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ENERGY



For years, Spain's energy policy has had many of the same goals as Europe's — to reduce pollutant emissions, guarantee energy supply, reduce dependence on foreign sources and develop interconnection infrastructure. The traditional characteristics of Spain's particular energy situation essentially comprise higher energy consumption per unit of Gross Domestic Product than the EU average and high levels of energy dependence and greenhouse gas emissions, the latter due chiefly to transport and electricity generation. However, this situation is currently undergoing notable changes. Energy efficiency and saving policies resulted in a 10% reduction in energy intensity between 2000 and 2008. Effectively, this means that in 2008 Spain used 10% less energy to achieve the same output as in 2000.

Meanwhile, development of renewable energy sources has been made a priority under Spanish energy policy. Highly notable advances have been made in this regard, especially in electricity production, where the amount of coal-generated power has fallen and the use of combined-cycle plants running on natural gas has increased. Among the most significant consequences of these changes are greater energy source sustainability, reductions in pollutant emissions, technological changes, reduced energy dependence and positive repercussions on employment and rural development.



Renewable sources are no longer a minor component in Spain's energy system, but have now established a leading position within the mix — 2010 was the first year in which renewable energy was the number one source in Spain's electricity-generation structure.

Spain's National Renewable Energy Action Plan 2011–2020 (PANER) seeks to consolidate and improve this situation and meet the objective set by Directive 2009/28/EC of the European Parliament and of the Council, which establishes a series

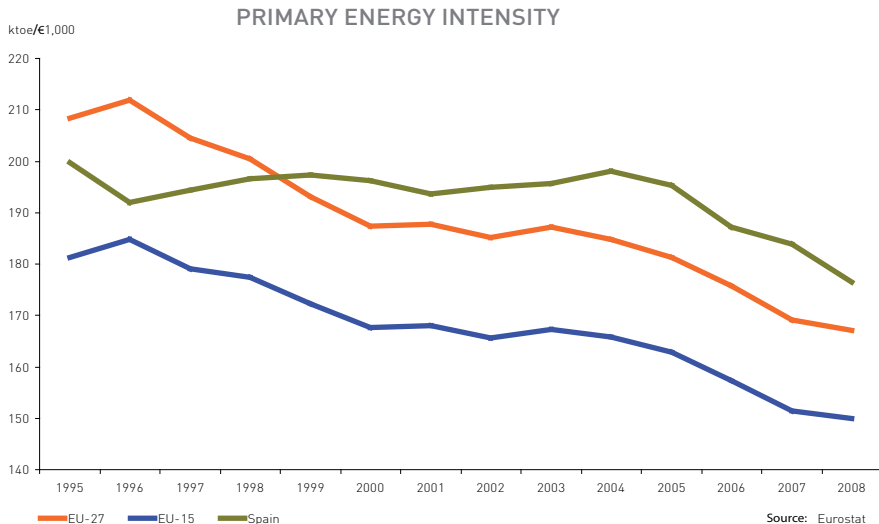
INDICATOR	GOAL	TREND
Primary energy intensity	Weaken the link between energy consumption and GDP	Primary energy intensity is falling faster in Spain than the European average
Energy-related GHG emissions intensity	Decouple economic growth from CO ₂ emissions	The intensity of energy-related CO ₂ emissions has decreased considerably in the last two years analysed
Renewable energy	Generate 20% of gross final energy consumption from renewable sources by 2020	Renewable energy, which accounts for 32.3% of the total, is now the number one source in Spain's electricity-generation structure
Eco-efficiency in energy	Decouple economic growth from the environmental pressure exerted by the sector	Energy-related GHG emissions are falling faster than primary energy consumption and GDP

of general goals for Member States for the year 2020. These include generating 20% of gross final energy consumption from renewable sources, as well as producing 10% of the energy used in the transport sector from renewable energy sources.

In addition to the aforementioned aspects, another important factor appearing in a number of indicators in this chapter is the drop in economic activity, which translates as lower energy consumption and reduced GDP, as well as exerting a partial influence on the reductions in greenhouse gas emissions related to energy production and distribution.

Primary energy intensity

The Spanish economy's energy intensity is decreasing faster than the European average

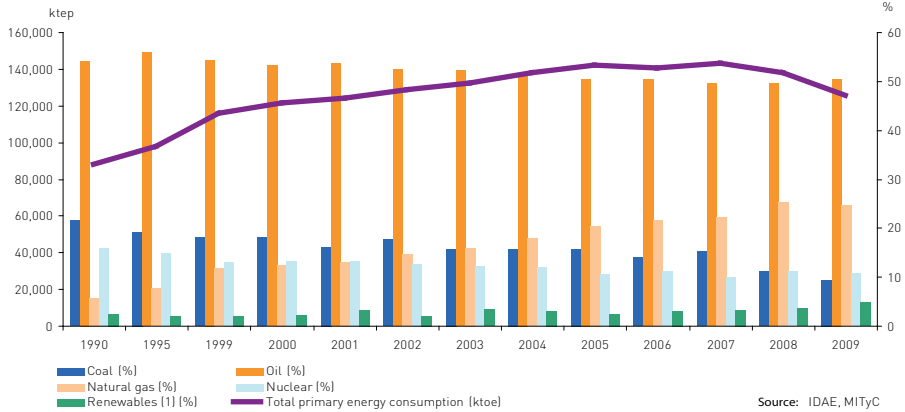


The Spanish economy's energy intensity, understood as the ratio between total primary energy consumption (in kt of oil equivalent) and GDP (expressed in thousands of euros) continues to decrease both nationally and in comparison with the EU. In addition, both ratios are falling at comparable rates — between 2000 and 2008, energy intensity decreased by 10.80% in the EU-27 and by 10.05% in Spain.

These figures vary slightly in the last two years analysed, when there was a 1.17% drop in the economy's energy intensity in the EU and a 4.06% fall in Spain.

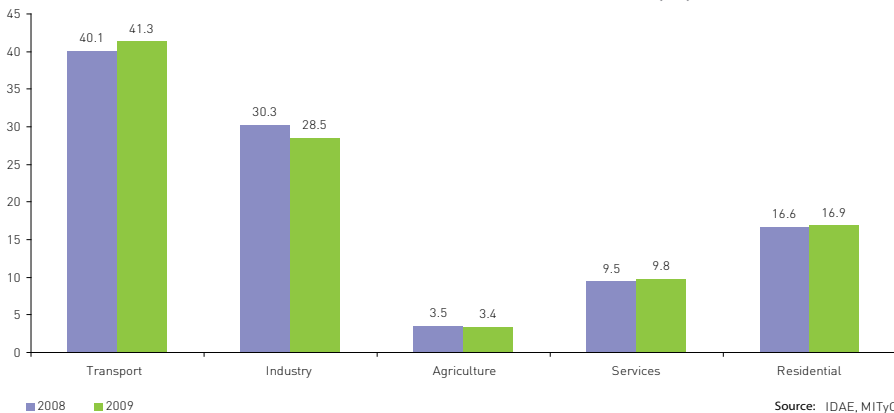
Comparing the 2009 figures for total primary energy consumption and its breakdown by energy source with the equivalent 2008 figures reveals a notable drop (8.76% of the total value — from 137,836 ktoe in 2008 to 125,762 ktoe in 2009). Energy from coal accounted for 11.2% of total primary energy consumption in 2008, and for 9.5% of total primary energy consumption in 2009. Likewise, there was a fall in the proportions of energy derived from natural gas (from 25.2% to 24.7%) and nuclear energy (from 11.1% to 10.9%). However, oil use increased slightly (from 49.5% in 2008 to 50.6% in 2009).

ANNUAL CONSUMPTION OF PRIMARY ENERGY (ktoe) BY SOURCE (%)



By sector, in 2009 transport still ranked first in terms of final energy consumption with a 41.3% share, up from 40.1% in 2008. Conversely, the proportion of final energy consumed by industry fell from 30.3% in 2008 to 28.5% in 2009. The residential sector increased its share slightly, from 16.6% of total final energy consumption in 2008 to 16.9% in 2009. Likewise, the proportion consumed by the service sector increased from 9.5% in 2008 to 9.8% in 2009. Finally, agriculture’s consumption remained practically unaltered, accounting for 3.5% of final energy consumption in 2008 and 3.4% in 2009.

FINAL ENERGY CONSUMPTION BY SECTOR (%)



SOURCES

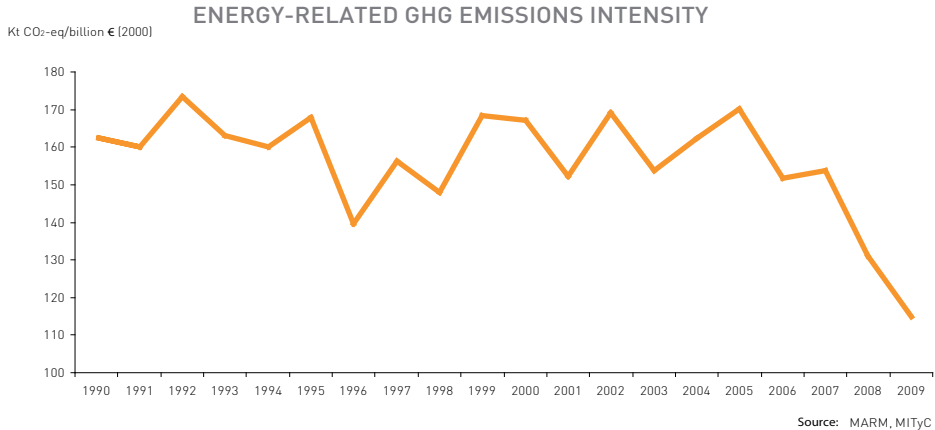
- EUROSTAT, 2011. Website: Eurostat/Statistics by theme/Energy/Database/Main indicators
- MITyC, 2010. *La Energía en España 2009*
- IDAE. *Boletín energético*, various years.

FURTHER INFORMATION

- www.idae.es
- www.cne.es/medioambiente.html
- www.mityc.es
- <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>

Energy-related GHG emissions intensity

The intensity of energy-related CO₂ emissions fell sharply in 2008 and 2009



The intensity of energy-related greenhouse gas emissions expressed as CO₂ equivalent (ratio between CO₂ equivalent emissions produced by energy transformation and processing industries and GDP) fell sharply in 2008 and 2009. What is more, this fall no longer depends (as it did in previous years) on meteorological conditions and the subsequent variations in the respective shares of hydroelectric power and fossil fuels.

GHG emissions from energy production in relation to the country's economic growth dropped by nearly 25% in only two years. Total GHG emissions from energy production and transformation fell from 121,631 kilotonnes of CO₂ equivalent in 2007 to 88,328 kt in 2009. At the same time, Spain's GDP dropped by 2.73% in 2009 in relation to 2007. The variations produced in these two items led to a 25.23% decrease in the energy-related CO₂-eq emissions intensity indicator in just two years.

In this case, if the difference between 2009 and 2008 is considered, the decline is general across all the greenhouse gases, though the reduction in CO₂ is the greatest (-15.44%). The drops in CH₄ and N₂O between 2009 and 2008 are slightly smaller, though certainly appreciable (-11.99% for CH₄ and -11.70% for N₂O). Thermal power stations were principally responsible for the fall in energy-related CO₂ emissions, as their output of these gases decreased from 106,708 kt of CO₂ in 2007 to 74,161 kt of CO₂ in 2009, a reduction of 30% in two years. However, emissions from coal mining, oil/gas extraction and pipeline compressors rose from 1,015 kt in 2007 to 1,551 kt in 2009 — an increase of 46.1% over the same two-year period.

NOTES

- For the purpose of calculating this indicator, CO₂-equivalent emissions refer to total emissions from combustion in the energy-sector industries included under the Energy heading (as per the IPCC categories) and comprise the six greenhouse gases expressed as CO₂-equivalent. The Energy category includes combustion processes, among them electricity generation, combustion at refineries and transformation of combustible fuels, as well as combustion in mining.
- The six main greenhouse gases covered by the Kyoto Protocol are, in order of importance, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and fluorinated gases, which include perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF₆), although the latter have no impact in the energy sector as they are only emitted in industrial processes.

SOURCES

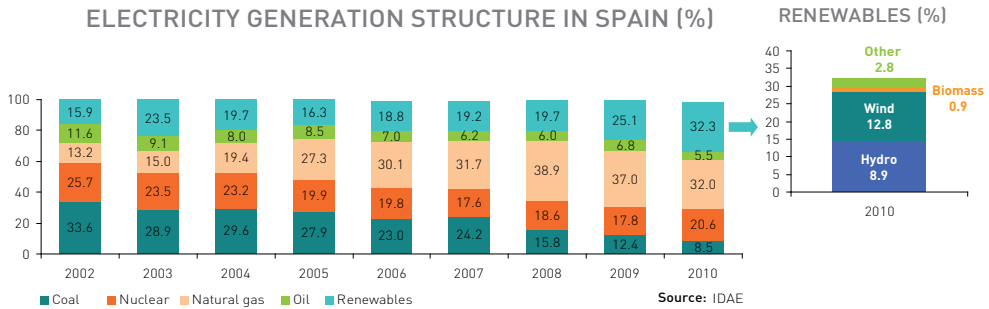
- Emissions data: MARM, 2011. *Inventario de Gases de Efecto Invernadero de España. Años 1990–2009*. Directorate-General for Environmental Quality and Assessment.
- GDP data: 1990–2009: MITyC, 2010. *La Energía en España 2009*.

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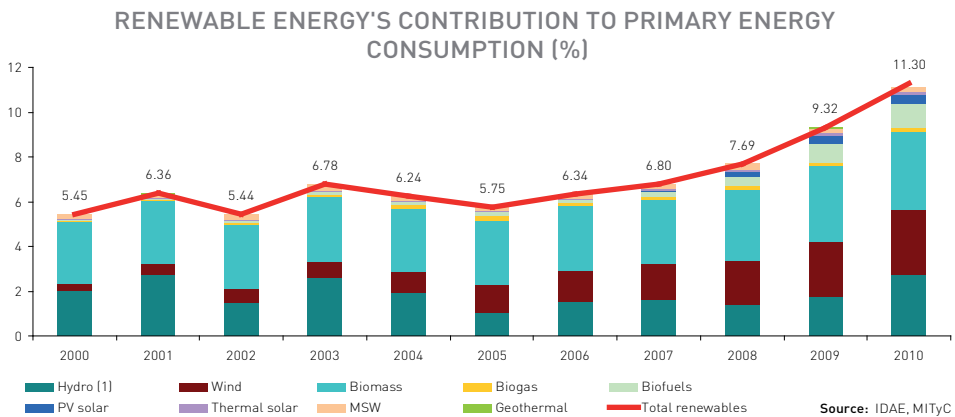
Renewable energy

In 2010, for the first time in Spain renewable energy exceeded all other sources in electricity production



In 2010, for the first time in Spain renewables were the leading electricity-generating source. The proportions of coal, gas and oil used all decreased; the use of nuclear energy rose slightly; and renewable energy’s share jumped from 19.7% in 2008 to 25.1% in 2009 and then to an impressive 32.3% in 2010.

Within this category, hydroelectric energy, which accounted for 7.3% of total electricity generation in 2008, rose to 8.9% in 2009 and to 14.1% in 2010. Wind energy, which accounted for 10% of total energy production in 2008, represented 12.8% in 2009 and 14.6% in 2010.

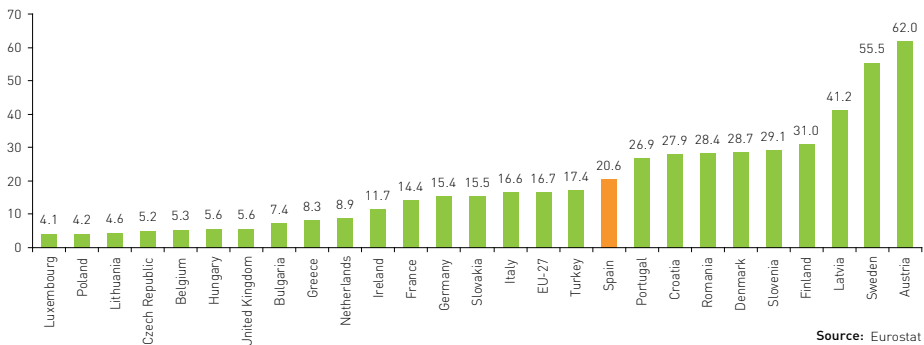


Directive 2009/28/EC of the European Parliament and of the Council, of 23 April 2009, on the promotion of the use of energy from renewable sources, stipulates that each Member State should draw up a national renewable energy action plan (the PANER, in the case of Spain) to meet the national objectives set in the same Directive.

For Spain, these objectives specify that renewable energy should represent 20% of gross final energy consumption and 10% of energy consumption by transport by 2020. Spain's Renewable Energy Plan 2011–2020, which is currently being drafted, estimates that by 2020 renewable energy's contribution to gross final energy consumption will stand at 22.7% (compared to the 20% objective) and at 42.3% for electricity generation.

According to Eurostat data, Spain is above the EU-27 average by proportion of electricity derived from renewable sources and ranks higher than countries like the United Kingdom, France, Germany and Italy (among others). What is more, this position is likely to improve over the next two years.

PROPORTION OF ELECTRICITY OUTPUT PRODUCED BY RENEWABLE SOURCES (%) (2008)



NOTES

- The renewable energy total includes hydroelectric, mini-hydroelectric, wind, biomass and urban waste, as well as thermal and photovoltaic solar power and biogas.
- Development of renewable energy sources is a key aspect of national energy policy. These sources make an efficient contribution to reducing the environmental impact of energy production and transformation. This is mainly achieved by cutting emissions of greenhouse gases, particularly CO₂, as well as lowering those of other pollutants (SO₂, NO_x, particulate matter, etc.). Increasing renewable energy's contribution to the energy balance also reduces the country's dependence on petroleum products and diversifies its sources of supply by encouraging development of inexhaustible and widely available resources. This in turn also reduces the need for transformation and transport, bringing a corresponding reduction in environmental impact.

SOURCES

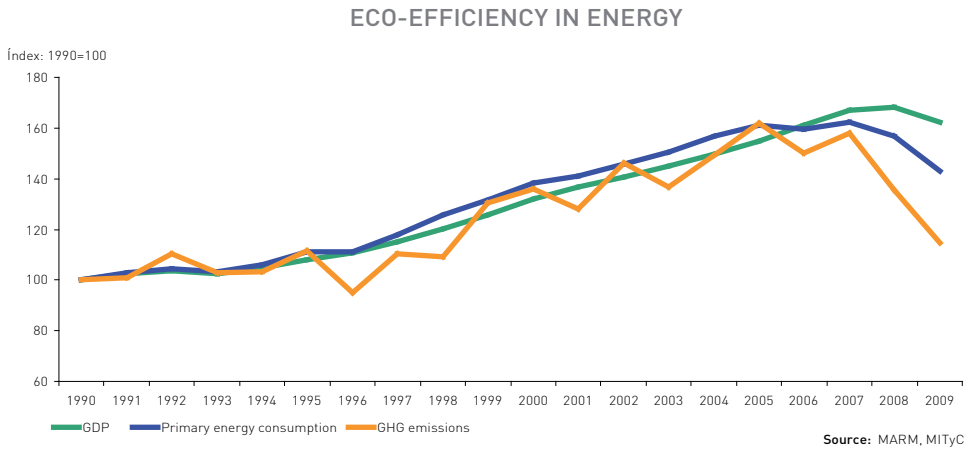
- Data provided by the IDAE. MITyC.
- MITyC, 2010. *La Energía en España 2009*.

FURTHER INFORMATION

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Eco-efficiency in energy

In 2009, energy-related GHG emissions fell sharply, while primary energy consumption and GDP also decreased, though to a lesser extent



In 2009, all three factors considered when analysing eco-efficiency in energy (GDP, primary energy consumption and greenhouse gas emissions associated with energy production and transformation) fell. These changes, however, were not comparable — GDP declined by 3.6% (from €803.4 billion in 2008 to €774.5 billion in 2009) and primary energy consumption decreased by 8.76% (from 137,836 ktoe in 2008 to 125,762 ktoe in 2009). However, the truly significant drop occurred in total greenhouse gas emissions (kt of CO₂-eq) associated with energy production and transformation, which fell 15.41% in just one year, from 105,303.70 kt of CO₂-eq in 2008 to 89,071.27 kt of CO₂-eq in 2009.

The magnitude of this decline in GHG emissions can be fully appreciated when it is taken into account that in 2005 these emissions, at 125,761.37 kt of CO₂-eq, represented 162% of the 1990 emissions value. Just four years later, in 2009, GHG emissions associated with energy production and transformation represented 114.78% of the 1990 emissions level.

NOTES

- In energy production, CO₂ accounts for the vast majority of greenhouse gas emissions, meaning that it makes no difference if total GHG emissions (CO₂-eq) or CO₂ emissions are used to analyse the sector's eco-efficiency and produce the graph. In this case, emissions of CO₂, CH₄ and N₂O in the SNAP subgroups related to combustion in energy and transformation industries have been used (public power; district heating plants; petroleum refining plants; solid fuel transformation plants; and coal mining, oil/gas extraction and pipeline compressors).

SOURCES

- MARM, 2011. *Inventario de Gases de Efecto Invernadero de España. Años 1990–2009*. Directorate-General for Environmental Quality and Assessment.
- MITyC, 2010. *La Energía en España 2009*
- IDAE. *Boletín energético*, various years.

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