

EN31 Energy prices

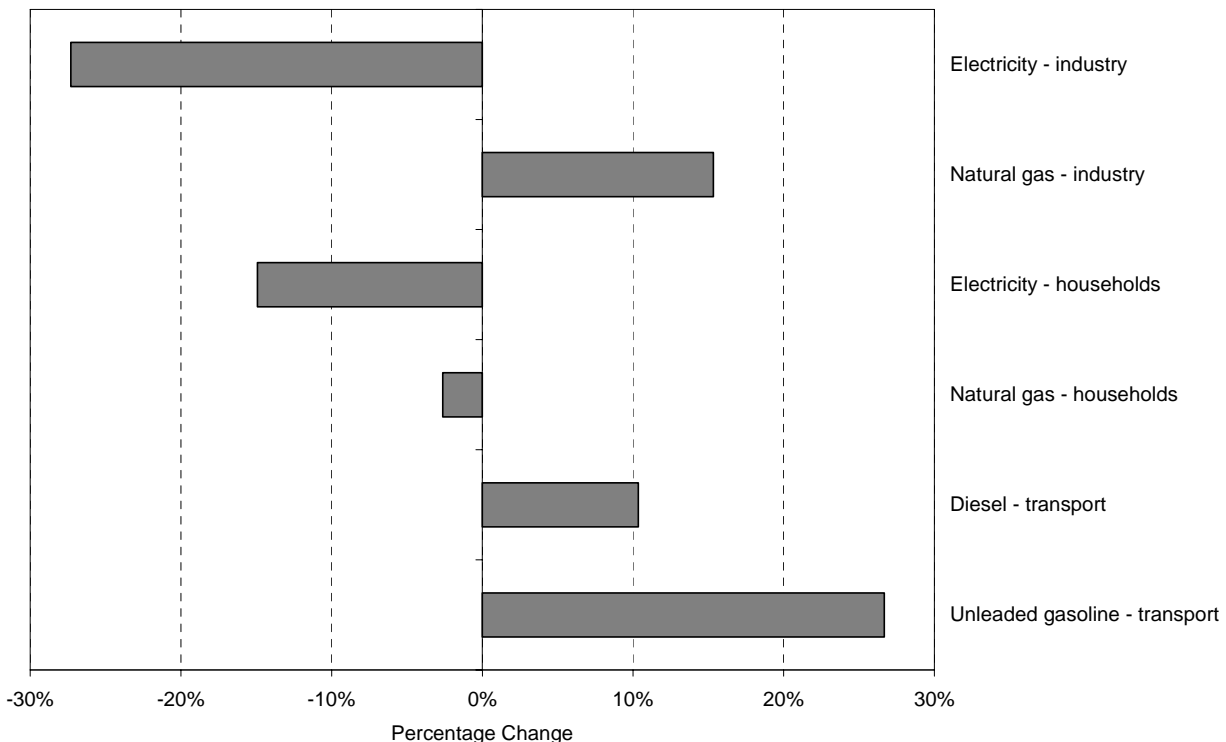
Key message

The real end use price of electricity and natural gas in the pre-2004 EU-15 fell between 1991 and 2005, except in the case of natural gas for industry. Electricity prices saw the largest reductions during the 1990s, due to the introduction of cheaper fuels such as gas for electricity production and increased competition in electricity markets. Significant price increases were seen for road transport fuels as a result of increasing tax levels and higher world oil prices. Prices in the new Member States are starting to better reflect the economic costs of fuel production. They are still lower than in the EU-15.

Rationale

The absolute level of final energy prices and their trends may influence overall energy consumption or demand for specific fuels in different sectors. Increasing energy prices may provide an incentive for end users to reduce their energy consumption and so reduce the burden on the environment. Changes in relative prices between substitutable fuels may also encourage fuel switching.

Fig. 1: Change in selected end user energy prices between 1991 and 2004 or 2005, EU-15

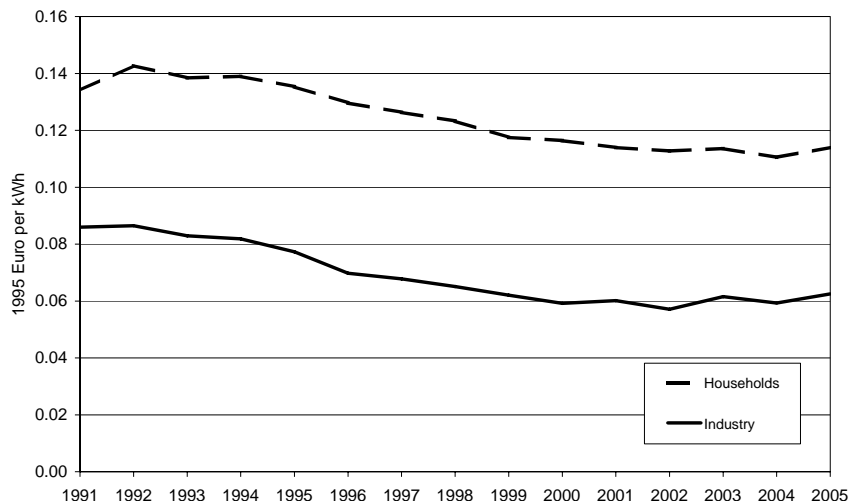


Notes: Price changes are between 1991 and 2004 for gasoline and diesel and between 1991 and 2005 for electricity and gas. Prices for industrial users do not include VAT. Industrial gas users are defined as follows: annual consumption of 41 860 GJ, and load factor of 200 days (1 600 hours). The reference annual consumption of gas for households is 83.70 GJ. Industrial electricity users are defined as follows: annual consumption of 2 000 MWh, maximum demand of 500 kW and annual load of 4 000 hours. The reference annual electricity consumption for households is 3 500 kWh of which 1 300 are at night. DG TREN, European Commission collects the data for transport fuels. All prices have been deflated to constant prices using the 1995 GDP deflator.

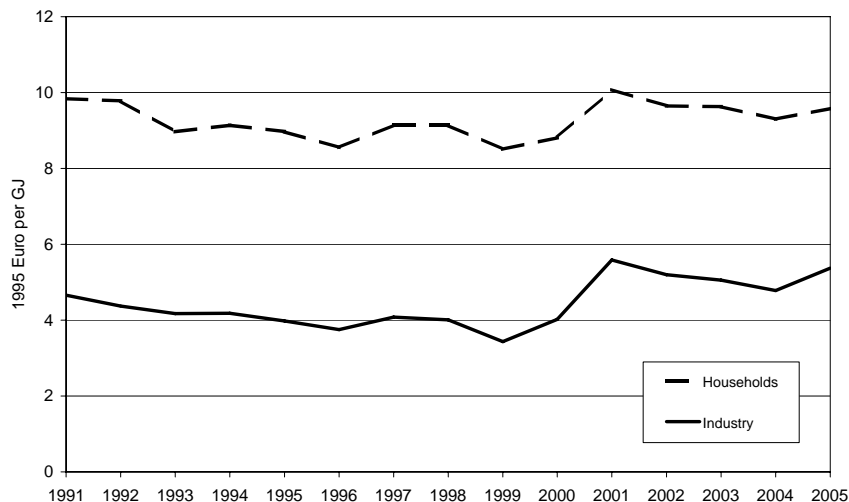
Source: Eurostat

Fig. 2: Trend in the selected end-user energy prices, in real terms, in EU-15

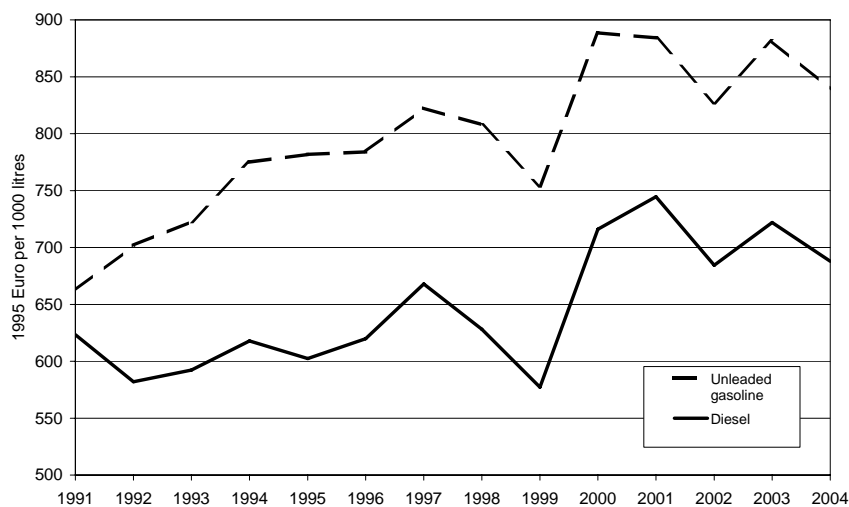
a) electricity



b) natural gas



c) transport fuels



Note: Prices are those applicable in January of each year in each Member State and have been weighted by national energy consumption to calculate average values for the EU-15 and converted to constant prices in 1995 Euros to remove the effect of inflation. Value Added Tax (VAT) is excluded from industry fuel prices. Eurostat collect data for different consumer categories (see meta-data data section). No price estimations are made to fill gaps.

Source: Eurostat for electricity and gas taxes; DG TREN (Oil bulletin), European Commission, for gasoline and diesel fuel taxes.



1. Indicator assessment

For the pre 2004 EU-15, final energy prices for most fuels, except those used for transport, have fallen since 1991, although prices since 2000 have often been higher than in the late 1990s. There are much fewer time series data available for new Member States, but the available evidence is that they are still generally lower than in the EU-15, although prices have risen significantly since the early 1990s. This increase is the result of a gradual liberalisation of energy prices and the removal of cross subsidies in the new Member States from central and eastern Europe. While under the former communist regimes energy prices were regulated and subsidised, and thus were much lower than their production costs, prices now better reflect the costs of production. In recent years this process has accelerated, as full price liberalisation was a necessary step before accession to the European Union.

The most significant price decreases since 1991 in both households and industry in the EU-15 have been for **electricity** (–14.9 % and –27.3 %, respectively, over the period 1991–2005), due to greater competition in electricity markets as a result of market liberalisation, fuel switching and the move towards the use of cheaper technologies for electricity production such as combined cycle gas turbines. Electricity prices were also greatly influenced by the development of the gas distribution infrastructure in the EU and a sharp decrease in gas prices during the 1990s, closely following a decrease in oil prices. Since 2000, electricity prices to both households and industry have tended to stabilise as higher gas prices have offset any reductions from liberalisation. In 1991, there were wide differences in electricity prices between EU-15 Member States, with more than a factor of two between the most expensive and cheapest electricity prices to both industry and households (at market exchange rates - MER). Since then, prices have started to converge, particularly in industry. It can be expected that the developing single market for electricity will lead to a continued trend towards more consistent electricity prices across the EU-15, although different tax levels (particularly in the household sector) mean that some variation will remain. In new Member States, electricity prices are typically around half of the EU-15 average for households and around 30 % less for industry, when converted to Euros at market exchange rates, but are very similar or sometimes even greater when expressed in purchasing power standards (PPS). Currently, the highest electricity prices (at MER) are in Denmark (households) and Italy (industry), with the lowest prices in Malta (households) and Latvia (industry).

Natural gas prices in the EU-15 declined through much of the early 1990s, reflecting increased production of natural gas from the North Sea and falling natural gas import prices (which historically have been linked to world crude oil prices). Over the period 1991-2005, the real price of gas for household dropped by 2.6 %. However, since the late 1990s natural gas prices have started to rise, reflecting higher import prices as a result of increases in the price of crude oil. The recent rise in gas prices has been particularly noticeable in industry (with prices now above their 1991 levels), as prices in this sector tend to be closest to the underlying costs. For the domestic sector, households in the EU-15 usually buy their gas under fixed price tariffs that do not respond to short term cost increases, but even in this sector a general upward trend is around the end of the turn of the century, although prices then declined again slightly between 2001 and 2004, before rising again in 2005. In the new Member States gas prices are currently below the level seen in the EU-15 and in the household sector this difference can be more than 50 % (at market exchange rates). However, when calculated at PPS gas prices in households are similar and, in industry, gas prices in the new-10 are often higher than in the EU-15. Currently, the highest gas prices (at MER) are in Denmark (households) and Sweden (industry), while the lowest gas prices are in Latvia (households) and Estonia (industry).

Road transport has the highest end-user fuel prices of any sector, due to the large share of taxation in the final price. Both **gasoline** and **diesel** have seen a significant increase in the EU-15 since 1991 due to both increasing tax rates and, more recently, rising world crude oil prices (see EN32 for more information about taxation). Over the 1990s, the level of tax applied to unleaded gasoline dominated price trends. When unleaded gasoline was first widely introduced in 1991, a lower tax was applied in order to encourage rapid uptake to replace leaded gasoline (which was being phased out). This tax break was progressively removed as gasoline consumption switched to unleaded gasoline. Diesel prices also increased in most Member States and again tax rates are important in determining the final user price and these are typically lower than for unleaded gasoline.

On average, diesel is substantially cheaper (per 1000 litres) than gasoline in the EU-15. This, together with its higher energy content and efficiency and improved diesel technology may explain the rapidly growing share of diesel vehicles in European countries. For larger mileages, driving a diesel vehicle is cheaper than a gasoline fuelled vehicle, since a diesel vehicle is about 20 % more efficient than a gasoline vehicle, although the engine is more expensive and the annual road tax higher in most countries. However, as well as fuel prices, differences in purchasing costs have also influence on the choice of the engine type with vehicle purchase. An increase in the share of diesel vehicles still poses air quality problems since even a new diesel vehicle (Euro-4) emits considerably more NO_x and PM₁₀ than a gasoline vehicle.

Table 1: Selected end user prices in 2004 or 2005 in current euros by country

	Electricity for households (Euros/kWh)	Gas for households (Euros/GJ)	Electricity for industry (Euros/kWh)	Gas for industry (Euros/GJ)
Austria	0.14	13.4	0.08	8.2
Belgium	0.15	11.2	0.08	5.3
Cyprus	0.11	:	0.08	:
Czech Republic	0.09	7.5	0.06	5.1
Denmark	0.23	28.4	0.07	6.8
Estonia	0.07	4.6	0.05	2.8
Finland	0.11	:	0.06	6.9
France	0.12	10.6	0.06	6.4
Germany	0.18	13.6	0.09	8.9
Greece	0.07	:	0.06	:
Hungary	0.11	6.2	0.07	6.0
Ireland	0.14	10.0	0.09	:
Italy	0.20	:	0.11	:
Latvia	0.08	4.5	0.04	3.5
Lithuania	0.07	5.4	0.05	3.6
Luxembourg	0.15	8.1	0.09	7.0
Malta	0.06	:	0.06	:
Netherlands	0.20	15.2	0.09	5.6
Poland	0.09	7.6	0.06	5.3
Portugal	0.14	12.3	0.07	6.2
Slovakia	0.13	8.1	0.07	5.1
Slovenia	0.10	10.3	0.06	5.9
Spain	0.11	11.9	0.07	4.7
Sweden	0.14	22.2	0.05	9.2
United Kingdom	0.09	7.3	0.06	6.1

Notes: See definition of groups in metadata section. All taxes are included for households. Value added tax (VAT) is excluded from industry fuel prices.
Source: Eurostat

2. Indicator rationale

2.1 Environmental context

Final energy prices and their trends may influence energy demand overall or demand for specific fuels in different sectors, and thus change the underlying environmental pressure of energy production and use. Increasing energy prices may provide an additional incentive for end users to reduce their energy use, through a combination of good housekeeping, purchasing more energy efficient products and reducing their demand for energy services. Changes in relative prices between substitutable fuels may also encourage fuel switching.

However, energy consumers are not always responsive to changes in fuel prices and historical evidence suggests that the price elasticity of demand, particularly in short term, is quite low. For instance an IEA publication concludes that demand response to price changes for electricity is typically low. However, it goes on to say that despite this, studies of price responsiveness in electricity markets show that customers can and do respond to price signals, but only when the conditions are right (IEA, 2003).

2.2 Policy context

Energy prices in the European Union are strongly affected by world demand and by both external geopolitical factors, mainly related to energy supply, and internal issues relating to market liberalisation, tax and environmental regulations.

Key external geopolitical factors include the oil production and oil pricing policies of the Organisation of Petroleum Exporting Countries (OPEC) and the political situation in the Middle East; the broadening of the oil and gas production base through the discovery and exploitation of new reserves in North Africa and the Eastern and Central European Countries, Caucasus and Central Asia, and the historical link between world oil and gas prices (due to fuel switching possibilities).

Internal factors affecting energy prices are:

- The liberalisation of electricity and gas markets (directives 2003/54/EC and 2003/55/EC), removal of cross subsidies in the new Member States and the expansion of the natural gas network;
- Legislation setting minimum levels of taxation on energy products, such as directive (2003/96/EC) on an EU-wide system of taxation of energy products, which introduces minimum levels of energy taxation on energy products;

- The move to better incorporate environmental costs into prices through environmental taxes or emission trading systems. National energy or carbon taxes have been introduced by a number of Member States including Denmark, Finland, Germany, the Netherlands, Sweden, and the United Kingdom (EEA, 2006).
- Air pollution charges – on emissions of SO₂, NO_x, or solid particulate matter – are widespread across the EEA countries including in the Czech Republic, Estonia, France, Italy, Latvia, Lithuania, Poland, Romania, Sweden and Turkey.
- European legislation also allows for reduced tax rates for certain environmentally more benign sources of energy. Examples include biofuels (2003/30/EC), which are subject to tax exemptions in many countries and renewable electricity (2001/77/EC), which benefits from a wide range of support including green certificates, investment aid, tax exemptions or reductions, tax refunds and direct price support schemes.

References

EEA (2005): Market-based instruments for Environmental Policy in Europe - Forthcoming

European Commission (2000) Towards a European Strategy for the Security of Energy Supply, Green Paper, COM(2000) 769 final

Eurostat (2005) Energy, transport and environment indicators, data 1991-2002

IEA (2003) The Power to Choose -- Demand Response in Liberalised Electricity Markets, International Energy Agency, Paris.

Meta data

Technical information

1. Data source (incl. data of most recent update)
Electricity and gas prices: Eurostat data for structural indicators
Transport fuel prices: DG TREN (Oil bulletin) http://europa.eu.int/comm/energy/oil/bulletin/2003_en.htm
2. Description of data/Indicator definition
Fuel prices in constant 1995 Euros per GJ, per kWh or per 1000 litres applicable in January each year. The data on the prices for electricity and natural gas for industry and households are for reference (or standard) consumers. Reference consumers are defined in the Council Directive 90/377/EEC of 29 June 1990 concerning a Community procedure to improve the transparency of gas and electricity prices charged to industrial end-users and on a gentleman's agreement for households. The reference consumers are those used in the structural indicators and are characterised by a selected annual consumption, maximum demand and annual utilisation, as follows:
Electricity for households: Households - Dc (Annual consumption: 3 500 kWh of which night 1 300)
Electricity for industry: Industry - Ie (Annual consumption: 2 000 MWh; maximum demand: 500 kW; annual load: 4 000 hours) (for Luxembourg: 50 % power reduction during hours of heavy loading)
Gas for households: Households - D3 (Annual consumption: 83.70 GJ)
Gas for industry: Industry - I3-1 (Annual consumption: 41 860 GJ; load factor: 200 days, 1 600 hours) (for Belgium: fixed supply (non-erasable) for non-specific applications that can easily be substituted by residual fuel oils (CNE 1 P 1))
Information on gasoline and diesel fuel prices (with and without taxes) are available from DG TREN (Oil bulletin), European Commission http://www.eu.int/comm/energy/oil/bulletin/index_en.htm
3. Geographical coverage: EU-15, with some data for the new Member States
4. Temporal coverage: 1991 – 2005 (1991- 2004 for transport fuels)
5. Methodology and frequency of data collection:
Data is collected by Eurostat. Some countries provide national prices, either as an arithmetical average from the regional prices, or weighted average using the annual consumption as a weight-factor. Price changes are, among other things, compared with the previous period. No price estimations are done. The prices aren't seasonally adjusted.
Gas and electricity prices correspond to prices applicable on 1st January each year. Prices are originally collected in national currencies per kWh (electricity) and per GigaJoule (natural gas). For countries outside the euro-zone, they are converted into EUR per kWh and GJ using the monthly average exchange rates (for January)
Eurostat Metadata for prices/taxes in the network industries (electricity and gas) can be found at:
http://europa.eu.int/estatref/info/sdds/en/strind/ecoref_pni_sm.htm
Price data for gasoline and diesel fuel (with and without taxes) can be obtained from DG TREN (Oil bulletin), European Commission http://www.eu.int/comm/energy/oil/bulletin/index_en.htm
6. Methodology of data manipulation:
Eurostat collects price data on gas and electricity for different consumer categories as described above and presents these in three

forms: 1) prices without taxes, 2) prices without VAT and 3) prices with all taxes included. For the transport fuels data is provided by DG Tren (European Commission). All prices and taxes are then deflated to constant 1995 prices using the GDP deflator.

Qualitative information

7. Strengths and weaknesses (at data level)

See Eurostat's metadata for prices in the network industries (electricity and gas)

http://europa.eu.int/estatref/info/sdds/en/strind/ecoref_pni_base.htm

8. Reliability, accuracy, robustness, uncertainty (at data level):

The main document is Council Directive of 29 June 1990 concerning a Community procedure to improve the transparency of gas and electricity prices charged to industrial end-users.

Quality profiles are produced by Eurostat in close co-operation with the National Statistical Institutes of the EU-Member States covering, so far, the structural indicators that have been added to the database in 2004 and the structural indicators on the short list.

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

Relevance: 1

Accuracy: 1

Comparability over time: 2 (New Member States 3)

Comparability over space: 1.5 (New Member States 3)