zeebrugge Interconnector	Interconnector (UK) Limited	Bacton and Zeebrugge	55
UK- Irish Gas Interconnector	Bord Gais	Moffat and Ireland	30

(1) Long range, medium range or short range storage. Status is determined both by capacity size and injection, deliverability and storage re-cycling rates.

(2) LNG Storage (a trading division of National Grid Gas) announced in May 2010 that it would no longer be offering commercial storage services at Glenmavis and Partington after May 2011.

4.5 Natural gas imports and exports (1)

GWh

	2006	2007	2008	2009	2010
Imports from:					
Belgium *(2)*	30,505	6,471	12,174	7,945	13,568
The Netherlands *(3)*	9,135	76,602	90,563	69,529	87,120
Norway *(4)*	157,035	225,764	283,722	260,438	276,807
Liquefied Natural Gas *(5)*	37,576	14,903	8,912	110,579	203,789
of which:					
Algeria	*20,718*	*6,605*	*3,113*	*19,392*	*11,524*
Australia	-	-	-	*812*	-
Egypt	*12,465*	*1,751*	-	*5,804*	*1,263*
Nigeria	-	-	-	-	*3,674*
Norway	-	-	-	*1,862*	*8,904*
Qatar	*779*	*2,693*	-	*61,159*	*159,984*
Trinidad & Tobago	*3,614*	*3,854*	*5,799*	*21,550*	*16,646*
Yemen	-	-	-	-	*1,794*
Total Imports	**234,251**	**323,740**	**395,371**	**448,491**	**581,284**
Exports to:					
Belgium *(2)*	60,195	51,390	45,949	62,084	95,932
The Netherlands *(6)*	3,371	6,358	10,389	13,094	15,830
Norway *(7)*	-	153	389	266	158
Republic of Ireland *(8)*	47,247	50,972	54,260	54,357	56,266
Total Exports	**110,813**	**108,873**	**110,987**	**129,801**	**168,186**
Net Imports *(9)*	**123,438**	**214,867**	**284,384**	**318,690**	**413,098**

(1) This table is also shown as Table G.6 of the Internet Annex G to the Digest.

(2) Physical flows of gas through the Bacton-Zeebrugge Interconnector. In tables 4.1 to 4.3 the commercial flows of gas through the pipeline are used. Commercial flows are the amounts of gas that companies requested be supplied through the pipeline. Net imports are the same whichever measurement is used.

(3) Via the Bacton-Balgzand (BBL) pipeline. Commissioned in November 2006.

(4) Currently via the Langeled and Vesterled pipelines, the Tampen Link (from Statfjord to FLAGS) and Gjoa/Vega (to FLAGS).

(5) From various sources to the Isle of Grain and Gasport Teesside.

(6) Direct exports from the Grove, Chiswick, Markham, Minke, Stamford and Windermere offshore gas fields using the Dutch offshore gas pipeline infrastructure.

(7) With effect from September 2007, UK gas from the Blane field to the Norwegian Ula field for injection into the Ula reservoir.

(8) Includes gas to the Isle of Man for which separate figures are not available.

(9) A negative figure means the UK was a net exporter of gas.

4.6 Liquefied Natural Gas imports by terminal

GWh

	2006	2007	2008	2009	2010
LNG Imports via:					
Dragon (*Milford Haven) (1)*	-		-	10,034	19,097
Isle of Grain (*Canvey Island*) *(2)*	37,576	14,861	8,912	50,483	59,770
South Hook (*Milford Haven*) *(3)*	-	-	-	49,249	124,922
Teesside GasPort (*Teesside*) *(4)*	-	42	-	813	-
	37,576	**14,903**	**8,912**	**110,579**	**203,789**

(1) Dragon began importing LNG to the UK in August 2009.

(2) LNG imports at the Isle of Grain commenced in 1965 but ceased in the early 1980's when, with increasing supplies from the North Sea, imports were no longer required. UK natural gas production peaked in 2000 and as a result of falling production LNG imports at the Isle of Grain recommenced in 2005.

(3) South Hook began importing LNG to the UK in April 2009.

(4) Teesside GasPort was commissioned with a small amount of gas in February 2007.

Chapter 5
Electricity

Key points

- UK electricity generation (including pumped storage) in the UK increased by 1.2 per cent, from 377 TWh in 2009 to 381 TWh in 2010. Total electricity supply (including net imports) increased by 1.1 per cent. (Table 5.1)
- Gas produced 46 per cent of generation in the UK in 2010, with the second highest annual total for gas fired generation (175 TWh). Coal's share increased from 27 to 28 per cent, with a large increase in generation in the second half of the year. Nuclear's share of overall generation fell from 18 per cent to 16 per cent, due to maintenance outages at several stations, including the largest station, Sizewell B, offline for six months. (Table 5.6)
- Renewables' share of generation increased from 6.7 per cent in 2009 to 6.8 per cent in 2010, with increases in offshore wind generation and co-firing countering falls in hydro and onshore wind. (Table 7B)
- Final consumption of electricity increased by 1.7 per cent, from 323 TWh to 328 TWh. Of this, industrial consumption increased by 3.6 per cent. (Table 5.1)
- Total UK Transmission Entry Capacity increased by six per cent, from 85 GW to 90 GW. This was mainly due to a 4.9 GW increase in CCGT capacity, with several new stations opening. (Table 5.7)
- The UK remained a net importer of electricity, with net imports contributing 0.7 per cent of electricity supply in 2010. (Table 5.1)

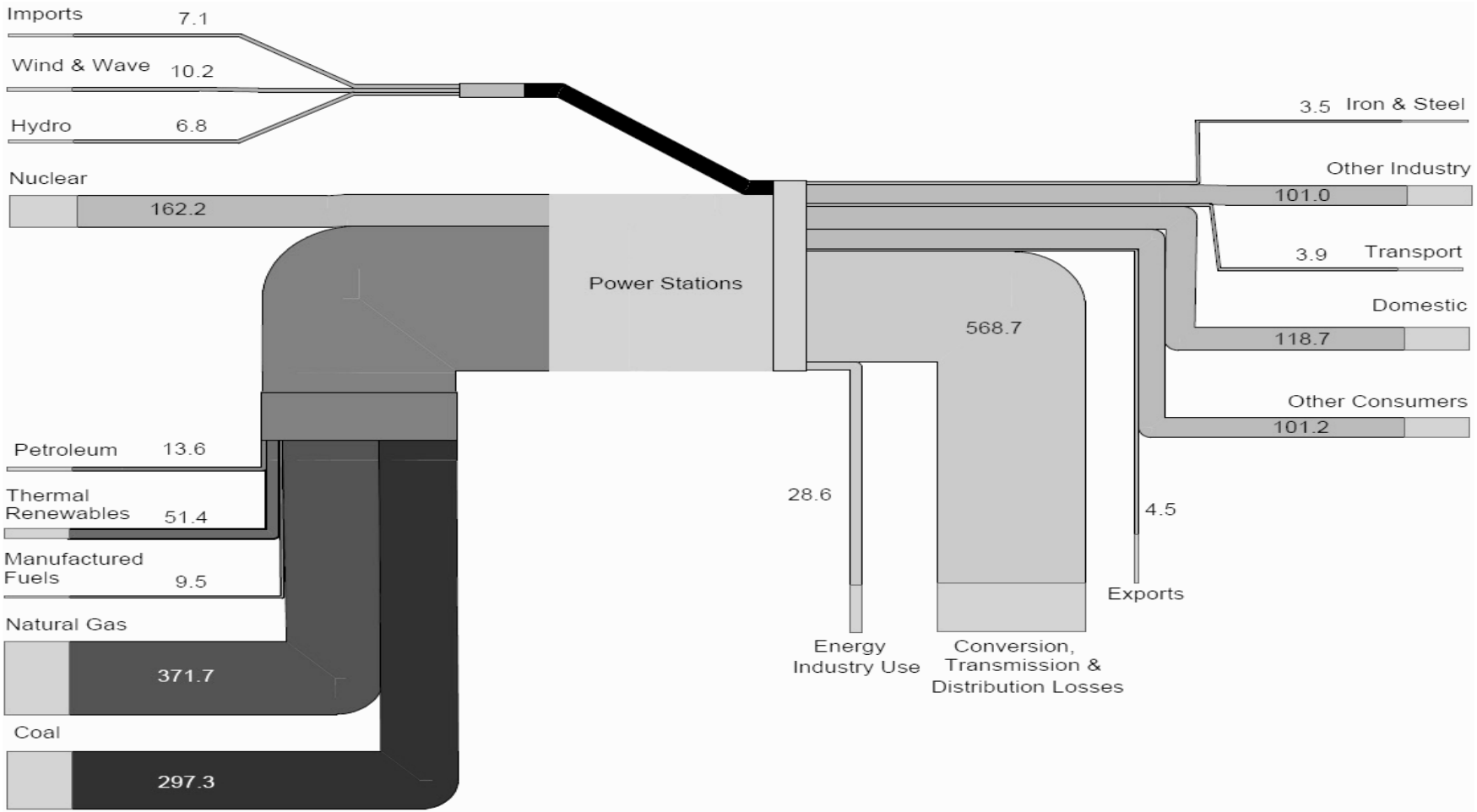
Introduction

5.1 This Chapter presents statistics on electricity from generation through to sales, and it includes statistics on generating capacity, fuel used for generation, load factors and efficiencies, and a map showing the transmission system in Great Britain and the location of the main power stations (page 129).

5.2 An energy flow chart for 2010, showing the flows of electricity from fuel inputs through to consumption, is included, overleaf. This is a way of simplifying the figures that can be found in the commodity balance tables. It illustrates the flow of primary fuels from the point at which they become available for the production of electricity (on the left) to the eventual final use of the electricity produced or imported (on the right) as well as the energy lost in conversion, transmission and distribution.

5.3 Commodity balances for electricity, for each of the last three years, form the introductory table (Table 5.1). The supply and consumption elements of the electricity balance are presented as a five-year time series in Table 5.2. Table 5.3 separates out the public distribution system for electricity from electricity generated and consumed by autogenerators and uses a commodity balance format. Fuels used to generate electricity in the UK in each of the last five years are covered in Table 5.4. Table 5.5 shows the relationship between the commodity balance definitions and traditional Digest definitions of electricity, so that the most recent data can be linked to the long term trends data, which can be found on DECC's energy statistics web site. Table 5.6 shows the relationship between fuels used, generation and supply in each of the latest five years. Tables on plant capacity (Tables 5.7, 5.8 and 5.9) and on plant loads and efficiency (Table 5.10) have been included. Two of these contain data at a sub-national level. Table 5.11 lists individual power stations in operation and is supplemented by a table showing large scale Combined Heat and Power (CHP) schemes in the UK (Table 5.12). The long term trends commentary and tables on fuel use, generation, supply and consumption back to 1970 are to be found on DECC's energy statistics web site:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Electricity flow chart 2010 (TWh)



Notes:
This flow chart is based on the data in Tables 5.1 (for imports, exports, use, losses and consumption) and 5.6 (fuel used).
(1) Solar photovoltaics included under wind & wave.
(2) Hydro includes generation from pumped storage while electricity used in pumping is included under Energy Industry Use.

Commodity balances for electricity (Tables 5.1 and 5.2)

5.4 In 2010, total electricity supply was 384 TWh, an increase of 1.1 per cent on 2009, which was the lowest level since 1998. Of this, just over 99 per cent of UK electricity supply was home produced and just under 1 per cent was from imports net of exports. For electricity, supply is totally driven by demand - with a recovering economy and a cold final quarter, supply increased in 2010. The recession in 2009, along with energy efficiency measures and weather factors, had caused a 5.0 per cent fall in supply, compared with 2008. Prior to this, 2005 to 2007 had all shown falls in supply, after continuous growth since 1997. The table below summarises the trend in total generation and supply over the last three years.

GWh

	2008	2009	2010
Total Generation (excl. pumped storage)	384,604	373,055	377,977
Total Supply	399,715	379,601	383,791

5.5 In 2010, indigenous production rose by 1.3 per cent on 2009's level, which was the lowest since 1999. Of the 378 TWh produced (excluding pumped storage production), 91 per cent was from major power producers and 9 per cent from other generators, while 20 per cent was from primary sources (including nuclear, wind and hydro) and 80 per cent from secondary sources (including coal, gas and oil).

5.6 Net imports in 2010 fell by 6.9 per cent on 2009. Whilst imports rose by 8.1 per cent, exports rose by 20 per cent. This followed a fall in net imports in 2009 to its lowest level since 2003, due to imports falling to almost half of 2008's level and exports almost trebling. In 2008, net imports reached an eight-year record high. In 2010, there was a 10 per cent fall in net imports from continental Europe, which accounted for 98 per cent of imports to the UK. A 37 per cent fall in net exports to the Republic of Ireland was also seen, which accounted for 8 per cent of UK exports in 2009[1].

5.7 Electricity generated by each type of fuel is also shown on the second page of Table 5.1. The link between electricity generated and electricity supplied is made in Table 5.6, and is discussed further in paragraphs 5.25 to 5.32.

5.8 Overall demand rose by 1.0 per cent, from 379 TWh in 2009 to 384 TWh in 2010[2]. Of total demand, 29 TWh (7 per cent) was used within the energy industry, 27 TWh (7 per cent) was accounted for by losses, and 328 TWh (85 per cent) was final consumption, which grew by 1.7 per cent on 2009.

5.9 Domestic consumption rose by 0.1 per cent in 2010, from 118 TWh to 119 TWh, after four successive years' falls, with energy efficiency improvements being offset by increased demand in the particularly cold final quarter of the year. Commercial sector consumption also rose, by 3.0 per cent, from the five year low level seen in 2009, while agriculture consumption rose by 6.0 per cent. Public administration consumption, meanwhile, fell by 3.4 per cent on 2009's previous record low level.

5.10 With the economic climate improving after 2009's recession, industrial consumption of electricity increased by 3.6 per cent in 2010 to 104 TWh, after a 12 per cent fall in 2009 led to consumption at its lowest level, 101 TWh, in at least the last decade. However, consumption in the iron and steel industry continued to fall, by 4.3 per cent to a new low of 3.5 TWh, after falling by 23 per cent in 2009 alone as the industry was hit severely by the recession.

5.11 In the 2011 Digest, the Transport category is now solely consumption used in traction, i.e. in Rail (including metro systems) and Road (light electric vehicles and cars), although electricity usage by electric vehicles is currently low. Non-traction transport, for example that used at airports and railway

[1] An analysis of electricity flows across Europe was carried out by BERR in 2007 using data published by the International Energy Agency and Eurostat. This was published in *Energy Trends*, March 2008, available at: www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx

[2] The term statistical difference is used to define the difference between total supply and total demand. – see paragraph 5.89

stations, from 2004, is included under Commercial consumption. Consumption by transport in 2010 was 0.2 per cent lower than in 2009, with virtually all consumed by Rail. This methodological change has been backdated to 2004.

5.12 Industrial consumption was 27 per cent of total demand for electricity, less than the consumption by households (31 per cent), with transport and the services sector accounting for 27 per cent. Within the industrial sector, the three largest consuming industries are chemicals, paper and food, which together account for 39 per cent of industrial consumption. Taken together, the engineering industries accounted for a further 14 per cent of industrial consumption of electricity. The iron and steel sector is also a substantial user of electricity but part of its consumption is included against blast furnaces and coke ovens under energy industry uses. A note on the estimates included within these figures is to be found in paragraph 5.86. Chart 5.1 shows diagrammatically the total demand for electricity in 2010.

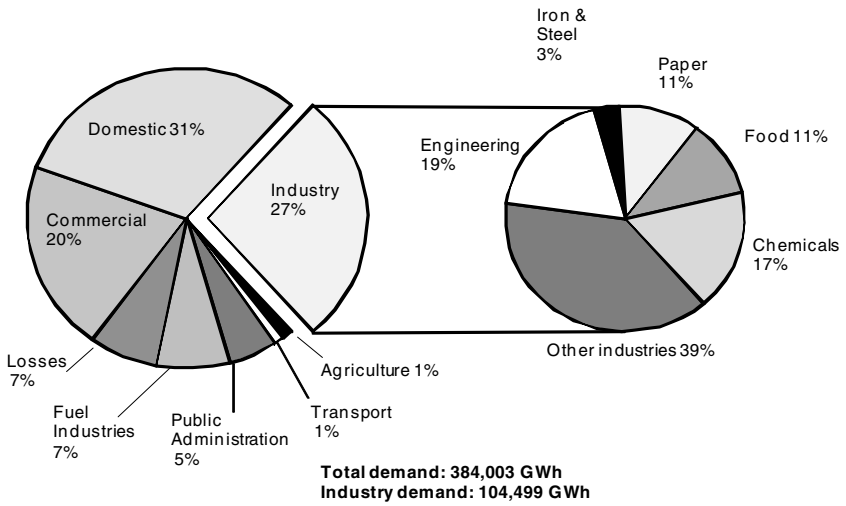
5.13 Energy industry use as a proportion of total demand, at 7.5 per cent, was slightly lower than in 2009 (7.8 per cent), as consumption fell by 3.3 per cent, to its lowest level in at least the last decade. The electricity industry itself uses 55 per cent of the energy industries' total use of electricity. This does not include the 15 per cent of energy industry use accounted for by pumping at pumped storage stations (see 'pumped storage' line in tables 5.1 and 5.2). Petroleum refineries are the next most significant consumer with 17 per cent of energy industry use.

5.14 Losses as a proportion of electricity demand in 2010, at 7.0 per cent, were slightly lower than in 2009 (7.1 per cent). The losses item has three components:

- transmission losses from the high voltage transmission system, which represented about 22 per cent of the figure in 2010;
- distribution losses, which occur between the gateways to the public supply system's network and the customers' meters, and accounted for about 74 per cent of losses; and
- theft or meter fraud (around 4 per cent).

5.15 Temperatures influence the actual level of consumption in any one year in the winter months, as customers adjust heating levels in their homes and businesses. The last three years have all seen drops in temperatures across the year, and particularly in one or both of the winter quarters. 2010 as a whole was 1.1 degrees cooler on average than 2009. Furthermore, 2010 saw the coldest December on record, with average temperatures in the final quarter as a whole 2.5 degrees lower than in 2009 quarter 4, and the first quarter also colder than a year earlier, by 1.4 degrees. In 2009, whilst the first quarter was also 1.1 degree colder than a year earlier (and the coldest since 2001), the average temperature across the year was much the same as for 2008. 2008 was itself the coldest year since 1996 and also had the coldest final quarter since 1993.

Chart 5.1: Electricity demand by sector 2010



Commodity balances for the public distribution system and for other generators (Table 5.3)

5.16 Table 5.3 expands on the commodity balance format to show consumption divided between electricity distributed over the public distribution system and electricity provided by other generators (largely autogeneration and generation from renewable sources). Further information on the definitions of other generators and major power producers (MPPs) can be found in paragraph 5.66. Table 5.3 also expands the domestic sector to show consumption by payment type, and the commercial sector, to show detailed data beyond that presented in Tables 5.1 and 5.2.

5.17 The proportion of electricity supplied by generators other than MPPs fell from 9.0 per cent in 2009 to 8.7 per cent in 2010. Of electricity supplied by other generators, 45 per cent was transferred to the public distribution system in 2010, a decrease of around 3 percentage points on 2009.

5.18 In 2010, 4.0 per cent of final consumption of electricity was by other generators and did not pass over the public distribution system. This was much the same proportion as in 2009. A substantial proportion of electricity used in the energy industries is self-generated (between 17 and 19 per cent in all three years shown in the table). At petroleum refineries the proportion is even higher and in 2010, 72 per cent of electricity was self-generated.

5.19 In 2010, 9.4 per cent of the industrial demand for electricity was met by autogeneration, around the same as the previous year. Table 1.9 in Chapter 1 shows the fuels used by autogenerators to generate this electricity within each major sector and also the quantities of electricity generated and consumed.

5.20 Within the domestic sector, the amount of electricity consumed, reported as being purchased under some form of off-peak pricing structure (eg Economy 7) was 22 per cent in 2010, the same as the previous year, and one percentage point lower than in 2008. Fifteen per cent of consumption was through prepayment systems, one percentage point higher than 2009, and about the same proportion as in 2008.

5.21 As noted in paragraph 5.11, in the 2011 Digest, the Transport category now shows only consumption used in traction, split by that used by Rail and Road vehicles. In table 5.3, non-traction transport consumption, is now shown under a new category, 'Transport Services', under the Commercial heading. This change has been backdated to 2004.

Electricity fuel use, generation and supply (Tables 5.4 & 5.6)

5.22 In Table 5.4, fuel used by electricity generators is measured in both original units and, for comparative purposes, in the common unit of million tonnes of oil equivalent. In Table 5.6, figures are quoted in a third unit, namely GWh, in order to show the link between fuel use and electricity generated[3].

5.23 A historical series of fuel used in generation on a consistent, energy supplied, fuel input basis is available at Table 5.1.1 on DECC's energy statistics web site and accessible from the Digest of UK Energy Statistics home page:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

5.24 The main data on generation and supply in Table 5.6 are presented by type of fuel. There also remains an interest in the type of station and so the final part of the table shows generation from conventional steam stations and from combined cycle gas turbine stations over the most recent five years.

5.25 Total electricity generated (including pumped storage) in the United Kingdom in 2010 was 381 TWh, 1.2 per cent higher than generation in 2009. Major power producers (MPPs, as defined in paragraph 5.66) accounted for 91 per cent of electricity generation in 2010. Generation by MPPs was

[3] Conversion factors for switching between mtoe, GWh and other units of energy can be found on page 229 and inside back cover flap.

up 1.5 per cent on 2009, at 348 TWh, while by other generators was 2.4 per cent down on a year earlier, at 33 TWh.

5.26 At 108 TWh, generation from coal was 4.5 per cent higher in 2010 than 2009's record low level, assisted by high demand for electricity in the final quarter.

5.27 In the 2011 Digest, generation from petroleum coke has been included in the oil generation figures. This was previously included within the generation figures for coal, with which petroleum coke is co-fired, and has been since 2006. In 2010, largely due to a reduction in the amount of petroleum coke used in coal power stations, generation from oil fell by 20 per cent, to 4,860 GWh, from 6,042 GWh in 2009.

5.28 At 175 TWh, generation from gas in 2010 was 5.1 per cent higher than 2009's level of 166 TWh, and just shy of 2008's record high level of 176 TWh. Due to maintenance outages, particularly to Sizewell B, the largest nuclear station, which was offline for six months, generation from nuclear sources fell by 10 per cent, from 69 TWh in 2009 to 62 TWh in 2010.

5.29 Generation by all renewable sources[4] rose 2.3 per cent (to 27 TWh) between 2009 and 2010. Generation from thermal renewables and wastes rose 12 per cent to 13 TWh. Despite low wind speeds in 2010 causing a fall in onshore generation, increased offshore generation meant overall wind generation [5] increased by 9.6 per cent to 10 TWh. With very low rainfall in 2010, however, hydro generation fell by 32 per cent, from 5.3 TWh to 3.6 TWh. More information on renewable electricity can be found in chapter 7.

5.30 Table 5.6 also shows electricity supplied data, which deducts stations' own use of electricity from its generation. These data take into account the fact that some stations use relatively more electricity than others in the generation process itself. In total, gross electricity supplied in 2010 was 1.4 per cent more than in 2009, at 365 TWh. For gas-fired stations it was 5.1 per cent more, for coal it was 4.6 per cent more, while for nuclear stations it was 10 per cent less.

5.31 Chart 5.2 shows the shares of net electricity supplied (including net imports)[6], by fuel input, on an output basis (ie the percentage of electricity supplied by the fuel), for 2010, compared with 2009. Further information on this, and the alternative, input basis, of comparing fuel use, can be found in paragraphs 5.74 to 5.75

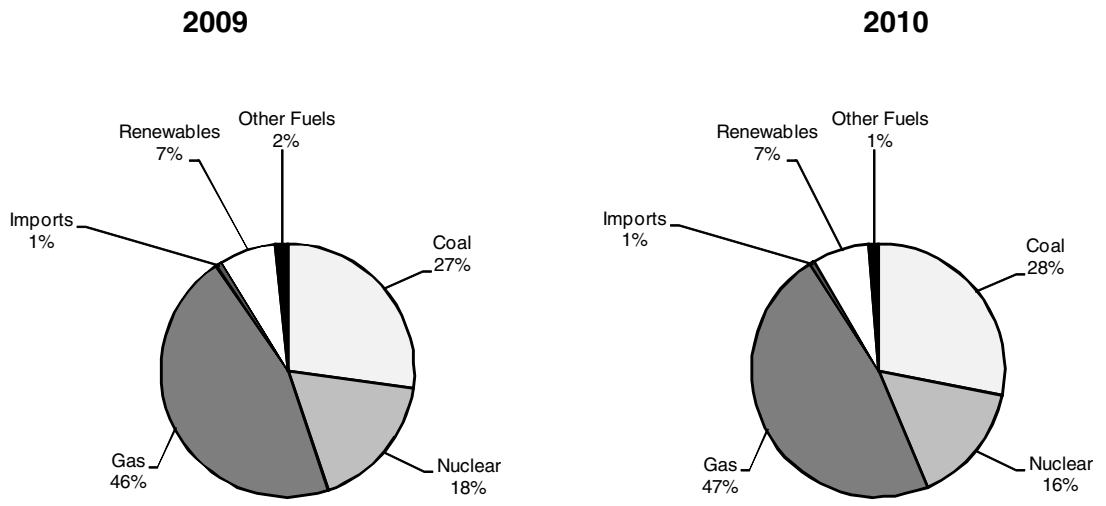
5.32 Gas's share of net electricity supplied plus imports in 2010, at 47 per cent, was 1 percentage point higher than in 2009, and a record high. Coal's share at 28 per cent was 1 percentage point more than in 2009, and 3 percentage points lower than in 2008. Nuclear's 16 per cent share in 2010 was 2 percentage points lower than in 2009, after 2008's 27 year record low of 13 per cent (due to maintenance work and outages). Renewables' share[4] in 2010 remained at 7 per cent. Of this, wind's share was 3 per cent, the same as for 2009. Other fuels, including oil and net pumped storage, fell from 2 per cent in 2009 to 1 per cent in 2010, while net imports' share remained at 1 per cent.

[4] Renewables includes wind, natural flow hydro and thermal renewables. Thermal renewables also includes non-biodegradable wastes, not considered a renewable source

[5] Including generation from wave, tidal and solar photovoltaics

[6] Net electricity supplied is gross electricity supplied minus electricity used in pumping

Chart 5.2: Shares of net electricity supplied, by fuel input



Relating measurements of supply, consumption and availability (Table 5.5)

5.33 Table 5.5 shows the relationship between these terms for the latest five years. For the full definitions of the terms used in the commodity balances see the Annex A, paragraphs A.7 to A.42.

Plant capacity (Tables 5.7, 5.8 and 5.9)

5.34 Table 5.7 shows capacity, ie the maximum power available at any one time, for major power producers and other generators by type of plant.

5.35 From 2006 onwards, major power producers (MPPs) capacities are measured in Transmission Entry Capacity (TEC) terms, rather than Declared Net Capacity (DNC) [7]. The effect of this change has been to increase the capacity of MPPs by about 2,000 GW in total with the majority of fossil fuel stations increasing their capacity under the TEC measurement but some decreasing.

5.36 In 2010, there was an increase of 5,522 MW (7.1 per cent) in the capacity of MPPs to 83,197 MW. The main contributory factors were an increase of 4,940 MW of Combined Cycle Gas Turbine (CCGT) capacity, as a result of the opening of five new stations. After an increase of 208 MW in 2009, as many new sites opened, wind capacity increased by a further 571 MW, largely due to several new sites opening, including the largest offshore wind farm, Thanet. However, it was also due to the reclassification of over 100 MW of wind capacity from other generators to MPPs. In December 2010, MPPs accounted for 92 per cent of the total generating capacity, the same proportion as at the end of the previous two years. The capacity of other generators fell by 80 MW (1.1 per cent), with a 200 MW increase in capacity from renewables other than hydro and wind [8] offset by falls in conventional steam, CCGT and, particularly, wind capacity (due to the reclassification). Total capacity increased by 6.4 per cent, from 84,766 MW to 90,208 MW.

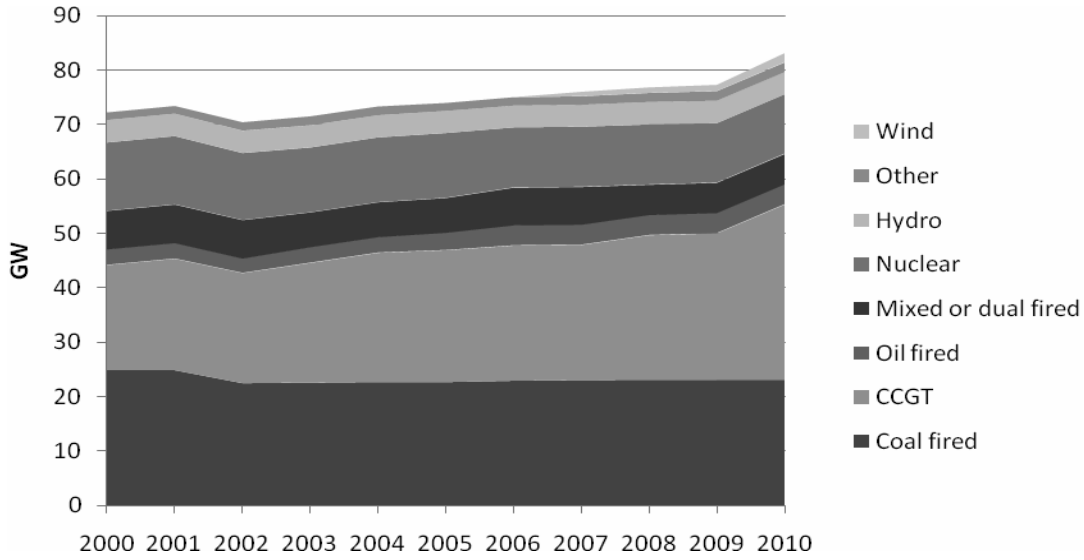
5.37 A breakdown of the capacity of the MPPs' plants at the end of December each year from 2000 to 2010 is shown in Chart 5.3.

[7] A full definition of TEC and DNC is given in paragraph 5.79. Renewables installed capacity figures are given in table 7.4. Wind (and small scale hydro) DNC is de-rated to take into account intermittency.

[8] Approximately 50 MW of this increase is due to solar photovoltaic capacity installed under the Feed in Tariff (FiT) scheme. For further information on FiTs, see paragraph 7.13.

5.38 Table 5.8 separates the capacities of MPPs geographically to show England and Wales, Scotland and Northern Ireland. In 2010, 85 per cent of the generating capacity in the UK owned by MPPs was in England and Wales, 12 per cent was in Scotland and 3 per cent in Northern Ireland. Out of the net increase in UK capacity of 5,522 MW in 2010, 5,604 MW was in England and Wales, with Scotland showing a net decrease of 125 MW due to a reduction in capacity at a major CCGT station offsetting a 224 MW increase in wind capacity. Northern Ireland's capacity increased by 43 MW, from 2,387 MW to 2,430 MW.

Chart 5.3: Generating capacity of major power producers 2000-2010



(1) 'Other' includes: Gas turbines, oil engines and renewables other than hydro.
(2) 'Hydro' includes Natural flow and pumped storage.
(3) 'Mixed or dual fired' includes non-CCGT stations that can be fuelled by a combination of gas, coal and oil
(4) Wind included from 2007

5.39 In Table 5.9, data for the generating capacity of industrial, commercial and transport undertakings are shown, according to the industrial classification of the generator. Schemes are classified according to the sector that receives the majority of the heat (as opposed to the sector in which the CHP operator was considered to operate). In 2010, 15 per cent of the capacity was in the chemicals sector. Oil and gas terminals and oil refineries had 14 per cent of capacity, engineering and other metal trades had a 9 per cent share and paper, printing and publishing had a 7 per cent share. In 2010, 45 per cent of capacity was outside the industrial sector. The total capacity of 'Other Generators' fell in 2007 as the capacity of major wind farm operators are now included under MPPs (see paragraph 5.68). In 2008, Shotton CHP plant was re-classified as a MPP as the electricity generated is now exported to the grid rather than for use in the nearby paper mill. This change in classification led to a fall in capacity in the paper, printing and publishing sector.

Plant loads, demand and efficiency (Table 5.10)

5.40 Table 5.10 shows the maximum load met each year, load factors (by type of plant and for the system in total) and indicators of thermal efficiency. Maximum demand figures cover the winter period ending the following March. With the advent of BETTA (see paragraph 5.53), England, Wales and Scotland are covered by a single network and a single maximum load is shown for Great Britain for 2006 to 2010.

5.41 Maximum demand in the UK during the winter of 2010/2011 occurred on 7 December 2010. At 60,893 MW, this was 1.1 per cent higher than the previous winter's maximum on 7 January 2010. In 2010/11, the maximum load in Great Britain occurred on 7 December 2010 at the half hour period ending 17:30 (59,130 MW). However, in Northern Ireland the maximum load occurred on 22 December 2010 at the period ending 18:00 (1,777 MW), which was 3.3 per cent above that of the previous winter. In Great Britain the highest ever load met was 60,118 MW on 10 December 2002.

5.42 Maximum demand in 2010/2011 was 73 per cent of the UK capacity of major power producers (MPPs) (as shown in Table 5.7) as measured at the end of December 2010, down from 78 per cent in 2008/2009.

5.43 In Great Britain, maximum demand in December 2010 was 73 per cent of the England, Wales and Scotland capacity of MPPs (Table 5.8) compared with 78 per cent for winter 2009/10. For Northern Ireland, the proportion was 73 per cent (72 per cent in 2009/10). These percentages do not include the capacities available via the interconnectors with neighbouring grid systems nor demand for electricity via these interconnectors.

5.44 Plant load factors measure how intensively each type of plant has been used. The load factor of nuclear stations in 2010 at 59.4 per cent was 6.2 percentage points lower than in 2009, due to maintenance outages at several stations, and 20.7 percentage points below the peak load factor of 80.1 per cent in 1998. Despite generation approaching 2008's levels, a large increase in capacity in 2010 resulted in the CCGT load factor falling by 2.6 percentage points, from 63.1 per cent in 2009, to 60.6 per cent. In 2009, the CCGT load factor had also fallen, by 6.6 percentage points from 2008's eight-year high of 69.7 per cent, partly due to lower electricity demand, coupled with a small increase in capacity. With the implementation of the Large Combustion Plant Directive, as well as higher prices relative to gas, restricting their use, coal fired stations' load factor fell continuously between 2006 and 2009. However, increased generation in 2010, mainly as a result of high demand in the second half of the year, saw a 1.7 percentage point increase in the load factor, to 40.9 per cent, from 39.3 per cent in 2009.

5.45 Load factors for natural flow hydro and wind (as well as other renewables) can be found in table 7.4, since these use the installed capacity measure, which has not been de-rated. Very low wind speeds in 2010 resulted in reduced generation from onshore wind, despite an increase in capacity, which resulted in a 5.7 percentage point fall in the onshore wind load factor, from 27.4 per cent in 2009 to 21.7 per cent in 2010.[9] The very dry year of 2010 also saw much lower use of hydro plant, with the load factor falling to a recent low of 22.1 per cent. This followed falls in the load factor, on account of less rain (and an increase in capacity in 2008), in both 2008 and 2009. The wet year of 2007 saw a greater use of large scale hydro plant, with hydro's load factor the highest since 2000. Pumped storage use is less affected by the dry weather and high electricity prices encouraged its use from 2006 to 2008. However, 2009 and 2010 both saw load factors fall back from 2008's peak, as peak time demand for electricity and lower prices deterred its use.

5.46 Thermal efficiency measures the efficiency with which the heat energy in fuel is converted into electrical energy. An increase in new, more efficient, CCGT capacity in 2010 resulted in an increase to the overall thermal efficiency of these stations of one percentage point, to a record high of 47.6 per cent. Prior to this, with little new capacity coming online, it had remained between 45.5 and 47.2 per cent. Since the closure of older, less efficient stations in 2006, the efficiency of nuclear stations has been increasing, with 2009 showing the highest efficiency yet, of 39.0 per cent. However, in 2010, as was the case in 2008, maintenance outages have counteracted these efficiency gains, with the efficiency falling to 38.3 per cent. The efficiencies presented in this table are calculated using **gross** calorific values to obtain the energy content of the fuel inputs. [10]

Power stations in the United Kingdom (Tables 5.11 and 5.12)

5.47 Table 5.11 lists the operational power stations in the United Kingdom as at the end of May 2011 along with their installed capacity and the year they began to generate electricity. Where a company operates several stations they are grouped together. In general, the table aims to list all stations of 1 MW installed capacity or over.

5.48 Table 5.12 shows CHP schemes of 1 MW and over for which the information is publicly available, but it is the total power output of these stations that is given, not just that which is classed as good quality CHP under the CHP Quality Assurance programme (CHPQA, see Chapter 6), since CHPQA information for individual sites is not publicly available.

[9] For renewables load factors, including the unchanged configuration measure for wind, see table 7.4

[10] For more information on gross and net calorific values, see paragraph 5.81

5.49 In Table 5.11, generating stations using renewable sources are also listed in aggregate form in the "Other power stations" section apart from hydro stations and wind farms operated by the major power producers, which appear in the main table. For completeness, CHP stations not appearing in the main table are also listed in aggregate in this section. Details of the interconnectors between England and France, England and the Netherlands, Scotland and Northern Ireland, and Northern Ireland and the Irish Republic, are also given in this table. The total installed capacity of all the power stations individually listed in Table 5.11 is 84,986 MW.

Carbon dioxide emissions from power stations

5.50 It is estimated that carbon dioxide emissions from power stations accounted for 32 per cent of the UK's total carbon dioxide emissions in 2010. Emissions vary by type of fuel used to generate the electricity and emission estimates for all electricity generation for 2008 to 2010 are shown in Table 5A below.

Table 5A: Estimated carbon dioxide emissions from electricity generation 2008 to 2010

Fuel	Emissions (tonnes of carbon dioxide per GWh electricity supplied)		
	2008	2009	2010
Coal	910	908	909
Oil	651	653	653
Gas	401	402	398
All fossil fuels	607	593	590
All fuels (including nuclear and renewables)	495	448	458

Sub-national electricity data

5.51 The collection of data relating to regional and local consumption of electricity began in 2004. For details of the availability of local level electricity (and gas) data see Chapter 4, paragraph 4.33 and the sub-national statistics pages of the DECC energy statistics web site: www.decc.gov.uk/en/content/cms/statistics/regional/regional.aspx. A summary of electricity consumption at regional level is given in Table 5B and relates to 2009. The regional data will not sum exactly to the figures given in table 5.5 as the regional data are not based exactly on a calendar year and are obtained via different data sources.

Table 5B: Electricity sales 2009

	Domestic sector sales (GWh)	Number of domestic customers (thousand) *(1)*	Industrial and commercial sector sales (GWh)	Number of I & C customers (thousand) *(1)*	All consumers sales (GWh)
Greater London	13,371	3,358	27,710	403	41,081
South East	16,442	3,672	23,305	331	39,747
North West	12,511	3,117	19,930	233	32,442
Scotland	11,401	2,723	15,610	214	27,011
East of England	11,220	2,516	15,736	213	26,956
West Midlands	9,858	2,353	14,766	193	24,624
South West	10,664	2,398	14,241	246	24,904
Yorkshire and the Humber	8,934	2,321	15,438	176	24,372
East Midlands	8,027	1,964	13,158	154	21,185
Wales	5,322	1,361	10,398	124	15,720
North East	4,241	1,187	7,793	81	12,034
Unallocated Consumption	74	18	2,494	11	2,567
Sales direct from high voltage lines *(2)*					4,900
Great Britain	112,064	26,987	180,578	2,378	292,642
Northern Ireland *(3)*					7,855
Total					305,398

(1) Figures are the number of Meter Point Administration Numbers (MPANs); every metering point has this unique reference number.
(2) Based on estimate provided by Ofgem.
(3) Northern Ireland data are based on data for electricity distributed provided by Northern Ireland Electricity

5.52 Since May 1999, all of the domestic electricity market in Great Britain has been open to competition. By December 2010, 15.5 million electricity consumers (59 per cent) were no longer with their home supplier. Table 5C gives market penetration in the fourth quarter of 2010, showing that by the end of 2010, the home suppliers (i.e. the former regional electricity companies) had lost 52 per cent of the credit, 65 per cent of the direct debit, and 56 per cent of the prepayment market. However, as Table 5C shows there is considerable regional variation with much higher retention in Northern Scotland and South Wales.

Table 5C: Domestic electricity market penetration (in terms of percentage of customers supplied) by Public Electricity Supply area and payment type, fourth quarter of 2010

	Home Supplier			Non-Home Supplier		
Region	Credit	Direct Debit	Prepayment	Credit	Direct Debit	Prepayment
North West	42	26	31	58	74	69
East Midlands	44	31	35	56	69	65
West Midlands	39	28	32	61	72	68
Merseyside and North Wales	43	34	49	57	66	51
Eastern	46	32	31	54	68	69
Yorkshire	39	29	31	61	71	69
North East	40	31	26	60	69	74
South East	47	31	43	53	69	57
London	51	37	50	49	63	50
Southern Scotland	45	41	63	55	59	37
South West	54	32	50	46	68	50
Southern	64	47	55	36	53	45
South Wales	69	56	80	31	44	20
Northern Scotland	82	65	69	18	35	31
Great Britain	48	35	44	52	65	56

Structure of the industry

5.53 Up to March 2005 the electricity industries of Scotland, Northern Ireland and England and Wales operated independently although interconnectors joined all three grid systems together. From April 2005 under the British Electricity Trading and Transmission Arrangements (BETTA), introduced in the Energy Act 2004, the electricity systems of England and Wales and Scotland have been integrated. The paragraphs below describe the position up to March 2005 but indicate the further changes that have been made under BETTA.

5.54 From the period immediately after privatisation of the industry in 1990, when there were seven generating companies in England and Wales and 12 Regional Electricity Companies distributing and supplying electricity to customers in their designated area, there were many structural and business changes and residual flotations. At the end of 2010, there were 30 major power producers operating in Great Britain [11]. Competition developed in mainland Britain as follows:

(a) From 1 April 1990, customers with peak loads of more than 1 MW (about 45 per cent of the non-domestic market) were able to choose their supplier;

(b) From 1 April 1994, customers with peak loads of more than 100 kW were able to choose their supplier;

(c) Between September 1998 and May 1999, the remaining part of the electricity market (ie below 100 kW peak load) was opened up to competition. Paragraph 5.52 and Table 5C give more details of the opening up of the domestic gas and electricity markets to competition.

[11] Some of these producers are joint ventures and so the number of generating companies involved is less than 30.

5.55 Since the late 1990s, there have been commercial moves toward vertical re-integration between generating, electricity distribution and/or electricity supply businesses. Those mergers that have taken place were approved by the relevant competition authority. Initially the National Grid Company was owned by the 12 privatised regional electricity companies, but was floated on the Stock Exchange in 1995. National Grid (and its predecessors since 1990) has owned and operated the high voltage transmission system in England and Wales linking generators to distributors and some large customers. This transmission system is linked to that of continental Europe via an interconnector to France under the English Channel and, since 1 April 2011, to the Netherlands under the North Sea (see Table 5.11). Up to March 2005, the Scottish transmission system was regarded as being linked to that in England and Wales by two interconnectors but under BETTA National Grid also took on responsibility for operating the system in Scotland, to form a single Great Britain transmission network.

5.56 In Scotland, until the end of March 2005, the two main companies, Scottish Power and Scottish and Southern Energy, covered the full range of electricity provision. They operated generation, transmission, distribution and supply businesses. In addition, there were a number of small independent hydro stations and some independent generators operating fossil-fuelled stations, which sold their output to Scottish Power and Scottish and Southern Energy.

5.57 The electricity supply industry in Northern Ireland has been in private ownership since 1993 with Northern Ireland Electricity plc (NIE) (part of the Viridian Group) responsible for power procurement, transmission, distribution and supply in the Province. Generation is provided by three private sector companies who own the four major power stations. In December 2001, the link between Northern Ireland's grid and that of Scotland was inaugurated. A link between the Northern Ireland grid and that of the Irish Republic was re-established in 1996, along which electricity is both imported and exported. However, on 1 November 2007 the two grids were fully integrated and a joint body SEMO (Single Electricity Market Operator) was set up by SONI (System Operator for Northern Ireland) and Eirgrid from the Republic to oversee the new single market.

5.58 In March 2001, the means of trading electricity changed with the introduction in England and Wales of the New Electricity Trading Arrangements (NETA). This replaced the Electricity Pool of England and Wales. These arrangements were based on bi-lateral trading between generators, suppliers, traders and customers. They were designed to be more efficient and provide greater choice for market participants, whilst maintaining the operation of a secure and reliable electricity system. The system included forwards and futures markets, a balancing mechanism to enable National Grid, as system operator, to balance the system, and a settlement process. In April 2005 this system was extended to Scotland under BETTA.

Comparisons of electricity in the European Union[12]

5.59 The European Union (EU) as a whole generated 3,374 TWh of electricity in 2008. Of this, 12 per cent was generated in the UK. Germany generated the largest share of electricity in the EU, with 19 per cent. Industry had 40 per cent of EU final electricity consumption, and households 29 per cent.

5.60 In 2008, the largest source of the EU's generation was Nuclear, with 28 per cent of total generation. Coal had a 27 per cent share, and gas 23 per cent. France sources the largest share of its generation from nuclear, with 76 per cent, while 43 per cent of Sweden's electricity is from nuclear. The largest shares of coal in the generation mix are in Denmark, with 48 per cent, and Germany, with 43 per cent. Italy and Spain source most of their electricity from gas, with 54 per cent and 39 per cent of generation respectively.

5.61 Renewables represented 17 per cent of the EU's generation. Sweden sources 55 per cent of its electricity from renewables (mainly hydro). Denmark's 30 per cent renewables share comes from wind (19 per cent) and biomass (11 per cent), the highest share of generation from wind in the EU. Italy and Spain had 19 per cent renewables shares, with Germany and France 14 per cent and 13 per cent.

5.62 France's exports, net of imports, were 8 per cent of its generation in 2008. Italy, however, net imported 13 per cent of its electricity requirements.

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[12] At the time of writing, the latest available data were for 2008. Data from Eurostat, at: http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/introduction

The Electricity Supply System in Great Britain in 2010

This map has been adapted from a map provided by Reed Business Publishing and National Grid; it is available in colour on the DECC energy website. Wind farms are now shown on the map in the Renewables Chapter (Page 196 of Chapter 7).

Technical notes and definitions

5.63 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.28 to 1.62. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A, paragraphs A.7 to A.42. While the data in the printed and bound copy of this Digest cover only the most recent 5 years, these notes also cover data for earlier years that are available on the DECC energy statistics web site.

Electricity generation from renewable sources

5.64 Figures on electricity generation from renewable energy sources are included in the tables in this section. Further detailed information on renewable energy sources is included in Chapter 7.

Combined heat and power

5.65 Electricity generated from combined heat and power (CHP) schemes, CHP generating capacities and fuel used for electricity generation are included in the tables in this chapter. However, more detailed analyses of CHP schemes are set out in Chapter 6.

Generating companies

5.66 Following the restructuring of the electricity supply industry in 1990, the term "Major generating companies" was introduced into the electricity tables to describe the activities of the former nationalised industries and distinguish them from those of autogenerators and new independent companies set up to generate electricity. The activities of the autogenerators and the independent companies were classified under the heading "Other generating companies". In the 1994 Digest, a new terminology was adopted to encompass the new independent producers, who were then beginning to make a significant contribution to electricity supply. Under this terminology, all companies whose prime purpose is the generation of electricity are included under the heading "Major power producers" (or MPPs). The term "Other generators" ("Autogenerators" in the balance tables) is restricted to companies who produce electricity as part of their manufacturing or other commercial activities, but whose main business is not electricity generation. "Other generators" also covers generation by energy services companies at power stations on an industrial or commercial site where the main purpose is the supply of electricity to that site, even if the energy service company is a subsidiary of a MPP.

5.67 The definition of MPPs was amended in 2008 to include major wind farm companies, but this change only applies to data for 2007 onwards. Most generators of electricity from renewable sources (apart from large scale hydro, large scale wind and some biofuels) are also included as "Other generators" because of their comparatively small size, even though their main activity is electricity generation.

5.68 Major wind farm operators have been included under MPPs, for 2007 onwards, in the monthly, quarterly, and annual tables of electricity statistics produced by DECC. Until then, all generation using wind turbines was excluded from the MPP classification. This was because originally such generation was by small independent companies and collecting data on a monthly basis was prohibitively costly and unnecessarily burdensome on such companies.

5.69 Generation from wind has now become more concentrated in the hands of larger companies and DECC has extended its system of monthly data collection to cover the largest wind power companies. The intention is that, in future, any company whose wind generation capacity increases to above 50 MW will be asked to provide monthly data for generation from wind and thus be included in the list of MPPs.

5.70 The inclusion of major wind farm operators under MPPs affects the majority of the electricity tables in DUKES, with figures for MPPs and the public distribution system increased, and other generators reduced for 2007 onwards.

5.71 **Major power producers at the end of 2010 were:**
AES Electric Ltd., Baglan Generation Ltd., Barking Power Ltd., British Energy plc., Centrica Energy, Coolkeeragh ESB Ltd., Corby Power Ltd., Coryton Energy Company Ltd., Derwent Cogeneration Ltd., DONG Energy Burbo UK Ltd., Drax Power Ltd., EDF Energy plc., E.On UK plc., Energy Power Resources, GDF Suez Teesside Power Ltd., Immingham CHP, Infinis plc., International Power Mitsui,

Magnox North Ltd., Premier Power Ltd., RGS Energy Ltd, Rocksavage Power Company Ltd., RWE Npower plc., Scottish Power plc., Scottish and Southern Energy plc., Seabank Power Ltd., SELCHP Ltd., Spalding Energy Company Ltd., Statkraft Energy Ltd.

5.72 **Additionally, the following major wind farm companies are included**, beginning with data for 2007:

Fred Olsen, HG Capital, Renewable Energy Systems, Vattenfall Wind Power.

Generation from wind farms owned or operated by the following MPPs that had previously been excluded from the MPP category are now included for 2007 onwards:

Centrica Energy, E.On UK plc, RWE Npower plc, Scottish Power plc, Scottish and Southern Energy plc.

Types of station

5.73 The various types of station identified in the tables of this chapter are as follows:

Conventional steam stations are stations that generate electricity by burning fossil fuels to convert water into steam, which then powers steam turbines.

Nuclear stations are also steam stations but the heat needed to produce the steam comes from nuclear fission.

Gas turbines use pressurised combustion gases from fuel burned in one or more combustion chambers to turn a series of bladed fan wheels and rotate the shaft on which they are mounted. This then drives the generator. The fuel burnt is usually natural gas or gas oil.

Combined cycle gas turbine (CCGT) stations combine in the same plant gas turbines and steam turbines connected to one or more electrical generators. This enables electricity to be produced at higher efficiencies than is otherwise possible when either gas or steam turbines are used in isolation. The gas turbine (usually fuelled by natural gas or oil) produces mechanical power (to drive the generator) and waste heat. The hot exhaust gases (waste heat) are fed to a boiler, where steam is raised at pressure to drive a conventional steam turbine that is also connected to an electrical generator.

Natural flow hydro-electric stations use natural water flows to turn turbines.

Pumped storage hydro-electric stations use electricity to pump water into a high level reservoir. This water is then released to generate electricity at peak times. Where the reservoir is open, the stations also generate some natural flow electricity; this is included with natural flow generation. As electricity is used in the pumping process, pumped storage stations are net consumers of electricity.

Wind farms use wind flows to turn turbines.

Other stations include stations burning fuels such as landfill gas, sewage sludge, biomass and waste.

Electricity supplied – input and output basis

5.74 The energy supplied basis defines the primary input (in million tonnes of oil equivalent, Mtoe) needed to produce 1 TWh of hydro, wind, or imported electricity as:

$$\text{Electricity generated (TWh)} \times 0.085985$$

The primary input (in Mtoe) needed to produce 1 TWh of nuclear electricity is similarly

$$\frac{\text{Electricity generated (TWh)} \times 0.085985}{\text{Thermal efficiency of nuclear stations}}$$

5.75 Figures on fuel use for electricity generation can be compared in two ways. Table 5.4 illustrates one way by using the volumes of **fuel input** to power stations (after conversion of inputs to an oil

equivalent basis), but this takes no account of how efficiently that fuel is converted into electricity. The fuel input basis is the most appropriate to use for analysis of the quantities of particular fuels used in electricity generation (eg to determine the additional amount of gas or other fuels required as coal use declines under tighter emissions restrictions). A second way uses the amount of electricity generated and supplied by each fuel. This **output** basis is appropriate for comparing how much, and what percentage, of electricity generation comes from a particular fuel. It is the most appropriate method to use to examine the dominance of any fuel and for diversity issues. Percentage shares based on fuel outputs reduce the contribution of coal and nuclear, and increase the contribution of gas (by almost 7 percentage points in 2010) compared with the fuel input basis. This is because of the higher conversion efficiency of gas.

Public distribution system

5.76 This comprises the grid systems in England and Wales, Scotland and Northern Ireland. In April 2005 the Scotland and England and Wales systems were combined into a single grid.

Sectors used for sales/consumption

5.77 The various sectors used for sales and consumption analyses are standardised across all chapters of the 2011 Digest. For definitions of the sectors see Chapter 1 paragraphs 1.56 to 1.60 and Annex A paragraphs A.31 to A.42.

Transmission Entry Capacity, Declared Net Capacity and Installed Capacity

5.78 Transmission Entry Capacity (TEC) is a Connection and Use of System Code term that defines a generator's maximum allowed export capacity onto the transmission system. In the generating capacity statistics of the 2007 Digest, it replaced Declared Net Capacity (DNC) as the basis of measurement of the capacity of Major Power Producers from 2006. DNC is the maximum power available for export from a power station on a continuous basis minus any power generated or imported by the station from the network to run its own plant. It represents the nominal maximum capability of a generating set to supply electricity to consumers. The maximum rated output of a generator (usually under specific conditions designated by the manufacturer) is referred to as its Installed Capacity. For the nuclear industry, the World Association of Nuclear Operators (WANO) recommends that capacity of its reactors is measured in terms of Reference Unit Power (RUP) and it is the RUP figure that is given as the installed capacity of nuclear stations.

5.79 DNC is used to measure the maximum power available from generating stations that use renewable resources. For wind and wave and small scale hydro a factor is applied to declared net capability to take account of the intermittent nature of the energy source (eg 0.43 for wind and 0.365 for small scale hydro). Further information on this can be found in paragraph 7.85.

Load factors

5.80 The following definitions are used in Table 5.10:

Maximum load – Twice the largest number of units supplied in any consecutive thirty minutes commencing or terminating at the hour.

Simultaneous maximum load met – The maximum load on the grid at any one time. From 2005 (following the introduction of BETTA – see paragraph 5.53) it is measured by the sum of the maximum load met in Great Britain and the load met at the same time in Northern Ireland. Prior to 2005 it was measured by the sum of the maximum load met in England and Wales and the loads met at the same time by companies in other parts of the United Kingdom.

Plant load factor – The average hourly quantity of electricity supplied during the year, expressed as a percentage of the average output capability at the beginning and the end of year.

System load factor – The average hourly quantity of electricity available during the year expressed as a percentage of the maximum demand nearest the end of the year or early the following year.

Thermal efficiency

5.81 Thermal efficiency is the efficiency with which heat energy contained in fuel is converted into electrical energy. It is calculated for fossil fuel burning stations by expressing electricity generated as a percentage of the total energy content of the fuel consumed (based on average gross calorific values). For nuclear stations it is calculated using the quantity of heat released as a result of fission of the nuclear fuel inside the reactor. The efficiency of CHP systems is discussed separately in Chapter 6, paragraph 6.24 and 6.25 and Table 6D. Efficiencies based on gross calorific value of the fuel (sometimes referred to as higher heating values or HHV) are lower than the efficiencies based on net calorific value (or lower heating value LHV). The difference between HHV and LHV is due to the energy associated with the latent heat of the evaporation of water products from the steam cycle which cannot be recovered and put to economic use.

Period covered

5.82 Until 2004, figures for the MPPs relate to periods of 52 weeks as listed below (although some data provided by electricity supply companies related to calendar months and were adjusted to the statistical calendar). In 2004, a change was made to a calendar year basis. This change was made in the middle of the year and the data are largely based on information collected monthly. The January to May 2004 data are therefore based on the 21 weeks ended 29 May 2004 and the calendar months June to December 2004, making a total of 361 days. In terms of days, 2004 is therefore 1.1 per cent shorter than 2005:

Year	**52 weeks ended**
2003	28 December 2003
2004	21 weeks ended 29 May 2004 and 7 months ended 31 December 2004
2005 – 2010:	12 months ended 31 December

5.83 Figures for industrial, commercial and transport undertakings relate to calendar years ending on 31 December, except for the iron and steel industry where figures relate to the following 52 or 53 week periods:

Year	**53 weeks ended**
2003	3 January 2004
	52 weeks ended
2004	1 January 2005
2005	31 December 2005
2006	30 December 2006
2007	29 December 2007
2008	27 December 2008
	53 weeks ended
2009	2 January 2010
	52 weeks ended
2010	1 January 2011

Monthly and quarterly data

5.84 Monthly and quarterly data on fuel use, electricity generation and supply and electricity availability and consumption are available on DECC's energy statistics web site: www.decc.gov.uk/en/content/cms/statistics/source/source.aspx. Monthly data on fuel used in electricity generation by MPPs are given in Monthly Table 5.3 and monthly data on supplies by type of plant and type of fuel are given in Monthly Table 5.4. Monthly data on availability and consumption of electricity by the main sectors of the economy are given in Monthly Table 5.5. A quarterly commodity balance for electricity is published in DECC's quarterly statistical bulletin *Energy Trends* (Quarterly Table 5.2) along with a quarterly table of fuel use for generation, generation, and electricity supplied by all generators (Quarterly Table 5.1). Both these quarterly tables are also available from DECC's energy statistics web site. See Annex C for more information about *Energy Trends*.

Data collection

5.85 For MPPs, as defined in paragraphs 5.66 to 5.68, the data for the tables in this Digest are obtained from the results of an annual DECC inquiry, sent to each company, covering generating capacity, fuel use, generation, sales and distribution of electricity.

5.86 Another annual inquiry is sent to electricity distributors to establish electricity distributed by these companies. Similarly, an annual inquiry is sent to licensed suppliers of electricity to establish electricity sales by these companies. Electricity consumption for the iron and steel sector is based on data provided by the Iron and Steel Statistics Bureau (ISSB) rather than electricity suppliers since electricity suppliers tend to over-estimate their sales to this sector by including some companies that use steel rather than manufacture it. The difference between the ISSB and electricity suppliers' figures has been re-allocated to other sectors. A further means of checking electricity consumption data is now being employed on data for 2006 and subsequent years. The data are validated using information on sectors from EU Emissions Trading Scheme (EU-ETS) sources. The figures could not be used directly in the allocation because not all electricity use is recorded by the EU-ETS as some companies are not signed up to the scheme. The EU-ETS was used to check minimum consumption by sectors against other data collected by DECC.

5.87 A sample of companies that generate electricity mainly for their own use (known as autogenerators or autoproducers – see paragraph 5.66, above) is covered by a quarterly inquiry commissioned by DECC but carried out by the Office for National Statistics (ONS). Where autogenerators operate a combined heat and power (CHP) plant, this survey is supplemented (on an annual basis) by information from the CHP Quality Assessment scheme (for autogenerators who have registered under the scheme – see Chapter 6 on CHP). There are two areas of autogeneration that are covered by direct data collection by DECC, mainly because the return contains additional energy information needed by the Department. These are the Iron and Steel industry, and generation on behalf of London Underground.

5.88 In addition to the above sources, some administrative data is used for renewable generation and capacity in the hands of non major power producers- this includes data from the Renewables Obligation and Feed in Tariff schemes.

Statistical differences

5.89 Statistical differences are included in Tables 5.1, 5.2 and 5.3. These arise because data collected on production and supply do not match exactly with data collected on sales or consumption. One of the reasons for this is that some of the data are based on different calendars as described in paragraphs 5.82 and 5.83, above. Sales data based on calendar years will always have included more electricity consumption than the slightly shorter statistical year of exactly 52 weeks.

5.90 Care should be exercised in interpreting the figures for individual industries in the commodity balance tables. Where companies have moved between suppliers, it has not been possible to ensure consistent classification between and within industry sectors and across years. The breakdown of final consumption includes some estimated data. In 2010, for about 6 per cent of consumption of electricity supplied by the public distribution system, the sector figures are partially estimated.

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5.1 Commodity balances

Electricity

GWh

	2008	2009	2010
Total electricity			
Supply			
Production	384,604r	373,055	377,977
Other sources *(1)*	4,089	3,685	3,150
Imports	12,294	6,609	7,144
Exports	-1,272	-3,748	-4,481
Marine bunkers	-	-	-
Stock change	-	-	-
Transfers	-	-	-
Total supply	**399,715**	**379,601**	**383,791**
Statistical difference *(2)*	+79	+189	-212
Total demand	**399,636**	**379,412**	**384,003**
Transformation	-	-	-
Electricity generation	-	-	-
Major power producers	-	-	-
Other generators	-	-	-
Heat generation	-	-	-
Petroleum refineries	-	-	-
Coke manufacture	-	-	-
Blast furnaces	-	-	-
Patent fuel manufacture	-	-	-
Other	-	-	-
Energy industry use	**29,917**	**29,613**	**28,643**
Electricity generation	16,268	16,499	15,803
Oil and gas extraction	598	594	563
Petroleum refineries	4,351	4,519	5,008
Coal extraction and coke manufacture	1,058	1,018	1,040
Blast furnaces	452	464	297
Patent fuel manufacture	-	-	-
Pumped storage	5,371	4,843	4,212
Other	1,818	1,676	1,719
Losses	**27,552**	**27,083**	**27,042**
Final consumption	**342,168**	**322,717**	**328,318**
Industry	**114,505**	**100,841**	**104,499**
Unclassified	-	-	-
Iron and steel	4,670	3,615	3,461
Non-ferrous metals	7,394	6,378	6,745
Mineral products	7,930	7,011	7,291
Chemicals	20,293	17,708	18,175
Mechanical engineering, etc	8,613	7,688	7,690
Electrical engineering, etc	7,390	6,450	6,679
Vehicles	5,811	5,013	5,225
Food, beverages, etc	12,255	10,741	11,536
Textiles, leather, etc	3,388	3,001	3,057
Paper, printing, etc	12,858	11,056	11,433
Other industries	22,087	20,594	21,565
Construction	1,817	1,586	1,642
Transport	**3,934**	**3,906**	**3,899**
Air	-	-	-
Rail	3,916	3,888	3,881
Road	18	18	18
National navigation	-	-	-
Pipelines	-	-	-
Other	**223,728**	**217,970**	**219,920**
Domestic	119,800	118,541	118,681
Public administration	20,355	19,442	18,773
Commercial	79,506	76,187	78,437
Agriculture	4,067	3,801	4,029
Miscellaneous	-	-	-
Non energy use			

5.1 Commodity balances (continued)

Electricity

GWh

	2008	2009	2010
Electricity production			
Total production *(3)*	**384,604**	**373,055**	**377,977**
Primary electricity			
Major power producers	**62,067**	**80,296**	**72,792**
Nuclear	52,486	69,098	62,140
Large scale hydro *(3)*	3,971	4,029	2,505
Small scale hydro	253	265	199
Wind *(4)*	5,357	6,904	7,950
Other generators	**2,701**	**3,388**	**3,166**
Nuclear	-	-	-
Large scale hydro	629	635	587
Small scale hydro	315	333	313
Wind *(4)*	1,757	2,420	2,266
Secondary electricity			
Major power producers	**289,168**	**258,502**	**271,761**
Coal	120,305	99,287	103,939
Oil	4,626	3,886	2,348
Gas	161,579	152,593	161,742
Renewables	2,659	2,736	3,733
Other	-	-	-
Other generators	**30,668**	**30,870**	**30,257**
Coal	4,077	3,751	3,755
Oil	2,152	2,155	2,512
Gas	14,636	13,901	13,261
Renewables	7,360	8,735	9,104
Other	2,444	2,327	1,625
Primary and secondary production *(5)*			
Nuclear	52,486	69,098	62,140
Hydro	5,168	5,262	3,603
Wind	7,114	9,324	10,216
Coal	124,381	103,038	107,694
Oil	6,778	6,042	4,860
Gas	176,215	166,494	175,003
Other renewables	10,019	11,470	12,837
Other	2,444	2,327	1,625
Total production	**384,604**	**373,055**	**377,977**

(1) Pumped storage production.
(2) Total supply minus total demand.
(3) Excludes pumped storage production.
(4) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.59
(5) These figures are the same as the electricity generated figures in Table 5.6 except that they exclude pumped storage production. Table 5.6 shows that electricity used on works is deducted to obtain electricity supplied. It is electricity supplied that is used to produce Chart 5.2 showing each fuel's share of electricity output (see paragraph 5.31).

5.2 Electricity supply and consumption

GWh

	2006	2007	2008	2009	2010
Supply					
Production	393,429r	392,921r	384,604r	373,055r	377,977
Other sources *(1)*	3,853	3,859	4,089	3,685	3,150
Imports	10,282	8,613	12,294	6,609	7,144
Exports	-2,765	-3,398	-1,272	-3,748	-4,481
Total supply	**404,799r**	**401,994r**	**399,715r**	**379,601r**	**383,791**
Statistical difference *(2)*	+104r	+64r	+79r	+189r	-212
Total demand	**404,695**	**401,930r**	**399,636r**	**379,412r**	**384,003**
Transformation	**-**	**-**	**-**	**-**	**-**
Energy industry use	**32,055**	**32,554r**	**29,917r**	**29,613r**	**28,643**
Electricity generation	18,503r	17,690r	16,268r	16,499r	15,803
Oil and gas extraction	546	560	598	594r	563
Petroleum refineries	4,660	5,634	4,351	4,519r	5,008
Coal and coke	1,133	1,073	1,058	1,018r	1,040
Blast furnaces	497	479	452	464	297
Pumped storage	4,918	5,071	5,371	4,843	4,212
Other	1,798	2,047	1,818	1,676r	1,719
Losses	**27,410**	**26,720r**	**27,552r**	**27,083r**	**27,042**
Final consumption	**345,229**	**342,657r**	**342,168r**	**322,717r**	**328,318**
Industry	**114,896r**	**113,799r**	**114,505r**	**100,841r**	**104,499**
Unclassified	-	-	-	-	-
Iron and steel	5,860	4,937r	4,670r	3,615r	3,461
Non-ferrous metals	7,524	7,386	7,394r	6,378r	6,745
Mineral products	7,869	7,811	7,930r	7,011r	7,291
Chemicals	20,391	20,197	20,293r	17,708r	18,175
Mechanical engineering. etc	8,490	8,457	8,613r	7,688r	7,690
Electrical engineering, etc	7,341	7,290	7,390r	6,450r	6,679
Vehicles	5,748	5,723	5,811r	5,013r	5,225
Food, beverages, etc	12,117	12,082	12,255r	10,741r	11,536
Textiles, leather, etc	3,360r	3,349	3,388r	3,001r	3,057
Paper, printing, etc	12,906	12,741	12,858r	11,056r	11,433
Other industries	21,449	22,028r	22,087r	20,594r	21,565
Construction	1,840	1,799	1,817r	1,586r	1,642
Transport ***(3)***	**4,002r**	**3,962r**	**3,934r**	**3,906r**	**3,899**
Other	**226,331r**	**224,895r**	**223,728r**	**217,970r**	**219,920**
Domestic	124,704r	123,076r	119,800r	118,541r	118,681
Public administration	20,012r	20,087	20,355r	19,442r	18,773
Commercial	77,606r	77,677r	79,506r	76,187r	78,437
Agriculture	4,009r	4,055r	4,067	3,801r	4,029
Miscellaneous	-	-	-	-	-
Non energy use	**-**	**-**	**-**	**-**	**-**

(1) Pumped storage production.
(2) Total supply minus total demand.

5.3 Commodity balances

Public distribution system and other generators

GWh

	2008			2009			2010		
	Public distribution system	**Other generators**	**Total**	**Public distribution system**	**Other generators**	**Total**	**Public distribution system**	**Other generators**	**Total**
Supply									
Major power producers	351,235r	-	351,235r	338,798r	-	338,798r	344,554	-	344,554
Other generators	-	33,369r	33,369r	-	34,257r	34,257r	-	33,423	33,423
Other sources *(1)*	4,089	-	4,089	3,685	-	3,685	3,150	-	3,150
Imports	12,294	-	12,294	6,609	-	6,609	7,144	-	7,144
Exports	-1,272	-	-1,272	-3,748	-	-3,748	-4,481	-	-4,481
Transfers	13,545	-13,545	-	16,265r	-16,265r	-	14,956	-14,956	-
Total supply	**379,892r**	**19,824r**	**399,715r**	**361,609r**	**17,992r**	**379,601r**	**365,323**	**18,468**	**383,791**
Statistical difference *(2)*	+93r	-14r	+79r	+18	-0r	+18	- 161	-51	-212
Total demand	**379,798r**	**19,838r**	**399,636r**	**361,420r**	**17,992r**	**379,412r**	**365,484**	**18,518**	**384,003**
Transformation	- -		-	- -		-	- -		-
Energy industry use	**24,791r**	**5,126r**	**29,917r**	**24,144r**	**5,468r**	**29,613r**	**23,121**	**5,521**	**28,643**
Electricity generation	14,674r	1,595	16,268r	14,761r	1,738r	16,499r	14,381	1,422	15,803
Oil and gas extraction	598	-	598	594r	-	594r	563	-	563
Petroleum refineries	1,482	2,869	4,351	1,464r	3,055r	4,519r	1,407	3,601	5,008
Coke manufacture	979	79	1,058	928r	89	1,018r	950	90	1,040
Blast furnaces	-	452	452	-	464	464	-	297	297
Pumped storage	5,371	-	5,371	4,843	-	4,843	4,212	-	4,212
Other fuel industries	1,687	132	1,818	1,554r	123r	1,676r	1,608	112	1,719
Losses	**27,538r**	**14r**	**27,552r**	**27,062r**	**20r**	**27,083r**	**27,027**	**15**	**27,042**
Final consumption	**327,470r**	**14,698r**	**342,168r**	**310,213r**	**12,504r**	**322,717r**	**315,336**	**12,982**	**328,318**
Industry	**102,991r**	**11,514r**	**114,505r**	**91,568r**	**9,273r**	**100,841r**	**94,688**	**9,811**	**104,499**
Iron and steel	3,774	897r	4,670r	2,713	902r	3,615r	2,713	748	3,461
Non-ferrous metals	4,326r	3,067	7,394r	4,059r	2,319	6,378r	3,999	2,745	6,745
Mineral products	7,788r	142	7,930r	6,941r	69r	7,011r	7,218	73	7,291
Chemicals	17,472r	2,821	20,293r	15,729r	1,979r	17,708r	15,607	2,568	18,175
Mechanical engineering etc	8,245r	550	8,795r	7,345r	443r	7,788r	7,343	437	7,779
Electrical engineering etc	7,368r	-	7,368r	6,427r	-	6,427r	6,656	-	6,656
Vehicles	5,652r	-	5,652r	4,936r	-	4,936r	5,158	-	5,158
Food, beverages etc	10,939r	1,316	12,255r	9,782r	959r	10,741r	10,306	1,230	11,536
Textiles, leather, etc	3,383r	-	3,383r	2,997r	-	2,997r	3,052	-	3,052
Paper, printing etc	10,690r	2,168	12,858r	9,162r	1,894r	11,056r	10,204	1,229	11,433
Other industries	21,553r	539	22,091r	19,905r	692r	20,597r	20,804	766	21,571
Construction	1,802r	15	1,817r	1,571r	15	1,586r	1,627	15	1,642
Transport *(3)*	**3,934r**	**-r**	**3,934r**	**3,906r**	**-r**	**3,906r**	**3,899** -		**3,899**
Rail *(4)*	3,916r	-	3,916r	3,888r	-	3,888r	3,881	-	3,881
Road *(5)*	18r	-	18r	18r	-	18r	18	-	18
Other	**220,545r**	**3,183r**	**223,728r**	**214,739r**	**3,231r**	**217,970r**	**216,749**	**3,171**	**219,920**
Domestic	119,800r	-	119,800r	118,541r	-	118,541r	118,681	-	118,681
Standard	78,750r	-	78,750r	79,972r	-	79,972r	79,635	-	79,635
Economy 7 and other off-peak *(6)*	23,480r	-	23,480r	21,447r	-	21,447r	21,084	-	21,084
Prepayment (standard)	12,984r	-	12,984r	12,881r	-	12,881r	13,446	-	13,446
Prepayment (off-peak) *(6)*	4,487r	-	4,487r	4,122r	-	4,122r	4,516	-	4,516
Sales under any other arrangement	100	-	100	119	-	119	-	-	-
Public administration	18,260r	2,095	20,355r	17,688r	1,753r	19,442r	17,125	1,648	18,773
Public lighting *(7)*	2,279r	-	2,279r	2,030r	-	2,030r	1,962	-	1,962
Other public sector	15,981r	2,095	18,076r	15,658r	1,753r	17,411r	15,162	1,648	16,810
Commercial	78,417r	1,089r	79,506r	74,709r	1,477r	76,187r	76,914	1,523	78,437
Shops	31,609r	-	31,609r	27,629r	-	27,629r	28,246	-	28,246
Offices	23,932r	-	23,932r	23,045r	-	23,045r	24,868	-	24,868
Hotels	8,275	-	8,275	8,882r	-	8,882r	8,684	-	8,684
Combined domestic/ commercial premises	2,465r	-	2,465r	3,178r	-	3,178r	2,657	-	2,657
Post and telecommunications	6,184	-	6,184	6,142r	-	6,142r	6,149	-	6,149
Unclassified	1,912r	-	1,912r	2,176	-	2,176	2,369	-	2,369
Transport services	4,041r	-	4,041r	3,655r	-	3,655r	3,941	-	3,941
Agriculture	4,067	-	4,067	3,801r	-	3,801r	4,029	-	4,029

(1) Pumped storage production.
(2) Total supply minus total demand.
(3) From 2004, non-traction Transport sector consumption is included under 'Transport Services'.
(4) From 2004, this includes light rail and metro systems (eg. London Underground). See paragraph 5.21.
(5) Included from 2004. See paragraph 5.21.

5.4 Fuel used in generation[1]

	Unit	2006	2007	2008	2009	2010
						Original units of measurement
Major power producers *(2)*						
Coal	M tonnes	55.93	51.03	46.25	38.34r	40.23
Oil *(3)*	"	0.81	0.54	0.84	0.63r	0.46
Gas	GWh	278,149	319,836	344,454	328,249	342,150
Other generators *(2)*						
Transport undertakings:						
Gas	GWh	24	21	21	16	18
Undertakings in industrial and commercial sectors:						
Coal	M tonnes	1.51	1.48	1.56	1.42	1.27
Oil *(4)*	"	0.43	0.41	0.43	0.44r	0.47
Gas	GWh	33,235	36,021	32,336	31,038r	29,607
Major power producers (2)						**Mtoe**
Coal		34.998	31.991	28.995	23.791r	24.780
Oil *(5)*		0.958r	0.699r	1.105r	1.025r	0.634
Gas		23.917	27.501	29.618	28.224r	29.420
Nuclear		17.131	14.037	11.910	15.230	13.947
Hydro (natural flow) *(6)*		0.318	0.356	0.363r	0.369r	0.232
Wind *(6) (7)*		-	0.307	0.461r	0.594	0.684
Other renewables *(6)*		0.731	0.625	0.766r	0.744r	1.013
Net imports		0.646	0.448	0.948	0.246	0.229
Total major power producers *(2)*		**78.699r**	**75.964r**	**74.166r**	**70.223r**	**70.939**
Of which: conventional thermal and other stations *(8)*		38.361r	35.357r	31.802r	26.455r	27.537
combined cycle gas turbine stations		22.243	25.766	29.144	27.923r	28.994
Other generators *(2)*						
Transport undertakings:						
Gas		0.002	0.002	0.002	0.001	0.002
Undertakings in industrial and commercial sectors:						
Coal		0.945	0.929	0.971	0.871r	0.783
Oil *(4)*		0.475	0.463	0.478	0.489r	0.539
Gas		2.858	3.097	2.780	2.669r	2.542
Hydro (natural flow) *(6)*		0.077	0.081	0.081	0.083	0.077
Wind *(6) (7) (9)*		0.364r	0.148r	0.151r	0.208r	0.195
Other renewables *(6)*		2.739	2.843r	2.757r	3.262r	3.410
Other fuels *(10)*		1.551	1.257	1.124	0.993	0.816
Total other generators *(2)*		**9.011**	**8.819r**	**8.345r**	**8.576r**	**8.364**
All generating companies						
Coal		35.943	32.920	29.967	24.662r	25.563
Oil *(4)(5)*		1.433r	1.162r	1.583r	1.514r	1.174
Gas		26.776	30.600	32.400	30.895r	31.964
Nuclear		17.131	14.037	11.910	15.230	13.947
Hydro (natural flow) *(6)*		0.395	0.438	0.444r	0.452r	0.310
Wind *(6) (9)*		0.364r	0.455r	0.612r	0.802r	0.878
Other renewables *(6)*		3.470r	3.468r	3.524	4.005r	4.423
Other fuels *(10)*		1.551	1.257	1.124	0.993	0.816
Net imports		0.646	0.448r	0.948	0.246	0.229
Total all generating companies		**87.710r**	**84.783r**	**82.510r**	**78.799r**	**79.304**

(1) For details of where to find monthly updates of fuel used in electricity generation by major power producers and quarterly updates of fuel used in electricity generation by all generating companies see paragraph 5.84.

(2) See paragraphs 5.66 to 5.72 for information on companies covered.

(3) Includes oil used in gas turbine and diesel plants, and oil used for lighting up coal fired boilers.

(4) Includes refinery gas.

(5) Includes oil used in gas turbine and diesel plants, and oil used for lighting up coal fired boilers, as well as petroleum coke and a small quantity of high carbon ash.

(6) Renewable sources, which are included under hydro and other renewables in this table, are shown separately in Table 7.4 of Chapter 7.

(7) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.70.

(8) Includes gas turbines, oil engines and plants producing electricity from thermal renewable sources.

(9) Includes wave and solar photovoltaics.

(10) Main fuels included are coke oven gas, blast furnace gas, and waste products from chemical processes.

5.5 Electricity supply, electricity supplied (net), electricity available, electricity consumption and electricity sales

GWh

	2006	2007	2008	2009	2010
Total supply					
(as given in Tables 5.1 and 5.2)	404,799r	401,994r	399,715r	379,601r	383,791
less imports of electricity	-10,282	-8,613	-12,294	-6,609	-7,144
plus exports of electricity	+2,765	+3,398	+1,272	+3,748	+4,481
less electricity used in pumped storage	-4,918	-5,071	-5,371	-4,843	-4,212
less electricity used on works	-18,503r	-17,690r	-16,268r	-16,499r	-15,803
equals					
Electricity supplied (net)	373,861r	374,018r	367,054r	355,398r	361,113
(as given in Tables 5.6, 5.1.2 and 5.1.3)					
Total supply					
(as given in Tables 5.1 and 5.2)	404,799r	401,994r	399,715r	379,601r	383,791
less electricity used in pumped storage	-4,918	-5,071	-5,371	-4,843	-4,212
less electricity used on works	-18,503r	-17,690r	-16,268r	-16,499r	-15,803
equals					
Electricity available	381,378r	379,233r	378,076r	358,259r	363,776
(as given in Table 5.1.2)					
Final consumption					
(as given in Tables 5.2 and 5.3)	345,229	342,657r	342,168r	322,717r	328,318
plus Iron and steel consumption counted as energy industry use	+637	+607	+568r	+603	+421
equals					
Final users	345,866	343,264r	342,736r	323,320r	328,739
(as given in Table 5.1.2)					
Final consumption					
Public distribution system					
(as given in Table 5.3)	324,533	326,479	327,470r	310,213r	315,336
plus Oil and gas extraction use	+546	+560	+598	+594r	+563
plus Petroleum refineries use	+1,501	+1,461	+1,482	+1,464r	+1,407
plus Coal and coke use	+1,037	+983	+979	+928r	+950
plus Other fuel industries use	+1,614	+1,763	+1,687	+1,554r	+1,608
equals					
UK Electricity sales *(1)*	329,231	331,246	332,216r	314,753r	319,864

(1) The renewables obligation percentage is calculated using total renewables generation on an obligation basis from Table 7.5 (x 100) as the numerator, and this figure as the denominator. Separate electricity sales data for public electricity suppliers are given for England and Wales, Scotland and Northern Ireland in Table 5.5 of Energy Trends on the DECC website at www.decc.gov.uk/en/content/cms/statistics/source/electricity/electricity.aspx (scroll to the Monthly Tables section).

5.6 Electricity fuel use, generation and supply

GWh

	Thermal sources							Non-thermal sources			
	Coal	Oil	Gas	Nuclear	Renew-ables (1)	Other (3)	Total	Hydro-natural flow	Hydro-pumped storage	Other (4)	Total All sources
2006											
Major power producers *(2)*											
Fuel used	407,027	11,144r	278,149	199,235	8,504	-	904,059r	3,693	3,853	-	911,605r
Generation	144,947r	3,723r	126,637	75,451	2,928	-	353,686	3,693	3,853	-	361,232
Used on works	7,145r	611r	2,634	6,214	285	-	16,888	13	130	-	17,031
Supplied (gross)	137,802r	3,112r	124,003	69,237	2,643	-	336,798	3,680	3,722	-	344,201
Used in pumping											4,918
Supplied (net)											339,283
Other generators *(2)*											
Fuel used	10,991	5,521	33,259	-	31,853r	18,038	99,661r	900	-	4,236	104,797r
Generation	3,903	2,450	14,191	-	6,999r	3,371	30,914r	900	-	4,236	36,050r
Used on works	210	156	440	-	533r	119	1,457r	14	-	-	1,472
Supplied	3,693	2,295	13,751	-	6,466r	3,252	29,457r	885	-	4,236	34,578r
All generating companies											
Fuel used	418,018	16,665r	311,408	199,235	40,357r	18,038	1,003,720r	4,593	3,853	4,236	1,016,401r
Generation	148,850r	6,173r	140,828	75,451	9,928r	3,371	384,600r	4,593	3,853	4,236	397,282r
Used on works	7,355r	766r	3,074	6,214	818r	119	18,346	27	130	-	18,503r
Supplied (gross)	141,495r	5,407r	137,754	69,237	9,109r	3,252	366,255r	4,566	3,722	4,236	378,779r
Used in pumping											4,918
Supplied (net)											373,861r
2007											
Major power producers *(2) (5)*											
Fuel used	372,054	8,128r	319,836	163,247	7,271	-	870,537r	4,144	3,859	3,569	882,109r
Generation	132,074r	3,002r	149,346	63,028	2,388	-	349,838	4,144	3,859	3,569	361,410
Used on works	6,706r	436r	2,894	5,779	240	-	16,055	30	13	-	16,099
Supplied (gross)	125,368r	2,566r	146,452	57,249	2,148	-	333,783	4,114	3,846	3,569	345,311
Used in pumping											5,071
Supplied (net)											340,240
Other generators *(2) (5)*											
Fuel used	10,803	5,381	36,042	-	33,059r	14,613	99,898r	946	-	1,719	102,563r
Generation	3,870	2,093	16,447	-	7,543r	2,753	32,706r	946	-	1,719	35,371r
Used on works	207	152	510	-	613r	93	1,575r	16	-	-	1,591r
Supplied	3,662	1,941	15,937	-	6,931r	2,660	31,131r	930	-	1,719	33,779r
All generating companies											
Fuel used	382,857	13,509r	355,878	163,247	40,331r	14,613	970,435r	5,089	3,859	5,288	984,672r
Generation	135,944r	5,095r	165,793	63,028	9,931r	2,753	r	5,089	3,859	5,288	396,781r
Used on works	6,914r	588r	3,404	5,779	852r	93	17,630r	46	13	-	17,690r
Supplied (gross)	129,030r	4,507r	162,389	57,249	9,079r	2,660	364,914r	5,043	3,846	5,288	379,091r
Used in pumping											5,071
Supplied (net)											374,019r
2008											
Major power producers *(2) (5)*											
Fuel used	337,217	12,849r	344,454	138,508	8,914r	-	841,943r	4,224	4,089	5,357	855,613r
Generation	120,305r	4,626r	161,579	52,486	2,659	-	341,654r	4,224	4,089	5,357	355,324r
Used on works	6,112r	676r	2,777	4,813	267	-	14,645r	15	14	-	14,674r
Supplied (gross)	114,192r	3,950r	158,802	47,673	2,392	-	327,009r	4,209	4,075	5,357	340,650r
Used in pumping											5,371
Supplied (net)											335,279r
Other generators *(2) (5)*											
Fuel used	11,296	5,557	32,357	-	32,065r	13,074	94,349r	944	-	1,757	97,050r
Generation	4,077	2,152	14,636	-	7,360r	2,444	30,668r	944	-	1,757	33,369r
Used on works	216	155	453	-	671	83	1,578r	17	-	-	1,595
Supplied	3,861	1,997	14,183	-	6,689r	2,361	29,090r	927	-	1,757	31,774r
All generating companies											
Fuel used	348,513	18,407r	376,810	138,508	40,979r	13,074	936,292r	5,168	4,089	7,114	952,663r
Generation	124,381r	6,778r	176,215	52,486	10,019r	2,444	372,322r	5,168	4,089	7,114	388,693r
Used on works	6,328r	830r	3,231	4,813	938	83	16,222r	32	14	-	16,268r
Supplied (gross)	118,053r	5,947r	172,984	47,673	9,081r	2,361	356,100r	5,136	4,075	7,114	372,425r
Used in pumping											5,371
Supplied (net)											367,053r

5.6 Electricity fuel use, generation and supply (continued)

GWh

	Thermal sources							Non-thermal sources			
	Coal	Oil	Gas	Nuclear	Renew-ables (1)	Other (3)	Total	Hydro-natural flow	Hydro-pumped storage	Other (4)	Total All sources
2009											
Major power producers *(2) (5)*											
Fuel used	276,689r	11,922r	328,249r	177,129	8,648r	-	802,637r	4,294	3,685	6,904	817,520r
Generation	99,287r	3,886r	152,593r	69,098	2,736	-	327,600r	4,294	3,685	6,904	342,483r
Used on works	5,030r	480r	2,612r	6,336	275	-	14,733r	15	13	-	14,761r
Supplied (gross)	94,257r	3,406r	149,980r	62,762	2,461	-	312,866r	4,279	3,672	6,904	327,722r
Used in pumping											4,843
Supplied (net)											322,879r
Other generators *(2) (5)*											
Fuel used	10,132r	5,684r	31,054r	-	37,931r	11,551r	96,352r	968	-	2,420	99,739r
Generation	3,751	2,155r	13,901r	-	8,735r	2,327	30,870r	968	-	2,420	34,257r
Used on works	210	154r	431r	-	848r	78	1,720r	18	-	-	1,738r
Supplied	3,541	2,002r	13,471r	-	7,887r	2,250r	29,150r	950	-	2,420	32,519r
All generating companies											
Fuel used	286,820r	17,606r	359,303r	177,129	46,579r	11,551r	898,988r	5,262	3,685	9,324	917,259r
Generation	103,038r	6,042r	166,494r	69,098	11,470r	2,327	358,469r	5,262	3,685	9,324	376,740r
Used on works	5,240r	634r	3,043r	6,336	1,122r	78	16,453r	33	13	-	16,499r
Supplied (gross)	97,798r	5,408r	163,451r	62,762	10,348r	2,250r	342,016r	5,229	3,672	9,324	360,241r
Used in pumping											4,843
Supplied (net)											355,398r
2010											
Major power producers *(2) (5)*											
Fuel used	288,195	7,376	342,150	162,203	11,784	-	811,708	2,703	3,150	7,950	825,511
Generation	103,939	2,348	161,742	62,140	3,733	-	333,901	2,703	3,150	7,950	347,704
Used on works	5,233	318	2,770	5,665	375	-	14,361	9	11	-	14,381
Supplied (gross)	98,706	2,030	158,972	56,475	3,358	-	319,540	2,694	3,139	7,950	333,323
Used in pumping											4,212
Supplied (net)											329,111
Other generators *(2) (5)*											
Fuel used	9,106	6,273	29,586	-	39,656	9,490	94,111	900	-	2,266	97,277
Generation	3,755	2,512	13,261	-	9,104	1,625	30,257	900	-	2,266	33,423
Used on works	195	185	411	-	569	46	1,405	17	-	-	1,422
Supplied	3,560	2,327	12,850	-	8,536	1,579	28,852	883	-	2,266	32,002
All generating companies											
Fuel used	297,301	13,650	371,736	162,203	51,439	9,490	905,819	3,603	3,150	10,216	922,788
Generation	107,694	4,860	175,003	62,140	12,837	1,625	364,158	3,603	3,150	10,216	381,128
Used on works	5,428	503	3,180	5,665	943	46	15,766	26	11	-	15,803
Supplied (gross)	102,266	4,357	171,822	56,475	11,894	1,579	348,392	3,577	3,139	10,216	365,324
Used in pumping											4,212
Supplied (net)											361,112

	2006		2007		2008		2009		2010	
	Conv-entional thermal (6)	CCGT	Conv-entional thermal (6)	CCGT	Conv-entional thermal (6)	CCGT	Conv-entional thermal (6)	CCGT	Conv-entional thermal (6)	CCGT
Major power producers *(2)*										
Generated	160,417r	117,819r	146,799r	140,011r	129,059r	160,109r	107,048r	151,454r	111,244	160,517
Supplied (gross)	151,866	115,695	138,877	137,657	121,920r	157,417r	101,197r	148,907r	105,247	157,818
Other generators										
Generated	19,485	11,430	20,633r	12,073	19,146r	11,522	20,080r	10,790r	20,067	10,190
Supplied (gross)	18,598r	10,859	19,661r	11,470	18,143r	10,947	18,898r	10,251r	19,171	9,682
All generating companies										
Generated	179,901r	129,248r	167,432r	152,084r	148,205r	171,631r	127,128r	162,244r	131,311	170,708
Supplied (gross)	170,463r	126,554	158,538r	149,127	140,063r	168,364r	120,096r	159,159r	124,418	167,500

(1) Thermal renewable sources are those included under biomass and non-biodegradable wastes in Chapter 7.
(2) See paragraphs 5.66 to 5.72 on companies covered.
(3) Other thermal sources include coke oven gas, blast furnace gas and waste products from chemical processes.
(4) Other non-thermal sources include wind, wave and solar photovoltaics.
(5) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.70
(6) Includes gas turbines, oil engines and plants producing electricity from thermal renewable sources; also stations with some CCGT capacity but mainly operate in conventional thermal mode.

5.7 Plant capacity - United Kingdom

MW

	end December				
	2006	2007	2008	2009	2010
Major power producers *(1)*					
Total transmission entry capacity *(2)*	**74,996**	**75,979**	**76,782**	**77,675r**	**83,197**
Of which:					
Conventional steam stations:	33,608	33,734	32,423	32,431	32,439
Coal fired	22,882	23,008	23,069	23,077	23,085
Oil fired	3,778	3,778	3,778	3,778	3,778
Mixed or dual fired *(3)*	6,948	6,948	5,576	5,576	5,576
Combined cycle gas turbine stations	24,859	24,854	26,578	27,269r	32,209
Nuclear stations	10,969	10,979	10,979	10,858	10,865
Gas turbines and oil engines	1,444	1,445	1,456	1,560	1,560
Hydro-electric stations:					
Natural flow *(4)*	1,294	1,293	1,392	1,395	1,391
Pumped storage	2,726	2,744	2,744	2,744	2,744
Wind *(4) (5)*		795	997	1,205	1,776
Renewables other than hydro and wind	96	134	213	213	213
Other generators *(1)*					
Total capacity of own generating plant *(6)*	**7,407**	**6,763**	**6,664**	**7,091r**	**7,011**
Of which:					
Conventional steam stations *(7)*	3,059	2,924	2,722	2,813r	2,757
Combined cycle gas turbine stations	2,106	2,076	2,015	1,945r	1,890
Hydro-electric stations (natural flow) *(4)*	123	126	127	131	133
Wind *(4) (7)*	822	246	435	656	484
Renewables other than hydro and wind	1,296	1,391	1,365	1,547	1,747
All generating companies					
Total capacity	**82,403**	**82,742**	**83,446**	**84,766r**	**90,208**
Of which:					
Conventional steam stations *(8)*	36,667	36,658	35,145	35,244r	35,196
Combined cycle gas turbine stations	26,965	26,930	28,593	29,214r	34,099
Nuclear stations	10,969	10,979	10,979	10,858	10,865
Gas turbines and oil engines	1,444	1,445	1,456	1,560	1,560
Hydro-electric stations:					
Natural flow	1,417	1,419	1,519	1,526	1,524
Pumped storage	2,726	2,744	2,744	2,744	2,744
Wind *(4)*	822	1,042	1,432	1,860	2,260
Renewables other than hydro and wind	1,392	1,525	1,578	1,760	1,960

(1) See paragraphs 5.66 to 5.72 for information on companies covered.
(2) See paragraph 5.78 for definition. Data before 2006 are based on declared net capability.
(3) Includes gas fired stations that are not Combined Cycle Gas Turbines, or have some CCGT capability but mainly operate as conventional thermal stations.
(4) Small-scale hydro and Wind capacity are shown on declared net capability basis, and are de-rated to account for by factors of 0.365 and 0.43 respectively. See paragraph 5.79.
(5) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.70
(6) "Other generators" capacities are given in declared net capacity terms, see paragraph 5.79

5.8 Plant capacity - England and Wales, Scotland, and Northern Ireland

MW

	2006	2007	2008	2009	2010
					end December
Major power producers in England and Wales *(1)*					
Total transmission entry capacity *(2)*	**63,390**	**63,891**	**64,134**	**64,800**	**70,404**
Of which:					
Conventional steam stations:	28,132	28,258	28,447	28,455	28,463
Coal fired	19,426	19,552	19,613	19,621	19,629
Oil fired	3,778	3,778	3,778	3,778	3,778
Mixed or dual fired *(3)*	4,928	4,928	5,056	5,056	5,056
Combined cycle gas turbine stations	23,358	23,353	23,351	23,955	29,239
Nuclear stations	8,559	8,569	8,569	8,569	8,576
Gas turbines and oil engines	1,124	1,018	1,018	1,037	1,037
Hydro-electric stations:					
Natural flow	136	136	129	130	130
Pumped storage	1,986	2,004	2,004	2,004	2,004
Wind *(4)*		419	447	481	786
Renewables other than hydro and wind	96	134	169	169	169
Major power producers in Scotland *(1)*					
Total transmission entry capacity *(2)*	**9,582**	**10,034**	**10,346**	**10,489r**	**10,363**
Of which:					
Conventional steam and combined cycle gas turbine stations	5,119	5,119	5,119	5,206r	4,862
Nuclear stations	2,410	2,410	2,410	2,289	2,289
Gas turbines and oil engines	155	263	264	265	265
Hydro-electric stations:					
Natural flow	1,158	1,157	1,263	1,265	1,261
Pumped storage	740	740	740	740	740
Wind *(4)*		345	506	680	904
Renewables other than hydro and wind	-	-	44	44	44
Major power producers in Northern Ireland *(1)*					
Total transmission entry capacity *(2)*	**2,023**	**2,054**	**2,303**	**2,387**	**2,430**

(1) See paragraphs 5.66 to 5.72 for information on companies covered.
(2) See paragraph 5.78 for definition. Data before 2006 are based on declared net capability.
(3) Includes gas fired stations that are not Combined Cycle Gas Turbines, or have some CCGT capability but mainly operate as conventional thermal stations.
(4) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.70.

5.9 Capacity of other generators

MW

	2006	2007	2008	2009	2010
					end December
Capacity of own generating plant *(1) (2)*					
Undertakings in industrial and commercial sector:					
Oil and gas terminals and oil refineries	983	1,015	1,013	1,011r	1,012
Iron and steel	315	316	316	316	316
Chemicals	1,123	1,075	1,051	1,039r	1,049
Engineering and other metal trades	622	634	632	626	626
Food, drink and tobacco	410	426	406	408	392
Paper, printing and publishing	757	763	569	522	491
Other *(3)*	3,095	2,433	2,569	3,064r	3,023
Total industrial and commercial sector	7,305	6,662	6,556	6,988r	6,909
Undertakings in transport sector	103	103	103	103	103
Total other generators	**7,408**	**6,765**	**6,659**	**7,091r**	**7,012**

(1) For combined heat and power plants the electrical capacity only is included. Further CHP capacity is included under major power producers in Table 5.7. A detailed analysis of CHP capacity is given in the tables of Chapter 6. Figures may not sum to 5.7 due to rounding
(2) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.70
(3) Includes companies in the commercial sector.

5.10 Plant loads, demand and efficiency

Major power producers [1]

	Unit	2006	2007	2008	2009	2010
Simultaneous maximum load met *(2) (3)*	MW	59,071	61,527	60,289	60,231	60,893
of which England and Wales	MW	..	..	..	..	..
Scotland	MW	..	..	..	..	..
Great Britain	MW	57,490	59,880	58,590	58,510	59,130
Northern Ireland	MW	1,581	1,647	1,699	1,721	1,763
Maximum demand as a percentage of UK capacity	Per cent	78.8	81.0	78.5	77.5	73.2
Plant load factor *(2) (4)*						
Combined cycle gas turbine stations	Per cent	53.8r	63.2r	69.7r	63.1r	60.6
Nuclear stations	"	69.3	59.6	49.4	65.6r	59.4
Pumped storage hydro	"	15.4	16.1	16.9	15.3r	13.1
Conventional thermal and other stations *(5)*	"	50.3r	45.0r	40.0r	33.8r	35.1
of which coal-fired stations *(6)*	"	54.4r	47.5r	45.8r	39.3r	40.9
All plant *(7)*	"	**52.7**	**52.7**	**50.0**	**47.5r**	**46.1**
System load factor	"	**68.7**	**66.1**	**67.6**	**64.5r**	**64.7**
Thermal efficiency *(8)*						
(gross calorific value basis)						
Combined cycle gas turbine stations	"	45.5r	46.7	47.2	46.6r	47.6
Coal fired stations	"	35.6r	35.5r	35.7r	35.9r	36.1
Nuclear stations	"	37.9	38.6	37.9	39.0	38.3

(1) See paragraphs 5.66 to 5.72 for information on companies covered.
(2) See paragraph 5.80 for definitions.
(3) Data cover the 12 months ending March of the following year, e.g. 2010 data are for the year ending March 2011.
(4) Load factors for renewable sources, including wind and hydro, can be found in Table 7.4.
(5) Conventional steam plants, gas turbines and oil engines and plants producing electricity from thermal renewable sources.
(6) Includes both coal-fired stations, and dual/mixed fired stations that mainly use coal.
(7) Includes wind (from 2008) and natural flow hydro, using capacity that has not been de-rated for intermittency.
(8) See paragraph 5.81 for definition of thermal efficiency.

5.11 Power Stations in the United Kingdom
(operational at the end of May 2011)[1]

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
AES	Kilroot	coal/oil	662	1981	Northern Ireland
	Ballylumford B	gas/oil/OCGT	656	1968	Northern Ireland
	Ballylumford C	CCGT	616	2003	Northern Ireland
Baglan Generation Ltd	Baglan Bay	gas turbine	510	2002	Wales
Barking Power *(2)*	Barking	CCGT	1000	1994	London
Beaufort Wind Ltd *(3)*	Bears Down	wind	10	2001	South West
	Bein Ghlas	wind	8	1999	Scotland
	Bryn Titli	wind	10	1994	Wales
	Carno	wind	34	1996	Wales
	Causeymire	wind	48	2004	Scotland
	Kirkby Moor	wind	5	1993	North West
	Lambrigg	wind	7	2000	North West
	Llyn Alaw	wind	20	1997	Wales
	Mynydd Gorddu	wind	10	1996	Wales
	Novar	wind	17	1997	Scotland
	Taff Ely	wind	9	1993	Wales
	Tow Law	wind	2	2001	North East
	Trysglwyn	wind	6	1996	Wales
	Windy Standard	wind	22	1996	Scotland
	North Hoyle	wind (offshore)	60	2003	Wales
	Farr	wind	92	2006	Scotland
	Ffynnon Oer	wind	32	2006	Wales
BNP Paribas Clean Energy Partne	Gruig	wind	25	2009	Northern Ireland
Braes of Doune Windfarm *(4)*	Braes of Doune	wind	72	2007	Scotland
British Energy *(5)*	Dungeness B	nuclear	1040	1983	South East
	Hartlepool	nuclear	1190	1984	North East
	Heysham1	nuclear	1160	1984	North West
	Heysham 2	nuclear	1210	1988	North West
	Hinkley Point B	nuclear	870	1976	South West
	Sizewell B	nuclear	1191	1995	East
	Hunterston B	nuclear	890	1976	Scotland
	Torness	nuclear	1205	1988	Scotland
Cemmaes Windfarm Ltd *(6)*	Cemmaes	wind	15	2002 *(7)*	Wales
Centrica	Barry	CCGT	230	1998	Wales
	Glanford Brigg	CCGT	260	1993	Yorkshire and
	Killingholme	CCGT	665	1994	the Humber
	Kings Lynn	CCGT	340	1996	East
	Peterborough	CCGT	405	1993	East
	Roosecote	CCGT	229	1991	North West
	South Humber Bank	CCGT	1285	1996	Yorkshire and the Humber
	Langage	CCGT	905	2010	South West
	Glens of Foudland	wind	26	2005	Scotland
	Lynn Wind Farm	wind (offshore)	97	2009	East Midlands
	Inner Dowsing Wind Farm	wind (offshore)	97	2009	East Midlands
Citigen (London) UK Ltd	Charterhouse St, London	gas/gas oil CHP	31	1995	London
Cold Northcott Windfarm Ltd *(6)*	Cold Northcott	wind	7	1993	South West

For footnotes see page 155

5.11 Power Stations in the United Kingdom
(operational at the end of May 2011)[1] (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
Coolkeeragh ESB Ltd	Coolkeeragh	CCGT	408	2005	Northern Ireland
Corby Power Ltd	Corby	CCGT	401	1993	East Midlands
Derwent Cogeneration *(2)*	Derwent	gas CHP	228	1994	East Midlands
Dong Energy	Burbo Bank	Wind	90	2009	North West
	Gunfleet Sands 1	Wind	108	2010	South East
	Gunfleet Sands 2	Wind	65	2010	South East
	Walney *(2)*	Wind	184	2011	West
	Barrow Offshore Windfarm *(8)*	wind (offshore)	90	2006	North West
	Severn	CCGT	848	2010	Wales
Drax Power Ltd	Drax	coal	3870	1974	Yorkshire and
	Drax GT	gas oil	75	1971	the Humber
EDF Energy	Sutton Bridge	CCGT	819	1999	East
	Cottam	coal	2008	1969	East Midlands
	West Burton	coal	2012	1967	East Midlands
	West Burton GT	gas oil	40	1967	East Midlands
	Thames Valley Power	Gas/Gas oil CHP	15	1995	London
	London Heat & Power Company (Imperial College)	gas CHP	9	2000	London
	Barkantine Heat & Power Company	Gas CHP	1	2000	London
	Aberdare District Energy	gas	10	2002	Wales
	Bridgewater District Energy	gas	10	2000	South West
	Sevington District Energy	gas	10	2000	South East
	Solutia District Energy	gas	10	2000	Wales
EDF Energy Renewables	Bicker Fen	wind	26	2008	East Midlands
	Walkaway	wind	14	2008	North East
	Longpark	wind	38	2009	Scotland
	Burnfoot Hill	wind	26	2010	Scotland
	Rusholme	wind	24	2010	Yorkshire
	Fairfield	wind	7	2011	North West
Eggborough Power Ltd	Eggborough	coal	1960	1967	Yorkshire and the Humber
EPR Ely Limited	Elean	straw/gas	38	2001	East
EPR Glanford Ltd	Glanford	meat & bone meal	13	1993	East
EPR Eye Ltd	Eye, Suffolk	AWDF *(9)*	13	1992	East
EPR Thetford Ltd	Thetford	poultry litter	39	1998	East
EPR Scotland Ltd	Westfield	poultry litter	12	2000	Scotland
E.On UK	Kingsnorth	coal/oil	1940	1970	South East
	Ironbridge	coal	940	1970	West Midlands
	Ratcliffe	coal	1960	1968	East Midlands
	Grain	oil	1300	1979	South East
	Grain GT	gas oil	55	1978	South East
	Kingsnorth GT	gas oil	34	1967	South East
	Ratcliffe GT	gas oil	34	1966	East Midlands
	Taylor's Lane GT	gas oil	132	1979	London
	Connahs Quay	CCGT	1380	1996	Wales
	Cottam Development Centre	CCGT	390	1999	East Midlands
	Enfield	CCGT	408	1999	London
	Killingholme	CCGT	900	1993	Yorkshire and the Humber
	Sandbach	CCGT	50	1999	North West

For footnotes see page 155

5.11 Power Stations in the United Kingdom

(operational at the end of May 2011)[1] (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
	Castleford	CCGT	56	2002	Yorkshire and the Humber
	Thornhill	CCGT	50	1998	Yorkshire and the Humber
	Grain	CCGT	1320	2010	South East
	Steven's Croft	biomass	44	2007	Scotland
	Askam	wind	5	1999	North West
	Blood Hill	wind	2	1992	East
	Bowbeat	wind	31	2002	Scotland
	Deucheran Hill	wind	16	2001	Scotland
	Hare Hill	wind	5	2004	North East
	High Volts	wind	8	2004	North East
	Holmside	wind	5	2004	North East
	Lowca	wind	5	2000	North West
	Oldside	wind	5	1996	North West
	Out Newton	wind	9	2002	Yorkshire and
	Rheidol	wind	2	1997	Wales
	Scroby Sands	wind (offshore)	60	2004	East
	Siddick	wind	4	1996	North West
	St Breock	wind	5	1994	South West
	Stags Holt	wind	20	2007	East
	Rhyd-y-Groes	wind	7	1992	Wales
	Blyth Offshore	wind (offshore)	4	2000	North East
	Robin Rigg	wind (offshore)	180	2010	Scotland
	Great Eppleton	wind	8	2010	North East
	Butterwick Moor	wind	19	2011	North East
	Haswell Moor	wind	10	2010	North East
Fenland Windfarms Ltd (6)	Deeping	wind	16	2006	East Midlands
	Glass Moor	wind	16	2006	East Midlands
	Red House	wind	12	2006	East Midlands
	Red Tile	wind	24	2007	East Midlands
Fred Olsen	Crystal Rig Windfarm	wind	63	2003	Scotland
	Paul's Hill	wind	64	2005	Scotland
	Rothes	wind	51	2004	Scotland
	Crystal Rig II	wind	138	2010	Scotland
GDF Suez	Shotton	gas CHP	45	2001	Wales
	Teesside Power Station	CCGT	210	1992	North East
	Scotia Wind	wind	20	2010	Scotland
Great Orton Windfarm Ltd (6)	Great Orton	wind	4	1999 (7)	North West
HG Capital	Tyr Mostyn & Foel Goch	wind	21	2005	Wales
	Bagmoor	wind	16	2009	East Midlands
	Long Hill Road	wind	2	2005	East
	Solutia	wind	5	2009	Wales
	Workington (Eastman)	wind	4	2005	North West
	Greendykeside	wind	4	2007	Scotland
	Lochhead	wind	6	2009	Scotland
	Haverigg III	wind	3	2005	North West
	Dewley Cheese	wind	2	2010	North West
High Hedley Hope Wind Ltd (6)	High Hedley 1	wind	2	2001	North East
	High Hedley 2	wind	5	2008	North East
	Trimdon Grange	wind	5	2008	North East
	Langley Park	wind	8	2008	North East
	Broomhill	wind	8	2008	North East
Immingham CHP LLP	Immingham CHP	gas CHP	1240	2004	Yorkshire and
Infinis Windfarm (2)	Ardrossan	wind	24	2004	Scotland
	Ardrossan Extension	wind	6	2008	Scotland
	Dalswinton	wind	30	2008	Scotland
	Minsca	wind	37	2008	Scotland
	Slieve Divena	wind	30	2009	N Ireland

For footnotes see page 155

5.11 Power Stations in the United Kingdom
(operational at the end of May 2011)[1] (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
Intergen	Coryton	CCGT	800	2001	East
	Rocksavage	CCGT	810	1998	North West
	Spalding	CCGT	880	2004	East Midlands
International Power / Mitsui	Indian Queens	gas oil/kerosene	140	1996	South West
	Dinorwig	pumped storage	1728	1983	Wales
	Ffestiniog	pumped storage	360	1961	Wales
	Rugeley	coal	1006	1972	West Midlands
	Rugeley GT	gas oil	50	1972	West Midlands
	Deeside	CCGT	500	1994	Wales
	Saltend	CCGT	1200	2000	Yorkshire and
Kirkheaton Wind Ltd *(6)*	Kirkheaton	wind	1	2000	North East
K/S Winscales *(6)*	Winscales 1	wind	2	1999	North West
	Winscales 2	wind	7	2005	North West
Llangwyryfon Windfarm Ltd *(6)*	Llangwyryfon	wind	9	2003	Wales
Magnox Ltd *(10)*	Oldbury	nuclear	434	1967	South West
	Wylfa	nuclear	980	1971	Wales
	Maentwrog	hydro	28	1928	Wales
Marchwood Power Limited *(2)*	Marchwood	gas	842	2009	South West
Peel Energy Ltd	Scout Moor	Wind	65	2009	North West
	Seaforth	Wind	3	1999	North West
	Port of Liverpool	Wind	10	2008	North West
Px Limited *(11)*	Fellside CHP	gas CHP	180	1995	North West
RES-Gen Ltd	Dyffryn Brodyn	wind	6	1994	Wales
	Four Burrows	wind	5	1995	South West
	Forss	wind	2	2003	Scotland
	Forss2	wind	5	2007	Scotland
	Lendrum's Bridge	wind	13	2000	Northern Ireland
	Altahullion	wind	26	2003	Northern Ireland
	Altahullion2	wind	12	2007	Northern Ireland
	Black Hill	wind	29	2006	Scotland
	Lough Hill	wind	8	2007	Northern Ireland
RGS Energy Ltd	Knapton	gas	40	1994	Yorkshire and the Humber
RWE Npower Plc	Aberthaw B	coal	1586	1971	Wales
	Tilbury B	coal	1063	1968	East
	Didcot A	coal/gas	1958	1972	South East
	Aberthaw GT	gas oil	51	1971	Wales
	Cowes	gas oil	140	1982	South East
	Didcot GT	gas oil	100	1972	South East
	Fawley GT	gas oil	68	1969	South East
	Littlebrook GT	gas oil	105	1982	South East
	Tilbury GT	gas oil	68	1968	East

For footnotes see page 155

5.11 Power Stations in the United Kingdom

(operational at the end of May 2011)[1] (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
	Little Barford GT	gas oil	17	2006	East
	Fawley	oil	968	1969	South East
	Littlebrook D	oil	1370	1982	South East
	Didcot B	CCGT	1430	1998	South East
	Great Yarmouth	CCGT	420	2001	East
	Little Barford	CCGT	665	1995	East
	Staythorpe C	CCGT	1724	2010	East Midlands
RWE Npower Renewables Ltd	Braevallich	hydro	2	2005	Scotland
(Part of RWE Npower)	Cwm Dyli	hydro	10	2002 *(7)*	Wales
	Dolgarrog High Head	hydro	17	2002 *(7)*	Wales
	Dolgarrog Low Head	hydro	15	1926/2002	Wales
	Garrogie	hydro	2	2005	Scotland
	Inverbain	hydro	1	2006	Scotland
	Kielder	hydro	6	2006 *(7)*	North East
	River E	hydro	3	2008	Scotland
	Douglas Water	hydro	3	2008	Scotland
	Inverlael	hydro	3	2009	Scotland
	Carnoch	hydro	1	2009	Scotland
	Burgar Hill	wind	5	2007	Scotland
	Hameldon Hill	wind	5	2007	Northwest
	Bilbster	wind	4	2008	Scotland
	Hollies	wind	3	2008	East
	Knabs Ridge	wind	16	2008	North East
	Little Cheyne	wind	60	2008	South East
	Rhyl Flats	wind (offshore)	90	2009	Wales
	Lindhurst	wind	9	2010	East Midlands
	An Suidhe	wind	19	2010	Scotland
Scottish and Southern Hydro Schemes:					
Affric/Beauly	Mullardoch Tunnel	hydro	2	1955	Scotland
	Fasnakyle	hydro	69	1951	Scotland
	Fasnakyle Compensation Set	hydro	8	2006	Scotland
	Deanie	hydro	38	1963	Scotland
	Culligran	hydro	17	1962	Scotland
	Culligran Compensation Set	hydro	2	1962	Scotland
	Aigas	hydro	20	1962	Scotland
	Kilmorack	hydro	20	1962	Scotland
Breadalbane	Lubreoch	hydro	4	1958	Scotland
	Cashlie	hydro	11	1959	Scotland
	Lochay	hydro	46	1958	Scotland
	Lochay Compensation Set	hydro	2	1959	Scotland
	Finlarig	hydro	17	1955	Scotland
	Lednock	hydro	3	1961	Scotland
	St. Fillans	hydro	17	1957	Scotland
	Dalchonzie	hydro	4	1958	Scotland
Conon	Achanalt	hydro	3	1956	Scotland
	Grudie Bridge	hydro	19	1950	Scotland
	Mossford	hydro	19	1957	Scotland
	Luichart	hydro	34	1954	Scotland
	Orrin	hydro	18	1959	Scotland
	Torr Achilty	hydro	15	1954	Scotland
Foyers	Foyers	hydro/ pumped storage	300	1974	Scotland
Great Glen	Foyers Falls	hydro	5	1968	Scotland
	Mucomir	hydro	2	1962	Scotland
	Ceannacroc	hydro	20	1956	Scotland
	Livishie	hydro	15	1962	Scotland

For footnotes see page 155

5.11 Power Stations in the United Kingdom
(operational at the end of May 2011)[1] (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
	Glenmoriston	hydro	37	1957	Scotland
	Glendoe	hydro	100	2008	Scotland
	Quoich	hydro	18	1955	Scotland
	Invergarry	hydro	20	1956	Scotland
	Kingairloch	hydro	4	2005	Scotland
Shin	Cassley	hydro	10	1959	Scotland
	Lairg	hydro	4	1959	Scotland
	Shin	hydro	19	1958	Scotland
	Loch Dubh	hydro	1	1954	Scotland
Sloy/Awe	Sloy	hydro	153	1950	Scotland
	Sron Mor	hydro	5	1957	Scotland
	Clachan	hydro	40	1955	Scotland
	Allt-na-Lairige	hydro	6	1956	Scotland
	Nant	hydro	15	1963	Scotland
	Inverawe	hydro	25	1963	Scotland
	Kilmelfort	hydro	2	1956	Scotland
	Loch Gair	hydro	6	1961	Scotland
	Lussa	hydro	2	1952	Scotland
	Striven	hydro	8	1951	Scotland
Tummel	Gaur	hydro	8	1953	Scotland
	Cuaich	hydro	3	1959	Scotland
	Loch Ericht	hydro	2	1962	Scotland
	Rannoch	hydro	44	1930	Scotland
	Clunie	hydro	61	1950	Scotland
	Tummel	hydro	34	1933	Scotland
	Errochty	hydro	75	1955	Scotland
	Pitlochry	hydro	15	1950	Scotland
Wind	Artfield Fell	wind	20	2005	Scotland
	Bu	wind	3	2002	Scotland
	Hadyard Hill	wind	120	2005	Scotland
	Spurness	wind	8	2004	Scotland
	Tangy	wind	19	2002	Scotland
	Drumderg	wind	37	2008	Scotland
	Bessy Bell 1	wind	5	1995	N Ireland
	Bessy Bell 2	wind	9	2008	N Ireland
	Bin Mountain	wind	9	2007	N Ireland
	Tappaghan	wind	29	2005	N Ireland
	Carcant	wind	7	2010	Scotland
	Toddleburn	wind	28	2010	Scotland
	Griffin	wind	9	2011	Scotland
	Greater Gabbard *(12)*	wind (offshore)	152	2011	East
	Achany	wind	38	2010	Scotland
	Fairburn	wind	40	2009	Scotland
Small Hydros:	Chliostair	hydro	1	1960	Scotland
	Cuileig	hydro	3	2002	Scotland
	Kerry Falls	hydro	1	1951	Scotland
	Nostie Bridge	hydro	1	1950	Scotland
	Storr Lochs	hydro	2	1952	Scotland
Thermal:	Peterhead *(13)*	gas/oil	1180	1980	Scotland
	Fife Power Station	gas	123	2000	Scotland

For footnotes see page 155

5.11 Power Stations in the United Kingdom
(operational at the end of May 2011)[1,2] (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
Thermal (continued)	Keadby	gas/oil	749	1994	Yorkshire and the Humber
	Medway	CCGT	688	1995	South East
	Ferrybridge C	coal/biomass	1960	1966	Yorkshire and the Humber
	Fiddler's Ferry	coal/biomass	1961	1971	North West
	Ferrybridge GT	gas oil	34	1966	Yorkshire and the Humber
	Fiddler's Ferry GT	gas oil	34	1969	North West
	Uskmouth	coal/biomass	363	2000	Wales
	Slough	coal/biomass/ gas/waste derived fuel	61	1918	South East
	Chickerell	gas/oil	45	1998	South West
	Burghfield	gas/oil	47	1998	South East
	Thatcham	light oil	10	1994	South East
	Five Oaks	light oil	9	1995	South East
	Chippenham	gas	10	2002	South West
	Wheldale	mines gas	8	2002	Yorkshire and the Humber
Island Generation	Arnish	diesel	10	2001	Scotland
	Barra	diesel	2	1990	Scotland
	Bowmore	diesel	6	1946	Scotland
	Kirkwall	diesel	16	1953	Scotland
	Lerwick	diesel	67	1953	Scotland
	Loch Carnan, South Uist	diesel	10	1971	Scotland
	Stornoway	diesel	19	1950	Scotland
	Tiree	diesel	3	1945	Scotland
Scottish Power Hydro schemes:					
Galloway	Carsfad	hydro	12	1936	Scotland
	Drumjohn	hydro	2	1985	Scotland
	Earlstoun	hydro	14	1936	Scotland
	Glenlee	hydro	24	1935	Scotland
	Kendoon	hydro	24	1936	Scotland
	Tongland	hydro	33	1935	Scotland
Lanark	Bonnington	hydro	11	1927	Scotland
	Stonebyres	hydro	6	1927	Scotland
Cruachan	Cruachan	pumped storage	440	1966	Scotland
Thermal:	Cockenzie	coal	1152	1967	Scotland
	Longannet	coal	2304	1970	Scotland
	Damhead Creek	CCGT	800	2000	South East
	Pilkington - Greengate	gas	10	1998	North West
	Rye House	CCGT	715	1993	East
	Shoreham	CCGT	400	2000	South East
Wind:					
	Arecleoch	wind	120	2010	Scotland
	Beinn an Tuirc	wind	30	2001	Scotland
	Beinn Tharsuinn	wind	30	2007	Scotland
	Black Law	wind	124	2005	Scotland
	Callagheen	wind	17	2006	Northern Ireland
	Carland Cross	wind	6	1992	South West
	Clachan Flats	wind	15	2009	Scotland
	Coal Clough	wind	10	1992	North West
	Coldham	wind	16	2006	East
	Corkey	wind	5	1994	Northern Ireland

For footnotes see page 155

5.11 Power Stations in the United Kingdom
(operational at the end of May 2011)[1] (continued)

Station type		Fuel	Capacity (MW)		
	Cruach Mhor	wind	30	2004	Scotland
	Dun Law	wind	17	2000	Scotland
	Dun Law II	wind	30	2009	Scotland
	Elliots Hill	wind	5	1995	Northern Ireland
	Greenknowes	wind	27	2008	Scotland
	Hagshaw Hill	wind	16	1995	Scotland
	Hagshaw Hill II	wind	26	2009	Scotland
	Hare Hill	wind	13	2000	Scotland
	Mark Hill	wind	56	2011	Scotland
	Penryddian & Llidiartywaun	wind	31	1992	Wales
	Rigged Hill	wind	5	1994	Northern Ireland
	Wether Hill	wind	18	2007	Scotland
	Whitelee	wind	322	2007	Scotland
	Wolf Bog	wind	10	2008	Northern Ireland
Seabank Power Limited *(2)*	Seabank 1	CCGT	812	1998	South West
	Seabank 2	CCGT	410	2000	South West
Sembcorp Utilities (UK) Ltd	Wilton Power Station	Gas/Coal/Oil	280	1952	North East
	Wilton GT2	Gas	42	2005	North East
	Wilton 10	Biomass	38	2007	North East
South East London Combined Heat & Power Ltd	SELCHP ERF	waste	32	1994	London
Statkraft Energy Ltd	Rheidol	hydro	49	1961	Wales
	Alltwalis	wind	23	2009	Wales
Talisman Energy	Beatrice *(2)*	wind (offshore)	10	2007	Scotland
Vattenfall Wind Power	Kentish Flats	wind (offshore)	90	2005	South East
	Thanet	wind (offshore)	300	2010	South East
	Edinbane	Wind (onshore)	41	2010	Scotland
Yorkshire Windpower Ltd *(14)*	Ovenden Moor	wind	9	1993	Yorkshire and the Humber
	Royd Moor	wind	7	1993	Yorkshire and the Humber
Total			**84,986**		

Other power stations[15]

Renewable sources and combustible wastes	wind	942
	landfill gas	1025
	sewage gas	189
	hydro	227
	Biomass and waste	844
CHP schemes listed in Table 5.12	various fuels	2,080
CHP schemes other than major power producers and renewables and those listed in Table 5.12	mainly gas	2,119
Other autogenerators	various fuels	448

For footnotes see page 155

5.11 Power Stations in the United Kingdom
(operational at the end of May 2011)(1) (continued)

Interconnectors

	Capacity (MW)
England - France	2,000
England - Netherlands *(16)*	1,000
Scotland - Northern Ireland	500
Northern Ireland - Irish Republic	600

Footnotes

(1) This list covers stations of more than 1 MW capacity, but excludes some renewables stations of over 1 MW which are included in the sub table on page 154.

(2) Joint venture with Scottish and Southern Energy

(3) Managed by RWE

(4) Joint venture between E.On and SSE, but operated by SSE

(5) Now owned by EDF

(6) Managed by EDF Energy Renewables Ltd

(7) Recommissioning dates.

(8) Co-owned with Centrica

(9) Animal Waste Derived Fuel, i.e. meat and bone meal, poultry litter, feathers and small quantities of other material such as wood chips

(10) Owned by NDA but operated by Magnox Ltd

(11) Owned by NDA but operated by Px Limited

(12) Joint venture between Greater Gabbard Offshore Wind Ltd and SSE, operated by SSE

(13) Total capacity is 1,840 MW but because of transmission constraints only 1,180 MW can be used at any one time.

(14) Owned by E.On and EPR

(15) As at end December 2010.

(16) Offically opened 1st April 2011

5.12 Large scale CHP schemes in the United Kingdom (operational at the end of December 2010)[1]

Company Name	Scheme Location	Installed Capacity (MWe) (2)
Alta Estate Services Limited	Chp Station, Alta Estate Services Ltd, University Of	6
Anglian Water Services Limited	Tilbury Sewage Treatment Works	2
Archer Daniels Midland Erith Limited	Erith Oil Works	14
Balcas Limited	Balcas Limited	3
Barkantine Heat & Power Company	Barkantine, Barkantine Heat & Power Company	1
Basf Performance Products	Water Treatments, Basf Performance Products	17
Bayer Cropscience Limited	Bayer Cropscience Limited, Norwich	4
Bd Diagnostics	Bd Diagnostics, Beckton Dickinson	3
Bhp Billiton Uk Production Unit	Point Of Ayr Terminal, Bhp Billiton Uk Production Unit	9
British Sugar Plc	Wissington Sugar Factory, British Sugar Plc (Chp 2)	94
British Sugar Plc	Bury St Edmunds Sugar Factory (Chp 2)	90
Cambridge University Hospitals Foundation	Addenbrookes Hospital	4
Carillion Services Ltd Ta Carillion Health	Queen Alexandra Hospital	3
Carlsberg Uk Limited	Carlsberg Brewery Leeds, Carlsberg Uk Limited	1
Celts Limited	Levenmouth Wwtw, Celts Limited	3
Cofely District Energy Ltd	Icc Energy Centre	2
Cofely District Energy Ltd	Soas Chp, The Boiler House	2
Cofely District Energy Ltd	Aston University Energy Centre, Aston University	3
Cofely District Energy Ltd	The Heat Station (Chp 2)	7
Cofely Ltd	Hillhouse International,Vinnolit	5
Crisp Maltings Group Ltd	Crisp Maltings Ryburgh	1
Cyclerval Uk Ltd	Newlincs Efw, Newlincs Development Ltd	4
Dalkia Clean Power 2 Ltd	Fribo Foods Limited	1
Dalkia Plc	Lincoln County Hospital	1
Dalkia Utilities Services	Freeman Hospital (Newcastle Upon Tyne Nhs Trust)	4
Dalkia Utilities Services Plc	ASTRAZENECA	23
De La Rue International	Overton Mill, De La Rue International Ltd	7
Dsm Nutritional Products (Uk) Ltd	Dsm Dalry	46
E.On Uk Chp Limited	Stoke Chp, Michelin Tyre Plc	61
E.On Uk Chp Limited	Brunner Mond (Uk) Limited	146
E.On Uk Chp Limited	Port Of Liverpool Chp	31
E.On Uk Cogeneration Ltd	Citigen Chp. Citigen (London) Limited	16
E.On Uk Cogeneration Ltd	Queens Medical Centre Nhs Trust	5
E.On Uk Plc	Workington Chp	48
East Sussex Hospitals Trust	Eastbourne District General Hospital	1
Ed&F Man Ltd (Man Group Plc)	Sugar Quay	1
Energy Centre For Sustainable Communities	Tcmk Phase 1 Chp No 2 Gas Engine, Thameswey Central	3
Energy Centre For Sustainable Communities	Woking Town Centre Phase I	1
Energy Centre For Sustainable Communities	Tcmk Phase 1 Chp, Thameswey Central Milton Keynes	3
Esso Petroleum Company Limited	Esso Fawley Chp	316
Fine Organics Limited	Fine Organics Limited	4
Fortum O&M (Uk) Ltd	Sullom Voe Power Station	89
Genzyme Ltd	Genzyme - Haverhill	1
Georgia Pacific Gb Ltd	Georgia Pacific Chp, Bridgend Paper Mills	9
Glaxosmithkline	Glaxosmithkline Montrose	1
Glaxosmithkline, Irvine	Glaxosmithkline, Irvine	4
Imperial College London	South Kensington Campus Chp Plant	9
Inbev Uk Ltd	Samlesbury Brewery, Inbev Uk Ltd	7
Inbev Uk Ltd	Magor Brewery, Inbev Uk Ltd	7
Ineos Chlor Limited	Ineos Chlor Limited	38
Ineos Newton Aycliffe Ltd	Ineos Newton Aycliffe Ltd	12
James Cropper Plc	James Cropper Plc	7
John Heathcoat & Company Limited	John Heathcoat & Company Limited	1
John Thompson And Son Ltd	John Thompson & Sons Limited	3
Johnson Matthey Plc	Johnson Matthey - Enfield	3
Johnson Matthey Plc	Johnson Matthey - Royston	6

For footnotes see page 157

5.12 Large scale CHP schemes in the United Kingdom (operational at the end of December 2010)[1] *(continued)*

Company Name	Scheme Location	Installed Capacity (MWe) *(2)*
Kingspan Insulation Limited	Kingspan Insulation Limited	1
Kodak Limited	Harrow Site, Kodak Limited	12
Medway Nhs Foundation Trust	Medway Hospital, Medway Maritime Hospital	1
Mill Nurseries Ltd	Millchp, Mill Nurseries	15
Millenium Inorganic Chemicals Ltd	Stallingborough Chp C/O Millenium Inorganic Chemicals	16
North Tees & Hartlepool Nhs Foundation	University Hospital Of North Tees	2
Northumbrian Water Limited	Bran Sands (Biogas)	5
Npower Cogen Ltd	Hythe Chp, Npower Cogen (Hythe) Ltd	53
Npower Cogen Ltd	Dow Corning Chp C/O Dow Corning Ltd	27
Npower Cogen Ltd	Ppco Generating Plant C/O Conoco Phillips Teesside	97
Npower Cogen Ltd	Bridgewater Paper Chp C/O Bridgewater Paper Co Ltd	58
Npower Cogen Ltd	Basf Chp C/O Basf Plc	98
Npower Cogen Ltd	Aylesford Chp C/O Aylesford Newsprint Ltd	100
Prosper De Mulder	De Mulder & Sons - Hartshill	3
Royal Mail Group Property	Royal Mail (Hwdc) Chp 1, Consignia Plc	3
Ryobi Aluminium Casting (Uk) Ltd	Ryobi	1
Scottish And Southern Energy Plc	Slough Nurseries, G + C Property	2
Scottish And Southern Energy Plc	Ninewells Hospital, Tayside University Hospitals Nhs Trust	3
Scottish And Southern Energy Plc	Red Roofs - North Moor	3
Scottish And Southern Energy Plc	Western General Hospital, Lothian Universities Nhs Trust	1
Scottish And Southern Energy Plc	Port Clarence Works, Koppers	2
Scottish And Southern Energy Plc	Bradon Farm	10
Shell Uk Oil Products Ltd	Stanlow Manufacturing Complex	109
Slough Heat & Power Ltd	Slough Power Station	104
Smithkline Beecham Plc/Glaxo Smith Kline	Glaxo Smith Kline Worthing	2
Smurfit Kappa Ssk Limited	Smurfit Kappa Ssk Limited	9
Springfield Fuels Ltd	Springfields, Springfield Fuels Ltd	12
Syngenta Limited	Huddersfield Works, Syngenta Ltd	16
T & L Sugars Ltd	Thames Refinery, T & L Sugars Ltd	20
Tangmere Airfield Nurseries Limited	Tangmere Nursery	9
Thames Valley Power Ltd	Thames Valley Power, Thames Valley Power Ltd	15
Thames Water Utilities Ltd	Reading (Island Road) Stw	1
Thames Water Utilities Ltd	Ryemeads Stw	2
Thames Water Utilities Ltd	Long Reach Stw	4
Thames Water Utilities Ltd	Maple Lodge Stw	4
Thames Water Utilities Ltd	Mogden Stw	8
The Boots Group Plc	Boots Energy Centre	14
University College London	University College London, Bloomsbury Campus	3
University Of Bristol	University Of Bristol Chp 2	1
University Of Dundee	Dundee University - Main Chp Boilerhouse	3
University Of East Anglia	University Of East Anglia (Plain Campus)	3
University Of Edinburgh Utilities Supply	King's Buildings, University Of Edinburgh Utilities Supply	3
University Of Southampton	University Of Southampton	3
University Of Surrey	University Of Surrey	1
University Of Sussex	University Of Sussex	1
Upm Kymmene (Uk) Ltd	Upm Shotton	22
Van Heyningen Brothers Ltd	West End Nurseries	2
Wessex Water Services Ltd	Bristol Waste Water Treatment Works Scheme A	6
Total *(2)*		2,080
Electrical capacity of good quality CHP for these sites in total		1,105

(1) These are sites of 1 MW installed electrical capacity or more that either have agreed to be listed in the Ofgem register of CHP plants or whose details are publicly available elsewhere, or who have provided the information directly to DECC. It excludes CHP sites that have been listed as major power producers in Table 5.11.

(2) This is the total power capacity from these sites and includes all the capacity at that site, not just that classed as good quality CHP under CHPQA.

Chapter 6
Combined heat and power

Key points

- CHP capacity increased by nearly 7 per cent between 2009 and 2010 from 5,614 MWe to 5,989 MWe. (Table 6.1)
- Despite the increase in capacity the amount of good quality electricity produced fell by 1.4 per cent to just over 26 TWh in 2010. This corresponds to just under 7 per cent of all electricity produced in the UK. (Table 6.4)
- Sixty-eight percent of the fuel used in CHP schemes was natural gas. The use of renewable fuel increased between 2009 and 2010 and now makes up 6 per cent of fuel used (up from 5 per cent in 2009). (Table 6.2)
- Heat generation also fell by 0.7 per cent between 2009 and 2010. In terms of heat demand, the refineries sector had the largest share of total installed capacity, followed by the chemicals sector and then the paper sector. (Table 6.6)

Introduction

6.1 This chapter sets out the contribution made by Combined Heat and Power (CHP) to the United Kingdom's energy requirements. The data presented in this chapter have been derived from information submitted to the CHP Quality Assurance programme (CHPQA) or by following the CHPQA methodology in respect of data obtained from other sources. The CHPQA programme was introduced by the Government to provide the methods and procedures to assess and certify the quality of the full range of CHP schemes. It is a rigorous system for the Government to ensure that the incentives on offer are targeted fairly and benefit schemes in relation to their environmental performance.

6.2 CHP is the simultaneous generation of usable heat and power (usually electricity) in a single process. The term CHP is synonymous with cogeneration, which is commonly used in other Member States of the European Union and the United States. CHP uses a variety of fuels and technologies across a wide range of sizes and applications. The basic elements of a CHP plant comprise one or more prime movers (a reciprocating engine, gas turbine, or steam turbine) driving electrical generators, with the heat generated in the process captured and put to further productive use, such as for industrial processes, hot water and space heating or cooling.

6.3 CHP is typically sized to make use of the available heat[1], and connected to the lower voltage distribution system (i.e. embedded). This means that unlike conventional power stations, CHP can provide efficiency gains by avoiding transmission and distribution losses. CHP can also provide important network services such as black start, improvements to power quality, and some have the ability to operate in island mode if the grid goes down. There are four principal types of CHP system: steam turbine, gas turbine, combined cycle systems and reciprocating engines. Each of these is defined in paragraph 6.34 later in this chapter.

Government policy towards CHP

6.4 Good Quality CHP denotes schemes that have been certified as being highly efficient through the UK's CHP Quality Assurance (CHPQA) programme. The criteria used are in line with the requirements for high efficiency CHP set down in the EU Cogeneration Directive (2004/8/EC). A Good Quality CHP plant must achieve 10 per cent primary energy savings compared to the separate generation of heat and power i.e. via a boiler and power station. Only Good Quality CHP schemes are eligible for Government support.

[1] *But not always, see paragraph 6.10. In such cases there is an impact upon the electrical capacity and electrical output classified as CHP.*

6.5 There are a range of support measures to incentivise the growth of Good Quality CHP in the UK. These include:

- Exemption from the Climate Change Levy (CCL) of all fuel inputs to, and electricity outputs from, Good Quality CHP.
- Eligibility to Enhanced Capital Allowances for Good Quality CHP plant and machinery.
- Favourable allocations of carbon allowances under Phase II of the EU Emissions Trading Scheme (EU ETS).
- Business Rates exemption for CHP power generation plant and machinery.
- Reduction of VAT (from 20 to 5 per cent) on domestic micro-CHP installations.
- Extension of the eligibility for Renewable Obligation Certificates (ROCs) to energy from waste plants that utilise CHP.
- Increased support under the Renewables Obligation from with two ROCs allocated to the Good Quality electricity output of CHP fuelled by biomass.
- In April 2010 the Carbon Reduction Commitment (CRC) came into force. The CRC is a mandatory emissions trading scheme that covers large, non-energy intensive business, currently not covered under other policy measures like Climate Change Agreements (CCAs) and the EU ETS. In the CRC, organisations covered are required to purchase allowances to cover the CO_2 emissions from all fixed-point energy sources. This means that allowances must be purchased to cover the use of electricity, gas and all other fuel types such as Liquefied Petroleum Gas (LPG) and diesel. However, under CRC heat is zero-rated, meaning that allowances will not have to be purchased by a site to cover any imported heat.
- The Feed-in-Tariff scheme which launched on 1st April 2010 provides financial support for the first 30,000 micro-CHP schemes with an electrical capacity of 2kW or less.

International context

6.6 The EU-ETS commenced on 1st January 2005 and involves the trading of carbon emissions allowances. The purpose of the EU-ETS is to reduce emissions by a fixed amount at least cost to the regulated sources. Each year participants in the scheme are allocated a set number of allowances. At the end of each trading year allowances equal to the reported emissions must be given up. In the EU-ETS Phase I National Allocation Plan (NAP), the sectoral classification of CHP plant depended on the sector in which it was modelled in DTI's Updated Energy Projections (UEP) and the presence of CHP at an installation was not considered explicitly in their allocation calculations. The sector in which an installation is classified has an effect on the level of its allocation, because allocations are calculated on the basis of sectoral growth projections. It was argued that this method of allocation would have an impact on CHP because its future growth and emissions are different to those of non-CHP installations in Phase I sectors. For this reason the Government decided to create a specific sector for GQCHP in Phase II, to ensure that incumbent CHP plant would not be disincentivised and to ensure that investment in GQCHP would be encouraged by the implementation of Phase II. Phase II runs from January 2008- December 2012.

6.7 Phase III of EU ETS will run from 2013 until 2027. Under this Phase there will be no allocation made in respect of CO_2 emissions associated with the generation of electricity, including electricity generated by CHP. However, there will be an allocation made in respect of CO_2 emissions associated with the generation of heat. The allocation will be based upon harmonised benchmarks for heat production, and a heat generating installation will, in 2013, receive 80 per cent of the allocations determined using this benchmark, declining linearly to 30 per cent by 2020 and then to 0 per cent by 2027. The benchmark for heat adopted by the European Commission is based on the use of natural gas with a conversion efficiency of 90 per cent (N.C.V.). An allocation is only made in respect of measurable heat consumed. This means that the benchmark allocation made for each MWh of heat generated by a CHP scheme and subsequently consumed is 0.224 tCO2[2].

6.8 UK incentives for CHP have influenced developments and operations of CHP in Continental Europe. The value of the CCL exemption on Good Quality CHP electricity outputs, which can be realised by the sale of Levy Exemption Certificates (LECs) issued against CHP electricity outputs exported to the grid and consumed in the UK, has encouraged CHP operators in France, Denmark

[2] *Where the CHP supplies heat to an EU ETS Phase III sub-installation or installation and the sub-installation or installation produces a product that is product benchmarked, then an allocation is not made in respect of the heat supplied but in respect of the product produced.*

Germany and Republic of Ireland to generate and export low carbon CHP electricity to the UK. In 2010 LECs were issued in respect of 3,696 GWh of Good Quality CHP electricity generated by over 70 overseas CHP schemes. This represents approximately 14 per cent of Good Quality CHP electricity consumed in the UK in 2010.

UK energy markets, and their effect on CHP[3]

6.9 Two major factors affecting the economics of CHP are the relative cost of fuel (principally natural gas) and the value that can be realised for electricity. Energy price trends that are applicable to CHP schemes differ depending upon the size and sector of the scheme. During the last few years there has been an improving trend in the viability of CHP due to an increase in the price of electricity relative to that of gas. This is known as the spark gap (i.e. the difference between the price of electricity and the price of the gas required to generate that electricity). Due to the long term nature of CHP investments long term trends in the spark gap need to be taken into account.

Use of CHPQA in producing CHP statistics

6.10 The CHPQA programme is the major source for CHP statistics. The following factors need to be kept in mind when using the statistics produced:

- Through CHPQA, scheme operators have been given guidance on how to determine the boundary of a CHP scheme (what is regarded as part of the CHP installation and what is not). A scheme can include multiple CHP prime movers[4], along with supplementary boilers and generating plant, subject to appropriate metering being installed to support the CHP scheme boundaries proposed, and subject to appropriate metering and threshold criteria. (See CHPQA Guidance Note 11 available at www.chpqa.com). This point is relevant when considering the figures in Table 6D, where the power efficiencies, heat efficiencies and heat to power ratios stated in that table for 2010 are those of the scheme, which may not be just the prime mover.
- The output of a scheme is based on gross power output. This means that power consumed by parasitic plant such as pumps and fans is included in the power output of the scheme.
- The main purpose of a number of CHP schemes is the generation of electricity including export to other businesses and the grid. Such schemes may not be sized to use all of the available heat. In such cases, the schemes' total electrical capacity and electrical output have been scaled back using the methodologies outlined in CHPQA. Only the portion of the electrical capacity and electrical output that qualifies as Good Quality is counted in this chapter. The remaining electrical capacity and electrical output are regarded as power only, and these are reported in Chapter 5 as part of 'Other Generators'. The fuel allocated to the power-only portion of the output is calculated from the power efficiency of the prime mover.
- There are two load factors presented in Table 6A. Load Factor (CHPQA) is based on the Good Quality Power Output and Good Quality Power Capacity reported in this Chapter. Load Factor (Actual) is based on the Total Power Capacity and the Total Power Output. The Load Factor (CHPQA) is lower than the Load Factor (Actual) for schemes that have been scaled back on the power outputs.
- Over the last two years there has been a noticeable fall in the load factor as measured by both methods. Over the same period there has been a loss of heat load in the chemicals sector and the relevant schemes have responded by either reducing power outputs or continuing to generate power in spite of the fall in heat demand. In the latter case the power output considered Good Quality is reduced and for both responses there is a consequential fall in load factor. In 2010 an appreciable additional increment of generating capacity was commissioned in the oil refineries sector, which was under-utilized, due to energy market conditions, and this has contributed to a fall in load factor over the past year. There is also a trend of falling load factor in the paper sector, and this has occurred at the same time as a fall in capacity and outputs for this sector.

[3] *Reference source for price trends is DECC's 'Quarterly Energy Prices March 2009. Table 3.1.3', available at www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx*

[4] *The CHP prime mover is the heart of a CHP system and is a mechanical machine which drives the electricity generator or develops mechanical power for direct use*

Table 6A: A summary of the recent development of CHP[1]

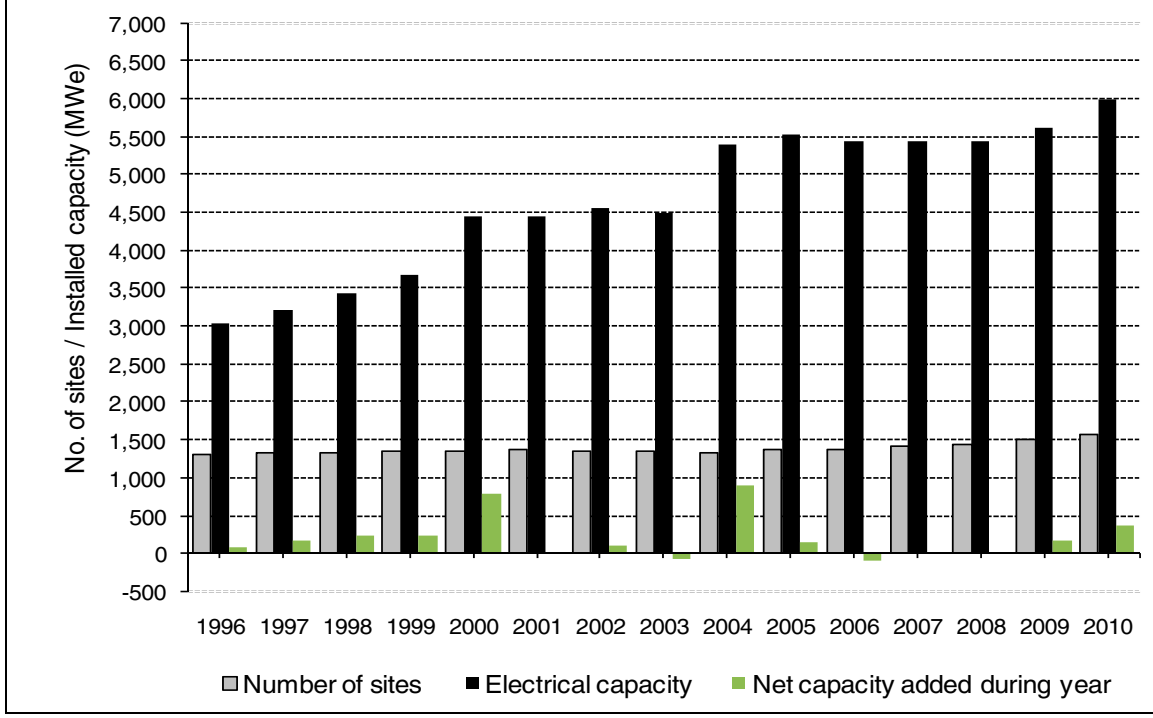
	Unit	2006	2007	2008	2009	2010
Number of schemes		1,363	1,414	1,434	1,495	1,568
Net No. of schemes added during year (2)		-1	51	20	61	73
Electrical capacity (CHP_{QPC})	MWe	5,432	5,438	5,449	5,614	5,989
Net capacity added during year		-101	6	11	165	374
Capacity added in percentage terms	Per cent	-1.8	0.1	0.2	3.0	6.7
Heat capacity	MWth	11,208	11,068	10,882	10,746	10,522
Heat to power ratio *(3)*		1.86	1.84	1.89	1.82	1.83
Fuel input *(4)*	GWh	122,348	118,638	118,833	111,,51	110,323
Electricity generation (CHP_{QPO})	GWh	28,731	27,844	27,547	26,463	26,083
Heat generation (CHP_{QHO})	GWh	53,408	51,312	51,945	48,155	47,815
Overall efficiency *(5)*	Per cent	67.1	66.7	66.9	66.9	67.0
Load factor (CHPQA) *(4)*	Per cent	60.4	58.5	57.7	53.8	49.7
Load factor (Actual) *(6)*	Per cent	63.7	65.0	64.6	56.6	54.4

(1) All data in this table for 2006 to 2010 have been revised since last year's Digest.
(2) Net number of schemes added = New schemes – Decommissioned existing schemes
(3) Heat to power ratios are calculated from the qualifying heat output (QHO) and the qualifying power output (QPO).
(4) The load factor (CHPQA) is based on the qualifying power generation and capacity and does not correspond exactly to the number of hours run by the prime movers in a year
(5) Overall efficiencies are calculated using gross calorific values; overall net efficiencies are some 6 percentage points higher.
(6) The load factor (Actual) is based on the total power generated and total capacity

Changes in CHP capacity

6.11 Chart 6.1 shows the change in installed CHP capacity over the last thirteen years. Installed capacity at the end of 2010 stood at 5,989 MWe. During 2010 107 new CHP schemes came into operation and 34 CHP schemes that were operating in 2009 subsequently closed and did not operate in 2010. This resulted in a net increase of 73 schemes between 2009 and 2010 and a net increase of 374 MWe in installed capacity.

Chart 6.1: Installed CHP capacity by year



6.12 A number of operators have chosen to mothball their CHP schemes rather than continue to operate. As these schemes are still able to operate they have been included in the capacity figures. At the end of 2010, there were 114 mothballed schemes with a Good Quality capacity of 103 MWe.

6.13 Table 6A gives a summary of the overall CHP market. The electricity generated by CHP schemes in 2010 was 26,083 GWh, a decrease of 1.4 per cent on 2009 which represents a little under 7 per cent of the total electricity generated in the UK. Across the commercial and industrial sectors (including the fuel industries other than electricity generation) electrical output from CHP accounted for around 12 per cent of electricity consumption. CHP schemes in total supplied 47,815 GWh of heat in 2010, a decrease of 0.4 per cent since 2009.

6.14 In terms of electrical capacity by size of scheme, schemes larger than 10 MWe represent over 83 per cent of the total electrical capacity of CHP schemes as shown in Table 6B. However, in terms of number of schemes, the largest share (81 per cent) is in schemes less than 1 MWe. Schemes of 1 MWe or larger, make up approximately 19 per cent of the total number of schemes. Table 6.5 provides data on electrical capacity for each type of CHP installation and the map on page 168 shows how these schemes are located around the country.

Table 6B: CHP schemes by capacity size ranges in 2010

Electrical capacity size range	Number of schemes	Share of total (per cent)	Total electricity capacity (MWe)	Share of total (per cent)
Less than 100 kWe	462	29.4	29	0.5
100 kWe - 999 kWe	806	51.4	204	3.4
1 MWe - 9.9 MWe	231	14.7	773	12.9
Greater than 10 MWe	69	4.4	4,984	83.2
Total	**1,568**	**100.0**	**5,989**	**100.0**

6.15 Seventy-seven per cent of electrical capacity is now gas turbine based[5], with about 87 per cent of this (67 per cent in total) in combined cycle mode. After combined cycle, reciprocating engines represent the second largest technology in terms of installed electrical capacity, followed by open cycle gas turbines. Table 6.7 provides data on heat capacity for each type of CHP installation. Over the years there has been a clear downward trend in the capacity of back pressure and pass-out condensing steam turbines.

Fuel used by types of CHP installation

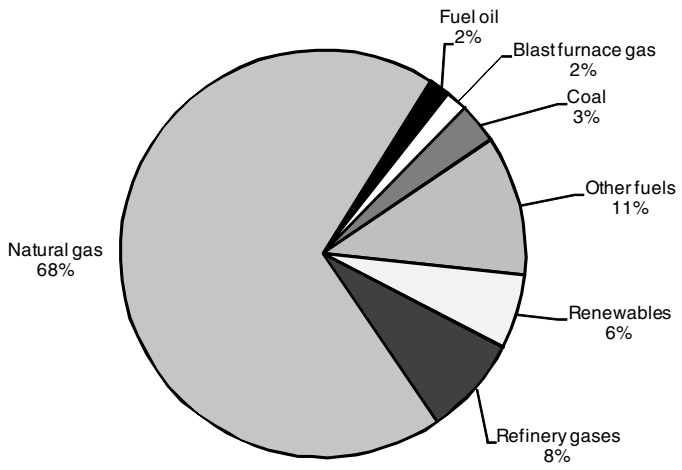
6.16 Table 6.2 shows the fuel used to generate electricity and heat in CHP schemes (see paragraphs 6.38 to 6.40, below for an explanation of the convention for dividing fuel between electricity and heat production). Table 6.3 gives the overall fuel used by types of CHP installation (which are explained in paragraph 6.37). Total fuel use is summarised in Chart 6.2. In 2010, 68 per cent of the total fuel use was natural gas. This is a small decrease compared with 2008 and 2009. Over the same period there was a decrease in the use of fuel oil and coal, continuing a trend that has been present for the last 8 years, and an increase in the proportion of fuel that is renewable. CHP schemes accounted for 7.5 per cent of UK gas demand in 2010 (see Table 4.3). Over the last 10 years the refineries sector has seen a decrease in the use of heavy fuel oil and an increase in the use of natural gas. Since 2005 there has also been an increase in the use of refinery gas. This may be a reflection of the rise in the market value of heavy fuel oil over this same time period. A refinery selling rather than burning the heavy fuel oil it produces, and substituting this with lower value refinery gas and natural gas, the latter having increased in value less than fuel oil, would likely increase its revenue.

6.17 Since 2009 the proportion of all fuels that are renewable has increased from approximately 5 per cent to about 6 per cent in 2010. The increase in renewable fuel use was mainly the result of sharp increases in the use of sewage gas and wood fuels.

[5] *See table 6.5 Gas turbine and Combined cycle.*

6.18 Non-conventional fuels (liquids, solids or gases which are by-products or waste products from industrial processes) account for 21 per cent of all fuel used in CHP in 2010. Some of these are fuels that are not commonly used by the mainstream electricity generating industry, and some would otherwise be flared or disposed of by some means. These fuels, with the exception of some waste gases, will generally be utilised in steam turbines being fed by boilers. In almost all cases, the technical nature of the combustion process, and the lower fuel quality (lower calorific value of the fuel, high moisture content of the fuel, the need to maintain certain combustion conditions to ensure complete disposal etc.) will generally result in a lower efficiency.

Chart 6.2: Types of fuel used by CHP schemes in 2010



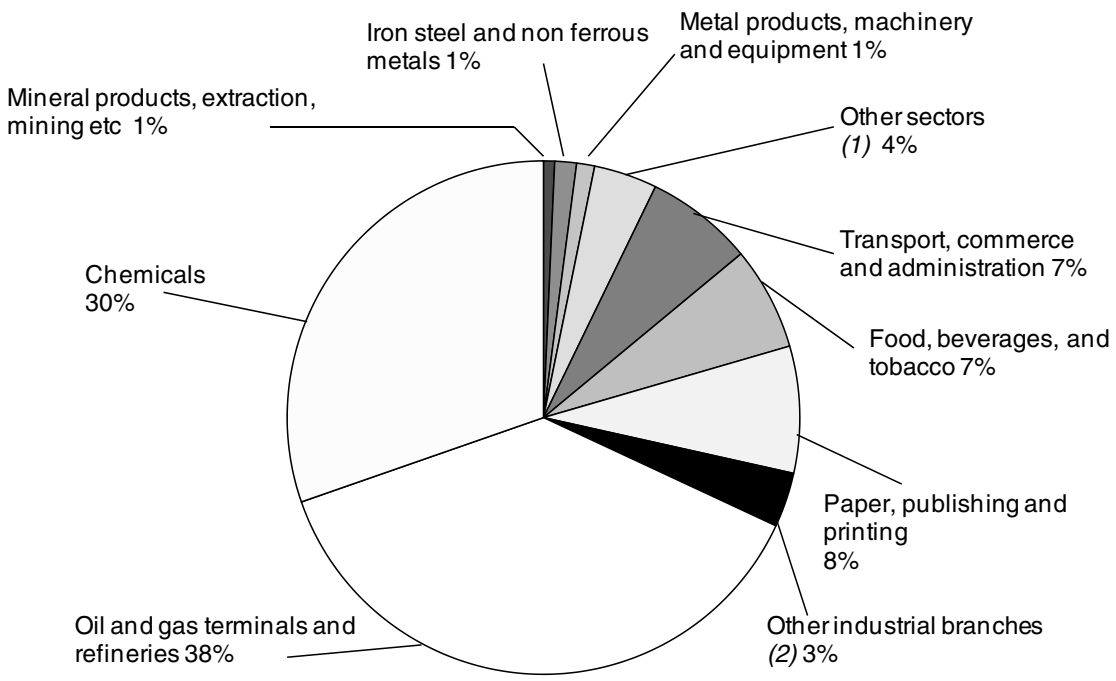
CHP capacity, output and fuel use by sector

6.19 In this chapter of the Digest CHP is allocated to the sector using the heat, or, where the heat is sent to users in more than one sector, to the sector taking the majority of the heat. This method of assigning a CHP scheme to a sector was rigorously applied for the first time in DUKES 2008 and resulted in the movement of CHP schemes between sectors. One consequence of this was the removal of all schemes once allocated to the "electricity supply" sector and their distribution to other sectors. Full details of this reassignment are provided in paragraph 6.33 and Table 6J of DUKES 2008.

6.20 Table 6.8 gives data on all operational schemes by economic sector. A definition of the sectors used in this table can be found in Chapter 1, paragraph 1.59 and Table 1H:

- 343 schemes (89 per cent of electrical capacity) are in the industrial sector and 1,225, schemes (11 per cent of capacity) are in the agricultural, commercial, public administration, residential and transport sectors.
- Three industrial sectors account for about 76 per cent of the CHP electrical capacity – oil refineries (38 per cent), chemicals (30 per cent), and paper and publishing and printing (8 per cent). Capacity by sector is shown in Chart 6.3. The share of capacity attributed to oil refineries increased in 2010 due to the commissioning of a significant additional increment of CHP capacity in this sector. Up until 2008 the chemicals sector had the largest share of CHP electrical capacity.

Chart 6.3: CHP electrical capacity by sector in 2010



(1) Other sectors include agriculture, community heating, leisure, landfill and incineration.
(2) Other industry includes textiles, clothing and footwear, and sewage treatment.

6.21 Table 6C gives a summary of the 1,072 schemes installed in the commercial sector, public sector and residential buildings. These schemes form a major part of the "Transport, commerce and administration" and "Other" sectors in Tables 6.8 and 6.9. The vast majority of these schemes are based on spark ignition reciprocating engines fuelled with natural gas, though the larger schemes use compression ignition reciprocating engines or gas turbines. The largest proportion of the capacity is in the health sector, mainly hospitals. Leisure and hotels account for nearly 60 per cent of the total number of schemes but only about 23 per cent of the electrical capacity, with an average scheme capacity of 134 kWe. Table 6.9 gives details of the quantities of fuels used in each sector.

Table 6C: Number and capacity of CHP schemes installed in buildings by sector in 2010

	Number of schemes	Electrical capacity (MWe)	Heat capacity (MWth)
Leisure	394	50.8	51.2
Hotels	244	34.7	39.9
Health	184	134.3	159.7
Residential Group Heating	35	26.6	59.1
Universities	42	53.7	65.2
Offices	18	14.8	11.4
Education	19	10.3	17.7
Government Estate	15	15.2	17.5
Retail	118	27.2	3.4
Other *(1)*	3	10.5	18.7
Total	**1,072**	**378.1**	**443.7**

(1) All schemes under Other are at airports

CHP performance by main prime mover

6.22 Table 6D gives a summary of the performance of schemes in 2010 by main prime mover type. In 2010 the prime mover type with the highest average operating hours was back pressure steam turbines followed by gas turbines. Combined cycle schemes have historically had the highest average operating hours. However, the data for 2010 is somewhat distorted due to a large addition of combined cycle capacity in 2010 which was only partially utilised. As the operating hours are calculated by dividing power generation by capacity, this gives a lower value of operating hours than would be the case during a normal year. The average operating hours for all schemes is 4,355, which is over 7 per cent lower than the figure for 2009 (4,714 hrs). This fall in average operating hours is consistent with a fall in power generation against a background of an increase in generating capacity, as observed above.

6.23 The average electrical efficiency is 24 per cent and heat efficiency 43 per cent, giving an overall average of 67 per cent, which is the same as in 2009 (all measured on a gross calorific value (GCV) basis).

6.24 The average operating hours for reciprocating engines is the lowest of all the prime mover types. This is a reflection of the fact that many reciprocating engines are deployed in buildings to satisfy space heating and hot water loads, which are seasonal.

Table 6D: A summary of scheme performance in 2010 (1)

	Average operating hours per annum (Full load equivalent)	Average electrical efficiency (% GCV)	Average heat efficiency (% GCV)	Average overall efficiency (% GCV)	Average heat to power ratio
Main prime mover in CHP plant					
Back pressure steam turbine	4,862	11	62	73	5.3
Pass out condensing steam turbine	4,304	17	46	63	2.7
Gas turbine	4,621	21	50	71	2.3
Combined cycle	4,463	26	40	66	1.5
Reciprocating engine	3,492	27	42	69	1.6
All schemes	**4,355**	**24**	**43**	**67**	**1.8**

(1) The figures relate to the CHP scheme which may include supplementary boilers.

CHP schemes which export and schemes with mechanical power output

6.25 Table 6E shows the electrical exports from CHP schemes between 2008 and 2010. Where a scheme that exports is Good Quality for only a portion of its capacity and output, the exports have been scaled back in the same way as power output has been scaled back (see paragraph 6.10, above). Exports accounted for about 31 per cent of power generation from CHP in 2010, but this may be an underestimate as reporting of exports remains voluntary under CHPQA.

Table 6E: Electrical exports from CHP

GWh

	2008	2009	2010
To part of same qualifying group *(1)*	5,668	6,159r	5,206
To a firm NOT part of same qualifying group	2,609	2,069r	2,305
To an electricity supplier	942	565r	674
Total	**9,218**	**8,794r**	**8,185**

(1) A qualifying group is a group of two or more corporate consumers that are connected or related to each other, for example, as a subsidiary, or via a parent or holding company, or in terms of share capital.

6.26 In 2010 31 large schemes also exported heat, some larger schemes to more than one customer. As Table 6F shows, together they supplied 8,546 GWh of heat in 2010.

Table 6F: Heat exports from CHP

GWh

	2008	2009	2010
To part of same qualifying group *(1)*	3,672r	3,618r	1,859
To a firm NOT part of same qualifying group	8,473r	5,787r	6,687
Total	**12,144r**	**9,405r**	**8,546**

(1) A qualifying group is a group of two or more corporate consumers that are connected or related to each other, for example, as a subsidiary, or via a parent or holding company, or in terms of share capital.

6.27 There are an estimated 12 schemes with mechanical power output. For those schemes, mechanical power accounts for around 5 per cent of their total power capacity (Table 6G). These schemes are predominantly on petro-chemicals or steel sites, using by-product fuels in boilers to drive steam turbines. The steam turbine is used to provide mechanical rather than electrical power, driving compressors, blowers or fans, rather than an alternator.

Table 6G: CHP schemes with mechanical power output in 2010

	Unit	
Number of schemes		12
Total Power Capacity of these schemes (CHP_{TPC})	MWe	4,220
Mechanical power capacity of these schemes	MWe	231

Emissions savings

6.28 The calculation of carbon emissions savings from CHP is complex because CHP displaces a variety of fuels, technologies and sizes of plant. The methodology and assumptions used for calculating carbon emission savings are outlined in Energy Trends June 2003 (www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx) and the figures compare CHP with the UK fossil fuel basket carbon intensity and the UK total basket carbon intensity which includes nuclear and renewable generation. The carbon emission savings from CHP in 2010 as compared to the fossil fuel basket were 12.98 $MtCO_2$, which equates to 2.17 Mt CO_2 per 1,000 MWe installed capacity. Against the total basket, in 2010, CHP saved 9.28 Mt CO_2, or 1.55 Mt CO_2 per 1,000 MWe installed capacity. Corresponding figures for 2008 and 2009 are shown in Table 6H. It is worthy of note that, with an exception for 2009 to 2010 for the total basket, since 2007 there has been a downward trend in the carbon intensity of conventionally generated electricity against both measures, and this was particularly marked in the case of the full mix between 2008 and 2009. This downward trend, together with a downward trend in the Good Quality power outputs and heat outputs over the same period, explains the fall in absolute CO_2 savings attributable to CHP. The CO_2 savings per MWe in 2010 are also suppressed by the low load factor recorded for that year, which was the result of a large increment of additional capacity not being under-utilised in 2010 (see paragraph 6.10).

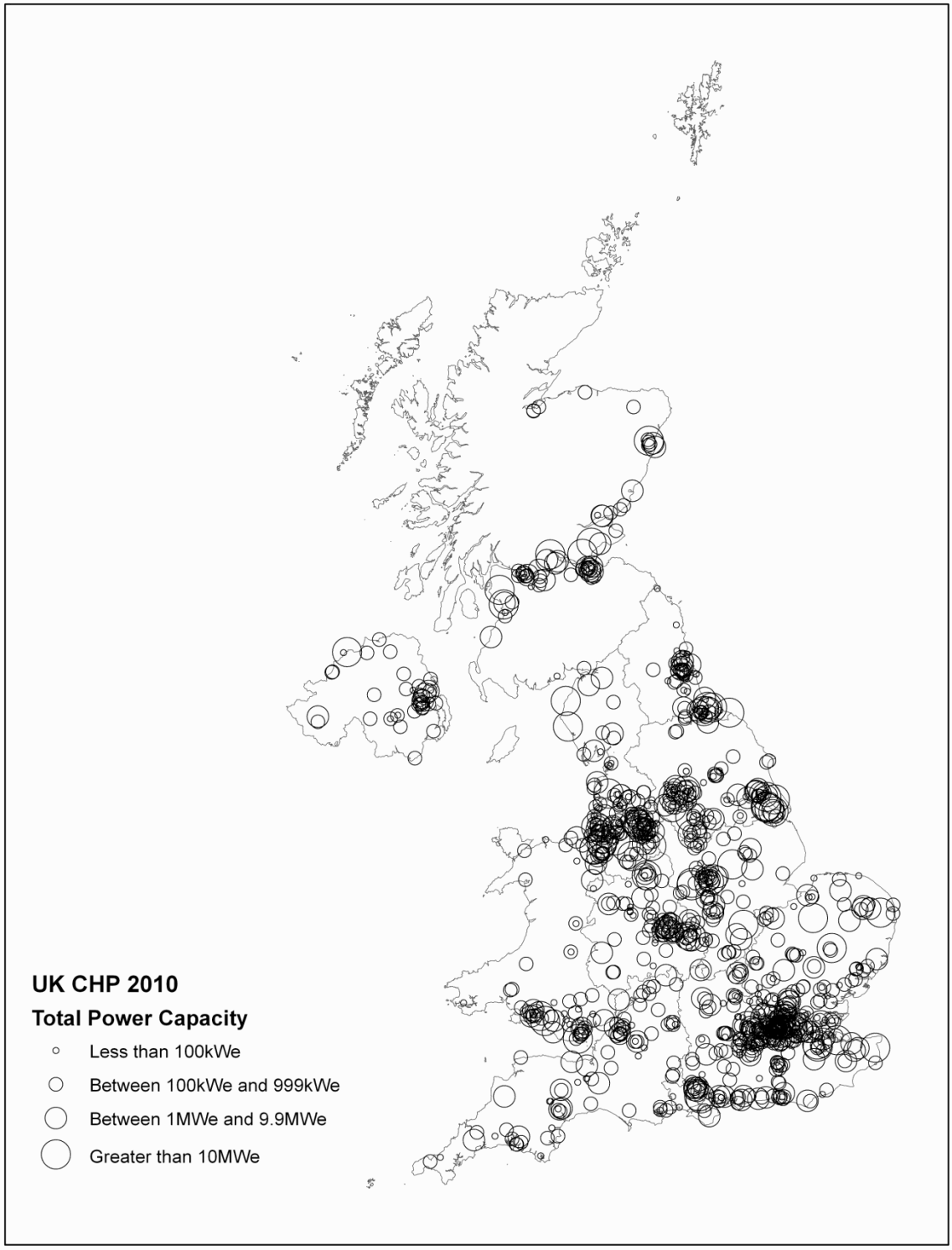
Table 6H: Carbon dioxide savings due to CHP, absolute and per 1,000 MWe of installed good quality CHP capacity

	2008		2009		2010	
	$MtCO_2$	$MtCO_2$/1000 MWe	$MtCO_2$	$MtCO_2$/1000 MWe	$MtCO_2$	$MtCO_2$/1000 MWe
Carbon savings against all fossil fuels	14.20	2.61	13.27	2.36	12.98	2.17
Carbon savings against all fuels (including nuclear and renewables)	10.86	1.99	9.12	1.62	9.28	1.55

Note: (1) The CO_2 savings in Table 6H assume that CHP generated electricity avoids the transmission and distribution losses associated with its conventionally generated equivalent. These losses are assumed to be 1.5% in the case of transmission losses and 6.0% in the case of distribution losses.

(2) The CO_2 savings quoted above for 2010 are based on preliminary CO_2 intensities, for that year, for the fossil fuel basket and the total fuel basket of conventional electricity generation. As such, they are subject to revision at a later date. The CO_2 savings quoted above for 2008 and 2009 have also been revised in response to changes in the CO_2 intensity factors for electricity for these years since reporting in DUKES 2010.

CHP schemes in the United Kingdom by power capacity, 2010



Combined Heat and Power in the EU

6.29 Data on CHP activity is submitted to Eurostat annually in line with the EU Cogeneration Directive. This is calculated on a different basis to the data in chapter 6 of DUKES (supplementary boilers, supplementary firing and auxiliary firing are removed for the EU data submission) and the latest available data is for 2008. It should be noted that there is no agreed methodology within the EU Cogeneration Directive for defining CHP capacity. This means that countries will report to EUROSTAT CHP capacities calculated on differing bases.

6.30 In total the EU has over 100 GW of installed CHP capacity of which 22 per cent is in Germany, followed by the Netherlands and Poland with 9 per cent each. The UK has 6 per cent of the total installed capacity (the 6th highest of the 27 countries).

6.31 Germany also produces the most electricity from CHP but as they also have high overall electricity consumption this only equates to 12.5 per cent of their overall electricity generation (the 12th highest in the EU). Denmark has the highest proportion of electricity produced by CHP (46.1 per cent) and Finland, The Netherlands and Latvia all produce more than 30 per cent of their electricity from CHP.

6.32 Overall 845TWh of heat was produced by CHP in the EU in 2008, of which 21 per cent was contributed by Germany. This equated to 13 per cent of their gross final energy consumption for heating and cooling. CHP heat production contributed 44 per cent of Finland's overall heat consumption and over 30 per cent of Denmark and Sweden's. This compares to around 6 per cent of the UK's.

Technical notes and definitions

6.33 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.26 to 1.58.

Data for 2010

6.34 The data are summarised from the results of a long-term project undertaken by AEA on behalf of the Department of Energy & Climate Change (DECC). Data are included for CHP schemes installed in all sectors of the UK economy.

6.35 The project continues to be overseen by a Steering Group that comprises officials from DECC, the Office of Gas and Electricity Markets (Ofgem) and the Combined Heat and Power Association (CHPA) all of whom have an interest in either the collection of information on CHP schemes or the promotion of the wider use of CHP in the UK.

6.36 Data for 2010 were based on data supplied to the CHPQA programme, on information from the Iron and Steel Statistics Bureau (ISSB), on information from Ofgem in respect of "Renewables Obligation Certificates" (ROCs) and from a survey of anaerobic digestion sites (AD survey). Approximately 96 per cent of the total capacity is from schemes certified under the CHPQA programme, while about 1.2 per cent is from schemes covered by ISSB sources. Since 2005, Sewage Treatment Works that do not provide returns to CHPQA in a format that can be used within these statistics, have been included based on ROCs information from Ofgem returns. The sewage treatment works data from this source accounts for approximately 2.2 per cent of total electrical capacity. The balance of the capacity (about 0.9 per cent) are for schemes included in the AD survey and for schemes not applying to CHPQA and not available from other sources. In the latter case data for these schemes were interpolated from historical data.

Definitions of schemes

6.37 There are four principal types of CHP system:

- **Steam turbine,** where steam at high pressure is generated in a boiler. In **back pressure steam turbine systems**, the steam is wholly or partly used in a turbine before being exhausted from the turbine at the required pressure for the site. In **pass-out condensing steam turbine systems**, a proportion of the steam used by the turbine is extracted at an intermediate pressure from the turbine with the remainder being fully condensed before it is exhausted at the exit. (Condensing steam turbines without passout and which do not utilise steam are not included in these statistics as they are not CHP). The boilers used in such schemes can burn a wide variety of fuels including coal, gas, oil, and waste-derived fuels. With the exception of waste-fired schemes, a steam turbine plant has often been in service for several decades. Steam turbine schemes capable of supplying useful steam have electrical efficiencies of between 10 and 20 per cent, depending on size, and thus between 70 per cent and 30 per cent of the fuel input is available as useful heat. Steam turbines used in CHP applications typically range in size from a few MWe to over 100 MWe.

- **Gas turbine systems**, often aero-engine derivatives, where fuel (gas, or gas-oil) is combusted in the gas turbine and the exhaust gases are normally used in a waste heat boiler to produce usable steam, though the exhaust gases may be used directly in some process applications. Gas turbines range from 30 kWe upwards, achieving electrical efficiency of 23 to 30 per cent (depending on size) and with the potential to recover up to 50 per cent of the fuel input as useful heat. They have been common in CHP since the mid 1980s. The waste heat boiler can include supplementary or auxiliary firing using a wide range of fuels, and thus the heat to power ratio of the scheme can vary.

- **Combined cycle systems**, where the plant comprises more than one prime mover. These are usually gas turbines where the exhaust gases are utilised in a steam generator, the steam from which is passed wholly or in part into one or more steam turbines. In rare cases reciprocating engines may be linked with steam turbines. Combined cycle is suited to larger installations of 7 MWe and over. They achieve higher electrical efficiency and a lower heat to power ratio than steam turbines or gas turbines. Recently installed combined cycle gas turbine (CCGT) schemes

have achieved an electrical efficiency approaching 50 per cent, with 20 per cent heat recovery, and a heat to power ratio of less than 1:1.

- **Reciprocating engine systems** range from less than 100 kWe up to around 5 MWe, and are found in applications where production of hot water (rather than steam) is the main requirement, for example, on smaller industrial sites as well as in buildings. They are based on auto engine or marine engine derivatives converted to run on gas. Both compression ignition and spark ignition firing is used. Reciprocating engines operate at around 28 to 33 per cent electrical efficiency with around 50 per cent to 33 per cent of the fuel input available as useful heat. Reciprocating engines produce two grades of waste heat: high grade heat from the engine exhaust and low grade heat from the engine cooling circuits.

Determining fuel consumption for heat and electricity

6.38 In order to provide a comprehensive picture of electricity generation in the United Kingdom and the fuels used to generate that electricity, the energy input to CHP schemes has to be allocated between heat and electricity production. This allocation is notional and is not determinate.

6.39 The convention used to allocate the fuels to heat and electricity relates the split of fuels to the relative efficiency of heat and electricity supply. The efficiency of utility plant varies widely: electricity generation from as little as 25 per cent to more than 50 per cent and boilers from 50 per cent to more than 90 per cent. Thus it is around twice as hard to generate a unit of electricity as it is to generate a unit of heat. Accordingly a simple convention can be implemented whereby twice as many units of fuel are allocated to each unit of electricity generated, as to each unit of heat supplied. This approach is consistent with the Defra Guidelines for Company Reporting on greenhouse gas emissions and for Negotiated Agreements on energy efficiency agreed between Government and industry as part of the Climate Change Levy (CCL) package. It recognises that, in developing a CHP scheme, both the heat customer(s) and the electricity generator share in the savings, reflecting the fact that more than three-quarters of CHP build in the last few years has been supplied under an energy services arrangement.

6.40 The assumption in this convention that it is twice as hard to generate a unit of electricity as heat, is appropriate for the majority of CHP schemes. However, for some types of scheme (for example in the iron and steel sector) this allocation is less appropriate and can result in very high apparent heat efficiencies. These, however, are only notional efficiencies.

The effects on the statistics of using CHPQA

6.41 Paragraph 6.10 described how schemes were scaled back so that only CHP_{QPC} and CHP_{QPO} are included in the CHP statistics presented in this Chapter. This is illustrated in Table 6K. For information, in 2009 207 schemes were scaled back. In 2008, 177 schemes were scaled back.

6.42 In 2009, the power output from these schemes was scaled back from a total of 33,662 GWh to 12,311 GWh. The total fuel input to these schemes was 98,636 GWh of which 51,229 GWh was regarded as being for power only.

Table 6I: CHP capacity, output and fuel use which has been scaled back in 2010

	Units	
Number of schemes requiring scaling back		208
Total Power Capacity of these schemes (CHP_{TPC})	MWe	6,935
Qualifying Power Capacity of these schemes (CHP_{QPC})	MWe	3,247
Total power output of these schemes (CHP_{TPO})	GWh	33,396
Qualifying Power Output of these schemes (CHP_{QPO})	GWh	13,300
Electricity regarded as "Power only" not from CHP (CHP_{TPO} - CHP_{QPO})	GWh	20,097
Total Fuel Input of these schemes (CHP_{TFI})	GWh	99,190
Fuel input regarded as being for "Power only" use i.e. not for CHP	GWh	48,216

**This figure includes generation from major power producers*

Exports of electricity and heat

6.43 The figures quoted in Tables 6E and 6F for exports of electricity and heat are based mainly on voluntary returns from schemes. As such, there is the potential for these figures to underestimate the

true situation. However, and in respect of exports of electricity, all schemes participating in CHPQA, exporting to the grid and participating in the Levy Exemption Certificate (LEC) scheme are required to identify a meter recording this exported electricity. Where a site meeting these criteria has not volunteered electricity export data this meter reading is used when compiling the data presented in Table 6E. In such cases all electricity read by this meter is assumed to be exported to an electricity supplier, via the grid. If this value exceeds the QPO for the scheme, then the quantity of exported electricity is amended to QPO. For all schemes, where a value of exported electricity is volunteered this figure is used when compiling the data presented in Table 6E.

This approach for Table 6E was adopted for the first time in DUKES 2009. The data presented for 2008 and 2009 in this edition of DUKES have been compiled on the same basis as for 2010.

Exports of heat, quoted in Table 6F, continue to be compiled on the basis of volunteered data only.

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6.1 CHP installations by capacity and size range

	2006	2007	2008	2009	2010
Number of schemes *(1)*	**1,363r**	**1,414r**	**1,434r**	**1,495r**	**1,568**
Less than 100 kWe	462	456	457	448r	462r
100 kWe to 999 kWe	643r	686r	705r	766r	806r
1 MWe to 9.9 MWe	187	202	201r	209r	231r
10.0 MWe and above	71	70	71r	72	69r
					MWe
Total capacity	**5,432**	**5,438**	**5,449r**	**5,614r**	**5,989**
Less than 100 kWe	29	29	28	28	29
100 kWe to 999 kWe	165r	179	181r	195r	204
1 MWe to 9.9 MWe	705	733	709r	725r	773
10.0 MWe and above	4,532	4,497	4,530r	4,666r	4,984

(1) A site may contain more than one CHP scheme.

6.2 Fuel used to generate electricity and heat in CHP installations

GWh

	2006	2007	2008	2009	2010
Fuel used to generate electricity *(1)*					
Coal *(2)*	1,797	1,750	1,856	1,545r	1,486
Fuel oil	1,552	892	887	880r	770
Natural gas	46,860r	46,504r	45,424r	42,908r	41,437
Renewable fuels *(3)*	1,783	1,742	2,373	2,904r	3,452
Other fuels *(4)*	10,801	10,300	10,100	9,520r	9,778
Total all fuels	**62,793r**	**61,189r**	**60,640r**	**57,758r**	**56,922**
Fuel used to generate heat					
Coal *(2)*	2,559	2,369	2,418	2,134r	2,062
Fuel oil	2,006	1,248	1,178	1,265r	1,089
Natural gas	39,266r	38,512r	38,678r	35,027r	34,045
Renewable fuels *(3)*	1,400	1,477	2,344	2,553r	3,066
Other fuels *(4)*	14,323	13,842	13,574	12,772r	13,139
Total all fuels	**59,555r**	**57,449r**	**58,192r**	**53,753r**	**53,401**
Overall fuel use					
Coal *(2)*	4,356	4,120	4,274	3,679r	3,548
Fuel oil	3,558	2,140	2,065	2,146r	1,859
Natural gas	86,126r	85,016r	84,103r	77,936r	75,481
Renewable fuels *(3)*	3,183	3,219	4,717	5,458r	6,518
Other fuels *(4)*	25,124	24,142	23,674r	22,293r	22,916
Total all fuels	**122,348r**	**118,638r**	**118,833r**	**111,511r**	**110,323**

(1) See paragraphs 6.35 to 6.37 for an explanation of the method used to allocate fuel use between heat generation and electricity generation.
(2) Includes coke and semi-coke.
(3) Renewable fuels include: Biomass; sewage gas; other biogases; municipal waste and refuse derived fuels.
(4) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.3 Fuel used by types of CHP installation

GWh

	2006	2007	2008	2009	2010
Coal					
Back pressure steam turbine	693	592	521	513	549
Gas turbine	-	43	29	-	-
Combined cycle	589	568	834	327r	197
Reciprocating engine	-	-	8	1	-
Pass out condensing steam turbine	3,074	2,916	2,881	2,838r	2,802
Total coal	**4,356**	**4,120**	**4,274**	**3,679r**	**3,548**
Fuel oil					
Back pressure steam turbine	207	138	140	185	142
Gas turbine	12	3	1	1r	5
Combined cycle	2,994	1,629	1,474	1,466r	1,416
Reciprocating engine	140	139	153	131r	122
Pass out condensing steam turbine	206	232	297	362	174
Total fuel oil	**3,558**	**2,140**	**2,065**	**2,146r**	**1,859**
Natural gas					
Back pressure steam turbine	2,154	1,855	1,694	1,730r	1,752
Gas turbine	11,462	11,763	10,809r	10,636r	9,957
Combined cycle	64,979	63,719	63,907	57,079r	54,920
Reciprocating engine	6,402r	6,713r	6,830r	7,625r	7,868
Pass out condensing steam turbine	1,128	966	863	866r	983
Total natural gas	**86,126r**	**85,016r**	**84,103r**	**77,936r**	**75,481**
Renewable fuels *(1)*					
Back pressure steam turbine	535	525	1,521	1,339r	1,390
Gas turbine	26	10	-	1r	1
Combined cycle	654	611	520	562	560
Reciprocating engine	1,317	1,462	1,508	1,730r	2,458
Pass out condensing steam turbine	651	611	1,167	1,826r	2,109
Total renewable fuels	**3,183**	**3,219**	**4,717**	**5,458r**	**6,518**
Other fuels *(2)*					
Back pressure steam turbine	5,829	5,090	5,089	4,932	4,929
Gas turbine	4,125	4,024	3,514	3,695r	3,499
Combined cycle	10,516	10,837	11,274	9,911r	10,637
Reciprocating engine	57	51	36	49r	54
Pass out condensing steam turbine	4,597	4,141	3,761	3,705	3,797
Total other fuels	**25,124**	**24,142**	**23,674r**	**22,293r**	**22,916**
Total - all fuels					
Back pressure steam turbine	9,418	8,199	8,966	8,699r	8,763
Gas turbine	15,625	15,843	14,353r	14,333r	13,461
Combined cycle	79,733	77,363	78,009	69,346r	67,731
Reciprocating engine	7,916r	8,365r	8,535r	9,536r	10,502
Pass out condensing steam turbine	9,655	8,867	8,969	9,597r	9,866
Total all fuels	**122,348r**	**118,638r**	**118,833r**	**111,511r**	**110,323**

(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuel
(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.4 CHP - electricity generated by fuel and type of installation

GWh

	2006	2007	2008	2009	2010
Coal					
Back pressure steam turbine	77	63	57	52	64
Gas turbine	-	7	5	-	-
Combined cycle	136	120	172	56r	31
Reciprocating engine	-	-	1	0	-
Pass out condensing steam turbine	517	514	501	501r	509
Total coal	**730**	**704**	**736**	**610r**	**605**
Fuel oil					
Back pressure steam turbine	25	16	16	20	18
Gas turbine	3	1	0	0	1
Combined cycle	618	316	303	285r	272
Reciprocating engine	47	47	51	45r	42
Pass out condensing steam turbine	34	36	44	58	30
Total fuel oil	**727**	**417**	**413**	**408r**	**363**
Natural gas					
Back pressure steam turbine	172	142	122	125	135
Gas turbine	2,464	2,701	2,369r	2,407r	2,346
Combined cycle	17,600	16,952	16,715	15,482r	14,799
Reciprocating engine	1,615r	1,686r	1,705r	1,973r	2,008
Pass out condensing steam turbine	135	144	131	135r	155
Total natural gas	**21,985r**	**21,625r**	**21,043r**	**20,122r**	**19,442**
Renewable fuels *(1)*					
Back pressure steam turbine	70	71	215	201r	197
Gas turbine	4	1	-	0	0
Combined cycle	60	21	10	16	15
Reciprocating engine	387	445	460	528r	684
Pass out condensing steam turbine	109	115	212	339r	425
Total renewable fuels	**631**	**653**	**898**	**1,083r**	**1,320**
Other fuels *(2)*					
Back pressure steam turbine	641	593	628	604	604
Gas turbine	571	608	540	572r	503
Combined cycle	2,860	2,800	2,899	2,567	2,742
Reciprocating engine	14	12	8r	12r	15
Pass out condensing steam turbine	573	432	383	484	488
Total other fuels	**4,659**	**4,445**	**4,458**	**4,240r**	**4,352**
Total - all fuels					
Back pressure steam turbine	987	884	1,037	1,003r	1,017
Gas turbine	3,041	3,318	2,915r	2,980r	2,851
Combined cycle	21,274	20,209	20,098	18,406r	17,859
Reciprocating engine	2,062r	2,191r	2,226r	2,559r	2,749
Pass out condensing steam turbine	1,367	1,241	1,271	1,517r	1,607
Total all fuels	**28,731r**	**27,844r**	**27,547r**	**26,463r**	**26,083**

(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fue
(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.5 CHP - electrical capacity by fuel and type of installation

MWe

	2006	2007	2008	2009	2010
Coal					
Back pressure steam turbine	26	28	20	19	20
Gas turbine	-	1	1	-	-
Combined cycle	18	20	26	21r	13
Reciprocating engine	-	-	1	0	-
Pass out condensing steam turbine	150	145	145	144	143
Total coal	**195**	**194**	**193**	**184r**	**176**
Fuel oil					
Back pressure steam turbine	9	7	7	7	6
Gas turbine	0	0	0	0	10
Combined cycle	131	68	60	63r	61
Reciprocating engine	16	16	16	15	15
Pass out condensing steam turbine	8	10	12	12	8
Total fuel oil	**165**	**102**	**94**	**97r**	**101**
Natural gas					
Back pressure steam turbine	61	47	37	39	38
Gas turbine	479	502	488r	501r	484
Combined cycle	3,015	3,029	3,002	3,108r	3,343
Reciprocating engine	496	522	539r	589r	603
Pass out condensing steam turbine	43	39	39	39r	41
Total natural gas	**4,094r**	**4,139r**	**4,104r**	**4,275r**	**4,509**
Renewable fuels *(1)*					
Back pressure steam turbine	16	16	37	35	35
Gas turbine	1	0	-	0	0
Combined cycle	10	8	3	3	3
Reciprocating engine	100	116	119	131r	160
Pass out condensing steam turbine	23	23	45	71r	79
Total renewable fuels	**149**	**163**	**203**	**240r**	**276**
Other fuels *(2)*					
Back pressure steam turbine	112	109	109	109	109
Gas turbine	113	119	114	117r	123
Combined cycle	494	509	535	493	582
Reciprocating engine	4	4	3	5r	10
Pass out condensing steam turbine	105	99	93	93	102
Total other fuels	**828**	**840**	**854**	**817r**	**926**
Total - all fuels					
Back pressure steam turbine	225	207	210	210	209
Gas turbine	593	623	604r	618r	617
Combined cycle	3,668	3,635	3,625	3,687r	4,002
Reciprocating engine	616	658	678r	740r	787
Pass out condensing steam turbine	330	315	333	359	373
Total all fuels	**5,432**	**5,438**	**5,449r**	**5,614r**	**5,989**

(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuels.
(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.6 CHP - heat generated by fuel and type of installation

GWh

	2006	2007	2008	2009	2010
Coal					
Back pressure steam turbine	504	442	373	367	421
Gas turbine	-	24	19	-	-
Combined cycle	170	155	237	72r	45
Reciprocating engine	-	-	4	0	-
Pass out condensing steam turbine	1,503	1,380	1,396	1,336r	1,311
Total coal	**2,177**	**2,002**	**2,028**	**1,775r**	**1,777**
Fuel oil					
Back pressure steam turbine	181	122	117	136	118
Gas turbine	5	2	1	1	2
Combined cycle	1,568	901	789	822r	800
Reciprocating engine	43	44	49	40r	37
Pass out condensing steam turbine	90	101	131	162	74
Total fuel oil	**1,886**	**1,169**	**1,086**	**1,160r**	**1,031**
Natural gas					
Back pressure steam turbine	1,672	1,444	1,278	1,284r	1,275
Gas turbine	5,648	5,679	5,432r	5,135r	4,764
Combined cycle	25,976	25,396	25,751	22,557r	21,706
Reciprocating engine	2,839r	2,938r	3,065r	3,333r	3,506
Pass out condensing steam turbine	611	507	402	418r	524
Total natural gas	**36,747r**	**35,964r**	**35,927r**	**32,727r**	**31,775**
Renewable fuels *(1)*					
Back pressure steam turbine	242	176	755	745r	692
Gas turbine	14	5	-	0	0
Combined cycle	107	85	82	77	76
Reciprocating engine	444	518	493	512r	779
Pass out condensing steam turbine	143	141	256	457r	650
Total renewable fuels	**949**	**924**	**1,586**	**1,791r**	**2,198**
Other fuels *(2)*					
Back pressure steam turbine	3,314	2,911	3,079	2,879	2,877
Gas turbine	1,962	1,891	1,734	1,830r	1,792
Combined cycle	4,209	4,562	4,811	4,319r	4,616
Reciprocating engine	23	22	11	15r	18
Pass out condensing steam turbine	2,141	1,867	1,681	1,658	1,731
Total other fuels	**11,649**	**11,253**	**11,317**	**10,701r**	**11,034**
Total - all fuels					
Back pressure steam turbine	5,912	5,094	5,602	5,411r	5,383
Gas turbine	7,630	7,601	7,185r	6,966r	6,559
Combined cycle	32,030	31,100	31,669	27,847r	27,243
Reciprocating engine	3,348r	3,522r	3,623r	3,900r	4,340
Pass out condensing steam turbine	4,488	3,995	3,865	4,030r	4,290
Total all fuels	**53,408r**	**51,312r**	**51,945r**	**48,155r**	**47,815**

(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuels.
(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.7 CHP - heat capacity by fuel and type of installation

MWth

	2006	2007	2008	2009	2010
Coal					
Back pressure steam turbine	152	160	127	122	128
Gas turbine	-	3	4	-	-
Combined cycle	14	16	19	15r	10
Reciprocating engine	-	-	1	0	-
Pass out condensing steam turbine	453	424	444	432	412
Total coal	**619**	**604**	**595**	**570r**	**550**
Fuel oil					
Back pressure steam turbine	51	42	39	41	36
Gas turbine	1	0	0	0	56
Combined cycle	275	119	102	111	104
Reciprocating engine	18	18	18	14r	14
Pass out condensing steam turbine	23	28	36	39	22
Total fuel oil	**367**	**207**	**195**	**205r**	**232**
Natural gas					
Back pressure steam turbine	364	348	289	295	273
Gas turbine	1,424	1,402	1,381	1,257r	1,206
Combined cycle	4,252	4,431	4,391	4,437r	4,220
Reciprocating engine	667	661	642r	638r	632
Pass out condensing steam turbine	176	159	130	140	161
Total natural gas	**6,884**	**7,001**	**6,833r**	**6,767r**	**6,493**
Renewable fuels *(1)*					
Back pressure steam turbine	47	45	45	40	39
Gas turbine	2	2	-	-	0
Combined cycle	17	16	16	17	17
Reciprocating engine	113	111	110	111r	112
Pass out condensing steam turbine	43	43	43	43	43
Total renewable fuels	**222**	**218**	**215**	**211r**	**211**
Other fuels *(2)*					
Back pressure steam turbine	397	380	380	381	380
Gas turbine	1,586	1,572	1,536	1,577	1,556
Combined cycle	746	740	795	700r	749
Reciprocating engine	4	4	4	6r	6
Pass out condensing steam turbine	383	342	329	328	345
Total other fuels	**3,116**	**3,039**	**3,044**	**2,992r**	**3,036**
Total - all fuels					
Back pressure steam turbine	1,011	975	879	879	857
Gas turbine	3,013	2,980	2,921	2,834r	2,819
Combined cycle	5,304	5,323	5,323	5,280	5,099
Reciprocating engine	801	794	776r	769r	764
Pass out condensing steam turbine	1,079	996	983	983	983
Total all fuels	**11,208**	**11,068**	**10,882r**	**10,746r**	**10,522**

(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuels.
(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.8 CHP capacity, output and total fuel use[1] by sector

	2006	2007	2008	2009	2010
Iron and steel and non ferrous metals					
Number of sites	7	8	8	8	8
Electrical capacity	81	80	78	78	82
Heat capacity	285	285	285	285	285
Electrical output	520	367	349	467	442
Heat output	1,812	1,718	1,592	1,589	1,575
Fuel use	3,984	3,812	3,593	3,569	3,462
of which : for electricity	1,426	1,096	1,024	1,232	1,204
for heat	2,558	2,716	2,569	2,337	2,259
Chemicals					
Number of sites	49r	48r	45r	46	49
Electrical capacity	1,817r	1,788r	1,770r	1,800r	1,816
Heat capacity	3,920	3,818	3,779	3,756	3,734
Electrical output	10,076r	9,394r	9,278r	7,199r	7,056
Heat output	18,295r	17,101r	17,110r	14,161r	14,450
Fuel use	43,014r	40,500r	40,976r	33,373r	33,520
of which : for electricity	22,537r	21,333r	21,449r	17,079r	16,821
for heat	20,477r	19,167r	19,527r	16,294r	16,698
Oil and gas terminals and oil refineries					
Number of sites	9	9	9	9	9
Electrical capacity	1,731	1,765	1,763	1,901r	2,260
Heat capacity	3,677	3,677	3,677	3,677	3,677
Electrical output	10,040	9,940	9,823	10,672r	10,700
Heat output	16,779	16,894	17,244	16,727r	16,752
Fuel use	40,426	40,068	39,543	39,766r	39,751
of which : for electricity	21,679	21,429	20,884	21,898r	21,843
for heat	18,747	18,639	18,659	17,868r	17,908
Paper, publishing and printing					
Number of sites	26	26	26	24	23
Electrical capacity	619	535	556	509	478
Heat capacity	1,217	1,182	1,169	1,106	975
Electrical output	3,394	3,062	3,074	2,710r	2,289
Heat output	6,770	6,137	6,386	5,966r	5,109
Fuel use	14,028	12,865	13,126	12,179r	10,483
of which : for electricity	6,927	6,388	6,374	5,769r	4,934
for heat	7,100	6,477	6,752	6,409r	5,549
Food, beverages and tobacco					
Number of sites	39r	39r	36r	38r	36
Electrical capacity	408	423r	404	406	390
Heat capacity	923	911	814	814	763
Electrical output	1,950r	2,100r	1,961r	2,103r	2,076
Heat output	4,573r	4,214r	4,349r	4,355r	4,105
Fuel use	8,597r	8,536r	8,359r	8,712r	8,301
of which : for electricity	3,941r	4,251r	3,975r	4,241r	4,154
for heat	4,656r	4,285r	4,384r	4,472r	4,147

For footnotes see page 182

6.8 CHP capacity, output and total fuel use[1] by sector (continued)

	2006	2007	2008	2009	2010
Metal products, machinery and equipment					
Number of sites	17	18	17	17	18
Electrical capacity	37	69	68	68	68
Heat capacity	38	57	56	56	56
Electrical output	146	174	206	172r	176
Heat output	214	211	221	196r	196
Fuel use	633	609	619	558r	601
of which : for electricity	346	370	389	342r	366
for heat	286	239	229	216r	235
Mineral products, extraction, mining and agglomeration of solid fuels					
Number of sites	7r	7r	7r	6r	6
Electrical capacity	38r	38r	50r	42r	42
Heat capacity	208r	208r	199r	172r	172
Electrical output	171r	172r	142r	133r	122
Heat output	742r	707r	590r	500r	553
Fuel use	1,217r	1,151r	996r	903r	921
of which : for electricity	368r	376r	324r	316r	292
for heat	848r	775r	672r	587r	629
Sewage treatment					
Number of sites	123r	159r	160r	172r	185
Electrical capacity	128r	145r	147	151r	162
Heat capacity	138	138	137	137	136
Electrical output	445r	499r	532r	598r	702
Heat output	513r	584r	579r	594r	847
Fuel use	1,523r	1,651r	1,766r	1,983r	2,535
of which : for electricity	970r	1,043r	1,155r	1,341r	1,602
for heat	552r	608r	612r	641r	933
Other industrial branches *(2)*					
Number of sites	8r	8r	9r	9r	9
Electrical capacity	47r	44r	44r	44r	44
Heat capacity	51r	51r	51r	51r	51
Electrical output	155r	176r	181r	162r	174
Heat output	246r	269r	247	224r	239
Fuel use	579r	660r	662r	568r	610
of which : for electricity	331r	386r	404r	343r	369
for heat	249r	274r	259r	225r	242
Total industry					
Number of sites	285r	322r	317r	329r	343
Electrical capacity	4,907r	4,887r	4,880r	5,000r	5,343
Heat capacity	10,457r	10,327r	10,168r	10,053r	9,849
Electrical output	26,897r	25,885r	25,547r	24,215r	23,737
Heat output	49,944r	47,834r	48,321r	44,311r	43,826
Fuel use	114,000r	109,852r	109,640r	101,611r	100,184
of which : for electricity	58,526r	56,672r	55,978r	52,562r	51,584
for heat	55,474r	53,180r	53,662r	49,049r	48,599

For footnotes see page 182

6.8 CHP capacity, output and total fuel use[1] by sector (continued)

	2006	2007	2008	2009	2010
Transport, commerce and administration					
Number of sites	803r	821r	850r	899r	939
Electrical capacity	320r	345r	370r	398r	407
Heat capacity	500r	494r	471r	449r	430
Electrical output	1,168r	1,303r	1,429r	1,518r	1,576
Heat output	2,392r	2,471r	2,665r	2,659r	2,737
Fuel use	5,182r	5,551r	6,171r	6,340r	6,562
of which : for electricity	2,520r	2,823r	3,197r	3,368r	3,502
for heat	2,662r	2,727r	2,974r	2,972r	3,060
Other *(3)*					
Number of sites	275r	271r	267r	267r	286
Electrical capacity	205r	205r	199r	216r	239
Heat capacity	250r	247r	244r	243r	243
Electrical output	666r	656r	572r	731r	769
Heat output	1,072r	1,007r	959r	1,184r	1,253
Fuel use	3,166r	3,235r	3,022r	3,560r	3,577
of which : for electricity	1,747r	1,693r	1,465r	1,828r	1,835
for heat	1,419r	1,542r	1,557r	1,732r	1,742
Total CHP usage by all sectors					
Number of sites	1,363r	1,414r	1,434r	1,495r	1,568
Electrical capacity	5,432	5,438	5,449r	5,614r	5,989
Heat capacity	11,208	11,068	10,882r	10,746r	10,522
Electrical output	28,731r	27,844r	27,547r	26,463r	26,083
Heat output	53,408r	51,312r	51,945r	48,155r	47,815
Fuel use	122,348r	118,638r	118,833r	111,511r	110,323
of which : for electricity	62,793r	61,189r	60,640r	57,758r	56,922
for heat	59,555r	57,449r	58,192r	53,753r	53,401

(1) The allocation of fuel use between electricity and heat is largely notional and the methodology is outlined in paragraphs 6.35 to 6.37.

(2) Other industry includes Textiles, clothing and footwear sector.

(3) Sectors included under Other are agriculture, community heating, leisure, landfill and incineration.

6.9 CHP - use of fuels by sector

GWh

	2006	2007	2008	2009	2010
Iron and steel and non ferrous metals					
Coal	-	-	-	-	
Fuel oil	79	105	170	235	47
Natural gas	181	195	313	277	274
Blast furnace gas	3,083	2,885	2,490	2,232	1,920
Coke oven gas	641	628	621	826	1,221
Other fuels *(1)*	-	-	-	-	
Total iron and steel and non ferrous metals	**3,984**	**3,812**	**3,593**	**3,569**	**3,462**
Chemicals					
Coal	3,395	3,372	3,653	3,103r	3,016
Fuel oil	292	153	137	132r	132
Gas oil	98	28	21	11	191
Natural gas	35,303r	33,337r	33,567r	26,458r	26,044
Refinery gas	1,181	1,181	1,181	1,181	1,181
Renewable fuels *(2)*	26	10	-	3	81
Other fuels *(1)*	2,719	2,420	2,417	2,485	2,874
Total chemical industry	**43,014r**	**40,500r**	**40,976r**	**33,373r**	**33,520**
Oil and gas terminals and oil refineries					
Fuel oil	2,844	1,606	1,466	1,464	1,416
Gas oil	80	122	112	159	164
Natural gas	21,041	22,045	21,618	23,240r	23,408
Refinery gas	4,651	5,583	5,703	5,795r	7,509
Other fuels *(1)*	11,810	10,711	10,644	9,108r	7,254
Total oil refineries	**40,426**	**40,068**	**39,543**	**39,766r**	**39,751**
Paper, publishing and printing					
Coal	595	437	402	359r	323
Fuel oil	3	0	12	0	-
Gas oil	188	22	20	23r	20
Natural gas	13,092	12,255	11,552	10,124r	8,084
Renewable fuels *(2)*	-	-	1,032	1,590r	1,905
Other fuels *(1)*	150	151	108	83	151
Total paper, publishing and printing	**14,028**	**12,865**	**13,126**	**12,179r**	**10,483**
Food, beverages and tobacco					
Coal	338	238	156	194	186
Fuel oil	199	137	127	183r	142
Gas oil	81	59	26	44r	107
Natural gas	7,959r	8,094r	8,043r	8,272r	7,809
Renewable fuels *(2)*	1	2	7	18	55
Other fuels *(1)*	20	5	-	2	2
Total food, beverages and tobacco	**8,597r**	**8,536r**	**8,359r**	**8,712r**	**8,301**
Metal products, machinery and equipment					
Fuel oil	89	89	89	89	89
Gas oil	0	0	0	0	0
Natural gas	439	455	504	434r	445
Renewable fuels *(2)*	104	65	26	34r	67
Total metal products, machinery and equipment	**633**	**609**	**619**	**558r**	**601**

For footnotes see page 184

6.9 CHP - use of fuels by sector (continued)

GWh

	2006	2007	2008	2009	2010
Mineral products, extraction, mining and agglomeration of solid fuels					
Coal	-	-	-	-	
Fuel oil	-	-	-	-	
Gas oil	1	0	0	3	1
Natural gas	945r	882r	704r	612r	656
Coke oven gas	271	269	291	288	264
Total mineral products, extraction, mining and agglomeration of solid fuels	**1,217r**	**1,151r**	**996r**	**903r**	**921**
Sewage treatment					
Fuel oil	41	48	62	30r	31
Gas oil	20	23	17	27r	25
Natural gas	145	118	179r	215	201
Renewable fuels *(2)*	1,317r	1,462r	1,508r	1,710r	2,278
Total sewage treatment	**1,523r**	**1,651r**	**1,766r**	**1,983r**	**2,535**
Other industrial branches					
Fuel oil	-	-	-	-	
Gas oil	1	13	3	0	0
Natural gas	579r	647r	660r	568r	610
Total other industrial branches	**579r**	**660r**	**662r**	**568r**	**610**
Transport, commerce and administration					
Coal	0	43	29	-	-
Fuel oil	3r	2r	2r	11r	1
Gas oil	125r	43r	19r	23r	25
Natural gas	4,688r	5,121r	5,299r	5,610r	5,834
Refinery gas	-	-	-	-	
Renewable fuels *(2)*	366r	342r	822r	696r	701
Other fuels *(1)*	-	-	-	-	2
Total transport, commerce and administration	**5,182r**	**5,551r**	**6,171r**	**6,340r**	**6,562**
Other *(3)*					
Coal	28	29	33	24	23
Fuel oil	9r	-r	-r	1	1
Gas oil	4r	0r	0r	3r	1
Natural gas	1,754r	1,868r	1,665r	2,125r	2,115
Renewable fuels *(2)*	1,369r	1,338r	1,322r	1,406r	1,431
Other fuels *(1)*	1	1	1	1	6
Total other	**3,166r**	**3,235r**	**3,022r**	**3,560r**	**3,577**
Total - all sectors					
Coal	4,356	4,120	4,274	3,679r	3,548
Fuel oil	3,558	2,140	2,065	2,146r	1,859
Gas oil	599	309	218r	292r	534
Natural gas	86,126r	85,016r	84,103r	77,936r	75,481
Blast furnace gas	3,083	2,885	2,490	2,232	1,920
Coke oven gas	911	897	912	1,114	1,484
Refinery gas	5,832	6,764	6,884	6,976r	8,690
Renewable fuels *(2)*	3,183	3,219	4,717	5,458r	6,518
Other fuels *(1)*	14,699	13,287	13,170	11,680r	10,288
Total CHP fuel use	**122,348r**	**118,638r**	**118,833r**	**111,511r**	**110,323**

(1) Other fuels include: process by-products.
(2) Renewable fuels include: sewage gas, other biogases, municipal solid waste and refuse derived fuels.
(3) Sectors included under Other are agriculture, community heating, leisure, landfill and incineration.

Chapter 7
Renewable sources of energy

Key points

- Electricity generation from renewable sources increased by around 2 per cent between 2009 and 2010 to reach 25.7 TWh. Capacity grew by 15 per cent (to 9.2 GW) over the same period. (paragraphs 7.16 and 7.18; table 7.4)
- Offshore wind generation was 75 per cent higher than in 2009, with capacity up 42 per cent. (paragraphs 7.16 and 7.18; table 7.4)
- Load factors for onshore wind generation and hydro were lower during 2010, due to lower wind speeds and less rain. (paragraph 7.20)
- 68MW of electricity capacity was introduced via feed-in tariffs during 2010, following the introduction of the FIT scheme in April 2010. (paragraph 7.18)
- The contribution of all renewables to UK electricity generation was 6.8 per cent in 2010, 0.1 percentage points higher than one year earlier. However when using normalised load factors to take account of fluctuations in wind and hydro, the contribution of renewables to gross electricity consumption increased from 6.6 per cent to 7.4 percent. (table 7B)
- Heat from renewable sources increased by 17 per cent during 2010 (to 1,212 ktoe); and renewable biofuels for transport also rose by 17 per cent (to 1,214ktoe). (paragraphs 7.25 and 7.30; table 7.6)
- Progress has been made against the UK's 15 per cent target introduced in the 2009 EU Renewables Directive. Using the methodology required by the Directive, 3.3 per cent of energy consumption in 2010 came from renewable sources; this is up from 3.0 per cent in 2009. (table 7C)

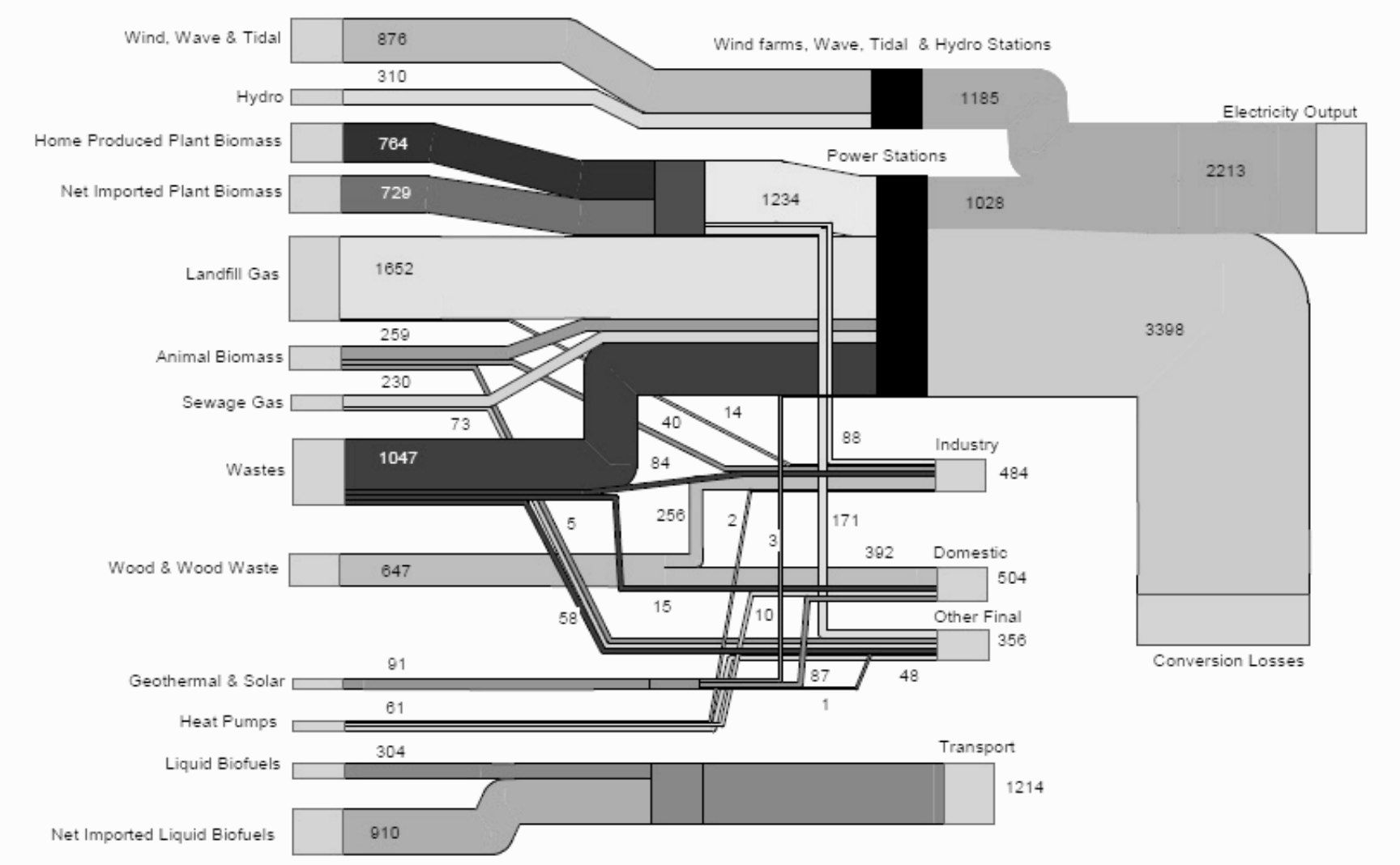
Introduction

7.1 This chapter provides information on the contribution of renewable energy sources to the United Kingdom's energy requirements. It covers the use of renewables to generate electricity, the burning of renewable fuels to produce heat either in boilers (or cookers) or in combined heat and power (CHP) plants, heat obtained from other renewable sources including geothermal, active solar and heat pumps, and the use of liquid biofuels for transport. The chapter includes some sources that under international definitions are not counted as renewable sources or are counted only in part. This is to ensure that this Digest covers all sources of energy available in the United Kingdom. However, within this chapter the international definition of total renewables is used and this excludes non-biodegradable wastes. The energy uses of these wastes are still shown in the tables of this chapter but as "below the line" items.

7.2 The data summarise the results of DECC surveys of electricity generators, information from CHP schemes, and an ongoing study undertaken by AEA on behalf of DECC to update a database containing information on all relevant renewable energy sources in the United Kingdom. This database is called RESTATS, the Renewable Energy STATisticS database.

7.3 The AEA study started in 1989, when all relevant renewable energy sources were identified and, where possible, information was collected on the amounts of energy derived from each source. New technologies have been included for more recent years, such as the inclusion of energy from heat pumps from 2008 onwards. The technical notes at the end of this chapter define these renewable energy sources. The database now contains 22 years of data from 1989 to 2010. Information within RESTATS was recently combined with data obtained from monitoring the planning process for new renewable installations to ensure that it is comprehensive.

Renewables flow chart 2010 (thousand tonnes of oil equivalent)



Note: This flow chart is based on data that appear in Tables 7.1 and 7.4

7.4 The information contained in the database is collected by a number of methods. For larger projects, an annual survey is carried out in which questionnaires are sent to project managers. For technologies in which there are large numbers of small projects, the values given in this chapter are estimates based on information collected from a sub-sample of the projects. Some data are also collected via other methods, such as desk research. Further details about the data collection methodologies used in RESTATS, including the quality and completeness of the information, are given in the technical notes at the end of this chapter, and in a guidance note on the DECC website at: www.decc.gov.uk/en/content/cms/statistics/source/renewables/renewables.aspx

7.5 A renewable energy flow chart for 2010, showing the flows of renewables from fuel inputs through to consumption, is included. This is a way of simplifying the figures that can be found in the commodity balance for renewables energy sources in Table 7.1 and the renewable electricity output that can be derived from Table 7.4. It illustrates the flow of primary fuels from the point at which they become available from home production or imports (on the left) to their eventual final uses (on the right) as well as the energy lost in conversion.

7.6 Commodity balances for renewable energy sources covering each of the last three years form the first three tables in this chapter (Tables 7.1 to 7.3). Unlike the commodity balance tables in other chapters of the Digest, Tables 7.1 to 7.3 have zero statistical differences. This is because the data for each category of fuel are, in the main, taken from a single source where there is less likelihood of differences due to timing, measurement, or differences between supply and demand. These balance tables are followed by 5-year tables showing capacity of, and electricity generation from, renewable sources (Table 7.4), and electricity generation only from sources eligible for the Renewables Obligation (RO) (Table 7.5). Table 7.6 shows renewable sources used to generate electricity, to generate heat, and for transport purposes in each of the last five years. Table 7.7 shows the UK's progress against the 2009 EU Renewable Energy Directive target; the layout of this table has been amended slightly compared with the version in the 2010 edition of the Digest; it now contains additional detail on the separate components of the target. A long-term trends commentary and table (Table 7.1.1) covering the use of renewables to generate electricity, to generate heat, and as a transport fuel is available on DECC's energy statistics web site and accessible from the Digest of UK Energy Statistics home page:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

7.7 Also available on the web site is Table 7.1.2 summarising all the renewable orders made under the Non Fossil Fuels Obligation (NFFO), Northern Ireland Non Fossil Fuels Obligation, and Scottish Renewables Orders (SRO) along with descriptive text.

EU Renewables Directives

7.8 The European Union's Renewables Directive (Directive 2001/77/EC) ('RD') came into force in October 2001. It proposed that Member States adopt national targets for renewables that were consistent with reaching the overall EU target of 12 per cent of energy (22.1 per cent of electricity) from renewables by 2010. The UK "share" of this target was that renewables sources eligible under the RD should account for 10 per cent of UK electricity consumption by 2010; the denominator for this target is shown as "total demand" in Table 5.1 contained in the electricity chapter of this Digest. In March 2007 the European Council agreed to a common strategy for energy security and tackling climate change. An element of this was establishing a target of 20 per cent of EU's energy to come from renewable sources. In 2009 a new Renewable Energy Directive (Directive 2009/29/EC) ('RED') was implemented on this basis and resulted in agreement of country "shares" of this target. For the UK, its share is that 15 per cent of final energy consumption - calculated on a net calorific value basis, and with a cap on fuel used for air transport - should be accounted for by energy from renewable sources by 2020 (see paragraphs 7.32 to 7.35, below). The RED required each Member State to produce a National Renewable Energy Action Plan, which contains a progress trajectory and identifies measures which will enable countries to meet their targets. The UK's action plan is available at: www.decc.gov.uk/en/content/cms/meeting_energy/Renewable_ener/uk_action_plan/uk_action_plan.aspx

UK Renewables Policy

7.9 The United Kingdom has a number of measures to increase renewables deployment. These include:

- Putting in place appropriate financial incentives to bring forward and support the take-up of renewable energy, including the "banded" Renewables Obligation (RO), the introduction last year (April 2010) of feed in tariffs (FITs) for small scale electricity generation, and the forthcoming Renewable Heat Incentive (RHI) tariff scheme (for industry, commercial businesses and the public sector) and the RHI Premium Payment Scheme (for households);
- Identifying and removing the most significant non-financial barriers to renewables deployment, including measures to improve existing grid connection arrangements; and
- Overcoming supply chain blockages and promoting business opportunities in the renewables sector in the UK.

The Renewables Obligation

7.10 In April 2002 the Renewables Obligation (RO) (and the analogous Renewables Obligation (Scotland)) came into effect[1]. It is an obligation on electricity suppliers to source a specific and annually increasing proportion of electricity from eligible renewable sources or pay a penalty. The proportion is measured against total electricity sales (as shown in Table 5.5 contained in the electricity chapter of this Digest). The Obligation is intended to incentivise an increase in the level of renewable generating capacity and so contribute to our climate change targets. Examples of RO eligible sources are listed in Table 7A. The Office for Gas and Electricity Markets (Ofgem), which administers the RO, issues Renewables Obligation Certificates (ROCs) to qualifying renewables. These certificates may be sold by generators directly to licensed electricity suppliers or traders. ROCs can be traded separately from the electricity to which they relate. Suppliers present ROCs to Ofgem to demonstrate their compliance with the obligation.

Table 7A: Examples of eligible Renewables Obligation sources of energy

Wind energy (offshore and onshore)	Geothermal (hot dry rock and aquifers)
Tidal and tidal stream	Anaerobic digestion
Wave energy	Landfill gas and sewage gas
Photovoltaics	Co-firing of biomass with fossil fuel
Energy from waste	Other biomass
Hydro power [excluding hydro power from plants exceeding 20 MW DNC commissioned before 1 April 2002]	Energy crops

7.11 When the Obligation was first introduced, 1 ROC was awarded for each MWh of renewable electricity generated. In 2009, 'banding' was introduced into the RO, meaning different technologies now receive different numbers of ROCs depending on their costs and potential for large scale deployment; for example offshore wind receives 1.5 ROCs/MWh, and the following technologies all receive 2 ROCs/MWh: wave and tidal, dedicated energy crops, advanced gasification and pyrolysis, and anaerobic digestion. New developments in the more established renewable technologies now receive less support; for example, sewage gas receives 0.5 ROCs/MWh and landfill gas receives 0.25 ROCs/MWh. Following an early review of the banding for offshore wind, the level of support for this technology further increased from 1.5 ROCs/MWh to 2 ROCs/MWh for stations or capacity accredited between 1 April 2010 and 31 March 2014[2]. Onshore wind continues to receive 1 ROC/MWh. A scheduled banding review commenced in October 2010. It is proposed that new bands will come into effect on 1 April 2013 (with the exception of offshore wind for which new bands will come in on 1 April 2014). Table 7.5 shows all the components of total electricity generation on an RO basis. Strictly speaking until 2005, the RO covers only Great Britain, but in these UK based statistics Northern Ireland renewable sources have been treated as if they were also part of the RO.

[1] Parliamentary approval of the Renewables Obligation Orders under The Utilities Act 2000 was given in March 2002. The Renewables Obligation covering England and Wales and the analogous Renewables (Scotland) Obligation came into effect in April 2002. Northern Ireland introduced a similar Renewables Obligation in April 2005.

[2] This increased level of support will apply to the whole station accredited within the period or to all of the additional capacity accredited in the period. It therefore includes any turbines that form part of the station or the additional capacity, even if some of those turbines are yet to be installed.

7.12 Prior to 2002 the main instruments for pursuing the development of renewables capacity were the NFFO Orders for England and Wales and for Northern Ireland, and the Scottish Renewable Orders. In this chapter the term "NFFO Orders" is used to refer to these instruments collectively. For projects contracted under NFFO Orders in England and Wales, the Non Fossil Purchasing Agency (NFPA) provided details of capacity and generation. The Scottish Executive and Northern Ireland Electricity provided information on the Scottish and Northern Ireland NFFO Orders, respectively. Statistics of these Orders can now be found in Table 7.1.2 on the DECC energy web site (see paragraph 7.6, above).

Feed-in Tariffs

7.13 Feed-in tariffs (FITs) are a financial support scheme for eligible low-carbon electricity technologies, aimed at small-scale installations up to a maximum capacity of 5 Megawatts (MW). FITs support new anaerobic digestion (AD), solar photovoltaic, small hydro and wind projects up to 5MW, by requiring electricity suppliers to make payments (generation tariffs) to these generators based on the number of kilowatt hours (kWh) they generate. An additional guaranteed export tariff of 3p per kWh is paid for electricity generated that is not used on site and exported to the grid. The scheme is also planned to support the first 30,000 micro combined heat and power installations with an electrical capacity of 2kW or less, as a pilot programme. A comprehensive review of the FITs scheme will conclude at the end of 2011, with changes being implements in April 2012. However the review of the level of support for solar PV installations above 50kW and farm scale AD was fast-tracked, and on 9 June 2011 revised tariffs were announced for these new solar PV and AD entrants into the FIT scheme. Any changes implemented as a result of the review will only affect new entrants to the scheme and there is no intention to retrospectively adjust support levels.

Commodity balances for renewables in 2010 (Table 7.1), 2009 (Table 7.2) and 2008 (Table 7.3)

7.14 Twelve different categories of renewable fuels are identified in the commodity balances. Some of these categories are themselves groups of renewables because a more detailed disaggregation could disclose data for individual companies. In the commodity balance tables the distinction between biodegradable and non-biodegradable wastes cannot be maintained for this reason. Since the previous edition of the Digest, the renewable portion of energy produced by heat pumps has been included in the commodity balances for 2008 onwards (see paragraph 7.26). The largest contribution to renewables in input terms (nearly 83 per cent) is from biomass, with wind generation and large-scale hydro electricity production contributing the majority of the remainder as Chart 7.1 shows. Less than 3 per cent of renewable energy comes from renewable sources other than biomass, wind and large-scale hydro. These include solar, small-scale hydro, heat pumps, and geothermal aquifers.

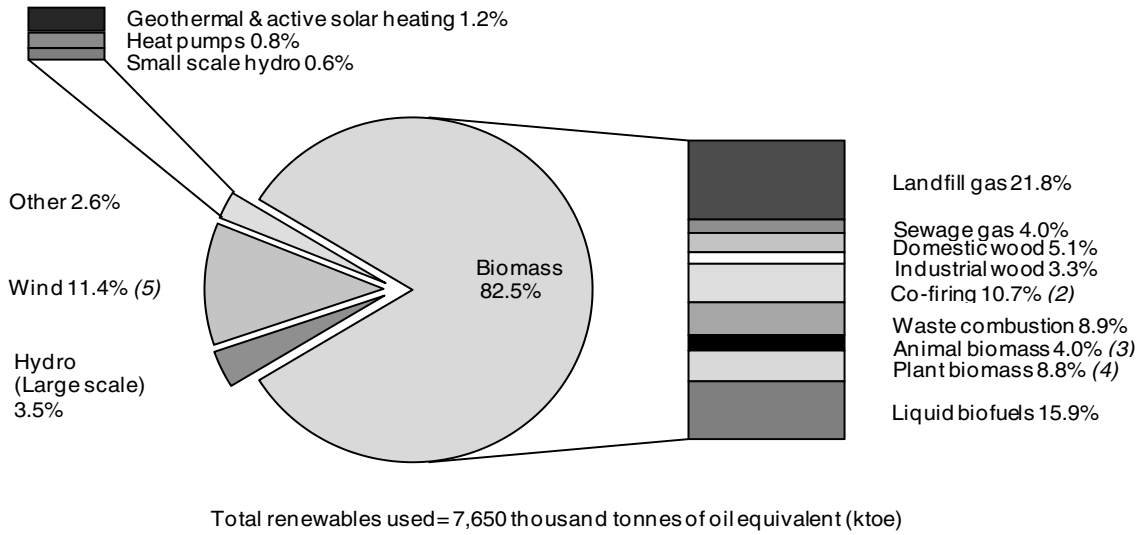
7.15 Over two-thirds (68 per cent) of the 7,650 ktoe of renewable energy (excluding non-biodegradable wastes) produced in 2010 was transformed into electricity. This proportion has reduced year-on-year since 2005 when electricity accounted for 85 per cent of renewable energy, as a result of the use of biofuels for transport growing at a faster rate than the use of renewables for electricity generation. While biomass appears to dominate the picture when fuel inputs are being measured, hydro electricity and wind power together provide a larger contribution when the **output** of electricity is being measured as Table 7.4 shows. This is because on an energy supplied basis the inputs are deemed to be equal to the electricity produced for hydro, wind, wave and solar (see Chapter 5, paragraph 5.75). However for landfill gas, sewage sludge, municipal solid waste and other renewables a substantial proportion of the energy content of the input is lost in the process of conversion to electricity as the flow chart (page 186, illustrates).

Capacity of, and electricity generated from, renewable sources (Table 7.4)

7.16 Table 7.4 shows the capacity of, and the amounts of electricity generated from, each renewable source. Total electricity generation from renewables in 2010 amounted to 25,734 GWh, an increase of 552 GWh (+2.2 per cent) on 2009. The largest increase in generation, both in absolute and percentage terms, came from offshore wind, reflecting the large increase in capacity over the course of the year. Offshore wind generation grew by 75 per cent, from 1,740 GWh in 2009 to 3,046 GWh in 2010. Additionally, co-firing of renewables with fossil fuels increased by 39 per cent, from

1,806 GWh in 2009 to 2,506 GWh in 2010. Other sources showing large increases – but from smaller levels – included plant biomass (an increase of 297 GWh, 27 per cent) and sewage sludge digestion (a 104 GWh, 17 per cent increase). Countering these increases were falls in two of the largest contributors to renewable generation: onshore wind and hydro. Despite increased onshore wind capacity, the low wind speeds experienced for much of the year (during 2010, 10 of the 12 months saw below average wind speeds) resulted in onshore wind generation falling by 6 per cent, from 7,564 GWh to 7,137 GWh in 2010. Total generation from biomass sources was 12 per cent higher than in 2009, with wind being 9 per cent higher (driven by offshore generation). Meanwhile particularly low rainfall throughout 2010 resulted in the hydro output falling by around one-third on 2009's level, from 5,262 GWh to 3,603 GWh. Wind continued to be the leading individual technology for the generation of electricity from renewable sources during 2010 with 40 per cent of renewables generation during 2010 coming from this source; a further 14 per cent came from hydro. However the combined generation from the variety of different biomass sources accounted for 46 per cent of renewable generation, with landfill gas accounting for two-fifths of the biomass generation. Chart 7.2 shows the amount of electricity generated, split into three renewable source categories, since 2000.

Chart 7.1: Renewable energy fuel use 2010 (1)



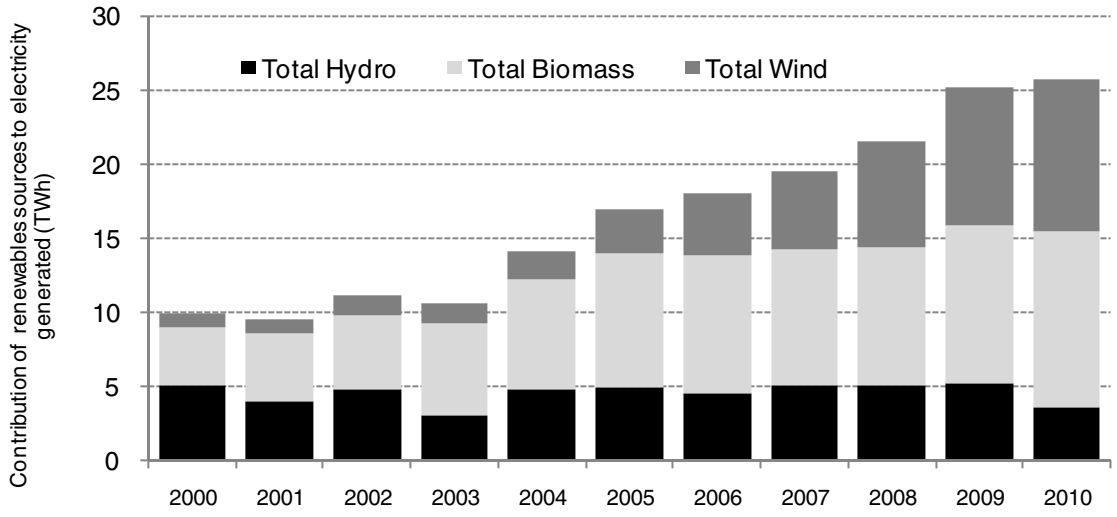
(1) Excludes all passive use of solar energy and all (520 ktoe) non-biodegradable wastes. In this chart renewables are measured in primary input terms.
(2) Biomass co-fired with fossil fuels in power stations; imported 9.8 per cent of total renewables, home produced 0.9 per cent
(3) 'Animal biomass' includes anaerobic digestion, farm waste, poultry litter, and meat and bone combustion.
(4) 'Plant biomass' includes straw and energy crops.
(5) 'Wind' includes energy from shoreline wave and tidal generation, but this accounted for less than 0.2 ktoe

7.17 Renewable sources provided 6.8 per cent of the electricity generated in the United Kingdom in 2010 (measured using the international basis), 0.1 percentage points higher than the proportion recorded during 2009. Table 7B and Chart 7.2 show the growth in the proportion of electricity produced from renewable sources. The table also includes the progress towards the electricity renewables target set under the RO (see paragraph 7.10 above and paragraph 7.22, below), and progress towards the 2001 RD (using both the original and normalised calculation methods) and 2009 RED (see paragraph 7.8 above).

Table 7B: Percentages of electricity derived from renewable sources

	2006	2007	2008	2009	2010
Overall renewables percentage (international basis)	4.6	4.9	5.5	6.7	6.8
Percentage on a Renewables Obligation basis	4.5	4.8	5.3	6.7	7.0
Percentage on original 2001 Renewables Directive basis	4.5	4.9	5.4	6.6	6.7
Percentage on normalised 2001 Renewables Directive basis	4.4	4.7	5.3	6.6	7.3
Percentage on a 2009 Renewable Energy Directive basis (normalised)	4.5	4.8	5.4	6.6	7.4

Chart 7.2: Electricity generation by main renewable sources since 2000



7.18 Installed generation capacity reached 9,202 MW at the end of 2010, an increase of 1,199 MW (15 per cent) during the year; this excludes the capacity within conventional generation stations that was used for co-firing (a further 390 MW). The main contributors to this increase were 553 MW (16 per cent) from onshore wind, 400 MW (+42 per cent) from offshore wind, 50 MW from solar PV (+190 per cent – as a result of this form of generation being included in the Feed In Tariff scheme) and 43 MW (+11 per cent) from municipal solid waste combustion. In capacity terms, wind was the leading technology in 2010, with hydro second, followed by landfill gas. Fifty eight per cent of renewable electricity capacity in 2010 was from wind, 18 per cent from hydro and 11 per cent from landfill gas. Between April and December 2010, a total of 67.9 MW of capacity was installed via the FIT scheme; around three quarters of the FIT capacity were photovoltaics.

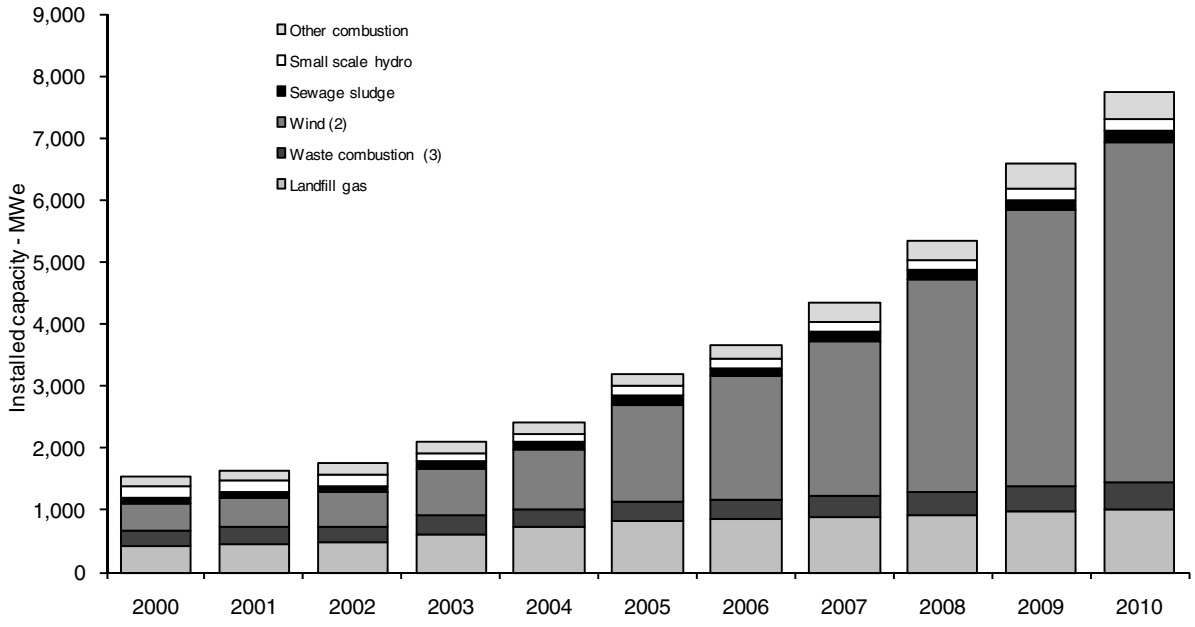
7.19 Chart 7.3 (which covers all renewables capacity except large scale hydro) illustrates the continuing increase in the electricity generation capacity from all significant renewable sources. This upward trend in the capacity of renewable sources should continue as recently consented onshore and offshore windfarms and other projects come on stream. The map, shown on page 196, shows the location of wind farms in operation at the end of December 2010, together with an indication of the capacity.

7.20 Plant load factors in Table 7.4 have been calculated in terms of installed capacity and express the average hourly quantity of electricity generated as a percentage of the average capacity at the beginning and end of the year. A number of weather factors have had a major impact on generation, and hence load factors, during 2010. There was 63 per cent less rain during 2010 than in 2009, making it the driest year since 2003; hydro load factors fell from 36.7 per cent in 2009 to 25.0 per cent in 2010. Additionally the lowest average wind speeds this century adversely impacted onshore load factors during 2010, reducing them to 21.7 per cent. However offshore wind speeds were not as significantly affected as those onshore, and load factors increased to 30.5 per cent. Whilst it has always been possible to calculate load factors for biomass fuelled generation from data contained within this table, they are reported separately for the first time in this edition of the Digest. Load factors for sewage sludge digestion and plant biomass during 2010 were both 1.5 percentage points higher than in 2009; however the other forms of biomass shows reduced load factors. Load factors for all generating plant in the UK are shown in Chapter 5, Table 5.10.

7.21 As mentioned in paragraph 7.18, wind capacities have shown the largest renewable capacity growth during recent years. To overcome the biasing of load factors for wind caused by new turbines coming on stream either early or late in a calendar year, Table 7.4 also contains a second statistic for the load factor of onshore and offshore wind turbines, calculated in the same way as the other load factors but includes only those wind farms that have operated throughout the calendar year with an *unchanged configuration*. Paragraphs 7.86 to 7.88 contain technical definitions of how the load factor

calculations are performed. As an indication of the impact that new capacity can have on load factors, the off-shore capacity at Rhyl Flats (90MW) which came on line on 28 December 2009, had the impact of reducing the all-offshore factor by 1½ percentage points in 2009, since it was only generating for 4 days but its capacity has an impact on the denominator of the calculation for the whole year.

Chart 7.3: Electrical generating capacity of renewable energy plant (excluding large-scale hydro)[(1)]



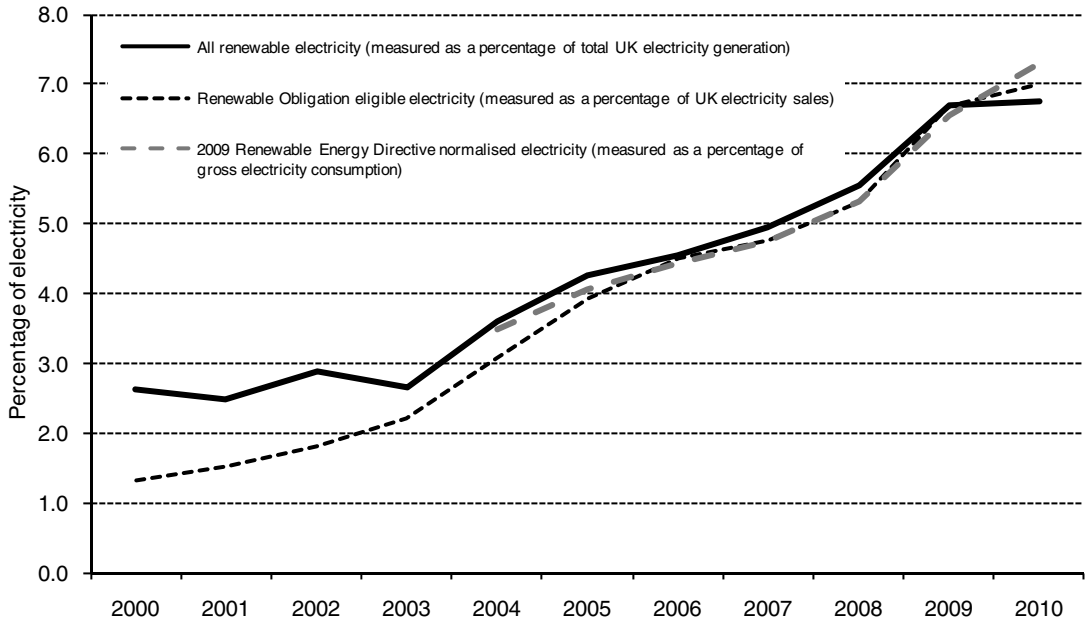
(1) Large scale hydro capacity was 1,453 MW in 2010.
(2) Wind includes both onshore and offshore and also solar photovoltaics (76.9 MW in 2010) and shoreline wave (2.6 MW in 2010).
(3) All waste combustion plant is included because both biodegradable and non-biodegradable wastes are burned together in the same plant.

Electricity generated from renewable sources: Renewables Obligation basis (Table 7.5)

7.22 Electricity generated in the UK from renewable sources eligible under the RO in 2010 was 6 per cent greater than in 2009. This compares with growth of 19 per cent and 12 per cent in 2009 and 2008 respectively. Chart 7.4 includes a line showing the growth in the proportion of electricity produced from renewable sources under the Renewables Obligation in addition to the International definition and the definition used to monitor the electricity component of the 2009 RED. Table 7B shows electricity eligible under the RO as a percentage of electricity sales. RO eligible generation has increased by nearly 17 TWh since its introduction in 2002, an increase of 288 per cent, although some of this is due to existing hydro stations being refurbished and thus becoming within the scope of the RO definition, as opposed to new capacity being installed. This compares with an all-renewable electricity generation figure that has increased by 131 per cent over the same period, but from a higher starting level.

7.23 As shown in Table 7B, during 2010 renewable generation measured using the RO basis (ie as a proportion of electricity sales by licensed suppliers) increased to 7.0 per cent. The RO proportion has increased at a higher rate than the other non-normalised measures during 2010 as hydro forms a smaller proportion of the RO-eligible renewable generation. This is because many large scale hydro plants are excluded from the RO, and as such this measure was not as severely impacted by the reduced rainfall during the year. Since the introduction of the RO in 2002 generation from wind has increased on average by thirty per cent each year.

Chart 7.4: Growth in electricity generation from renewable sources since 2000



Renewable sources used to generate electricity, heat, and for transport fuels (Table 7.6)

7.24 Between 2009 and 2010 there was an increase of 6.8 per cent in the **input** of renewable sources into electricity generation. Wind grew by 9 per cent, and biomass use increased by 11 per cent; hydro fell by 32 per cent.

7.25 Table 7.6 also shows the contribution from renewables to heat generation. Around 16 per cent of renewable sources were used to generate heat in 2010. Renewables used to generate heat have shown some growth in recent years, following a decline that started more than 10 years ago as a result of tighter emission controls which discouraged on-site burning of biomass, especially wood waste. Since their 'low point' in 2005 biomass use has increased by 103 per cent to 1,212 ktoe; the increase between 2009 and 2010 was 17 per cent. Recent growth has been in domestic wood use, plant biomass in the agriculture sector, combined with a higher demand for wood waste in industry. Further significant growth in this area is anticipated, especially in the industrial and domestic wood use sectors, together with additional heat pumps, as a result of the RHI. Domestic use of wood is the main contributor to renewables used for heat, comprising around 32 per cent of the renewable heat total. Plant biomass (including anaerobic digestion) and non-domestic use of wood (and wood waste) formed the next largest components, at 17 per cent each.

7.26 Heat pumps (Air Source and Ground Source) have been included in the statistics for the first time this year, with historic data collected from 2008. Air Source Heat Pumps (ASHP) use an electric driven vapour compression cycle to pump heat from ambient air to the target heating system. Only air to water systems are included in these data and ASHP utilising exhaust air are excluded from these data. A ground source heat pump uses electricity to circulate a mixture of water and antifreeze around a loop of pipe buried underground. Heat from the ground is absorbed into this fluid and is pumped through a heat exchanger in the heat pump. Low grade heat passes through the heat pump compressor and is concentrated into a higher temperature useful heat capable of heating water for the heating and hot water circuits of the building. Only the net gain in energy (ie total heat energy minus the electricity used to power the pump) is counted as renewable energy. The calculations have used information from BSRIA, a research organisation, that heat pumps installed in 2008 and onwards have a seasonal performance factor (SPF) of 3, and that there was no significant contribution from heat pumps installed before 2008.

Renewable Heat Incentive (RHI)

7.27 On 10 March 2011, the Government announced the details of the Renewable Heat Incentive (RHI). For commercial, industrial and community heating RHI tariffs will start later in 2011. The incentive is expected to promote the delivery of 57 TWh of renewable heat (equating to 12 per cent of heat coming from new and diversified renewable sources) and save 44 million tonnes of carbon by 2020. For renewable heating in households an RHI premium payment scheme will begin later this year and run until the Green Deal comes in during October 2012, at which point RHI tariffs will begin for the domestic sector too. The technologies and heat generated through the RHI will be incorporated in the renewables statistics, starting in the 2012 edition of the Digest.

Liquid Biofuels for transport

7.28 It is estimated that 177 million litres of biodiesel were produced in the UK in 2010, around one-third of the production in 2007 (485 million litres). Biodiesel consumption figures can be obtained from figures published by HM Revenue and Customs (HMRC) derived from road fuel taxation statistics. The most usual way for biodiesel to be sold is for it to be blended with ultra-low sulphur diesel fuel; further information on this is given in Chapter 3 (which starts on page 65). However, it was estimated that around 1 per cent of liquid biofuels was used in 2008 to generate electricity. Until 31 March 2010, the duty payable on biodiesel (and bioethanol) was 20 pence per litre less than the duty payable on road diesel and petrol; in blended fuels the duty payable is proportionate to the duty payable on the constituent fuels. On 1 April 2010, the duty rates for biodiesel and bioethanol was increased to the same rate as the main road fuel rate. However, biodiesel made from waste cooking oil continues to benefit from a 20 pence per litre duty differential for a period of two years, via a relief scheme introduced from 1 April 2010. The HMRC figures show that 1,045 million litres of biodiesel were consumed in 2010, a similar level to 2009. Therefore around 870 million litres of biodiesel were imported in 2010. The total annual capacity for biodiesel production in the UK in 2010 is estimated to be 575 million litres. This reduced capacity, compared to that reported in last year's Digest, is due to continuing adverse market conditions with a number of significant producers closing down, and other plant operating at reduced output.

7.29 HMRC data show that 631 million litres of bioethanol was consumed in the UK in 2010; this continues a trend of increasing bioethanol use that started with 85 million litres in 2005, and is nearly double the amount used in 2009 (320 million litres). The UK capacity for bioethanol production at the end of 2010 was estimated to be 475 million litres.

7.30 The HMRC data have been converted from litres to tonnes of oil equivalent and the data are shown in both the commodity balances (Tables 7.1 to 7.3) and in Table 7.6. In addition these data are also included in the aggregate energy balances (Tables 1.1 to 1.3). The tables show the increasing contribution that liquid biofuels are making towards total renewable sourced energy. Between 2009 and 2010, the use of biofuels for transport increased by 17 per cent to 1,214 ktoe. In 2010 16 per cent of the renewable sources used in the UK in primary input terms were liquid biofuels for transport, up from 15 per cent in 2009, 14 per cent in 2008, and less than half of one per cent in 2003.

7.31 A further source of statistical information on liquid biofuels is from the monitoring of the Renewable Transport Fuel Obligation (RTFO), which came into force on 15 April 2008. There is a monthly reporting process required of fuel companies under the RTFO, issuing Renewable Transport Fuel certificates in proportion to the quantity of biofuels registered. DECC and AEA work closely with the team collecting data on the sustainability of biofuels – a key aspect of the data required for the Renewable Energy Directive - and DECC hope to make use of this data in future years.

Renewable sources data used to indicate progress under the 2009 EU Renewable Energy Directive (Table 7.7)

7.32 As discussed in paragraph 7.8, the Renewable Energy Directive has a target for the UK to obtain 15 per cent of its energy from renewable sources by 2020. The target uses a slightly different definition of renewable and total energy than is used in the rest of the Digest. It includes the use of electricity, energy for heating by final consumers, as well as the use of energy for transport purposes. Gross final energy consumption (which is calculated on a net calorific value basis) also includes consumption of electricity by electricity generators, consumption of heat by heat generators, transmission and distribution losses for electricity, and transmission and distribution losses for distributed heat. Additionally, the Directive includes a cap on the proportion that air transport can

contribute to the total; this cap is currently 6.18 percent; certain fuels also receive a higher weighting in the calculation, with full details being set out in the Directive, which is available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF.

7.33 In the UK, energy balances are usually published on a gross calorific value basis, but in order to facilitate comparisons with EU statistics the balances for 2004 to 2010 have been calculated on a net calorific value basis and are available in Table I.1 at: www.decc.gov.uk/en/content/cms/statistics/source/total/total.aspx

7.34 The layout of Table 7.7 has been expanded slightly since the previous edition of the Digest, taking into account feedback from data users. The table brings together the relevant renewable energy and final energy consumption data to show progress towards the target of 15 per cent of UK energy consumption to be sourced from renewables by 2020, and also shows the proportions of electricity, heat and transport energy coming from renewables sources.

Table 7C: Percentages of energy derived from renewable sources

	2006	2007	2008	2009	2010
Percentage of capped gross final energy consumption (ie the basis proposed by Eurostat for the Renewable Energy Directive)	1.6	1.8	2.4	3.0	3.3
Percentage of primary energy demand (ie the basis previously quoted in this Digest)	2.1	2.4	2.8	3.4	3.6

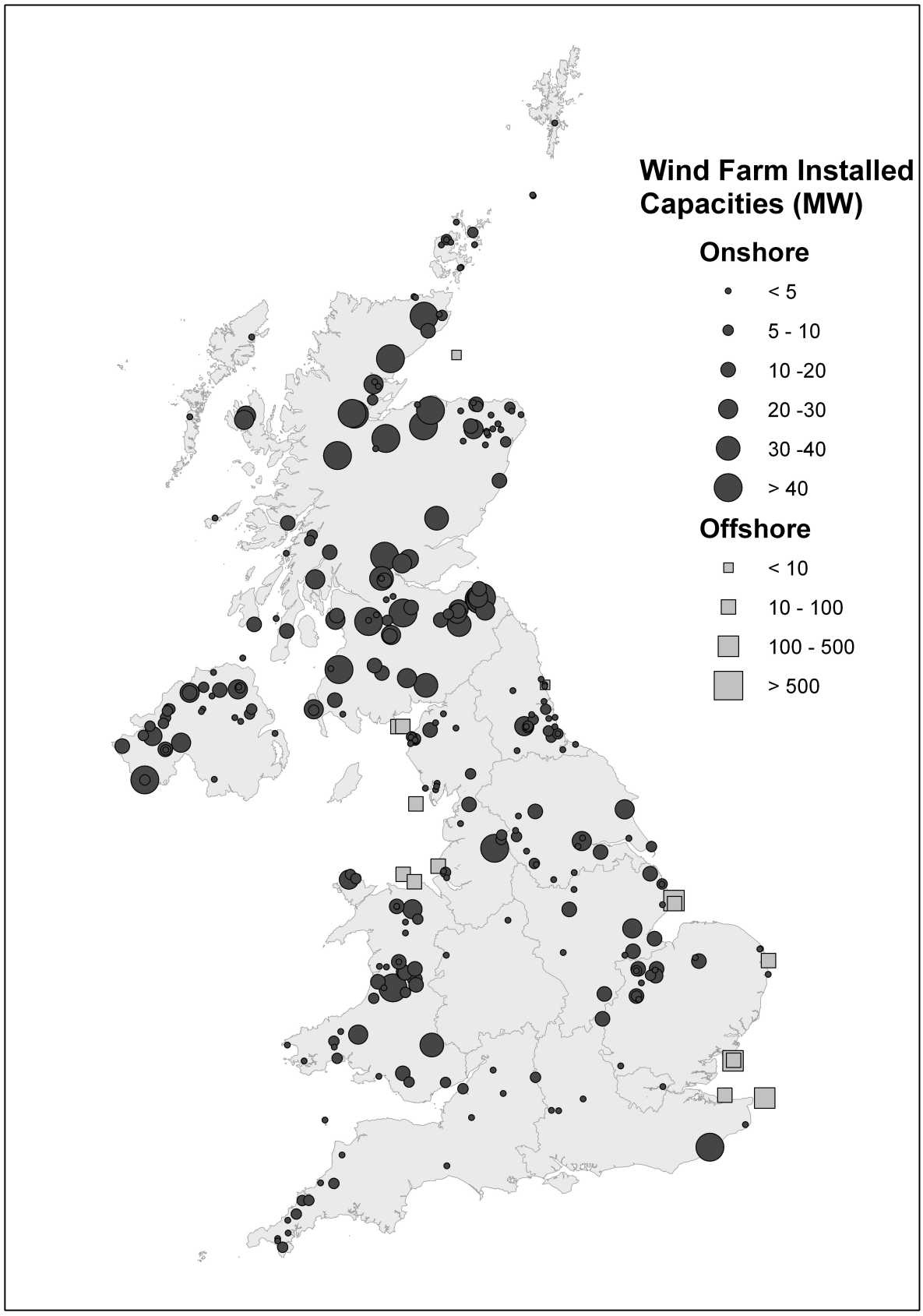
7.35 Table 7C shows that, on the basis used to monitor the Renewable Energy Directive, the UK percentage of energy derived from eligible renewable sources rose by 0.3 percentage points in 2010 to 3.3 per cent. Overall, renewable sources, excluding non-biodegradable wastes and passive solar design (see paragraph 7.40), provided 3.6 per cent of the United Kingdom's total primary energy requirements in 2010. The primary energy demand basis produces higher percentages because thermal renewables are measured including the energy that is lost in transformation. The thermal renewables used in the UK are less efficient in transformation than fossil fuels and as non-thermal renewables such as wind (which by convention are 100 per cent efficient in transformation) grow as a proportion of UK renewables use, the gross final energy consumption percentage will overtake the primary energy demand percentage. Both of these percentage measures are directly influenced by overall energy use: for instance, whilst the renewable energy component (the numerator in the RED calculation) increased by 14.1 per cent, the denominator increased by around one-third of that rate (4.8 per cent).

7.36 A proportion of the electricity imported into the United Kingdom is certified as being exempt from the Climate Change Levy (CCL) because it has been produced from renewable sources. The UK cannot count this electricity as contributing towards its EU renewables target because its origin is other EU Member States and it is already being counted in their own electricity generation figures. It is estimated by the Office of the Gas and Electricity Markets (Ofgem) that imports of electricity counted as CCL exempt amounted to 7,081 GWh in 2010; this compares to 6,817GWh in 2009 and 7,589 GWh in 2008.

7.37 Eurostat publishes data on how all countries are progressing towards their RED targets. The latest comparative data relates to 2008, contained within a report[3] published in July 2010. It shows that, in 2008, the UK had the third lowest RED percentage, with Malta and Luxembourg having lower percentages. The 2008 RED percentage for all EU countries was 10.3 per cent, but with wide variation amongst member states, from 0.2 per cent in Malta to 44.4 per cent in Sweden.

[3] http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-QA-10-030/EN/KS-QA-10-030-EN.PDF

The Location of Wind Farms in the United Kingdom, as at 31 December 2010.



Technical notes and definitions

7.38 Energy derived from renewable sources is included in the aggregate energy tables in Chapter 1 of this Digest. The main commodity balance tables (Tables 7.1 to 7.3) present figures in the common unit of energy, the tonne of oil equivalent, which is defined in Chapter 1 paragraph 1.28. The gross calorific values and conversion factors used to convert the data from original units are given on page 231 of Annex A and inside the back cover flap. The statistical methodologies and conversion factors are in line with those used by the International Energy Agency and the Statistical Office of the European Communities (Eurostat). Primary electricity contributions from hydro and wind are expressed in terms of an electricity supplied model (see Chapter 5, paragraph 5.74). Electrical capacities in this chapter are quoted as Installed capacities. However, in Chapter 5, Declared Net Capacity (DNC) or Transmission Entry Capacity of renewables are used when calculating the overall UK generating capacity. These measures take into account the intermittent nature of the power output from some renewable sources (see paragraph 7.85, below).

7.39 The various renewable energy sources are described in the following paragraphs. This section also provides details of the quality of information provided within each renewables area, and the progress made to improve the quality of this information. While the data in the printed and bound copy of this Digest cover only the most recent five years, these notes also cover data for earlier years that are available on the DECC energy web site.

Use of existing solar energy

7.40 Nearly all buildings make use of some passive solar energy because they have windows or roof lights, which allow in natural light and provide a view of the surroundings. This existing use of passive solar energy is making a substantial contribution to the energy demand in the UK building stock. Passive solar design (PSD), in which buildings are designed to enhance solar energy use, results in additional savings in energy. The installed capacity of PSD in the UK and other countries can only be estimated and is dependent on how the resource is defined. The unplanned benefit of solar energy for heating and lighting in UK buildings is estimated to be 145 TWh/year. The figure is very approximate and, as in previous years, has therefore not been included in the tables in this chapter. Only a few thousand buildings have been deliberately designed to exploit solar energy – a very small proportion of the total UK building stock. It has been estimated that the benefit of deploying PSD in these buildings is equivalent to a saving of about 10 GWh/year.

Active solar heating

7.41 Active solar heating employs solar collectors to heat water mainly for domestic hot water systems but also for swimming pools and other applications. Updated figures have been obtained by AEA (on behalf of DECC). For 2010, an estimated 122 GWh for domestic hot water generation replaces gas and electricity heating; for swimming pools, an estimated 640 GWh generation replaces gas (45 per cent), oil (45 per cent) or electricity (10 per cent).

Photovoltaics

7.42 Photovoltaics (PV) is the direct conversion of solar radiation into direct current electricity by the interaction of light with the electrons in a semiconductor device or cell. The PV installed capacity in the UK increased from 10.9 MW in 2005 to 76.9 MW in 2009. There have been significant increases in capacity and generation of PV in recent years due to increased support from policy incentives; support in the past has principally been means of the Major Photovoltaic Demonstration Programme (2002-2006) and the Low Carbon Buildings Programme (2006 - May 2010), both of which provided support for PV installations by means of capital grants. Support for PV and other microgeneration technologies is now provided through a system of Feed-In Tariffs introduced in April 2010, which provide householders and communities generating their own electricity with regular payments through their energy supplier. Payments consist of a tariff for each unit of electricity generated together with a second tariff for each unit of electricity that is then exported to grid. Tariffs are to be linked to the Retail Price Index and support for individual PV schemes will last for 25 years. Specific tariff levels are dependent on size and type of installation (i.e. retro-fit, new build or standalone). Tariffs for large scale PV installations (>50kW) were subject to a fast track review in early 2011 in order to respond to higher levels of interest in large scale PV than had originally been anticipated at its inception. These new tariffs will affect installations commissioned after 1 August 2011.

Onshore wind power

7.43 Onshore wind is one of the most mature renewable energy technologies. The UK has an excellent onshore wind resource with wind speeds particularly good in Scotland, Northern Ireland and Wales, (less so in England, particularly the South East). A wind turbine extracts energy from the wind by means of a rotor (usually a three-bladed horizontal-axis rotor) that can be pitched to control the rotational speed of a shaft linked via a gearbox to a generator.

7.44 The UK's first commercial wind farm, the Delabole wind farm in Cornwall, began generating electricity in November 1991. Installed capacity has increased every year since, although installation rates vary year on year; the maximum installed in one year of 737MW (in 2008). The introduction of the Renewables Obligation (RO) has proved a more attractive incentive to developers than the NFFO it replaced and the rate of installation of new wind farms has increased since its introduction in April 2002. As at end December 2010, the UK has more than 4 GW of installed capacity, from almost 600 wind schemes in the UK. Turbine size has steadily increased over the years and the average new turbine size is around 2.5MW. The increased tower height associated with the increased turbine size has increased wind capture (wind speed generally increases with height above ground level) and turbine design has improved and become more sophisticated – both of these leading to improvements in efficiency over the early models, prompting many of the early projects, for example, Delabole, to re-power (replacing ageing turbines with more efficient ones). The figures included for generation from wind turbines are based on actual metered exports from the turbines and, where these data are unavailable, are based on estimates using regional load factors (see paragraphs 7.86 to 7.88 regarding load factors) and the wind farm installed capacity.

7.45 The Energy Act 2008 established enabling powers for the introduction of Feed-in Tariffs (FITs) to supplement the RO and incentivise small-scale low-carbon electricity generation (including wind), up to a maximum limit of 5 megawatts (MW) capacity. FITs are predicted to stimulate fast growth in the small-medium wind market (15–100kW), in which generated energy is predominantly used to satisfy on-site demand[4]. Small wind system technology can be subdivided into three categories: micro wind turbines (0–1.5kW), small wind turbines (1.5–15kW) and small–medium wind turbines (15–100kW). The two main designs are the horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT).

7.46 In terms of operational characteristics, siting considerations and the value and nature of the market, small-scale wind systems vary markedly from large-scale units. They can be off-grid or on-grid, mobile or fixed, free-standing or building-mounted, and can form part of combined installations, most commonly with photovoltaic systems. As a result, they have a greater range of applications compared to large-scale wind turbines and can be sited on board boats, in commercial, public and domestic settings or as single or multiple installations providing power to communities. With the arrival of new financial incentives it is anticipated that the main growth market will be for those applications connecting to the grid, with free-standing turbines continuing to make up the greatest share of installations. It is estimated there were around 14,280 small wind system units (up to 100kW) deployed in the UK up to the end of 2008.[5], with an installed generating capacity of around 26 MW. At this time approximately 80 per cent of all small-scale turbine units were micro-wind turbines providing around 9 MW of generating capacity. Electricity generated from small-scale wind was estimated to have reached upto 33 GWh.

Offshore wind power

7.47 The UK has the largest offshore wind resource in the world, with relatively shallow waters and strong winds extending far into the North Sea. Offshore wind is expected to make the single biggest contribution towards the Government's target of 15 per cent of energy from renewable sources by 2020.

7.48 Offshore winds tend to flow at higher speeds and are more consistent than on land, thus allowing turbines to produce more electricity (because the potential energy produced from the wind is directly proportional to the cube of the wind speed, increased wind speeds of only a few miles per hour can produce a significantly larger amount of electricity). Due to economies of scale, offshore turbines are also larger than their onshore counterparts. Today's operational offshore wind turbines are

[4] Renewable-UK, "Small Wind Systems – UK Market Report" (April 2010)
[5] UK Small-Scale Wind Survey: Installed Capacity, Annual Generation & Market Growth (AEA 2009)

essentially marine versions of land-based turbines. The current commercially available turbines have a rated capacity of between 3 MW and 5 MW. Design variations currently being pursued include increasing turbine capacities (up to 10 MW), direct drive generators (removing the need for transmission gearboxes and offering the prospect of simplicity and high reliability) and floating concepts are also being developed as they are considered by many to be more viable (both economically and environmentally) in deeper waters. In addition, onshore constraints such as planning, noise effects and visual impact are reduced offshore.

7.49 The UK offshore wind industry remains the largest in the world. As at the end of 2010, 15 offshore wind farms have been built around the UK coastline, equating to 1341 MW of installed capacity. The operational projects are Barrow (90MW), Beatrice (10MW), Blyth (4MW), Burbo Bank (90MW), Gunfleet Sands I&II (173MW), Kentish Flats (90MW) Lynn and Inner Dowsing (194MW), North Hoyle (60MW), Rhyl Flats (90MW), Robin Rigg I&II (180MW), Scroby Sands (60MW) and Thanet (300MW).

7.50 In January 2010, The Crown Estate announced the successful bidders for each of the nine new Round 3 offshore wind zones, potentially totalling 32GW in capacity. This is considered sufficient to ensure that the 25GW that has been enabled by the Government's SEA for offshore renewable energy can be achieved. This is in addition to the 8GW already enabled across Rounds 1 and 2. The combined total of all leasing rounds is over 49GW (including sites in Scottish Territorial Waters and Round 1/2 extensions).

Wave and Tidal Stream Power

7.51 Ocean waves are created by the interaction of winds with the surface of the sea. Because of the UK's position on the north eastern rim of the Atlantic it has some of the highest wave power levels in the world. Tidal currents are created by the movement of the tides, often magnified by local topographical features such as headlands, and channels. Tidal current energy is the extraction of energy from this flow, analogous to the extraction of energy from moving air by wind turbines. A recent study estimated that the available UK resource could be up to 22 TWh per year.

7.52 The UK is currently seen as the world leader in wave and tidal stream energy. Many of the leading device concepts were developed in the UK, including the Limpet, the Pelamis, the Aquamarine Oyster, the Seagen tidal turbine and several others. A number of developments in support of wave and tidal stream have occurred in the past year. These include:

- In the summer of 2010, the South West Regional Development Agency's (SWRDA) Wave Hub was deployed off the north coast of Cornwall. This was managed by the subsea and pipeline engineering company J P Kenny. The wavehub was connected to the UK grid in November 2010 and it now awaits the installation of trial wave devices at each of its 4 available berths.
- In July 2010, the UK Technology Strategy Board (TSB) and the Engineering and Physical Sciences Research Council (EPSRC) invested £7m in 9 wave and tidal projects. These projects will focus on driving down the cost of energy while improving the reliability and performance of wave and tidal devices.
- In July 2010 the Scottish WATERS fund announced £13 million in funding to support five wave and tidal projects off the coast of Scotland.
- In August 2010, Atlantis Resources successfully deployed its 1MW tidal turbine – the world's largest and most powerful tidal turbine - on its subsea berth, in 35 metres of water at the European Marine Energy Centre (EMEC) in Orkney.
- In September 2010, Tidal Generation Ltd, a subsidiary of Rolls-Royce, successfully deployed produced power from its 500kW turbine at the EMEC.
- The EMEC test facilities have several test berths each having an 11kV cable connecting them to a Scottish and Southern Energy substation that transforms the voltage to 33kV to enter the SSE network. As of the end of 2010, no significant amount of electricity has been produced for export to the grid. This has therefore currently been excluded from the capacity figures for DUKES reporting.
- In October 2010, the Crown Estate awarded the rights to develop a tidal project in the Pentland Firth and around the Orkneys to a consortium of Atlantis Resources, International Power and Morgan Stanley. This project will involve 400 turbines which have the potential to generate up to 400MW of electricity.

- In November 2010, the Environmental Research Institute (ERI) launched its Marine Renewable Energy and the Environment programme, backed by a £4m grant.
- In March 2011, the Scottish Government approved plans for 10 tidal turbines to be built in the Sound of Islay off the west coast of Scotland, each turbine producing 1MW of electricity.
- In May 2011, The EMEC and the Fundy Ocean Research Center for Energy (FORCE) signed a strategic agreement to help advance the marine renewable energy industry worldwide.
- The world's first oscillating horizontal hydrofoil tidal energy device is to be installed in the Kylerhea Narrows off the Isle of Skye in 2012. These devices have the capacity to operate in shallow water and can each produce 1.2MW of electricity.

Large scale hydro

7.53 In hydro schemes the turbines that drive the electricity generators are powered by the direct action of water either from a reservoir or from the run of the river. Large-scale hydro covers plants with a capacity of 5 MW and over. Most of the plants are located in Scotland and Wales and mainly draw their water from high-level reservoirs with their own natural catchment areas. Major Power Producers (MPPs) report their output to DECC in regular electricity surveys. Prior to 2004 these data were submitted in aggregate form and not split down by size of scheme. This meant that some small-scale schemes were hidden within the generation data for the large-scale schemes. Since 2004 MPPs have provided a more detailed breakdown of their data and some smaller sites included under "large scale" before 2004 are now under "small scale". There is some 1,453 MW of installed capacity for large-scale hydroelectric schemes in the UK; this is a reduction of about 6 MW since the previous year, owing to the capacity of a borderline large-scale scheme falling below the 5MW threshold and being transferred to the small-scale. In 2008, the Glendoe project, the largest hydro scheme built for many years, went operational but is currently experiencing difficulties. The coverage of these large-scale hydro figures is the same as that used in the tables in Chapter 5 of this Digest. The data in this Chapter exclude pumped storage stations (see paragraph 5.73).

Small scale hydro

7.54 Electricity generation schemes with a hydro capacity below 5 MW are classified as small scale. These are schemes being used for either domestic/farm purposes or for local sale to electricity supply companies. The results from this exercise were supplemented with a survey of small-scale schemes undertaken in 2008 which essentially helped to 'clean up' the data. Currently there is 198 MW of installed small-scale hydro schemes. Of this, 59 per cent is owned by small-scale energy producers with the remainder owned by major power producers. Of the 356 schemes in existence, around three quarters (77 per cent) claim ROCs, with 27 schemes having current NFFO contracts. There was a small increase in installed capacity during 2010 of 12 MW.

Geothermal aquifers

7.55 Aquifers containing water at elevated temperatures occur in some parts of the United Kingdom at between 1,500 and 3,000 metres below the surface. This water can be pumped to the surface and used, for example, in community heating schemes. There is currently only one scheme operating in the UK at Southampton.

Heat Pumps

7.56 Renewable heat production from ground source heat pumps (GSHP) and air source heat pumps (ASHP) is included for the first time for 2010. GSHP use a vapour compression cycle to pump heat from underground heat exchange coils and boreholes to a target heating system. ASHP use a vapour compression cycle to pump heat from ambient air to the target heating system. The ASHP included in these data are air to water heat pumps extracting heat from external air only. This excludes specifically air to air systems and exhaust air systems. Information on GSHP and ASHP installations in the UK has been obtained from an annual market survey conducted by BSRIA[6]. This survey gives total number of installations only. The number of these installations in the domestic sector was estimated by the Federation of Environmental Trade Associations (FETA) and the average capacities, load factors and split between heating and hot water production for the domestic, commercial and industrial sectors were determined in discussion with FETA and heat pump manufacturers and installers.

[6] BSRIA Heat pumps UK. World renewable 2010. Johannes Fritsch Jan 2011.

7.57 Heat pumps use a substantial amount of electricity to operate the compression cycle and, as part of the drafting of the Renewable Energy Directive, a formula was developed to estimate the proportion of the energy produced by the heat pump that could be counted as renewable for the purpose of monitoring the Directive. There is a cut off in the heat pump performance (Seasonal performance factor or SPF) below which the heat pump is deemed not to contribute to renewable energy generation. It was assumed that the heat pumps installed in 2008 and later in the UK have an SPF of 3, which meets this minimum standard.The total installed capacity of GSHP and ambient air to water heat pumps meeting the minimum performance factor was estimated to be 596MW at the end of 2010. The capacity installed in 2010 was assumed to be installed at a steady rate throughout the year. Heat pumps were estimated to deliver 710GWh of renewable heat in 2010.

Biomass

(a) Landfill gas

7.58 Landfill gas is a methane-rich biogas formed from the decomposition of organic material in landfill. The gas can be used to fuel reciprocating engines or turbines to generate electricity or used directly in kilns and boilers. In other countries, the gas is cleaned to pipeline quality or used as a vehicle fuel. Landfill gas exploitation benefited considerably from NFFO and this can be seen from the large rise in the amount of electricity generated since 1992. Ofgem's ROCs database provides details of landfill gas sites claiming ROCs. Information on landfill gas was supplemented by a RESTATS survey carried out by AEA in 2008 on behalf of DECC, and covered the period up to the end of 2007, as part of data cleansing activities. In 2010 the number of operating landfill gas sites increased by 12, with a corresponding increase in installed capacity of 40 MW.

(b) Sewage sludge digestion

7.59 In all sewage sludge digestion projects, some of the gas produced is used to maintain the optimum temperature for digestion. In addition, many use combined heat and power (CHP) systems. The electricity generated is either used on site or sold under the NFFO. Information from these projects was provided from the CHAPSTATS Database, which is compiled and maintained by AEA on behalf of DECC (see Chapter 6). Within the CHAPSTATS database the majority of the data are gathered through the CHP Quality Assurance (CHPQA) Programme. However, many sewage treatment works are not part of the CHPQA Programme, and to allow these CHP schemes to be included in the statistics data provided to Ofgem, via the ROC registers, is used. In respect of these schemes, estimates of electrical efficiencies and heat to power ratios typical of the technology and capacity are used to determine fuel inputs and heat outputs. In this year's statistics, data for 10 percent of the schemes (21 per cent of the capacity) were from CHPQA and data for 90 per cent of the schemes (79 per cent by capacity) were from RESTATS (i.e. ROCs registers).

(c) Domestic wood combustion

7.60 Domestic wood use includes the use of logs in open fires, "AGA"-type cooker boilers and other wood burning stoves. Up to 2002 the figure given for each year is an approximate estimate based on a survey carried out in 1989. The Forestry Commission carried out a survey of domestic wood fuel use in 1997 but the results from this were inconclusive. As an upper limit, about 600,000 oven-dried tonnes (ODTs) were estimated to be available for domestic heating. In 2001, AEA undertook a study of UK domestic wood use. A methodology was devised for surveying the three major sectors involved in wood use – the stove or boiler supplier, the wood supplier and the end user. Questionnaires were devised for all these parties and then attempts were made to contact representative samples in the various regions of the UK. From the evidence obtained via the questionnaires and telephone interviews, we believe that the domestic wood burning market is growing, but not in the area of wood as the primary heat source. This still remains a relatively small market and a small percentage of the wood burnt. Unfortunately, the survey was unable to provide statistically sound evidence as to the amount of wood used in the domestic sector and although it was felt that there has been a small increase in the domestic use of wood as a fuel, on the basis of the results of the approach, at the time AEA could not justify modifying the current estimate for the UK.

7.61 In view of the importance attached to finding out about domestic wood use, the Forestry Commission decided to undertake another study guided by the lessons learnt from the previous work. In particular they would approach the newly emerging wood cooperatives, as they are likely to be a good source of information now that they should be more well established, the National House-Building Council (NHBC) to examine new build and treating equipment suppliers, fuel suppliers and users under separate surveys. This work is on-going. In 2005, as part of an omnibus survey, a pilot

study was undertaken in Scotland by the Forestry Commission to assist in developing the correct methodology prior to a national survey, but unfortunately the response rate was poor. A review of a different approach to calculating domestic wood use has suggested that we have been underestimating the use of this resource in recent years and, following peer review, are now confident enough to remain with the historic changes to these data, made in 2008, the first time since the survey began in 1989. This was based a 50 per cent growth rate over a 2 to 3 year period based on anecdotal information and subsequently supported from other sources (HETAS, the National Association of Chimney Sweeps and discussions with a risk assessor acting on behalf of insurance companies); additional discussions this year to glean further anecdotal information have confirmed that this growth rate still persists. In 2008, the Forestry Commission undertook a wood fuel study but figures for end use were not gathered. DECC has therefore continued to remain with its current approach, which may be revised at a later date when we have better information.

(d) Non-domestic wood combustion

7.62 In 1997, the industrial wood figure (which includes sawmill residues, furniture manufacturing waste etc.) was included as a separate category for the first time. This was due to the availability of better data as a result of a survey carried out in 1996 on wood fired combustion plants above 400 kW thermal input. Follow-up surveys in 2000 and 2006 highlighted that the in-house use of wood had in declined since 1996 due to the imposition of more stringent emissions controls. There is, however, increased interest in off-site use of untreated wood for space heating in schools, hospitals, nursing homes, government buildings, etc. In 2009, a follow up survey of industrial wood use was undertaken, together with an an analysis of schemes receiving funding under the Bio-Energy Capital Grants Scheme (BECGS) which has seen significant growth in the biomass heating sector over the last 5 years with many installations between 50 kW - 500 kW. The 2010 data was improved with the inclusion of data on large industrial sites was provided by the Wood Panel Industries Federation (WPIF). In 2011 additional datasets from Wood Energy Biomass Scheme (WEBS) and the Forestry Comission Scotland were added. The combined 2011 results showed an increase of 331GWh of biomass heating compared to 2010. Future reporting is expected to be facilitated by the introduction of the Renewable Heat Incentive.

(e) Energy crops and forestry residues

7.63 Several plantations of Short rotation willow coppice (SRC) have become established but the rate of uptake of this crop has been very slow. Interest has also been shown in Miscanthus. Approximately 1000 hectares were planted to supply the ARBRE project (see below). Over 500 hectares of SRC have been have been planted in the south of Scotland and northern England to supply the Steven's Croft, Lockerbie 44 MWe project. Further plantings are planned to increase the supply in the coming years both for Lockerbie and Sembcorp (see below) but progress is very slow. Approximately 1,000 hectares of Miscanthus are being grown in the Staffordshire area to supply the Eccleshall 2.6 MWe power station supported by the Bioenergy Capital Grant scheme and other, co firing projects. Support for the growing of energy crops continues as part of the Rural Development Programme for England (RDPE) 2007-2013 administered by Natural England.

7.64 In England, Project ARBRE in South Yorkshire was contracted under NFFO 3 to generate 10 MW of electricity of which 8 MW were to be exported to the local grid. The fuel supply was to have been largely SRC This project ran into difficulties and is not operational. Some SRC from the plantings made for the ARBRE project have been used for co-firing in coal-fired power stations. SembCorp Utilities UK has completed a 32 MW wood-burning power station, burning a mix of, recovered wood, forestry residues sawmill co-product and a very small proportion of SRC at the Wilton facility on Teesside (Wilton 10). It entered commercial operation in summer 2007. The 44 MW plant at Steven's Croft near Lockerbie has also entered commercial service, fuelled mainly by forestry residues, small round wood and sawmill co-product, and recovered wood. Initially both Wilton 10 and Steven's Croft had an intention to source 25 per cent of their fuel from energy crops, but this now seems unlikely. The Port Talbot Bioenergy Plant, a 14 MW electric scheme firing mostly forestry residues, small round wood and saw mill co-product entered service in June 2008. The use of wood fuels from forestry and woodland management for heating has expanded rapidly in the past five years. This is as a result of incentives such as the Bioenergy Capital Grants Scheme and various other grant schemes instituted by Central and devolved government, and carbon reduction requirements contained in building regulations.

(f) Straw combustion

7.65 Straw can be burnt in high temperature boilers, designed for the efficient and controlled combustion of solid fuels and biomass to supply heat, hot water and hot air systems. There are large numbers of these small-scale batch-fed whole bale boilers. The figures given are estimates based partly on 1990 information and partly on a survey of straw-fired boilers carried out in 1993-94. A 40 MW straw fired power station near Ely, Cambridgeshire is currently the only electricity generation scheme in operation.

(g) Waste combustion

7.66 Domestic, industrial and commercial wastes represent a significant resource for materials and energy recovery. Wastes may be combusted, as received, in purpose built incinerators or processed into a range of refuse derived fuels for both on-site and off-site utilisation. Only the non-biodegradable portion of waste is counted in renewables statistics although non-biodegradable wastes are included in this chapter as "below the line" items. The paragraphs below describe various categories of waste combustion in greater detail.

7.67 In 2010, 25 waste-to-energy plants were in operation, burning municipal solid waste (MSW), refuse derived fuel (RDF) and general industrial waste (GIW).

7.68 **Municipal solid waste combustion** (MSW): Information was provided from the refuse incinerator operators in the United Kingdom that practice energy recovery using the RESTATS questionnaire. This included both direct combustion of unprocessed MSW and the combustion of RDF. In the latter, process waste can be partially processed to produce coarse RDF that can then be burnt in a variety of ways. By further processing the refuse, including separating off the fuel fraction, compacting, drying and densifying, it is possible to produce an RDF pellet. This pellet has around 60 per cent of the gross calorific value of British coal. The generation from MSW has been split between biodegradable sources and non-biodegradable sources using information outlined in paragraph 7.64 below. Non-biodegradable municipal solid waste is not included in the overall renewables percentage under the international definition of renewables (see paragraph 7.1). However, such wastes are still shown in the tables accompanying this chapter as 'below the line' items.

7.69 There has been an ongoing programme of waste analysis in the UK for many years; such analyses may be carried out to an accuracy of $\pm$ 1 per cent. Such studies are guided by the use of ACORN (which stands for A Classification Of Residential Neighbourhoods) socio-economic profiles which are used to select sample areas for the analysis of household collected waste and is based on the premise that households of similar socio-economic characteristics are likely to have similar behavioural, purchasing and lifestyle characteristics; this will be reflected in the quantity and composition of waste that those households produce. MSW comprises domestic waste plus other feedstocks, such as, general industrial waste, building demolition waste and tree clippings from civil amenities. A large scale study in Wales showed that the only category in domestic waste to show a statistically significant seasonal variation was garden waste; as garden waste is a small percentage (certainly when compared to food and kitchen waste), the effect on the operation of biomass-to-energy plants should be almost unnoticed. As there is now virtually no regional variation to be seen within the UK; these data became the UK standard for the last several years. The UK domestic waste has had a biodegradable content of 67.5 per cent $\pm$ 1 per cent and this accounts for about 62.5 per cent of the energy generated from its combustion. Following the result of recent work, it has been calculated that 63.5 per cent of MSW is now formed of biodegradable material (average of Wales and Scotland using English EA guidance method), one percentage point above previous years. We have continued to use this figure for this years' survey but will review its applicability on an annual basis.

7.70 **General industrial waste combustion** (GIW): Certain wastes produced by industry and commerce can be used as a source of energy for industrial processes or space heating. These wastes include general waste from factories such as paper, cardboard, wood and plastics.

7.71 A survey conducted in 2001 noted that GIW is now burnt in MSW waste-to-energy facilities. As no sites are solely burning GIW for heat or electricity generation, this feedstock is being handled under the MSW category.

7.72 **Specialised waste combustion:** Specialised wastes arise as a result of a particular activity or process. Materials in this category include scrap tyres, hospital wastes, poultry litter, meal and

bone and farm waste digestion. Although the large tyre incineration plant with energy recovery has not generated since 2000, the cement industry has burned some waste tyres in its cement and lime kilns. Although part of waste tyre combustion is of biodegradable waste, because there is no agreed method of calculating the small biodegradable content, all of the generation from waste tyres has been included under non-biodegradable wastes in this chapter (see paragraph 7.64, above).

7.73 Information on hospital waste incineration has continued to be based on a RESTATS survey, carried out by AEA in 2007, and updated in 2010, which aimed to establish if there were any changes and developments in the market. A list of sites that reclaim energy was obtained from the Environment Agency clinical waste incineration database; this was integrated in to the findings of the previous RESTATS survey, the combined list was then cleaned to ensure the contact information is both up-to-date and still relevant. Relevant sites were contacted to confirm their operational status and verify the electrical installed capacity and generation. The results revealed an ongoing process of centralisation and consolidation, as the industry responds to changes in pollution emissions and clinical waste regulations. It also documented the closure of many smaller incineration facilities with energy recovery, for which the costs of compliance with regulations were no longer viable. Despite this, the survey established that energy recovery in this field does have a future, with three new sites for power generation being developed.

7.74 One poultry litter combustion project started generating electricity in 1992; a second began in 1993. Both of these are NFFO projects. In addition, a small-scale CHP scheme began generating towards the end of 1990. However, this has now closed due to new emissions regulations. A further NFFO scheme started generating in 1998, and during 2000 an SRO scheme began to generate. A further poultry litter scheme became fully operational in 2001. One of the earlier poultry litter projects was modified to be fuelled mainly by meat and bone; two additional schemes fuelled primarily by meat and bone have also been built.

7.75 Anaerobic Digestion (AD) produces energy from wet wastes and/ or purpose grown crops in the form of biogas. This gas can be used for process heat and electricity generation, or can be upgraded to biomethane for use in transport applications or injection into the gas grid. AD fermentation only occurs very slowly at the ambient temperatures found in nature and so commercially it is carried out in large heated prefabricated digestion tanks, either under mesophilic (35^{o}C) or thermophilic (55^{o}C) conditions. Different bacteria predominate at each operating temperature. These facilities would be fed primarily with farm wastes , non-toxic, industrial organic wastes from food processing and preparation activities and purpose grown energy crops. The process also produces a liquid digestate containing nutrients that can be used as a fertilizer according to the Quality Protocol (PAS110). Digestate can be used whole, spread on land with tankers or umbilical pipe lines. Alternatively, it can be separated in to liquor and fibres, which have differing distributions of nutrients. Separated fibre can be used fresh as a soil conditioner or, after further aerobic composting to stabilise it, a material suitable for making into a compost product.

7.76 Information on operational AD sites in the UK was obtained from a number of sources including; the CHPQA database, information from previous AD surveys conducted for RESTATS, the AD portal run by NNFCC, the REA, the Renewable Energy Planning Database, ROCS and FITS returns and AEA internal information. The information was compiled and cross checked to obtain a single list of operational schemes. The schemes qualifying as CHP under the CHPQA criteria were identified, as were schemes dedicated to producing heat and electricity. The electricity and heat production was estimated for each scheme using survey information, where available, or information from ROCS and FITS if no survey information existed. Where neither of these sources was available the electricity production was calculated from the capacity and estimated load factor based on ROC data from operating schemes and date of commissioning where applicable. Heat production from schemes exporting electricity only was estimated from standard heat to power factors, and it was estimated that 40 per cent of this heat would be utilized on site as part of the processing operations. There were 46 AD plants generating at the end of 2010. Of these 17 qualified as CHP plant, 16 were electricity only and 13 were heat only. The heat only schemes were small on farm schemes. No schemes were producing significant quantities of biomethane for grid injection in 2010.

(h) Co-firing of biomass with fossil fuels

7.77 Co-firing of biomass fuel in fossil fuel power stations is not a new idea. Technically it has been proven in power stations worldwide, although, until 2002, it was not practised in the UK. The biomass fuel is usually fed by means of the existing stoking mechanism as a partial substitute for the fossil fuel. The combustion system may cope with up to a 25 per cent substitution without any major changes to the boiler design and airflows, but fuel preparation and transport systems may be the limiting feature at percentages much lower than this.

7.78 Since 2002, co-firing of biomass with fossil fuels has been eligible under the RO, the first time that any renewable energy initiative has included co-firing. Compared with other renewables, co-firing is relatively low cost and quick to implement. As such, the following limits were originally placed on co-firing to prevent a high volume of co-firing reducing the value in the RO for other renewables whilst enabling markets and supply chains for biomass to develop:

- Only electricity generated before 1 April 2011 would be eligible;
- From 1 April 2006 at least 25 per cent of the biomass used must consist of energy crops.

7.79 The scheme was later extended to allow longer for an energy crop market to develop and to recognise the need to reduce CO2 emissions from coal-fired generation as the role that coal will play in the UK's generation has increased. The current position is that there is no cap on co-firing with energy crops. However, to reduce the risk of flooding the ROC market with co-fired ROCs, thereby affecting ROC prices and investor confidence adversely, there is a limit on the number of co-fired ROCs using non-energy crop biomass a supplier can present to Ofgem when demonstrating that it has met its obligation. From 2010/11 the cap has been set at 12.5 per cent; prior to this it was set at 10 per cent.

7.80 In May 2007 the Government published the Energy White Paper, "Meeting the Energy Challenge". This proposed banding the RO, where different levels of support are given to different renewable technologies which came into effect in 'Renewables Obligation 2009' on 1 April 2009. Co-firing with non-energy crops has been moved into a band receiving 0.5 ROC per MWh. This will allow more co-firing to come forward but at an appropriate support level, minimising the risk of co-firing impacting negatively on other renewables.

(i) Biodiesel and bioethanol (liquid biofuels)

7.81 In the UK biodiesel is defined for taxation purposes as diesel quality liquid fuel produced from biomass or waste vegetable and animal oils and fats, the ester content of which is not less than 96.5 per cent by weight and the sulphur content of which does not exceed 0.005 per cent by weight or is nil. Diesel fuel currently sold at a number of outlets is a blend with 5 per cent biodiesel. Bioethanol is defined for taxation purposes as a liquid fuel consisting of ethanol produced from biomass and capable of being used for the same purposes as light oil. For further information, see HMRC Notice 179E: Biofuels and other fuel substitutes, October 2009, available at http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageVAT_ShowContent&id=HMCE_CL_000205&propertyType=document#P22_1468

7.82 The Renewable Transport Fuel Obligation (RTFO), introduced in April 2008, placed a legal requirement on transport fuel suppliers (who supply more than 450,000 litres of fossil fuel per annum to the UK market) to ensure that 5 per cent (by volume) of their overall fuel sales are from a renewable source by 2013/14, with incremental levels of 2.5 per cent (by volume) for 2008/09, 3.25 per cent (by volume) in 2009/10, and 3.5 per cent (by volume) in 2010/11. Figures from HM Revenue and Customs based on road fuel taxation statistics show that 1,045 million litres of biodiesel and 631 million litres of bioethanol were consumed in 2010, compared with 1,044 million litres of biodiesel and 320 million litres of bioethanol in 2009, During 2010 biodiesel accounted for 4.1 per cent of diesel, and bioethanol 3.1 per cent of motor spirit; the combined contribution of biodiesel and bioethanol was 3.6 per cent. Once the 5 per cent level is reached it is estimated that it will save around a million tonnes of carbon per annum. A survey of major UK biofuels producers was conducted in early 2011 by DECC. Responses showed that 175 million litres of biodiesel and 287 million litres of bioethanol were produced in the UK in calendar year 2010.

Combined Heat and Power

7.83 A CHP plant is an installation where there is a simultaneous generation of usable heat and power (usually electricity) in a single process. Some CHP installations are fuelled either wholly or partially by renewable fuels. The main renewable fuel used in CHP is sewage gas, closely followed by other biomass.

7.84 Chapter 6 of this Digest summarises information on the contribution made by CHP to the United Kingdom's energy requirements in 2006 to 2010 using the results of annual studies undertaken to identify all CHP schemes (CHAPSTATS). Included in Tables 6.1 to 6.9 of that chapter is information on the contribution of renewable sources to CHP generation in each year from 2006 to 2010. Corresponding data for 1996 to 2005 are available on the DECC energy web site. The information contained in those tables is therefore a subset of the data contained within the tables presented in this chapter. There are occasionally differences in the numbers reported by CHAPSTATS compared with RESTATS that are primarily attributed to whether the electricity is considered to be 'good quality'; further details on 'good quality' CHP are to be found in Chapter 6. In addition, there are oddities with some CHP facilities where biomass and fossil fuels are both burnt (though not always as co-firing). The total installed capacity recorded for the site under CHAPSTATS can cover multiple generators, some of which only handle fossil fuels (eg. gas turbines). As it would be misleading to record the entire capacity reported in RESTATS as being potentially available for renewables generation, only the appropriate capacity figures are recorded.

Generating capacity and load factor

7.85 The electrical capacities are given in Table 7.4 as installed capacities ie the maximum continuous rating of the generating sets in the stations. In Chapter 5 Declared Net Capacity (DNC) is used, i.e. the maximum continuous rating of the generating sets in the stations, less the power consumed by the plant itself, and reduced by a specified factor to take into account the intermittent nature of the energy source e.g. 0.43 for wind, 0.365 for small hydro and 0.33 for shoreline wave. DNC represents the nominal maximum capability of a generating set to supply electricity to consumers. For electrical capacities of generation using renewables in DNC terms see Table 7.1.1 on the DECC energy web site.

7.86 Plant load factors in this chapter have been calculated in terms of installed capacity (ie the maximum continuous rating of the generating sets in the stations) and express the average hourly quantity of electricity generated as a percentage of the average of the capacities at the beginning and end of the year. For the first time this year, load factor data for biomass have been subdivided and presented for landfill gas, sewage sludge digestion, municipal solid waste combustion, animal Biomass and plant Biomass.

7.87 In the 2006 Digest a new term was introduced to describe the amount of electricity generated from wind farms compared with the amount that such turbines would have generated had they been available for the whole of the calendar year and running continually and at maximum output throughout the calendar year. This term is "load factor on an unchanged configuration basis". A full account of the exercise to derive these factors can be found in *Energy Trends*, March 2006 pages 28 to 32. *Energy Trends* is available on the DECC energy web site at www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx, although here the term "capacity factor" was used.

7.88 To compare the two calculations, the **load factor** for a calendar year (as historically reported in this Digest) is:

$$\frac{\text{Electricity generated during the year (kWh)}}{\text{(Installed capacity at the beginning of the year + Installed capacity at the end of the year (kW))} \times 0.5 \times 8760 \text{ hours}}$$

whilst the **load factor on an unchanged configuration basis** for a calendar year is:

$$\frac{\text{Electricity generated during the year (kWh)}}{\text{(Installed capacity of wind farms operating throughout the year with an unchanged configuration (kW))} \times 8760 \text{ hours}}$$

7.89 In addition, because load factors on an unchanged configuration basis are mainly of interest for commercial scale wind power rather than small/micro generation, turbines under 100 kW are excluded and any single turbine of 100 kW or above is considered to be a wind farm.

7.90 It is recognised that one of the shortcomings of the differences in the reporting periods for the data contained in the Digest (end of calendar year) and Ofgem's finalised ROCs data (end of financial year), is that the finalised Ofgem figures are not available for use during the compilation process for the Digest. This chapter utilises ROCs data as reported in April 2011, when 2010 data were still provisional. In particular this can have an impact on the schemes included in the unchanged configuration definition as new data could include or remove particular schemes. This should be kept in mind if users wish to reanalyse these results.

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7.1 Commodity balances 2010

Renewables and waste

Thousand tonnes of oil equivalent

	Wood waste	Wood	Poultry litter, meat and bone, and farm waste	Straw, SRC, and other plant-based biomass (3)	Sewage gas	Landfill gas
Supply						
Production	256	392	304	764	303	1,666
Other sources	-	-	-	-	-	-
Imports	-	-	-	753	-	-
Exports	-	-	-	-24	-	-
Marine bunkers	-	-	-	-	-	-
Stock change *(1)*	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply	**256**	**392**	**304**	**1,493**	**303**	**1,666**
Statistical difference *(2)*	-	-	-	-	-	-
Total demand	**256**	**392**	**304**	**1,493**	**303**	**1,666**
Transformation	**-**	**-**	**259**	**1,234**	**230**	**1,652**
Electricity generation	-	-	259	1,234	230	1,652
Major power producers	-	-	189	734	-	-
Autogenerators	-	-	70	500	230	1,652
Heat generation	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Other	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-
Other	-	-	-	-	-	-
Losses	**-**	**-**	**-**	**-**	**-**	**-**
Final consumption	**256**	**392**	**45**	**259**	**73**	**14**
Industry	**256**	**-**	**40**	**88**	**-**	**14**
Unclassified	256	-	40	88	-	14
Iron and steel	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-
Other industries	-	-	-	-	-	-
Construction	-	-	-	-	-	-
Transport	**-**	**-**	**-**	**-**	**-**	**-**
Air	-	-	-	-	-	-
Rail	-	-	-	-	-	-
Road	-	-	-	-	-	-
National navigation	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-
Other	**-**	**392**	**5**	**171**	**73**	**-**
Domestic	-	392	-	-	-	-
Public administration	-	-	-	-	73	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	5	171	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	**-**	**-**	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) SRC is short rotation coppice.

(4) Municipal solid waste, general industrial waste and hospital waste.

(5) The amount of shoreline wave and tidal included is less than 0.2 ktoe.

7.1 Commodity balances 2010 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste *(4)* and tyres	Geothermal and active solar heat	Heat pumps	Hydro	Wind wave and tidal *(5)*	Liquid biofuels	Total renewables	
							Supply
1,205	91	61	310	876	304	6,531	Production
-	-	-	-	-	-	-	Other sources
-	-	-	-	-	991	1,744	Imports
-	-	-	-	-	-81	-105	Exports
-	-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	-	Stock change *(1)*
-	-	-	-	-	-	-	Transfers
1,205	**91**	**61**	**310**	**876**	**1,214**	**8,170**	**Total supply**
-	-	-	-	-	-	-	**Statistical difference** *(2)*
1,205	**91**	**61**	**310**	**876**	**1,214**	**8,170**	**Total demand**
1,047	**3**	**-**	**310**	**876**	**-**	**5,611**	**Transformation**
1,047	3	-	310	876	-	5,611	Electricity generation
90	-	-	232	684	-	1,929	Major power producers
957	3	-	77	192	-	3,682	Autogenerators
-	-	-	-	-	-	-	Heat generation
-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	**Energy industry use**
-	-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	-	Oil and gas extraction
-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	**Losses**
157	**88**	**61**	**-**	**-**	**1,214**	**2,558**	**Final consumption**
84	**-**	**2**	**-**	**-**	**-**	**484**	**Industry**
84	-	2	-	-	-	484	Unclassified
-	-	-	-	-	-	-	Iron and steel
-	-	-	-	-	-	-	Non-ferrous metals
-	-	-	-	-	-	-	Mineral products
-	-	-	-	-	-	-	Chemicals
-	-	-	-	-	-	-	Mechanical engineering, etc
-	-	-	-	-	-	-	Electrical engineering, etc
-	-	-	-	-	-	-	Vehicles
-	-	-	-	-	-	-	Food, beverages, etc
-	-	-	-	-	-	-	Textiles, leather, etc
-	-	-	-	-	-	-	Paper, printing, etc
-	-	-	-	-	-	-	Other industries
-	-	-	-	-	-	-	Construction
-	-	-	-	-	**1,214**	**1,214**	**Transport**
-	-	-	-	-	-	-	Air
-	-	-	-	-	-	-	Rail
-	-	-	-	-	1,214	1,214	Road
-	-	-	-	-	-	-	National navigation
-	-	-	-	-	-	-	Pipelines
73	**88**	**59**	**-**	**-**	**-**	**860**	**Other**
15	87	10	-	-	-	504	Domestic
47	0	-	-	-	-	121	Public administration
11	0	48	-	-	-	60	Commercial
-	-	-	-	-	-	176	Agriculture
-	-	-	-	-	-	-	Miscellaneous
-	**-**	**-**	**-**	**-**	**-**	-	**Non energy use**

7.2 Commodity balances 2009

Renewables and waste

Thousand tonnes of oil equivalent

	Wood waste	Wood	Poultry litter, meat and bone, and farm waste	Straw, SRC, and other plant-based biomass (3)	Sewage gas	Landfill gas
Supply						
Production	223r	375	272	745r	247r	1,638
Other sources	-	-	-	-	-	-
Imports	-	-	-	423r	-	-
Exports	-	-	-	-5r	-	-
Marine bunkers	-	-	-	-	-	-
Stock change *(1)*	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply	**223r**	**375**	**272**	**1,163r**	**247r**	**1,638**
Statistical difference *(2)*	-	-	-	-	-	-
Total demand	**223r**	**375**	**272**	**1,163r**	**247r**	**1,638**
Transformation	**-**	**-**	**232**	**960r**	**196r**	**1,624**
Electricity generation	-	-	232	960r	196r	1,624
Major power producers	-	-	165r	491r	-	-
Autogenerators	-	-	67r	469r	196r	1,624
Heat generation	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Other	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-
Other	-	-	-	-	-	-
Losses	**-**	**-**	**-**	**-**	**-**	**-**
Final consumption	**223r**	**375**	**40**	**203**	**51r**	**14**
Industry	**223r**	**-**	**38**	**69**	**-**	**14**
Unclassified	223r	-	38	69	-	14
Iron and steel	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-
Other industries	-	-	-	-	-	-
Construction	-	-	-	-	-	-
Transport	**-**	**-**	**-**	**-**	**-**	**-**
Air	-	-	-	-	-	-
Rail	-	-	-	-	-	-
Road	-	-	-	-	-	-
National navigation	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-
Other	**-**	**375**	**2**	**134**	**51r**	**-**
Domestic	-	375	-	-	-	-
Public administration	-	-	-	-	51r	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	2	134	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	**-**	**-**	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) SRC is short rotation coppice.

(4) Municipal solid waste, general industrial waste and hospital waste.

(5) The amount of shoreline wave and tidal included is less than 0.1 ktoe.

7.2 Commodity balances 2009 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste *(4)* and tyres	Geothermal and active solar heat	Heat pumps	Hydro	Wind wave and tidal *(5)*	Liquid biofuels	Total renewables	
							Supply
1,165	72	29r	452	800	226r	6,244r	Production
-	-	-	-	-	-	-	Other sources
-	-	-	-	-	812r	1,235r	Imports
-	-	-	-	-	-	-5r	Exports
-	-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	-	Stock change *(1)*
-	-	-	-	-	-	-	Transfers
1,165	**72**	**29r**	**452**	**800**	**1,038r**	**7,475r**	**Total supply**
-	-	-	-	-	-	-	**Statistical difference** *(2)*
1,165	**72**	**29r**	**452**	**800**	**1,038r**	**7,475r**	**Total demand**
993	**2**	**-**	**452**	**800**	**-**	**5,259r**	**Transformation**
993	2	-	452	800	-	5,259r	Electricity generation
87r	-	-	369	594	-	1,706r	Major power producers
906r	2	-	83	206	-	3,553r	Autogenerators
-	-	-	-	-	-	-	Heat generation
-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	**Energy industry use**
-	-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	-	Oil and gas extraction
-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	**Losses**
172	**70**	**29r**	**-**	**-**	**1,038r**	**2,216r**	**Final consumption**
102	**-**	**1r**	**-**	**-**	**-**	**447r**	**Industry**
102	-	1r	-	-	-	447r	Unclassified
-	-	-	-	-	-	-	Iron and steel
-	-	-	-	-	-	-	Non-ferrous metals
-	-	-	-	-	-	-	Mineral products
-	-	-	-	-	-	-	Chemicals
-	-	-	-	-	-	-	Mechanical engineering, etc
-	-	-	-	-	-	-	Electrical engineering, etc
-	-	-	-	-	-	-	Vehicles
-	-	-	-	-	-	-	Food, beverages, etc
-	-	-	-	-	-	-	Textiles, leather, etc
-	-	-	-	-	-	-	Paper, printing, etc
-	-	-	-	-	-	-	Other industries
-	-	-	-	-	-	-	Construction
-	-	-	-	-	**1,038r**	**1,038r**	**Transport**
-	-	-	-	-	-	-	Air
-	-	-	-	-	-	-	Rail
-	-	-	-	-	1,038r	1,038r	Road
-	-	-	-	-	-	-	National navigation
-	-	-	-	-	-	-	Pipelines
70	**70**	**28r**	**-**	**-**	**-**	**730r**	**Other**
16	69	5r	-	-	-	465r	Domestic
45	0	-	-	-	-	97r	Public administration
9	0	23r	-	-	-	32r	Commercial
-	-	-	-	-	-	136	Agriculture
-	-	-	-	-	-	-	Miscellaneous
-	**-**	**-**	**-**	**-**	**-**	-	**Non energy use**

7.3 Commodity balances 2008

Renewables and waste

Thousand tonnes of oil equivalent

	Wood waste	Wood	Poultry litter, meat and bone, and farm waste	Straw, SRC, and other plant-based biomass (3)	Sewage gas	Landfill gas
Supply						
Production	220r	359	296	474r	224r	1,574
Other sources	-	-	-	-	-	-
Imports	-	-	-	433r	-	-
Exports	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-
Stock change *(1)*	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply	**220r**	**359**	**296**	**906r**	**224r**	**1,574**
Statistical difference *(2)*	-	-	-	-	-	-
Total demand	**220r**	**359**	**296**	**906r**	**224r**	**1,574**
Transformation	**-**	**-**	**253**	**718r**	**174r**	**1,560**
Electricity generation	-	-	253	718r	174r	1,560
Major power producers	-	-	170	541r	-	-
Autogenerators	-	-	83	178r	174r	1,560
Heat generation	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Other	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-
Other	-	-	-	-	-	-
Losses	**-**	**-**	**-**	**-**	**-**	**-**
Final consumption	**220r**	**359**	**42**	**188**	**50r**	**14**
Industry	**220r**	**-**	**40**	**56**	**-**	**14**
Unclassified	220r	-	40	56	-	14
Iron and steel	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-
Other industries	-	-	-	-	-	-
Construction	-	-	-	-	-	-
Transport	**-**	**-**	**-**	**-**	**-**	**-**
Air	-	-	-	-	-	-
Rail	-	-	-	-	-	-
Road	-	-	-	-	-	-
National navigation	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-
Other	**-**	**359**	**2**	**132**	**50r**	**-**
Domestic	-	359	-	-	-	-
Public administration	-	-	-	-	50r	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	2	132	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	**-**	**-**	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) SRC is short rotation coppice.

(4) Municipal solid waste, general industrial waste and hospital waste.

(5) The amount of shoreline wave included is less than 0.05 ktoe.

7.3 Commodity balances 2008 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste *(4)* and tyres	Geothermal and active solar heat	Heat pumps	Hydro	Wind and wave *(5)*	Liquid biofuels	Total renewables	
							Supply
1,002	58	7r	444	610	302r	5,570r	Production
-	-	-	-	-	-	-	Other sources
-	-	-	-	-	547r	980r	Imports
-	-	-	-	-	-	-	Exports
-	-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	-	Stock change *(1)*
-	-	-	-	-	-	-	Transfers
1,002	**58**	**7r**	**444**	**610**	**849r**	**6,550r**	**Total supply**
-	-	-	-	-	-	-	**Statistical difference** *(2)*
1,002	**58**	**7r**	**444**	**610**	**849r**	**6,550r**	**Total demand**
817	**1**	**-**	**444**	**610**	**5**	**4,585r**	**Transformation**
817	1	-	444	610	5	4,585r	Electricity generation
93r	-	-	363	461	-	1,627r	Major power producers
724r	1	-	81	150	5	2,957r	Autogenerators
-	-	-	-	-	-	-	Heat generation
-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	**Energy industry use**
-	-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	-	Oil and gas extraction
-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	**Losses**
185	**57**	**7r**	**-**	**-**	**845r**	**1,966r**	**Final consumption**
119	**-**	**0r**	**-**	**-**	**-**	**449r**	**Industry**
119	-	0r	-	-	-	449r	Unclassified
-	-	-	-	-	-	-	Iron and steel
-	-	-	-	-	-	-	Non-ferrous metals
-	-	-	-	-	-	-	Mineral products
-	-	-	-	-	-	-	Chemicals
-	-	-	-	-	-	-	Mechanical engineering, etc
-	-	-	-	-	-	-	Electrical engineering, etc
-	-	-	-	-	-	-	Vehicles
-	-	-	-	-	-	-	Food, beverages, etc
-	-	-	-	-	-	-	Textiles, leather, etc
-	-	-	-	-	-	-	Paper, printing, etc
-	-	-	-	-	-	-	Other industries
-	-	-	-	-	-	-	Construction
-	-	-	-	-	**845r**	**845r**	**Transport**
-	-	-	-	-	-	-	Air
-	-	-	-	-	-	-	Rail
-	-	-	-	-	845r	845r	Road
-	-	-	-	-	-	-	National navigation
-	-	-	-	-	-	-	Pipelines
66	**57**	**6r**	**-**	**-**	**-**	**672r**	**Other**
16	56	1r	-	-	-	431r	Domestic
39	0	-	-	-	-	89r	Public administration
11	0	5r	-	-	-	17r	Commercial
-	-	-	-	-	-	134	Agriculture
-	-	-	-	-	-	-	Miscellaneous
-	**-**	**-**	**-**	**-**	**-**	-	**Non energy use**

7.4 Capacity of, and electricity generated from, renewable sources

	2006	2007	2008	2009	2010
Installed Capacity (MW) *(1)*					
Wind:					
Onshore	1,650.7	2,083.4	2,820.2	3,483.2	4,036.7
Offshore *(2)*	303.8	393.8	586.0	941.2	1,341.2
Shoreline wave / tidal	0.5	0.5	0.5	2.5	2.6
Solar photovoltaics	14.3	18.1	22.5	26.5	76.9
Hydro:					
Small scale	153.4	166.2	173.3	186.3	195.4
Large scale *(3)*	1,361.4	1,358.7	1,456.5	1,458.5	1,452.9
Biomass:					
Landfill gas	856.2	900.6	908.3	984.9	1,024.6
Sewage sludge digestion	143.8r	150.2r	147.6r	156.9r	189.2
Municipal solid waste combustion	326.5	326.4	375.9	392.0	435.3
Animal Biomass *(4)*	88.9	114.4	114.4	119.3	138.6
Plant Biomass *(5)*	132.4	189.5	197.7	278.5	308.9
Total biomass and wastes	1,547.7r	1,681.1r	1,743.9r	1,931.6r	2,096.6
Total	**5,031.7r**	**5,701.8r**	**6,802.9r**	**8,029.7r**	**9,202.2**
Co-firing (6)	310.2	247.6	226.9	254.7	390.2
Generation (GWh)					
Wind:					
Onshore *(7)*	3,574	4,491	5,792	7,564	7,137
Offshore *(8)*	651	783	1,305	1,740	3,046
Solar photovoltaics	11	14	17	20	33
Hydro:					
Small scale	478	534	568	598	511
Large scale *(3)*	4,115	4,554	4,600	4,664	3,092
Biomass:					
Landfill gas	4,424	4,677	4,757	4,952	5,037
Sewage sludge digestion	445r	449r	532r	598r	702
Municipal solid waste combustion *(9)*	1,083	1,177	1,226	1,511	1,594
Co-firing with fossil fuels	2,528	1,956	1,613	1,806	2,506
Animal Biomass *(10)*	434	555	587	620	670
Plant Biomass *(11)*	363	409	568	1,109	1,406
Total biomass	9,277r	9,223r	9,283r	10,596r	11,915
Total generation	**18,106**	**19,600r**	**21,565r**	**25,182r**	**25,734**
Non-biodegradable wastes *(12)*	651	707	736	874	922
Load factors (per cent) *(13)*					
Onshore wind	27.2	27.5	27.0	27.4	21.7
Offshore wind	28.7	25.6	30.4	26.0	30.5
Hydro	34.8	38.2	37.4	36.7	25.0
Landfill gas	60.3	60.8	60.0	59.7	57.2
Sewage sludge digestion	36.1	34.9	40.8	44.9	46.3
Municipal solid waste combustion	38.6	41.2	39.9	44.9	44.0
Animal Biomass	56.5	62.4	58.6	60.6	59.3
Plant Biomass	35.7	29.0	33.5	53.2	54.6
Biomass (excluding co-firing and non-biodegradable wastes)	51.3	51.4	51.1	54.6	53.3
Total (excluding non-biodegradable wastes)	37.2	37.5	36.4	36.0	30.8
Load factors on an unchanged configuration basis (per cent) *(14)*					
Onshore wind	26.7	27.3	29.4	26.9	21.5
Offshore wind	27.5	28.3	34.9	33.7	29.6

(1) Capacity on a DNC basis is shown in Long Term Trends Table 7.1.1 available on the DECC web site - see paragraph 7.85.
(2) From 2010, Beatrice (10 MW) has been included as it is now classified as a Major Power Producer , as opposed to solely supplying an offshore oil platform.
(3) Excluding pumped storage stations. Capacities are as at the end of December.
(4) Includes the use of farm waste digestion, anaerobic digestion, poultry litter and meat and bone.
(5) Includes the use of waste tyres, straw combustion, short rotation coppice and hospital waste.
(6) This is the amount of fossil fuelled capacity used for co-firing of renewables based on the proportion of generation accounted for by the renewable source.
(7) Actual generation figures are given where available, but otherwise are estimated using a typical load factor or the design load factor, where known.
(8) Latest years include electricity from shoreline wave and tidal, but this amounts to less than 2 GWh, and excludes the EMEC test facility. Generation by Beatrice is included from 2010 (see note 2).
(9) Biodegradable part only.
(10) Includes the use of farm waste digestion, anaerobic digestion, poultry litter combustion and meat and bone combustion.
(11) Includes the use of straw and energy crops.
(12) Non-biodegradable part of municipal solid waste plus waste tyres, hosptal waste and general industrial waste.
(13) Load factors are calculated based on installed capacity at the beginning and the end of the year - see paragraph 7.86.
(14) For a definition see paragraphs 7.87 and 7.88.

7.5 Electricity generated from renewable sources - Renewables Obligation basis

GWh

	2006	2007	2008	2009	2010
Generation : Renewables Obligation basis					
Wind:					
Onshore *(1)*	3,574	4,491	5,792	7,564	7,137
Offshore *(2)*	651	783	1,305	1,740	3,046
Solar photovoltaics	11	14	17	20	33
Hydro:					
Small scale *(1)*	478	534	568	598	511
Other hydro including refurbished large scale	1,969	1,912	1,926	2,016	1,310
Biomass:					
Landfill gas	4,424	4,677	4,757	4,952	5,037
Sewage sludge digestion	445r	449r	532r	598r	702
Co-firing with fossil fuels	2,528	1,956	1,613	1,806	2,506
Animal Biomass *(3)*	434	555	587	620	670
Plant Biomass *(4)*	363	409	568	1,109	1,406
Total biomass	8,194r	8,046r	8,057r	9,086r	10,321
Total renewables generation on an obligation basis *(5)*	**14,876r**	**15,780r**	**17,665r**	**21,024r**	**22,358**

(1) Actual generation figures are given where available, but otherwise are estimated using a typical load factor or the design load factor, where known.
(2) Includes electricity from shoreline wave and tidal, but this amounts to less than 2 GWh, and excludes the EMEC test facility.
(3) Includes the use of farm waste digestion, poultry litter combustion and meat and bone combustion.
(4) Includes the use of straw and energy crops.
(5) See paragraph 7.10 for definitions.

7.6 Renewable sources used to generate electricity and heat and for transport fuels[(1)(2)]

Thousand tonnes of oil equivalent

	2006	2007	2008	2009	2010
Used to generate electricity *(3)*					
Wind:					
Onshore	307.3	386.2	498.0	650.4	613.7
Offshore *(4)*	56.0	67.3	112.2	149.6	261.9
Solar photovoltaics	0.9	1.2	1.5	1.7	2.9
Hydro:					
Small scale	41.1	46.0	48.8	51.4	44.0
Large scale *(5)*	353.9	391.6	395.5	401.0	265.9
Biomass:					
Landfill gas	1,451.1	1,533.9	1,560.3	1,624.2	1,652.0
Sewage sludge digestion	145.9r	147.4r	174.5r	196.2r	230.3
Biodegradable municipal solid waste combustion	479.0	486.8	506.8	624.5	659.0
Co-firing with fossil fuels	829.0	641.4	528.9	592.3	821.8
Animal Biomass *(6)*	148.5	222.5	253.3	231.9	259.3
Plant Biomass *(7)*	122.9r	137.8r	189.5r	367.3r	412.3
Liquid biofuels	-	-	4.9	-	-
Total biomass	3,176.4r	3,169.6r	3,218.2r	3,636.4r	4,034.7
Total	**3,935.6r**	**4,061.8r**	**4,274.3r**	**4,890.6r**	**5,222.9**
Non-biodegradable wastes *(8)*	293.7	298.3	310.3	368.6	388.4
Used to generate heat					
Active solar heating	36.3	44.9	55.7	69.5	87.0
Biomass:					
Landfill gas	13.6	13.6	13.6	13.6	13.6
Sewage sludge digestion	44.1r	50.2r	49.8r	51.0r	72.8
Wood combustion - domestic	298.8	332.0	358.6	375.2	391.8
Wood combustion - industrial	97.0	101.2	220.3r	223.4r	255.7
Animal Biomass *(9)*	24.9	47.8	42.4	40.3	45.1
Plant Biomass *(10)*	103.0	108.8	188.1	203.0	259.0
Biodegradable municipal solid waste combustion	33.7	33.7	31.5	31.3	25.6
Total biomass	615.1r	687.4r	904.2r	937.7r	1,063.6
Geothermal aquifers	0.8	0.8	0.8	0.8	0.8
Heat Pumps *(11)*	-	-	6.5r	28.8r	61.0
Total	**652.2r**	**733.1r**	**967.3r**	**1,036.8r**	**1,212.4**
Non-biodegradable wastes *(8)*	111.6	137.3	153.7	140.4	131.5
Renewable sources used as transport fuels					
as Bioethanol	53.4	85.8	116.3r	180.4r	355.4
as Biodiesel	134.4	275.9	728.2r	858.1r	859.0
Total	**187.8**	**361.7**	**844.5r**	**1,038.5r**	**1,214.4**
Total use of renewable sources and wastes					
Solar heating and photovoltaics	37.2	46.1	57.2	71.2	89.8
Onshore and offshore wind *(4)*	363.3	453.5	610.3	800.0	875.5
Hydro	394.9	437.5	444.4	452.4	309.8
Biomass	3,791.6r	3,857.0r	4,122.4r	4,574.2r	5,098.3
Geothermal aquifers	0.8	0.8	0.8	0.8	0.8
Heat Pumps *(11)*	-	-	6.5r	28.8r	61.0
Transport fuels	187.8	361.7	844.5r	1,038.5r	1,214.4
Total	**4,775.6r**	**5,156.6r**	**6,086.1r**	**6,965.9r**	**7,649.7**
Non-biodegradable wastes *(9)*	405.3	435.6	464.1	509.0	520.0
All renewables and wastes *(12)*	**5,180.9r**	**5,592.2r**	**6,550.2r**	**7,474.9r**	**8,169.7**

(1) Includes some waste of fossil fuel origin.
(2) See paragraphs 7.38 to 7.90 for technical notes and definitions of the categories used in this table
(3) For wind, solar PV and hydro, the figures represent the energy content of the electricity supplied but for biomass the figures represent the energy content of the fuel used.
(4) Latest years includes electricity from shoreline wave and tidal but this is less than 0.2 ktoe and excludes the EMEC test facil
(5) Excluding pumped storage stations.
(6) Includes electricity from farm waste digestion, anaerobic digestion, poultry litter combustion and meat and bone combustion.
(7) Includes the use straw combustion and energy crops.
(8) Non-biodegradable part of municipal solid waste plus waste tyres, hospital waste, and general industrial waste.
(9) Includes heat from farm waste digestion, anaerobic digestion, meat and bone combustion and sewage sludge combustion.
(10) Includes heat from straw, energy crops, paper and packaging.
(11) Data on heat pumps were included in this table for the first time in 2011. It is understood that there was a negligable contri

7.7 Renewable sources data used to indicate progress under the 2009 EU Renewable Energy Directive (measured using net calorific values)

Thousand tonnes of oil equivalent

	2006	2007	2008	2009	2010
Electricity generation component:					
Normalised hydro generation *(1) (2)*	395	393	422	422	412
Normalised wind generation *(3)*	351	444	602	803	966
Electricity generation from renewables other than wind, hydro, and compliant biofuels	799	799	801	916	1,027
Electricity generation from compliant biofuels	-	-	-	-	-
Total renewable generation from all compliant sources	1,545	1,636	1,825	2,141	2,406
Total Gross Electricity Consumption *(2)*	34,475	34,234	34,018	32,323	32,729
Percentage of electricity from renewable sources	4.5%	4.8%	5.4%	6.6%	7.4%
Heat component:					
Renewable energy for heating and cooling	608	693	906	962	1,117
Total Gross energy consumption for heating and cooling	63,689	61,197	62,234	55,751	61,530
Percentage of heating and cooling energy from renewable sources	1.0%	1.1%	1.5%	1.7%	1.8%
Transport component (excluding air transport):					
Road transport renewable electricity	-	-	-	-	-
Non-road transport renewable electricity	15	16	18	22	25
Biofuels	180	349	806	988	1,147
Total electricity consumption in transport	344	341	338	336	335
Total petrol and diesel consumption in transport	42,048	42,107	40,730	39,113	38,936
Percentage of transport energy from renewable sources	0.5%	0.9%	2.0%	2.5%	2.9%
Overall directive target:					
Renewables used for:					
Electricity generation	1,545	1,636	1,825	2,141	2,406
Heating and Cooling	608	693	906	962	1,117
Transport (Biofuels only)	180	349	806	988	1,147
Total Final Consumption of Renewable Energy ["Row A"]	2,333	2,678	3,536	4,092	4,670
Final Electricity Consumption *(4)*	29,684	29,463	29,421	27,749	28,230
Transport Final Energy Consumption (including air transport) *(5)*	55,982	56,201	54,979	52,778	52,341
Heating and Cooling Final Energy Consumption	63,689	61,197	62,234	55,751	61,530
Total Final Energy Consumption *(6)*	149,356	146,861	146,634	136,278	142,101
plus Distribution losses for electricity	2,366	2,303	2,376	2,345	2,307
plus Distribution losses for heat	-	-	-	-	-
plus Consumption of electricity in the electricity and heat generation sectors	1,591	1,521	1,399	1,419	1,359
plus Consumption of heat in the electricity and heat generation sectors	-	-	-	-	-
Gross Final Energy Consumption (GFEC)	153,312	150,685	150,409	140,042	145,767
of which Air transport	13,299	13,211	12,832	12,114	11,673
Air transport as a proportion of GFEC	8.67%	8.77%	8.53%	8.65%	8.01%
Air transport cap specificed in Directive	6.18%	6.18%	6.18%	6.18%	6.18%
Capped air transport	9,475	9,312	9,295	8,655	9,008
Capped Gross Final Energy Consumption (CGFEC) ["Row B"] *(7)*	149,488	146,787	146,872	136,582	143,102
Headline Directive percentage : Renewable Energy Consumption as a percentage of Capped Gross Final Energy Consumption ["Row A" divided by "Row B"]	1.6%	1.8%	2.4%	3.0%	3.3%

(1) Based on a 15 year average hydro load factor.
(2) Excludes generation from pumped storage.
(3) Based on a 5 year average wind load factor.
(4) Final Electricity Consumption is Gross Electricity Consumption minus generators' own use of electricity and losses.
(5) Includes consumption of petrol and diesel, biofuels, other oil products, and coal.
(6) Total final consumption less non-energy use, as shown in Annex I, Table I.1, available on the DECC website.
(7) This row includes adjustments for loses, and generators own use of electricity, combined with the capping mechanism for air transport as specified in the Directive.

Digest of United Kingdom Energy Statistics 2011

Annexes

Annex A: Energy and commodity balances, conversion factors and calorific values

Annex B: Glossary and acronyms

Annex C: Further sources of UK energy publications

Annex D: Major events in the Energy Industry, 2009-2011

Department of Energy and Climate Change

Annex A
Energy and commodity balances, conversion factors and calorific values

Balance principles

A.1 This Annex outlines the principles behind the balance presentation of energy statistics. It covers these in general terms. Fuel specific details are given in the appropriate chapters of this publication.

A.2 Balances are divided into two types, each of which performs a different function.

a) *commodity balance* – a balance for each energy commodity that uses the units usually associated with that commodity. By using a single column of figures, it shows the flow of the commodity from its sources of supply through to its final use. Commodity balances are presented in the individual fuel chapters of this publication.

b) energy balance - presents the commodity balances in a common unit and places them alongside one another in a manner that shows the dependence of the supply of one commodity on another. This is useful as some commodities are manufactured from others. The layout of the energy balance also differs slightly from the commodity balance. The energy balance format is used in Chapter 1.

A.3 Energy commodities can be either primary or secondary. Primary energy commodities are drawn (extracted or captured) from natural reserves or flows, whereas secondary commodities are produced from primary energy commodities. Crude oil and coal are examples of primary commodities, whilst petrol and coke are secondary commodities manufactured from them. For balance purposes, electricity may be considered to be both primary electricity (for example, hydro, wind) or secondary (produced from steam turbines using steam from the combustion of fuels).

A.4 Both commodity and energy balances show the flow of the commodity from its production, extraction or import through to its final use.

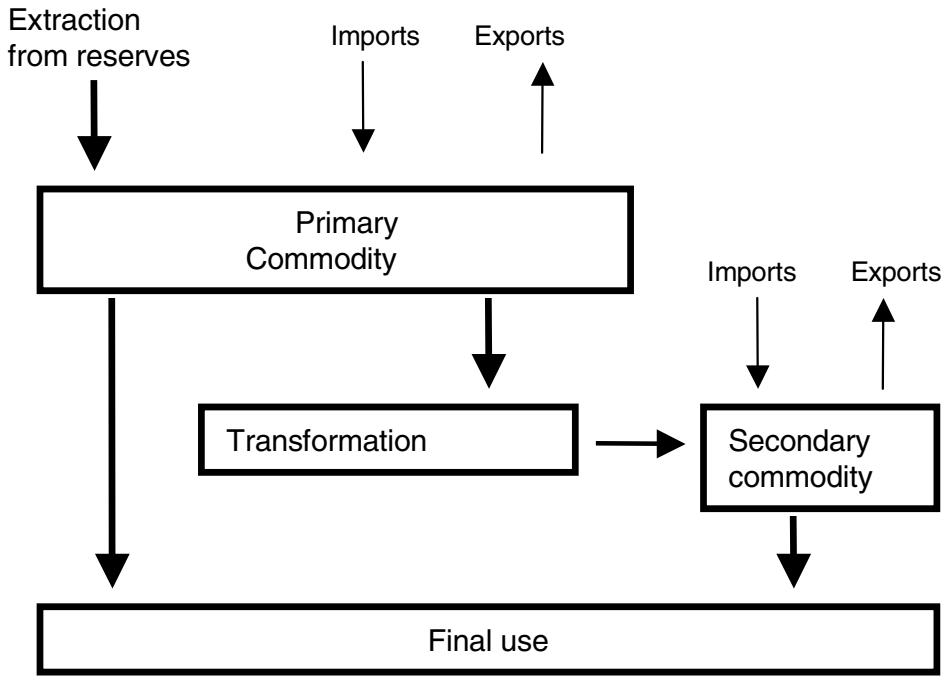
A.5 A simplified model of the commodity flow underlying the balance structure is given in Chart A.1. It illustrates how primary commodities may be used directly and/or be transformed into secondary commodities. The secondary fuels then enter final consumption or may also be transformed into another energy commodity (for example, electricity produced from fuel oil). To keep the diagram simple these “second generation” flows have not been shown.

A.6 The arrows at the top of the chart represent flows to and from the “pools” of primary and secondary commodities, from imports and exports and, in the case of the primary pool, extraction from reserves (eg the production of coal, gas and crude oil).

Commodity balances (Tables 2.1 to 2.6, 3.1 to 3.4, 4.1, 5.1, 5.3 and 7.1 to 7.3)

A.7 A commodity balance comprises a supply section and a demand section. The supply section gives available sources of supply (ie exports are subtracted). The demand section is divided into a transformation section, a section showing uses in the energy industries (other than for transformation) and a section covering uses by final consumers for energy or non-energy purposes. Final consumption for energy purposes is divided into use by sector of economic activity. The section breakdowns are described below.

Chart A.1: Energy flows



Supply

Production

A.8 Production, within the commodity balance, covers indigenous production (extraction or capture of primary commodities) and generation or manufacture of secondary commodities. Production is always gross, that is, it includes the quantities used during the extraction or manufacturing process.

Other sources

A.9 Production from other sources covers sources of supply that do not represent "new" supply. These may be recycled products, recovered fuels (slurry or waste coal), or electricity from pumped storage plants. The production of these quantities will have been reported in an earlier accounting period or have already been reported in the current period of account. Exceptionally, the *Other sources* row in the commodity balances for ethane, propane and butane is used to receive transfers of these hydrocarbons from gas stabilisation plants at North Sea terminals. In this manner, the supplies of primary ethane, propane and butane from the North Sea are combined with the production of these gases in refineries, so that the disposals may be presented together in the balances.

Imports and exports

A.10 The figures for imports and exports relate to energy commodities moving into or out of the United Kingdom as part of transactions involving United Kingdom companies. Exported commodities are produced in the United Kingdom and imported commodities are for use within the United Kingdom (although some may be re-exported before or after transformation). The figures thus exclude commodities either exported from or imported into HM Revenue and Customs bonded areas or warehouses. These areas, although part of the United Kingdom, are regarded as being outside of the normal United Kingdom's customs boundary, and so goods entering into or leaving them are not counted as part of the statistics on trade used in the balances.

A.11 Similarly, commodities that only pass through the United Kingdom on their way to a final destination in another country are also excluded. However, for gas these transit flows are included because it is difficult to identify this quantity separately, without detailed knowledge of the contract information covering the trade. This means that for gas, there is some over statement of the level of imports and exports, but the net flows are correct.

A.12 The convention in these balances is that exports are shown with a negative sign.

Marine bunkers

A.13 These are deliveries of fuels (usually fuel oil or gas oil) to ships of any flag (including the United Kingdom) for consumption during the voyage to other countries. Marine bunkers are treated rather like exports and shown with a negative sign.

Stock changes

A.14 Additions to (- sign) and withdrawals from stocks (+ sign) held by producers and transformation industries correspond to withdrawals from and additions to supply, respectively.

Transfers

A.15 There are several reasons why quantities may be transferred from one commodity balance to another:

- a commodity may no longer meet the original specification and be reclassified;
- the name of the commodity may change through a change in use;
- to show quantities returned to supply from consumers. These may be by-products of the use of commodities as raw materials rather than fuels.

A.16 A quantity transferred from a balance is shown with a negative sign to represent a withdrawal from supply and with a positive sign in the receiving commodity balance representing an addition to its supply.

Total supply

A.17 The total supply available for national use is obtained by summing the flows above this entry in the balance.

Total demand

A.18 The various figures for the disposals and/or consumption of the commodities are summed to provide a measure of the demand for them. The main categories or sectors of demand are described in paragraphs A.31 to A.42.

Statistical difference

A.19 Any excess of supply over demand is shown as a statistical difference. A negative figure indicates that demand exceeds supply. Statistical differences arise when figures are gathered from a variety of independent sources and reflect differences in timing, in definition of coverage of the activity, or in commodity definition. Differences also arise for methodological reasons in the measurement of the flow of the commodity eg if there are differences between the volumes recorded by the gas producing companies and the gas transporting companies. A non-zero statistical difference is normal and, provided that it is not too large, is preferable to a statistical difference of zero as this suggests that a data provider has adjusted a figure to balance the account.

Transformation

A.20 The transformation section of the balance covers those processes and activities that transform the original primary (and sometimes secondary) commodity into a form which is better suited for specific uses than the original form. Most of the transformation activities correspond to particular energy industries whose main business is to manufacture the product associated with them. Certain activities involving transformation take place to make products that are only partly used for energy needs (coke oven coke) or are by-products of other manufacturing processes (coke oven and blast furnace gases). However, as these products and by-products are then used, at least in part, for their energy content they are included in the balance system.

A.21 The figures given under the activity headings of this section represent the quantities used for transformation. The production of the secondary commodities will be shown in the *Production* row of the corresponding commodity balances.

Electricity generation

A.22 The quantities of fuels burned for the generation of electricity are shown in their commodity balances under this heading. The activity is divided into two parts, covering the major power producers

(for whom the main business is the generation of electricity for sale) and autogenerators (whose main business is not electricity generation but who produce electricity for their own needs and may also sell surplus quantities). The amounts of fuels shown in the balance represent the quantities consumed for the gross generation of electricity. Where a generator uses combined heat and power plant, the figures include only the part of the fuel use corresponding to the electricity generated.

A.23 In relation to autogenerators' data, the figures for quantities of fuel used for electricity generation appear under the appropriate fuel headings in the *Transformation* section heading for *Autogenerators,* whilst the electricity generated appears in the *Electricity* column under *Production*. A breakdown of the information according to the branch of industry in which the generation occurs is not shown in the balance but is given in Chapter 1, Table 1.9. The figures for energy commodities consumed by the industry branches shown under final consumption include all use of electricity, but exclude the fuels combusted by the industry branches to generate the electricity.

Heat generation

A.24 The quantities of fuel burned to generate heat that is sold under the provision of a contract to a third party are shown in their commodity balances under this heading. It includes heat that is generated and sold by combined heat and power plants and by community heating schemes (also called district heating).

Petroleum refineries

A.25 Crude oil, natural gas liquids and other oils needed by refineries for the manufacture of finished petroleum products are shown under this heading.

Coke manufacture and blast furnaces

A.26 Quantities of coal for coke ovens and all fuels used within blast furnaces are shown under this heading. The consumption of fuels for heating coke ovens and the blast air for blast furnaces are shown under *Energy industry use*.

Patent fuel manufacture

A.27 The coals and other solid fuels used for the manufacture of solid patent fuels are reported under this heading.

Other

A.28 Any minor transformation activities not specified elsewhere are captured under this heading.

Energy industry use

A.29 Consumption by both extraction and transformation industries to support the transformation process (but not for transformation itself) are included here according to the energy industry concerned. Typical examples are the consumption of electricity in power plants (eg for lighting, compressors and cooling systems) and the use of extracted gases on oil and gas platforms for compressors, pumps and other uses. The headings in this section are identical to those used in the transformation section with the exception of *Pumped storage*. In this case, the electricity used to pump the water to the reservoir is reported.

Losses

A.30 This heading covers the intrinsic losses that occur during the transmission and distribution of electricity and gas (including manufactured gases). Other metering and accounting differences for gas and electricity are within the statistical difference, as are undeclared losses in other commodities.

Final consumption

A.31 *Final consumption* covers both final energy consumption (by different consuming sectors) and the use of energy commodities for non-energy purposes, that is *Non energy use*. Final consumption occurs when the commodities used are not for transformation into secondary commodities. The energy concerned disappears from the account after use. Any fuel used for electricity generation by final consumers is identified and reported separately within the transformation section. When an enterprise generates electricity, the figure for final consumption of the industrial sector to which the enterprise belongs includes its use of the electricity it generates itself (as well as supplies of electricity it purchases from others) but does not include the fuel used to generate that electricity.

A.32 The classification of consumers according to their main business follows, as far as practicable, the *Standard Industrial Classification (SIC2007).* The qualifications to, and constraints on, the classification are described in the technical notes to Chapter 1. Table 1G in Chapter 1 shows the breakdown of final consumers used, and how this corresponds to the SIC2007.

Industry

A.33 Two sectors of industry (iron and steel and chemicals) require special mention because the activities they undertake fall across the transformation, final consumption and non-energy classifications used for the balances. Also, the data permitting an accurate allocation of fuel use within each of these major divisions are not readily available.

Iron and steel

A.34 The iron and steel industry is a heavy energy user for transformation and final consumption activities. Figures shown under final consumption for this industry branch reflect the amounts that remain after quantities used for transformation and energy sector own use have been subtracted from the industry's total energy requirements. Use of fuels for transformation by the industry may be identified within the transformation section of the commodity balances.

A.35 The amounts of coal used for coke manufacture by the iron and steel industry are in the transformation section of the coal balance. Included in this figure is the amount of coal used for coke manufacture by the companies outside of the iron and steel industry, ie solid fuel manufacturers. The corresponding production of coke and coke oven gas may be found in the commodity balances for these products. The use of coke in blast furnaces is shown in the commodity balance for coke, and the gases produced from blast furnaces and the associated basic oxygen steel furnaces are shown in the production row of the commodity balance for blast furnace gas.

A.36 Fuels used for electricity generation by the industry are included in the figures for electricity generation by autogenerators and are not distinguishable as being used by the iron and steel sector in the balances. Electricity generation and fuel used for this by broad industry group are given in Table 1.9.

A.37 Fuels used to support coke manufacture and blast furnace gas production are included in the quantities shown under *Energy industry use.* These gases and other fuels do not enter coke ovens or blast furnaces, but are used to heat the ovens and the blast air supplied to furnaces.

Chemicals

A.38 The petro-chemical industry uses hydrocarbon fuels (mostly oil products and gases) as feedstock for the manufacture of its products. Distinguishing the energy use of delivered fuels from their non-energy use is complicated by the absence of detailed information. The procedures adopted to estimate the use are described in paragraphs A.41 and A.42 under *Non energy use*.

Transport

A.39 Figures under this heading are almost entirely quantities used strictly for transport purposes. However, the figures recorded against road transport usually include some fuel that is actually consumed in some "off-road" activities. Similarly, figures for railway fuels include some amounts of burning oil not used directly for transport purposes. Transport sector use of electricity includes all electricity used in industries classified to SIC2007 Groups 49 to 51. Fuels supplied to cargo and passenger ships undertaking international voyages are reported as *Marine bunkers* (see paragraph A.13). Supplies to fishing vessels are included under "agriculture".

Other sectors

A.40 The classification of all consumers groups under this heading, except *domestic*, follows *SIC2007* and is described in Table 1G in Chapter 1. The consistency of the classification across different commodities cannot be guaranteed because the figures reported are dependent on what the data suppliers can provide.

Non energy use

A.41 The non energy use of fuels may be divided into two types. They may be used directly for their physical properties eg lubricants or bitumen used for road surfaces, or by the petro-chemical industry

as raw materials for the manufacture of goods such as plastics. In their use by the petro-chemical industry, relatively little combustion of the fuels takes place and the carbon and/or hydrogen they contain are largely transferred into the finished product. However, in some cases heat from the manufacturing process or from combustion of by-products may be used. Data for this energy use are rarely available. Depending on the feedstock, non energy consumption is either estimated or taken to be the deliveries to the chemicals sector.

A.42 Both types of non energy use are shown under the *Non energy use* heading at the foot of the balances.

The energy balance (Tables 1.1 to 1.3)

Principles

A.43 The energy balance conveniently presents:

- an overall view of the United Kingdom's energy supplies;
- the relative importance of each energy commodity;
- dependence on imports;
- the contribution of our own fossil and renewable resources;
- the interdependence of commodities on one another.

A.44 The energy balance is constructed directly from the commodity balances by expressing the data in a common unit, placing them beside one another and adding appropriate totals. Heat sold is also included as a fuel. However, some rearrangement of the commodity balance format is required to show transformation of primary into secondary commodities in an easily understood manner.

A.45 Energy units are widely used as the common unit, and the current practice for the United Kingdom and the international organisations which prepare balances is to use the tonne of oil equivalent or a larger multiple of this unit, commonly thousands. One tonne of oil equivalent is defined as 10^7 kilocalories (41.868 gigajoules). The tonne of oil equivalent is another unit of energy like the gigajoule, kilocalorie or kilowatt hour, rather than a physical quantity. It has been chosen as it is easier to visualise than the other units. Due to the natural variations in heating value of primary fuels such as crude oil, it is rare that one tonne of oil has an energy content equivalent to one tonne of oil equivalent, however it is generally within a few per cent of the heating value of a tonne of oil equivalent. The energy figures are calculated from the natural units of the commodity balances by multiplying by factors representing the calorific (heating) value of the fuel. The gross calorific values of fuels are used for this purpose. When the natural unit of the commodity is already an energy unit (electricity in kilowatt hours, for example) the factors are just constants, converting one energy unit to another.

A.46 Most of the underlying definitions and ideas of commodity balances can be taken directly over into the energy balance. However, production of secondary commodities and, in particular, electricity are treated differently and need some explanation. The components of the energy balance are described below, drawing out the differences of treatment compared with the commodity balances.

Primary supply

A.47 Within the energy balance, the production row covers only extraction of primary fuels and the generation of primary energy (hydro, nuclear, wind). Note the change of row heading from *Production* in the commodity balances to *Indigenous production* in the energy balance. Production of secondary fuels and secondary electricity are shown in the transformation section and not in the indigenous production row at the top of the balance.

A.48 For fossil fuels, indigenous production represents the marketable quantity extracted from the reserves. Indigenous production of *Primary electricity* comprises hydro-electricity, wind and nuclear energy. The energy value for hydro-electricity is taken to be the energy content of the electricity produced from the hydro power plant and not the energy available in the water driving the turbines. A similar approach is adopted for electricity from wind generators. The electricity is regarded as the primary energy form because there are currently no other uses of the energy resource "upstream" of the generation. The energy value attached to nuclear electricity is discussed in paragraph A.52.

A.49 The other elements of the supply part of the balance are identical to those in the commodity balances. In particular, the sign convention is identical, so that figures for exports and international marine bunkers carry negative signs. A stock build carries a negative sign to denote it as a withdrawal from supply whilst a stock draw carries a positive sign to show it as an addition to supply.

A.50 The *Primary supply* is the sum of the figures above it in the table, taking account of the signs, and expresses the national requirement for primary energy commodities from all sources and foreign supplies of secondary commodities. It is an indicator of the use of indigenous resources and external energy supplies. Both the amount and mixture of fuels in final consumption of energy commodities in the United Kingdom will differ from the primary supply. The "mix" of commodities in final consumption will be much more dependent on the manufacture of secondary commodities, in particular electricity.

Transformation

A.51 Within an energy balance the presentation of the inputs to and outputs from transformation activities requires special mention, as it is carried out using a compact format. The transformation section also plays a key role in moving primary electricity from its own column in the balance into the electricity column, so that it can be combined with electricity from fossil fuelled power stations and the total disposals shown.

A.52 Indigenous production of primary electricity comprises nuclear electricity, hydro electricity and electricity from wind generation. Nuclear electricity is obtained by passing steam from nuclear reactors through conventional steam turbine sets. The heat in the steam is considered to be the primary energy available and its value is calculated from the electricity generated using the average thermal efficiency of nuclear stations, currently 38.3 in the United Kingdom. The electrical energy from hydro and wind is transferred from the *Primary electricity* column to the *Electricity* column using the *transfers* row because electricity is the form of primary energy and no transformation takes place. However, because the form of the nuclear energy is the steam from the nuclear reactors, the energy it contains is shown entering electricity generation and the corresponding electricity produced is included with all electricity generation in the figure, in the same row, under the *Electricity* column.

A.53 Quantities of fuels entering transformation activities (fuels into electricity generation and heat generation, crude oil into petroleum product manufacture (refineries), or coal into coke ovens) are shown with a negative sign to represent the input and the resulting production is shown as a positive number.

A.54 For electricity generated by Major power producers, the inputs are shown in the *Major power producers'* row of the *coal, manufactured fuel, primary oils, petroleum products, gas, renewables* and *primary electricity* columns. The total energy input to electricity generation is the sum of the values in these first seven columns. The *Electricity* column shows total electricity generated from these inputs and the transformation loss is the sum of these two figures, given in the *Total* column.

A.55 Within the transformation section, the negative figures in the *Total* column represent the losses in the various transformation activities. This is a convenient consequence of the sign convention chosen for the inputs and outputs from transformation. Any positive figures represent a transformation gain and, as such, are an indication of incorrect data.

A.56 In the energy balance, the columns containing the input commodities for electricity generation, heat generation and oil refining are separate from the columns for the outputs. However, for the transformation activities involving solid fuels this is only partly the case. Coal used for the manufacture of coke is shown in the coke manufacture row of the transformation section in the coal column, but the related coke and coke oven gas production are shown combined in the *Manufactured fuels* column. Similarly, the input of coke to blast furnaces and the resulting production of blast furnace gas are not identifiable and have been combined in the *Manufactured fuels* column in the *Blast furnace* row. As a result, only the net loss from blast furnace transformation activity appears in the column.

A.57 The share of each commodity or commodity group in primary supply can be calculated from the table. This table also shows the demand for primary as well as foreign supplies. Shares of primary supplies may be taken from the *Primary supply* row of the balance. Shares of fuels in final consumption may be calculated from the final consumption row.

Energy industry use and final consumption

A.58 The figures for final consumption and energy industry use follow, in general, the principles and definitions described under commodity balances in paragraphs A.29 to A.42.

Standard conversion factors

1 tonne of oil equivalent (toe)	= 10^7 kilocalories = 396.83 therms = 41.868 GJ = 11,630 kWh
100,000 British thermal units (Btu)	= 1 therm

This Digest follows UK statistical practice and uses the term "billion" to refer to one thousand million or 10^9

The following prefixes are used for multiples of joules, watts and watt hours:

kilo (k)	= 1,000	or 10^3
mega (M)	= 1,000,000	or 10^6
giga (G)	= 1,000,000,000	or 10^9
tera (T)	= 1,000,000,000,000	or 10^{12}
peta (P)	= 1,000,000,000,000,000	or 10^{15}

WEIGHT

1 kilogramme (kg)	= 2.2046 pounds (lb)
1 pound (lb)	= 0.4536 kg
1 tonne (t)	= 1,000kg = 0.9842 long ton = 1.102 short ton (sh tn)
1 Statute or long ton	= 2,240 lb = 1.016 t = 1.120 sh tn

VOLUME

1 cubic metre (cu m)	= 35.31 cu ft
1 cubic foot (cu ft)	= 0.02832 cu m
1 litre	= 0.22 Imperial gallons (UK gal)
1 UK gallon	= 8 UK pints = 1.201 US gallons (US gal) = 4.54609 litres
1 barrel	= 159.0 litres = 34.97 UK gal = 42 US gal

LENGTH

1 mile	= 1.6093 kilometres
1 kilometre (km)	= 0.62137 miles

TEMPERATURE

1 scale degree Celsius (C)	= 1.8 scale degrees Fahrenheit (F)

For conversion of temperatures: $^{o}C = 5/9 (^{o}F - 32)$; $^{o}F = 9/5\ ^{o}C + 32$

Average conversion factors for petroleum 2010

	Imperial gallons per tonne	Litres per tonne
Crude oil		
Indigenous	264	1,199
Imported	260	1,181
Average of refining throughput	262	1,192
Ethane	601	2,730
Propane	423	1,924
Butane	381	1,732
Naphtha	324	1,474
Aviation gasoline	310	1,411
Motor spirit		
All grades	299	1,360
Super	298	1,355
Premium	299	1,360
Middle distillate feedstock	244	1,109
Kerosene		
Aviation turbine fuel	274	1,247
Burning oil	274	1,244

	Imperial gallons per tonne	Litres per tonne
DERV fuel		
0.005% or less sulphur	262	1,191
Gas/diesel oil		
Gas oil	254	1,156
Marine diesel oil	254	1,156
Fuel oil		
All grades:	223	1,015
Light:	235	1,070
Medium	225	1,021
Heavy:	222	1,011
Lubricating oils		
White	244	1,108
Greases	237	1,075
Bitumen	217	987
Petroleum coke	*	*
Petroleum waxes	260	1,184
Industrial spirit	274	1,247
White spirit	280	1,271

Note: The above conversion factors, which for refined products have been compiled by DECC using data from UK Petroleum Industry Association companies, apply to the year 2010, and are only approximate for other years.

* Denotes commercially sensitive as too few companies are producting this to be able to report it.

Fuel conversion factors for converting fossil fuels to carbon dioxide, 2008

	kg CO_2 per tonne	kg CO_2 per kWh	kg CO_2 per litre
Gases			
Natural Gas		0.185	
Liquid fuels			
LPG		0.214	1.490
Gas oil	3190	0.252	2.767
Fuel oil	3206	0.265	3.130*
Burning oil	3150	0.246	2.530
Naptha	3131	0.237	2.159*
Petrol	3135	0.240	2.302
Diesel	3164	0.250	2.641
Aviation spirit	3128	0.238	2.212
Aviation turbine fuel	3150	0.246	2.522
Solid fuels			
Industrial coal	2295	0.317	
Domestic coal	2506	0.296	
Coking coal	2986	0.330	

All emission factors are based on a Gross Calorific Value basis

*DECC estimates

The information above is based on the 2010 Greenhouse gas conversion factors for company reporting, available at: www.defra.gov.uk/environment/economy/business-efficiency/reporting/ . The information on this website also provide emission factors on a Net Calorific Basis.

The figures are derived by AEA based on data contained in the 2009 edition of this Digest, available at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx, together with information from the National Atmospheric Emissions Inventory. More information on the Inventory is available at: www.naei.org.uk/reports.php. For liquid fuels, the "kg CO_2 per tonne" figure remains fairly constant on a year to year basis, so it is possible to derive "kg CO_2 per kWh" and "kg CO_2 per litre" figures for other years using the average conversion factors for petroleum data contained annually in Annex A of the Digest.

Updated conversion factors for 2009 will be available in Summer 2011.

A.1 Estimated average calorific values of fuels 2010

	GJ per tonne net	GJ per tonne gross
Coal:		
All consumers (weighted average) *(1)*	25.7	27.0
Power stations *(1)*	23.7	24.9
Coke ovens *(1)*	29.0	30.5
Low temperature carbonisation plants and manufactured fuel plants	28.7	30.2
Collieries	27.8	29.3
Agriculture	26.6	28.0
Iron and steel	28.9	30.4
Other industries (weighted average)	26.3	27.7
Non-ferrous metals	24.1	25.4
Food, beverages and tobacco	27.2	28.6
Chemicals	25.4	26.7
Textiles, clothing, leather etc.	28.0	29.5
Pulp, paper, printing etc.	22.9	24.1
Mineral products	26.2	27.6
Engineering (mechanical and electrical engineering and vehicles)	28.0	29.5
Other industries	26.3	27.7
Domestic		
House coal	28.3	29.8
Anthracite and dry steam coal	33.0	34.7
Other consumers	24.2	25.5
Imported coal (weighted average)	26.5	27.9
Exports (weighted average)	30.7	32.3
Coke (including low temperature carbonisation cokes)	29.8	29.8
Coke breeze	24.8	24.8
Other manufactured solid fuel	31.0	32.6

	GJ per tonne net	GJ per tonne gross
Renewable sources:		
Domestic wood *(2)*	12.3	13.9
Industrial wood *(3)*	12.1	13.7
Straw	13.4	15.8
Poultry litter	7.6	9.1
Meat and bone	16.8	20.0
General industrial waste	15.2	16.0
Hospital waste	13.3	14.0
Municipal solid waste *(4)*	6.65	9.5
Refuse derived waste *(4)*	13.0	18.5
Short rotation coppice *(5)*	9.3	11.1
Tyres	30.4	32.0
Wood pellets	16.8	17.2
Biodiesel	37.2	38.7
Bioethanol	26.8	29.7
Petroleum:		
Crude oil (weighted average)	43.4	45.7
Petroleum products (weighted average)	43.8	46.1
Ethane	46.6	50.7
Butane and propane (LPG)	45.9	49.2
Light distillate feedstock for gasworks	45.4	47.8
Aviation spirit and wide cut gasoline	45.0	47.4
Aviation turbine fuel	43.9	46.2
Motor spirit	44.7	47.1
Burning oil	43.9	46.2
Gas/diesel oil	42.5	45.3
DERV	42.9	45.6
Fuel oil	40.7	43.3
Power station oil	40.7	43.3
Non-fuel products (notional value)	40.9	43.1

	MJ per cubic metre net	MJ per cubic metre gross
Natural gas produced *(6)*	36.1	40.1
Natural gas consumed *(7)*	35.6	39.5
Coke oven gas	16.2	18.0
Blast furnace gas	3.0	3.0
Landfill gas *(8)*	19-23	21-25
Sewage gas *(8)*	19-23	21-25

(1) Applicable to UK consumption - based on calorific value for home produced coal plus imports and, for "All consumers" net of exports.

(2) On an "as received" basis; seasoned logs at 25% moisture content. On a "dry" basis 18.6 GJ per tonne.

(3) Average figure covering a range of possible feedstock; at 25% moisture content. On a "dry" basis 18.6 GJ per tonne.

(4) Average figure based on survey returns.

(5) On an "as received" basis; at 40% moisture content. On a "dry" basis 18.6 GJ per tonne.

(6) The gross calorific value of natural gas can also be expressed as 11.128 kWh per cubic metre. This value represents the average calorific value seen for gas when extracted. At this point it contains not just methane, but also some other hydrocarbon gases (ethane, butane, propane). These gases are removed before the gas enters the National Transmission System for sale to final consumers.

(7) UK produced and imported gas. This weighted average of calorific values will approximate the average for the year of entering the National Transmission System. It can also be expressed as 10.961 kWh per cubic metre.

(8) Calorific value varies depending on the methane content of the gas.

Note: The above estimated average calorific values apply only to the year 2010. For calorific values of fuels in earlier years see Tables A.2 and A.3 and previous issues of this Digest. See the notes in Chapter 1, paragraph 1.54 regarding net calorific values. The calorific values for coal other than imported coal are based on estimates provided by the main coal producers, but with some exceptions as noted on Table A.2. The calorific values for petroleum products have been calculated using the method described in Chapter 1, paragraph 1.31. The calorific values for coke oven gas, blast furnace gas, coke and coke breeze are currently being reviewed jointly by DECC and the Iron and Steel Statistics Bureau (ISSB).

Data reported in this Digest in 'thousand tonnes of oil equivalent' have been prepared on the basis of 1 tonne of oil equivalent having an energy content of 41.868 gigajoules (GJ), (1 GJ = 9.478 therms) - see notes in Chapter 1, paragraphs 1.28 to 1.29.

A.2 Estimated average gross calorific values of fuels 1980, 1990, 2000 and 2007 to 2010

GJ per tonne (gross)

	1980	1990	2000	2007	2008	2009	2010
Coal							
All consumers *(1)(2)*	25.6	25.5	26.2	26.3	26.1	25.7r	25.8
All consumers - home produced plus imports minus exports *(1)*	..	..	27.0	27.0	26.9r	26.8r	27.0
Power stations *(2)*	23.8	24.8	25.6	25.3	25.4	24.9r	24.9
Power stations - home produced plus imports *(1)*	..	..	26.0	26.2	26.2	26.0r	25.8
Coke ovens *(2)*	30.5	30.2	31.2	32.8	32.6	32.6	30.5
Coke ovens - home produced plus imports *(1)*	..	..	30.4	30.5	30.5	32.6r	30.5
Low temperature carbonisation plants and manufactured fuel plants	19.1	29.2	30.3	29.4	30.5	28.8r	30.2
Collieries	27.0	28.6	29.6	29.8	29.7	29.4	29.3
Agriculture	30.1	28.9	29.2	28.0	28.0	28.0	28.0
Iron and steel industry *(3)*	29.1	28.9	30.7	30.4	30.4	30.4	30.4
Other industries *(1)*	27.1	27.8	26.7	27.2	27.0	27.5	27.7
Non-ferrous metals	..	23.1	25.1	25.4	25.4	25.0r	25.4
Food, beverages and tobacco	28.6	28.1	29.5	30.4	30.4	28.7r	28.6
Chemicals	25.8	27.3	28.7	26.7	26.7	26.7	26.7
Textiles, clothing, leather and footwear	27.5	27.7	30.4	29.5	29.5	29.5	29.5
Pulp, paper, printing, etc.	26.5	27.9	28.7	29.4	29.4	23.9	24.1
Mineral products *(4)*	..	28.2	27.0	27.6	27.6	27.6	27.6
Engineering *(5)*	27.7	28.3	29.3	29.5	29.5	29.5	29.5
Other industry *(6)*	28.4	28.5	30.2r	28.5r	26.1r	31.6r	27.7
Domestic							
House coal	30.1	30.2	30.9	30.5	30.5	29.7r	29.8
Anthracite and dry steam coal	33.3	33.6	33.5	33.8	34.7	34.7	34.7
Other consumers	27.5	27.5	29.2	29.3	29.3	26.4r	25.5
Transport - Rail	..	..	..	30.5	30.1	30.0	30.3
Imported coal *(1)*	..	28.3	28.0	27.3	27.2	27.3r	27.9
of which Steam coal	..	..	26.6	26.5	26.5	26.5	26.5
Coking coal	..	..	30.4	30.4	30.4	30.4	30.4
Anthracite	..	..	31.2	32.7	30.9	31.0r	31.0
Exports *(1)*	..	29.0	32.0	32.6	33.0	32.7r	32.3
of which Steam coal	..	..	31.0	32.2	32.2	31.4r	31.2
Anthracite	..	..	32.6	32.6	33.0	33.2	33.2
Coke *(7)*	28.1	28.1	29.8	29.8	29.8	29.8	29.8
Coke breeze	24.4	24.8	24.8	24.8	24.8	24.8	24.8
Other manufactured solid fuels *(1)*	27.6	27.6	30.8	32.6	32.6	32.6	32.6
Petroleum							
Crude oil *(1)*	45.2	45.6	45.7	45.7	45.7	45.7	45.7
Liquified petroleum gas	49.6	49.3r	49.1r	49.3	49.3	49.2	49.2
Ethane	52.3	50.6	50.7	50.7	50.7	50.7	50.7
LDF for gasworks/Naphtha	47.8	47.9	47.6r	47.7	47.7	47.5	47.8
Aviation spirit and wide-cut gasoline (AVGAS and AVTAG)	47.2	47.3	47.3	47.4	47.4	47.4	47.4
Aviation turbine fuel (AVTUR)	46.4	46.2	46.2	46.2	46.2	46.2	46.2
Motor spirit	47.0	47.0	47.0	47.1	47.1	47.1	47.1
Burning oil	46.5	46.2	46.2	46.2	46.2	46.2	46.2
Vaporising oil	45.9	45.9	..	..	..	..	..
Gas/diesel oil (9)	45.5	45.4	45.6	45.3r	45.3r	45.2r	45.3
DERV (9)	..	..	..	45.6	45.6	45.7	45.6
Fuel oil	42.8	43.2	43.1	43.6	43.6	43.5	43.3
Power station oil	42.8	43.2	43.1	43.6	43.6	43.5	43.3
Non-fuel products (notional value)	42.2	43.2	43.8	43.2	43.1	43.1	43.1
Petroleum coke (Power stations)	..	..	..	32.0	31.4	31.0	31.0
Petroleum coke (Other)	..	39.5	35.8	35.8	35.8	35.8	35.8
Natural Gas *(8)*	..	38.4	39.4	39.7	39.7	40.0	40.1

(1) Weighted averages.
(2) Home produced coal only.
(3) From 2001 onwards almost entirely sourced from imports.
(4) Based on information provided by the British Cement Industry Association; almost all coal used by this sector in the latest 4 years was imported.
(5) Mechanical engineering and metal products, electrical and instrument engineering and vehicle manufacture.
(6) Includes construction.
(7) Since 1995 the source of these figures has been the ISSB.
(8) Natural Gas figures are shown in MJ per cubic metre
(9) DERV included within gas/diesel oil until 2005

A.3 Estimated average net calorific values of fuels 1980, 1990, 2000 and 2007 to 2010

GJ per tonne (net)

	1980	1990	2000	2007	2008	2009	2010
Coal							
All consumers *(1)(2)*	24.3	24.2	24.9	25.0	24.8	24.4r	24.5
All consumers - home produced plus imports minus exports *(1)*	..	..	25.6r	25.7	25.6r	25.4r	25.7
Power stations *(2)*	22.6	23.6	24.3	24.1r	24.1	23.7r	23.7
Power stations - home produced plus imports *(1)*	..	..	24.7	24.9	24.9	24.7r	24.5
Coke ovens *(2)*	29.0	28.7	29.6	31.2	31.0	31.0	29.0
Coke ovens - home produced plus imports *(1)*	..	..	28.9	29.0	29.0	31.0r	29.0
Low temperature carbonisation plants and manufactured fuel plants	18.1	27.7	28.8	28.0r	29.0	27.4r	28.7
Collieries	25.7	27.2	28.1	28.3	28.2	27.9	27.8
Agriculture	28.6	27.5	27.8r	26.6	26.6	26.6	26.6
Iron and steel industry *(3)*	27.6	27.5	29.2	28.9	28.9	28.9	28.9
Other industries *(1)*	25.7	26.4	25.4	25.9r	25.6r	26.1	26.3
Non-ferrous metals	..	21.9	23.8	24.1	24.2r	23.8r	24.1
Food, beverages and tobacco	27.2	26.7	28.0	28.9	28.9	27.3r	27.2
Chemicals	24.5	25.9	27.2r	25.4	25.4	25.4	25.4
Textiles, clothing, leather and footwear	26.1	26.3	28.9	28.0	28.0	28.0	28.0
Pulp, paper, printing, etc.	25.2	26.5	27.3	27.9	27.9	22.7	22.9
Mineral products *(4)*	..	26.8	25.7	26.3r	26.3r	26.3r	26.2
Engineering *(5)*	26.3	26.9	27.8	28.0	28.0	28.0	28.0
Other industry *(6)*	27.0	27.1	28.7r	27.0r	24.8r	30.1r	26.3
Domestic							
House coal	28.6	28.7	29.4	29.0	29.0	28.2r	28.3
Anthracite and dry steam coal	31.6	31.9	31.9r	32.1	33.0	32.9r	33.0
Other consumers	26.1	26.1	27.7	27.9r	27.8	25.1r	24.2
Transport - Rail	..	..	..	29.0	28.6	28.5	28.8
Imported coal *(1)*	..	26.9	26.6	25.9	25.9r	25.9r	26.5
of which Steam coal	..	..	25.3	25.2	25.2	25.2	25.2
Coking coal	..	..	28.9	28.9	28.9	28.9	28.9
Anthracite	..	..	29.6	31.1	29.3r	29.4r	29.5
Exports *(1)*	..	27.6	30.4	31.0	31.3r	31.0r	30.7
of which Steam coal	..	..	29.4r	30.6	30.6	29.8r	29.6
Anthracite	..	..	30.9r	31.0	31.3r	31.6r	31.5
Coke *(7)*	28.1	28.1	29.8	29.8	29.8	29.8	29.8
Coke breeze	24.4	24.8	24.8	24.8	24.8	24.8	24.8
Other manufactured solid fuels *(1)*	26.2	26.2	29.3	30.9r	30.9r	31.0	31.0
Petroleum							
Crude oil *(1)*	42.9	43.3	43.4	43.4	43.4	43.4	43.4
Liquified petroleum gas	46.2	46.0	46.0	45.9	45.9	46.0r	46.0
Ethane	48.1	46.6	46.6	46.6	46.6	46.6	46.6
LDF for gasworks/Naphtha	45.4	45.5	45.3	45.3	45.3	45.2	45.4
Aviation spirit and wide-cut gasoline (AVGAS and AVTAG)	44.8	44.9	44.9	45.0	45.0	45.1	45.0
Aviation turbine fuel (AVTUR)	44.1	43.9	43.9	43.9	43.9	43.9	43.9
Motor spirit	44.7	44.7	44.7	44.7	44.7	44.7	44.7
Burning oil	44.2	43.9	43.9	43.9	43.9	43.9	43.9
Vaporising oil	43.6	43.6	..	..	..	..	..
Gas/diesel oil (9)	42.8	42.7	42.9	42.5r	42.5r	42.5r	42.5
DERV (9)	..	..	..	42.9	42.9	42.9	42.9
Fuel oil	40.2	40.6	40.5	41.0	41.0	40.8	40.7
Power station oil	40.2	40.6	40.5	41.0	41.0	40.8	40.7
Non-fuel products (notional value)	40.1	41.0	41.6	41.1	40.9	40.9	40.9
Petroleum coke (Power stations)	..	..	..	30.4	29.8	29.5	29.5
Petroleum coke (Other)	..	37.5	34.0	34.0	34.0	34.0	34.0
Natural Gas *(8)*	..	34.6	35.5	35.7	35.7	36.0	36.1

For footnotes see table A.2
The net calorific values of natural gas and coke oven gas are the gross calorific values x 0.9.

Annex B
Glossary and Acronyms

Advanced gas-cooled reactor (AGR)	A type of nuclear reactor cooled by carbon dioxide gas.
AEA Energy & Environment	Part of the AEA Group, comprising the former Future Energy Solutions and NETCEN.
AEP	Association of Electricity Producers
Anthracite	Within this publication, anthracite is coal classified as such by UK coal producers and importers of coal. Typically it has a high heat content making it particularly suitable for certain industrial processes and for use as a domestic fuel.
Anthropogenic	Produced by human activities.
Associated Gas	Natural gas found in association with crude oil in a reservoir, either dissolved in the oil or as a cap above the oil.
Autogeneration	Generation of electricity by companies whose main business is not electricity generation, the electricity being produced mainly for that company's own use.
Aviation spirit	A light hydrocarbon oil product used to power piston-engined aircraft power units.
Aviation turbine fuel	The main aviation fuel used for powering aviation gas-turbine power units (jet aircraft engine).
BE	British Energy
Benzole	A colourless liquid, flammable, aromatic hydrocarbon by-product of the iron and steel making process. It is used as a solvent in the manufacture of styrenes and phenols but is also used as a motor fuel.
BERR	Department for Business, Enterprise and Regulatory Reform
BETTA	British Electricity Trading and Transmission Arrangements (BETTA) refer to changes to electricity generation, distribution and supply licences. On 1 April 2005, the England and Wales trading arrangements were extended to Scotland by the British Electricity Trading and Transmission Arrangements creating a single GB market for trading of wholesale electricity, with common arrangements for access to and use of GB transmission system. From 1 April 2005, NGC has become the System Operator for the whole of GB. BETTA replaced NETA (see page 242) on 4 April 2005.
Biodiesel	(FAME - biodiesel produced to BS EN 14214). Produced from vegetable oils or animal fats by mixing them with ethanol or methanol to break them down.
Bioethanol	Created from crops rich in starch or sugar by fermentation, distillation and finally dehydration.

Biogas Energy produced from the anaerobic digestion of sewage and industrial waste.

Biomass Renewable organic materials, such as wood, agricultural crops or wastes, and municipal wastes. Biomass can be burned directly or processed into biofuels such as ethanol and methane

Bitumen The residue left after the production of lubricating oil distillates and vacuum gas oil for upgrading plant feedstock. Used mainly for road making and construction purposes.

Blast furnace gas Mainly produced and consumed within the iron and steel industry. Obtained as a by-product of iron making in a blast furnace, it is recovered on leaving the furnace and used partly within the plant and partly in other steel industry processes or in power plants equipped to burn it. A similar gas is obtained when steel is made in basic oxygen steel converters; this gas is recovered and used in the same way.

Breeze Breeze can generally be described as coke screened below 19 mm (¾ inch) with no fines removed but the screen size may vary in different areas and to meet the requirements of particular markets.

BG British Gas

BOS Basic Oxygen Steel furnace gas

BNFL British Nuclear Fuels plc.

BRE Building Research Establishment

Burning oil A refined petroleum product, with a volatility in between that of motor spirit and gas diesel oil primarily used for heating and lighting.

Butane Hydrocarbon (C_4H_{10}), gaseous at normal temperature but generally stored and transported as a liquid. Used as a component in Motor Spirit to improve combustion, and for cooking and heating (see LPG).

Calorific values (CVs) The energy content of a fuel can be measured as the heat released on complete combustion. The SI (Système International - see page 244) derived unit of energy and heat is the Joule. This is the energy per unit volume of the fuel and is often measured in GJ per tonne. The energy content can be expressed as an upper (or gross) value and a lower (or net) value. The difference between the two values is due to the release of energy from the condensation of water in the products of combustion. Gross calorific values are used throughout this publication.

CCA Climate Change Agreement. Climate Change Agreements allow energy intensive business users to receive an 80 per cent discount from the Climate Change Levy (CCL), in return for meeting energy efficiency or carbon saving targets. The CCL is a tax on the use of energy in industry, commerce and the public sector. The aim of the levy is to encourage users to improve energy efficiency and reduce emissions of greenhouse gases.

CCL Climate Change Levy. The Climate Change Levy is a tax on the use of energy in industry, commerce and the public sector, with offsetting cuts in employers' National Insurance Contributions and additional support for energy efficiency schemes and renewable sources of energy. The aim of the levy is to encourage users to improve energy efficiency and reduce emissions of greenhouse gases.

CO_2	Carbon dioxide. Carbon dioxide contributes about 60 per cent of the potential global warming effect of man-made emissions of greenhouse gases. Although this gas is naturally emitted by living organisms, these emissions are offset by the uptake of carbon dioxide by plants during photosynthesis; they therefore tend to have no net effect on atmospheric concentrations. The burning of fossil fuels, however, releases carbon dioxide fixed by plants many millions of years ago, and thus increases its concentration in the atmosphere.
Co-firing	The burning of biomass products in fossil fuel power stations
Coke oven coke	The solid product obtained from carbonisation of coal, principally coking coal, at high temperature, it is low in moisture and volatile matter. Used mainly in iron and steel industry.
Coke oven gas	Gas produced as a by-product of solid fuel carbonisation and gasification at coke ovens, but not from low temperature carbonisation plants. Synthetic coke oven gas is mainly natural gas which is mixed with smaller amounts of blast furnace and basic oxygen steel furnace gas to produce a gas with almost the same quantities as coke oven gas.
Coking coal	Within this publication, coking coal is coal sold by producers for use in coke ovens and similar carbonising processes. The definition is not therefore determined by the calorific value or caking qualities of each batch of coal sold, although calorific values tend to be higher than for steam coal. Not all coals form cokes. For a coal to coke it must exhibit softening and agglomeration properties, ie the end product must be a coherent solid.
Colliery methane	Methane released from coal seams in deep mines which is piped to the surface and consumed at the colliery or transmitted by pipeline to consumers.
Combined Cycle Gas Turbine (CCGT)	Combined cycle gas turbine power stations combine gas turbines and steam turbines which are connected to one or more electrical generators in the same plant. The gas turbine (usually fuelled by natural gas or oil) produces mechanical power (to drive the generator) and heat in the form of hot exhaust gases. These gases are fed to a boiler, where steam is raised at pressure to drive a conventional steam turbine, which is also connected, to an electrical generator.
Combined Heat and Power (CHP)	CHP is the simultaneous generation of usable heat and power (usually electricity) in a single process. The term CHP is synonymous with cogeneration and total energy, which are terms often used in the United States or other Member States of the European Community. The basic elements of a CHP plant comprise one or more prime movers driving electrical generators, where the steam or hot water generated in the process is utilised via suitable heat recovery equipment for use either in industrial processes, or in community heating and space heating. For further information see Chapter 6 paragraph 6.33.
CHPQA	Combined Heat and Power Quality Assurance Scheme
Conventional thermal power stations	These are stations which generate electricity by burning fossil fuels to produce heat to convert water into steam, which then powers steam turbines.

Cracking/conversion A refining process using combinations of temperature, pressure and in some cases a catalyst to produce petroleum products by changing the composition of a fraction of petroleum, either by splitting existing longer carbon chain or combining shorter carbon chain components of crude oil or other refinery feedstocks. Cracking allows refiners to selectively increase the yield of specific fractions from any given input petroleum mix depending on their requirements in terms of output products.

CRC Carbon Reduction Commitment. The Carbon Reduction Commitment is a proposed mandatory cap and trade scheme that will apply to large non energy-intensive organisations in the public and private sectors.

Crude oil A mineral oil consisting of a mixture of hydrocarbons of natural origins, yellow to black in colour, of variable density and viscosity.

DECC Department of Energy and Climate Change

DEFRA Department for Environment, Food and Rural Affairs

DERV Diesel engined road vehicle fuel used in internal combustion engines that are compression-ignited (see gas diesel oil on page 240).

DFT Department for Transport

Distillation A process of separation of the various components of crude oil and refinery feedstocks using the different temperatures of evaporation and condensation of the different components of the mix received at the refineries.

DNC Declared net capacity and capability are used to measure the maximum power available from generating stations at a point in time. See Chapter 5 paragraphs 5.78 and 5.79 and Chapter 7 paragraph 7.85 for a fuller definition.

DNO Distribution Network Operator

Downstream Used in oil and gas processes to cover the part of the industry after the production of the oil and gas. For example, it covers refining, supply and trading, marketing and exporting.

DTI Department of Trade and Industry

DUKES Digest of United Kingdom Energy Statistics, the Digest provides essential information for everyone, from economists to environmentalists and from energy suppliers to energy users.

ECA Enhanced Capital Allowances

EEC The Energy Efficiency Commitment (formerly known as Energy Efficiency Standards of Performance) is an obligation placed on all energy suppliers to offer help and advice to their customers to improve the energy efficiency of their homes.

EHCS English House Condition Survey

Embedded Generation Embedded generation is electricity generation by plant which has been connected to the distribution networks of the public electricity distributors rather than directly to the National Grid Company's transmission systems. Typically they are either smaller stations located on industrial sites, or combined heat and power plant, or renewable energy plant such as wind farms, or refuse burner generators. The category also includes some domestic generators such as those with electric solar panels. For a description of the current structure of the electricity industry in the UK see Chapter 5 paragraphs 5.53 to 5.58.

Energy use Energy use of fuel mainly comprises use for lighting, heating or cooling, motive power and power for appliances. See also non-energy use on page 242.

ESA European System of Accounts. An integrated system of economic accounts which is the European version of the System of National Accounts (SNA).

Ethane A light hydrocarbon gas (C_2H_6) in natural gas and refinery gas streams (see LPG).

EU-ETS European Union Emissions Trading Scheme. This began on 1st January 2005 and involves the trading of emissions allowances as means of reducing emissions by a fixed amount.

EUROSTAT Statistical Office of the European Commission.

Exports For some parts of the energy industry, statistics on trade in energy related products can be derived from two separate sources. Firstly, figures can be reported by companies as part of systems for collecting data on specific parts of the energy industry (eg as part of the system for recording the production and disposals of oil from the UK continental shelf). Secondly, figures are also available from the general systems that exist for monitoring trade in all types of products operated by HM Revenue and Customs.

Feedstock In the refining industry, a product or a combination of products derived from crude oil, destined for further processing other than blending. It is distinguished from use as a chemical feedstock etc. See non-energy use on page 242.

FES Future Energy Solutions, now known as AEA Energy & Environment, part of the AEA Group.

Final energy consumption Energy consumption by final user – ie which is not being used for transformation into other forms of energy.

Fossil fuels Coal, natural gas and fuels derived from crude oil (for example petrol and diesel) are called fossil fuels because they have been formed over long periods of time from ancient organic matter.

Fuel oils The heavy oils from the refining process; used as fuel in furnaces and boilers of power stations, industry, in domestic and industrial heating, ships, locomotives, metallurgic operations, and industrial power plants etc.

Fuel oil - Light Fuel oil made up of heavier straight-run or cracked distillates and used in commercial or industrial burner installations not equipped with pre-heating facilities.

Fuel oil - Medium Other fuel oils, sometimes referred to as bunker fuels, which generally require pre-heating before being burned, but in certain climatic conditions do not require pre-heating.

Fuel oil - Heavy Other heavier grade fuel oils which in all situations require some form of pre-heating before being burned.

Fuel poverty The common definition of a fuel poor household is one needing to spend in excess of 10 per cent of household income to achieve a satisfactory heating regime (21ºC in the living room and 18ºC in the other occupied rooms).

Gas Diesel Oil The medium oil from the refinery process; used as a fuel in diesel engines (ie internal combustion engines that are compression-ignited), burned in central heating systems and used as a feedstock for the chemical industry.

GDP Gross Domestic Product.

GDP deflator An index of the ratio of GDP at current prices to GDP at constant prices. It provides a measure of general price inflation within the whole economy.

Gigajoule (GJ) A unit of energy equal to 10^9 joules (see note on joules on page 241).

Gigawatt (GW) A unit of electrical power, equal to 10^9 watts.

Heat sold Heat (or steam) that is produced and sold under the provision of a contract. Heat sold is derived from heat generated by Combined Heat and Power (CHP) plants and from community heating schemes without CHP plants.

HMRC HM Revenue and Customs.

Imports See the entry for exports on page 239. Before the 1997 edition of the Digest, the term "arrivals" was used to distinguish figures derived from the former source from those import figures derived from the systems operated by HM Revenue and Customs. To make it clearer for users, a single term is now being used for both these sources of figures (the term imports) as this more clearly states what the figures relate to, which is goods entering the UK.

Indigenous production The extraction or capture of primary fuels, for oil this includes production from the UK Continental Shelf both onshore and offshore.

Industrial spirit Refined petroleum fractions with boiling ranges up to 200ºC dependent on the use to which they are put – e.g. seed extraction, rubber solvents, perfume etc.

International Energy Agency (IEA) The IEA is an autonomous body located in Paris which was established in November 1974 within the framework of the Organisation for Economic Co-operation and Development (OECD) to implement an international energy programme.

ISSB Iron and Steel Statistics Bureau

ITF Industry Technology Facilitator

Joules	A joule is a generic unit of energy in the conventional SI system (see note on page 244). It is equal to the energy dissipated by an electrical current of 1 ampere driven by 1 volt for 1 second; it is also equal to twice the energy of motion in a mass of 1 kilogram moving at 1 metre per second.
Kilowatt (kW)	1,000 watts
Landfill gas	The methane-rich biogas formed from the decomposition of organic material in landfill.
LDF	Light distillate feedstock
LDZ	Local distribution zone
Liquefied Natural Gas (LNG)	Natural gas that has been converted to liquid form for ease of storage or transport.
Liquefied Petroleum Gas (LPG)	Gas usually propane or butane, derived from oil and put under pressure so that it is in liquid form. Often used to power portable cooking stoves or heaters and to fuel some types of vehicle, eg some specially adapted road vehicles, forklift trucks.
Lead Replacement Petrol (LRP)	An alternative to Leaded Petrol containing a different additive to lead (in the UK usually potassium based) to perform the lubrication functions of lead additives in reducing engine wear.
Lubricating oils	Refined heavy distillates obtained from the vacuum distillation of petroleum residues. Includes liquid and solid hydrocarbons sold by the lubricating oil trade, either alone or blended with fixed oils, metallic soaps and other organic and/or inorganic bodies.
Magnox	A type of gas-cooled nuclear fission reactor developed in the UK, so called because of the magnesium alloy used to clad the uranium fuel.
Major Power Producers	Companies whose prime purpose is the generation of electricity (paragraph 5.71 of Chapter 5 gives a full list of major power producers).
Megawatt (MW)	1,000 kilowatts. MWe is used to emphasise when electricity is being measured. MWt is used when heat ("thermal") is being measured.
Micro CHP	Micro CHP is a new technology that is expected to make a significant contribution to domestic energy efficiency in the future.
Motor spirit	Blended light petroleum product used as a fuel in spark-ignition internal combustion engines (other than aircraft engines).
NAEI	National Atmospheric Emissions Inventory
Naphtha	(Light distillate feedstock) – Petroleum distillate boiling predominantly below 200ºC.
National Allocation Plan (NAP)	Under the EU Emissions Trading Scheme (EU-ETS) Directive each EU country must have a National Allocation Plan which lays down the overall contribution of the EU-ETS participants (the "cap") for the country and the allowances that each sector and each individual installation covered under the Directive is allocate, effectively stating how much that sector can emit over the trading period of the scheme

Natural gas	Natural gas is a mixture of naturally occurring gases found either in isolation, or associated with crude oil, in underground reservoirs. The main component is methane; ethane, propane, butane, hydrogen sulphide and carbon dioxide may also be present, but these are mostly removed at or near the well head in gas processing plants.
Natural gas - compressed	Natural gas that has been compressed to reduce the volume it occupies to make it easier to transport other than in pipelines. Whilst other petroleum gases can be compressed such that they move into liquid form, the volatility of natural gas is such that liquefaction cannot be achieved without very high pressures and low temperatures being used. As such, the compressed form is usually used as a "half-way house".
Natural gas liquids (NGLs)	A mixture of liquids derived from natural gas and crude oil during the production process, including propane, butane, ethane and gasoline components (pentanes plus).
NDA	Nuclear Decommissioning Authority
NETA	New Electricity Trading Arrangements - In England and Wales these arrangements replaced "the pool" from 27 March 2001. The arrangements are based on bi-lateral trading between generators, suppliers, traders and customers and are designed to be more efficient, and provide more market choice.
NETCEN	National Environment Technology Centre, now known as AEA Energy & Environment, part of the AEA Group.
NFFO	Non Fossil Fuel Obligation. The 1989 Electricity Act empowers the Secretary of State to make orders requiring the Regional Electricity Companies in England and Wales to secure specified amounts of electricity from renewable sources.
NFPA	Non Fossil Purchasing Agency
NIE	Northern Ireland Electricity
NI NFFO	Northern Ireland Non Fossil Fuel Obligation
Non-energy use	Includes fuel used for chemical feedstock, solvents, lubricants, and road making material.
NO_X	Nitrogen oxides. A number of nitrogen compounds including nitrogen dioxide are formed in combustion processes when nitrogen in the air or the fuel combines with oxygen. These compounds can add to the natural acidity of rainfall.
NUTS	Nonmenclature of Units for Territorial Statistics
OFGEM	The regulatory office for gas and electricity markets
OFT	Office of Fair Trading
ONS	Office for National Statistics
Orimulsion	An emulsion of bitumen in water that was used as a fuel in some power stations until 1997.
OTS	Overseas Trade Statistics of the United Kingdom
OXERA	Oxford Economic Research Association Ltd

Patent fuel	A composition fuel manufactured from coal fines by shaping with the addition of a binding agent (typically pitch). The term manufactured solid fuel is also used.
Petrochemical feedstock	All petroleum products intended for use in the manufacture of petroleum chemicals. This includes middle distillate feedstock of which there are several grades depending on viscosity. The boiling point ranges between 200°C and 400°C.
Petroleum cokes	Carbonaceous material derived from hydrocarbon oils, uses for which include metallurgical electrode manufacture and in the manufacture of cement.
Photovoltaics	The direct conversion of solar radiation into electricity by the interaction of light with the electrons in a semiconductor device or cell.
PILOT	Phase 2 (PILOT) is the successor body to the Oil & Gas Industry Task Force (OGITF) and was established on 1 January 2000, to secure the long-term future of the oil and gas industry in the UK. A forum that brings together Government and industry to address the challenges facing the oil and gas industry. One outcome of PILOT's work is the published Code of Practice on Supply Chain Relationships.
Plant capacity	The maximum power available from a power station at a point in time (see also Chapter 5 paragraph 5.78).
Plant loads, demands and efficiency	Measures of how intensively and efficiently power stations are being used. These terms are defined in Chapter 5 paragraphs 5.74 and 5.75.
PPRS	Petroleum production reporting system. Licensees operating in the UK Continental Shelf are required to make monthly returns on their production of hydrocarbons (oil and gas) to DECC. This information is recorded in the PPRS, which is used to report flows, stocks and uses of hydrocarbon from the well-head through to final disposal from a pipeline or terminal (see DUKES internet annex F on the DECC energy statistics website for further information).
Primary electricity	Electricity obtained other than from fossil fuel sources, e.g. nuclear, hydro and other non-thermal renewables. Imports of electricity are also included.
Primary fuels	Fuels obtained directly from natural sources, e.g. coal, oil and natural gas.
Process oils	Partially processed feedstocks which require further processing before being classified as a finished product suitable for sale. They can also be used as a reaction medium in the production process.
Propane	Hydrocarbon containing three carbon atoms (C_3H_8), gaseous at normal temperature, but generally stored and transported under pressure as a liquid.
PWR	Pressurised water reactor. A nuclear fission reactor cooled by ordinary water kept from boiling by containment under high pressure.
RD	Renewables Directive – this proposes that EU Member States adopt national targets that are consistent with the overall EU target of 20 per cent of energy from renewables by 2020.

Refinery fuel Petroleum products produced by the refining process that are used as fuel at refineries.

Reforming Processes by which the molecular structure of different fractions of petroleum can be modified. It usually involves some form of catalyst, most often platinum, and allows the conversion of lower grades of petroleum product into higher grades, improving their octane rating. It is a generic term for processes such as cracking, cyclization, dehydrogenation and isomerisation. These processes generally led to the production of hydrogen as a by-product, which can be used in the refineries in some desulphurization procedures.

Renewable energy sources Renewable energy includes solar power, wind, wave and tide, and hydroelectricity. Solid renewable energy sources consist of wood, straw, short rotation coppice, other biomass and the biodegradable fraction of wastes. Gaseous renewables consist of landfill gas and sewage gas. Non-biodegradable wastes are not counted as a renewables source but appear in the Renewable sources of energy chapter of this Digest for completeness.

Reserves With oil and gas these relate to the quantities identified as being present in underground cavities. The actual amounts that can be recovered depend on the level of technology available and existing economic situations. These continually change; hence the level of the UK's reserves can change quite independently of whether or not new reserves have been identified.

RESTATS The Renewable Energy Statistics database for the UK.

RO Renewables Obligation – this is an obligation on all electricity suppliers to supply a specific proportion of electricity from eligible renewable sources.

ROCs Renewables Obligation Certificates

Secondary fuels Fuels derived from natural primary sources of energy. For example electricity generated from burning coal, gas or oil is a secondary fuel, as are coke and coke oven gas.

SI (Système International) Refers to the agreed conventions for the measurement of physical quantities**.**

SIC The United Kingdom Standard Industrial Classification of Economic Activities (SIC) is used to classify business establishments and other standard units by the type of economic activity in which they are engaged. It provides a framework for the collection, tabulation, presentation and analysis of data and its use promotes uniformity. In addition, it can be used for administrative purposes and by non-government bodies as a convenient way of classifying industrial activities into a common structure.

The system is identical to the EUROSTAT System NACE at the four digit class level and the United Nations system ISIC at the two digit Divisional level.

SO_2 Sulphur Dioxide. Sulphur dioxide is a gas produced by the combustion of sulphur-containing fuels such as coal and oil.

SRO Scottish Renewable Orders

Steam coal	Within this publication, steam coal is coal classified as such by UK coal producers and by importers of coal. It tends to be coal having lower calorific values; the type of coal that is typically used for steam raising.
Synthetic coke oven gas	Mainly a natural gas, which is mixed with smaller amounts of blast furnace, and BOS (basic oxygen steel furnace) gas to produce a gas with almost the same quantities as coke oven gas.
Tars	Viscous materials usually derived from the destructive distillation of coal which are by-products of the coke and iron making processes.
Temperature correction	The temperature corrected series of total inland fuel consumption indicates what annual consumption might have been if the average temperature during the year had been the same as the average for the years 1971 to 2000.
Terawatt (TW)	1,000 gigawatts
Therm	A common unit of measurement similar to a tonne of oil equivalent which enables different fuels to be compared and aggregated. .
Thermal efficiency	The thermal efficiency of a power station is the efficiency with which heat energy contained in fuel is converted into electrical energy. It is calculated for fossil fuel burning stations by expressing electricity generated as a percentage of the total energy content of the fuel consumed (based on average gross calorific values). For nuclear stations it is calculated using the quantity of heat released as a result of fission of the nuclear fuel inside the reactor.
Thermal Sources of Electricity	These include coal, oil, natural gas, nuclear, landfill gas, sewage gas, municipal solid waste, farm waste, tyres, poultry litter, short rotation coppice, straw, coke oven gas, blast furnace gas, and waste products from chemical processes.
Tonne of oil equivalent (toe)	A common unit of measurement which enables different fuels to be compared and aggregated. (See Chapter 1 paragraphs 1.28 to 1.297 for further information and Annex A page 229 for conversion factors).
TWh	Terawatt Hour
UKCS	United Kingdom Continental Shelf
UKOOA	United Kingdom Offshore Operators Association
UKPIA	UK Petroleum Industry Association. The trade association for the UK petroleum industry.
UKSA	UK Statistics Authority
Ultra low sulphur Diesel (ULSD)	A grade of diesel fuel which has a much lower sulphur content (less than 0.005 per cent or 50 parts per million) and of a slightly higher volatility than ordinary diesel fuels. As a result it produces fewer emissions when burned, and initially enjoyed a lower rate of hydrocarbon oil duty in the UK than ordinary diesel to promote its use, although duty rates on standard diesel and ULSD have since been equalised. Virtually 100 per cent of sales of DERV fuel in the UK are ULSD.

Ultra low sulphur Petrol (ULSP)	A grade of motor spirit with a similar level of sulphur to ULSD (less than 0.005 per cent or 50 parts per million). ULSP initially enjoyed a lower rate of hydrocarbon oil duty in the UK than ordinary petrol to promote its use, although duty rates on standard petrol and ULSP have since been equalised. It has quickly replaced ordinary premium grade unleaded petrol in the UK market place.
Upstream	A term to cover the activities related to the exploration, production and delivery to a terminal or other facility of oil or gas for export or onward shipment within the UK.
VAT	Value added tax
Watt (W)	The conventional unit to measure a rate of flow of energy. One watt amounts to 1 joule per second.
White spirit	A highly refined distillate with a boiling range of about 150ºC to 200ºC used as a paint solvent and for dry cleaning purposes etc.

Annex C
Further sources of United Kingdom energy publications

Some of the publications listed below give shorter term statistics, some provide further information about energy production and consumption in the United Kingdom and in other countries, and others provide more detail on a country or fuel industry basis. The list also covers recent publications on energy issues and policy, including statistical information, produced or commissioned by DECC. The list is not exhaustive and the titles of publications and publishers may alter. Unless otherwise stated, all titles are available from

Publications Orderline
Web: www.decc.gov.uk/publications
Phone: 0845 504 9188
Email: deccteam@decc.ecgroup.net

and can also be found on the DECC website at www.decc.gov.uk/.

Department of Energy and Climate Change publications on energy statistics

Energy Statistics
Monthly, quarterly and annual statistics on production and consumption of overall energy and individual fuels in the United Kingdom together with energy prices is available in MS Excel format on the Internet at: www.decc.gov.uk/en/content/cms/statistics/source/source.aspx

Energy Trends
A quarterly publication covering all major aspects of energy. It provides a comprehensive picture of energy production and use and contains analysis of data and articles covering energy issues. Available on subscription, with Quarterly Energy Prices (see below). Annual subscriptions run from June to March and are available at £40 to UK subscribers from Amey, Paramount House, Pascal Close, Paramount Business Park, St Mellons, Cardiff, Wales CF3 0LW, Tel. 01633 682228. A subscription form is available at: www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx. An electronic version of the latest nine editions can be found at the same address. Single copies are available from the Publications Orderline priced at £6.

Quarterly Energy Prices
A quarterly publication containing tables, charts and commentary covering energy prices to domestic and industrial consumers for all the major fuels as well as presenting comparisons of fuel prices in the European Union and G7 countries. Available on subscription, with Energy Trends, (details given above). An electronic version of the latest nine editions can be found at www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx. Single copies are available from the Publications Orderline priced at £8.

Energy Flow Chart
An annual publication illustrating the flow of primary fuels from home production and imports to their eventual final uses. They are shown in their original state and after being converted into different kinds of energy by the secondary fuel producers. The 2011 edition of the chart shows the flows for 2010. Available free from DECC, Energy Statistics Team, 6th Floor, Area B, 3 Whitehall Place, London SW1A 2AW, tel. 0300 068 5056 and from the Publications Orderline. It is also available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/publications/flow/flow.aspx

UK Energy in Brief

An annual publication summarising the latest statistics on energy production, consumption and prices in the United Kingdom. The figures are taken from "Digest of UK Energy Statistics". Available free from DECC, Energy Statistics Team, 6th Floor, Area B, 3 Whitehall Place, London SW1A 2AW, tel. 0300 068 5056 and from the Publications Orderline. It is also available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/publications/brief/brief.aspx

UK Energy Sector Indicators

An annual publication designed to show the extent to which secure, diverse and sustainable supplies of energy to UK businesses and consumers, at competitive prices, are ensured. It is available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/publications/indicators/indicators.aspx.

Energy Consumption in the United Kingdom

Energy consumption in the United Kingdom brings together statistics from a variety of sources to produce a comprehensive review of energy consumption and changes in efficiency, intensity and output since the 1970s, with a particular focus on trends since 1990. The information is presented in five sections covering overall energy consumption and energy consumption in the transport, domestic, industrial and service sectors. It is available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/publications/ecuk/ecuk.aspx

Annual report on Fuel Poverty statistics

A report, published separately from the UK Fuel Poverty Strategy, detailing the latest statistics on fuel poverty. It is available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/fuelpov_stats.aspx

Statutory Security of Supply Report

The Statutory Security of Supply Report, an evolution of the Energy Markets Outlook report, sets down technical information on security of supply. The report is available on the Internet at: www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/resilience/sec_supply_rep/sec_supply_rep.aspx

UK Energy and CO2 emissions projections

The Updated Energy Projections (UEP) are published annually by DECC. They provide updated projections and analysis of energy use and carbon dioxide emissions in the UK. The UEP exercise incorporates all firm environmental policy measures and is based on updated assumptions consistent with the most recent UK Budget announcements. The latest report is available on the Internet at: www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx

Department of Energy and Climate Change policy publications

Energy Bill 2010/2011

On 16 March 2011, the Energy Bill was introduced into the House of Commons with its first reading; the second reading was delivered on 10 May. The Bill has been designed to provide for a step change in the provision of energy efficiency measures to homes and businesses, and make improvements to enable and secure, low carbon energy supplies and fair competition in the energy markets. Further information on the Bill is available on the Internet at:
www.decc.gov.uk/en/content/cms/legislation/energy_bill/energy_bill.aspx

Annual Energy Statement

In the Coalition Programme for Government, the Government committed to producing an Annual Energy Statement (AES) to provide market direction, set strategic energy policy and help guide investment. The first statement was delivered to Parliament on 27 June 2010 and is available on the Internet at: www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/aes/aes.aspx

Energy Act 2010

The Energy Act 2010 was given Royal Assent on 8 April 2010. The Act is available on the Internet at:
www.decc.gov.uk/en/content/cms/legislation/energy_act_10/energy_act_10.aspx

UK Low Carbon Transition Plan

The UK Low Carbon Transition Plan was published on 15 July 2009. The Plan is available on the Internet at: www.decc.gov.uk/en/content/cms/tackling/carbon_plan/lctp/lctp.aspx and in hard copy from The Stationery Office.

Energy Act 2008

The Energy Act 2008 was granted Royal Assent on 26 November 2008. The Act is available on the Internet at: www.decc.gov.uk/en/content/cms/legislation/energy_act_08/energy_act_08.aspx

Climate Change Act 2008

The Climate Change Act 2008 was granted Royal Assent on 26 November 2008. The Act is available on the Internet at: www.decc.gov.uk/en/content/cms/legislation/cc_act_08/cc_act_08.aspx

Energy White Paper, 'Meeting the Energy Challenge'

The Energy White Paper, 'Meeting the Energy Challenge' was published on 23 May 2007. The White Paper is available on the Internet at:
www.decc.gov.uk/en/content/cms/legislation/white_papers/white_paper_07/white_paper_07.aspx and in hard copy from The Stationery Office.

Other publications including energy information

General

Wales in Figures; *Welsh Assembly Government*
Eurostat Yearbook (annual); *Statistical Office of the European Commission - Eurostat*
Eurostatistics (monthly); *Statistical Office of the European Commission – Eurostat*
High Level Summary of Statistics: Key Trends for Scotland; *Scottish Government*
Monthly Digest of Statistics; *Office for National Statistics*
Northern Ireland Abstract of Statistics; *Northern Ireland Statistics and Research Agency*
Overseas Trade Statistics of the United Kingdom; *H.M. Revenue and Customs*

- Business Monitor OTS1 (monthly) (trade with countries outside the EC)
- Business Monitor OTS2 (monthly) (trade with the EC and the world)
- Business Monitor OTSQ (quarterly) (trade with the EC)
- Business Monitor OTSA (annually) (trade with the EC and the world)

Regional Trends (annual); *Office for National Statistics*
Regional Yearbook (annual); *Statistical Office of the European Commission – Eurostat*
United Kingdom Minerals Yearbook; *British Geological Survey*

Energy

BP Statistical Review of World Energy (annual); *BP*
Energy - Yearly Statistics; *Statistical Office of the European Commission – Eurostat*
Energy Balance Sheets; *Statistical Office of the European Commission – Eurostat*
Panorama of Energy; *Statistical Office of the European Commission – Eurostat*
Energy Statistics and Balances of Non-OECD Countries (annual); *International Energy Agency*
Energy Statistics and Balances of OECD Countries (annual); *International Energy Agency*
UN Energy Statistics Yearbook (annual); *United Nations Statistical Office*
World Energy Statistics; *International Energy Agency*

Coal

Annual Reports and Accounts of The Coal Authority and the private coal companies; (*apply to the Headquarters of the company concerned)*
Coal Information (annual); *International Energy Agency*
Coal Statistics (quarterly); *International Energy Agency*

Electricity

Annual Report of The Office of Gas and Electricity Markets; *OFGEM*
Annual Reports and Accounts of the Electricity Supply Companies, Distributed Companies and Generators; (*apply to the Headquarters of the company concerned)*
Electricity Information (annual); *International Energy Agency*
Electricity Statistics (quarterly); *International Energy Agency*
National Grid - Seven Year Statement - (annual); *National Grid*

Environment

e-Digest of Environmental Statistics; *Department for Environment, Food and Rural Affairs (Defra).*
Measuring progress: Sustainable development indicators; *Department for Environment, Food and Rural Affairs (Defra)*

Oil and gas

Annual Reports and Accounts of National Grid, Centrica and other independent gas supply companies; (contact *the Headquarters of the company concerned directly)*
Oil and Gas Information (annual); *International Energy Agency*
Oil and Gas Statistics (quarterly); *International Energy Agency*
Petroleum Review (monthly); *Energy Institute*

Prices

Energy Prices and Taxes (quarterly); *International Energy Agency*
Gas and Electricity Prices (bi-annual); *Statistical Office of the European Commission - Eurostat*

Renewables

Renewables Information (annual); *International Energy Agency*

Useful energy related web sites

The DECC web site can be found at www.decc.gov.uk/, the energy information and statistics web site is at www.decc.gov.uk/en/content/cms/statistics/statistics.aspx

Other Government web sites

Central Office of Information	www.coi.gov.uk
Department for Communities and Local Government.	www.communities.gov.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Department for Transport	www.dft.gov.uk
HM Government Online	www.direct.gov.uk
HM Revenue and Customs	www.hmrc.gov.uk
Northern Ireland Executive	www.northernireland.gov.uk
Ofgem (The Office of Gas and Electricity Markets)	www.ofgem.gov.uk
The Scottish Government	www.scotland.gov.uk
The Scottish Parliament	www.scottish.parliament.uk
UK Parliament	www.parliament.uk
UK Statistics Authority	www.statisticsauthority.gov.uk
Welsh Assembly Government	www.wales.gov.uk

Other useful energy related web sites

AEA Energy & Environment	www.aeat.co.uk
Association of Electricity Producers	www.aepuk.com
BP	www.bp.com
British Geological Survey	www.bgs.ac.uk
BRE (Building Research Establishment)	www.bre.co.uk
Coal Authority	www.coal.gov.uk
Consumer Focus	www.consumerfocus.org.uk/
Energy Institute	www.energyinst.org
Energy Networks Association	www.energynetworks.org
Europa (European Union Online)	http://europa.eu/
Eurostat	http://epp.eurostat.ec.europa.eu/
Interconnector (UK) Ltd	www.interconnector.com
International Energy Agency	www.iea.org
Iron and Steel Statistics Bureau	www.issb.co.uk
National Grid	www.nationalgrid.com
Oil & Gas UK	www.ukooa.co.uk
Renewable UK	www.bwea.com
The Stationery Office	www.tso.co.uk
UK Air Quality Archive	http://uk-air.defra.gov.uk/
UK Petroleum Industry Association	www.ukpia.com
United Nations Statistics Division	http://unstats.un.org/unsd/default.htm
US Department of Energy	www.energy.gov
US Energy Information Administration	www.eia.doe.gov

Annex D

Major events in the Energy Industry

2011

Carbon Capture and Storage

At a meeting in April 2011 in the United Arab Emirates, Energy Ministers from around the world agreed to proposals to help speed up the global deployment of carbon capture and storage. The proposals include:

- Advance policies that address the financial gap and risks associated with early-mover carbon capture and storage (CCS) projects;
- Identify and advance appropriate funding mechanisms to support the demonstration of large-scale CCS projects in developing economies;
- Advance the development of legal and regulatory frameworks for CCS;
- Promote the importance to global CCS deployment of ratifying key international marine treaty amendments;
- Support and encourage the development of best practice knowledge-sharing from early mover projects, in particular those with public funding;
- Review key gaps in storage data coverage and knowledge including capacity assessment; and
- Recognise the potential of CCS for industrial emission sources and review demonstration opportunities.

Climate Change

A fourth carbon budget of 1950 MtCO2e for the period that will span from 2023 to 2027, putting the UK on course to cut emissions by at least 80% by 2050, was announced by the Government in May 2011. The carbon budget will place the British economy at the leading edge of a new global industrial transformation, and ensure low carbon energy security and decarbonisation is achieved at least cost to the consumer.

Electricity

In March 2011, the Government gave approval for RWE npower to build a 2400 megawatt gas power plant on the site of the former Willington A and B power stations in South Derbyshire.

In February 2011, the Government gave approval for SSE to build a gas-fired power station near Port Talbot. The Abernedd Combined Cycle Gas Turbine Plant will be built at the Baglan Bay Energy Park, on the former site of a chemicals facility.

In January 2011, the Government gave approval for ScottishPower to construct a new 1,000 megawatt gas-fired power station near Hoo St Werburgh in Kent, adjacent to the existing Damhead Creek 800 MW gas-fired power station.

Emissions Trading

In January 2011, 4.4 million allowances were auctioned in the sixteenth auction as part of phase II of the EU ETS. In 2011, the UK plans to auction a total of 30.7 million allowances.

2011 (continued)

Energy Policy

The Government published its finalised Energy National Policy Statements (NPSs) in June 2011 in order for them to be debated in Parliament. The Energy NPSs provide a clear framework for decision making and set out the need for a surge of investment in new energy sources, including 33GW of new renewable energy capacity.

Ofgem announced in March 2011 new rules that mean energy suppliers must give consumers at least 30 days advance notice before putting up their prices. The changes come into effect on 28 April 2011.

Measures designed to hasten the speed and scale of investment in low carbon energy projects as well as changes to oil and gas taxes were announced by the Chancellor of the Exchequer in the March 2011 Budget. These include:

- Green Investment Bank – the initial capitalisation of the Bank will be £3 billion and it will begin operation in 2012/13.
- Carbon price support – the Government is to introduce a floor to the carbon price for electricity generation from April 2013, this will start at around £16 per tonne of carbon dioxide and move to a target price of £30 per tonne in 2020.
- Oil and gas taxes – the rate of the supplementary charge levied on profits from UK oil and gas production will increase to 32 per cent from midnight on 24 March 2011.

In March 2011, the Energy Bill was introduced into the House of Commons with its First Reading. The Second Reading was heard on 10 May with Committee sessions being held during June 2011.

In March 2011, following a Call for Evidence, the Government revised aspects of the 2050 Calculator. Major changes include:

- Adding four new sectors to the 2050 Calculator, including the option to fit carbon capture and storage technology to gas-fired power plants;
- Adding three additional scenarios for international shipping emissions;
- Amending some of the boundaries of the choices, for example reflecting a higher capacity for the offshore wind level 4;
- Improving the five-day balancing ‘stress test’ and adding a short, sharp one-day stress test.

The world’s first financial incentive of its kind to revolutionise the way heat is generated and used in buildings was launched by the Government in March 2011. The Renewable Heat Incentive (RHI) will support emerging technologies and businesses in the UK, strengthening security of supply by reducing dependence on fossil fuel heating and emissions.

Nuclear

The Nuclear National Policy Statement, published in June 2011, listed eight sites across the country, Bradwell, Hartlepool, Heysham, Hinkley Point, Oldbury, Sellafield, Sizewell, and Wylfa, as suitable for new nuclear power stations by 2025.

2011 (continued)

Oil and Gas

In June 2011 the UK joined its partners in the International Energy Agency (IEA) in releasing oil stocks to the market. A total of 60 million barrels of oil were made available for purchase, with the UK contributing some three million barrels. The release of stocks will help prevent short-term supply disruptions leading to volatile oil prices that could damage the economy. At the end of June 2011 Brent crude oil prices stood at $112 a barrel.

In January 2011 Brent crude oil prices topped $100 a barrel for the first time since October 2008 following concerns about political unrest in Egypt; prices rose to over $125 a barrel in April, the highest level for over two years, following continued unrest in oil producing nations in North Africa and the Middle East.

Renewables

The outcome of the Government's fast track review on Feed-in Tariff (FIT) levels of support for large scale solar and anaerobic digestion installations was announced in June 2011. New tariffs for large scale and all stand-alone solar and farm-scale anaerobic digestion will start from 1st August 2011 for new installations, whilst money will be protected for householders, small businesses and communities and a range of technologies ensuring scheme longevity.

In February 2011, the Government gave permission for the construction of a 230MW wind farm off the coast of Humberside. The Humber Gateway wind farm will generate enough electricity to power up to around 150,000 homes.

Smart Meters

The Government published its plans for the national rollout of smart meters in March 2011. 53 million smart meters in 30 million homes and businesses will be installed across Great Britain, with an estimated net benefit to the nation of £7.3 billion over the next twenty years. The mass rollout will start in early 2014, and will be completed in 2019.

2010

Carbon Capture and Storage

Funding was awarded by the Government in March 2010 to E.ON and Scottish Power for design and development studies as part of the competition to build one of the world's first commercial scale carbon capture and storage demonstration plants. The funding will support Front End Engineering and Design studies, which will enable the companies to further their designs for the projects at Kingsnorth and Longannet respectively.

Carbon Emissions Reduction Target

The Government announced in June 2010 that the CERT target will be extended from March 2011 until December 2012 as well as placing new obligations on energy companies to include:

- 68% of energy suppliers' work will now have to be met through professionally installed loft, cavity and solid wall insulation. With DIY insulation added, more than 80% of the scheme will be focused on insulation. Previously just 60% was met through professional and DIY work;
- 15% of homes helped will be the lowest income households more at risk of fuel poverty;
- Energy companies will now be stopped from promoting compact fluorescent lamps in order to prioritise insulation, further to the total ban on light bulb mail-outs.

The changes to CERT will mean some 3.5 million more homes across Great Britain are likely to benefit from insulation, building substantially on the 2.5 million homes treated under the scheme since April 2008.

Climate Change

The United Nations Climate Change conference took place in Cancun, Mexico in November/December 2010. Key outcomes from the agreements at the conference are:

- Objective: agreed to peak emissions and an overall 2 degree target to limit temperature rise.
- Emissions: bringing details of what developed and developing countries are doing to tackle climate change, promised in Copenhagen, into the UN system so they can be assessed.
- MRV: agreed a system so we know how countries are living up to their promises to take action on emissions
- Long-term finance: established the Green Climate Fund and will start to get it ready to help developing countries go low carbon and adapt to climate impacts.
- Deforestation: agreed to slow, halt and reverse destruction of trees and agree the rules for delivering it and for monitoring progress.
- Technology/Adaptation: set up the mechanisms to help developing countries access low carbon technology, and adapt to climate change.

In April 2010, the Government launched an incentive scheme, Carbon Reduction Commitment Energy Efficiency Scheme (CRC EES), which aims to save public and private sector organisations around £1billion per year by 2020 through cost effective energy efficiency measures that are not yet being taken up.

2010 (continued)

Electricity

In December 2010 the Government launched consultations on fundamental reforms to the electricity market to ensure the UK can meet its climate goals and have a secure, affordable supply of electricity in the long term. The key proposals include:

- Four reforms to provide long-term certainty for electricity investors.
- A new market to have built-in level playing field for low carbon .
- Rules for existing investments protected.
- Long term impact on household electricity bills lower than under the current market.

In November 2010, the Government gave approval for the construction of a 900 MW Combined Cycle Gas Turbine (CCGT) power station at West Marsh Road, Spalding, Lincolnshire.

The Government gave consent, in April 2010, for the construction of a 1,520 MW Combined Cycle Gas Turbine (CCGT) power plant in Carrington, Greater Manchester.

Emissions Trading

In January 2010, 4.9 million allowances were auctioned in the eighth auction as part of phase II of the EU ETS. In 2010, the UK plans to auction a total of 35.8 million allowances.

Energy Policy

In December 2010 the Energy Bill 2010, announced in the Queen's Speech in May 2010, was published. The Bill has three principal objectives: tackling barriers to investment in energy efficiency; enhancing energy security; and enabling investment in low carbon energy supplies.

In October 2010 it was announced that the Department of Energy and Climate Change will, over the course of the Spending Review period (2011-2015), reduce resource spending by 18% in real terms, and increase capital spending by 41% in real terms. The Department's administration budget will be reduced by 33%.

In the first ever Annual Energy Statement to Parliament in July 2010, the Energy and Climate Change Secretary set out 32 actions being taken to accelerate the transformation of the energy system and wider economy in 4 key areas:

- Saving energy through the Green Deal and supporting vulnerable consumers
- Delivering secure energy on the way to a low carbon energy future
- Managing the UK energy legacy responsibly and cost-effectively
- Driving ambitious action on climate change at home and abroad

Published alongside the Statement was a groundbreaking '2050' analysis, which included 6 illustrative 'pathways' showing that meeting the target of an 80% cut in emissions by 2050 is ambitious but achievable, and compatible with maintaining security of energy supplies. An online '2050 Calculator' was also launched, enabling the public to explore the trade-offs inherent in designing the future secure, low carbon energy system and wider economy.

2010 (continued) Major low carbon components of the Budget announced by the Chancellor in June 2010 include:

- An assessment of how the energy tax framework can provide the right incentives for investment, alongside wider market reforms.
- Detailed proposals on the creation of a Green Investment Bank, following the Spending Review, to help the UK meet the low-carbon investment challenge.
- Establishing a Green Deal for households through legislation in the Energy Security and Green Economy Bill, to help individuals invest in home energy efficiency improvements that can pay for themselves from the savings in energy bills.
- Making the tax system fairer by examining options for the design of a fair fuel stabiliser; considering the case for introducing a fuel duty discount in remote rural areas; and exploring changes to the aviation tax system.

The Energy Bill received Royal Assent in April 2010, becoming the Energy Act 2010. The main elements of the new Act are:

- Carbon capture and storage (CCS) – delivering a new financial incentive to bring forward four commercial scale demonstration projects on coal-fired power stations and to support the retrofit of additional CCS capacity to those projects should it be required at a later date.
- Mandatory social price support – creating a framework to mandate energy companies to provide support to the fuel poor, including powers to give greater guidance and direction on the types of households eligible for future support and the type of support they should be given.
- Clarifying Ofgem's remit – making it clear that Ofgem must: include the reduction of carbon emissions and the delivery of secure energy supplies in their assessment of the interests of consumers, and step in proactively to protect consumers as well as considering longer term actions to promote competition
- Tackling market power exploitation – giving Ofgem additional powers to tackle market exploitation where companies might take advantage of constraints in the electricity transmission grid.

2010 (continued) Major low carbon components of the Budget announced by the Chancellor in March 2010 include:

- A new Green Investment Bank for Low Carbon Development to assist the finance challenge confronting infrastructure projects in the UK.

- An offshore wind infrastructure competition for up to £60m of funds to develop sites close to ports that will support manufacturing for the offshore wind industry.

- Publication of the initial findings of the Energy Market Assessment, narrowing down the options for market reform to incentivise the necessary investment over the next few decades and to ensure the consumer gets the best deal possible in the long term.

- Government and the financial services industry will undertake detailed work through a joint forum to develop Pay As You Save arrangements. This will enable millions of households to finance the high upfront costs of installations from the savings they make on their energy bills.

- A consultation on proposals to change the way in which electricity from biomass is supported to improve investor certainty and ensure sustainability.

- Government intends to opt nitrous oxide gases from nitric acid production into the EU ETS from 2011.

The Government launched in January 2010 a national scheme to upgrade household heating systems to cut carbon, save money on fuel bills and sustain work for the heating industry. Up to 125,000 households in England with working "G-rated" boilers can apply through the Energy Saving Trust for a voucher which will entitle them to £400 off the price of a new, modern "A-rated" boiler or a renewable heating system like a biomass boiler or a heat pump.

Oil and Gas

In October 2010 the Government issued a gas storage licence for ENI's proposed major new gas storage facility at the Deborah field, under the Southern North Sea near the Bacton terminal, if established the facility will become the first large scale UK depleted offshore field to be used as a gas storage facility in 27 years.

In September 2010, the Government gave approval for WINGAS Storage to convert its Saltfleetby onshore gas field into an underground gas storage facility. As a result the UK's gas storage capacity is set to rise by 15 per cent with Saltfleetby in Lincolnshire, the UK's largest onshore gas field, providing between 700 million to 800 million cubic metres of new gas storage capacity.

In June 2010, the Government approved the development of the Bacchus oil and gas field located in the Central North Sea, which has estimated reserves of 18 million barrels of oil equivalent.

In June 2010 the Government announced record levels of interest in new developments in the North Sea. 356 blocks were applied for in the latest licensing round, the largest number of blocks applied for since the first licensing round was launched in 1964.

2010 (continued)

In April 2010, South Hook, Europe's largest Liquefied Natural Gas (LNG) Terminal, at Milford Haven in South West Wales, successfully completed the build and commissioning of phase 2 and is now complete. The terminal has a total processing capacity of 15.6 million tonnes per annum of LNG and is capable of delivering up to 21 billion cubic metres per annum of gas into the National Transmission System (NTS).

The Government gave consent, in March 2010, for Total and Dong Energy to develop the Laggan and Tormore gas fields, which lie in 600 metres of water and in one of the most hostile environments in the UK. These will be the first gas fields to be developed in UK waters at this depth and will produce more than 1 trillion cubic feet of gas in the course of the field's life.

The Government issued, in February 2010, the first licence under the Energy Act 2008 to encourage the construction of more gas storage which could see the UK's gas storage capacity increase by 30%. The Gateway Project, located in the east Irish Sea, will create twenty new salt caverns each the size of the Albert Hall.

A new round of offshore licensing was announced in January 2010. The 26th offshore licensing round will allow for oil and gas exploration in UK waters; for the first time since 1998, this round offers blocks in all areas of the UK seas for new licensing. The blocks offered include a number relinquished under the Government and industry's 'Fallow Initiative', which stimulates activity on blocks where there had been no significant activity for three years.

Renewables

In November 2010, the Government gave approval for a 56MW onshore wind farm on the Ray Estate near Kirkwhelpington, Northumberland.

The world's largest wind farm off the south coast of England was officially opened in September 2010. The Thanet Offshore Windfarm will generate enough electricity to power 200,000 homes. It increases the UK's output by a third and means that the UK now generates more offshore wind than the rest of the world put together.

In April 2010, the Government launched the Feed in tariffs (FITs) scheme, which will allow individuals, organisations or businesses in England, Wales and Scotland who install low carbon electricity generation to be paid for any electricity they generate themselves from low carbon sources and benefit from a cheaper electricity bill.

The Government, in March 2010, gave approval to the construction of a new 100 MW power plant fuelled by biomass at Bristol Port, Avonmouth.

In January 2010 The Crown Estate, owner of the UK's coastal seabeds, granted rights to energy companies to develop wind energy. The announcement has the potential to see an additional 32GW of wind generation into the UK grid, on top of 8GW from previous rounds, and will mean an extra 6,400 turbines.

2009

Carbon Capture and Storage

Alongside the six draft National Policy Statements laid before Parliament in November 2009 by the Secretary of State for Energy and Climate Change, a Framework for the Development of Clean Coal was also published which confirmed that with immediate effect, to gain development consent all new coal plant will have to show that they will demonstrate the full CCS chain (capture, transport and storage) from the outset on at least 300 MW net of their total output.

The Secretary of State for Energy and Climate Change announced in a statement to Parliament in April 2009 a new generation of coal-fired power stations equipped for carbon capture and storage, of which up to four such plants could be built by 2020.

Carbon Emissions Reduction Target

The Government announced in June 2009 that more help to save energy will be available to householders due to an increase in the Carbon Emissions Reduction Target (CERT) scheme and the introduction of a new Community Energy Saving Programme (CESP). Together, CERT and CESP will see extra investment by energy companies under the two schemes, taking the total to an estimated £3.5billion in energy efficiency improvements by the end of 2012.

The Government published in February 2009 a consultation on proposals to amend the Carbon Emissions Reduction Target (CERT) through the Electricity and Gas (Carbon Emissions Reduction) Order 2008. This supports a key element of the Prime Minister's £1 billion Home Energy Saving Programme announced in September 2008.

Climate Change

The move towards global and immediate action on climate change was agreed as part of the Copenhagen Accord, in December 2009. The Accord – agreed by major developed and developing country leaders and backed by a large majority of countries - will reinforce the need for strong domestic action on climate change across the world. The Accord includes international backing for an overall limit of 2 degrees on global warming; agreement that all countries need to take action on climate change; and the provision of immediate and longer term financial help to those countries most at risk of climate change.

The Secretary of State for Energy and Climate Change announced in September 2009 new measures to help householders save money and energy following the launch of 10:10 – a new independent campaign to cut carbon emissions by 10% in 2010.

In September 2009, the Government launched a search for local authorities, charities and social enterprises to take up the challenge to help communities fight climate change. Communities will be able to apply for a share of a £10million fund as part of the Low Carbon Communities Challenge to build on existing low carbon schemes.

2009 (continued)

The Chancellor announced the UK's first three 'carbon budgets' alongside his fiscal Budget in April 2009, and also set out new measures designed to help low carbon industries capitalise on the opportunities presented by the UK's legally binding target to cut greenhouse gas emissions to at least 80% below 1990 levels by 2050. The new measures include:

- Legally binding carbon budgets for the first three five-year periods 2008-2012, 2013-2017 and 2018-2022.
- A revised target to reduce emissions to at least 34% below 1990 emissions by 2018-22.
- Aim to meet the carbon budgets announced through domestic action alone, and consistent with this, setting a zero limit in the non-traded sector on offsetting through international credits for the first budget period.
- Commitment to tighten the budget after Copenhagen in December 2009, once we have a global climate change agreement.

Electricity

A new 95 Mega Watt power plant capable of turning 600,000 tonnes of waste each year into electricity and heat, to be built at Ince in Cheshire, was approved by the Government in August 2009. The waste, which would have otherwise gone to landfill, will instead be used to generate electricity to power a new Resource Recovery Park. Excess electricity will also be exported to the National Grid.

The Government granted consent in February 2009 for three new power stations capable of providing approximately four million homes with electricity to be constructed at Pembroke, King's Lynn and Hatfield. The new gas fired power stations will produce around 4 gigawatts of power.

Emissions Trading

The Government announced in February 2009 that it intends to auction four million allowances in its second auction as part of the EU ETS. In 2009 the UK plans to auction a total of 25 million allowances.

Energy Policy

A new Energy Bill was introduced into Parliament in November 2009 by the Government. New powers and clearer legislation will provide support for energy consumers, giving a greater amount of help to the poorest and most vulnerable, as well as introducing a new financial incentive for carbon capture and storage.

Faster and fairer planning decisions on new energy infrastructure were laid before Parliament in November 2009 by the Secretary of State for Energy and Climate Change. Six draft National Policy Statements - one overarching and one for each of the following areas: fossil fuels, nuclear, renewables, transmission networks and oil and gas pipelines – will guide planning decisions on energy infrastructure from March 2010 by the Infrastructure Planning Commission.

2009 (continued)

A comprehensive plan to move the UK onto a permanent low carbon footing and to maximise economic opportunities, growth and jobs was published by the Government in July 2009. The UK Low Carbon Transition Plan sets out how by 2020:

- More than 1.2 million people will be in green jobs;
- 7 million homes will have benefited from whole house makeovers, and more than 1.5 million households will be supported to produce their own clean energy;
- 40% of electricity will be from low carbon sources, from renewables, nuclear and clean coal;
- The UK will be importing half the amount of gas that we otherwise would;
- The average new car will emit 40% less carbon than now.

In February 2009 the Department of Energy and Climate Change, together with the Department for Communities and Local Government, published three consultation documents: the Heat and Energy Saving Strategy (HESS), the Carbon Emissions Reduction Target uplift (CERT) and the Community Energy Saving Programme (CESP). These home energy efficiency measures make up a comprehensive package to save people energy and reduce emissions from now through to 2020 and beyond.

Fuel Poverty

The Government published its UK Fuel Poverty Strategy Seventh Annual Progress Report in October 2009, reporting on the progress made since the last report, highlighting key areas for attention during the coming year, and setting out the fuel poverty figures for 2007. Alongside the report the Government set out four next steps to help low income homes deal with high energy bills:

- Action to help the poorest insulate their homes.
- Provision of street by street help in low income neighbourhoods.
- Action on prices for the most vulnerable.
- Tougher regulation to make sure all consumers get a fair deal.

In April 2009, following a review, it was announced that the Warm Front Scheme had been changed to improve the quality of service for its customers. Households connected to the gas grid are now eligible for grants of up to £3500, up from £2700, while those in areas off the gas grid can apply for funding up to £6000, an increase of £2000.

Nuclear

In the draft nuclear National Policy Statement laid before Parliament in November 2009 by the Secretary of State for Energy and Climate Change, the Government confirmed that all of the sites, with the exception of Dungeness, nominated by industry have been assessed as potentially suitable for new nuclear deployment by the end of 2025.

2009 (continued)

A third potential new nuclear operator entered the UK market in October 2009 taking total proposals for new nuclear power stations up to 16 gigawatts of electricity. A consortium of GDF SUEZ SA, Iberdrola SA and Scottish and Southern Energy Plc have secured an option to purchase land for the development of a new nuclear power station at Sellafield.

A list of eleven sites that could be potential hosts to new nuclear power stations in the UK, and be operational by 2025, was published in April 2009.

In January 2009, EDF's £12.5 billion purchase of British Energy Group plc (British Energy) was completed. The purchase is a significant step in EDF's plans to build four new nuclear reactors in the UK. The sale, which includes the 36 per cent stake in the company held by the Government's Nuclear Liabilities Fund, raises approximately £4.4 billion towards the cost of decommissioning British Energy's existing nuclear power stations.

Oil and Gas

In May 2009 the South Hook LNG re-gasification terminal, the largest LNG terminal in Europe, was officially opened, following earlier arrival of commissioning cargoes.

A proposed new licensing scheme which will open up an area of up to 200 miles around the UK for offshore gas storage and importation projects was announced in a consultation document published in February 2009. The scheme will create a regulatory environment that will encourage investment in new gas supply infrastructure, including gas storage.

Renewables

At an Energy Council meeting in Brussels in December 2009, the Government signed an agreement along with Germany, France, Belgium, the Netherlands, Luxembourg, Denmark, Sweden and Ireland to develop an integrated offshore wind grid in the North and Irish Seas.

In November 2009 the Government gave approval for the construction of a 80MW energy from waste and biomass fuelled power station at Storey's Bar Gate in Peterborough.

In August 2009 the Government gave approval for a new 60 Mega Watt power plant, fuelled by biomass and waste, to be built on a disused site at Tilbury Docks in Essex.

The Secretary of State for Energy and Climate Change announced in July 2009 that three UK-based banks, RBS, Lloyds and BNP Paribas Fortis, will start work with the European Investment Bank (EIB) on a programme to lend up to £1 billion to onshore wind farms over the next 3 years. The cash will help get building started for onshore wind projects which have been hit by the credit crunch, particularly small and mid-sized wind farms.

In July 2009 the Government published, alongside the UK Low Carbon Transition Plan, the Renewable Energy Strategy which maps out how the UK will deliver its target of getting 15% of all energy (electricity, heat and transport) from renewables by 2020.

In May 2009 E.ON, Dong and Masdar announced the go ahead of the first phase of the London Array offshore windfarm. The 1 Gigawatt London Array, to be situated off Kent and Essex, will be the biggest offshore wind farm in the world, generating enough electricity to power a quarter of Greater London's homes, with the first power feeding into the grid by 2012.

2009 (continued)

Smart Meters

In December 2009 the Government confirmed that smart meters will be rolled out through energy suppliers to every home by the end of 2020, alongside a paper setting out the case for developing smart grids in the UK.

All homes in Britain will have smart meters installed by 2020 under plans published by the Government in May 2009. Smart meters enable meter readings to be taken remotely and together with a display device give householders real time information on their energy use. The new information smart meters provide will help consumers to see what energy they are using and how to save money on their bills.

For major events in earlier years see the DECC website version of this annex at:
www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Notes