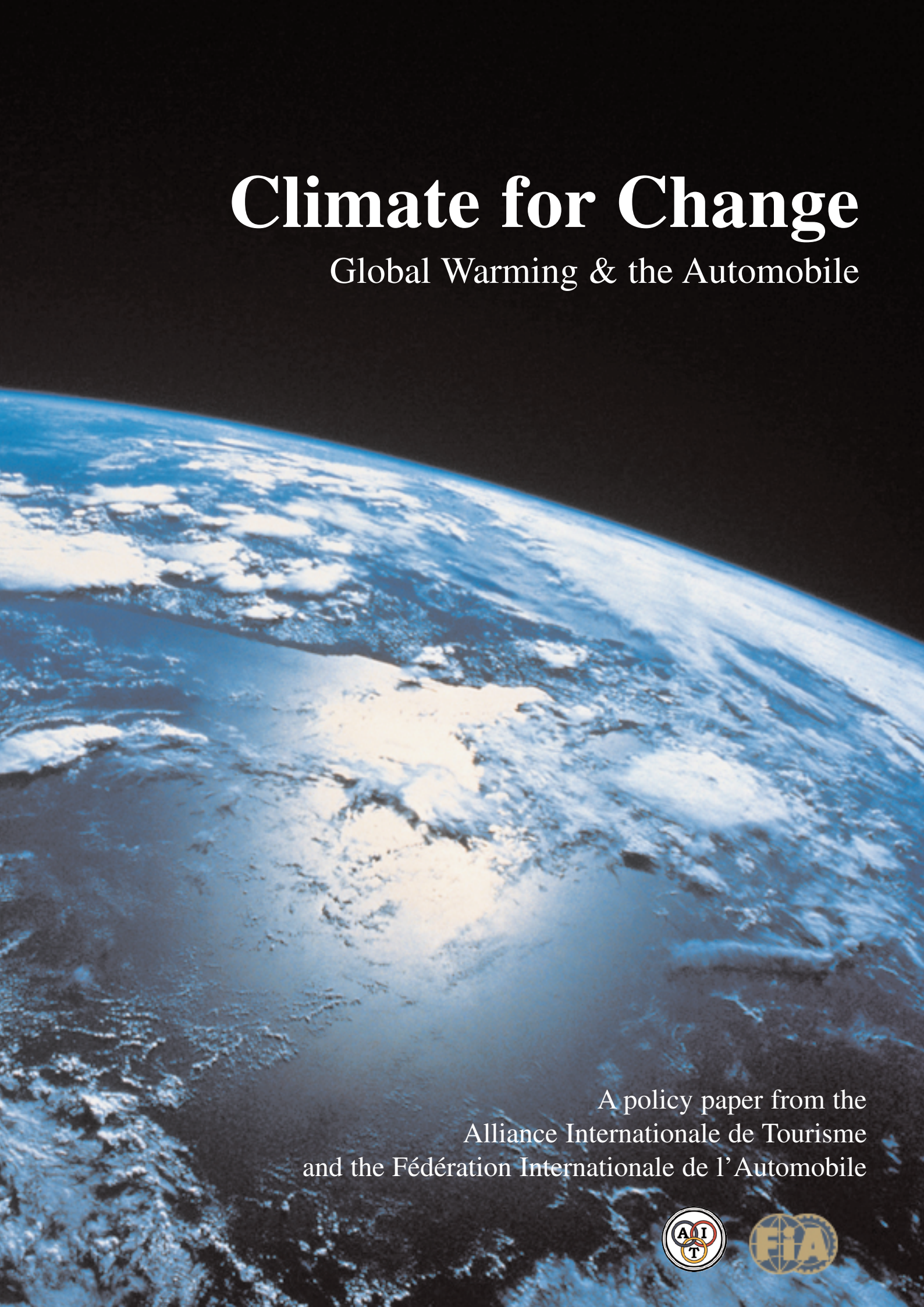
Climate for Change

Global Warming & the Automobile



A policy paper from the
Alliance Internationale de Tourisme
and the Fédération Internationale de l'Automobile

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Foreword

Representing some 100 million motorists worldwide, the AIT & FIA recognise the responsibility of all users of passenger cars to protect the environment.

The consequences of global warming are still unclear, and may remain so for many decades. But scientific evidence overwhelmingly supports the view that emissions, caused by human activity, are increasing concentrations of carbon dioxide in the atmosphere and raising the temperature of our planet.

We must not wait until it is too late, in the hope that the predictions and the warnings are wrong, before reacting to global warming. Responsible preventative action is necessary now.

We are determined to work with governments, the motor industry and car users to secure reductions in CO_2 emissions from the passenger car sector, while safeguarding the benefits that the automobile brings to society.

Fernando Falcó
President of the AIT

Max Mosley
President of the FIA

Global warming is a shared problem and we all have a role to play. There are simple steps that ordinary drivers can take right now to reduce CO_2 emissions. Regular car maintenance, reducing speed and driving smoothly can make an instant improvement in fuel efficiency.

Think about the environmental contribution that 100 million motorists could make if we all follow this greener motoring advice. One hundred million individual reductions in greenhouse emissions could make a world of difference. This is why the AIT & FIA's message to motorists is “Think Before You Drive”.

Frank Thackwray,
Chairman, AIT & FIA Foundation

Climate for Change - Summary

If CO_2 emissions from passenger cars are to be reduced, there must be an effective strategy to promote fuel efficiency and to reduce car dependency. This will require policies that encourage the development of new vehicle and fuel technologies, persuade the consumer to purchase fuel economic vehicles and offer a greater choice of alternative transport options.

It is vital to recognise that global warming is a shared problem, and must be dealt with in partnership. All sectors of transport have a role to play, including the regulatory and planning authorities whose decisions can have as great an impact on the environment as any actions by vehicle producers or users.

Representing some 100 million motorists worldwide, the AIT & FIA recognise the responsibility of all users of passenger cars to contribute to achieving the emissions reductions decided at the Kyoto Conference. Below, we set out a framework for achieving such reductions.

PROMOTING FUEL EFFICIENT CARS

(i) Vehicle Technology

Substantial reductions in CO_2 emissions from the motor car sector ultimately depend on a new generation of ultra clean and highly fuel efficient vehicles. On board diagnostics, improved aerodynamics, adaptive cruise control, reduced rolling resistance and light-weight materials are some of the technological developments that will improve fuel economy. Telematics systems, in particular navigation aids and congestion warning systems, will also improve the efficiency of motor transport. Voluntary agreements with the car industry to target CO_2 reduction can be a valuable stimulus to bringing new low emission technologies to the market.

(ii) Fuel & Engine systems

Direct injection technology can improve the fuel efficiency of conventional internal combustion engines. But new fuels and propulsion systems will also be crucial to reducing emissions. There are a range of possible alternative fuels and engine systems under consideration, including liquid and non-liquid fuels, hybrid engines, battery-powered electric vehicles and fuel cell power sources.

However, the viability of these fuels and engine systems will depend not only on their potential reduction in greenhouse gases but on other practical factors such as refuelling and distribution infrastructure needs. The cost of purchasing vehicles using these new technologies, and their functional ability to replace conventional petrol engined cars, will be critical to their acceptance by the public. The least environmentally friendly car is the zero-emissions vehicle that cannot be sold.

INVESTING IN THE ENVIRONMENT

(i) Fiscal measures

Fiscal policy can play an important role in reducing car emissions. Unfortunately, the fiscal instruments used in many countries are only succeeding in raising the tax burden and real costs for ordinary motorists, particularly poorer drivers.

Reducing CO_2 emissions and toxic pollutants, rather than maximising revenue, should be the central aim of fuel duties and other 'environmental' motoring taxes. The emphasis should shift from penalising and punishing motorists for using their cars to rewarding use of cleaner vehicles and encouraging some modal shift.

(ii) Investment in transport

If governments are serious about reducing CO_2 emissions from cars, they must also provide ways out of car dependence. Car use is essential for social and economic life in many industrialised countries. As car ownership expands in the developing world a similar situation could emerge. In some countries shortsighted planning decisions have contributed to over dependence on the car.

Land-use planning must be a central element of any CO_2 reduction strategy. Integrating modes of transport, and aiming for the fusion of private and public modes of transport at the points on the network where they meet, must be a priority for investment. This will require major investment and support for both infrastructure and Intelligent Transport Systems (ITS) - and a commitment from governments to re-invest road user taxes.

FUEL EFFICIENT DRIVING

(i) Consumer Information

Clear information on fuel economy is needed to influence the motorist's purchase decisions in the marketplace. The results of independent fuel economy tests on different car models should be made available at all points of sale, at trade exhibitions and in advertising. This should be supported with financial incentives that lead consumers to choose the most fuel efficient cars and encourage manufacturers to make such vehicles available.

(ii) Driver Behaviour

Driving style can alter a car's fuel consumption by around 15 per cent. Some vehicles already display fuel consumption information via 'econometers' on the car dashboard. This real time demonstration of the consequences of speed, acceleration and poor maintenance should be included in all new cars. On board diagnostics will also help to inform drivers about the performance of their vehicle. The AIT & FIA's advice “Think Before You Drive...six steps to greener driving” encourages motorists to reduce their car's impact on the environment on every journey.

CARBON SEQUESTRATION

Climate change experts recognise the importance for CO_2 reduction of “sinks” - natural processes that absorb carbon dioxide from the atmosphere. Forests are the best example of sinks, and afforestation schemes should be an integral part of countering global warming. The FIA supports a carbon sequestration project in Mexico, which accounts for all the greenhouse emissions from Formula One teams. Such projects should be eligible for carbon trading, in addition to other measures, to encourage conservation of existing forest and reforestation of the 17 million hectares of forest destroyed every year.

Global Greenhouse

Greenhouse gases occur naturally in the atmosphere and the ‘greenhouse effect’ plays a vital role in determining the Earth’s climate. Visible sunlight warms the surface of the planet, which then radiates heat. Some of this natural infrared radiation is absorbed by gases in the atmosphere, trapping heat near the surface of the earth.

The main atmospheric constituents responsible for this ‘radiative forcing’ and the creation of this greenhouse effect are water vapour and carbon dioxide. Without these greenhouse gases, the surface temperatures on the earth would be around 30ºC lower than they are.

Since the late nineteenth century, surface temperatures have increased by about 0.6ºC. Over roughly the same period global sea levels have increased by between 10 and 25cm, an increase that the majority of scientists believe to be the result of the greenhouse effect causing gradual global warming.

It is difficult to prove that there have been consistent global changes in climate variability or weather extremes during this time, but localised changes in weather characteristics have been noted. For example, some regions have had fewer frosts than historically, or higher regional rainfall has been recorded. Four of the five warmest years since records began have fallen during the 1990’s. It could be argued that this evidence points towards an enhanced greenhouse effect. `

The existence, and causes, of the enhanced greenhouse effect have been a matter of vigorous debate for many years. To what extent are rising temperatures being caused by human activity rather than natural climatic changes? Although it is difficult to accurately quantify human influence on the greenhouse effect, the Intergovernmental Panel on Climate Change (IPCC), comprising many of the world's climatology experts, believes that "the balance of evidence suggests that there is a discernible human influence on the global climate". There is now a widespread, although by no means complete, consensus for the view that global warming is occurring and is being caused by the world's human population.

Since the Industrial Revolution, the concentration of the largest greenhouse gas, CO_2, in the atmosphere has risen from 280 parts per million (ppm) to 350 ppm. Together with this 30% increase in carbon dioxide, levels of other greenhouse gases such as methane (CH_4) and nitrous oxide (N_2O) have risen by 145% and 15% respectively over the same period. It is now generally accepted that these increases in concentration are responsible for higher temperatures and sea levels, and have been largely the result of human activity.

The surge in heavy industrial activity during the nineteenth and first half of the twentieth century, deforestation and population growth have all played their part. In the second half of the twentieth century emissions from transport have also contributed to greenhouse gases.

If CO_2 emissions are allowed to continue at their current rate, the concentration in the atmosphere will reach about 500 parts per million by 2100, from a level of 350ppm today.

As a result surface temperatures could rise by as much as 3.5ºC. Melting glaciers and ice sheets, and thermal expansion of the oceans, could result in sea levels rising by up to 95cm over the same time period, and continuing to rise for centuries afterwards. According to the IPCC, even the best case 'do nothing' scenario would lead to a 1ºC increase in temperature, the greatest climate change in 10,000 years.

Such a change, over a relatively short time, could affect the physical world and human existence. Around 100 million people could be at risk of coastal flooding, and significant areas of low-lying countries like the Netherlands and Bangladesh would be submerged. Desert lands would become hotter; marginal grasslands, desert. Self-sufficiency in food and water could become an even more serious problem for some nations. It is likely that the regions that have done least to contribute to the problem would experience the worst effects of global warming.

The world's forests are its lungs. By absorbing carbon dioxide, forests are also a defence against the greenhouse effect. But forests could be seriously affected by increases in surface temperatures. Higher temperatures could destroy forest ecosystems, particularly in tropical belts, over time, reducing defences against warming and releasing more carbon into the atmosphere. This highlights the importance of protecting forests and encouraging carbon sequestration projects. The challenge for the world is to stabilise CO_2 emissions at a sustainable level.

Cars & CO_2

Over the past fifty years the number of cars in the world has increased from 50 million to around 450 million. An inevitable consequence of this rapid growth in vehicle numbers has been that the car's contribution to greenhouse gas emissions increased over the period. But today motor vehicles still only account for 15% of global greenhouse emissions.

Although significant, the role of the car in global warming must be kept in perspective. CO_2 emissions from cars are now falling. The overwhelming majority of greenhouse gas emissions are caused by industrial or domestic use of fossil fuels. The total transport sector, including air travel, heavy goods vehicles and passenger cars, accounts for just one fifth of global CO_2 emissions. Reductions in the emissions from cars are vital if global targets are to be achieved, but these reductions will only make a small contribution to solving a problem that mostly lies elsewhere.

The motor industry has already managed to reduce CO_2 emissions, although making further big improvements in fuel efficiency is proving difficult. As the diagram on the facing page shows, changes in car design to make a safer, more comfortable ride negate the effect of fuel efficiency measures such as better aerodynamics and combustion efficiency. Achieving an 8% improvement in the consumption of a medium sized car has required a 28% improvement in fuel efficiency (see Figure 1).

Despite the technological obstacles, the car industry is taking seriously its responsibilities for reducing greenhouse emissions. In the European Union, where CO_2 emissions from road transport have increased by 9% during the 1990's, the Automobile Manufacturers Associations of Europe (ACEA), Korea (KAMA) and Japan (JAMA) have committed to reducing CO_2 emissions from new cars by 25% over the next decade.

This target is to be achieved by reaching an average CO2 emission figure for new cars of 140 g/km by 2008. The current average rate in the EU is 186 g/km. This compares with a figure of 191 g/km for cars produced in Japan and 260 g/km in the United States (see graph above). Clearly, similar efforts to improve fuel efficiency will need to be made by all major automobile-manufacturing nations if the individual, and global, targets assigned at Kyoto are to be met.

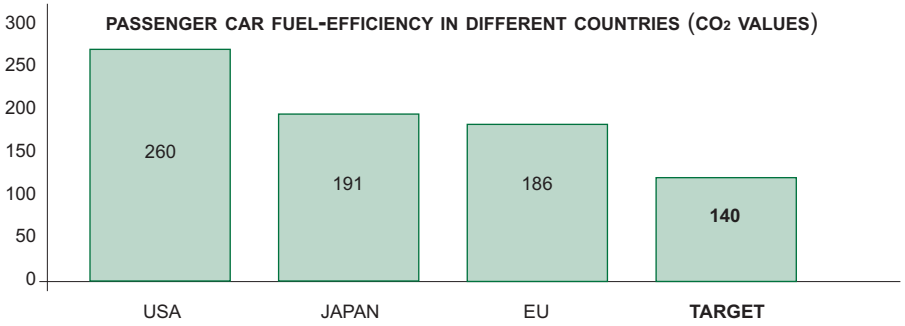
EUROPEAN UNION AGREEMENT WITH MOTOR MANUFACTURERS' ASSOCIATIONS ON REDUCING CO_2 EMISSIONS FROM CARS

• to achieve an average CO_2 emission figure of 140g/km by 2008 for all its new cars sold in the EU, as measured according to the EU's test procedure;

• to bring to the market individual car models with CO_2 emissions of 120 g/km or less by 2000;

• to an indicative intermediate target in the order of 165-170g/km in 2003 as the basis for monitoring progress;

• to review the potential for additional improvements with a view to moving the new car fleet average further towards 120g/km by 2012. This review will be undertaken in 2003.



If car emissions are to be reduced the motor manufacturers cannot be expected to operate in isolation. There is a role to be played by everyone connected with the motor car, be it transport planners, tax authorities, road authorities, car sales forces and, of course, the motorists themselves.

Over the following pages we offer the policy prescriptions of the AIT & FIA for combating global warming and set the contribution of the car to CO_2 emissions in the context of the climate change debate and the international effort to reduce greenhouse emissions.

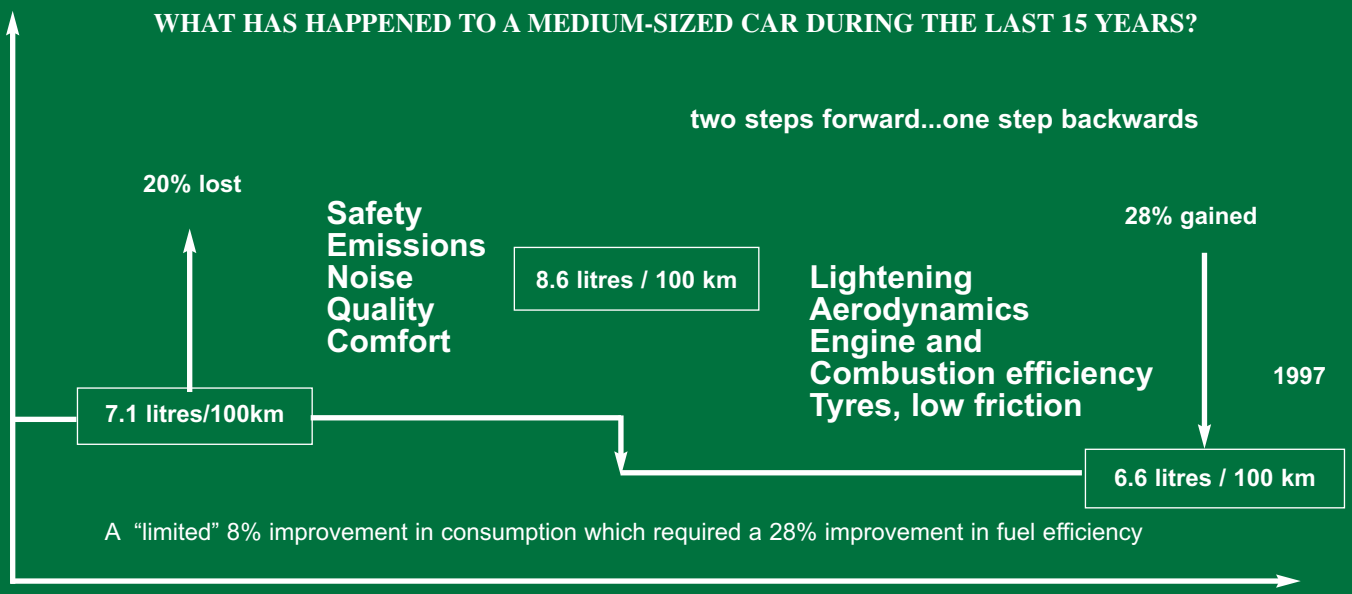


Figure 1: source ACEA

Fair and Effective: the AIT & FIA agenda

We all have a role to play in taking constructive action to prevent the worst predictions about global warming becoming a reality. Representing some 100 million motorists worldwide, the AIT & FIA recognise the responsibility of all users of motorised transport to contribute to achieving the emissions reductions decided at the Kyoto Conference. Any action needs to be cost effective, well balanced and fully comprehensive. Below we set out the principles and policies that the AIT & FIA believe should be followed in reducing greenhouse emissions from cars.

A FAIR SHARE OF THE CO_2 BURDEN

The international debate on emissions reduction measures has highlighted the importance of equity and cost-efficiency. Climate change is a global problem. It requires every nation, and every sector responsible for creating the problem, to play their part. It would be ineffective, expensive and socially unjustifiable to target one source of CO_2 emissions whilst ignoring or sheltering others. The effect of CO_2 on the environment is the same regardless of its emission source. This principle has been accepted by the Kyoto and Buenos Aires conferences, and will be put into practice through the flexible, or 'Kyoto', mechanisms.

Passenger cars account for about half of the emissions from the transport sector. As has been illustrated, passenger cars are a growing and significant source of CO_2 emissions, but they cannot be considered in isolation from the fossil fuel consumption of households and industry in general, which in many countries are much greater than CO_2 emissions from private cars.

BALANCING THE NEEDS OF THE ENVIRONMENT AND SOCIETY

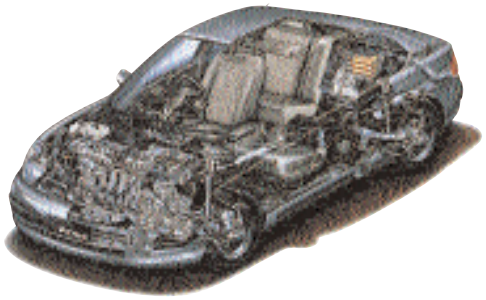
The AIT & FIA endorse the 'precautionary principle' which justifies action now to address global warming. But solutions must be considered in the context of the overall best interests of society and human progress. This is particularly important in the passenger car sector. Evolving policies and standards for improved fuel consumption must be balanced against the need for greater safety and improved local air quality.

Improved safety standards may tend to raise the overall weight and bulk of passenger vehicles with potentially adverse effects for fuel economy. We want to ensure that the drive for greater fuel economy does not conflict with the design of safer cars, which play an immediate role in saving lives. We would also be concerned if hasty or ill-considered measures to favour fuel economy raised the cost of new cars and slowed down the modernisation of the vehicle parc. This would set back improvements in local air quality, in itself a crucial environmental objective, as well as improvements in safety.

If they are to succeed, and command public support, CO_2 reduction policies must recognise the vital economic and social role of the car in modern society. In some countries motoring taxes are used as a blunt instrument in an attempt to alter travel behaviour and reduce emissions. Experience has shown that car dependent motorists have no choice but to absorb the extra cost of motoring, with the poorest motorists hit hardest. Such fiscal policy has a negligible environmental impact. A better way forward combines investment in transport alternatives and a highly targeted, strategic environmental taxation policy with fiscal incentives for purchasing and running fuel economic vehicles. If CO_2 emissions from passenger cars are to be reduced, there must be an effective strategy to promote fuel efficiency and to reduce car dependency. This will require a policy mix that encourages the following:

- New vehicle technologies
- Alternative fuel and engine systems
- Incentives for cleaner, more fuel efficient vehicles
- Investment in alternative transport options
- Driver education and information
- Carbon sequestration

The Policy Options: Vehicle Technology



Substantial reductions in CO_2 emissions from the motor car sector ultimately depend on a new generation of ultra clean and highly fuel efficient vehicles. Many governments around the world are working with the motor industry to develop and promote work on the car of the future. The European Commission's Task Force on the Car of Tomorrow and the US government-led Partnership for a New Generation of Vehicles are two of the larger examples. The AIT & FIA believe that improved co-ordination and harmonisation of the automotive research and development efforts of both industry and governments worldwide are needed to enhance and focus these important projects.

The range of potential technological improvements is very broad. Some of the technology already available, or under development, that could improve fuel efficiency includes:

On Board Diagnostics: an engine management system that enables rapid detection of engine malfunction or other performance failures, enabling optimum efficiency.

Low Rolling Resistance Tyres: can significantly reduce vehicle rolling resistance and thereby save energy.

Intelligent, Integrated Powertrains: computer controlled matching of engine and transmission, using a high efficiency automatic gearbox, IIP can optimise overall powertrain efficiency.

Intelligent Cruise Control: coupled to IIP, vehicle headways are reduced and smooth motorway driving improves fuel economy.

Route Guidance & Navigation Systems: help ease congestion and promote more fuel efficient driving.

Policy Options: Fuel & Engine Systems

INTERNAL COMBUSTION ENGINES

There is still great scope for improving the fuel efficiency of the conventional internal combustion engine. The GDI (gasoline direct injection) petrol engine, pioneered by Mitsubishi, reduces CO_2 emissions by up to 20%, compared with other internal combustion engines, and also produces lower local emissions.

By radically increasing the ratio of air-to-fuel needed for combustion, the GDI engine can achieve considerable fuel economy savings. Most conventional engines are controlled to operate with around 14 times as much air to fuel, although some 'lean burn' engines can achieve a 25:1 air-to fuel ratio. However, the GDI engine runs with a ratio of 40:1. Fuel economy savings averaging 20% are the result.

Mitsubishi's GDI system overcomes the usual problem of lean burn - misfiring - by injecting fuel at high pressure very close to the sparking plug. It is a highly complex operation requiring accuracy in delivering fuel, timing the burn precisely and controlling airflow to keep the injected fuel in place. More than 100,000 GDI cars have been sold in Japan, and the technology is now available in 1.8 litre cars in Europe, at only a slightly higher price than conventional cars.

NEW FUEL AND PROPULSION SYSTEMS

New fuels and propulsion systems will also be crucial to reducing emissions. There are a range of possible alternative fuels under consideration, including liquid and non-liquid fuels, battery-powered electric vehicles, petrol and electric hybrids and fuel cell power sources. Some car manufacturers are quite advanced in developing new technologies. However, the viability of these fuels will depend not only on their potential for reducing greenhouse gases but on other practical factors such as refuelling and distribution infrastructure needs, building and purchasing costs and consumer acceptance. Developing new technologies is one thing. Building alternative fuel cars that are versatile and low-priced enough to appeal to a mass market is another. It is likely that petrol and diesel in conventional internal combustion engines will remain unchallenged for some time yet as the main fuel source for motor vehicles.

However, the evolution of alternative fuels and propulsion systems from prototypes to 'niche' vehicles to mass market family cars will happen, with eventual benefits for the environment. The main developments in fuel and engine technology are outlined below, in order of mass-market viability.

HYBRID ENGINES

The first stage of new technologies to offer a realistic mass-market alternative to the conventional petrol engine will probably be the hybrid, combining gasoline engines and electric motors. There are two main types of hybrid engine. Series hybrids use a gasoline engine to generate electricity for the electric motor that drives the vehicle. Parallel hybrids use both gasoline engines and electric motors for motive power, switching between one and the other depending on the type and speed of driving that is being undertaken. Toyota has developed an advanced hybrid car, the Prius, which combines the best aspects of both series and parallel systems.

The Prius is powered by a specially developed hybrid power-train, the Toyota Hybrid System (THS). In a typical drive cycle, its emissions of unburned hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NOx), are reduced to about 10% of the levels demanded by current Japanese regulations. Its fuel economy - 20 km/litre in the Japanese test cycle - means its emissions of CO_2 are also significantly reduced. Already a mass seller in Japan, the Prius is now being launched in Europe and the US.

FUEL CELLS - THE ZERO EMISSIONS OPTION

Like a battery, a fuel cell delivers electrical power from a chemical reaction. Unlike a battery the reactants are stored externally to the fuel cell. A fuel cell is an electrochemical device that produces electricity silently and without combustion. Hydrogen fuel, which can be obtained from water, methanol, natural gas or petroleum products, is combined with oxygen from the air to produce electrical energy. The only by-product from a direct hydrogen fuelled vehicle is water. A fuel cell will keep producing electricity as long as its external reactants continue to be delivered to it, so it does not become drained like a conventional battery.

A fuel cell car has an electric drive system. However, unlike a conventional battery powered electric vehicle, a fuel cell can be quickly and easily re-fuelled. As a result the fuel cell car can combine the zero emissions benefits of an electric car with range, flexibility and performance comparable to a conventional internal combustion engined vehicle.

The Ford P2000 fuel cell car is one of the advanced prototypes currently being developed, and Ford plan to have a version in production by 2004, although the cost of such a vehicle is not yet known.

NATURAL GAS

Natural gas is a high octane fuel which combusts more efficiently than petrol, producing lower CO_2 emissions per unit of energy. Natural gas has a similar level of energy efficiency to diesel, but produces fewer local pollutants. However, as natural gas consists mainly of methane, emissions of this greenhouse gas are higher. The technology for compressed natural gas is advanced, and both cars and heavy vehicles propelled by compressed gas are available on the market, although mainly bought for niche uses.

ELECTRIC CARS

Electric cars are propelled entirely by electric power from an internal battery. They have the advantage of zero emissions at point of use. But their limited range currently rules them out as a realistic option for many consumers, while their power generation requirements cause significant CO_2 emissions and raise other environmental concerns. Because of these obstacles electric vehicles are likely to remain restricted to niche users for some time, although limited attempts have been made to market them to a wider public.

There is obvious scope for using small electric vehicles in inner cities, where distances travelled are small and recharging is reasonably practicable. However, hybrid engines provide a way to combine the electric option in urban areas with flexibility and realistic re-fuelling capability on longer journeys.

Policy Options: Investing in the Environment

FISCAL MEASURES

Fiscal policy can play an important role in reducing car emissions. Unfortunately, the fiscal instruments used in many countries only succeed in raising the tax burden and real costs for ordinary motorists, particularly poorer drivers.

The AIT & FIA accept that motorists should make a fair contribution through taxation towards the cost of roads infrastructure, and we would welcome an accurate, scientifically based assessment of the external costs and benefits of the motor car. We believe that car users in most of the OECD countries do already meet their share of costs when the benefits and dis-benefits to society of car use are weighed up.

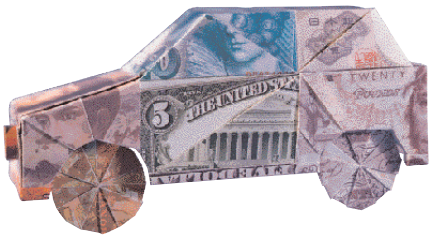
Reducing CO_2 emissions and toxic pollutants, rather than maximising revenue, should be the central aim of fuel duties and other 'environmental' motoring taxes. Fiscal, transport and environmental planning policies need to be focused on these objectives and developed in tandem. The emphasis should shift from penalising and punishing motorists for using their cars to rewarding use of cleaner vehicles and encouraging some modal shift.

There are three main elements to such a strategy: altering purchasing behaviour in favour of cleaner, more fuel efficient vehicles, reducing car dependence through investment in alternatives and educating motorists about greener driving and available alternatives.

INCENTIVISING CHANGE

The tax system should be used positively to reward the purchase of low-emission cars, in terms of both CO_2 and toxic pollutants, rather than just being operated as a penalty-driven regime. As voluntary regulation, or legislation, drives up technological performance the emphasis must be on replacing the car fleet as quickly as possible, to remove the older “gross polluting” and least fuel-efficient vehicles from our roads.

Governments should agree a harmonised approach, within each geographical 'market' area, to voluntary scrappage of older cars combined with generous fiscal incentives for the most efficient new vehicles. Wherever possible, charges and taxes should be related to actual emissions. In this way, genuine environment-led fiscal strategies will result in tangible environmental results.



INVESTMENT IN TRANSPORT

If governments are serious about reducing CO_2 emissions from cars, they will have to tackle car dependence. This means investing in alternative modes of transport and reversing the planning mistakes of the past. Car use is now essential for social and economic life in all industrialised countries. But for some types of journey and activity the car has become even more essential because public transport has been neglected or as a result of shortsighted planning decisions.

Integrating modes of transport, and aiming for easy interoperability of private and public modes of transport must be a priority. This requires major investment and support for road and public transport infrastructure.

One of the significant opportunities for reducing CO_2 emissions is in the use of ITS. The ERTICO* 20 year vision for ITS in Europe suggests that improving the efficiency of freight and fleet operations through improved traffic flows can reduce fuel consumption by 2-13%, and emissions by 5-15%. Major investment and encouragement for R&D in the ITS sector must be a priority for governments.

Land-use planning must be a central element of any CO_2 reduction strategy, and policies for urban renewal can halt the drift to out-of-town developments and increased car dependence.

But these enlightened policies require an investment commitment from governments. That is why the AIT & FIA are calling for a Fair Deal for motorists:

- revenue neutral reform of road user taxes to target environmental improvements and to provide incentives for cleaner, fuel efficient cars;
- major re-investment of road user taxes in road, public transport and ITS infrastructure to improve efficiency and provide genuine modal alternatives.

Climate change is a global problem and the planning and traffic management lessons learnt by industrialised nations can be taught elsewhere. Some countries are more advanced in funding and providing a proper public transport network than others. The transfer of such best practice, and practical assistance with additional transportation projects in countries where the transport network is less advanced, should qualify as emission reduction projects under the Joint Implementation mechanism.

Similarly, implementing such transport schemes in developing countries should qualify for Clean Development credits if real emission reductions can be shown to have resulted.

*Intelligent Transport Systems Europe

Policy Options: Driver Education

Raising awareness of CO_2 reduction measures amongst motorists is the final, vital part of the strategy that will deliver lower greenhouse emissions. Clear information on fuel economy is needed to influence the motorist's purchase decisions in the marketplace. As discussed above, this should be supported with financial incentives that lead consumers to choose the most fuel efficient cars and encourage manufacturers to make such vehicles available.

Fuel economy labelling is a good way to provide consumers with the means to choose according to environmental, and cost effective, performance. The results of independent fuel economy tests on different car models should be made available at all points of sale, at trade exhibitions and in advertising.

We also need to raise awareness about the effect of driving style on fuel economy. Driver behaviour can alter a car's fuel consumption by around fifteen per cent. The Japanese Automobile Federation's "Stop Idling" campaign demonstrated the positive results on driving style of a simple awareness campaign. Some vehicles already display fuel consumption information via 'econometers' on the car dashboard. This real time demonstration of the consequences of speed, acceleration and poor maintenance should be included in all new cars. On board diagnostics will also help to inform drivers about the environmental performance of their vehicle.

Simple voluntary measures can be far more cost effective and environmentally efficient than taxation. The UK Automobile Association has produced an analysis of energy and money saving measures for the car and home (see below).

By putting this advice into practice at a business level, the AA's own energy efficiency programme aims to reduce carbon output by 1,500 tonnes and $600,000 / 572,000 per year.

To encourage motorists to think about simple ways of reducing CO_2 emissions, the AIT & FIA have produced a six point plan for greener travel, which is both kind to the planet and to your wallet.

Measure	Typical cost per Household	Time to recover costs through reduced fuel bills	Average annual saving in carbon (tC)
Fit low rolling resistance tyres	$16-24 / €15-23 (additional cost to set of ordinary tyres)	1 year	0.14
Lagging hot water tank	$16 / €15	1-2 years	0.05
Lagging hot water pipes	$16 / €15	1 year	0.03
Energy saving bulbs	$8-24 / €7.5-23	1-2 years	0.02
Loft insulation (15cm)	$176-256 / €167.5-244	2 years	0.20 - 0.24
Cavity wall insulation	$481-802 / €457-762	4 years	0.20 - 0.24
Installing energy efficient boiler	$401-642 / €381-609.5	2-3 years	0.34 - 0.46

Think before you drive...

Greener driving can save you money as well as helping to save the planet. Overall greener motoring can cut fuel consumption by 15%.

For urban driving the difference between hard acceleration, harsh braking, heavy gear changes and more relaxed, greener and cleaner driving style can mean fuel savings of as much as 40%.

Many motorists don't realise the savings that can be made from even the most modest changes to the way they drive. The AIT & FIA have identified six steps to help cut your car's impact on the environment and on your wallet.

Six steps to greener driving

IN TUNE
Regularly servicing your car can cut running costs and pollution. As much as 50% of exhaust emissions are caused by only 11%of vehicles - poorly maintained 'gross polluters'.

STAY SMOOTH
Smoother acceleration and driving style can achieve savings of as much as 10%.

TOP GEAR
Choosing the highest gear for the driving conditions is often more fuel efficient. Driving at 37mph in third gear uses 25% more fuel than in fifth.

FULLY LOADED
Loaded roof racks can increase fuel consumption by as much as a third on motorway journeys.

KEEP UP THE PRESSURE
Check tyre pressures. Driving with pressure below manufacturer's recommendations can increase fuel consumption by as much as 3%.

AIR CON
Air conditioning increases fuel consumption by as much as 11%. Why use it if you don't need to?

Policy Options: Carbon Sequestration

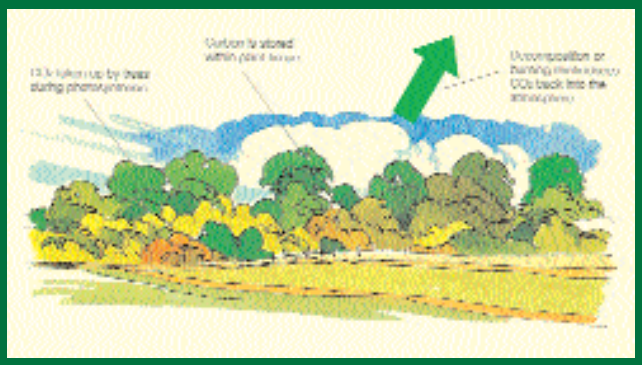
The Kyoto Conference recognised the importance for CO_2 reduction of 'sinks' - natural processes that absorb carbon dioxide from the atmosphere. Forests are the best example of sinks, and the UNFCCC negotiating teams are trying to develop an acceptable system for quantifying the potential of sinks and establishing how reforestation and afforestation will fit into the regime of flexible mechanisms that will be used to measure emissions reduction.

Meanwhile, a number of official pilot schemes are already in operation. The Federation Internationale de l'Automobile (FIA) accounts for all the CO_2 emissions caused by Formula One teams during a Grand Prix season by supporting carbon sequestration in Mexico, as part of an official project accredited by the United States Initiative on Joint Implementation (USIJI).

Twenty-five thousand trees are planted every year in the Chiapas project, in southern Mexico, to offset emissions from Formula One. By making an annual purchase of 5,500 tons of carbon credits from the International Carbon Sequestration Federation, the FIA helps to fund local farmers in their planting and conservation work. Studies in the project area indicate that the establishment of tree plantations on areas previously used as pasture may increase the carbon stored in vegetation by about 120tC/ha (tonnes of carbon per hectare) over a fifty year period.

The current annual rate of deforestation is around 17 million hectares worldwide. This leads to a carbon emission of almost 2 billion tonnes every year. These forests need to be protected through conservation programmes and better management, and industrial deforestation should be offset through re-planting.

Through schemes such as the Chiapas project, between 50-150 billion tonnes of carbon (equivalent to 10-15 years worth of fossil fuel emissions) could be sequestered globally over the next half century. French carmaker Peugeot, for example, is investing FF65 million in a carbon sink in Brazil. The sequestration project in Mato Grosso State will plant ten million trees over a deforested area of 12,000 hectares. Careful conservation and sensitive harvesting can minimise subsequent carbon releases from these forests.



Individual motorists can also offset the CO_2 emissions caused by their car by supporting a carbon sequestration scheme and purchasing carbon credits. Australian motorists for example can pay $25 to plant 7 trees. These will in their life cycle soak up the CO_2 emissions generated by an average vehicle in one year. This public initiative is supported by the Victoria motoring club, RACV.

If you want to know more about how you can support carbon sequestration, contact:

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Policy Options: Priorities for Action

The AIT & FIA are strongly committed to action to curb global warming.

Our priorities are:

- Motor industry agreements on fuel efficiency targets: voluntary where possible, compulsory where necessary;
- Tax incentives for the purchase and running of cleaner, fuel efficient cars;
- Revenue neutral reform of road user taxes to target environmental improvements more efficiently;
- Re-investment of road user taxes in road, public transport and ITS infrastructure to improve traffic flow efficiency and provide genuine modal alternatives;
- Integration of land-use planning and urban renewal policies into CO_2 transport strategies;
- Clear consumer information on new car fuel efficiency and toxic emission performance;
- Awareness campaigning on driver behaviour - think before you drive;
- Wider use of carbon sequestration projects to maintain natural defences against global warming.

Earth Summits: The International Response to Climate Change in the 1990's

THE EARTH SUMMIT, RIO, 1992

Concerned at scientific evidence of possible global warming, the United Nations convened the Earth Summit in Rio de Janeiro in 1992. More than 150 heads of government established the framework for the international response to global warming, by signing the Framework Convention on Climate Change (FCCC). Industrially developed nations also committed themselves in Rio to non-binding attempts to stabilise greenhouse emissions at 1990 levels by the end of the century.

Signatories to the FCCC met at Ministerial level at the first Conference of Parties (COP-1) in Berlin in 1995 to assess progress. COP-1 concluded that the agreement reached in Rio would not achieve its emissions reduction aims, and that binding legal instruments were needed. The 'Berlin Mandate' agreed at this conference called for "quantified [emission] limitation and reduction objectives within specified time-frames" for industrialised countries.

The objectives established in Berlin were negotiated between 1995-7 by an Ad-hoc Group. At the mid-point in this negotiation process, the second Conference of Parties was held in Geneva. At this meeting the principle of setting quantified, legally binding targets on greenhouse gases beyond 2000 was agreed. Significantly, the USA announced her support for binding targets for greenhouse gas emissions.

THE KYOTO SUMMIT, 1997

At the Kyoto Summit in 1997 binding emission reduction targets for industrialised countries were agreed. The principle of using 'flexible mechanisms' as a cost-effective way of meeting targets was also approved. The detail of the operating and policing regimes for both targets and flexible mechanisms will be crucial to the success and viability of the Protocol.

Buenos Aires was the location for the fourth Conference of Parties, which began to discuss unfinished business from Kyoto. The role of developing countries in combating climate change was a contentious issue at the conference, with some developed nations - especially the USA - demanding that developing countries should take some of the burden of reducing emissions. Flexible mechanisms were the main issue on the agenda, and a work programme was adopted for the negotiations on how these mechanisms will operate. Negotiations, including the COP-5 meeting in Bonn in November 1999, will continue up to the end of 2000. COP-6, in November 2000, will be the crucial point for agreement on emissions trading and flexible mechanisms, which would mark real progress on the Kyoto Protocol.

The details of the Kyoto Protocol are explained overleaf.

GREENHOUSE EMISSION TARGETS

At Kyoto, each of the industrialised countries were allocated assigned amounts of greenhouse gases that they will be permitted to produce over a five year period, 2008-12. These assigned amounts will, in practice, require reduction of the aggregate emissions of a basket of six greenhouse gases (expressed in CO_2 equivalents) by at least 5% below 1990 levels. Allowing the targets to be achieved by averaging over five years should avoid skewing of results by short-term fluctuations in economic performance or weather. The Protocol allows countries to achieve their reduction targets individually or jointly, (enabling the European Union, for example, to pursue a community-wide strategy).

THE MAJOR EMISSION ALLOWANCES ASSIGNED AT KYOTO:

European Union	**8% below 1990 levels**
United States	**7% below 1990 levels**
Japan & Canada	**6% below 1990 levels**
Russia, Ukraine & New Zealand	**0% (stabilisation at 1990 levels)**
Australia	**8% above 1990 levels**

The AIT & FIA attended the Rio Summit in 1992, the Kyoto conference in 1997 and have also participated as official observers in subsequent conferences and meetings of the climate change convention.

Emissions Trading and Flexible Mechanisms

As well as setting binding emissions targets, the Kyoto Protocol allows countries to achieve these targets by using 'flexible mechanisms' in CO_2 reduction alongside domestic reduction measures. There are three types of flexible mechanism under discussion.

(I) INTERNATIONAL EMISSIONS TRADING.

Emissions trading works by allowing a country to trade part of its assigned emissions with another country. In this way emissions credits can be re-distributed from a Party that has no need for them (because its emissions are lower than the assigned amount) to a Party that has difficulties attaining its emissions target.

At the end of trading the global level of emissions should be the same as the original global target, but beneath that strict global ceiling the ability of one country to reduce its emissions will have allowed another country to exceed its assigned amount by buying unneeded credits. The same principle could work for domestic reduction strategies, as industrial sectors or individual businesses develop an internal market in emissions credits. This has been the experience in the USA, where trading permits for sulphur emissions and ozone depleting substances have proved very successful.

(II) JOINT IMPLEMENTATION (JI)

Some industrialised countries argue that the cost of introducing emission reduction and energy saving measures becomes, after a certain point, very expensive. A more cost effective way to meet emission reduction commitments is to help less advanced industrialised countries introduce more basic energy saving measures that will have the same global effect of reducing CO_2 but at a lower cost.

Under Joint Implementation an industrialised country ('donor' country) can work with another industrialised country ('host' country) and assist with additional energy saving and emissions reduction measures. These measures can include investment in 'sinks', essentially afforestation and reforestation. The emissions reduction units (ERU's) arising from this additional work (over and above what the host country would anyway be doing) are then credited to the donor country and are counted towards the donors' assigned reduction. However, JI work by the donor must be supplemental to a domestic emission reduction strategy.

(III) CLEAN DEVELOPMENT MECHANISM (CDM)

This would work in a similar way to Joint Implementation, except that the donor country can only conduct a CDM operation in a developing country (which has no emissions reduction commitments). The certified emissions reductions (CER's) arising from clean development will be credited to a donor country as part of its assigned target. As with Joint Implementation the CDM would allow an industrialised country to reduce emissions more cheaply than at home, while providing developing countries with state-of-the-art technology.

For more information about the Climate Change Convention and negotiations on the Kyoto Protocol, please contact:

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The Alliance Internationale de Tourisme & the Fédération Internationale de l'Automobile

The AIT & FIA are the worldwide federations for motorists and touring, representing more than 100 million motorists across the globe. The FIA is also the world governing body for motor sport.

The AIT & FIA bring together some 150 national motoring organisations on five continents. On issues such as safety, mobility, the environment and consumer law the AIT & FIA actively promote the interests of motorists at the United Nations, within the European Union and other international bodies. The AIT & FIA Foundation for Mobility & Society works to enhance safe and environmentally responsible use of the motor car through education and awareness raising.

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