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TRANSPORT



Transport is one of the key sectors in terms of resolving the conflict between energy use and climate change. In 2009, transport accounted for approximately 13% of greenhouse gas (GHG) emissions worldwide, and for 26% of total emissions in Spain. It is a sector in which significant reductions can be made in pollutant emissions without restricting the mobility of citizens or goods, thereby contributing to the much-needed improvement in air quality in cities. To achieve this, government must reinforce and/or refocus part of current policy; mainstream sustainable mobility principles into spatial planning (e.g., by promoting public transport and localised urban development and by considering non-motorised modes of transport in urban planning); and increase investment in technological innovation. These and other policies should not only further raise citizens' awareness about environmental quality in cities, but should also encourage them to get involved in resolving the problem by changing aspects of their lifestyle and conduct.

One way of achieving this is to produce and improve hybrid/electric vehicles. Spain's Automotive Industry Plan, Sustainable Mobility Strategy, Sustainable Economy Law and the future Sustainable and Safe Mobility Law all promote the use of cleaner and more efficient vehicles as a means of reducing emissions. Naturally, progressive integration of externalities must



continue to ensure that in the medium and long term prices reflect all of the costs involved whilst maintaining social equity. If by 2014 Spain's automobile fleet were to include a million hybrid/electric cars, it would be a huge step forward and would have a significant impact on the economy, energy use and the environment.

INDICATOR	GOAL	TREND
Total inter-city transport volume: modal split	Achieve a balance between transport modes, promoting more environmentally friendly options	Road transport is still predominant. Meanwhile, rail passenger transport exceeded air passenger transport for the second year running
Emissions of air pollutants by transport	Reduce emissions of air pollutants and contribute to meeting environmental targets	Decrease in emissions of ozone precursors and acidifying gases by transport. GHG emissions have also been falling since 2008
Air transport	Achieve a balance between transport modes, promoting more environmentally friendly options	In 2010, air passenger traffic increased, reversing the downturn in 2008 and 2009
Waste generated by transport: end-of-life tyres	In this order: reduce, reuse, recycle and recover ELTs	Integrated management of ELTs is increasing as more producers sign up to the IMS
Eco-efficiency in transport	Decouple economic growth from the environmental pressure exerted by the sector	Between 1995 and 2009, economic growth was similar to that of energy consumption and greater than GHG emissions and transport demand

It is important to note that in July 2010, Law 13/2010 was passed, which amends the regulation governing the greenhouse gas emissions trading scheme. The new law improves and extends the regulation and now includes aviation. It also transposes the amendments to Directives 2003/87/EC, 2008/101/EC and 2009/29/EC into Spanish law.

Meanwhile, the European Commission has recently adopted the recommendations of a new White Paper on Transport for 2050 entitled *Roadmap to a Single European Transport Area — Towards a competitive and resource-efficient transport system*. This highlights the fundamental role that transport and mobility play in the economy and citizens' quality of life, while also recognising that Europe's transport system will not be sustainable if, over the next few decades, it continues to develop as it is currently doing. Based on acquired experience, the new White Paper on Transport reviews the transport sector's development, the future challenges it faces and the policy initiatives that, according to the European Commission, need to be considered.

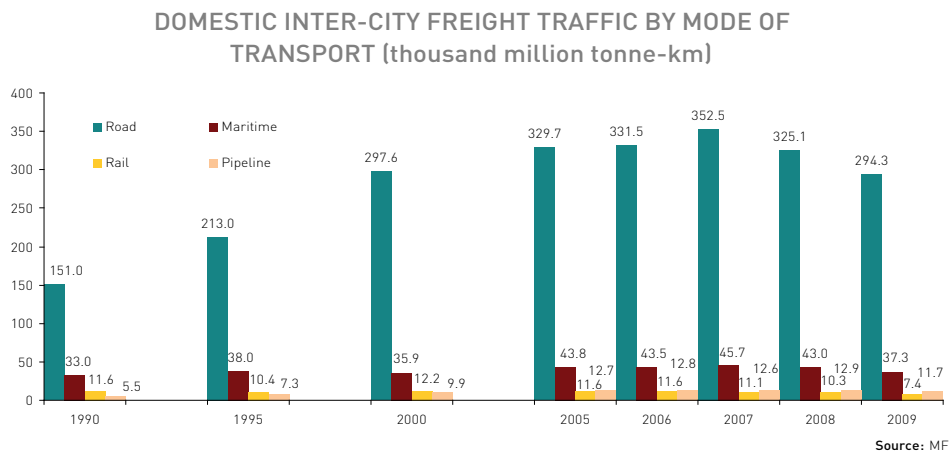
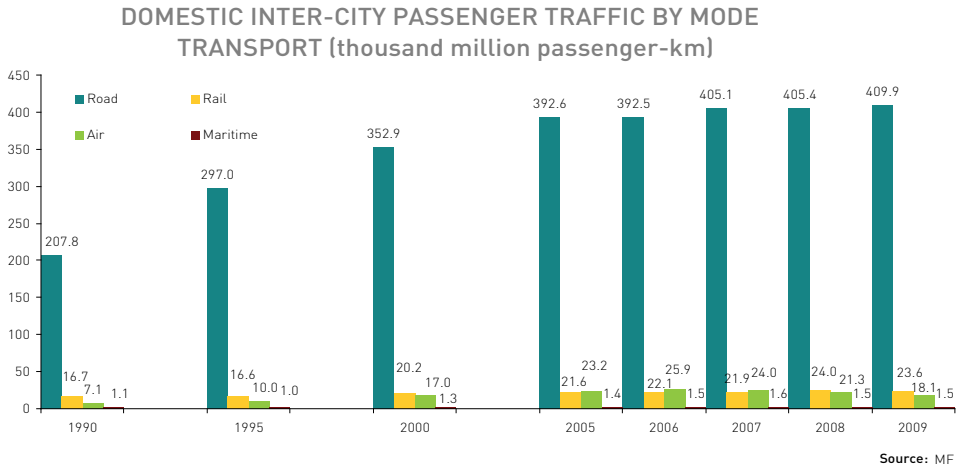
As regards transport safety, in 2009 the trend of previous years was maintained, with the number of fatalities falling by 12% and the number of injured dropping by 16% in comparison with 2008. In 2009, there were 2,714 fatalities, which despite being 50% less than in 2003 is still a concerning number. The accident rate stood at three accidents with victims per thousand vehicles in the Spanish vehicle fleet.

In the same year, the vehicle fleet shrank by 0.37% on 2008, while that of passenger cars contracted by 0.73% and that of motorcycles increased by 4.23%. Diesel vehicles continued to account for an ever-growing proportion of the national fleet and represented 52.4% of the total number of vehicles and 50.4% of the total number of passenger cars.

In December 2010, Royal Decree 1738/2010 established mandatory targets for biofuels, setting these at 5.9% for 2011, 6.0% for 2012 and 6.1% for 2013. These targets were subsequently modified in early 2011 and a new biofuel target (set at 7% in energy terms of all automotive petrols and diesels) was established for 2011.

Total inter-city transport volume: modal split

2009 saw a 10.4% decrease in freight traffic, while passenger traffic remained similar to the 2008 figure



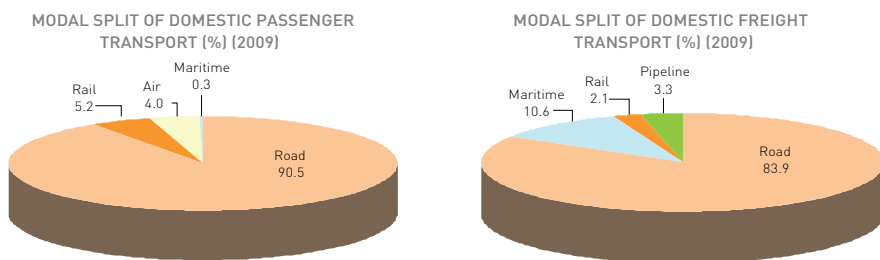
Over the period 1990–2009, inland passenger traffic in Spain grew by 94.8%, though in 2008–2009 there was barely any increase in volume. In fact, only road transport increased (by 1.1%), while the rest of the modes of transport recorded decreases (14.8% for air transport, 1.6% for rail and 1.9% for maritime).

Over the same period, inter-city freight traffic shot up by 74.4%, though this was tempered by a 10.4% decrease between 2008 and 2009. All modes of freight

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transport contributed to this reduction, though the 28.1% drop in rail freight was particularly significant. Freight transport by road fell the least of all the modes.

As in previous years, the modal split for inland transport in 2009 shows that the most popular mode for both passengers and freight was road transport, which accounted for slightly higher percentages than in 2008. Due to further development of existing high-speed routes and the start-up of new services, rail travel is gaining ground as a form of passenger transport and, for the second consecutive year, it was more popular than air transport. However, for freight, rail lost market share to road transport.



Source: MF

Road transport is dominated by passenger vehicles, which accounted for 85.5% of p-km in 2009, with buses accounting for 14% and motorcycles for just 0.5%.

NOTES

- The unit of measurement used for passenger transport is passenger-kilometre (p-km), which is calculated by multiplying the annual number of passengers by the number of kilometres travelled.
- The unit of measurement used for freight transport is tonne-kilometre (t-km), calculated by multiplying the number of tonnes transported by the number of kilometres travelled.
- Air freight transport is not relevant as it only represents 0.02% of the total t-km transported in 2009.

SOURCES

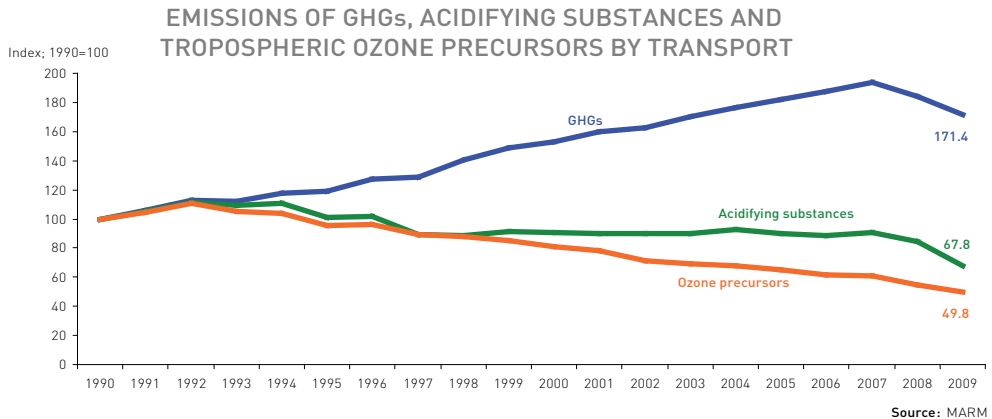
- MF, 2010. *Los transportes, las infraestructuras y los servicios postales 2009* (and previous editions).
- MF, 2010. *Anuario Estadístico 2009* (and previous editions).

FURTHER INFORMATION

- <http://www.marm.es>
- <http://www.fomento.es>
- <http://www.eea.europa.eu/>

Emissions of air pollutants by transport

In 2009, emissions of greenhouse gases, acidifying gases and ozone precursors by transport decreased again



In 2009, the transport sector was responsible for 25.7% of all greenhouse gas emissions, making it the most pollutant sector in Spain. Since 1990, emissions by transport have increased by 71.4% (a percentage much higher than that of total emissions) and have risen practically every year. Nevertheless, and largely due to the economic situation, which reduced production of goods and services, 2009 was the second consecutive year in which this trend was reversed, recording a significant 6.8% decrease following a 5.2% drop in 2008.

Acidifying substances emitted by transport present a very different pattern, showing a general decrease largely due to the reduction in sulphur and nitrogen oxide emissions. Emissions of these substances fell by 32.2% over 1990–2009 and have been dropping particularly sharply since 2007. In fact, last year alone, they decreased by 19.7%.

Emissions of ozone precursors are following the same downward trend and fell even more markedly, diminishing by 50.2% over 1990–2009. Emissions in 2009 were 9.4% below the 2008 level. In both cases, the determining factors were improvements in fuel quality and new technological developments in vehicles to comply with Euro standards.

Over the period 1990–2009, the increase in energy consumption by transport was estimated to be 71.2%. Energy consumption by all modes of transport increased, although at different rates: domestic maritime transport's consumption increased by 121% (a figure that rises to 136% if international maritime transport is taken into account); domestic air transport's consumption rose by 91% (114% when international

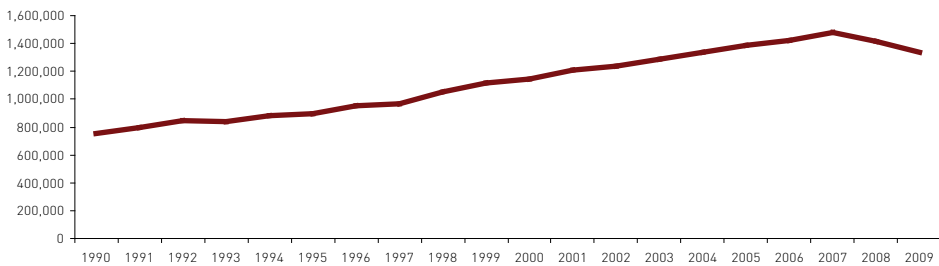
transport's consumption is counted); road transport's consumption went up by 70%; and rail transport's consumption, including suburban services, climbed by 13%.

In this context of growing energy consumption, the descents seen in 2008 and 2009, of 4.5% and 5.2% respectively (excluding both international air and maritime consumption and rail transport's electricity consumption) stand out particularly. These decreases are attributable to technological improvements, structural measures and the economic climate.

By mode, and referring solely to fuels derived from oil, in 2009 road transport continued to be in high demand and have the largest energy consumption (91.6%), while air (3.8%) and maritime (3.4%) transport showed similar, but much lower, levels of consumption. Rail transport consumes the least energy, barely 1.2%.

FINAL ENERGY CONSUMPTION BY TRANSPORT (Total Tj equivalent)

International air and maritime transports' consumption are excluded from the calculation, as is rail transport's electricity consumption



Source: MARM

NOTES

- The graph for the indicator shows the changes in aggregate total annual emissions of acidifying and eutrophying substances (SO₂, NO_x and NH₃) and tropospheric ozone precursors (NO_x, NMVOCs, CO and CH₄) in relation to the base year 1990 (1990=100).
- Emissions of acidifying and eutrophying gases are presented as acid equivalent (hydrogen ion-generating potential) and are aggregated using the following weighting factors: 31.25 acid equivalent/kg for SO₂ (2/64 acid equivalent/g), 21.74 acid equivalent/kg for NO_x, expressed as NO₂, (1/46 acid equivalent/g) and 58.82 acid equivalent/kg for NH₃ (1/17 acid equivalent/g). Emissions of tropospheric ozone precursors were estimated using the tropospheric ozone depleting potential (expressed as NMVOC equivalent). The following weighting factors were employed: 1.22 for NO_x, 1.00 for NMVOCs, 0.11 for CO, and 0.014 for CH₄.
- International air and maritime transports' consumption are excluded from the calculation, as is rail's electricity consumption.

SOURCES

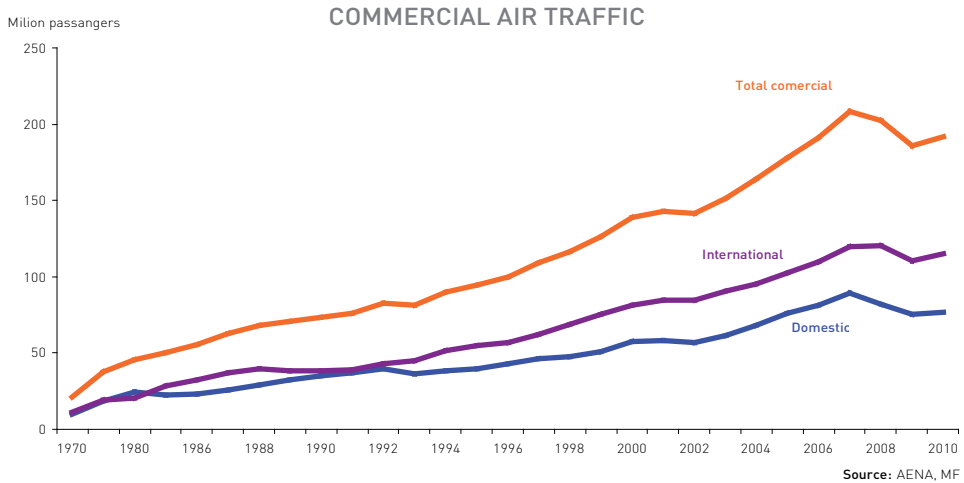
- MARM, 2011. *Inventario de Gases de Efecto Invernadero de España*. Years 1990–2009. Directorate-General for Environmental Quality and Assessment.
- MITyC, 2010. *La energía en España 2009*

FURTHER INFORMATION

- <http://www.marm.es>
- <http://www.mityc.es>
- <http://www.eea.europa.eu/>

Air transport

After decreases in 2008 and 2009, in 2010 air passenger transport grew by 2.7% and air freight transport increased by 15.5%



With 192,787,860 passengers, 2010 saw an increase in total air passenger transport (2.7% on 2009), reversing the downward trend of the two previous years. As regards commercial air traffic, the number of passengers was 3.1% higher than in 2009, at 191,697,798. Similarly to other years, of these commercial flights, around 60% of passengers were on international flights and 40% were on internal flights.

In 2010, 652,146 tonnes of freight were transported by air, 15.5% more than in 2009. This rise was mainly due to the increase in international cargo, which went up by 23.4%.

Nevertheless, the total number of air operations was 2.4% lower than in 2009, with 2,116,512 passenger and freight flights.

Madrid-Barajas airport recorded the greatest volume of passengers, operations and freight, followed by Barcelona-El Prat. However, these were not the airports that recorded the biggest increases — the number of passengers passing through the airports in Santiago de Compostela and Fuerteventura grew by over 11%, while Lanzarote airport saw the greatest rise in operations (8.7%).

Over 2000–2010, total passenger traffic increased by 36.7%, while the total number of operations grew by 14.2%.



NOTES

- Total air traffic includes inbound and outbound flights and includes all commercial traffic (both scheduled and charter flights). It includes passengers in transit and other traffic types. Total commercial air traffic is the sum of Spain's national (or internal) and international flights.

SOURCES

- AENA, 2011. Annual statistical reports on Spain's airports.

FURTHER INFORMATION

- <http://www.mfom.es>
- <http://www.aena.es>

Waste generated by transport: end-of-life tyres

Material recovery is the most established management method, although energy-value recovery is increasing

WASTE GENERATED BY TRANSPORT: END-OF-LIFE TYRES

	2007			2008			2009		
	Signus	TNU	Total	Signus	TNU	Total	Signus	TNU	Total
Collected (t)	213,542	55,326	268,868	198,347	52,659	251,006	190,080	49,593	239,673
Managed (t)	163,570	55,315	217,945	230,408	52,659	283,067	187,198	49,100	236,298
Reused (t) %	18,035 11.0	7,707 13.9	25,742 11.8	19,072 8.3	13,165 25.0	32,237 11.4	16,848 9.0	4,429 9.0	21,277 9.0
Recovered (materials) (t) %	123,575 75.5	23,624 42.7	146,259 67.1	132,891 57.7	18,957 36.0	151,848 53.6	101,087 54.0	24,349 49.6	125,436 53.1
Recovered (energy) (t) %	21,960 13.4	23,984 43.4	45,944 21.1	78,445 34.0	20,537 39.0	98,982 35.0	69,263 37.0	20,322 41.4	89,586 37.9

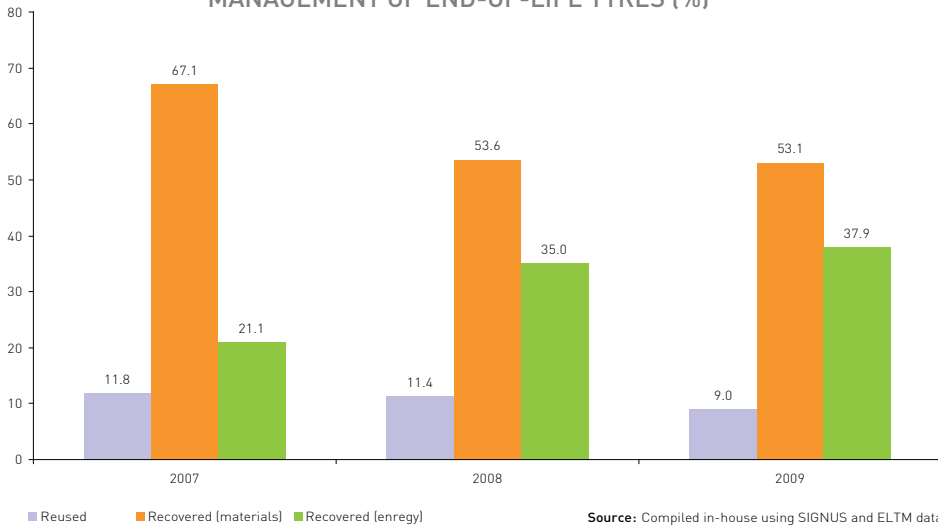
Compiled in-house using data from SIGNUS and TNU

The annual reports published by the two end-of-life tyre Integrated Management Systems (IMS) currently in operation (SIGNUS and ELTM) provide valuable information on how this type of waste is managed. In recent years, these schemes have been further developed and tyre management has improved, resulting in a better balance between collected and managed volumes. This is proved by the rise in the number of producers registered with the IMS. In 2009, SIGNUS had 149 registered producers (almost five times as many as in 2006), while TNU had 143, which together represent almost 85% of all producers.

It should be noted that the IMS have developed a model that collects end-of-life tyres from all over Spain. This is a fundamental step in proceeding to reuse, recycle and recover them, practices that along with a decrease in generation are essential for environmental protection.

During the three years studied, material recovery remained the main management method for end-of-life tyres, although there was also an increase in energy recovery, which was used to deal with 37.9% of the tonnes managed by both IMS.

WASTE GENERATED BY TRANSPORT
MANAGEMENT OF END-OF-LIFE TYRES (%)



NOTES

- Royal Decree 1619/2005, of 30 December, on management of end-of-life tyres, establishes a specific legal framework for tyre production and management and promotes, in the following order, reduction, reuse, recycling and other forms of recovery, with the aim of protecting the environment. It establishes that the integrated management systems, which should be authorised by the regional governments in the autonomous communities in which they operate, should ensure collection of end-of-life tyres and appropriate management. Management of the system should be performed by an administrative body constituted as a legal person on a not-for-profit basis.
- To date, two Integrated Management Systems have been established in Spain — Signus Ecovalor, S.L., legally constituted on 19 May 2005, and Tratamiento de Neumáticos Usados, S.L., legally constituted on 13 July 2006.

SOURCES

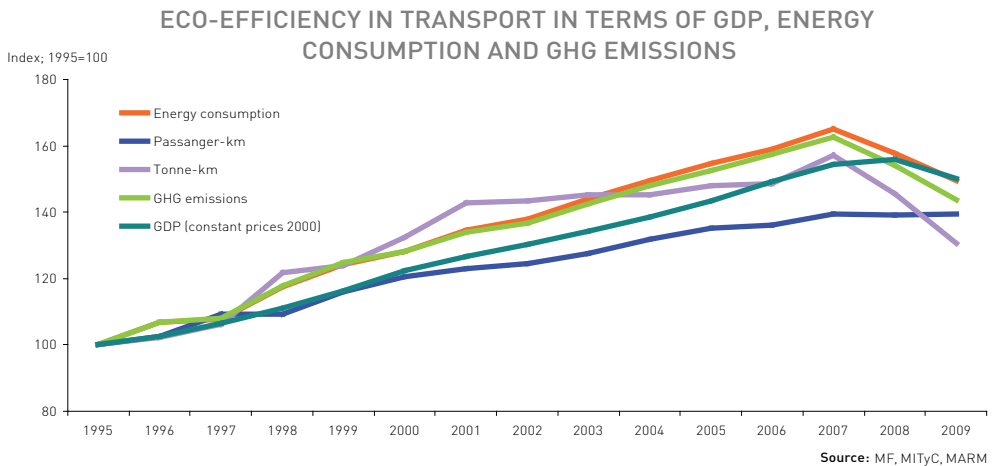
- Sistema Integrado de Gestión de Neumáticos Usados (SIGNUS), various years. 2007 to 2009 annual reports.
- Tratamiento de Neumáticos Usados, S.L. (TNU), various years. 2008 and 2009 annual reports.
- MARM, 2008. *Plan Nacional Integrado de Residuos (PNIR) 2008–2015*.

FURTHER INFORMATION

- <http://www.marm.es/>
- <http://www.eea.europa.eu/>
- <http://www.signus.es>
- <http://www.tnu.es>

Eco-efficiency in transport

The decrease in GDP in 2009 followed, although to a lesser extent, the trend started the year before in the other variables



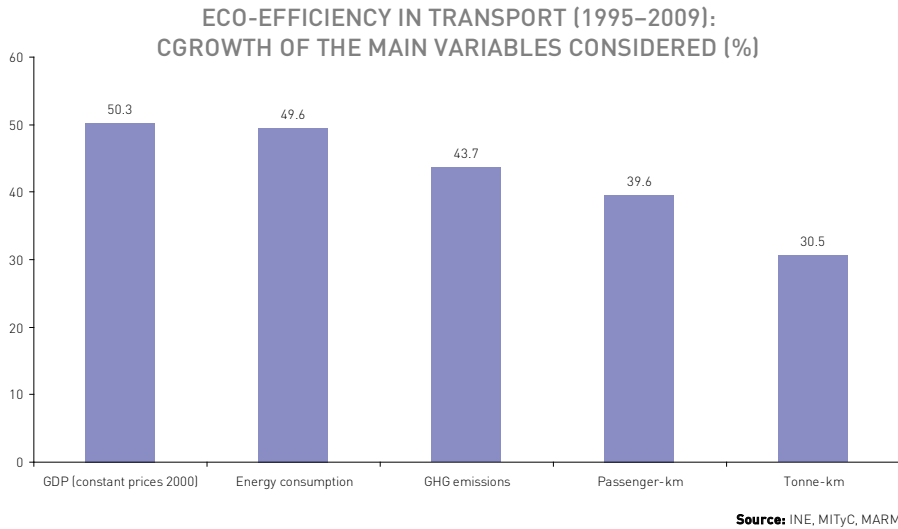
2007 was a turning point in the trend of the variables considered when assessing eco-efficiency in transport. Until 2007, all of them, except passenger transport, had increased in parallel (and more strongly) to GDP. In 2008, there was a change of trend in energy consumption, greenhouse gas (GHG) emissions and freight transport. This was not the case for passenger transport, which had grown less than the other variables and was decoupled from GDP growth. This change in trend coincides with the onset of the economic crisis, which became more pronounced in that year.

In 2009, GDP dropped by 3.6%, contrasting with the 0.9% growth recorded in 2008. Energy consumption went down by 5.1%, expanding upon the reduction of the year before (4.5%). GHG emissions followed the same trend, but with even greater decreases (6.8% and 5.2% in 2009 and 2008, respectively). These stronger decreases could be due to technological improvements and the energy-efficiency measures implemented in vehicles, engines, fuels, tyres and so on.

Freight transport also declined more markedly in 2009 than the previous year (10.4% in 2009 and 7.3% in 2008). Conversely, in 2009 passenger transport, which in 2008 remained at a similar level to 2007, increased very slightly (0.22%).

The graph below shows the increase in the variables over the 1995–2009 period. It

clearly shows how the increase in economic growth in Spain coincided with a smaller rise in the volume of inter-city transport (of both passengers and freight) and with lower GHG emissions. However, this GDP growth was coupled to a similar rise in energy consumption.



Greater use of private vehicles, with few occupants, in urban and metropolitan areas could continue to be one of the factors responsible for this situation. Therefore, analysis of these variables is necessary over the next few years to decouple the structural component from the economic one.

NOTES

- Greenhouse gas emissions by transport refer to those produced by Group 7 of the SNAP classification (Road Transport), part of Group 8 (Other Transport Modes: rail, air and sea) and pipeline transport included in stationary sources (SNAP 01.05.06). The estimates include emissions of CH₄, N₂O and CO₂. Annual emissions of each of these three pollutants, converted into tonnes of CO₂ equivalent according to their global-warming potential, are as follows: 1 (CO₂), 21 (CH₄) and 310 (N₂O).
- The GDP figures are those used by the MITyC to estimate energy intensity at constant prices (base year 2000).

SOURCES

- MARM, 2011. *Inventario de Gases de Efecto Invernadero de España*. Years 1990–2009. Directorate-General for Environmental Quality and Assessment.
- INE. Economic Accounts. INE. Spanish National Accounts. Gross domestic product at market prices and its components. Current prices.
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