

TRANSPORT



2.14

Environmental Profile of Spain 2012

Transport is a crucial sector for social and economic development. In Europe it provides direct employment to 10 million people and represents around 5% of the GDP. In Spain, the Gross Added Value (GAV) of 'Transport and storage' sector activities in 2011 was 5.1% of the total, slightly higher than the proportion in 2010, of 4.8%, and previous years. Between 1990 and 2012 employment in the transport sector increased by almost 22.1%. This growth was continuous from 1994 up to 2007 when there were 890,000 employees, at which time it began to fall, a trend that has seen employment fall to 728,000 persons in 2012 (a decrease of 5.7%).

From a household point of view transport is a significant cost burden. The 2011 Survey on Households Budgets, carried out by the National Statistics Institute, found that the budget for transport was 12% of the total, being 3,530 euro. It decreased by 3.1% with respect to 2010. According to Eurostat, an average European household allocates 13.2% of its budget to transport goods and services.

From an environmental point of view, transport is responsible for almost one quarter of total GHG emissions (24.9% in 2011). More than 90% of these emissions come from road transport. Furthermore, the development of transport systems' linear infrastructures has a significant impact on natural habitats (surface loss, barrier effect, accidents, etc.), as well as on people, both due to



respiratory problems and acoustic pollution from traffic congestion, and from traffic accidents. These have been reduced in recent years, but continue to be a societal problem.

The Infrastructure, Transport and Housing Plan 2012-2014 developed by the Ministry of Development and presented to the public in September 2012, is a further step in management and financing models for public investment. In part its configuration revolves around the cooperation between the public and private sector. The Plan has as one of its principles the promotion of sustainable transport.

KEY MESSAGES

- A decoupling was observed between the economic growth of transport (growth of 78% between 2000 and 2011) and some of the main variables such as the transport of interurban freight (which fell 8.6%) and passenger transport, and energy consumed (both of which increased 11% during that period). The GAV is the only variable that has continued to grow over recent years, compared to decreases in transport demand and energy consumption.
- The structure of the passenger car fleet has changed to have more diesel vehicles; in 2011 there were 47.1% petrol vehicles and 52.9% diesel vehicles. At the same time the emergence of hybrid passenger vehicles can be observed, with approximately 20,700 vehicles registered in 2011. In 2011, 65.8% of passenger vehicles complied with the EURO III standard and subsequent, and 36.8% with EURO IV and subsequent.
- The EU has passed legislation in relation to emissions for new passenger vehicles, as part of its integrated approach to reduce CO₂ vehicles emissions. In Spain, in 2011, a total of 809,930 passenger vehicles were sold, with a nominal average emission of 133.8 g of CO₂/km.
- The energy consumption of transport has increased by 84% between 1990 and 2011, with continuous growth up to 2007. National transport consumed 69.5% of all the energy used by the sector, with road transport almost 92%. Diesel was used for the production of almost 70% of the energy consumed in 2011.
- There was a reduction in the quantity of pollutants emitted per energy unit used in transport, especially of ozone and acidifying precursors and, to a lesser extent, of particulate matter and GHG. The renewal of the vehicle fleet, with cars that are continually more efficient and consume less, is one of the main causes.

INDICATORS

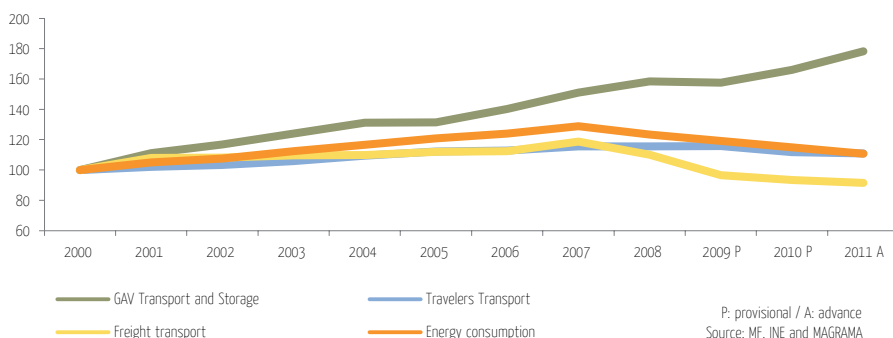
- Main transport variables
- Passenger vehicle fleet by fuel type
- Specific emissions of new passenger vehicles
- Energy consumption of transport
- Intensity of air pollutants emissions from transport



Main transport variables

The economic growth of transport is decoupled from energy consumption and from the demand of travellers and freight transport

Main variables of transport: travelers and freight transport, energy consumption and GAV of the sector (Index 2000=100)



The transport sector is one of the most important in a country's development, both in itself and for its contributions to other sectors. The sector's contribution to the GAV of the Spanish economy (measured in current prices) in 2011 was 5.1%, a value similar though slightly higher, to that of previous years (4.8% in 2010, 4.5% in 2005 and 4.9% in 2000). During the period 2000-2011, the growth of this variable was 78.3%, higher than other figures that help to measure the sector, such as demand for transport and energy consumption.

Transport energy consumption, which has a direct relationship with the emission of air pollutants, reached its maximum in 2007, with a declining trend starting in that year. In 2011, energy consumption was 10.7% higher than in 2000, while in 2007 it was almost a 30% higher. By types of transport, road transport consumes the largest amount of energy (91% in 2011, referring only to domestic road transport). Domestic maritime transport consumed around 4%, air 3.6% and rail 1.4% (both with reference to domestic traffic). Compared with the distribution of the year 2000, a slight increase in the consumption rate of maritime and rail transport can be seen, at the expense of air and road traffic.

Regarding road traffic, during the period 1990-2011, energy consumption has increased 64.5%, of which the energy coming from petrol declined by 38.8%, while that coming from diesel fuel increased by 150.3%. An increase in the use of biomass, from 0.3% of energy consumption in road transport in 2000 to 6.5% in 2011, was observed.

In 2011, the distribution by transport type for passenger's domestic travel maintained the trend of previous years, with road transport having the highest demand (90%), followed by rail and air. The same scenario is seen for freight, with road being the main mode of transport with 81%, and maritime having more than 12%. Rail only transported 2.5% of total freight in 2011.

In terms of growth, between 2000 and 2011, passenger road transport demand, the most used type, increased by 11%, while rail increased by 18.6%, due to the development of high speed railways. Air transport has increased at only around 3%, while maritime increased by around 7.5%, with significant development of cruising as a holiday option.

Regarding freight transport, 2007 saw the highest demand volume, with all transport types seeing significant declines up to 2011 (20.3% in road, 6.3% maritime, 30.4% rail and 11% pipeline). During the period 2000-2011, maritime and pipeline transport saw increases (13.6% and 14.4%, respectively), while freight transport by road declined by 11% and by rail 34.1%.

For air transport, AENA provisional data estimates that in 2012 Spanish airports had 5% less passenger traffic, and 10.1% fewer air operations in relation to 2011.

NOTES

- The indicator is calculated by presenting in a direct manner the annual information of the four variables in index terms, with the year 2000=100.
- The unit of measurement used for passenger traffic is passenger-kilometre and is calculated by multiplying the annual number of passengers by the number of kilometres travelled.
- The unit of measurement of freight transport is the tonne-km, calculated by multiplying the number of tonnes transported by the number of kilometres travelled.
- The energy consumption figure does not include air transport or international maritime consumption.

SOURCES

- Ministry of Development (MF), 2012. Transport and infrastructure. Annual report 2011.
- Ministry of Agriculture, Food and Environment, 2013. Spanish GHG Emissions Inventory. Years 1990-2011. Directorate-General on Environmental Quality and Assessment and Natural Environment.
- National Statistics Institute, 2013. Spanish National Accounting. GAV at current prices. In INEbase / Economía / Cuentas Económicas / Contabilidad nacional de España. Base 2008 / Accounting tables 2000-2011.

MORE INFORMATION

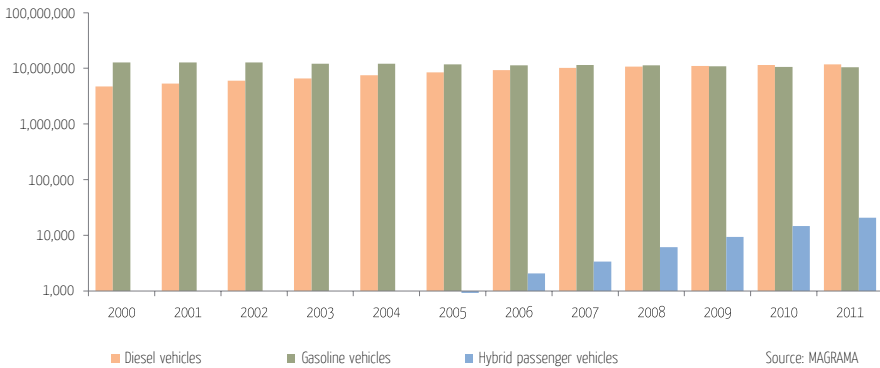
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Passenger vehicle fleet by fuel type

The structure of the passenger vehicles fleet is changing and includes a higher proportion of diesel vehicles.

Fleet of passenger vehicles according to the type of engine



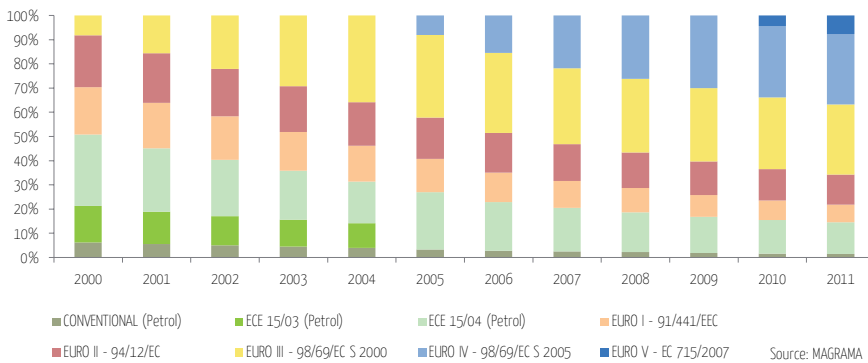
The passenger vehicle fleet in Spain has undergone a structural change in which the proportion of diesel vehicles has increased at the expense of petrol vehicles. During the period 2000-2011 alone the total number of passenger cars increased by 27.5%, to reach 22,251,437 registered vehicles. Separately, diesel cars have increased by 150% while petrol cars declined by 17.9%.

The structure of the fleet in the year 2000 was made up of 73.1% petrol passenger vehicles and 26.9% diesel vehicles. In 2005, there were 58.3% of petrol passenger vehicles and 41.7% diesel vehicles, with the emergence of the start of trend for hybrid vehicles (petrol only) of 0.004% (around 900 vehicles). In 2011, the structure has been turned on its head, with 47.1% of the fleet being petrol vehicles and 52.9% diesel. Hybrid vehicles reached almost 20,700 (around 0.1% of the total), although it appears that their growth is consolidating year on year. The importance of diesel vehicles has grown to a greater extent and in 2011 54.5% of all passenger vehicles used this fuel.

The European Union has been introducing fuel requirements in order to reduce the polluting vehicle emissions. Such things as the prohibition on advertising unleaded fuel, the supply of zero sulphur fuels and the promotion of biofuels have been, among others, measures included in the legal framework (through the adoption of regulations or the implementation

of directives). One of the most important aspects, characterised by a progressive tightening of the requirements, has focused on reducing the limit values of polluting emissions from motor vehicles. Action has been taken in relation to fuel quality as well as to the best engine system techniques for best use and efficiency, and also in terms of the information provided to the public regarding vehicles and their components, and the possibility of tax incentives. The Euro standards have incorporated these improvements gradually, adapting the fleet of vehicles by renewal according to the established requirements.

Distribution of the fleet of vehicles classified per type of fuel according to the Euro norm



NOTES

- The data for hybrid vehicles are from an estimation made by the General Traffic Directorate in relation to certain manufacturers.
- The data of the hybrid vehicles are referred to petrol models. No accounting is made for other models.
- The graph 'Fleet of passenger vehicles according to engine type' is represented in logarithmic scale due to the difference in the scale of the hybrid vehicles.

SOURCES

- Ministry of Agriculture, Food and Environment, 2013. Spanish GHG Emissions Inventory. Years 1990-2011. Directorate-General on Environmental Quality and Assessment and Natural Environment.
- Directorate-General of Traffic. Statistics of the Directorate General of Traffic (several years).

MORE INFORMATION

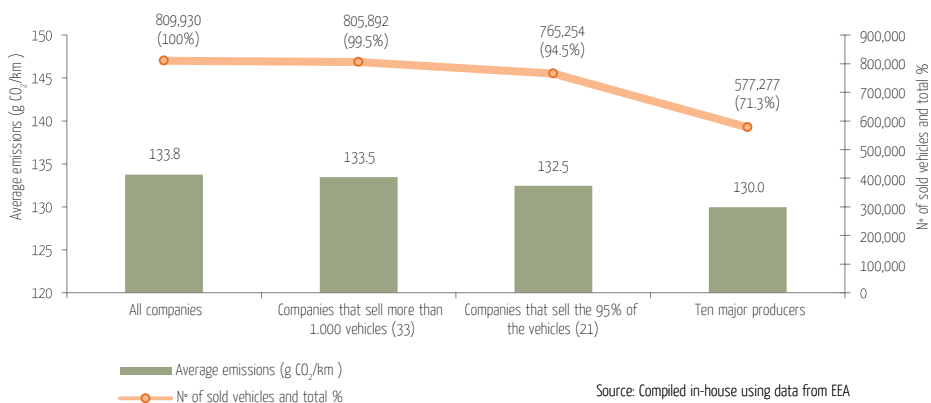
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- <http://www.dgt.es>
- <http://movele.es/>
- <http://www.eea.europa.eu/>



Specific emissions of new passenger vehicles

The average vehicle emissions of the 10 biggest manufacturers in Spain, whose sales represented 71.3% of passenger vehicles, was 130 g of CO₂/km

Vehicles sold in Spain (number and percentage with respect to the total) and average emissions. Year 2011



The European Environment Agency (EEA) collaborates with the European Commission in the control of CO₂ emissions of passenger vehicles, and offers the public, for consultation, the data base containing manufacturers information in accordance with the Regulation (CE) 443/2009.

The available information for Spain allows the following conclusions to be drawn:

- In Spain a total of 809,930 passenger vehicles were sold in 2011. Their nominal average emission was 133.8 grams of CO₂/km, of which only 58.3% (472,238 vehicles) had an average emission lower than 130 g of CO₂/km. The only vehicles included in the EEA database with an average emission of 0 g of CO₂/km were electric vehicles.
- Analysing only those brands that have sold more than 1,000 vehicles, the total introduced into the market was 805,892, and the nominal average emission of these was 133.5 g of CO₂/km, very similar to the previous figure. The lowest average emission of these brands is 98.5 g of CO₂/km.
- The average emissions of the biggest manufacturers (meaning those brands whose overall

sales represent 95% of the total sales) are slightly lower than average emissions. This percentage is equivalent to 765,254 vehicles, with a nominal average emission of 132.5 g of CO₂/km. In this group of brands, the lowest value of nominal average emission was 120.5 g of CO₂/km.

- Finally, the 10 biggest manufacturers sold, in 2011, a total of 527,277 vehicles (71.3% of the total), with a nominal average emission of 130 g of CO₂/km, of which 75.5% release less than 130 g of CO₂/km. The brand with the lowest nominal average emission sold vehicles with an average of 124 g of CO₂/km.

NOTES

- The indicator is calculated using the database 'Cars and CO₂' of the EEA (Monitoring of CO₂ emissions from passenger cars- Regulation 443/2009). The information used comes from data provided by the manufacturers that have sold in Spain. Each model sold on the Spanish market by each brand is analysed, and the average CO₂ emissions and average weight are calculated. The final result means there is data available for each manufacturer of the number of sold vehicles, emissions and the average weight. Comparing these three variables enables a check to be done as to whether each of the manufacturers is close to meeting the targets established in the regulation.
- Regulation 443/2009 establishes performance standards for emissions of new passenger vehicles, as part of the integrated approach the EU is taking to reduce vehicle CO₂ emissions. It sets a target for the emissions of new passenger vehicles for the year 2015 (130 g of CO₂/km), to be pursued in a progressive manner as of 2012, and for the year 2020 (95 g of CO₂/km). Likewise, Regulation 510/2011, of 11 May 2011, sets a target for light commercial vehicles, of 175 g of CO₂/km for the average emissions of CO₂ of these types of vehicles. From 2020, the objective will be 147 g of CO₂/km for the average emissions of new light commercial vehicles. The Commission has the intention of modifying both regulations and prepared proposals for their amendment in 2012.
- These objectives are in relation to the average size (calculated according to the weight) of the vehicles sold by each manufacturer. Manufacturers exceeding the limits are obliged to pay fines per vehicle and per g/km over the established target.
- The emission limits are set by means of a curve that relates the average emissions of the fleet (in terms of the target of 130 g of CO₂/km in 2015) and its weight. The curve allows the heaviest vehicles to have more emissions than lighter ones, provided that the total average of the fleet is preserved.

SOURCES

- European Environmental Agency, 2013. Data base Monitoring of CO₂ emissions from passenger cars- Regulation 443/2009". Available at Home / Data and maps / Datasets / Monitoring of CO₂ emissions from passenger cars – Regulation 443/2009 (<http://www.eea.europa.eu/data-and-maps/data/co2-cars-emission-3>).

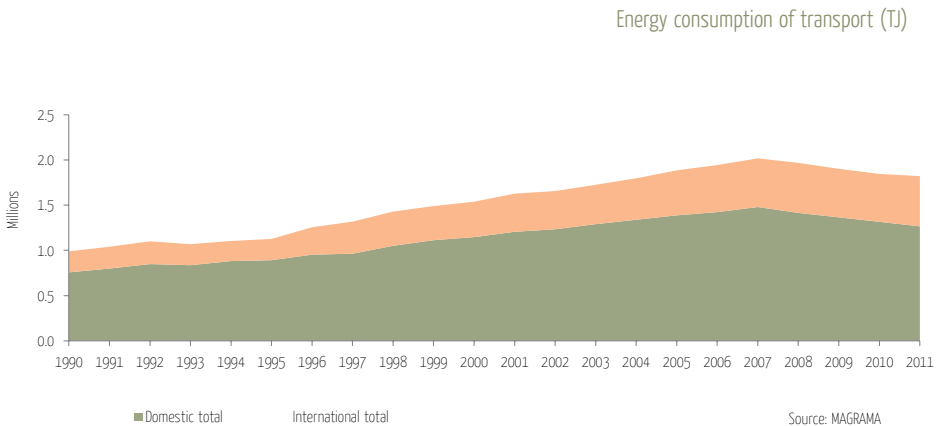
MORE INFORMATION

- http://ec.europa.eu/clima/policies/transport/vehicles/cars/index_en.htm/
- <http://www.eea.europa.eu/highlights/most-car-manufacturers-on-track/>
- <http://www.eea.europa.eu/>



Energy consumption of transport

The energy consumption of transport has grown by 84% since 1990. The maximum was reached in 2007, with a gradually decrease since then



The increase in transport demand in Spain in recent years has led to an increase in the energy consumption of the sector. During the period 1990-2011, the total consumption of energy increased by 84%, with a continuous rise up to 2007 (exceeding 104%). A decline began as of that year, coinciding with the financial and economic crisis.

In 2011, domestic transport consumed 69.5% of the total energy of the sector, with international transport being responsible for only 30.5%. However, the growth of international transport has been much more intense due to Spanish economic expansion. Commercial and business activities, as well as demand from tourism, have affected it, meaning that from 1990 through to 2011 international transport grew by 138.5% while domestic transport did so to a lesser extent (67.2% in the same period).

It should be highlighted that, although the high point for domestic transport energy consumption was in 2007, followed by a fall in consumption as of that year, the highpoint for international transport occurred in 2011 (after there was an increase in goods exports that year), with two decreases in 2009 and 2010.

By modes of transport, the energy used in road transport accounted for almost 92% of the energy consumed by domestic transport. Maritime transport consumed 4%, while air transport consumption was slightly lower, at 3.6%. Only taking into account fossil fuels,



rail transport only had a rate of 0.3% of energy consumption in 2011, though that value increases to 1.4% when electricity use is taken into account. Maritime transport was the largest energy consumer in international transport (64.5% in 2011) with a higher use of fuel oil than diesel.

In terms of the trends of the types of fuels used as energy sources in domestic transport during the reference period 1990-2011, the marked increase in the use of diesel at the expense of petrol consumption can be noted, especially for passenger vehicles. Likewise, the increase in the use of the biomass for road freight was consolidated. In 2000 this only had a rate of use of 0.3%, but reached 6.5% in 2011. The use of kerosene in aviation continued to be generally stable, while the use of fuel oil in shipping increased slightly.

In international maritime transport the greater use of fuel oil (84.2%) is notable compared to diesel (25.8%) in 2011. In comparison, in 1990, the use of fuel oil was 66%. Looking at the energy consumed in the use of both types of fuel, this has increased notably in the case of fuel oil, from 100,851.8 TJ in 1990 to 301,591.1 TJ in 2011 (almost 200%), while for diesel, on the other hand, it has maintained a similar position, with a growth of only 9% during that period to reach a total energy consumption of 56,721.6 TJ in 2011.

NOTES

- The indicator is calculated directly by using the energy consumption data estimated in drawing up the "GHG Emission's Inventory in Spain. Years 1990-2011".
- In the analysis of the distribution of the energy consumption per sources the gaseous fuels are not included, nor is Liquid Petroleum Gas (LPG) used in road transport, natural gas used by rail nor fossil fuels used for pipeline transport, which in total was around 0.5% of the total in 2011.

SOURCES

- Ministry of Agriculture, Food and Environment, 2013. Spanish GHG Emissions Inventory. Years 1990-2011. Directorate-General on Environmental Quality and Assessment and Natural Environment.

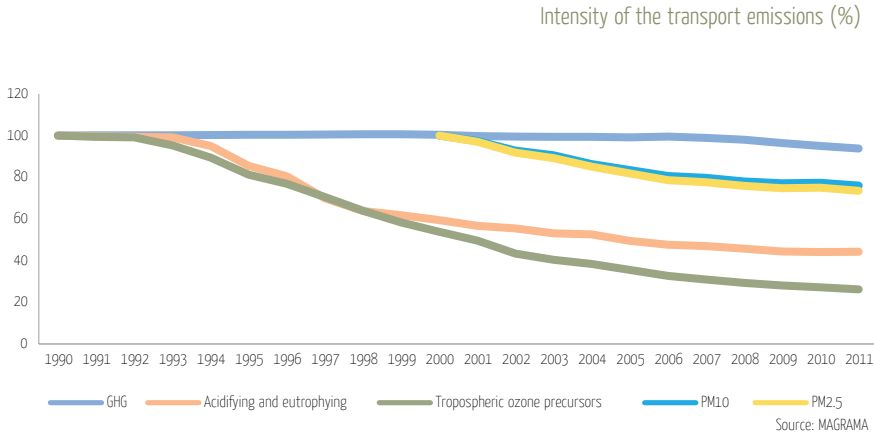
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Intensity of air pollutant emissions from transport

There is a decrease in the emissions of pollutants from transport per consumed unit of energy



Analysing the emissions of pollutants per unit of consumed energy reveals the energy intensity of the emissions. A decreasing trend shows a reduction in the quantity of pollutants released per each unit of energy used. Among the aspects that have led to this trend, are improvements in the technical specifications of new vehicles and fuel quality, along with fleet renewal, with new vehicles being ever more efficient and having lower consumption. At the same time, the increase of hybrid vehicles and the use of alternative fuels should be taken into account, although the latter to a lesser extent due to the limited entry of biofuels into the market.

During the period 1990-2011 a significant drop in the energy intensity of ozone precursors can be seen, with a fall of 73.8%, as well as of the intensity of the acidifying and eutrophying substances, with a fall of 55.8%, although during last year the downward trend has stabilised.

Equally particulate matter has seen an intensity reduction, with less particles being released each year per unit of energy consumed. This reduction has been slightly more significant for particulates with a diameter of less than 2.5 micron.

The lowest intensity reduction was in greenhouse gases emissions, which only fell by 6.1% during the period mentioned; the reduction began in 2001, mainly because of the a significant entry of biofuels into the market and a limited modal transfer towards

rail transport. By type of gas it is worth mentioning the falling trend in the intensity of methane emissions, which have fallen 83.2%, although this has a limited effect due to its insignificance within the total.

The contribution of transport to total GHG emissions varies between 19% and 26% during the entire period analysed. In 2011, the CO₂-equivalent emissions from transport were responsible for 24.7% of total emissions, a slightly lower percentage than the 26.2% of 2010. Road transport has the largest share and its CO₂-equivalent emissions made up between 91% and 94% of the total emissions of the sector. Between 1990 and 2011, GHG emissions from transport have increased by almost 57%, while the acidifying and eutrophying substances decreased by 26.2% and the ozone precursors fell by 56%. In comparison with the previous year, all these emissions have decreased: GHG by 4.9%, acidifying and eutrophying substances by 3.5% and ozone precursors by 6.9%. The trend of the previous years is therefore maintained, with it being more pronounced since 2007.

NOTES

- The graph for the indicator shows the changes in aggregate total annual emissions of GHG (CO₂, N₂O, CH₄), acidifying and eutrophying substances (SO₂, NO_x and NH₃) and ozone precursors (NO_x, NMVOC, CO and CH₄) in relation to the base year of 1990 (1990=100). It also shows primary particles smaller than 10 micron and 2.5 micron, with the year 2000 being taken as the year base in this case.
- The intensity has been calculated as the result of dividing the total aggregate emissions of each one of the totals mentioned above by the total energy consumed by transport.
- GHG emissions are expressed in CO₂ equivalent, calculated by the global warming potential of each gas (see chapter on "Air"). Emissions of acidifying and eutrophying gases are presented as acid equivalent (hydrogen ion generating potential). Emissions of ozone precursors were estimated using the tropospheric ozone depleting potential (expressed as NMVOC equivalent).

SOURCES

- Ministry of Agriculture, Food and Environment, 2013. Spanish GHG Emissions Inventory. Years 1990-2011. General Directorate on Environmental Quality and Assessment and Natural Environment.
- Ministry of Development, 2012. Infrastructure, Transport and Housing Plan (PITIVI), 2012-2014. Initial document for the institutional presentation and public participation of 26 September 2012.

MORE INFORMATION

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