

2.11

TRANSPORT



The development of increasingly comprehensive transport systems is an essential requirement for economic growth and an improved standard of living. However, this does have an increasingly clear impact on the environment and quality of life: pollution, air quality, waste generation, noise, accidents, traffic congestion in towns and cities, loss of natural habitats and biodiversity, etc.

Many measures are taken in an attempt to minimise such effects and ensure that the service provided by transport has a progressively less damaging effect on the environment and individuals. Some such measures are based on orientating modal distribution towards more environmentally-friendly forms and applying technological improvements to vehicles and fuels.

In this last area, one of the EU's commitments is set out in Directive 2003/30/EC, of 8 May 2003, on promotion of the use of biofuels and other renewable fuels, which sets the target of achieving a 5.75% share of the transport market for these fuels by 2010. This commitment has been transposed into Spanish law in the form of Royal Decree 61/2006, of 31 January, and included in the Renewable Energy Plan 2005-2010 (*Plan de Energías Renovables 2005-2010*), although with the slightly more ambitious target of 5.83%.

Consumption of biofuels in 2005 stood at 265.1 Ktoe (0.44% of the energy content of all petrol and diesel sold

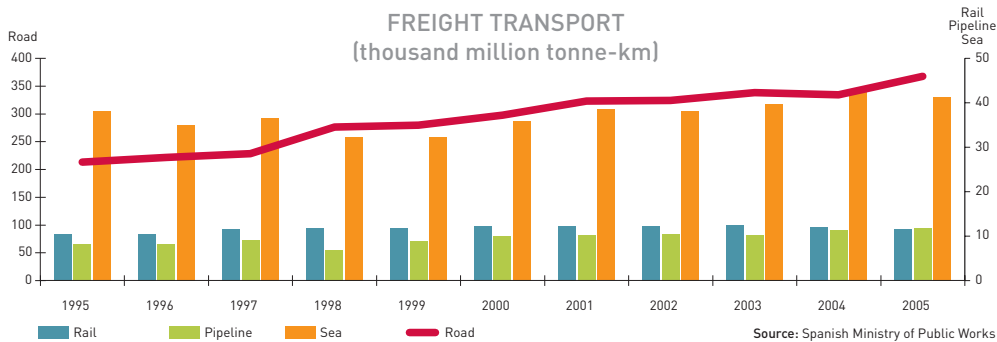
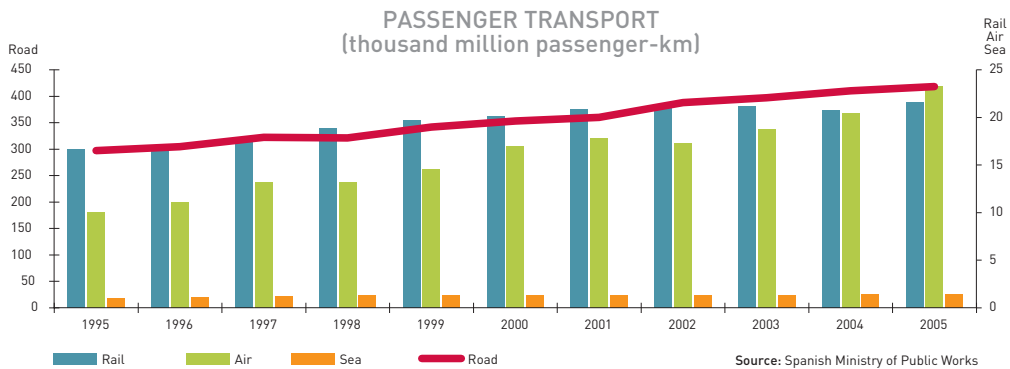


for transport use), a figure which, while it falls short of the Directive's target for the year of 2%, is significant in terms of future prospects, since in 2000 there were no biofuel production plants in existence at all. The Renewable Energy Plan 2005-2010 (*Plan de Energías Renovables 2005-2010*) anticipates consumption of such fuels to stand at 2,200 Ktoe by 2010. It should be remembered that biofuels have lower emissions of carbon monoxide, aromatic hydrocarbons and particles than fossil fuels, and are practically free of sulphur emissions.

INDICATOR	GOAL	TREND
Total transport volume: modal distribution	Achieve a balance between transport modes, promoting the more environmentally-friendly options	In 2005, 90% of passenger transport and 85% of freight transport was by road
Atmospheric emissions of pollutants by transport	Reduce atmospheric emissions of pollutants and work towards achieving environmental targets	The rise in emissions of CO ₂ is in contrast to the stabilisation seen in acidifying pollutants and the reduction in ozone precursors
Energy consumption by transport	Reduce energy consumption by the transport sector	Increase in volume of waste produced: increase in energy recycling and recovery, decrease in landfill
Waste generated by transport: End-of-Life Tyres (ELTs)	In this order: reduce, reuse, recycle and recover end-of-life tyres (ELTs)	Transport, particularly by road, has the highest energy consumption of any sector
Motorisation and accident rate	By 2010 the number of fatalities should be half the 2001 figure	Very high number of fatalities, although a downward trend is evident
Eco-efficiency in transport	Decouple economic growth from environmental pressures applied by the sector	No clear decoupling is apparent between growth in the sector and the pressures it exerts on the environment

Total transport volume: modal distribution

Road transport continues to be the most widely used mode, although air transport has seen greatest growth since 1990

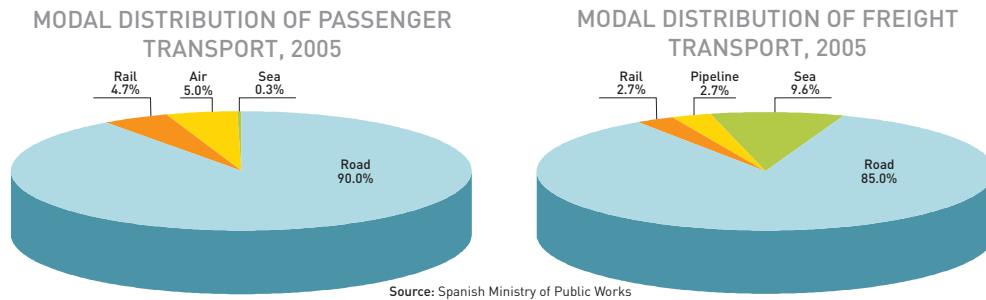


Over the last decade (1995-2005), passenger transport by road rose by 40.7%, by rail by slightly over 30% (30.3%) and by sea by 43.4%, although the most striking increase was in passenger transport by air: 131.7%.

In terms of distribution, road transport was the most heavily used in 2005, accounting for 90.0% of all passenger-km. For the same year, the remaining transport modes were distributed as follows: rail 4.7%, air 5.0%, and sea just 0.3%.

During the same period, freight transport also saw different rates of increase across the different modes: sea increased by 8.7%, rail by 11.7%, while the biggest increases were in transport by pipeline (42.2%) and road (72.5%).

The modal distribution of freight transport in 2005 shows the clear predominance of road transport, making up 85% of all freight traffic. It is followed by sea transport, although this accounts for only 9.6% of the total, while rail and pipeline each have a 2.7% share.



Analysis of the changes between 1990 and 2005 reveals:

- Passenger transport: particularly large increases in air and road transport, rising by 229.7% and 101.1% respectively.
- Freight transport: road transport rose by 143.4%, whilst pipelines experienced the second-greatest growth (83.3%) as a result of increased fuel transport.

NOTES

- Passenger transport by road refers solely to intercity transport.
- Freight transport by pipeline only includes oil pipelines.
- From 1995 onwards, the information for roads refers to the 163,799 km managed by the State, Autonomous Regional Governments and Councils (as of 31/12/2001). The previous series of data corresponds to the 85,000 km of the former National Road Network (*Red de Carreteras del Estado*).
- Transport by rail includes the RENFE (Spanish National Rail Network – *Red Nacional de los Ferrocarriles Españoles*) and FEVE (Narrow Gauge Railway – *Ferrocarriles de Vía Estrecha*) networks.
- Transport by air includes scheduled and non-scheduled services by the IBERIA group, AIR EUROPA and SPANAIR. From 2000 onwards it also includes Air Nostrum.
- The unit of measurement for passenger transport is the passenger-kilometre (p-km), which is calculated by multiplying the number of passengers making journeys each year by each transport mode by the number of kilometres covered by each of them.
- The unit of measurement for freight transport is the tonne-kilometre (tn-km), calculated by multiplying the total number of tonnes transported by each transport mode by the number of kilometres covered.

SOURCES

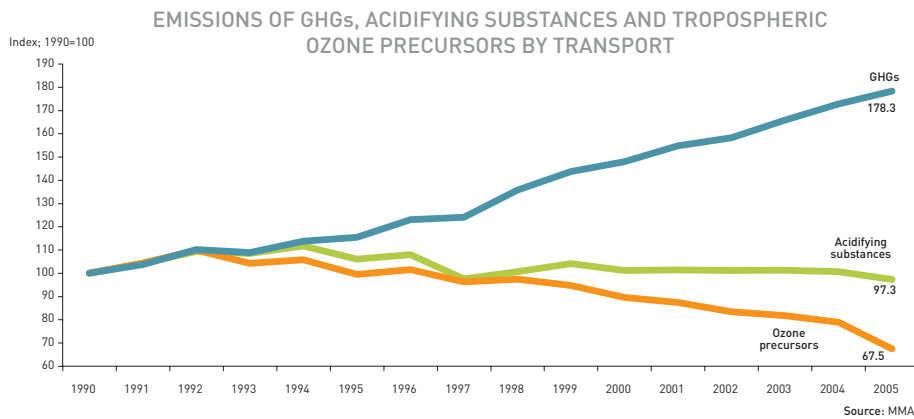
- Passenger transport: Spanish Ministry of Public Works (*Ministerio de Fomento*). "Transport and mail services 2004 and 2005" (*Los transportes y los servicios postales 2004 y 2005*).
- Freight transport: Spanish Ministry of Public Works. "Transport and Communications 1997" (*Los transportes y las Comunicaciones 1997*), (for 1995) and "Transport and mail services 2004 and 2005" (for the other years).

FURTHER INFORMATION

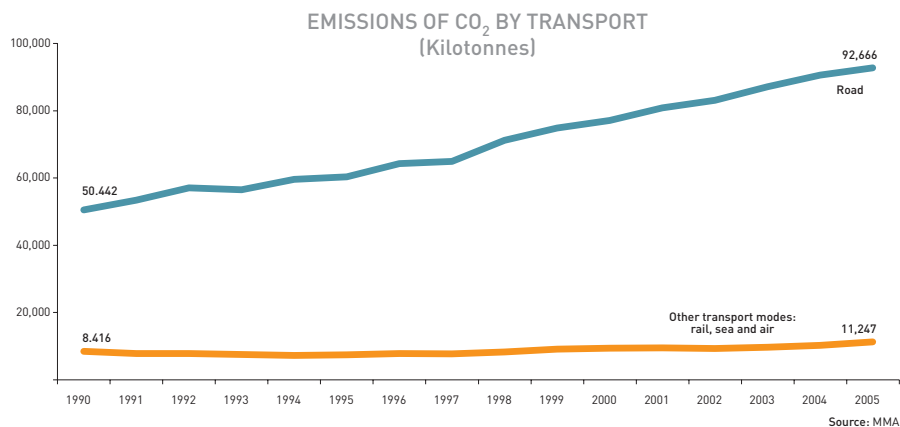
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Atmospheric emissions of pollutants by transport

GHG emissions by transport have been rising continually, while there has been a reduction in emissions of ozone precursors and acidifying substances



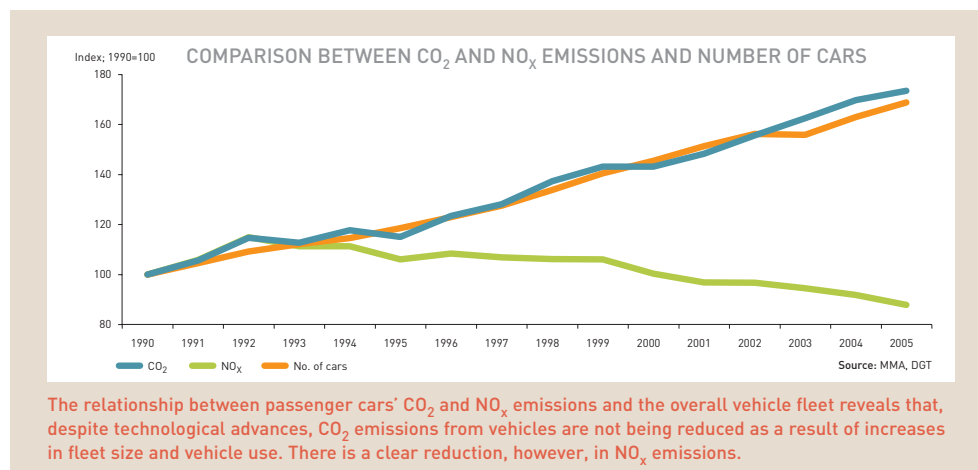
Over the period 1990-2005, greenhouse gas (GHG) emissions by transport rose by 78.3%, while those of acidifying substances fell by 2.7%. There was a particularly notable fall in emissions of tropospheric ozone precursor gases (32.5%).



CO₂ emissions by transport rose by 76.6% over the period. By sector, those from road transport rose by almost 84% (83.7%), while emissions from rail, air and sea transport (included under other transport modes and mobile machinery) climbed by 33.6%.

In 2005, CO₂ emissions from road transport made up 25.2% of overall CO₂ emissions (368,282 Kt), while emissions from other transport modes (air, rail and sea) rose by only 3.1%. Therefore, in 2005 emissions by transport as a whole made up 28.3% of all CO₂ emissions.

By vehicle type, passenger cars accounted for 13.1% of emissions in 2005, heavy vehicles (>3.5 tn) and buses for 8.6%, and air transport for only 1.9% of all CO₂ emissions.



NOTES

- The information provided corresponds exclusively to emissions covered by group 7 of the SNAP classification (Road Transport) and part of group 8 (Other Transport Modes: rail, air and sea).
- The GHG emissions estimate takes into consideration CH₄, N₂O and CO₂ emissions, while excluding fluorinated gases. Total emissions (index 1990=100) are obtained from annual emissions of each of the three pollutants, converted into tonnes of CO₂ equivalent in accordance with their global warming potential: 1 for CO₂, 21 for CH₄ and 310 for N₂O.
- In estimating the total acidifying effect, expressed as acid equivalent, consideration is given to annual emissions of SO₂, NO_x and NH₃, with the following weighting factors:
 - SO₂: 2/64 acid equivalent/g = 31.25 acid equivalent/kg
 - NO_x (expressed as NO₂): 1/46 acid equivalent/g = 21.74 acid equivalent/kg
 - NH₃: 1/17 acid equivalent/g = 58.82 acid equivalent/kg
- Emissions of tropospheric ozone precursors were estimated using the tropospheric ozone depleting potential (expressed as NMVOC equivalent) of the four following precursors: nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOCs), carbon monoxide (CO) and methane (CH₄). The following weighting factors were employed: 1.22 for NO_x, 1.00 for NMVOCs, 0.11 for CO and 0.014 for CH₄. Total emissions are presented in index form (1990=100).
- In comparing CO₂ and NO_x emissions with the number of cars, the information on CO₂ emissions refers exclusively to CO₂. Only passenger cars' emissions (SNAP group 0701) and the passenger car fleet in existence at the end of each year are included.

SOURCES

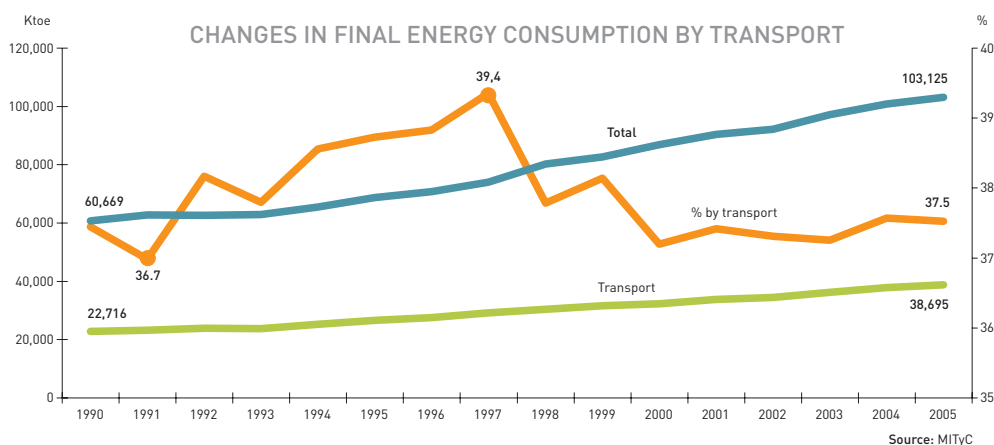
- Emissions figures: Spanish Ministry of the Environment (*Ministerio de Medio Ambiente*). Sub-Directorate General for Air Quality and Risk Prevention (*Subdirección General de Calidad del Aire y Prevención de Riesgos*). Spanish National Atmospheric Emissions Inventory (*Inventario Nacional de Emisiones a la Atmósfera*).
- Vehicle fleet figures: Spanish Ministry of Public Works. "General Statistics Yearbook, 2004" (*Anuario Estadístico General, 2004*) and Directorate General for Traffic (*Dirección General de Tráfico*). "General Statistics Yearbook, 2005" (*Anuario Estadístico General, 2005*).

FURTHER INFORMATION

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- www.mfom.es
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- www.dgt.es

Energy consumption by transport

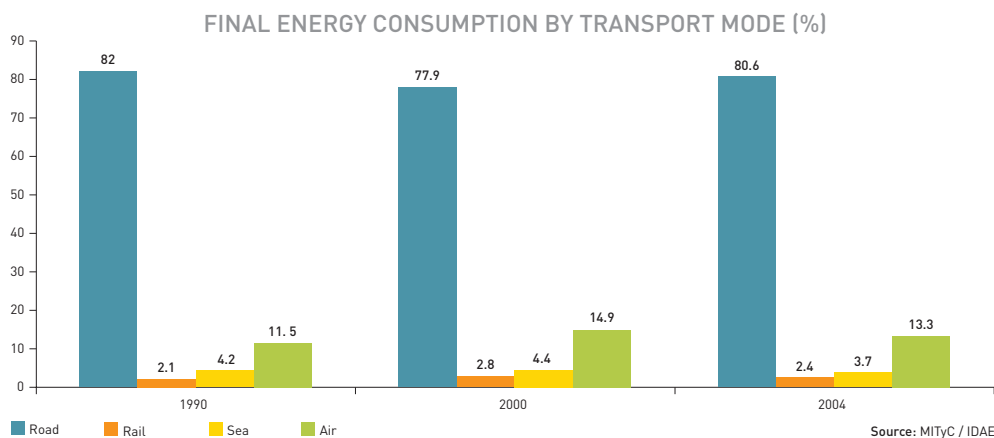
The transport sector is the biggest final energy consumer



Total final energy consumption in Spain for 2005 stood at 103,125 kilotonnes of oil equivalent (Ktoe), 2.4% higher than the previous year, the figure rising to 106,940 Ktoe if we include final consumption of renewable energy.

Since 2000, transport has consumed slightly more than 37% of final energy (37.5% in 2005). This percentage has remained fairly stable after, recovering from the high levels seen in 1997.

Growth in energy consumption by transport has been very similar to that of total energy consumption, although the trend since 1994 has been for slightly lower growth (compared with final energy consumption).



SOURCES

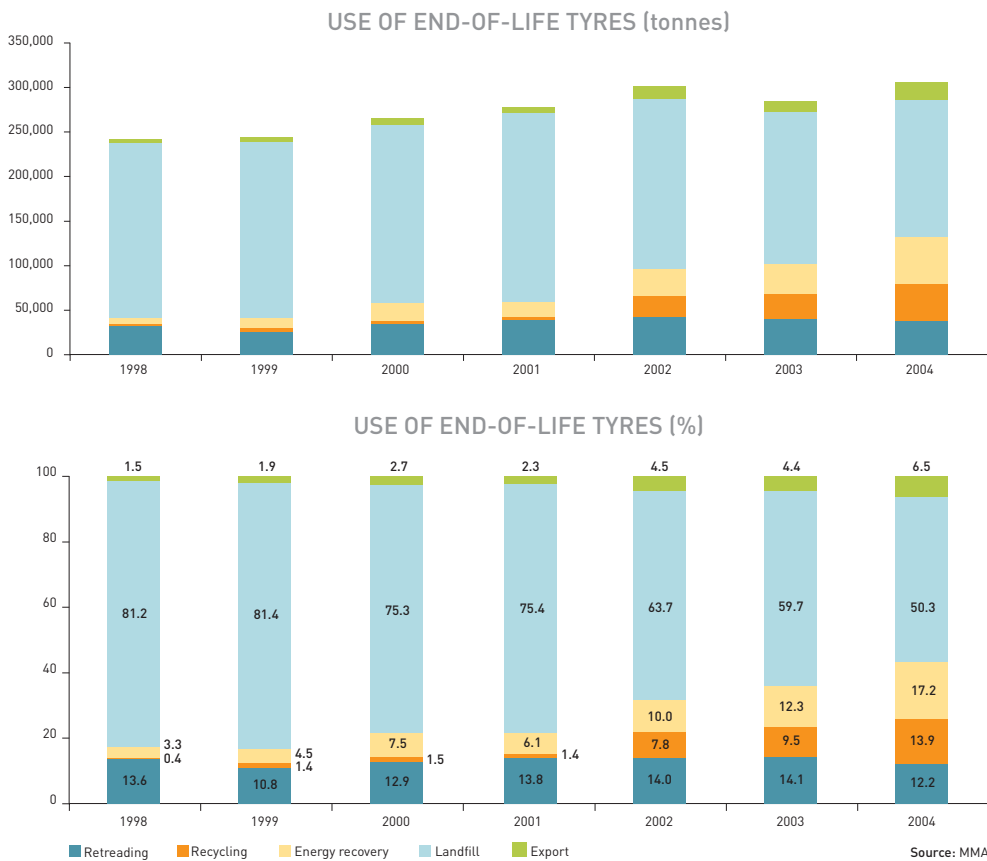
- Spanish Ministry of Trade, Industry and Tourism (*Ministerio de Industria, Turismo y Comercio*). "Energy in Spain, 2005" ("*La Energía en España, 2005*").

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Waste generated by transport: End-of-Life Tyres (ELTs)

Energy recycling and recovery for energy are on the increase, while landfill is declining



Road transport exerts serious pressures on the environment. One such pressure is waste generation, much of which is hazardous (lubricating oils and batteries). Moreover, other less hazardous forms, such as end-of-life vehicles and used tyres, require special processing.

Royal Decree 1619/2005, of 30 December, on management of end-of-life tyres (*Real Decreto 1619/2005, de 30 de diciembre, sobre la gestión de neumáticos fuera de uso*), published in Official State Bulletin (*BOE*) n°. 2, of 3 January 2006, covers, among other aspects, specified storage conditions and a number of obligations for tyre manufacturers, including in particular:

- Manufacturers must produce a prevention plan to minimise ELTs' environmental impact within a period of 18 months from the entry into force of the Royal Decree, with the option of doing so using the integrated management systems established.
- Manufacturers must undertake to achieve at least the environmental targets established in the National End-of-Life Tyre Plan 2001-2006 (*Plan Nacional de Neumáticos Fuera de Uso 2001-2006*) and its subsequent reviews.

The trend over recent years reveals a situation in which landfill dumping of end-of-life tyres has gradually fallen, while energy recovery and, above all, recycling have made strong progress. This situation means that, although the Plan targets may not be fully achieved, we are drawing closer to the goal defined. We will have to wait for review of the Plan to take stock of the actual situation within the sector based on the experience acquired.

NOTES

- The Spanish Tyre Recycling Association (AER - *Asociación Española de Reciclado de Neumáticos*) is a non-profit organisation founded in 1996 that groups together some 40 tyre retreading companies nationwide.
- According to the definition on its website, Signus Ecovalor is a non-profit organisation whose main aim is to guarantee the proper processing of end-of-life tyres and to optimise the costs of this process for the direct benefit of consumers. Prevention is another of the organisation's key commitments. This Integrated Management System for End-of-Life tyres began operation in October 2006.
- Tratamiento de Neumáticos Usados, S.L. is a non-profit organisation established as an integrated management system for end-of-life tyres. It covers all tyre producers (manufacturers and importers) wishing to subscribe to an integrated environmentally-friendly solution based on retreading, recycling and reusing used tyres.
- The legislative framework covering end-of-life tyres includes the Waste Act 10/1998, of 21 April (*Ley 10/1998 de Residuos*); the National End-of-Life Tyre Plan 2001-2006, approved in the Ruling of 8 October 2001 (*Resolución de 8 de octubre de 2001*) of the Secretariat General for the Environment (*Secretaría General de Medio Ambiente*) (Official State Bulletin (*BOE*) no. 260 of 20 October 2001); and Royal Decree 1619/2005, of 30 December, on the management of end-of-life tyres (*Real Decreto 1619/2005, de 30 de diciembre, sobre la gestión de neumáticos fuera de uso*).

SOURCES

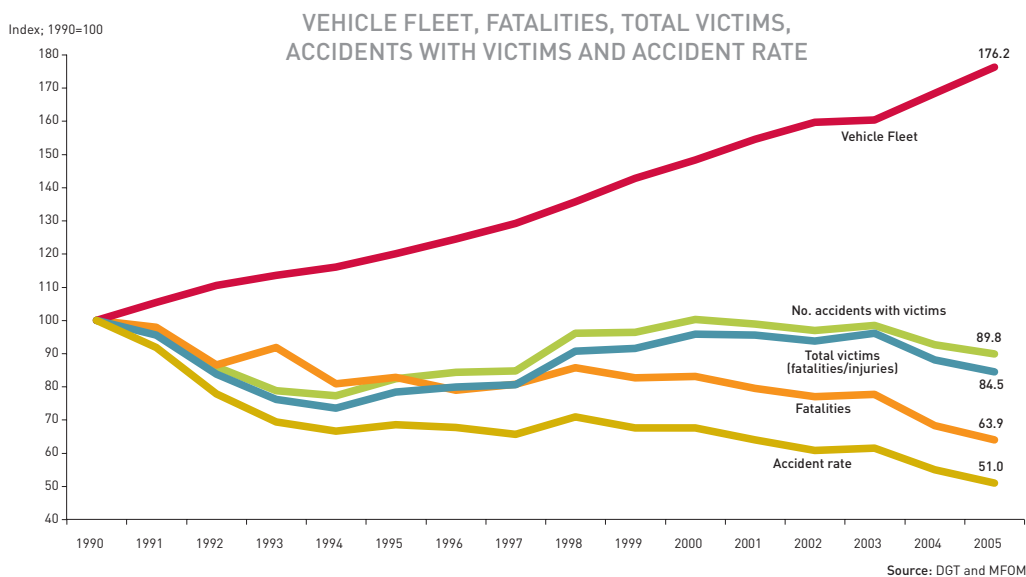
- Figures provided by the Sub-Directorate General for Waste Prevention (*Subdirección General de Prevención de Residuos*). Spanish Ministry of the Environment, produced from information provided by various business associations.

FURTHER INFORMATION

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- www.fairguide.com/A-E-R
- www.eea.europa.eu/
- www.tnu.es
- www.signus.es

Motorisation and accident rate

In 2005 there were 91,187 traffic accidents involving victims, with 4,442 fatalities and more than 132,800 injuries



Accidents represent one of the most worrying social problems connected with transport and vehicle traffic, with an average of 5,583 individuals being killed per year over the period 1980-2005. Since 1989, when there were 7,188 fatalities, there has been a downward trend in this figure, which fell to 4,442 in 2005. This decrease cannot however in any way mask the scale of the number of victims, which still amounted to an average of more than 12 fatalities per day in 2005.

During 2005, accidents involving victims and fatalities fell by 3% and 6% respectively compared with 2004, while serious injuries rose by 0.3% and minor injuries fell by 5%. It should be underlined that traffic accidents continue to be the leading cause of death among 15- to 24-year-olds, with 170 deaths per million inhabitants, accounting for 38% of all deaths within this age bracket in 2004.

Over the period 1990-2005, the number of fatalities fell by 36.1%, while the vehicle fleet increased by 76%. The relationship between the number of accidents with victims (fatalities and injuries) and the vehicle fleet gives us the “*accident rate*”, which shows a sharp downward trend: in 2005 it was almost half the figure for 1990 (falling by 49%).

Within this context, it is of note that although the number of accidents with victims has also fallen slightly, this is a less consistent trend, with an upturn from 1994 onwards in contrast to the initial decrease. The same situation also applies to overall victims when both fatalities and injuries are taken into account.

The fact that the number of fatalities has fallen by more than the number of accidents is in part explained by the safety systems fitted to vehicles (seat belts, air bags, child restraint systems, etc.). However, certain circumstances and driving habits remain responsible for the continuing high level of accidents (excessive speeds, carelessness, distractions from mobile phones, driving under the effect of alcohol, etc.).

This led, in addition to the regular information campaigns aimed at preventing accidents and other traffic offence control and monitoring measures implemented by the Directorate General for Traffic, to the introduction in July 2006 of the points-based driving licence, with points being docked for each offence committed.

The situation across Europe is equally concerning. According to the EU Commission's European Road Safety Charter, in 2005 41,600 people died on the EU's roads, while approximately 1.9 million were injured. Traffic accidents' economic impact is estimated at 200 billion euros, approximately 2% of Europe's gross domestic product. The intermediate assessment carried out by the Commission in 2006 in monitoring the European Road Safety Action Programme adopted in 2003 reached the conclusion that, over the four years from 2001 to 2005, the reduction of 17.5% was inadequate. At this rate, the EU would suffer 32,500 road fatalities in 2010, rather than the target figure of 25,000.

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NOTES

- The vehicle fleet includes: trucks, vans, buses, cars, motorcycles, industrial tractors and other vehicles (trailers, semi-trailers and special vehicles, excluding self-propelled agricultural machinery and towed agricultural machinery). It does not include mopeds.
- The accident rate is calculated by dividing the total annual number of accidents with victims (on both highways and in urban areas) by the vehicle fleet recorded at the end of each year (multiplied by one thousand). This indicator is represented by means of a reference index (1990), with percentage figures for subsequent years being given in terms of this index.
- The Transport White Paper established the target of halving the number of fatalities in traffic accidents by 2010 from 50,000, the figure for 2001, to 25,000. The European Road Safety Action Programme adopted in 2003 established a series of as many as 60 specific road safety measures. The aim of cutting accidental deaths by half will only be achieved if the European Union, the Member States, social groups and citizens apply themselves fully within their respective spheres of action.

SOURCES

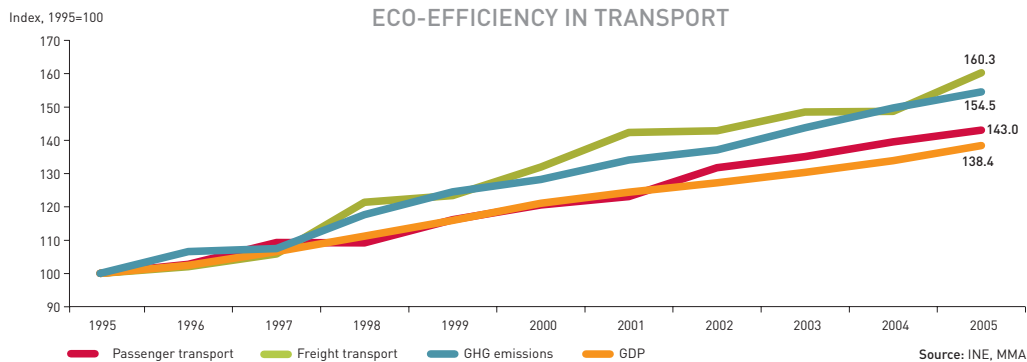
- Directorate General for Traffic. Spanish Ministry of the Interior (*Ministerio del Interior*).
 - Statistical series for accidents and victims. On the website:
http://www.dgt.es/dgt_informa/observatorio_seguridad_vial/pdf/anoarioaccidente2005.pdf
 - General Statistics Yearbook (*Anuario estadístico general*). Various years.
 - Spanish National Road Safety Monitoring Centre (*Observatorio Nacional de Seguridad Vial*). "Key Road Accident Figures. Spain 2005" ("*Las principales cifras de la Siniestralidad Vial. España 2005*")
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- Commission of the European Communities. "European Road Safety Action Programme - Halving the number of road accident victims in the European Union by 2010: a shared responsibility". (COM[2003]311 final, 2 June 2003).
- Commission of the European Communities "European Road Safety Action Programme. Mid-Term Review" (SEC(2006) 221). Brussels, 10 February 2006.

Eco-efficiency in transport

There is a clear connection between growing demand for transport, GHG emissions and the country's economic growth



The connection in Spain between economic growth, demand for transport (of both people and goods) and GHG emissions casts the sector in an unfavourable light when viewed from an environmental perspective.

Over the period 1995-2005, demand for passenger transport grew by 43.0%, and for freight transport by 60.3%, while GHG emissions by transport rose by 54.5%. Over the same period, Spain's GDP increased by only 38.4%, revealing clear environmental inefficiency, since the country's economic growth has been accompanied by an increase in environmental pressures.

NOTES

- Greenhouse Gas (GHG) emissions by transport refer to those produced by group 7 of the SNAP classification (Road Transport) and part of group 8 (Other Transport Modes: rail, air and sea). The estimates include emissions of CH₄, N₂O and CO₂, but omit fluorinated gases. These estimates are obtained from annual emissions of each of the three pollutants, converted into tonnes of CO₂ equivalent in accordance with their global warming potential: 1 for CO₂, 21 for CH₄ and 310 for N₂O.
- This indicator has not been calculated using the GVA for the sector because of a lack of updated figures, and so national GDP at constant prices has been used.

SOURCES

- Spanish National Atmospheric Emissions Inventory. Sub-Directorate General for Air Quality and Risk Prevention. Spanish Ministry of the Environment.
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- Spanish Ministry of Public Works. "Transport and mail services", various years.

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