

EN16 Final Energy Consumption by Sector

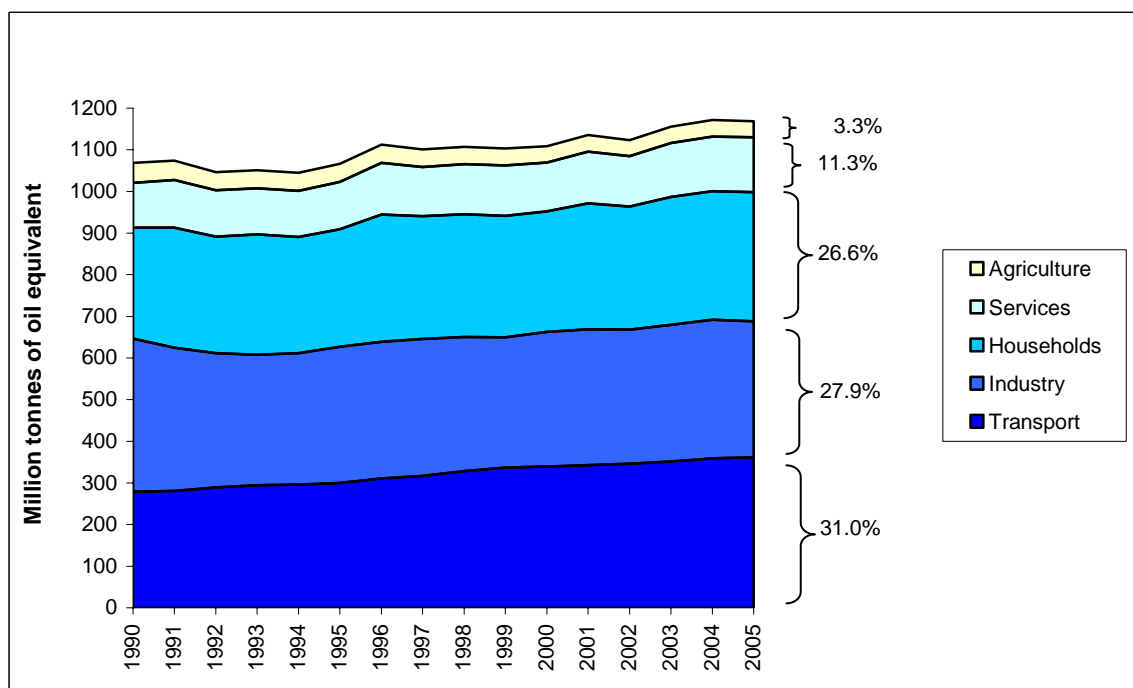
Key message

Final energy consumption in the EU-27 fell by 0.3% from 2004 to 2005 but has increased by 9.3% overall between 1990 and 2005. Transport has been the fastest-growing sector since 1990 and is now the largest consumer of final energy.

Rationale

The trend in final energy consumption by sector provides a broad indication of progress made in reducing energy consumption and associated environmental impacts by the different end-use sectors. It can be used to help monitor the success of key policies that attempt to influence energy consumption and energy efficiency.

Fig. 1: Final energy consumption by sector in the EU-27, 1990-2005



Data source: EEA, Eurostat (historic data)

1. Indicator assessment

Final energy consumption in the EU-27 increased by 9.3 % between 1990 and 2005, thus to an extent counteracting reductions in the environmental impact of energy production, which were achieved as a result of fuel mix changes and technological improvements (see energy and environment indicators on EEA website <http://www.eea.europa.eu/themes/energy/indicators>). Between 2004 and 2005, final energy consumption fell slightly by 0.3 %. The fastest growing sector was transport, followed by households and services. Final energy consumption in industry fell on average during 1990-2005 although the bulk of the fall occurred during the early 1990s economic recession.

Transport was the fastest-growing energy-consuming sector in the EU-27 between 1990 and 2005, with final energy consumption increasing by almost 30 %. Improvements in fuel efficiency were offset by increases in passenger and freight transport demand. Higher transport demand has resulted from increased ownership of private cars, particularly in the new EU

Member States, growing settlement and urban sprawl with longer distances and changes in lifestyle. Rapid increases in passenger aviation have contributed significantly to the increased transport demand. Aviation (both domestic and international) represented about 12-14% of energy consumption in the transport sector in 2005 and grew by about 75% between 1990 and 2005. This is in part due to the growth of low-cost airlines, which have made this mode of transport more accessible to a larger section of the population. By 2005, transport became the largest consumer of final energy in the EU.

Household final energy consumption increased by about 16 % during 1990-2005 as rising personal incomes have permitted higher standards of living, with increases in comfort levels and the ownership of domestic appliances. Real electricity prices in households fell over the same period. Space heating and cooling is the most significant component of household energy demand, and can vary substantially from year to year depending on climatic variations. However, it is the demand for electricity from appliances that has increased most rapidly in percentage terms in recent years.

Final energy consumption in services grew by about 22 % between 1990 and 2005. This was due to the continued increase in the demand for electrical appliances, in particular information and communication technology (such as computers and photocopiers), and also for other energy-intensive technologies such as air-conditioning. Higher summer land surface temperatures in Europe can also help explain these trends (see core set indicator on global and European temperature).

Final energy consumption in industry fell by about 11 % between 1990 and 2005. This was largely the result of a shift towards less energy-intensive manufacturing industries, as well as the continuing transition to a more service-oriented economy.

Projections:

Projections from POLES and IEA indicate an overall increase of the final energy consumption for all the scenario's.. In comparison with all the scenario's, the GHG Reduction Scenario has a focus on reducing the final energy consumption the most.

Fig 3: Final Energy Consumption by sector and per capita, EU-27, 2020 (million TOE)

	(IPTS) POLES		(IEA) WEO 2007	
	Baseline	GHG Reduction	Reference	Alternative Policy
Agriculture	32	35	557	528
Services	483	424		
Households				
Industry	509	471	446	430
Transport	363	324	409	385
TOTAL	1,387	1,254	1413	1343
Per capita final energy consumption (TOE/inhabitant)	2.9	2.6	x	X

Data source: IPTS, IEA

2. Indicator rationale

2.1 Environmental context

The trend in final energy consumption by sector provides a broad indication of progress in reducing energy consumption and associated environmental impacts by the different end-use sectors (transport, industry, services (incl. agriculture) and households). It can be used to support monitoring of the success of key policies that attempt to influence energy consumption and energy efficiency.

Final energy consumption helps to estimate the scale of environmental impacts of energy use, such as air pollution, global warming and oil pollution. The type and extent of energy-related pressures on the environment depends both on the sources of energy (and how they are used) and on the total amount of energy consumed. One way of reducing energy-related pressures on the environment is thus to use less energy. This may result from reducing the demand for energy-related activities (e.g. for warmth, passenger or freight transport), or by using energy in a more efficient way (thereby using less energy per unit of activity), or a combination of the two.

2.2 Policy context

The reduction of final energy consumption is seen in the context of enhancing the security of energy supply and reducing greenhouse gas emissions, for which a target of a 20 – 30% reduction in 2020 has been set by the Commission and the Council. In the short term, it will help in reaching the target of an 8 % reduction in greenhouse gas emissions by 2008-2012 from 1990 levels for the EU-15 and individual targets for most new Member - States, as agreed in 1997 under the Kyoto Protocol of the United Nations Framework Convention on Climate Change.

The European Commission proposed (in January 2008) a new climate change and energy package. Parts of the package are an improvement of the EU Emissions Trading Scheme (requiring a 21% emission reduction in 2020 vs. 2005), and binding targets for Member States for emissions outside of the EU-ETS. When adopted, it can be expected that these policy-proposals will further stimulate energy-efficiency, and could result in a decrease of final energy consumption.

The new Commission proposals follow the communication of the Commission "An energy policy for Europe" (COM(2007)2) and the European Council Action Plan (2007 – 2009) "Energy Policy for Europe". In these plans a target for improvement of energy-efficiency by 20% in 2020 (vs. the reference development of energy-use) has been set. Member States will make National Energy Efficiency Action Plans to reach this purpose.

In the Action Plan on Energy Efficiency (20 October 2006), the Commission put forward six pillars and five actions for realising an improvement in energy-efficiency. The actions refer to efficiency-requirements for energy-using equipment, energy-efficient transport, energy-saving behaviour of energy consumers, innovations in energy technology and energy savings from buildings. The Action Plan was supported by the Council 23 November 2006 (15210/06). This Action Plan follows the EU's Green Paper on energy efficiency (COM(2005)265 final) which estimates that the EU could reduce its current level of energy consumption by up to 20 % in a cost-effective manner (with a technical potential of almost 40 %). It aims to identify and address the reasons why these cost effective improvements are not already being taken up, in particular on the demand side, as well as aiming to drive forward a new EU-wide energy efficiency initiative.

In line with this, the directive on energy end-use efficiency and energy services aims at boosting the cost-effective and efficient use of energy in the EU (2006/32/EC) and the Eco Design Directive (2005/32/EC) sets a framework for standards for energy-efficiency of energy-using equipment.

Regarding the transport-sector the Commission has negotiated a voluntary agreement with car manufacturers, with a target of 140 g CO₂/km by 2008/2009. Although some improvements have been made, it is expected that this will not be met. Beyond these voluntary agreements, the European Commission is preparing legislative proposals aiming at a reduction of CO₂-emission to 120 – 130 g/km by 2012. In addition, measures on tyre pressures are being taken, as better tyre pressures can also reduce fuel consumption by over 5%.

Fig. 4: Final energy consumption (million TOE) and per capita final consumption, EU-27

	1990	1995	2000	2004	2005	Per capita final energy consumption in 2005 (TOE per inhabitant)
EEA	1,125	1,130	1,185	1,252	1,253	2.2
EU-27	1,069	1,066	1,109	1,172	1,169	2.4
EU-15	859	897	958	1,007	1,005	2.6
World	5,490	6,207	6,632	7,261	7,443	1.1
MENA	146	178	209	243	255	0.8
United States	1,236	1,306	1,466	1,496	1,500	5.0
China	451	777	762	994	1,082	0.8
Russia	633	448	403	406	396	2.8
Belgium	31.3	34.5	36.9	37.4	36.4	3.5
Bulgaria	16.1	11.4	8.6	9.1	9.5	1.2
Czech Republic	36.3	24.1	22.4	26.2	25.8	2.5
Denmark	13.5	14.7	14.6	15.3	15.3	2.8
Germany	226.8	222.4	218.2	221.8	217.9	2.6
Estonia	6.2	2.5	2.4	2.8	2.8	2.1
Ireland	7.4	7.9	10.7	11.7	12.3	2.9
Greece	14.5	15.8	18.5	20.2	20.7	1.9
Spain	56.7	63.5	79.4	94.3	97.2	2.2
France	135.4	141.2	152.1	158.8	158.2	2.5
Italy	107.2	113.7	123.3	132.6	134.1	2.3
Cyprus	1.1	1.4	1.6	1.8	1.7	2.2
Latvia	6.4	3.8	3.3	3.9	4.0	1.7
Lithuania	9.7	4.6	3.7	4.3	4.5	1.3
Luxembourg	3.3	3.2	3.5	4.3	4.4	9.6
Hungary	19.2	15.7	15.8	17.4	18.1	1.8
Malta	0.3	0.5	0.4	0.5	0.5	1.3
Netherlands	42.9	47.7	50.2	52.5	51.6	3.2
Austria	19.1	20.9	23.1	26.2	27.3	3.3
Poland	59.6	63.5	55.1	56.9	57.2	1.5
Portugal	11.8	13.8	17.7	20.1	18.7	1.8
Romania	36.9	26.7	22.5	26.1	24.5	1.1
Slovenia	3.4	3.9	4.4	4.8	4.9	2.4
Slovakia	14.7	10.9	10.5	10.9	10.6	2.0
Finland	21.7	22.0	24.2	26.1	25.2	4.8
Sweden	30.5	33.7	34.4	33.6	33.7	3.7
United Kingdom	136.9	142.4	151.7	152.0	151.6	2.5
Turkey	38.5	44.7	55.4	60.1	63.2	0.9
Iceland	1.6	1.7	2.1	2.2	2.2	7.3
Norway	16.1	16.9	18.1	18.4	18.6	4.0

Data Source: Eurostat, EEA, IEA

Notes: TOE refers to Ton of Oil equivalent. No data was available from Eurostat for Switzerland. MENA refers to Middle East and North Africa. No data was available from IEA for Djibouti, Iran or Palestinian territories (MENA countries)

References

COM (2005) 265 final – Green Paper on energy efficiency, or doing more with less , European Commission
http://europa.eu.int/comm/energy/efficiency/doc/2005_06_green_paper_text_en.pdf

COM (2006) 32 Directive of the European Parliament and the Council on energy end-use efficiency and energy services.
 Council resolution on energy efficiency 98/C 394/01

COM (2007)2 final – Limiting Global Climate Change to 2 degrees Celsius. The way ahead for 2020 and beyond.

Directive 2005/32/EC – Eco design directive

European Commission, climate action, energy for a changing world (climate change and energy package),
http://ec.europa.eu/news/energy/080123_1_en.htm

European Council, 23 november 2006, Brussels (15210/06): Sustainability of energy production and consumption: Promoting Energy Efficiency and Renewable Energy

Presidency conclusions European Council (7224/1/07), 8/9 march, Brussels

Meta data

Technical information

1. Data source:
 Final Energy Consumption: Eurostat (historical data) <http://ec.europa.eu/comm/eurostat/>
 Final Energy Consumption non European countries: IEA <http://data.iea.org/IEASTORE/DEFAULT.ASP>
 Final energy consumption is one of the European Environment Agency's core-set indicators. More information can be found at <http://themes.eea.eu.int/IMS/CSI>.
2. Description of data/Indicator definition:
 Final energy consumption covers energy supplied to the final consumer for all energy uses. It is calculated as the sum of final energy consumption of all sectors. These are disaggregated to cover industry, transport, households, services and agriculture.
 The indicator can be presented in relative or absolute terms. The relative contribution of a specific sector is measured by the ratio between the final energy consumption of that sector and total final energy consumption calculated for a calendar year. It is a useful indicator which highlights a country's sectoral needs in terms of final energy demand.
 Units: Final energy consumption is measured in thousand tonnes of oil equivalent (ktoe).
 Projections are for 2020 from the POLES (IPTS) Baseline and GHG Reduction Scenario and from the WEO 2007 (IEA) Reference and Alternative Policy Scenario.
3. Geographical coverage:
 The Agency had 32 member countries at the time of writing of this fact sheet. These are the 27 European Union Member States and Turkey, plus the EFTA4 countries (Iceland, Switzerland and Norway). There are 20 MENA (Middle East and North Africa) countries. No energy data is available for Switzerland, Djibouti, Iran and Palestinian territories.
4. Temporal coverage: 1990-2005, Projections 2020.
5. Methodology and frequency of data collection:
 Data collected annually.
 Eurostat definitions for energy statistics <http://forum.europa.eu.int/irc/dsis/coded/info/data/coded/en/Theme9.htm>
 Eurostat metadata for energy statistics http://europa.eu.int/estatref/info/sdds/en/sirene/energy_base.htm
6. Methodology of data manipulation:
 Average annual rate of growth calculated using: $[(\text{last year}/\text{base year})^{(1/\text{number of years})} - 1] * 100$
 The coding (used in the Eurostat database) and specific components of the indicator are:
 - Numerator: final energy consumption industry 101800 + final energy consumption transport 101900 + final energy consumption households 102010 + final energy consumption services/agriculture calculated as (final energy consumption households/services 102000 - final energy consumption households 102010).
 - Only if needed for shares; Denominator: (total) final energy consumption 101700
 The coding (used in the IEA database) and specific components of the indicator are:
 - Total Final Consumption – Memo: Feedstock use in petrochemical industry.
 Projections:
 POLES: Demand of fuel by sectors (Mtoe)
 Population (Mcap)
 WEO 2007: -

Qualitative information

7. Strengths and weaknesses (at data level)
 Officially reported data, updated annually. No obvious weaknesses.
 Data have been traditionally compiled by Eurostat through the annual Joint Questionnaires, shared by Eurostat and the International Energy Agency, following a well established and harmonised methodology. Methodological information on the annual Joint Questionnaires and data compilation can be found in Eurostat's web page for metadata on energy statistics.
http://europa.eu.int/estatref/info/sdds/en/sirene/energy_sm1.htm.
8. Reliability, accuracy, robustness, uncertainty (at data level):
 Indicator uncertainty (historical data):
 Any cross-country comparison of the distribution of final energy consumption between sectors will have to be accompanied by a relevant measure of the importance of the sector in the economy, as the sectoral shares also depends on the country's economic circumstances.

Because the focus is on the reduction of final energy consumption and not on the sectoral redistribution of such consumption, the trends in the absolute values (in thousand tonnes of oil equivalent) should be preferred as a more meaningful indicator of progress. However, even if the same sectors in two countries are equally important to the economy, the gross (primary) consumption of energy needed before it reaches the final user might draw from energy sources that pollute the environment in different ways. Thus, from an environmental point of view, the final energy consumption of a sector should be analysed in that broader context.

The sectoral breakdown of final energy consumption includes industry, transport, households, services, agriculture, fisheries and other sectors. The projection data aggregates agriculture, fisheries and other sectors together with the services sector, and projections are based on such aggregation. To be consistent with these projections, the core set indicator uses the same aggregation. The inclusion of agriculture and fisheries together with the services sector is however questionable given their divergent trends. Separate assessments are therefore made where appropriate. It is worth noting that according to Eurostat final energy consumption in agriculture is not very reliable and it mainly means consumption from engines used for agricultural transportation. From next year a new definition will be used in the energy questionnaires to be more in line with the IPCC guidelines.

9. Overall scoring – historic data (1 = no major problems, 3 = major reservations):

Relevance: 1

Accuracy: 1

Comparability over time: 1

Comparability over space: 1