EN34 Energy Subsidies

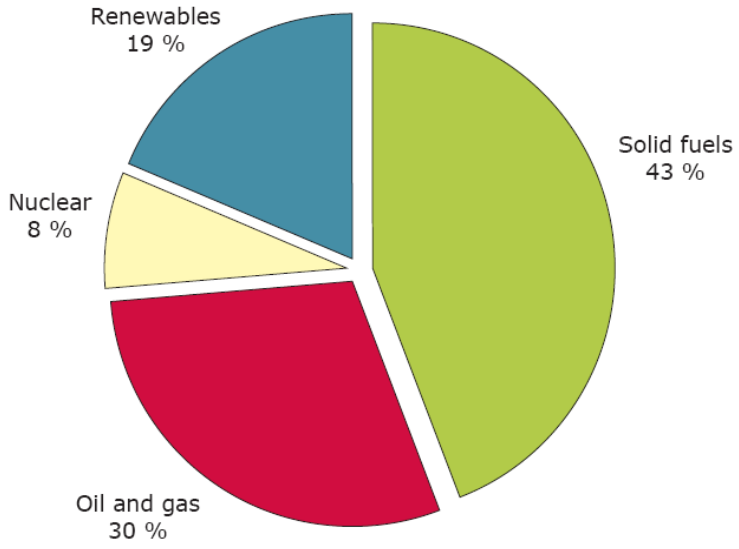
Key message

Energy subsidies in the EU-15 have been estimated to amount to over EUR 29 billion in 2001 with almost three quarters oriented towards the support of fossil fuels, despite the pressures and threats that these fuels place on the environment. However, there has been a significant increase in the subsidies and support mechanisms available for renewable energies. Total funding for energy research and development has declined steadily over the period 1990 to 2002, to just over half its initial level.

Rationale

Energy subsidies can be either beneficial or damaging to the environment. Damaging subsidies are those that lower the price of behaviour that is detrimental to the environment, thus encouraging excessive energy consumption, or making the cost of more-environmentally harmful fuels lower relative to those that are less harmful. In contrast, subsidies that are beneficial to the environment improve the competitiveness of environmentally sound practices by reducing their price relative to those that damage the environment.

Fig. 1: Indicative estimate of the distribution of energy subsidies in the EU 15, 2001



Source: Energy Subsidies in the European Union: A Brief Overview, European Environment Agency, 2004 http://reports.eea.eu.int/technical_report_2004_1/en, Eurostat

Notes: These figures are based on a synthesis of existing reports and data. Subsidies to electricity generation and consumption have been allocated to individual fuel sources on the basis of Eurostat 2001 data on primary energy inputs in the generating mix.

There is no agreed definition of energy subsidies among Member States. The most transparent way of understanding them is to identify those that appear 'on budget' and those that are 'off budget'. On-budget subsidies are cash transfers paid directly to industrial producers, consumers and other related bodies, such as research institutes, and appear on national balance sheets as government expenditure. Grants may be given to producers, mainly to support commercialisation of technology or industry restructuring, and to consumers. On-budget subsidies also include low interest or reduced-rate loans, administered by government or directly by banks with state interest rate subsidy. Off-budget subsidies are typically transfers to energy producers and consumers that do not appear on national accounts as government expenditure. They may include tax exemptions, credits, deferrals, rebates and other forms of preferential tax treatment. They also may include market access restrictions, regulatory support mechanisms such as feed-in tariffs, border measures, external costs, preferential planning consent and access to natural resources. Quantifying off-budget subsidies is complex, in some cases impossible. It often requires that the benefit be calculated on the basis of differential treatment between competing fuels, or between the energy sector and other areas of the economy.

1. Indicator assessment

The European Environment Agency (2004) has undertaken a detailed analysis of energy subsidies for a single year, 2001. The review indicates that total 'on-' and 'off-budget' subsidies (excluding external costs) are estimated to be in the order of 29 billion Euro a year for the EU-15 (the definition of 'on-budget' and 'off-budget' subsidies is defined in the note to Figure 1 and also in the Metadata section). This figure is indicative, due to the lack of consistency of data across countries and of assumptions made.

In general there is a slight trend in reduction of 'on-budget' subsidies in the EU, mainly following processes of deregulation, privatisation and the opening of energy markets to competition. However, this has been balanced by an increase in 'off budget' subsidy support as governments have used fiscal measures rather than direct capital grants to support energy production and consumption. Total public expenditure on energy Research and Development declined by 39 % between 1990 and 2002 (including EU level funding). The role of the private sector in R&D is also significant, especially in the development and commercialisation phases of new technologies, but has not been included in the indicators due to a lack of reliable data.

Figure 1 shows the on- and off-budget subsidies by fuel. For that purpose, subsidies directed to the production and consumption of electricity (EUR 6.7 billion) was attributed to the fuels used to generate electricity according to their shares in production. Solid fuels then received the largest share of total subsidies in 2001, with EUR 13 billion evenly split between 'on-' and 'off-budget' subsidies. Oil and gas received in excess of EUR 8.7 billion, of which approximately 97 % was in the form of 'off-budget' subsidies. Renewable energy received the third largest off-budget subsidy of EUR 5.5 billion, while nuclear power received approximately EUR 900 million. Some support was provided to energy conservation; however, the degree of influence on the improvement in energy consumption intensity is difficult to identify.

Focusing on public expenditure on energy R&D, the major share was allocated to nuclear fission and fusion (44 % in 2002). While the overall share for renewables was still relatively small in 2002 (19 % excluding EU level funding), it had increased significantly over the period. France had the highest energy R&D expenditure in 2002 (28 % of the total, excluding EU level funding), but the majority, 78 %, was allocated to nuclear (fusion and fission) R&D.

Fossil fuels were the main beneficiaries of energy subsidies in 2001, despite the pressures that these fuels place on the environment. EU average annual subsidies for fossil fuels accounted for almost 75 % of total EU energy subsidies. On- and off-budget support to the coal industry is the single most important funding regime in the EU-15. State financing to coal mines was commonplace throughout the last century, and exists today in a more rationalised form to protect high-cost domestic industries from competition with cheap foreign coal imports. On-budget subsidies continued in 2001 to the coal industries in Germany (over EUR 4 billion), Spain (over EUR 1 billion), and the UK (circa EUR 0.1 billion), whereas subsidies in other countries, such as Belgium, France, Ireland, the Netherlands and Portugal have more or less ceased.

Expenditure on oil and gas reflects expenditure predominantly in France, the Netherlands, and the United Kingdom whereas expenditure on coal production is highest in Finland, Germany, the Netherlands, Spain and the United Kingdom. There is little aid to investment in the oil sector, reflecting the fact that the bulk of oil reserve development is occurring outside Europe. The industry across Europe is largely privatised and receives no on-budget aid for oil production, transport or storage. Italy, the Netherlands and the United Kingdom provide the highest level of support to the oil and gas sector. In the Netherlands, preferential tax treatment under the regulatory energy tax for medium and large users of gas is significant (estimates range from EUR 0.9 to 2.4 billion). The United Kingdom supports oil and gas with reduced rates of VAT (5 %) on domestic oil and gas (circa EUR 1.4 billion), while Italy allows reduced VAT rates (10 %) on domestic gas (circa EUR 0.9 billion).

The amount spent on R&D associated with fossil fuel production declined by almost 56 % (in constant prices) during the period 1990-2002, and its share of total energy R&D dropped from 8 % to 6 %. Most R&D associated with fossil fuel production is still spent on coal production, but this share is slowly decreasing and the proportion spent on oil and gas has increased.

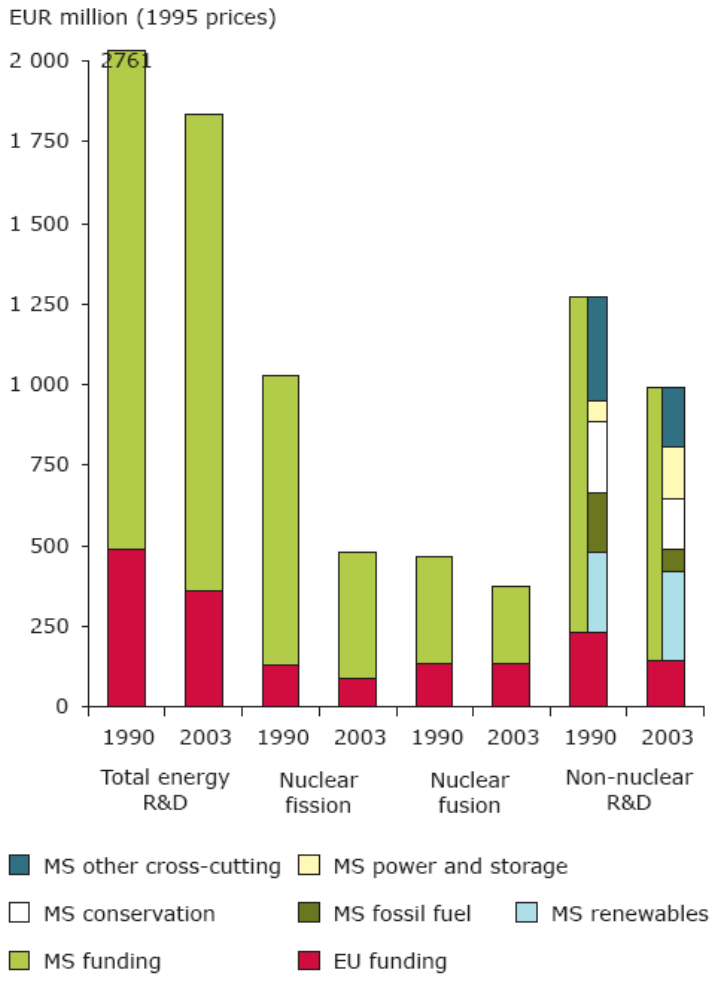
In 2001, nuclear power was the least subsidised form of energy, accounting for 8 % of total subsidy support. The on-budget support to nuclear energy comes from R&D grants by Member States (mainly France, Germany and Italy) and the European Community. These figures exclude the potential cost of not having to pay for full-liability insurance cover for a critical nuclear accident or fuel incident since commercial and state liabilities are limited by international treaty and such risks are too large to be commercially insurable. However, there are difficulties with producing an estimate that accurately reflects the risks associated with nuclear power. They also do not include external costs associated with the nuclear fuel cycle. In 2002, nuclear R&D expenditure still accounted for approximately 45 % (in constant prices) of EU total energy R&D spending, despite a substantial decline since 1990 (where it accounted for 53 %). France has the highest absolute expenditure on nuclear Research and Development and the largest share of spending, 78 % in 2002 (constant prices).

Support for renewable energy, which is on balance considered environmentally beneficial, has increased steadily between 1990 and 2001, through the introduction of regulatory support mechanisms, such as fixed feed in tariffs, competitive tenders and purchase obligations. Support for renewable energy is now well established across the EU-15, as indicated by the estimate of it taking 19 % of all on and off-budget subsidies in 2001. Every Member State provides a combination of price support through feed-in tariffs, obligations or competitive tender, together with a range of capital subsidies and fiscal mechanisms. In

2001, total levels of support were greatest in Germany and Italy, where over EUR 1 billion was provided, mainly in the form of feed-in tariffs. France provides tax exemptions for biofuels from oil excise duties. It can be expected that subsidies for the renewable industry will fall as costs decline and the technologies mature (with the exception of large hydro, which is already considered mature).

Research and development expenditure on energy conservation (not including combined heat and power) declined by approximately 26 % in absolute terms between 1990 and 2002 (in constant prices). However, due to the decline of total Member State R&D expenditure, its share of total funding has increased from 10 % to 13 % over this period. The Netherlands, Italy, Sweden and Finland have the highest absolute R&D spending on energy conservation together accounting for 74 % of total Member State spending in this category in 2002 (constant prices). Energy conservation is the highest percentage share of energy R&D spending in Finland and the Netherlands (30 % and 38 % respectively in 2002, in constant prices).

Fig 2: Total energy Research and Development expenditure, EU-15 Member States and EU level funding



Note: MS means Member States. EU level funding is from the R&D European Community Framework programmes. Framework programme expenditure has been estimated as an annual average over the duration of the programme. Non-nuclear research includes renewable energy, energy conservation, fossil fuel production, power production and storage technologies and cross-cutting research.

Source: IEA (Member States); data for European funding are planned expenditure figures from the 6th Framework Programme.

2. Indicator rationale

2.1 Environmental context

Subsidies can be either beneficial or damaging to the environment. Subsidies that are damaging to the environment lower the price of behaviour that is detrimental to the environment, making the activity more competitive and encouraging more of this type of behaviour than if the subsidy were not in place (such as fossil fuels subsidies). On the other hand, subsidies that are beneficial to the environment improve the competitiveness of environmentally sound practices by reducing their price relative to environmentally damaging practices (as subsidies for energy efficiency or renewables). The extent to which the removal of a damaging subsidy leads to environmental benefits is dependent on a number of factors:

- The level of environmental damage stemming from the subsidy
- The share of the subsidy in total price
- The price elasticity of demand and supply
- Cross price elasticity of demand
- The relative price of alternative goods and the environmental damage associated with them
- Overall economic and environmental effects including environmental policy.

The removal of harmful subsidies can lead to economic gains independent of reductions in environmental degradation, including release of government resources, greater resource efficiency, and technological and product development. The removal of subsidies is one step towards full cost pricing, to ensure that the conventional costs of production — those often referred to as the private costs to producers and consumers — are fully covered by the final price of the product, good or service. The other aspect of full cost pricing is to ensure that all other costs are incorporated into the price (see EN35)

These externalities are sometimes referred to as implicit subsidies of production but are not dealt with in the definition of subsidies used in this fact sheet. There is no agreed definition of energy subsidies among Member States. The term may include cash transfers paid directly to producers, consumers and related bodies, as well as less transparent support mechanisms, such as tax exemptions and rebates, price controls, trade restrictions, planning consent and limits on market access. It may also cover government failure to correct market imperfections, such as external costs arising from energy production or consumption. Subsidies can be classified in many ways. The most transparent way of understanding them is to identify those that appear ‘on budget’ and those that are ‘off budget’ (these are described in the metadata section).

2.2 Policy context

The importance of subsidy removal or restructuring is increasingly recognised by policy-makers, who are acknowledging the need to remove environmentally damaging subsidies and restructure subsidies to improve the competitiveness of environmentally beneficial products and services. At the EU level there is a wide range of policies that could directly or indirectly have an impact on subsidy reform. The EU Sixth Environment Action Programme highlights the impact of environmentally harmful subsidies and state aid**.** However, any reform will have to take place in the context of EU competition policy:

- EU rules on state aid, arts. 87 and 88 of the Amsterdam Treaty. These articles prohibit the use of any aid that distorts or threatens to distort competition ‘by favouring certain undertakings or the production of certain goods’. Member States are required to notify the Commission of any state aid before these are put in place.
- The internal electricity market Directive (96/92/EC). The Directive complements the Acquis Communautaire on state aid and aims to remove any (national) measures that may impair the development of competition.

There are a number of policies that regulate national subsidies. Under the ‘Community guidelines for state aid for environmental protection’ (OJ C 37, 3.2.2001), set on the 1st of January 2001, governments are able to subsidise up to 40 % of investments in new renewable or combined heat and power (CHP) plants, or to use market support mechanisms to enable renewable and CHP operators to sell at market price until investors have received a fair return on capital. The EU Directive on the promotion of electricity from renewable energy sources in the internal electricity market (2001/77/EC) makes direct references to these Community guidelines for state aid for environmental protection. There is also a variety of EU funding or subsidy schemes for research, development and demonstration, such as the Intelligent Energy Europe Programme. The Cohesion policy is also supposed to play a bigger role in the forthcoming cycle 2007–2013: co-funded measures for energy will still cover only renewables, energy efficiency and safe energy supply actions, while the role in terms of financial allocation will definitely grow.

References

COM (2001) 31 final - On the sixth environment action programme of the European Community 'Environment 2010: Our future, Our choice'

Directive on the internal electricity market (96/92).

Directive on the promotion of electricity from renewable energy sources in the internal electricity market (2001/77/EC).

EU rules on state aid, arts. 87 and 88 of the Amsterdam Treaty.

Eurofi (September 2000) Guide to European Community Grants and Loans.

European Commission (2002) Inventory of public aid granted to different energy sources, Commission Staff Working Paper.

European Community guidelines for state aid for environmental protection (OJ C 37, 3.2.2001).

European Environment Agency, 'Energy Subsidies in the European Union', 2004.

Institute for Environmental Studies, Vrije Universiteit, Amsterdam, 'Energy subsidies in Western Europe', Ruijgrok, E., Oosterhuis, F. (1997) Commissioned by Greenpeace International.

RIVM, Netherlands Institute for Public Health and the Environment, 'Towards a great deal on subsidies and climate change', Andre de Moor, May 2001, Natural Resource Forum May 2001.

Sauter, R. and Awerbuch, S (2003) 'Oil price volatility and economic activity: A survey and literature review', IEA Research Paper, August 2003.

Meta data

Technical information

1. Data source: EU Energy Subsidies 2001: Energy Subsidies in the European Union: A brief overview (2004), European Environment Agency http://reports.eea.eu.int/technical_report_2004_1/en
   Energy R&D expenditure for Member States: IEA R&D database http://www.iea.org/Textbase/stats/rd.asp
   Energy R&D expenditure at EU level: European Commission DG Enterprise and Industry

2. Description of data/Indicator definition:
   Data are in current prices unless stated otherwise. Where constant price data is used, the reference year is 1995 (Euro 1995 market prices).
   Energy subsidy data in Euro 2001 Prices
   R&D funding in constant Euro (1995 market prices) - from IEA data: US$ million 2003 prices
   General subsidies for coal under the ECSC treaty are taken from the European State Aid Scorecard (2003) and from the Commission staff working paper on energy subsidies (European Commission, 2003a). Aid to the oil and gas, and nuclear sectors is based primarily on the European Commission (2003a) and Oosterhuis (2001) reports. Renewables data on direct price support, such as quota and fixed price systems, are taken mainly from the Eurelectric (2004) report, with cross-referenced information from the EREF (2002) and Irish Government (2003) reports. Data on renewables capital investment, taxation support and other aid to related sources is taken from European Commission (2003a) and Oosterhuis (2001).
   There is no agreed definition of energy subsidies among European Union (EU) Member States. The term may include cash transfers paid directly to producers, consumers and related bodies, as well as less transparent support mechanisms, such as tax exemptions and rebates, price controls, trade restrictions, planning consent and limits on market access. It may also cover government failure to correct market imperfections, such as external costs arising from energy production or consumption. Subsidies can be classified in many ways. The most transparent way of understanding them is to identify those that appear 'on budget' and those that are 'off budget'.
   On-budget subsidies are cash transfers paid directly to industrial producers, consumers and other related bodies, such as research institutes, and appear on national balance sheets as government expenditure. Grants may be given to producers, mainly to support commercialisation of technology or industry restructuring, and to consumers. On-budget subsidies also include low interest or reduced-rate loans, administered by government or directly by banks with state interest rate subsidy.
   Off-budget subsidies are typically transfers to energy producers and consumers that do not appear on national accounts as government expenditure. They may include tax exemptions, credits, deferrals, rebates and other forms of preferential tax treatment. They also may include market access restrictions, regulatory support mechanisms such as feed-in tariffs, border measures, external costs, preferential planning consent and access to natural resources. Quantifying off-budget subsidies is complex, in some cases impossible. It often requires that the benefit be calculated on the basis of differential treatment between competing fuels, or between the energy sector and other areas of the economy.
   Research and development subsidies paid by Member States to all fuel sources are taken from the IEA R&D database (2004), while those paid by the European Community are taken from European Commission (2003a) and Oosterhuis (2001). Fuel taxation exemptions/differentials represent an updated version of the Oosterhuis report and are calculated using IEA (2003b) energy prices and tax data, and consumption/production figures using Eurostat 2001 data. Data on preferential tax treatment for medium and large users of gas and electricity is taken from Van Beers et al (2002); Electricity consumption subsidies represent updated versions of the Oosterhuis

report using more recent taxation and consumption data, and are allocated to individual fuels on the basis of Eurostat 2001 data on primary energy inputs in the generating mix.

3. Geographical coverage: EU-15

4. Temporal coverage: Total energy subsidies given for 2001. R&D data comparison of 1990 and 2002

5. Methodology and frequency of data collection:
   IEA data collected annually. No regular comprehensive survey of total energy subsidies is available. Data presented is a review and synthesis of available data undertaken in 2004.

6. Methodology of data manipulation:
   Data in US$(2003 prices) converted to Euros (2003 prices) using exchange rate of 1US$ = 1.131 Euros. Values then deflated to constant 1995 prices by multiplying by 0.863
   N.B. - For comparison Euro 2001 current prices can be converted to constant Euro 1995 prices by multiplying by 0.855
   Share of individual technologies/fuels as a percentage of total.
   Subsidies to electricity production and consumption allocated to primary fuels on the basis of share of inputs to generation, from Eurostat 2001 data on primary energy inputs to the generating mix.

Qualitative information

7. Strengths and weaknesses (at data level): see point 2 regarding the lack of a common definition of subsidies.

8. Reliability, accuracy, robustness, uncertainty (at data level):
   The primary area of uncertainty lies in the fact that that there is no agreed definition of subsidies between Member States as described above, meaning that the calculation of EU-wide subsidies for this indicator can be classed as 'indicative' only. The use of on and off-budget subsidies has been used to separate out the more certain 'on-budget' figures compared to the far more uncertain 'off-budget' subsidies. However, as indicated in Figure 2 'on-budget' subsidies account for less than a third of the estimated total.

9. Overall scoring – historical data (1 = no major problems, 3 = major reservations):
   Relevance: 1
   Accuracy: 3
   Comparability over time: 3
   Comparability over space: 2