2.8 INDUSTRY

Spanish industry achieved remarkable growth in the second half of the 20th century, with a radical transformation taking place following Spain's entry into the EEC in 1986. This led to rapid expansion in industrial production to meet demand from European markets and the corresponding increase in domestic consumption.

Since the mid-1980s, the process of European integration has also gone hand-in-hand with the growing process of economic globalisation, introducing new market conditions to which Spanish industry has to adapt. One recent analysis[1] of the country's industrial infrastructure highlights certain key characteristics, including:

- Inadequate average size of industrial companies, which are not only smaller than the EU average but also below that for the EU's new member states. Larger companies and high- and medium-technology enterprises are also comparatively small in scale.

- Low spending on R&D&I in the industrial sector, far below that of neighbouring economies, impacting on the capacity of companies to innovate.

(1) Trullén, Joan: Spain's New Industrial Policy: Innovation, External Economies and Productivity" (*La nueva política industrial española: innovación, economías externas y productividad*) 20/09/2006 (document on the website of the Spanish Ministry of Trade, Industry and Tourism.

- Production concentrated in relatively low-knowledge-intense sectors, although the relative importance of lower technology-content areas is falling. Highly competitive companies do nonetheless exist, for example in the food and metal industries.

- Moderate increase in productivity and competitiveness in the Spanish economy as a result of a growth model focusing more on reducing working and raw materials costs than developing a new, innovative production base.

INDICATOR	GOAL	TREND
Atmospheric emissions by industry	Prevent and reduce pollution	Except for SO_2, industry's pollutant emissions rose over the period 1990-2005
Energy consumption by industry	Reduce consumption and improve efficiency in resource use	Energy consumption is rising, as is use of natural gas as an energy source
Total Material Requirement	Rational use of resources	Total Material Requirement has been on the increase since 2001
Number of industrial enterprises with Environmental Management Systems	Integrate environmental concerns into production operations	Increase in the number of industrial enterprises with environmental management systems
Eco-efficiency in industry	Decouple industrial production from consumption of resources and pollution	Economic growth in the sector goes hand-in-hand with increasing environmental pressures

Despite the influence of these structural characteristics, industrial employment rose in Spain during the last decade. The worldwide market share for the country's industrial exports now stands at around 2%, reflecting the sector's generally strong performance. The figures are therefore positive on the whole, attributable to improvements in the financial environment, sustained wage moderation and rising demand, albeit within the context of such key factors as the emergence of new competitor countries and the rise of the Asian economies.

Within this scenario, the Spanish Ministry of Trade, Industry and Tourism (*Ministerio de Industria, Turismo y Comercio*) is aiming to relaunch its industrial enterprise support policy, concentrating on three overall goals:

- Increase the ratio of investment in R&D (from 1.07% in 2004 to 2% by 2010).
- Increase the private sector's contribution to R&D investment (from 48% in 2003 to 55% by 2010).
- Reach EU15 average levels for percentage of GDP dedicated to Information and Communication Technologies (ICT), rising from 4.8% in 2004 to 7% by 2010.

These goals are included within the relaunch of the Lisbon Strategy (November 2004), under which the Member States committed themselves to producing industrial strategies within the framework of the National Reform Programmes. In Spain, the main action areas of the Reform Programme approved in 2005 involve, in summary, the development of the following instruments:

- Support measures for Small and Medium-Sized Enterprises (SMEs)
- Tools to promote R&D&I
- Sector-specific industrial policies
- Re-industrialisation
- Spanish National Emission Rights Allocation Plan (PNA - *Plan Nacional de Asignación de Derechos de Emisión*)

These measures all have one common denominator: the need to meet the challenges facing Spanish industry, including: globalisation, the risk of industrial relocation to more attractive new EU members, the dwindling of Spain's low-cost advantage, inadequate productivity and the preponderance of medium- and low-technology sectors.

Within this development framework for the sector, which is justified by existing social and economic needs, it should be highlighted that, from the environmental perspective, the industrial sector is responsible for a range of environmental pressures (waste, atmospheric emissions, water pollution, and land use and degradation, among others). For example, a comparison with the previous year reveals an increase in hazardous waste generation, above all from the mining and quarrying industry which, as a result of changes in methodology, increased the amount from 3,077 tonnes in 2002 to 113,874 tonnes in 2003.

WASTE GENERATION IN THE INDUSTRIAL SECTOR (t)

Industry type	Non-hazardous waste		Hazardous waste	
	2002	2003	2002	2003
Mining and quarrying	35,490,345	30,838,995	3,077	113,874
Manufacturing	19,823,594	24,471,874	1,533,828	2,005,832
Energy	2,150,794	2,093,688	38,634	25,706
Total	**57,464,733**	**57,404,557**	**1,575,539**	**2,145,412**

Source: Survey on Waste Generation in the Industrial Sector (*Encuesta sobre generación de residuos en el sector industrial*). INE 2006.

Between 2002 and 2003, operating expenditure on environmental issues within the industrial sector rose by 15.2%, while companies' investment in environmental protection fell by 9%.

ENVIRONMENTAL PROTECTION EXPENDITURE BY INDUSTRIAL ENTERPRISES 2002 AND 2003 (€)

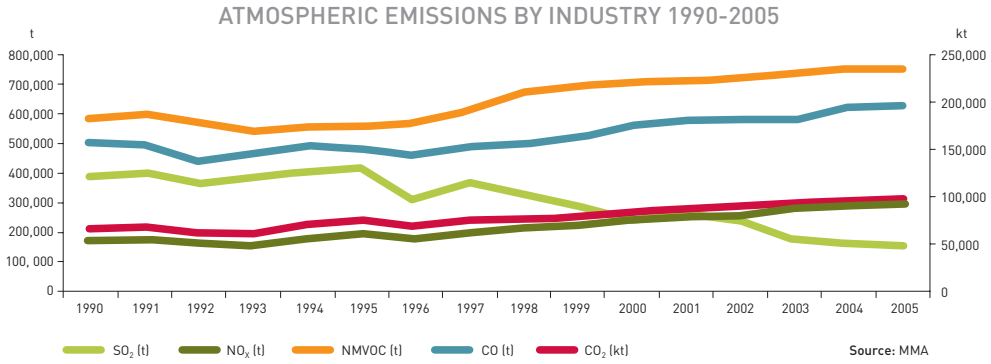
	2002	2003	Increase (%)
Investment expenditure	889,969,665	810,291,569	-9.0
Operating expenditure	1,001,250,144	1,153,341,358	15.2
Total	**1,891,219,809**	**1,963,632,927**	**3.8**

Source: Survey on Environmental Protection Expenditure by Industrial Enterprises (*Encuesta sobre el gasto de las empresas industriales en protección medioambiental*). INE 2006

Meanwhile, there has also been a notable increase in the number of industrial enterprises which have signed up to the European EMAS environmental management scheme, above all in the Autonomous Communities of Catalonia and Madrid. In fact, Spain has more companies with ISO 14001 environmental certification than any other European Union country.

Atmospheric emissions by industry

Over the period 1990-2005, only SO2 showed a clear downward trend



Atmospheric emissions of pollutant gases generated by industry have an impact on climate change, environmental acidification, the formation of tropospheric ozone and environmental health.

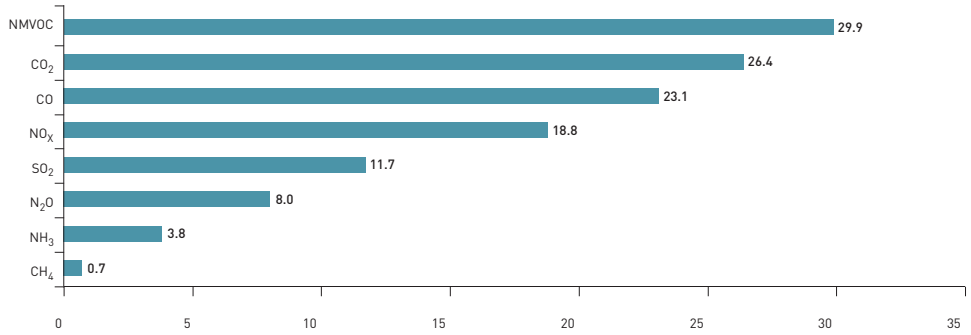
Emissions of certain gases have fallen appreciably over recent years within the European Union, with industrial emissions of acidifying gases, in particular, falling by 16% between 1990 and 2002. This reduction was mainly the result of natural gas replacing other fuels, the introduction of desulphurisation of combustion gas and the downturn in economic activity in certain regions of Germany.

Spain saw a downward trend in SO_2 emissions between 1990 and 2005, with a reduction of 61.5%. Between 2004 and 2005, these emissions dropped by 5.6%, in line with the underlying trend.

Over the same period, emissions of NO_x rose by 71.1%, CO_2 by 51.1%, NMVOC by 29.4% and CO by 24.4%. However, the increases last year compared with 2004 were moderate, with figures of 3.5% for NO_x and even a slight fall of 0.1% in NMVOC. In 2004 and 2005, lower levels of hydroelectric energy production in Spain resulted in greater use of fossil fuels for energy generating purposes, with a consequent increase in emissions.

Industry's overall contribution to total pollutant emissions in 2005 is depicted in the graph. Of particular significance is the sector's role in emissions of NMVOC, CO_2 and CO, all at levels above 20% of the total for Spain (29.9%, 26.4% and 23.1%, respectively).

EMISSIONS BY INDUSTRY COMPARED WITH TOTAL EMISSIONS 2005 (%)



Source: MMA

NOTES

- The indicator shows the changes in emissions of each of the pollutants generated by industry. In this edition, and in accordance with the SNAP classification, the following groups or sectors are considered industrial: Industrial combustion plants, Non-combustion industrial processes and Use of solvents and other products. The categories for combustion and energy transformation are not included, since these emissions are covered in the chapter on energy, nor are emissions generated by the extraction and distribution of fossil fuels and geothermal energy included.
- The graph shows changes in the pollutants emitted by industry in greatest quantity (SOx, CO2, NOx and NMVOC). For reasons of scale, the indicator does not include emissions of fluorinated gases, although these are 100% industrial in origin. The change in such emissions between 1990 and 2005 was as follows:

EMISSIONS OF FLUORINATED GASES (kg)

	1990	1995	2000	2005
SF_6	2,800	4,533	8,561	11,365
HFCs	205,400	399,110	1,502,996	2,269,989
PFCs	131,825	123,961	61,145	35,943

Source: MMA

SOURCES

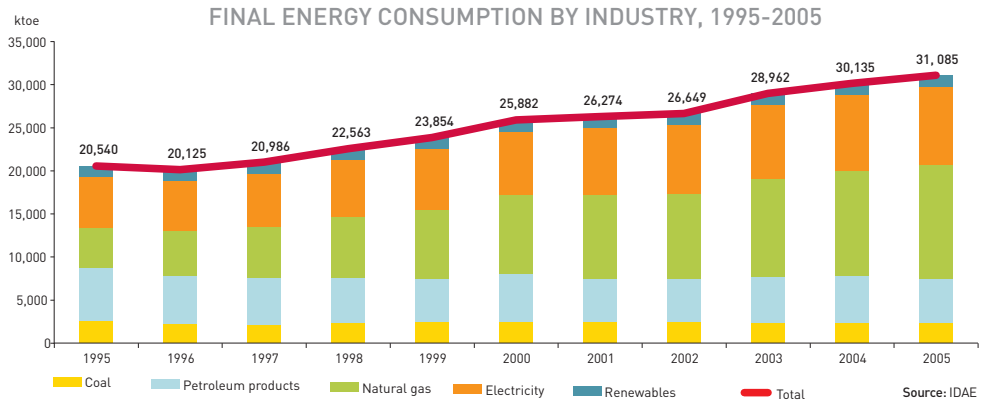
- Spanish National Atmospheric Emissions Inventory *(Inventario Nacional de Emisiones a la Atmósfera)*. Sub-Directorate General for Air Quality and Risk Prevention *(Subdirección General de Calidad del Aire y Prevención de Riesgos)*. Spanish Ministry of the Environment *(Ministerio de Medio Ambiente)*.

FURTHER INFORMATION

- www.mma.es

Energy consumption by industry

Industrial processes have driven an appreciable increase in energy consumption



Industry's final energy consumption continues to rise, with no change in this trend evident in the figures. There is, however, a change in the breakdown of final energy consumption. This edition only presents figures for energy consumption, and does not include petroleum products or gas used in industrial processes which do not directly produce energy.

The figure for coal remains practically unchanged (2,360 Ktoe in 2004 and 2,395 Ktoe in 2005). The use of petroleum products fell from 5,397 Ktoe in 2004 to 5,013 Ktoe in 2005, a reduction offset by the increase in use of natural gas, which rose from 12,259 Ktoe in 2004 to 13,292 Ktoe in 2005. As a source of final energy for industry, gas climbed from 4,643 Ktoe in 1995 to 13,292 Ktoe in 2005, almost trebling in eleven years.

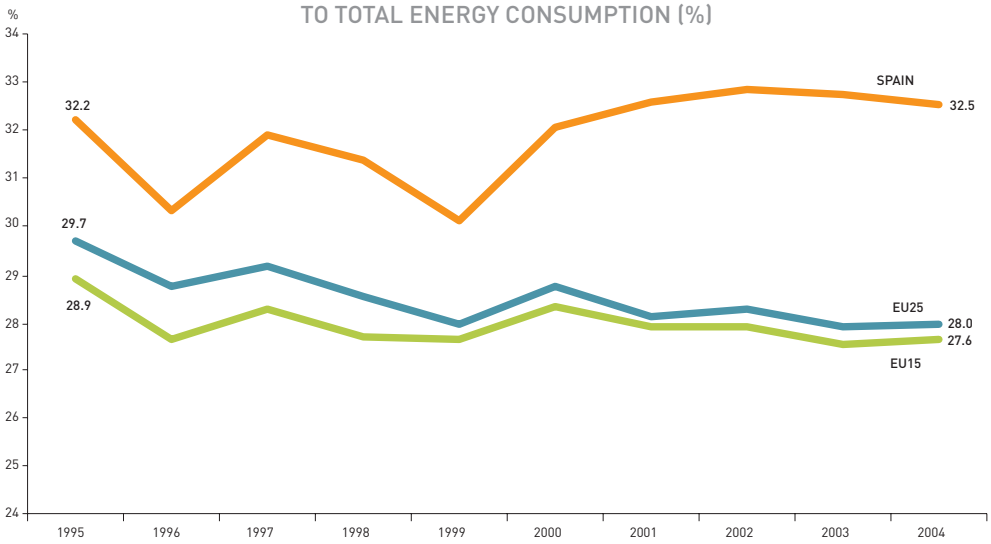
Renewable energy is making slow progress as a source of final energy for industry, with the total for the renewable energy sources included (thermal solar energy and biomass) rising from 1,238 Ktoe in 1995 to 1,352 Ktoe in 2005. Practically all this energy proceeds from biomass (1,238 Ktoe in 1995 and 1,351 Ktoe in 2005). The expansion of thermal solar energy continues apace, although the figures are not yet significant (0.01 Ktoe in 1995, rising to 1.29 Ktoe in 2005).

The breakdown by source for the final energy consumed by industry in 2005 is as follows: oil 16.13%, natural gas 42.76%, electricity 29.02%, coal 7.70% and renewables 4.35%. Over the period 1995-2005, final energy consumption by industry rose by close to 35%.

The percentage of final energy consumption by industry compared with total energy

consumption in Spain is on the decrease, although it still stood at close to 32.5% in 2004 according to Eurostat figures. In the European Union, this figure stands at around 27.6% for the EU15 countries and at approximately 28% for the EU25. Therefore, energy consumption in Spain in industrial processes remains higher than in the rest of the EU.

ENERGY CONSUMPTION BY INDUSTRY COMPARED TO TOTAL ENERGY CONSUMPTION (%)



Source: Eurostat

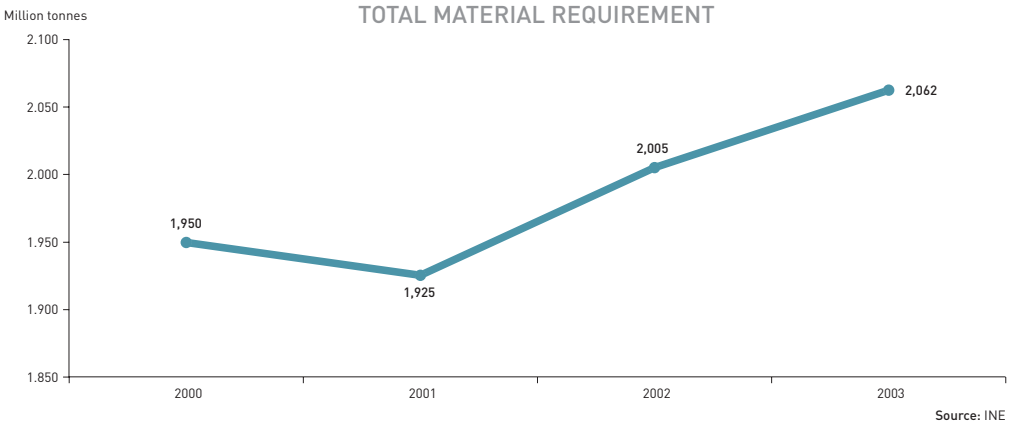
NOTES
- The 2005 final energy consumption figures are provisional.

SOURCES
- Energy in Spain 2005 *(La Energía en España 2005)*. Spanish Ministry of Trade, Industry and Tourism.
- Energy efficiency and renewable energy *(Eficiencia energética y energías renovables)*. Spanish Institute for Energy Saving and Diversification (IDAE - *Instituto para la Diversificación y Ahorro de la Energía)*. Spanish Ministry of Trade, Industry and Tourism.

FURTHER INFORMATION
- www.mityc.es
- www.idae.es
- http://epp.eurostat.cec.eu.int/

Total Material Requirement

Materials consumption in Spain is on the increase



Source: INE

The Total Material Requirement (TMR) indicator estimates total consumption of materials by all of the productive processes involved in a country's economic activity, enabling the balance between materials extraction from the natural environment and reincorporation of 'leftovers' resulting from the manufacturing process to be analysed.

To calculate Total Material Requirement, the INE uses the following variables: domestic extraction (fossil fuels, minerals and biomass), imported materials (raw materials and semi-manufactured and finished products), and the extraction of resources that are not used (crop biomass and the by-products of mining and land excavation). It also includes indirect flows associated with imports.

Despite a downturn in 2001, materials consumption in Spain shows overall growth of 6% for the period 2000-2003. There has been a very sharp increase in domestic mining and quarrying of materials, rising by 22% over the period considered, compared with a 4% fall in the indirect flow of imports.

The material flow account reveals an 11.5% fall in the extraction of fossil fuels during 2000-2003, and an increase of 33% in total mineral extraction (both for industrial and construction purposes). The use of biomass, meanwhile, remains stable.

NOTES

- Changes made by the INE to certain coefficients used in calculating this indicator prevent comparison with earlier years, as included in the previous edition of this publication. The aim of these changes is to include the modifications made to European methodology, including the change in the presentation of the breakdown of minerals, replacing the non-metallic and mined minerals categories with industrial and construction minerals, together with the new breakdown by types of waste, adapted to modifications in the Waste Statistics.

SOURCES

- Total Material Requirement: Spanish National Institute of Statistics (INE – *Instituto Nacional de Estadística*). Material flow accounts. Inebase. In Environment: Environmental Accounts *(Medio ambiente: cuentas ambientales)*.

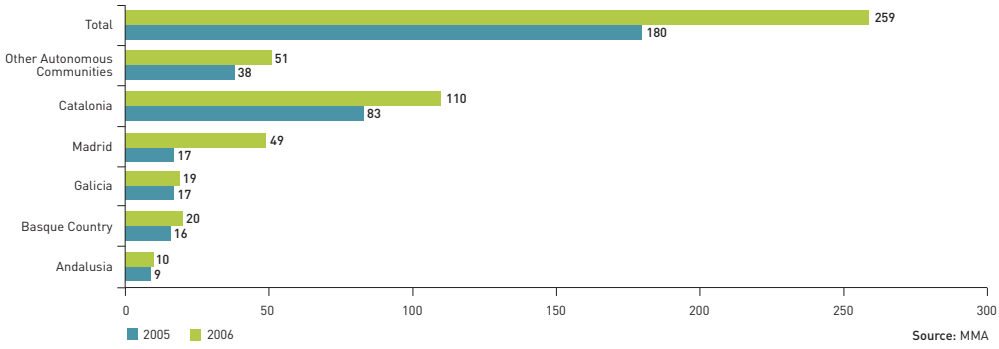
FURTHER INFORMATION

- www.ine.es
- www.eea.europa.eu
- http://epp.eurostat.cec.eu.int/

Number of industrial enterprises with Environmental Management Systems

Spain is one of Europe's leaders in terms of the number of companies registered with EMAS Environmental Management System or which hold ISO 14001 certification

NUMBER OF SPANISH INDUSTRIAL ENTERPRISES REGISTERED WITH EMAS (September 2006)



Source: MMA

EMAS (Eco-Management and Audit Scheme) is the European Union's environmental management system. It is a voluntary scheme enabling enterprises and organisations to assess and improve their environmental performance.

Between December 2003 and May 2005, the number of industrial enterprises in Spain registered with this Environmental Management System increased by 31.6%. Of the total number of 526 enterprises registered with EMAS in May 2005, 179 belonged to the industrial sector (34%).

NO. OF INDUSTRIAL ENTERPRISES REGISTERED WITH EMAS, 2003-2005

2003	2005	Increase
136	179	31.6 %

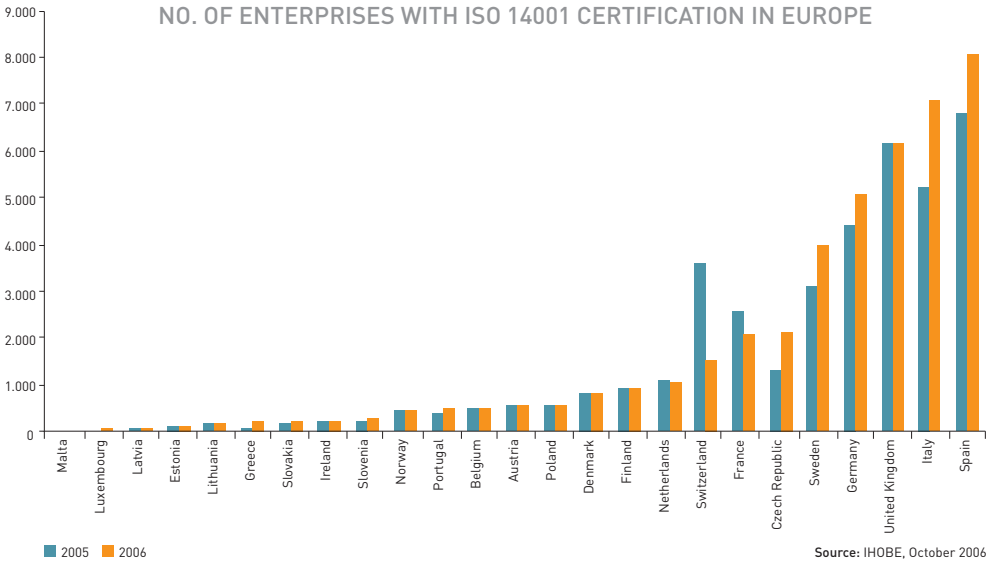
Source: MMA

Within Europe, and taking into account the total number of enterprises, Spain holds second place (behind Germany) in the ranking by number of companies registered with EMAS. In relation to population size, Spain holds fourth place (behind Austria, Denmark and Germany) among the EU countries, with 12 enterprises registered with EMAS for every million inhabitants (data as of 14 September, 2005, published on the EU EMAS website).

ISO 14001 is another international environmental certification system and Spain has the world's third-highest number of certified enterprises, behind Japan and China. Within Europe, it leads the ranking with 6,879 certifications, followed by the United Kingdom

(6,223), Italy (5,304) and Germany (4,440) (data as of October 2005, provided by IHOBE).

The graph below shows the total number of enterprises of all kinds with ISO 14001 certification in European countries in 2005 and 2006.



Source: IHOBE, October 2006

NOTES

- For the purpose of calculating this indicator, the enterprises included are those in categories 10 to 41 of the CNAE classification. Therefore, this excludes farming, fishing and forestry, as well as the construction and service industries.
- The EMAS system is governed by Regulation 761/2001, of 19 March, 2001, which includes the basic provisions of the previous Regulation (1836/93, of 29 June, 1993), while extending the scope to achieve greater participation. EMAS now extends to all enterprises, irrespective of the sector to which they belong. Actions arising from its application include:
  - Establishment and application of environmental management systems in enterprises, and systematic, objective, regular assessment of their operation
  - Dissemination of information about environmental performance
  - Active involvement of employees in the programme, achieved through continuous vocational training.
- The ISO 14000 series is a voluntary set of standards intended to achieve environmental commitment within organisations. The purpose of ISO standards is to develop a common focus for environmental management systems that is internationally recognised
- The ISO 14001 standard was adopted in 1996 as the international standard governing the design of environment management systems. The ISO 14001 EMS is defined as: "The part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy" (ISO 14001, 1996).

SOURCES

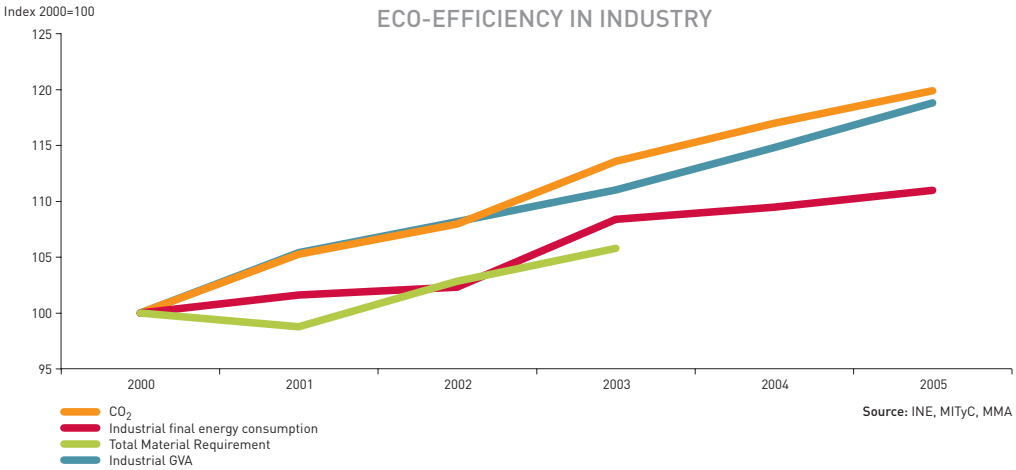
- European EMAS data: EMAS website.
- Data for Spain: Spanish Ministry of the Environment website (EMAS section, under Environmental Quality).
- ISO 14001 data: International Organisation for Standardization and IHOBE, S.A. websites.

FURTHER INFORMATION

- www.europa.eu/comm/environment/emas
- www.mma.es/calid_amb/ma_ind/index.htm
- www.ihobe.es
- www2.ihobe.net/CertMed.nsf
- www.iso.org

Eco-efficiency in industry

The sector's GVA, as well as its CO_2 emissions, continues to rise at levels above energy consumption and material requirement



In analysing eco-efficiency in the industrial sector, a comparison has been made between changes in economic growth in industry (measured in terms of its GVA at current prices, including industrial activity but not construction), final energy consumption, use of resources expressed as total material requirement and atmospheric CO_2 emissions generated by the industrial sector.

In general, economic growth in industry has gone hand-in-hand with, and been slightly surpassed by, CO_2 emissions (18.8% and 19.9%, respectively, over the period 2000-2005).

Final energy consumption also rose over the same period (10.9%), although at a lower rate than GVA. However, from 2003 onwards a return to previous rates of growth is evident which, while not the most desirable trend from an environmental perspective, does show signs of decoupling from economic growth.

Changes in Total Material Requirement, for which information is available only for the years 2000-2003 (following the modifications made to the previous methodology in order to include alterations to European methodology), show a clear link with economic growth within the sector, running practically in parallel from 2001 onwards (increase of 5.8% up until 2003).

SOURCES

- Gross Value Added at current prices by sector. Spanish National Institute of Statistics (INE). Spanish National Accounts *(Contabilidad Nacional de España)*. Economic accounts *(Cuentas económicas)*. Base 1995.
- Spanish Institute for Energy Saving and Diversification (IDAE), Spanish Ministry of Trade, Industry and Transport (Ministerio de Industria, Transporte y Comercio).
- Energy in Spain 2005. Spanish Ministry of Trade, Industry and Transport.
- Data on emissions of atmospheric pollutants from the Spanish National Atmospheric Emissions Inventory *(Inventario Nacional de Emisiones de Contaminantes a la Atmósfera)*. Sub-Directorate General for Air Quality and Risk Prevention. Spanish Ministry of the Environment.
- TMR: Material flow accounts *(Cuentas de flujos de materiales)*. Series 2000-2003. In: Physical and Natural Environment. Environmental Accounts *(Entorno físico y medio ambiente. Cuentas ambientales)*.

FURTHER INFORMATION

- www.ine.es
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- www.mityc.es
- www.eea.europa.eu