

## EN31 Energy prices

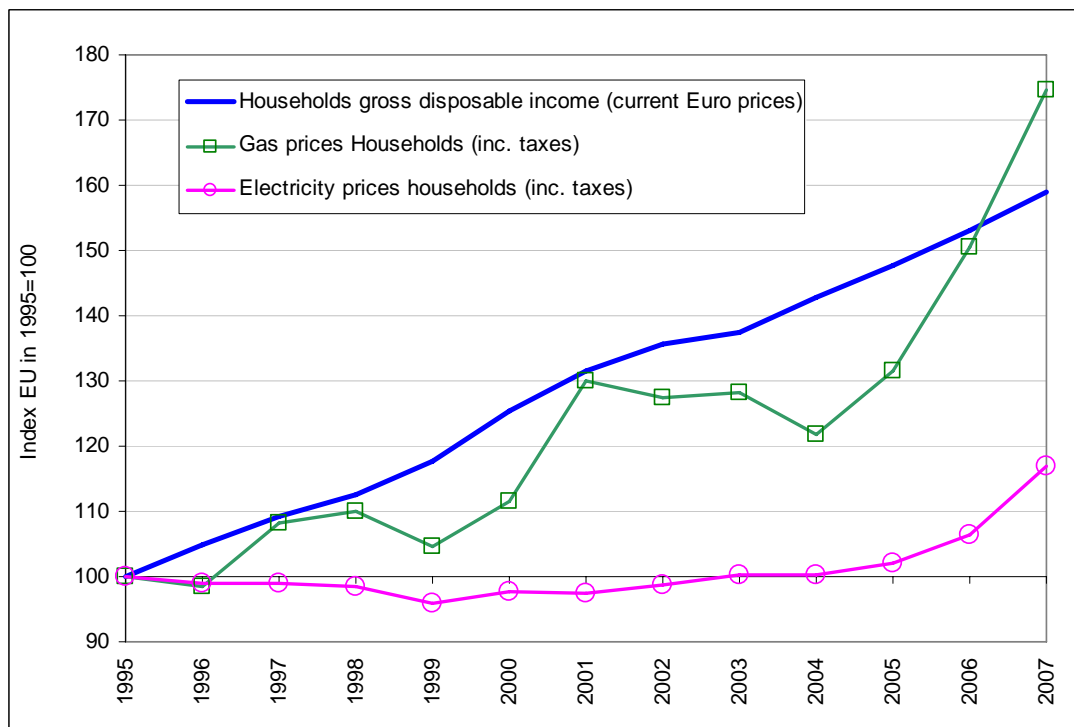
### Key message

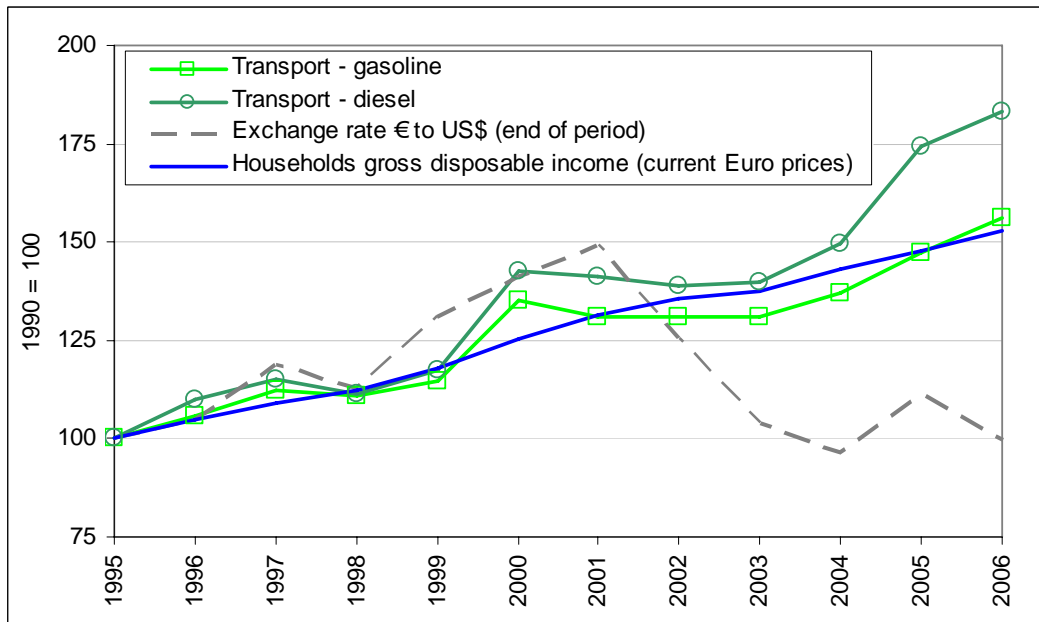
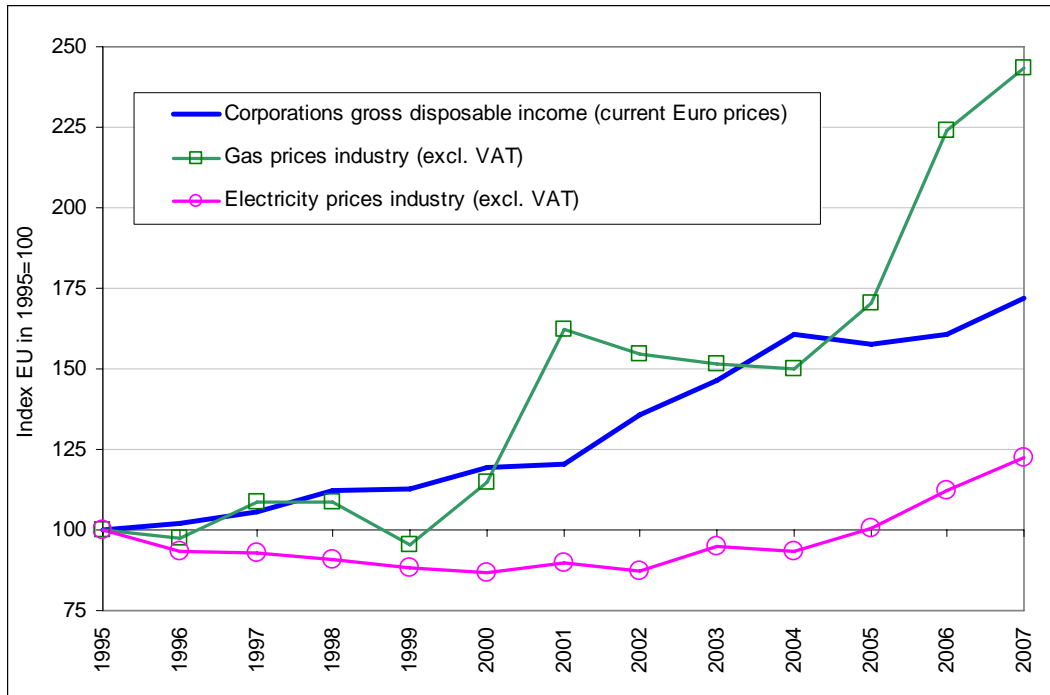
The nominal end user price of electricity and gas for both industry and households in the EU-15 rose from 2007 compared to 2006. This continues a period of rapid price rises from around 2004 onwards. For electricity, this reversed a trend of falling prices throughout the 1990s, due to the introduction of cheaper fuels such as gas for electricity production and increased competition in electricity markets. For gas and road transport fuels, end user prices have been higher this decade than in the 1990s and rose sharply from 2004 onwards. This was driven by rising world oil prices, to which the price of gas is broadly linked. Household and corporation disposable income has broadly kept pace with energy prices over the period, but this relationship has broken down with respect to gas prices in recent years.

### 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 are also drivers for fuel switching.

**Figure 1: Trends in nominal end user energy prices and disposable income, EU15 (EU-25 for road transport fuels)**

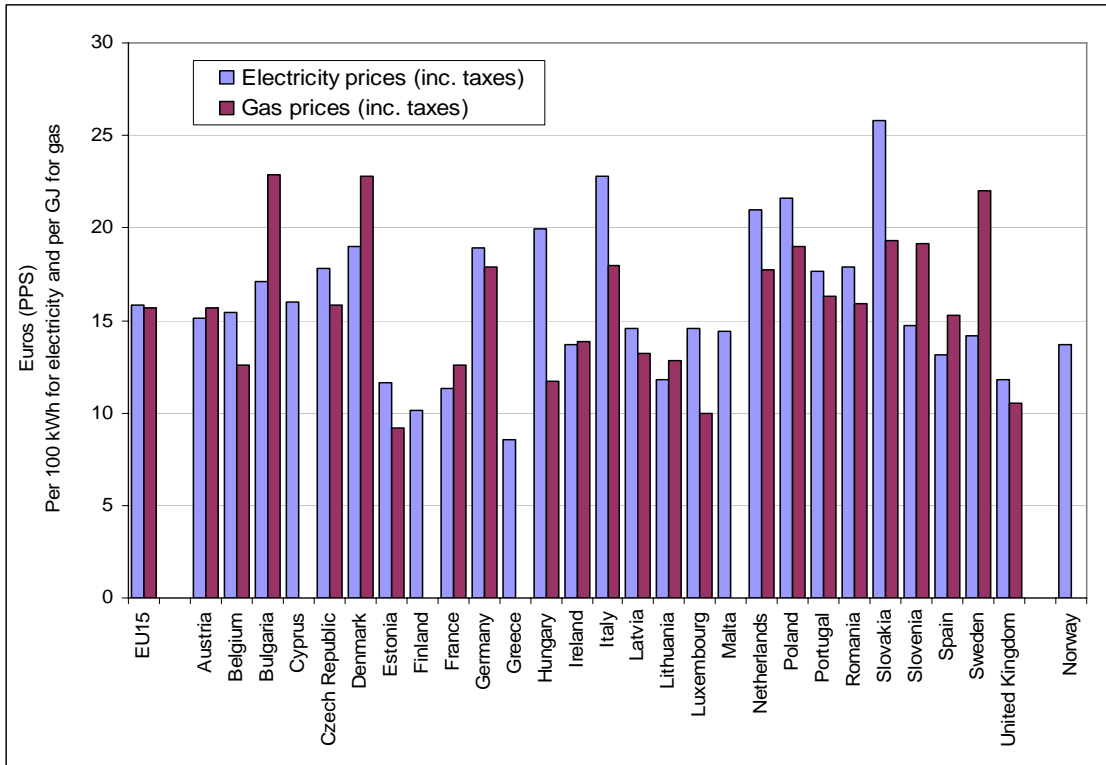




Source: EEA, Eurostat, DG Tren

Notes: 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. Trends for households and industry are for the EU15, trends in transport fuel prices are for the EU25.

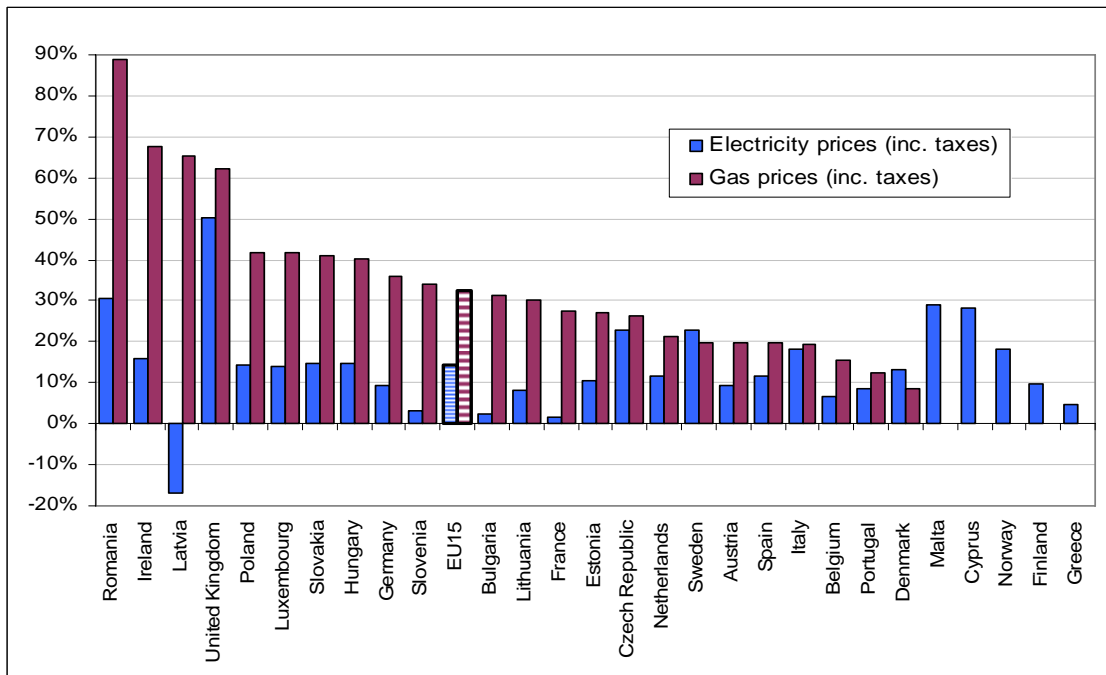
**Figure 2: Household electricity and gas prices 2007 - adjusted for purchasing power**



**Source:** Eurostat

**Notes:** PPS = Purchasing Power Standards. Electricity prices (PPS) are those for an average consumer with an annual consumption of 3500 kWh of which 1300 at night. Gas prices (PPS) are those for an average consumer with an annual consumption of 83.70 GJ. Data on PPS gas prices are not available for Malta, Cyprus, Norway, Finland and Greece (hence the last two are not included in the EU15 figure).

**Figure 3: Change in household electricity and gas prices from 2005-2007**



**Data source:** Eurostat

**Note:** Electricity prices are those for an average consumer with an annual consumption of 3500 kWh of which 1300 at night. Gas prices are those for an average consumer with an annual consumption of 83.70 GJ. Data on gas prices are not available for Malta, Cyprus, Norway, Finland and Greece (hence the last two are not included in the EU15 figure).

## 1. Indicator assessment

Household electricity prices for the EU-15 dropped slightly from around 1995 to 1999, driven by a decrease in gas prices used for electricity generation, but they started to rise again afterwards. From 2000 onwards increased liberalisation and competition in the electricity market, acted to push down prices. These reductions were offset to some extent by rising input fuel prices. Overall price rises have been particularly steep since 2004 and now prices are almost 17 % above 1995 levels. Gas prices have been on a steep upward trend since 1995 but accelerated from 2004 onwards driven by rising oil prices (to which the price of gas is generally linked). In 2007 gas prices were almost 75 % above their 1995 levels.

By comparison, EU-15 household gross disposable income grew steadily over the period, roughly keeping pace with gas price rises and well ahead of changes in electricity but this does not appear to be the case anymore in recent years. Should households have maintained the 1995 levels of energy consumption, they would have had more disposable income (on average) because of the difference between the growth in income and the pace of energy price rises.

However, given the rise in household energy consumption and rapid energy price increases in recent years, the energy bill is likely to increase its share in the household income in the near future. In addition, average EU figures mask fluctuations in energy prices across member states, and low income households will be acutely affected. Gas and electricity prices and disposable incomes have also followed a similar pattern in industry, although the rise in gas prices in the last few years has been even more rapid than in households (to some extent due to fewer remaining price controls in this sector compared to households). For some industries these price rises may be offset to an extent because they have the ability to insulate themselves from large price variations by signing up to longer term fixed price energy supply contracts.

The pattern of price changes for households excluding taxes is similar - household prices shown here include all taxes, whilst industry already excludes VAT (see EN32 for more information on energy taxes). Hence the price increases are driven by other factors such as rapid increase in the price of the fuels themselves and the internalisation of some environmental costs to consumers (e.g. via the EU Emissions Trading Scheme). Similarly, the price increases for diesel and gasoline over the period were driven primarily by rising world oil prices, which have both risen by over 50 % from 1990 to 2006.

Rising energy prices are a key driver of energy efficiency improvements, in particular for energy intensive industry where energy can account for a significant portion of overall costs. It is estimated that end-user energy efficiency has improved by around 5.2% and 10.5% for households and industry, respectively, in the EU-15 from 1995 to 2005 (8.4% and 14.1% for the EU-27) (Odyssee, 2008). It should be noted that these improvements are also driven by a range of other factors (such as legislation on minimum efficiency standards). The existence of market failures (e.g. lack of capital to invest in efficiency improvements) means that the link between prices and efficiency is more limited in some cases.

Household electricity and gas prices vary quite substantially across the EU member states even when compared at purchasing power standards (i.e. comparing the cost of a similar 'basket' of goods and services purchased using local currency) as opposed to foreign exchange rates. In the case of electricity, this varies by a factor of three and a factor of two in the case of gas. The variation reflects differences in taxation rates, fuel input prices, efficiency of generation, the supply structure and any market distortions resulting from differences in the speed of liberalisation of the energy market (e.g. price controls or other subsidies) which mean that prices do not properly reflect the costs of production. Where the price signal for energy is masked, this may lead to higher end-user energy consumption than would otherwise be the case.

For households across the EU member states, the rapid price rises from 2005-2007 have been most significant in natural gas, with an average increase of over 30 % (for EU-15). In particular, countries such as Romania, Ireland, Latvia and the UK have seen rises of over 50 %. Electricity prices also rose rapidly in countries such as the UK, Sweden, Czech Republic and Romania, but not to the same extent as gas, as input fuels for electricity production can be diversified to a certain extent as input prices rise.

Latvia experiences the lowest electricity prices in Europe due to its generation mix (around 68% of gross electricity generation was from hydro in 2005), the configuration of the power system and the geopolitical location (bilateral agreements with Russia). Planned integration with other low price areas in Europe (Scandinavia and Poland) could facilitate lower prices in the future and enhance competition among generators significantly. Energy prices in Romania reflect a complex set of market circumstances, most

notably the need for new investments in new generation capacity, market reform and increasing price for imported gas from Russia.

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 1995 due to 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, and led to increases in the end user price for unleaded gasoline. Diesel prices have also increased in most Member States since the 1990s and again tax rates, although lower than for unleaded gasoline, are important in determining the final user price. Tax rates have been relatively stable since 2000 with the main cause of the most recent increase in prices being the increase in world oil prices. On average, diesel is about 15% cheaper (per 1000 litres) than gasoline in the EU-25. This, together with its higher energy content, the higher efficiency of diesel engines and improved diesel technology may explain the rapidly growing share of diesel vehicles in European countries. Although a diesel engine is more expensive and the annual road tax higher in most countries, for higher mileages, driving a diesel vehicle is cheaper than a gasoline fuelled vehicle, since it is about 20 % more efficient. While an increase in the share of diesel vehicles may help to reduce CO<sub>2</sub> emissions from transport, it still poses air quality problems, as even a new diesel vehicle (meeting Euro IV standards) emits considerably more NO<sub>x</sub> and PM<sub>10</sub> than a new gasoline vehicle.

## 2. Indicator rationale

### 2.1 Environmental context

Final energy prices and their trends may influence overall energy demand 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 the short term, is quite low. For example, IEA (2006) indicates that at the European level a doubling of oil prices would lead to 3% decrease in consumption in the short-term (around one year) and around 11% over 10 years if the price increase persisted.

### 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. Over the last few years the world price of crude oil has risen significantly, showing several sharp spikes in price due to a variety of factors, many of them relating to increases in political tension, particularly in the Middle East. More generally though, some oil analysts believe that the longer term upward trend is due to underlying concerns about a future supply demand imbalance due to declining petroleum reserves, and increasing demand.

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. The EU has recently proposed (DG TREN, 2007) a number of updates and extensions to these Directives including: COM (2007) 0528 Common rules for the internal market in electricity; COM (2007) 0531 Cross-border exchanges in electricity; COM (2007) 0529 Common rules for the internal market in natural gas, and COM (2007) 0532 Access conditions to the gas transmission 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 European Council (EC, 2008) has recommended that this be reviewed to bring it more closely in line with environmental and climate change related policies. The Commission Green Paper on market-based instruments for environment and related policies (COM(2007) 140 final) outlines some of the proposed changes to the Energy Taxation Directive in more detail;
- The move to better incorporate environmental costs into prices through environmental taxes or trading schemes, in particular, the EU Emissions Trading Scheme (Directive 2003/87/EC). National energy or carbon taxes have also been introduced by a number of Member States including Denmark, Finland, Germany, the Netherlands, Sweden, and the United Kingdom. Air pollution charges – on emissions of SO<sub>2</sub>, NO<sub>x</sub>, or solid particulate matter – are also widespread across the EEA countries including in the Czech Republic, Estonia, France, Italy, Latvia, Lithuania, Poland, Romania, Sweden and Turkey (DG TAXUD, 2008);
- European legislation also allows for reduced tax rates for certain more environmentally 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.
- On January 23rd 2008 the European Commission presented a new comprehensive package on climate change and energy (COM(2008)16, 17 and 19), which will indirectly impact on energy prices. This package is a bundle of legislative proposals aimed at realising at least a 20% reduction in emissions of greenhouse gases in 2020. It includes an improvement of the EU Emissions Trading Scheme (with a binding target of a 21% emission reduction of greenhouse gases in 2020 vs. 2005 for large sources of CO<sub>2</sub>-emissions), targets for Member States for emissions outside the EU-ETS and targets for the use of renewable energy sources.

## References

DG TAXUD (2008) Taxes in Europe Database

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DG TREN (2007) The EU Electricity & Gas markets: third legislative package September 2007

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## Meta data

Technical information

1. Data source (incl. data of most recent update)

Electricity and gas prices: Eurostat data for structural indicators

Exchange rate US\$ to € (end of period): Eurostat

Transport fuel prices: DG TREN (Oil bulletin) <http://europa.eu.int/comm/energy/oil/bulletin/>



## 2. Description of data/Indicator definition

Current fuel prices in Euros per 100 kWh, per GJ 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 (N.B. these categories will be updated for 2008 data according 2007/394/EC: Commission Decision of 7 June 2007 amending Council Directive 90/377/EEC with regard to the methodology to be applied for the collection of gas and electricity prices charged to industrial end-users). 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](http://www.eu.int/comm/energy/oil/bulletin/index_en.htm)

3. Geographical coverage: EU-15 for electricity, natural gas and disposable income, EU-25 for transport fuels.

4. Temporal coverage: 1995 – 2007 (1995 - 2006 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 undertaken. The prices are not 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 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://epp.eurostat.ec.europa.eu/portal/page?\\_pageid=0,1136239,0\\_45571447&\\_dad=portal&\\_schema=PORTAL](http://epp.eurostat.ec.europa.eu/portal/page?_pageid=0,1136239,0_45571447&_dad=portal&_schema=PORTAL)

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](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. The tax component of energy prices for households is calculated by subtracting prices without taxes from prices including all taxes. For industry, it is calculated by subtracting prices without taxes from prices without VAT. For the transport fuels data is provided by DG Tren (European Commission) in a similar form and the same calculations as for households are applied.

## Qualitative information

### 7. Strengths and weaknesses (at data level)

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

[http://epp.eurostat.ec.europa.eu/portal/page?\\_pageid=0,1136239,0\\_45571447&\\_dad=portal&\\_schema=PORTAL](http://epp.eurostat.ec.europa.eu/portal/page?_pageid=0,1136239,0_45571447&_dad=portal&_schema=PORTAL)

### 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 (N.B. these categories will be updated for 2008 data according 2007/394/EC: Commission Decision of 7 June 2007 amending Council Directive 90/377/EEC with regard to the methodology to be applied for the collection 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

Comparability over space: 2