# REPORT ON THE
# **GREEN PAPER ON ENERGY**

## Four years of European initiatives

Directorate-General
for Energy and Transport

EUROPEAN
COMMISSION

# CONTENTS




The Directorate-General for Energy and Transport of the European Commission drafts and implements European Union policy in these two, closely interlinked areas. The Green Paper entitled ***'Towards a European strategy for the security of energy supply'*** and published in the year 2000 analysed the various options available with a view to stemming the increasing dependency of the European Union for energy supplies whilst continuing to pursue the EU's environmental goals. Over the past four years, a series of measures have been taken to meet with four key challenges: managing demand, the development of internal resources, enhancing the effectiveness of the internal market, and diversifying external sources. This report looks back over the developments made since this major debate was first launched in the EU and suggests future action that could be taken in this area.



Brochure published by the Energy and Transport DG, European Commission, B-1049 Brussels
Website: http://europa.eu.int/comm/dgs/energy_transport/index_en.html

Luxembourg: Office for Official Publications of the European Communities, 2005

ISBN 92-894-8419-5





Text completed on 15 December 2004.

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*Printed in Belgium*

# TEN POSSIBILITIES FOR ECONOMICAL ENERGY USE

**Household and office appliances:**
Standards for use and labelling to promote more energy-efficient appliances.

**Buildings:**
Strict thermal insulation standards, modernisation of heating units and building energy audits.

**Transport:**
Public transport of passengers and rail or waterway transport rather than road haulage for goods.

**Cars:**
More efficient combustion engines that use less energy and emit fewer pollutants into the atmosphere.

**Fuel:**
'Green' fuels such as biodiesel, which is made from vegetable oils, and bioethanol, which is made using the oils from cereals and beet.

**Lighting:**
Low-energy bulbs.

**Hot water:**
Solar thermal energy – at least half of the hot water used by households can be provided at a profitable price by the heat from the sun.

**Industrial processes:**
In sectors where demand for heat is significant and constant, simultaneous production of heat and electricity can produce savings in primary energy.

**Services:**
A market for energy services, ranging from energy performance audits to the sale of energy-efficient products.

**Investments:**
Positive taxation or specific subsidies for energy-efficiency projects, energy-efficient products and R & D.

In December 2000, the European Commission adopted a Green Paper on European Union energy policy. This brochure takes stock of the action undertaken in the following areas over the last four years: managing demand, diversifying internal energy sources, developing the internal energy market and the security of external supply.

For more information visit
http://europa.eu.int/comm/energy_transport/en/lpi_lv_en1.html

KO-63-04-553-EN-C

Publications Office
Publications.eu.int

ISBN 92-894-8419-5
9 789289 484190

# THE GREEN PAPER: THE STAKES

In November 2000, following a suggestion made by Mrs Loyola de Palacio, Vice-President and Commissioner responsible for energy and transport, the European Commission initiated an unprecedented strategic debate on energy supply inside the European Union.

The Green Paper 'Towards a European strategy for the security of energy supply' (COM(2000) 769 final of 29 November 2000) created a ripple in the relatively calm waters of the European energy sector. The citizens of Europe appeared unconcerned by where the petrol for their cars was actually coming from or who was supplying the electricity for their lighting at home. The cost of energy was low and was not seen as a cause for concern.

And yet, as the Commission's analysis clearly shows, it should be: we are facing forecasts of an energy dependency level of 70 % in 2030, compared with 50 % today. And that will come at a price, particularly as our sources of fossil fuels slowly dry up. And in view of the additional constraints caused by climate change, the issue of energy supply urgently needs to be considered.

## Our dependency is growing daily

The European Union as a whole does not have the resources needed to cover its domestic demand for energy. We are therefore obliged to import fossil energies from elsewhere. Overwhelmingly, the gas we import comes from Russia and the oil we use originates in the Middle East. This has significant repercussions in terms of the security of our energy supply. And, as the transport sector booms, petroleum remains our preferred energy source. Gas is also gaining ground for the production of electricity and heat, in particular in the wake of increasingly strict environmental constraints.

In short, the alarm bells are ringing: our energy consumption levels are rising and, more worryingly, we are importing an increasing percentage of the energy we use. The aim of the Green Paper was to initiate a debate on possible solutions to this problem, both in terms of supply and demand. The notion of 'managing demand' was brought to the fore for the first time; previously, energy policy had tended to focus on supply. And yet, it is in fact easier to change the former rather than the latter.

If we consider that for each unit of energy used, four units of primary energy are produced, it is clear to see that energy efficiency could have a major impact in terms of reducing our energy dependency. It would be difficult for us to give up our current level of day-to-day comfort, but opportunities are available to us that would enable us to reduce our demand for energy.

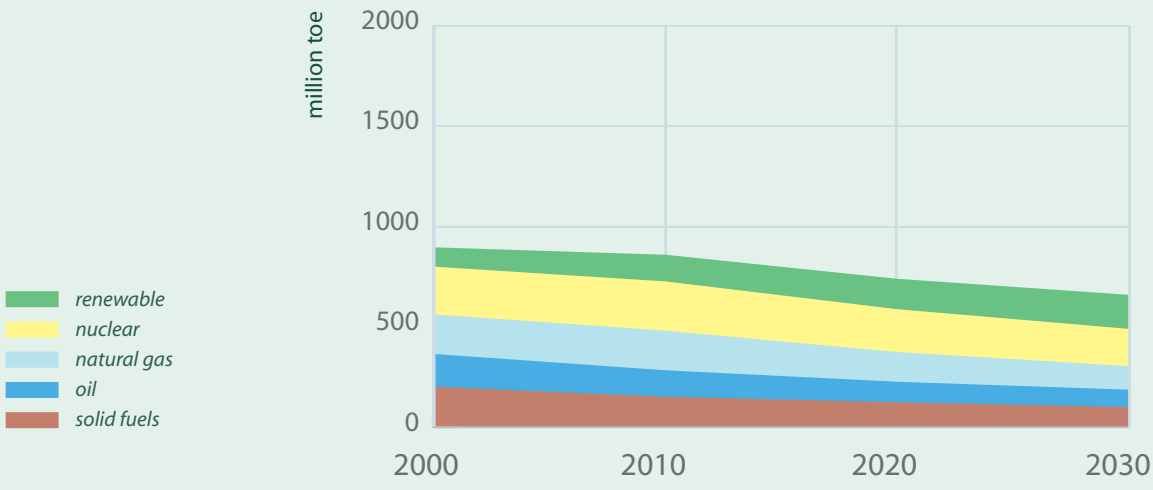
And in terms of supply, it is important to begin by stating that no energy source will provide us with a perfect cure for our ills: each source has its own advantages and disadvantages. One of the goals of the Green Paper was to look into how best to optimise energy supply, not only by diversifying the sources used, but also by diversifying areas of import. Each individual source has a role to play in enhancing the security of our energy supply, taking into account not only economic constraints, but also environmental and geopolitical considerations.

# PROGRESS MADE

As a result of the Green Paper, a host of Commission initiatives have been adopted by the European Union, or are still on the table, concerning a series of areas which are linked either directly or indirectly to the security of our energy supply. A great many Commission communications have been published outlining clear possibilities for energy policy in the future. But does the European Union now, four years after the publication of the Green Paper, have a body of legal texts that will enable it to cope with changes in its economy and its energy use?

Coincidence or consequence? Since the Green Paper was published, many of the Member States and candidate countries have made changes to their energy policies. The success of the Green Paper confirms the reality of the stakes it dealt with. The website for the Green Paper has continuously attracted more than 1 000 visitors each day. All of the economic and political decision-makers concerned – including in particular the citizens of the EU – have made their own contribution. More than 100 000 copies of the Green Paper and the summary version, intended for the general public, entitled 'Let us overcome our dependence' have been distributed throughout Europe. They have been used as the basis for hundreds of conferences and colloquiums held at European, national and regional level and have even served as a reference text in such far-flung countries as the USA, Japan and Russia! The proposals outlined in the Green Paper were debated at length through to February 2002.

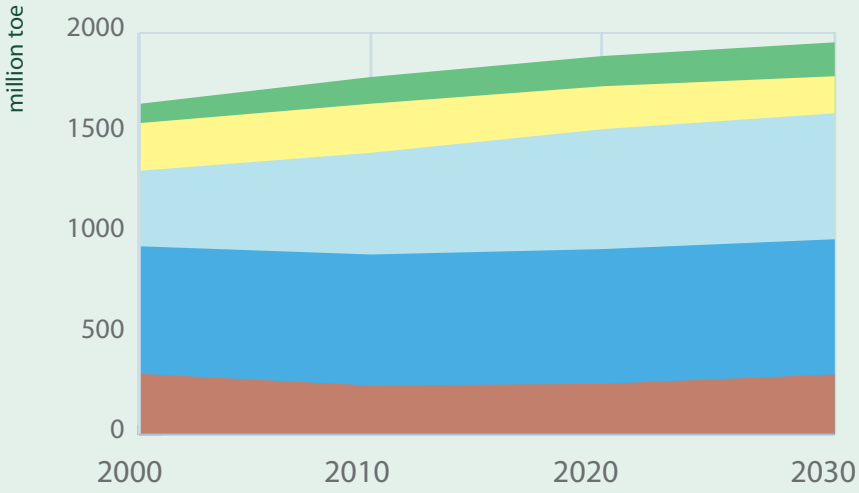
**Developments in the production of primary energy per energy product 2000–30 (EU-25)**



Some of the measures taken are no more than a first step in the right direction. Others will not suffice in order to achieve the objectives set out, such as the promotion of renewable energy sources. And even once the Member States have adopted such measures, they still require to be transposed correctly at national level. This is not always an easy task. Some other measures proposed, such as those which aimed to prevent potential difficulties with respect to the management of oil reserves and nuclear safety, were rejected by the political decision-makers. These problems will persist if nothing is done.

In four years, the political and economic backdrop to the EU has changed. The Union now has 25 Member States and this in turn places new constraints on its activities. The climate agenda has gained importance thanks, in particular, to the European system for trading in greenhouse gas emission quotas, which was adopted as an additional measure over and above the Kyoto Protocol. Finland and France have opted to extend their nuclear energy facilities and Russia has become a central partner in European neighbourhood policy. The events of 11 September 2001 and the war in Iraq altered the geopolitical balance. Europe and the United States experienced major electrical blackouts, while almost all of world growth in oil consumption and some other essential raw materials took place in China. The price per barrel of crude oil rocketed once again as a result of wild speculation in an increasingly uncertain geopolitical context. Lastly, and this list is not exhaustive, the European Union is currently facing economic stagnation which is endangering its aim of becoming the most competitive knowledge-based economy in the world by 2010, a desire formulated by the Heads of State or Government in Lisbon in March 2000.

## Developments in demand per energy product 2000–30 (EU-25)




*Source: European energy and transport – Scenarios on key drivers,* European Commission, 2004.

# THE FOUR POLITICAL CHALLENGES

**Within the current context of global uncertainty, the challenges set out in the Green Paper in November 2000 have become even more relevant today. Governments face a terrorist threat which has already had repercussions on energy infrastructures. A minor oil crisis occurred in the year 2000 and again in 2004, albeit with a lesser impact on the euro zone. This causes us to call into question once again the crucial issue of the dependency of Europe on oil and the countries of the Middle East. Today, uncertainty is widespread and the opportunities provided by the four key areas of the Green Paper must be investigated with a view to reducing the risk of a total breakdown in supply or, at the very least, energy prices that could not be borne by our economies and our citizens.**

## Managing demand

First and foremost, we must reduce our energy consumption wherever possible. Some sectors of industry, which are major energy users, have achieved optimum energy efficiency within the limitations of the technologies they use, but many savings could still be made in specific areas of the residential and transport sectors. The White Paper on transport entitled 'European transport policy for 2010: time to decide' (COM(2001) 370), of 12 September 2001, looked in even greater depth at the issues raised in the Green Paper on the security of supply and even outlines specific measures to be taken.

## Diversifying European sources

The European Union does have its own sources of energy which we must develop. And, above all, we must not rule out any of the possibilities available to us. Currently, nuclear energy provides more than a third of our electricity and is a stable source that is essentially shielded from fluctuations in the price of uranium and, furthermore, does not emit $CO_2$. There is plenty of coal and it is cheap, so why not make it cleaner? Renewable energy sources, although not constant, have considerable potential within the EU and we must help them to really get off the ground. Biofuels, for example, offer a substitute for oil and the EU has the capacity to develop these. Thermonuclear fusion and hydrogen present limitless possibilities for the future, but several obstacles still stand in their way.

## A streamlined internal energy market

The blackouts experienced in the summer of 2003 clearly demonstrated the need for electrical interconnections and better coordination amongst operators. The liberalisation of the electricity and gas markets must go hand in hand with the creation of a Community monitoring framework to ensure fair competition, optimal use of the networks and suitable development of these networks so as to promote flawless circulation of electricity and gas throughout the enlarged Union and beyond.

## Controlling external supply

Finally, the EU must enter into strategic partnerships with major potential suppliers such as Russia and even far-off countries such as Iran. It must promote dialogue with its immediate neighbours with the aim of integrating the available electricity and natural gas networks so as to guarantee better security of supply. The EU must maintain structured dialogue with oil-producing countries so as to ensure prices stay stable.

# MANAGING DEMAND

According to the Commission's forecasts, if we could increase our energy efficiency by just 1 % each year until 2010, we would succeed in realising two thirds of the potential energy savings available to the Union. And in one fell swoop, we would also comply with 40 % of the European objectives under the Kyoto Protocol (to reduce greenhouse gas emissions by 8 % by 2010–12 compared with 1990) by cutting back on 200 million tonnes per year in $CO_2$ emissions.

Prior to the Green Paper, the EU had drawn up a plan of action for energy efficiency (1). The Green Paper gave a fresh boost to the implementation of that plan. The most symbolic proposal drafted relates to the energy performance of buildings (2), which account for 40 % of total energy consumption across the EU. This directive enables us to calculate the integrated energy performance of buildings, sets out minimum requirements in this respect and binds the Member States to inspecting all heating and air conditioning installations.

Shortly prior to the adoption of the Green Paper, the Commission adopted a directive the aim of which was to enhance the energy efficiency of fluorescent lighting (3), which is still widely used in both public and industrial buildings.

The Union has also adopted a series of regulations with respect to the labelling of household appliances: air conditioners (4), electric ovens (5), refrigerators and freezers (6). Indeed, the European Union and the United States have signed an agreement concerning the coordination of energy efficiency labelling programmes for office equipment ('Energy Star') (7). These developments in terms of labelling are by no means insignificant: it has been proven, for example, that the labelling system introduced by the Commission in 1994 resulted in an increase of more than 30 % in the energy yield index for new refrigerators and freezers between 1996 and 2000.

Taxation and energy pricing policy are further important instruments in the promotion of energy efficiency. Following more than six years of in-depth discussions, the Council adopted a directive on the taxation of energy products (8). One of the aims of this directive is to encourage use of more environment friendly sources of energy.

This legislation endeavours to motivate the end-user to make more discerning choices when selecting specific products, by providing more information on their energy efficiency. With respect to buildings, transparency is paramount and in the very near future tenants will begin to study the energy costs of available accommodation before choosing where to live. And this, in turn, will influence the investment decisions taken by house owners in favour of energy-efficient technologies and products such as insulation.

The Commission intends to continue in this same vein, in particular by improving the European standards applicable to air conditioning, lighting and energy-efficient building materials.

At the end of 2003, the Commission set out a proposal for a directive to promote energy end-use efficiency and a market for energy services (9). The other European institutions are currently studying this directive. If it is adopted, the Member States will be required to meet overall energy saving targets of 1 % annually and even 1.5 % annually in the public sector, which must set a good example.

The majority of sources and uses of energy are concerned here: electricity, natural gas, municipal heating, heating fuels, coal and lignite, forestry and agriculture energy products and fuels for transport. The directive targets all energy users, except major industrial consumers (the steel, cement, glass, ceramics, refining, paper and cardboard industries), aviation and the navy.

The potential for energy savings offered by this directive is estimated at 200 million tonnes of oil each year, or in other words a fifth of our total primary consumption. Furthermore, the market for energy services would be profitable: taking electricity alone, for saving 1 kWh invoiced at EUR 0.46 on the domestic market one has to invest just EUR 0.22. The annual energy-efficiency market represents between EUR 5 billion and EUR 10 billion per year. The directive suggests that a framework should be set up to remove current obstacles to the creation of this market.

The directive will also require the Member States to promote energy efficiency, in particular by providing financial support for measures that will take longer to produce returns or will need a major investment. The market will essentially affect buildings, i.e. lighting, heating, cool air, hot water, ventilation, insulation and cooking, but also the manufacturing and transport sectors. Suppliers will be asked to earmark a share of their turnover for energy services. Regulators will be encouraged to do all they can to promote energy efficiency. Last but not least, improvements will be made in metering and invoicing so as to enable the consumer to take full advantage of the energy services on offer.

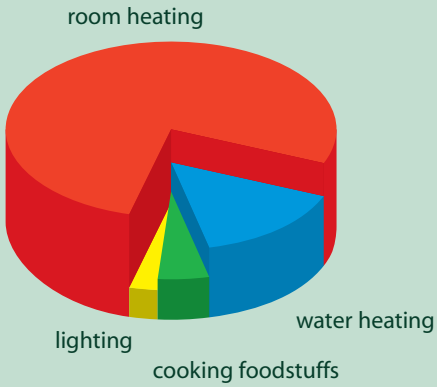
However, we must not be content only to encourage users to buy more energy-efficient products; changes must also be made to the structure of the energy supply. The impact on the environment of a specific product must not simply be transferred from one stage in its life cycle to another but, rather, must be reduced throughout its useful life. Voluntary regulation is not always possible, in particular in those sectors which have a highly fragmented market. It is for these reasons that the Commission has drafted a proposal for a directive that looks at the complete life cycle of consumer energy products and determines a general framework for setting eco-design requirements ([10]).

As soon as this framework directive has been adopted, the Commission intends to set out a series of measures for guaranteeing the energy efficiency of a number of products. The first group of products that will be dealt with, in view of their impact on the environment, will comprise: heating and hot water equipment; systems based on electric motors; lighting for the residential and tertiary sectors; domestic appliances; office equipment in the residential and tertiary sectors; mass electronic devices; and commercial heating, ventilation and air conditioning systems. Transport is not included. The exact measures to be implemented shall be set out after consulting the parties concerned, i.e. the manufacturing industry and other players in this sector, including non-governmental organisations (NGOs) and consumers.

ManagEnergy (http://www.managenergy.net/index.html) is a website run by the Directorate-General for Energy and Transport of the European Commission. It promotes cooperation between local and regional energy actors in Europe through workshops, study tours and online events in energy efficiency, renewable energy and sustainable transport. The website features the contact details of around 380 energy agencies. In total, the site includes 2 050 organisations. More than 5 900 individual energy actors in more than 65 countries have already registered to receive regular news and information. The site also enables visitors to look for partners among energy agencies, municipalities, consultants, industry and other energy experts.

Energy efficiency is one of the central pillars of the framework programme for energy of the European Union, which is entitled 'Intelligent energy – Europe' (2003–06), and was adopted in June 2003 ([11]). It is the Community's principal non-technological aid instrument in the area of energy. A special executive agency was created at the end of 2003 for the purposes of subcontracting the management of this programme. The SAVE subsection of the framework programme, which focuses on energy efficiency, has a budget of EUR 87.25 million. The STEER subsection, which deals with the energy aspects of transport, has a budget of EUR 40.75 million.

**Domestic energy consumption (excluding household appliances) in 2001 (EU-15)**



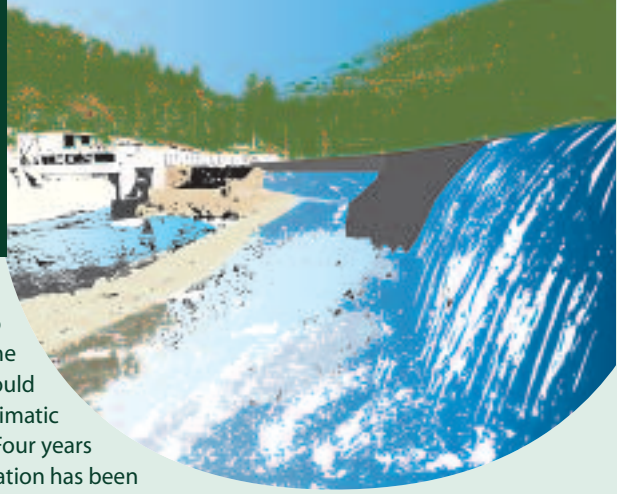

*Source:* ENERDATA.

In early 2004, the European Union adopted a directive with a view to promoting cogeneration based on useful heat demand ([12]). Cogeneration, when efficient, can result in savings in primary resources because it uses less energy, and emits less $CO_2$, than separate production. This proposal provided the sector with a long-awaited framework for smooth expansion of this possibility across the EU. Several obstacles still persist, in particular in terms of network access.

Reducing demand for energy contributes to preventing climate change. The European programme on climate change launched by the Commission in March 2000 outlines a list of potential future policies and measures that may be introduced by the Union as part of a European strategy for the implementation of the Kyoto Protocol. The proposals include energy-efficiency measures, applicable both to electricity producers and end-users (individuals, industry, transport) in such varied sectors as construction, heating, lighting, public procurement, infrastructures and private cars.

The White Paper on transport published in September 2001 made a direct contribution to the debate on the security of the energy supply. The transport sector guzzles a great deal of energy and is one which is used by many citizens on a daily basis. Transport is accountable for more than half of the oil used in the Union and this trend is growing. The Commission's White Paper aims to create a better balance between the different methods of transport by providing renewed momentum for rail transport through the creation of a European rail area, by promoting short-distance maritime transport, by deregulating the market for river transport services and by enhancing intermodality, in particular via the Marco Polo programme (2003–10). The White Paper also encourages the principle of 'sustainable transport', i.e. the development of methods of transport that are less harmful to the environment, notably because they are less dependent on oil. The Commission's 'Civitas' initiative grants some EUR 50 million to 19 European towns and cities to enable them to implement ground-breaking, innovative and integrated measures which aim to radically improve urban transport.

# DIVERSIFYING EUROPEAN SOURCES



In order to move away from dependency, we must also develop our own energy self-sufficiency. Although the potential for this within the European Union is limited, it should still be used to the full. But this must be done correctly: climatic constraints have a significant impact on EU energy policy. Four years after the publication of the Green Paper, a raft of new legislation has been introduced implementing highly ambitious measures in this respect.

## A voluntary policy in favour of renewable energy sources

The European Union has worked hard to promote renewable sources of energy. Its aim is to increase the share of green energy in total demand for primary energy from 6 % to 12 % by 2010. This will require ambitious policy-making not only at the European, but also at the national level. According to the analysis provided by the Commission in its recent report on the share of renewable energy sources in the Union ([13]), the policies that have already been instituted at European level are insufficient and will enable a best possible overall result of no more than 9 to 10 %.

In order to achieve this aim, the share of electricity from renewable sources must be increased to in excess of 21 % of overall EU-wide electricity consumption by 2010. The EU adopted a key directive in September 2001 ([14]) to create a framework for a significant increase in green electricity in the medium term. The directive binds the Member States to publishing national indicative targets and applying a series of measures in favour of green electricity, including subsidies which are granted at the discretion of the individual Member States. Plans for a certification system are also in the offing. On the whole, the Member States have adhered to the indicative targets of the directive, but in many cases transposition into national legislation has been lacking.

One month following the adoption of the Green Paper, the Commission introduced a new framework for State environmental aid, which shall remain valid until 2007 when the directive on the promotion of green electricity is revised. The approach chosen is highly favourable towards renewable energies and enshrines the promotion of renewable energy sources in EU policy, in particular with respect to the internal market. This was further confirmed by the Court of Justice in its ruling in the case of PreussenElektra of 13 March 2001 in which it stated that an obligation to purchase green electricity at a minimal price did not constitute State aid.

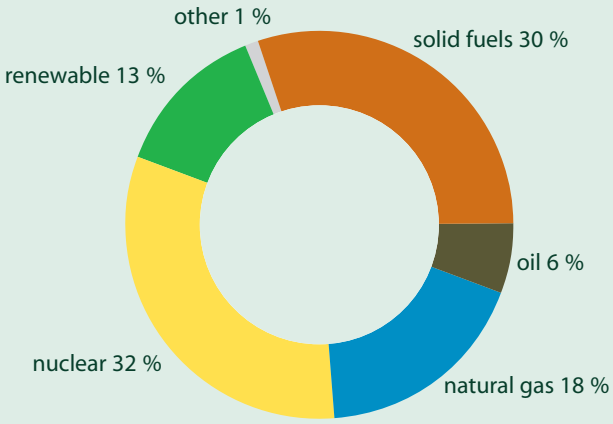
To date, biofuels are the only source of renewable energy that could potentially take the place of petroleum in the road transport sector. After a difficult round of discussions, the EU adopted a directive on the promotion of the use of biofuels for transport in May 2003 ([15]). This directive also contains a series of indicative targets, for example that biofuels should account for 2 % of the Community fuel market by the end of 2005 and for 5.75 % of that market by the end of 2010. The directive on energy taxation provides for exemptions from the Community minimums set out in terms of the excise duty levied on fuels. If the targets set out in the biofuels directive are met, their share will rise from 1.4 million tonnes of oil equivalent (toe) in 2001 to 19 million toe in 2010. The deadline for transposition of this directive was December 2004.

The use of renewable energy sources will only spread with optimum political support, not least because these sources are subject to technical and practical limitations which can make them less financially viable. These include: availability of land, the need to keep traditional energy sources as a back-up (because renewable sources can be intermittent) and, finally, the much higher cost of renewable energy sources in comparison to traditional sources.

The Commission has done a lot for renewable energy over the past four years, but it still is not enough. We must continue to provide the right funding. The European Investment Bank has already promised to increase loans to green electricity projects by 50 %. At the European level, similar measures may be introduced via the Structural and Cohesion Funds and even the common agricultural policy. Other, more sector-specific measures are also on the cards, in particular in the fields of biomass, heating, solar energy, geothermal energy and offshore wind farms.

The start-up initiative launched in the year 2000 ran for four years. It resulted in a series of public–private partnership projects and awarded more than 700 individual parties, whether local and regional communities, institutions, agencies, associations or businesses, working in 127 partnerships, with 31 different prizes. The programme was officially ended at a conference on intelligent policy options held in Berlin from 19 to 21 January 2004. A new programme is in the wings focusing on a fresh campaign for sustainable energy, which will comprise renewable energies, as well as energy efficiency. It will be based around sector-specific targets and a series of promotional tools and will enable those concerned to become involved in implementing European and even broader programmes and initiatives via partnerships.

## Gross electricity production per energy source in 2002 (EU-25)




*Source: EU energy and transport in figures: Statistical pocketbook 2004.*

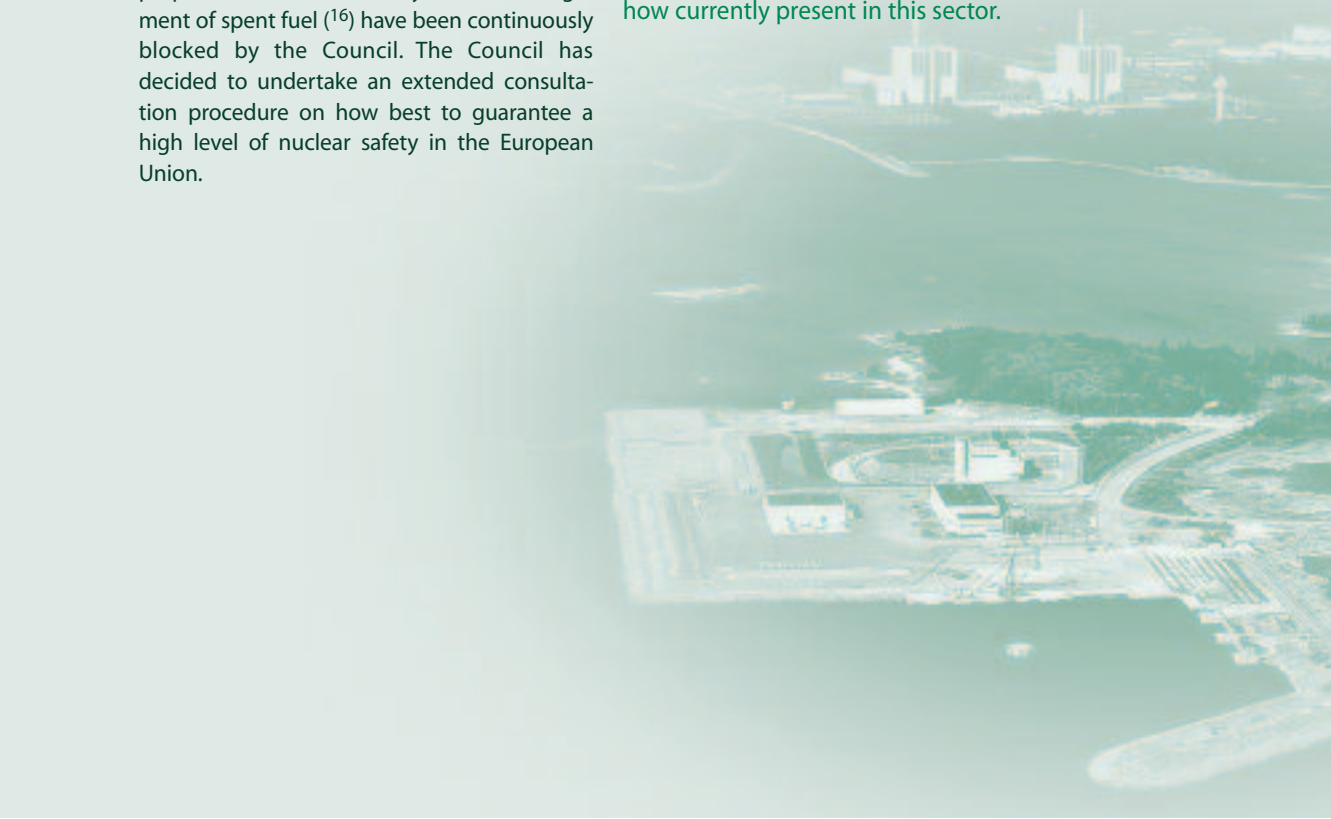
## The spread of nuclear energy

The European Commission has a neutral view of nuclear energy: the choice to use nuclear energy sources is governed by the energy policy of the individual Member States, who have responsibility for this area. Nevertheless, the Commission must ensure that existing installations have a very high level of security and that both radioactive waste and the fuels used are managed safely and without damage to the environment. Only by adhering to these essential conditions can we hope to make nuclear a more acceptable option, and this in turn is a sine qua non for the further development of this energy source.

Although some of the governments of Europe are opting to gradually decrease their nuclear energy capacity, the development of nuclear energy has taken on new momentum following the Finnish government's decision to start the construction of a new nuclear reactor called the European pressurised reactor, or EPR. France has also decided to build a similar reactor with a view to upgrading its current nuclear installations. The Member States look carefully at environmental issues and security of supply when making such choices. And despite the fierce price war currently raging on the internal electricity market, nuclear energy has become an important factor in ensuring a secure energy supply now and in the foreseeable future.

On 10 December 2002, the Court of Justice issued a ruling confirming that the European Commission is responsible for matters of nuclear safety. The enlargement of the Union has meant the inclusion of a further 19 Soviet-designed reactors into the Community, some of which are due to close early. But despite this, to date, the legislative package comprising two proposed directives on safety and the management of spent fuel ([16]) have been continuously blocked by the Council. The Council has decided to undertake an extended consultation procedure on how best to guarantee a high level of nuclear safety in the European Union.

A budget of EUR 480 million has been earmarked as part of the Euratom framework programme (2002–06) for Community research into nuclear fission. One of the major priorities of this research is to look into waste management, covering storage, deep geological burial, separation and transmutation. A further priority is the preservation of the scientific and technological know-how currently present in this sector.



## Revamping coal

Ever since the adoption of the climate convention, the success of coal in the energy sector has been waning. And yet this is a plentiful source of energy which, contrary to other fossil fuels, can be found across the globe and is sold on the international market at a relatively stable and low price. In short, coal could make a very useful contribution to enhancing security of supply in the EU. The main hurdle to this is that when burned coal releases considerably more $CO_2$ than its competitors.

The Commission has acted on two fronts. First of all, it has lent considerable backing to technical progress in terms of the actual burning process for coal, notably through its research fund for coal. One possibility that could be explored is that of enhancing the efficiency of the combustion of coal used to produce electricity. Research programmes looking into how to capture and isolate carbon, conducted as part of the sixth framework programme for R & D in the EU (2002–06), could also help reduce the emissions produced by burning coal.

Secondly, the Commission is focusing on maintaining Community coal as an optional energy source. The costs of coal mining are much higher in some Member States of the EU than the global rate. Consequently, when the ECSC Treaty expired, the EU decided to adopt a regulation aimed at gradually decreasing State aid to the coal industry ([17]). This regulation also guarantees access to Community coal reserves thanks to State aid that is limited to the strict minimum needed to contribute effectively to the goal of achieving a secure energy supply.

The ECSC Treaty expired on 23 July 2002, after remaining in force for 50 years. In February 2002, the Member States opted to transfer the assets of the ECSC to the European Community and to set up a common research fund that would be managed by the Commission. The money in that fund is used to finance research projects in sectors that are linked to the coal and steel industries and which are not covered by the framework programme for research. The funds are divided as follows: 27.2 % for the coal industry and 72.8 % for the steel industry. The coal programme concentrates on four priorities: enhancing the competitiveness of Community coal, health and safety in mines, the environment, and optimising use of the Community coal seams.

# A STREAMLINED INTERNAL ENERGY MARKET

Greater security of energy supply also means having an effective, correctly regulated market which will enable crises like those which have affected the United States in recent years to be avoided. In 2003, the EU adopted two important directives for developing the electricity ([18]) and gas ([19]) markets which make the European market of 450 million people the most integrated market in the world. They aim to give consumers genuine choice and to improve the efficiency of European industry.

Under these two directives, the market will be opened up for industrial consumers as of 1 July 2004 and for all consumers as of 1 July 2007. They give wider powers to regulators and set out a list of public service obligations to be met, in addition to legally separating network activities (transport and distribution) from other activities (generation, trading and supply) in integrated companies. The electricity directive obliges suppliers to give information on the source of the electricity they provide.

The Commission has published a benchmarking report on the implementation of the internal markets in gas and electricity every year since 2001. These reports provide a real yardstick for measuring the degree of market integration within the EU and their current level of competitiveness. Using objective criteria which make it possible to measure how open markets are to competition, the Commission wishes to encourage Member States to remove barriers to new operators, and therefore to new investment in means of production and infrastructures.

To ensure harmonised transposition of the gas and electricity directives, the Commission services have published a series of interpretative notes on the following fundamental aspects of the directives, which the Member States are invited to use as a basis for future legislation: unbundling (separation of activities), the role of regulators, public service obligations, distribution, exemptions, security of supply, electricity 'labelling' and gas storage.

In November 2003, the Commission set up the European Energy Regulators Group ([20]).
Like other regulatory groups which already exist in the telecommunications and financial services sectors, the group will assist the Commission in the harmonised interpretation of the directives.

## Better integrated networks

The electricity and gas networks are central to the way the electricity and gas markets operate and, in particular, to their efficiency. Along with the directives on opening up markets, the European Union also adopted a regulation on cross-border exchanges in electricity ([21]) in June 2003, providing a regulatory framework for measures to promote cross-border electricity exchanges in an enlarged Europe, and in particular for setting tariffs and managing congestion. It came into force on 1 July 2004.

### CROSS-BORDER TRANSACTIONS

The Florence Forum and the Madrid Forum, respectively the European regulatory forums on electricity and gas, have also contributed significantly to progress on these issues. These two forums will continue to play a considerable role as discussion platforms which bring together all the actors involved, whether State authorities, regulators or undertakings.

Realising that little progress was being made in setting tariffs for natural gas, at the end of 2003 the Commission proposed a draft regulation on access to gas networks ([22]) intended to make the guidelines on good practice binding for setting tariffs, services, capacity allocation in interconnections and for ensuring transparency of information for network users. Although these guidelines will be gradually modified, principally to extend their scope, they still do not go far enough.

The problem of physical congestion in European transport networks for gas and electricity must be solved and more must be done to link these networks together in order to enhance the security of the system and the opportunities for exchanges. Following enlargement, these priorities now need to be reviewed and this is the purpose of the Commission's latest proposal on the guidelines for the trans-European networks ([23]), which came at the end of 2003. In April 2004, the Union decided to step up financing for these networks to 20 %, as the Commission had proposed ([24]). The Commission's proposal includes, in particular, a priority list of essential interconnections, which may be the subject of a declaration of European public interest and ad hoc follow-up by a European coordinator. The Council has already adopted these innovative ideas for trans-European transport networks.

## Safer transportation of energy products

The Commission did not wait for the first blackouts to occur in Europe before looking into the issue of infrastructure development. Indeed, an initial communication on energy infrastructures published in December 2001 ([25]) put forward 13 specific measures for enhancing electrical energy performance and overcoming bottlenecks and congestion in supplies.

Two years later, in December 2003, the Commission published a new communication on the role of infrastructures in the security of supply ([26]), based largely on the conclusions of its latest report, which had documented the poor results achieved in implementing decisions on trans-European networks. The communication also echoed calls from the electricity generation sector for a framework to promote investment.

At the same time, the Commission proposed a draft directive on the security of electricity supply ([27]) to help Member States pursue a specific policy of balancing supply and demand by setting reserve capacity objectives or by taking equivalent steps to influence demand. The draft directive, which is still being studied by the Council and the Parliament, also includes measures for setting network safety norms and makes network managers responsible for providing multiannual investment plans, which are to be approved by national regulators.

In April 2004, the EU adopted a directive on minimum requirements for levels of natural gas supply in the Member States ([28]). This directive introduced for the first time coordination in security of gas supplies at European level and established a coordination group for gas, like the group for oil supplies which already exists. The directive means that Member States must draw up a policy on security of gas supplies (including plans to deal with emergencies) which defines the roles of all the actors involved. Some customers (households and SMEs) may be protected by specific measures. The directive provides a list, which is not exhaustive, of the instruments to be used in the policy: stocks, long-term contracts, interconnections, interruptible demand, etc.

# CONTROLLING EXTERNAL SUPPLY

Half of the Union's energy comes from imports and this trend is definitely set to grow, so links with third countries urgently need to be strengthened. It is quite natural that, in this, Europe should think of turning towards its large neighbour, Russia, the world leader in natural gas exports and the world's second-largest oil exporter.

## Continental energy partnerships

At the fifth EU–Russia industrialists' round table held in Moscow in December 2003, the participants acknowledged the importance of the energy sector for EU–Russian cooperation, since it is 'the area where the largest number of strategic and economic interests on both sides meet'. Russia and the Union's interests, then, run along the same lines and their energy strategies are well matched.

The possibility of a synchronous interconnection with the Russian electricity grid was raised at the EU–Russia summit in October 2001. A feasibility study on the necessary conditions, financed by the Union, will be started in the first semester of 2005. Meanwhile, the same rules apply to all those who wish to be part of the wider European market in electricity and gas: a reciprocal opening-up of markets, similar conditions for competition, and comparable levels of environmental protection and nuclear safety.

The EU–Russia energy dialogue was launched in October 2000 and in three and a half years produced some significant results. A series of important infrastructures of mutual interest have been identified, such as the north European gas pipeline. A centre for energy technology has been set up in Moscow. In January 2004, negotiations on trade in nuclear materials between Russia and the enlarged European Union began, and the two sides also intend to cooperate to improve safety levels for transportation of oil by sea. The EU has stressed the significance of long-term gas contracts many times, provided that these comply with European regulations, and the issue of destination clauses in some contracts between Russia and the Union has almost been completely settled. A feasibility study for a guarantee mechanism for non-commercial risks is under way.

In May 2003, the European Commission published a communication on a neighbourhood policy for energy ([29]) in an enlarged Union proposing the creation of a wider market in electricity and gas, through modernising our partners' energy systems and increased interconnection resulting from large-scale infrastructure projects. The increase in gas consumption in the Union will require new routes across eastern Europe.

The Odessa–Brody–Plotz oil pipeline is an example of international cooperation where the intervention of political decision-makers was decisive in the progress of a large-scale oil infrastructure project. Under the aegis of the European Commission, the Polish and Ukrainian governments have signed an agreement confirming the pipeline's strategic interest for providing north-west Europe with oil from the Caspian Sea.

At a ministerial session held in Athens on 8 December 2003, the Balkan countries signed a memorandum of understanding with the European Union on creating a single market in gas and electricity by 2005 for the Balkan region, based on and connected to the European system. It is a text which can be compared with the founding texts of European integration, which provide a guarantee of peace in the region. It addresses the challenges of external energy dependency, reconstruction, renewal and cooperation. The aim of the agreement is to attract investment in energy generation and transportation by providing a market environment with a stable regulatory set-up based on a single market in energy which stretches beyond the Union's borders.

A partnership and cooperation agreement with Ukraine has also led to a continued, fruitful dialogue in which discussions on energy have centred on the country's key role in terms of transit between the new independent States and the European Union since enlargement.

## Constructive dialogue with all of the Union's suppliers

The European Commission has also explored the possibilities of bilateral cooperation with its traditional and potential new suppliers of energy.

Bilateral discussions with Algeria have already resolved some of the issues about the conformity of long-term gas contracts with European legislation and the Commission has played a part in creating the conditions needed to double Algerian gas exports to Italy and Spain.

Euro-Mediterranean cooperation in energy received a new boost in 2003 when two ministerial conferences were held; one in Athens in May and one in Rome in December. These meetings provided new impetus to the Barcelona process, for energy relations among the partners of the Mediterranean ring, which had been launched in 1995, with those present agreeing on the principle of a genuine common energy policy. To this end, the Commission has created a technical platform and defined the financial instruments required to make this objective a reality. The ministers signalled the need for rapid implementation of the protocol of agreement regarding the phased integration of the electricity markets in Algeria, Morocco and Tunisia into the EU's internal electricity market by 2006. Initial studies were presented as part of the 'MedRing' project for the development of a Euro-Mediterranean electricity ring (Turkey–Greece, Algeria–Spain, Algeria–Italy–France).

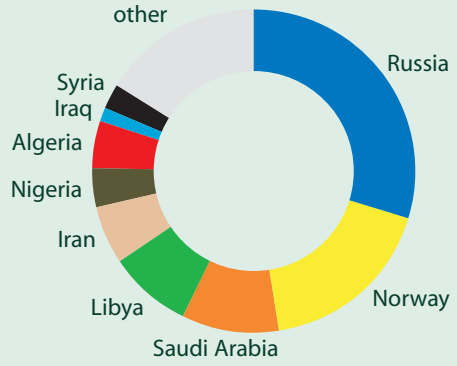
In 2002, the Commission launched a bilateral process of dialogue on non-nuclear energy with Iran, a country which could meet more than 10 % of the Union's natural gas requirements in the mid-term. The creation of new regional markets in the Mediterranean is also being promoted, in particular in Mashreq and Israel/the Palestinian Authority. It is hoped that these markets will subsequently be integrated into the European market and open up new routes to peripheral suppliers such as Egypt, Libya and Syria, which will soon be supplying us with gas. In this respect, Turkey has a strategic role to play. The Commission is working on interconnections with Turkey through Greece (under construction), Italy and the Nabucco gas pipeline, and through Romania, Bulgaria and Hungary (currently being studied).

For several years now, the EU has been negotiating with the Gulf Cooperation Council on creating a free-trade area between the two partners, including a better climate for investments. Experts from both Europe and the countries of the Gulf are cooperating in a working group on the transfer of hydrocarbon technology.

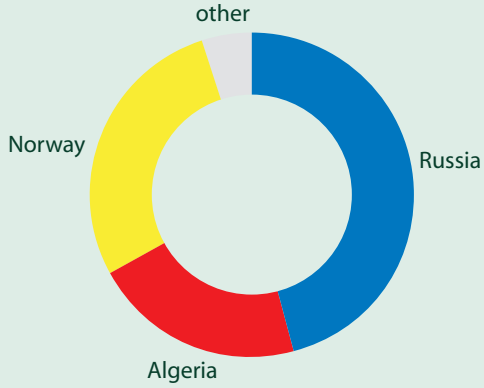
Oil imports account for 4 % of the Union's GDP. However, for the moment, there is no escaping the fact that the international dialogue between oil producers and consumers has not resulted in a great deal of concrete progress. Everyone, except perhaps the speculators, would benefit from stable prices ensuring steady long-term income for producer countries and reasonable oil expenditure for our economies.

## Oil and natural gas: origin of imports to the EU-25 (2003)

### Oil (crude and petroleum products)




### Natural gas




*Source:* European Commission and IEA.

A producer–consumer dialogue was started in 1991 and was renamed the International Energy Forum in 1999. At the seventh forum meeting, which took place in Riyadh in 2000, the decision was taken to set up a secretariat based in that city. An executive board of 15 members was also formed, including representatives from producer and consumer countries, the International Energy Agency and OPEC. Even though this organisation has no binding power over its members, it is the only channel which allows views to be exchanged between producer countries, both inside and outside OPEC, and consumers in industrialised and developing countries.

And yet, the European Union is still at risk from soaring oil prices despite European legislation on the management of oil stocks. The Commission's ambitious proposals to improve the Union's capability for dealing with oil crises ([30]) did not find much favour with the European Parliament or with the Council of the European Union. The current crisis highlights the Union's short-term lack of power against speculators, though the security of supplies is not at risk.

### Joint oil data initiative

This is one of the few specific advances to have come out of the dialogue between oil producers and consumers. Six organisations, including Eurostat (the Statistical Office of the European Communities), are taking part in this common monthly database project on oil, which was launched in April 2001 as a statistical exercise but became permanent two years later. Its aim is to speed up the continuous communication of data on production, demand and oil stocks and to improve overall statistical transparency so that markets can operate on the basis of recent, reliable data thus reducing the scale and combating the volatility of oil price fluctuations. Eighty-five countries representing approximately 95 % of the world oil market are involved in the initiative and its reliability is constantly improving.

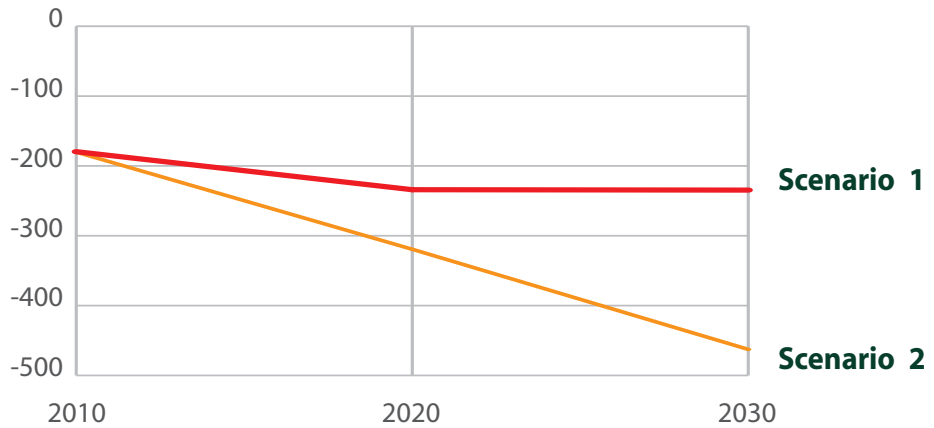
# FUTURE PROSPECTS FOR THE UNION

In spite of all the hard legislative work done over the past four years, we cannot say that we have achieved security of supply. Further avenues need to be explored in order to modify the demand curve. The European market in greenhouse gas emission quotas should make a contribution to this by speeding up energy-efficiency measures.

On the supply side, renewable energy sources obviously continue to be a short and medium-term priority. The Union's sixth framework programme for research (2003–06) provides support for innovative projects, both to develop new energy sources and to bring down their production costs compared with traditional forms of energy. In its November 2001 action plan on alternative fuels ([31]), the Commission set the figure of 20 % for new forms of fuel for transport, which is to be achieved by 2020.

The most optimistic scenarios for the Union's energy and climate policies suggest that by 2030 three aspects, at least, will be crucial in ensuring sustainability: management measures for energy demand and efficiency, renewable sources of energy and nuclear power. On this last point, it seems quite clear that public opinion will be against this kind of electricity generation unless it is able to offer additional guarantees on waste management, safety and security; and these are exactly the issues addressed by the specifications for the fourth generation of reactors currently being developed by researchers as part of the international Generation IV project.

**Reduction in $CO_2$ emissions (million tonnes) according to two scenarios (EU-25)**




Reference 0 in 2010 on the basis of the current trend with those measures in place at the end of 2001.
**Scenario 1:** By achieving a share of renewable energy of 12 % by 2010, we will be able to reduce our $CO_2$ emissions to a certain extent by 2030.
**Scenario 2:** Nuclear energy, based on a new generation of safer reactors that are more acceptable to public opinion, could contribute, together with a share of renewable energy of 12 %, to achieving a further major reduction in $CO_2$ emissions.

*Source: European energy and transport – Scenarios on key drivers,* European Commission, 2004.

Hydrogen is well placed in the field. Indeed, the Commission has made the hydrogen economy one of its long-term priorities for its energy system and, to this end, has created a technology platform for hydrogen to devise an action plan aimed at creating a completely integrated hydrogen economy, based on renewable energy sources and nuclear power, towards the middle of this century. This initiative was launched on 10 September 2003 in a Commission communication entitled 'A European partnership for a sustainable hydrogen economy'. In November of the same year, the Commission added this initiative, with a 10-year budget of EUR 2.8 billion, to the list of 'QuickStart' projects for transport, energy, telecommunications and research. Finally, on 21 November 2003, the Commission joined the International Partnership for the Hydrogen Economy, or IPHE, a platform launched by the United States at a ministerial meeting in Washington.

Thermonuclear fusion also bodes well for the future and could take over the reins from some of the existing energy sources towards the middle of the century. European research on fusion has a budget of EUR 750 million under the sixth framework programme (2003–06) and the European site at Cadarache (France) is a candidate for the future international thermonuclear experimental reactor (ITER).

# LEGISLATIVE DEVELOPMENTS

(1) Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions – Action plan to improve energy efficiency in the European Community (COM(2000) 247).

(2) Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings (OJ L 1, 4.1.2003, pp. 65–71).

(3) Directive 2000/55/EC of the European Parliament and of the Council of 18 September 2000 on energy efficiency requirements for ballasts for fluorescent lighting (OJ L 279, 1.11.2000, pp. 33–39).

(4) Commission Directive 2002/31/EC of 22 March 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household air-conditioners (OJ L 86, 3.4.2002, pp. 26–41).

(5) Commission Directive 2002/40/EC of 8 May 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric ovens (OJ L 128, 15.5.2002, pp. 45–56).

(6) Commission Directive 2003/66/EC of 3 July 2003 amending Directive 94/2/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations (OJ L 170 of 9.7.2003, pp. 10-14).

(7) Regulation (EC) No 2422/2001 of the European Parliament and of the Council of 6 November 2001 on a Community energy efficiency labelling programme for office equipment (OJ L 332, 15.12.2001, pp. 1–6).

(8) Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (OJ L 283, 31.10.2003, p. 51–70).

(9) Proposal for a directive of the European Parliament and of the Council on energy end-use efficiency and energy services (COM(2003) 739).

(10) Proposal for a directive of the European Parliament and of the Council on establishing a framework for the setting of eco-design requirements for energy-using products and amending Council Directive 92/42/EEC (COM(2003) 453).

(11) Decision No 1230/2003/EC of the European Parliament and of the Council of 26 June 2003 adopting a multiannual programme for action in the field of energy: 'Intelligent Energy — Europe' (2003–2006) (OJ L 176 of 15.7.2003, pp. 29–36).

(12) Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC (OJ L 52, 21.2.2004, pp. 50–60).

(13) Communication from the Commission to the Council and the European Parliament – The share of renewable energy in the EU – Commission report in accordance with Article 3 of Directive 2001/77/EC, evaluation of the effect of legislative instruments and other Community policies on the development of the contribution of renewable energy sources in the EU and proposals for concrete actions (COM(2004) 366).

(14) Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market (OJ L 283, 27.10.2001, pp. 33–40).

(15) Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport (OJ L 123, 17.5.2003, pp. 42–46).

(16) Proposal for a Council (Euratom) directive setting out basic obligations and general principles on the safety of nuclear installations and proposal for a Council directive (Euratom) on the management of spent nuclear fuel and radioactive waste (COM(2003) 32).

(17) Council Regulation (EC) No 1407/2002 of 23 July 2002 on State aid to the coal industry (OJ L 205, 2.8.2002, p. 1–8).

(18) Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC – Statements made with regard to decommissioning and waste management activities (OJ L 176, 15.7.2003, pp. 37–56).

(19) Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC (OJ L 176, 15.7.2003, pp. 57–78).

(20) Commission Decision 2003/796/EC of 11 November 2003 on establishing the European Regulators Group for Electricity and Gas (OJ L 296, 14.11.2003, pp. 34–35).

(21) Regulation (EC) No 1228/2003 of the European Parliament and of the Council of 26 June 2003 on conditions for access to the network for cross-border exchanges in electricity (OJ L 176, 15.7.2003, pp. 1–10).

(22) Proposal for a regulation of the European Parliament and of the Council on conditions for access to the gas transmission networks (COM(2003) 741).

(23) Proposal for a decision of the European Parliament and of the Council laying down guidelines for trans-European energy networks and repealing Decisions No 96/391/EC and No 1229/2003/EC (COM(2003) 742).

(24) Regulation (EC) No 807/2004 of the European Parliament and of the Council of 21 April 2004 amending Council Regulation (EC) No 2236/95 laying down general rules for the granting of Community financial aid in the field of trans-European networks (OJ L 143, 30.4.2004, pp. 46–48).

(25) Communication from the Commission to the European Parliament and the Council – European energy infrastructure (COM(2001) 775).

(26) Communication from the Commission to the European Parliament and the Council – Energy infrastructure and security of supply (COM(2003) 743).

(27) Proposal for a directive of the European Parliament and of the Council concerning measures to safeguard security of electricity supply and infrastructure investment (COM(2003) 740).

(28) Council Directive 2004/67/EC of 26 April 2004 concerning measures to safeguard security of natural gas supply (OJ L 127, 29.4.2004, pp. 92–96).

(29) Communication from the Commission to the Council and the European Parliament on the development of energy policy for the enlarged European Union, its neighbours and partner countries (COM(2003) 262).

(30) Proposal for a directive of the European Parliament and of the Council concerning the alignment of measures with regard to security of supply for petroleum products (COM(2002) 488).

(31) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on alternative fuels for road transportation and on a set of measures to promote the use of biofuels (COM(2001) 547).