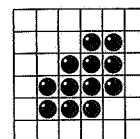
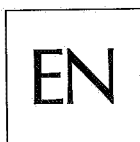


Periodical 7/1990

ENERGY IN THE EUROPEAN COMMUNITY



EUROPEAN DOCUMENTATION



Efficient production and use of energy is the key to future primary energy consumption. Energy intensity in the coming decades will be determined by the interaction of prices, technology, capital availability and environmental constraints. The dominant themes of the 1990s are the internal energy market and the environment.

Security of supply, energy production and consumption must be reconciled with a steady improvement in environmental quality. The internal energy market will provide a stimulus to economic activity and create a more favourable business climate. It will provide the basis through economic growth for the development of more efficient technologies, facilitate penetration of these technologies and help to reduce energy consumption through more rational use of energy. Above all, this will lead to a decline in emissions.

The three objectives of:

- (i) sustained economic growth,
 - (ii) a clean environment, and
 - (iii) a secure energy supply at competitive prices
- are not mutually exclusive. However, harmonious progress towards these goals is dependent on an effective common energy policy.

ISBN 92-826-1737-8



OFFICE FOR OFFICIAL PUBLICATIONS
OF THE EUROPEAN COMMUNITIES
L-2985 Luxembourg



9 789282 617373

ENERGY IN THE EUROPEAN COMMUNITY

(Fourth edition)

Manuscript completed in June 1990
Cover: photo Burt Glinn, Magnum, Paris

Cataloguing data can be found at the end of this publication.

Luxembourg: Office for Official Publications of the European Communities, 1991

ISBN 92-826-1737-8

Catalogue number: CB-56-89-538-EN-C

© ECSC-EEC-EAEC, Brussels · Luxembourg, 1990

Reproduction is authorized, except for commercial purposes, provided the source is acknowledged.

Printed in the FR of Germany

CONTENTS

INTRODUCTION	5
THE COMMUNITY AND THE WORLD ENERGY MARKET	7
■ THE FIGURES	7
■ SUPPLY STRUCTURES PRIOR TO 1973	9
■ THE ROAD TO CRISIS	11
■ EUROPE AND THE WORLD ENERGY MARKET FROM THE FIRST CRISIS TO THE PRESENT	14
EUROPE AFTER THE OIL CRISES	16
■ THE POSITION WHEN THE CRISES STRUCK	16
■ THE COMMUNITY'S REACTION TO THE NEW SITUATION ON THE ENERGY MARKET	17
■ THE TOOLS AT THE COMMUNITY'S DISPOSAL AND THEIR POTENTIAL	19
COMMUNITY OBJECTIVES	22
■ ENERGY OBJECTIVES FOR 1995	22
■ THE INTERNAL ENERGY MARKET	24
Areas of action: Horizontal barriers	24
Removal of technical barriers	24
Opening up of public procurement	25
Approximation of indirect taxation	25
Free movement of goods and services	25
State monopolies	26

<i>Rules of competition and State aid</i>	26
<i>Costs, prices, tariffs</i>	28
<i>Infrastructures</i>	30
<i>Obstacles and priority measures in the individual energy sectors</i>	31
— Solid fuels	31
— Oil and petroleum products	33
— Natural gas	35
— Electricity	36

ENERGY AND THE ENVIRONMENT	37
-----------------------------------	-----------

■ FOSSIL FUELS	38
■ NUCLEAR ENERGY	39
■ CONCLUSIONS	40

OUTLOOK	42
----------------	-----------

FURTHER READING	43
-----------------	----

INTRODUCTION

The Community is well on course for 1992, the year in which the legal and technical structure of the internal market is to be in place, ushering in the free movement of goods, services and capital. It goes without saying that such a large economic area (the Community already has over 320 million inhabitants, a figure which will probably be nearer 330 million in 1992) needs a blueprint for a common energy supply. As we shall see later, this is also what the people of Europe want. The 'script' for the ambitious internal market project, the Commission's White Paper adopted by the European Council in Milan at the end of June 1985, does not list energy or energy policy in the section on planned legislation. (There is an indirect reference concerning the opening up of public procurement in the electricity and water supply sectors.) Nevertheless, the energy sector occupies a far more important place in the internal market programme than might at first appear.

Let us consider again briefly how the new Article 8a of the EEC Treaty defines the internal market:

'The internal market shall comprise an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured in accordance with the provisions of this Treaty.' Is energy a commodity? A service? Or both? The prevailing view is that, while energy is a strategic economic commodity, energy marketing has more to do with services.

The internal energy market will therefore inevitably differ in some important ways from the internal market in, say, the food industry or audiocassette industry. Furthermore, the individual energy sources are also highly diverse in character — take water, coal, mineral oil and nuclear energy — and nature has distributed these resources (which we shall mainly consider collectively as 'primary energy' in the following) less than

evenly throughout the individual Member States. In addition, energy is used for different purposes: depending on how it is processed, an energy product may be used as a fuel, as a raw material or as motive power. All of this has given rise to very complex structures in the individual Member States and, of course, the structures become even more complicated at the level of the Community as a whole.

However, a superficial glance will suffice to show that there is little evidence of market forces in the usual meaning of competing products and suppliers in the European energy industry and many ancillary sectors. For example, there is virtually no alternative at present to oil in road transport or the petrochemicals industry. There is at least a choice of primary energy inputs for heating, steam raising and blast furnace operation, with cost generally being the deciding factor. Electricity, the most widely used form of secondary energy, and natural gas, are commonly subject to distribution monopolies, which close off the market in their catchment area, denying access to competitors. The undertakings operating on such markets are also highly diverse. Small and medium-sized private companies exist side by side with public utilities, national private enterprises and multinational concerns. These organizational differences are compounded by differences in rights, privileges and obligations. And just to round off the picture, the energy sector is influenced by different political traditions in the individual Member States and, above all, differences in taxation practice.

The net result is that differences between Member States in the energy sector are primarily determined by two factors: the type of energy products available there and the conditions under which they are produced, distributed and used. Nature and history have thus produced a situation where the in-

dividual energy markets in the Community's Member States are still strictly compartmentalized and the free movement of energy products consequently greatly hampered. This has inevitably had repercussions on the competitiveness both of the individual Member States and of the Community as a whole in the international arena.

However, the objective of the internal market is specifically to secure the Community's competitiveness and international prestige in the short to medium term. Energy has a key part to play in this owing to its vital importance for every sector of the economy and the individual citizen. It is hoped that a more open energy market will reduce access utilization costs and pave the way to more rational production through greater competition on the supply side. It will not only be private consumers who benefit, but also industry wherever it requires energy to function. If we consider that energy costs amount to between 25 and 30% of the production costs of steel, glass products, aluminium or building materials, it immediately becomes clear that lower energy prices have a direct impact on product prices and thus on competitiveness. This results in more opportunities for stable growth and better prospects for employment.

The effects on the energy industry itself are also likely to be positive. The removal of internal barriers should provide the industry with economies of scale in the production, transport and distribution of energy. This will go hand in hand with an improvement in the European producers' financial situation and

international market position. Another crucial aspect is that a more integrated energy market can decisively improve the security of supply of the Member States and their economies. Last but not least, intra-Community trade in energy products is likely to increase substantially, and thus reduce costs still further. These cost factors are by no means insignificant. The Commission has put the costs of 'non-Europe' in the energy sector, i.e. the additional costs that energy consumers — whether in industry or the domestic sector — have to bear owing to the current fragmentation of energy markets, at almost 0.5 % of the Community gross domestic product. For this reason alone, we can but endorse the statement made by the Commission in its paper of May 1988 entitled 'The internal energy market': 'The establishment of a more integrated energy market is of vital importance to the future of our Community. We should therefore endeavour to identify all the potential or existing obstacles confronting the various energy sources and the various Member States.' We shall return to this subject later. However, there are also objective constraints acting on all energy sources and all Member States, independently of any other impediments or barriers they may encounter individually. These are the security of supply and the strategic nature of energy generation and energy products. These constraints were abruptly revealed during the first oil crisis in 1973. Let us therefore begin with the Community's position in the world energy market.

THE COMMUNITY AND THE WORLD ENERGY MARKET

The world energy market has changed fundamentally since the end of the Second World War. Several factors have been implicated in this development:

(i) an increase of over 100% in primary energy consumption in the industrialized countries in the first three decades up to the early 1970s;

(ii) large-scale displacement of solid fuels (hard coal and lignite), which covered over 80% of energy requirements in the countries of the future European Community after the Second World War, by mineral oil and, subsequently, natural gas. Oil, which accounted for approximately 10% of European energy requirements at the beginning of the 1950s, increased its share to 59% in 1973, while solid fuels declined to 23%;

(iii) the emergence of a completely novel energy source in the form of nuclear power, which covered just 4% of requirements in 1973 together with geothermal energy and hydropower (now 12%);

(iv) two oil crises in 1973 and 1979-80 which changed the picture more radically than any other factor.

A new trend has been emerging as a result of increased environmental awareness in broad sections of the population, not only in Community countries, which has led to critical questions being asked about the main energy sources — coal and oil as well as nuclear energy — and the consequences of intensive energy utilization in the form of visible and tangible deterioration of the natural environment.

Let us now consider these factors individually:

■ THE FIGURES

The development of the world economy since the end of the Second World War has

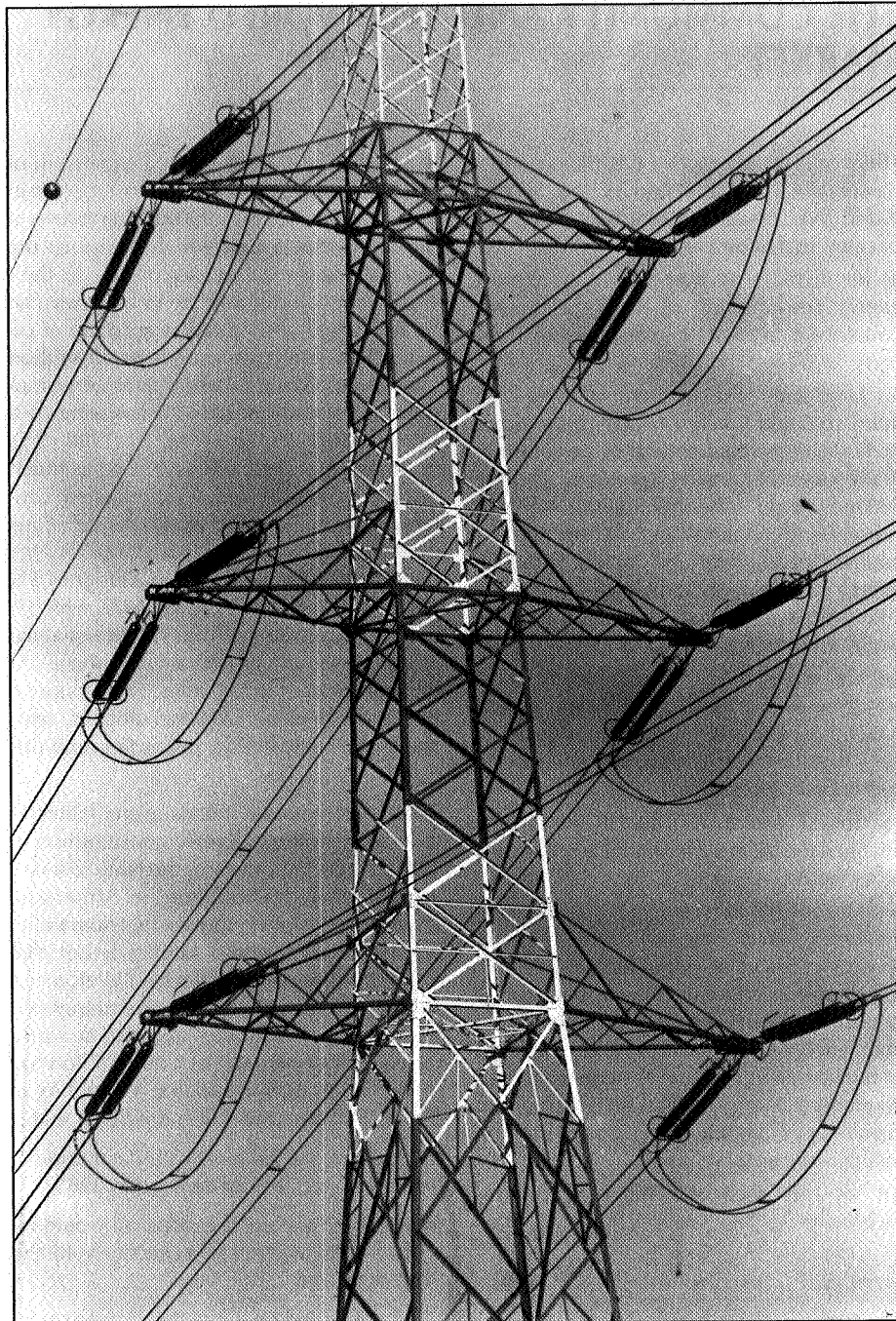
resulted in an unprecedented expansion of energy consumption. World consumption in 1950 stood at around 1 900 million tonnes of oil equivalent (a unit which measures the various energy sources according to their equivalent calorific values, so that they can be compared and added: one tonne of oil equivalent (toe) corresponds to 10 million kilocalories (kcal); 14 years later consumption had already doubled, increasing to a total of 8073.5 million toe by 1988. It is estimated that man will have used as much energy in the latter half of the twentieth century as throughout the whole period of his existence on Earth until 1950. World energy consumption increased by an average of 5% per annum between 1950 and 1973, which is twice the known rates from the 19th century. Steady economic growth of well above 5% on average over many years, rapid population growth of + 1.9% per annum, and, above all, stable energy prices favoured this trend.

These international trends were faithfully reflected in Europe. Energy consumption in 1973 in the Community of the Nine reached approximately 1 000 million toe. At that time it was not possible to foresee that demand in Europe could become saturated, nor that there could be zero growth. It is therefore not surprising that the Commission extrapolated the existing growth rates to arrive at a projected energy demand of 1 800 million toe for 1985; for 1988 it assumed a doubling of the 1973 figure. It was also predicted that:

(i) the share of solid fuels would continue to decline to just 10% of demand in 1985;

(ii) the share of natural gas and oil would increase to 15 and 64% respectively in the same year, and

(iii) there would be a massive expansion in nuclear energy from 14% in 1973 to about 9% in 1985.



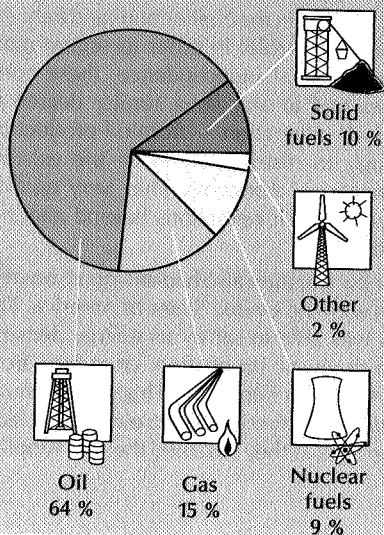
8

Europe needs an internal market without frontiers. The single European market needs an energy market without frontiers.

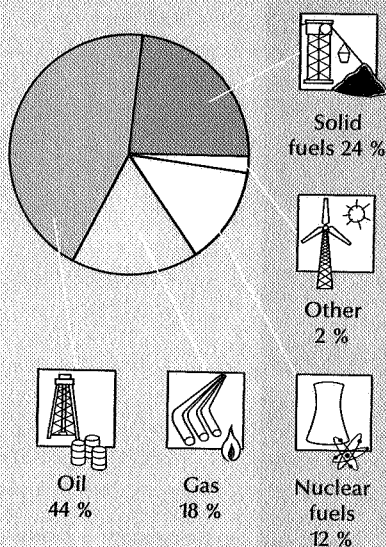
Energy requirement

1985: Forecast and reality —
a comparison

Prognosis 1985



Reality 1985



We shall come back to the prognoses later. Suffice it to say here that none of them was really borne out. However, one result of the changes in the relative shares of the various energy sources was that the Community's dependence on imports increased dramatically, as it had scarcely any oil resources of its own at the time. As the sharp increase in energy demand was largely covered by imported oil, the energy imports of the Nine temporarily accounted for 65% of the entire energy requirement. By contrast, only 10% of demand had to be covered from imports in 1950.

■ SUPPLY STRUCTURES PRIOR TO 1973

To sum up the trends outlined above, Europe's energy situation on the eve of the first oil crisis was the following.

The inexorable growth in the role of oil as a source of primary energy had engendered a structural crisis in the coalfields of the United Kingdom, Federal Republic of Germany, France, Belgium and the Netherlands, the consequences of which have still not been fully overcome.

Taking a Community view, this development in fact probably boosted solidarity between Member States. Owing to the lack of sufficient own oil resources, all Member States became importers of energy, although to varying degrees. This led to a change in attitudes. Previously, there had been a clear distinction between those countries which were able to cover a large proportion of their energy requirement from own resources, mainly coal, and those which were obliged to buy in energy from their neighbours.

The substitution of oil for coal as the main energy source brought with it major shifts in the location of industry. So long as coal had a predominant role, it was natural that the key industries were located in or around the coalfields. Oil, however, came into the Community via the ports and coastal areas, and no longer only in the northwest of the Community's territory where the oil industry had

hitherto been concentrated. Refineries and petrochemical plants were set up in the ports of entry and in the hinterland, leading to greater economic development in regions far from the coalfields. However, overcapacities have arisen in this sector at these locations, which are still creating problems today.

These developments were accompanied by far-reaching changes in the international structures of the energy industry. The long unchallenged position of the multinational oil companies with their highly integrated structures — exploration, production, transport, refining, storage and distribution in one hand — gradually began to crumble. Firstly, the oil-producing countries were no longer prepared to accept this domination of the market and, secondly, opposition also began to stir in some importing countries.

On the oil-producing side, the founding of the Organization of Petroleum Exporting Countries (OPEC) was primarily responsible for this development. In 1965, only five years after the organization was set up, the

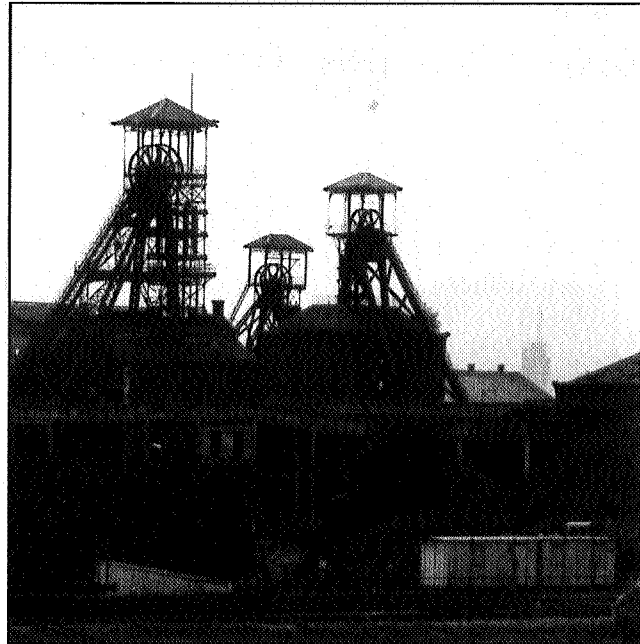
changed distribution of forces was reflected in the imposition by Libya of a new taxation system on the concession companies, under threat of a unilateral cut-back in the production volume. The importing countries of Western Europe in particular founded their own national oil companies with government support or, where these already existed, such as in the Netherlands and Italy, expanded their role. In order to secure maximum national independence, these companies had to aim for a similar degree of 'vertical' integration — from oil production through to distribution — as the existing multinational concerns. They very quickly expanded their operations beyond national frontiers.

The new situation also had an impact on relations with the United States of America. The USA was able to satisfy its energy demand from domestic production, or at least from the American continent. This gave it an advantage over its competitors overseas, at least for so long as they obtained their oil supplies



The Community is producing less and less coal...

... and yet in 1988 soild fuels still accounted for about 28% of total energy production.



primarily from American sources. However, a decision by President Eisenhower, designed to safeguard American oil supplies, diverted large quantities of oil to Western Europe from the much closer, but politically often highly unstable countries of the Middle East. Europe, and Japan, too, despite the distances involved, quickly availed themselves of this supply source. Many observers regard this as the reason why Japan and Western Europe in particular experienced faster and more uniform economic growth than the USA at the end of the 1960s.

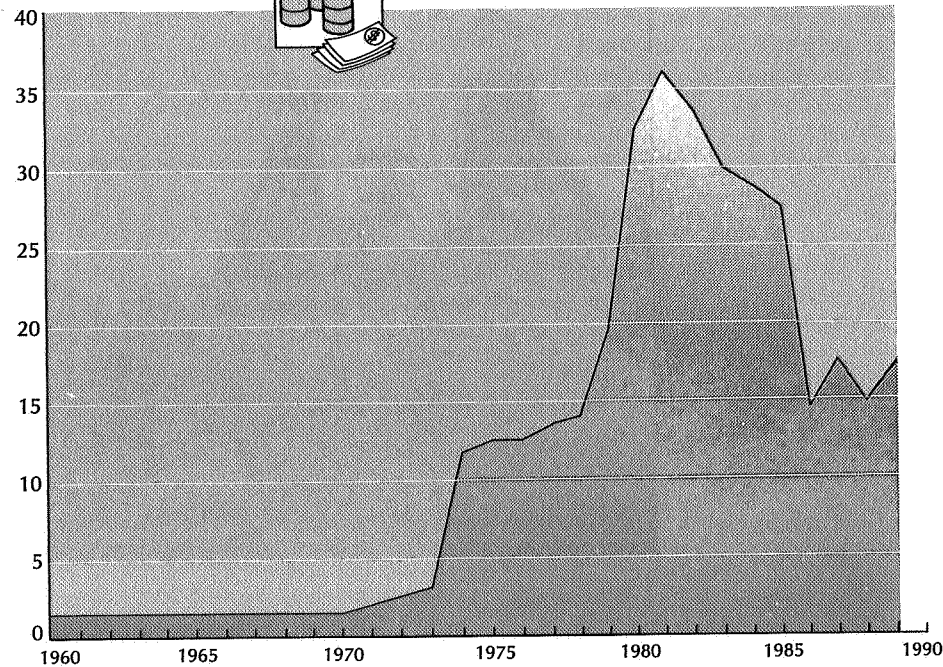
■ THE ROAD TO CRISIS

The first sign of change appeared towards the end of 1969. Because world energy demand was rising steadily and usually faster than the oil companies' prognoses, and because the role of oil as an energy source was becoming more important, the oil-producing countries gradually gained the upper hand and were quick to realize the potential of this favourable new situation. By coordinating

their policies they endeavoured to increase and stabilize their oil revenue as far as possible, as the situation on the international exchange markets was characterized by uncertainty owing to the floating of the dollar, the currency in which most oil transactions were, and still are, effected. Oil revenue is the most important, if not the sole, source of income for many oil-producing countries. Other countries such as Algeria, Iran and, to a certain extent, Iraq have been able to develop their agriculture and non-oil-related industry on the strength of their demographic and geographical resources. For them, the revenue from oil exports was a welcome means of diversifying their economies, and the western industrialized countries benefited enormously from their purchases of capital goods and basic infrastructure. Other oil-producing countries, especially in Arabia, did not have this possibility. Consequently, they invested the balance of their income (usually the larger portion) after current expenditure and extensive investment in their own infrastructure

Oil prices

USD / bbl



abroad ('petrodollars'). These usually short-term investments constituted a large supply of floating capital that, if not the direct cause, certainly contributed to some dangerous currency fluctuations. Whatever the specific differences between the individual countries, they all had a common interest in protecting their income against inflation and loss of purchasing power. These objectives were the driving force behind the oil-producing countries' policy from 1970. They were reflected in the Teheran and Tripoli Agreements (1971) on higher oil prices and in some agreements in the following year designed to adjust these prices in the wake of wild currency fluctuations.

Many elements of the scenario for the first oil crisis were therefore already present owing to the increasingly confident assertion by the oil-producing countries of their own interests. The trigger, but probably no more

than that, was the outbreak of the Yom Kippur War in October 1973. As on previous occasions, the Arab countries felt there was justification for using oil as a political weapon, although with the decisive difference that this time they did not stop at threats. In December 1973 the oil-producing countries refused to fix their prices in agreement with the oil companies and announced that they would in future decide prices unilaterally. Crude oil prices were immediately tripled and increased again soon after, with the result that ex-producer prices at the beginning of 1974 were more than four times their 1973 level.

This abrupt increase in prices had serious repercussions for the economies of the western industrialized countries. (The consequences were far more serious for developing countries with little or no oil reserves, many of whose financial problems assumed

gigantic proportions as a result of the quadrupling of their oil bill.) We shall return in the following chapter to the far-reaching consequences of the oil crisis, some of which are still in evidence today. For the present, it is sufficient to note that oil consumption world-wide diminished substantially in the years after 1973. The effect of this very marked trend, coupled with efforts to make more rational and sparing use of energy, was that the Community was able to cater for demand without serious problems up to and including 1978. The actual oil bill was lower than feared, as widespread inflation and the decline in the value of the dollar had a moderating effect.

The crisis prompted President Nixon to call an international energy conference in February 1974, in which, in addition to the host country the USA, the European Community, all its Member States, Canada, Japan and Norway took part. The conference appointed a coordinating group, whose work led to an international energy agreement and the founding of the International Energy Agency (IEA).

The IEA, which established its headquarters in Paris, has devoted itself to the following main tasks:

- (i) formulation and implementation of a programme of long-term cooperation in the development of energy sources and in energy conservation,
- (ii) review of national energy-saving programmes and development of new energy sources,
- (iii) improved information on the oil and natural gas markets,
- (iv) establishment of a centre for energy statistics, and
- (v) creation of a mechanism for restricting oil demand and sharing available supplies in times of crisis.

Following several years of relative calm, new tensions appeared on the world market in 1979. During the first half of that year, the Iran crisis was reflected in a modest supply deficit. However, as huge contingency sup-

plies were stockpiled in the light of experience with the first oil crisis, supply continued to contract resulting in higher prices on the spot markets (particularly on the Community's crucial Rotterdam market). OPEC took advantage of this situation to increase official oil prices still further, causing them to double in successive stages in 1980 as a whole compared with the December 1978 level.

Thus the price per barrel of crude oil had risen from under USD 3 to USD 36 as a result of the two oil crises of 1973/74 and 1979/80. This was the time when OPEC was at the zenith of its influence and power. There were some signs that the organization was about to go too far. Furthermore, the heavy energy users among the industrialized countries adjusted their behaviour considerably. Several elements therefore coincided:

- (i) the industrialized countries went into the first world-wide recession since the Second World War, which lasted until the early 1980s. The customary growth rates gave way to zero growth and, in some cases, decline (Community gross domestic product in 1975 diminished by 1% in real terms);
- (ii) this depressed energy demand, so that the oil-producing countries were unable to maintain the 1980 price level. Tensions surfaced in OPEC, leading to major problems in the hitherto solid group. Saudi Arabia in particular abandoned the policy of high prices. Oil prices gradually fell, in part because increased production in the North Sea weakened OPEC's position and some oil demand was absorbed by greater use of nuclear power and natural gas;
- (iii) persistent international monetary instability, particularly in the form of erratic fluctuations in the dollar exchange rate, did not only damage the finances of the industrialized countries. The oil-producing countries' revenue also deteriorated because of this development, which ironically stemmed in no small measure from their earlier, usually short-term, petrodollar investments. Finally, one of the chief causes of

the international debt problem can also be sought in the two oil crises.

■ EUROPE AND THE WORLD ENERGY MARKET FROM THE FIRST CRISIS TO THE PRESENT

It is clear from this summary that the direct cause of the aftermath of the first oil crisis was Europe's *de facto* tolerance of excessive dependence on oil imports from politically unstable parts of the world such as the Middle East. The lessons drawn from this internationally were that dependence on such imports and thus economic vulnerability had to be reduced at all costs. At the world economic summit in Tokyo in 1979, the USA, Canada, Japan and the European Community agreed to pursue a common strategy to reduce oil consumption and hold imports in the subsequent five years at their 1978 and 1979 levels, to promote energy saving and the production and consumption of coal and to coordinate development of alternative energy sources. The target with regard to reducing oil consumption was actually surpassed under the influence of the second oil crisis. Energy consumption was reined in, and imports quickly dropped below the levels envisaged in Tokyo.

In the years immediately after the second oil crisis, the strategy of reducing dependence on oil as far as possible had considerable success. For example, Community gross primary energy consumption remained more or less constant between 1973 and 1985: it rose from 1029 million toe to 1053 million toe in 1980, declining slightly again to 1048 million toe in 1985. In 1973 the present 12 members of the Community together consumed 606 million tonnes of oil. This had fallen to 552 million tonnes in 1980 and 457 million tonnes in 1985, a figure which was, however, distorted by the miners' strike in the UK, i.e. it was artificially high. Oil production within the 12 Community countries increased from 13 million tonnes to 93 million tonnes in 1980 and 151 million tonnes in 1985 (mainly due to North Sea oil); net oil imports fell from 643 million tonnes to 497

and 334 million tonnes respectively. A fact worth noting is that the share of oil in total energy demand and dependence on imported energy declined by practically the same amount: from 63% (65%) to 55% (56%) and 46% (43%) respectively. Notable in this context is that 1985 was a year in which the recovery of the world economy began to stabilize. As the lessons drawn from the two oil crises had obviously been taken on board (i.e. energy was being consumed more rationally, new and less energy-intensive technologies were being applied and thermal insulation was being improved), it appeared that the iron rule that economic growth always implied increased energy consumption no longer applied. The best indicator of this relationship is probably energy intensity, i.e. the quantity of energy required to obtain a given volume of gross domestic product. For every unit of GDP (USD 1 million at 1980 prices) the world consumed 616 toe in 1950, and still required 597 toe in 1976, while by 1986 this had fallen to 551 toe.

In 1986 OPEC had also drawn lessons from its experience since 1973 and returned to the system of fixed prices, the level of which steadied at about USD 18/barrel, or approximately half the level of 1980 prices. At the same time they agreed on a general ceiling on production and individual production quotas per country. OPEC representatives explicitly conceded at an internal Commission seminar on energy policy in 1987 that the net effect of the price fluctuations had been negative both for the oil market and the international economy.

The picture, however, is still not complete. On presentation of its review of Member States' energy policies in the light of the Community's energy objectives for 1995, the Commission noted in February 1985 that the Community was continuing to restructure its energy supply to reduce oil dependence. Nuclear energy was seen as the chief alternative. The share of oil in gross energy consumption declined from 51 to 47% between 1982 and 1986. Solid fuels (particularly coal) dropped slightly from 24 to 22%. Natural gas

increased its share slightly from 16 to 17%, while the share of nuclear power grew from 7 to 12%.

However, the Commission also noted with some concern that the decoupling of energy demand from economic growth (i.e. diminishing energy intensity) had slowed down, at least as far as the period 1982-86 was concerned. The annual growth in energy demand of 2% per annum on average was almost as high as the mean growth rate in GDP at 2.2%. In some countries such as France, Belgium, the Netherlands, Ireland

and Portugal, the de-linking trend had — according to the Commission — actually been reversed. Demand for electricity also exceeded economic growth with an increase of 3.3% per annum between 1982 and 1986. The Commission is therefore probably right in concluding that the inclination to conserve energy has diminished in the light of lower energy prices (in particular of crude oil) recently. Has Europe forgotten the lessons of the two oil crises? Or is it in the process of doing so? Let us return again to 1973 and the aftermath.

EUROPE AFTER THE OIL CRISES

■ THE POSITION WHEN THE CRISES STRUCK

The two crises which caused oil prices to increase twelvefold within a few years had disastrous effects on the economies of Europe and the whole world. The scars are still visible today. The crisis in the steel industry with stagnating sales following the build-up of overcapacities, which hit Europe particularly hard from the middle of the 1970s, was a direct consequence of the sudden drop in demand for steel.

Although prices increased by approximately the same amount both times, their effects could scarcely be compared. The first crisis in 1973 came at a time when utilization of production capacities was running at a fairly high level. In addition, raw material prices outside the energy sector were on the upturn which, together with a more expensive dollar, intensified the inflationary effects of the oil crisis. Inflation rates in the Community, which during the 1960s had been running at just over 4%, rocketed to an average of 12% in the years 1973-75, although this figure masks considerable differences from country to country. Inflation rates of 15-20% were recorded in Ireland, Italy and Greece, by no coincidence countries with a particularly high dependence on imported energy. At the same time, the balance of payments in most industrialized countries was transformed into a deficit. Indebtedness grew, which in turn led to disruptions in the international monetary system and a further shrinking of world trade. The Community's gross domestic product declined in real terms by over 1% in 1975. In short, the world was in its first real recession since the Second World War.

The second oil crisis broke before the consequences of the changed energy situation had been completely assimilated and adjustment processes were still in train. Growth rates

were positive again, but nothing like as high as in the early 1970s. The average growth rate in the Community between 1976 and 1979 was 3.5%, compared with an average 5% in the years 1969-70.

The economic situation, however, was totally different. Capacity utilization was running at a much lower rate, prices of many raw materials were stagnating or declining, and the leading industrialized countries were coordinating economic policy more effectively. As a result, a second recession in the years 1979-80 was successfully avoided. Nevertheless, the crisis persisted for several years. Growth rates in the 24 member countries of the Organization for Economic Cooperation and Development (OECD) averaged less than 1% during the years 1980-82, with just over 0.8% in the European Community, zero in the USA and about 3% in Japan. It was not until 1983 that a period of recovery set in, in the course of which growth rates regained the levels of the late 1960s.

The employment situation, by contrast, showed little improvement and in some cases even deteriorated. Unemployment in the Community, which affected 3.5 million people in 1974, had risen to 5 million by 1975 and hit the 10 million mark in 1981. The accession to the Community of Greece in 1981 and Spain and Portugal in 1986 brought with it a substantial increase in unemployment, not only in absolute terms but also as a percentage of the working population. There were still no fewer than 15.5 million people out of work in the Community of the Twelve at the end of 1988, equivalent to an unemployment rate of 10%.

■ THE COMMUNITY'S REACTION TO THE NEW SITUATION ON THE ENERGY MARKET

Higher prices and the resulting recession affected energy consumption in a way that belied all experience since the Second World War. Primary energy consumption had increased steadily from 1950 to reach approximately 1 000 million toe in 1973, the year of the first oil crisis, when the trend was abruptly stopped. In the subsequent years, consumption in million toe developed as follows: a drop in 1974 to 941 Mtoe and in 1975 to 890 Mtoe was followed by a slow, but uneven, expansion to 947 and 942 Mtoe in 1976 and 1977 respectively, and it was not until 1978 that consumption regained its 1973 level. It peaked briefly at 1 012 Mtoe in 1979 but crashed again to its 1973 level in

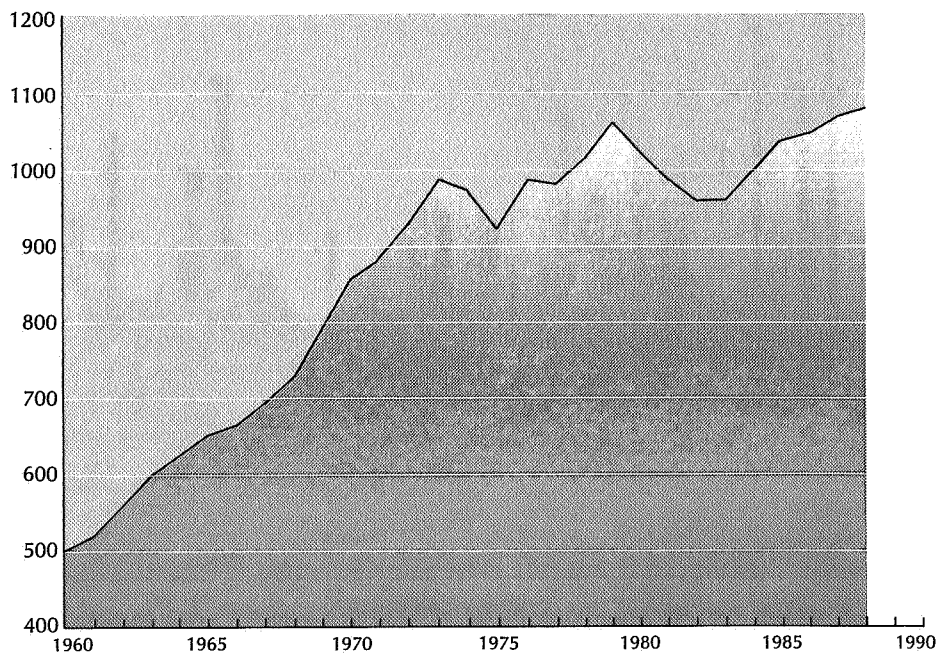
1980 at 970 Mtoe owing to the second oil crisis and even further in 1981 to 934 Mtoe. Gross primary energy consumption only passed the thousand million mark again in 1985 (1 056 Mtoe) and 1986 (1 073 Mtoe).

These figures broadly reflect the ups and downs of economic development during those years. Industrial activity had declined by 8% between 1974 and 1975 and recovered only slowly thereafter. It was mainly physical factors that were responsible for this in the first phase, such as the interruption of supplies to some countries and, of course, the price development itself which obliged consumers to hold back. At the same time, the countries affected took measures to damp energy consumption. What specific action did the Community take?

Although the 1973 oil price increase did not appear like a bolt from the blue as the warning signs had been there, the crisis hit the

Primary energy consumption in the Community

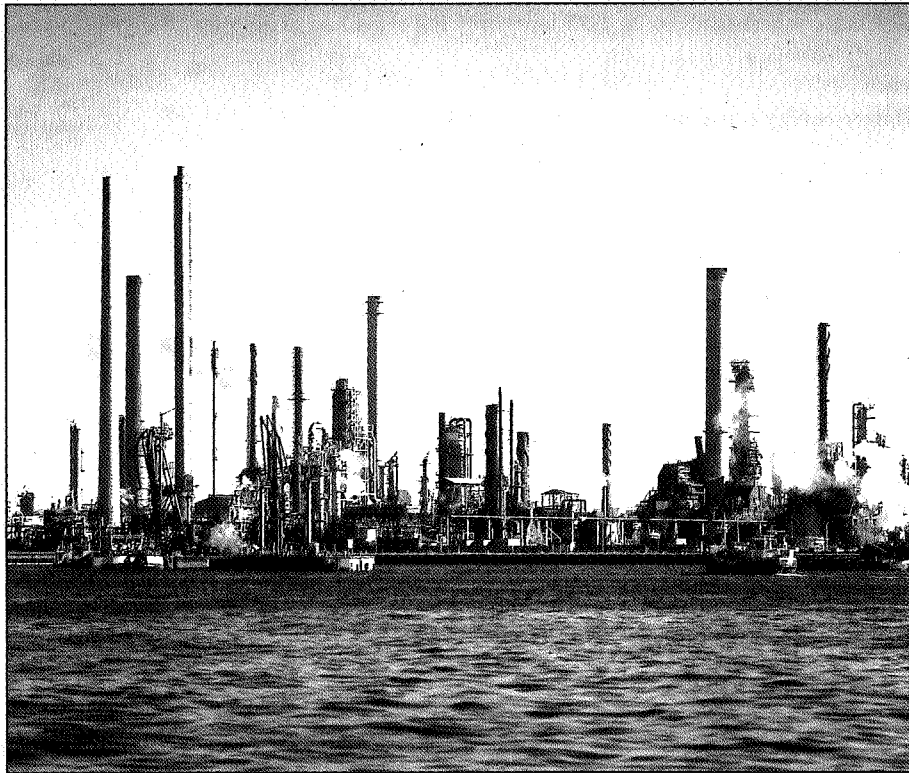
Mtoe (Million tonnes of oil equivalent)



Community and most other heavy consumers unprepared. The oil crisis was the overriding issue at the Copenhagen Summit on 14 and 15 December 1973, at which representatives of the OPEC countries were highly prominent, albeit unofficial, guests. In view of the gravity of the situation, it was agreed that energy policy measures should be drawn up without delay, for which a new body, the Energy Committee, was to be responsible. It was to consist of representatives of the Member States chaired by a Commission Member; its brief was to secure the coordinated implementation of the Community measures, facilitate exchange of information and consultations between Member States and the Commission and support the Commission in formulating its

proposals. However, under the pressure of events, Member States initially began to decide and implement their own measures without proper coordination.

The first essential for a coordinated approach was to get the facts. Designing a common energy policy requires precise information on the development of the energy market, and in particular the crude oil market. The Commission did receive information on coal and nuclear energy on the basis of the ECSC and Euratom Treaties, but it was only in 1972 that the Council enacted provisions giving the Commission access to information on planned investments in the oil, natural gas and electricity sectors, important data for the assessment of future demand and consumption.



After the onset of the energy crisis, the Commission called on the Member States to provide quarterly information on the development of oil and gas imports with a breakdown by company to enable the Community to make a reliable assessment of the supply situation. Two Council regulations adopted in 1974 also required Member States to notify the Commission of imports of oil products and exports of hydrocarbons (oil, derived products and gas). From 1979 onwards, in the light of the second oil crisis, oil imports were subjected to even closer monitoring in the form of a registration obligation. In this way the Community received some indication of the terms applying to these transactions. Finally, the Member States decided in 1977 to collect and forward to the Commission data on coal imports from non-Community countries.

Of course the Commission did not just collect all this information for its own sake. Its purpose was to serve as a basis for concerted action by the Member States in order to secure the implementation of common political guidelines and objectives. Such concerted action has not been confined to the national authorities: the Commission also has regular contacts with market operators, i.e. the oil companies, the major transport and distribution undertakings and the coal and electricity producers. Consumers, too, are involved either individually or through their representative organizations.

■ THE TOOLS AT THE COMMUNITY'S DISPOSAL AND THEIR POTENTIAL

Armed with this information, the Commission was better equipped to create the foundations of a common energy policy. Member States only gradually came to accept that a common policy offered greater prospects of success in such a crucial area as energy supplies, particularly in times of crises, than if every State acted unilaterally. This insight did not gain the same currency everywhere:

France, for example, fairly soon left the coordinating group set up by the Washington Energy Conference which led to the founding of the International Energy Agency, because it had reservations about some policy aspects. Nevertheless, the elements of a common energy policy gradually crystallized and still form the backbone of this policy today. They include:

(i) the setting of common medium-term energy objectives, to the achievement of which every Member State is to contribute according to its ability. The first objectives were formulated in 1974. In 1980 they were more precisely defined for the period until 1990. In the spring of 1988 the Commission presented the objectives for 1995, which will be considered later. The Commission monitors progress towards these objectives and reviews Member States' energy policies at regular intervals;

(ii) the use of certain Community instruments designed to supplement action by Member States whenever this is likely to prove more effective. These include joint research, development and demonstration programmes, Community legislation in areas such as rational use of energy, harmonization of the key components of price formation and coordination of relations with certain non-Community partners. In addition, support for investment in equipment and modernization in the energy sector is provided from the Community budget and through loans from Euratom, the European Coal and Steel Community (ECSC), the New Community Instrument (NCI) and the European Investment Bank (EIB). Examples of such assistance include participation in the financing of power stations, capital equipment for coal mines and coal terminals, conversion of oil-fired plant to solid fuels, expansion and integrated operation of electricity networks, development of new energy sources and support for various energy-saving projects in industry, public buildings or in the operation of district heating networks.

On the whole, the approach by the Community and the individual Member States

COMMUNITY FOSSIL FUEL USE FOR COMBUSTION PURPOSES

Mtoe	1980	%	1987	%	1995	%	2000	%	2010	%
Solid fuels	235	26	230	27	247	26	275	28	322	31
Oil	494	54	419	49	480	50	466	47	428	42
Gas	184	20	207	24	236	24	250	25	276	27
Total	913		856		963		991		1 026	
Total primary energy	1 025		1 062		1 226		1 277		1 375	
Community fossil fuel use for combustion as percentage of TPER		89		81		79		78		75

DOC. COM (89) 369 final, 8.2.1990

has been successful. The Community was able to reduce its oil imports by 50% between 1973 and 1983. It has also been calculated that more rational use of energy saves the Community the equivalent of 250 million tonnes of oil. At the same time, North Sea oil reserves contributed around 130 million tonnes; an equivalent volume of imports was saved through greater use of nuclear energy and natural gas.

Let us now examine this success more closely. If, instead of absolute consumption figures, we take energy intensity as a yardstick — i.e. the ratio of final energy consumption to gross domestic product — it emerges that 10 of the current 12 Community countries, including Spain which launched energy-saving programmes in the 1970s, have been able to improve this ratio by 20% (Community average). In particular Luxembourg (38.8%), Belgium (29.5%), Denmark (27.9%) and Ireland (27.6%) achieved excellent results in the period 1973-82. Greece, by contrast, which had no such programme at that time, paid for its growth with a deterioration of 1.9% in energy intensity.

To recapitulate: 1973 to 1982 was the period in which the world suffered two oil crises. However, as the unpleasant memories began to fade, the will to continue along the path embarked upon slackened. Progress in reducing energy intensity rapidly diminished: the impressive figure of 20% on average for the Community in the years 1973-82 shrunk by a factor of 10 to 2.4% in the four years from 1982 to 1986. The background at the time was one in which the industrial restructuring made necessary by the oil crises had largely been completed and crude oil prices stagnated and then began to slide. The picture is even more worrying when the Member States are considered separately. Four countries, the Federal Republic of Germany, the Netherlands, Belgium and Ireland, not only failed to make any progress during this period, but energy intensity actually deteriorated, i.e. they had to use more energy to achieve the same growth rate. While in the case of Germany the dimension involved was comparatively small (–0.3%), in Ireland's case, for example, it was considerably greater (–13%). As the Commission noted in

the spring of 1988 'Most Member States have reviewed their energy efficiency policies in the light of the changed energy market conditions and the experience gained with various initiatives. The result of this reappraisal has been the reduction (if not the total elimination) of direct subsidy programmes for energy efficiency investments'. Only Italy, the Netherlands and Denmark maintained their R&D spending at the same level during this period. The Federal Republic of Germany, for example, reduced its allocation for energy efficiency R&D by a factor of more than three compared with the figure of ECU 110 million in 1981.

These alarming developments were situated in a context of fundamental change. The four years from 1982 to 1986 were characterized by the following main trends on the energy markets:

- (i) gross energy consumption in 1986 for the Community as a whole was about 8% higher than in 1982 and some 4% higher than in 1973;
- (ii) the share of oil in gross energy consumption decreased from 63% in 1973 to 51% in 1982 and 47% in 1986;
- (iii) the share of net oil imports in gross energy consumption fell from 62% in 1973 to 38% in 1982 and 33% in 1986;

(iv) the share of natural gas in gross energy consumption grew from 11% in 1973 to 16% in 1982, and then remained more or less stable (1986: 17%);

(v) the share of solid fuels in the Community's energy balance was 23% in 1973, 24% in 1982 and 23% in 1986, i.e. relatively stable;

(vi) the share of hydrocarbons in electricity generation decreased from about 42% in 1973 to 24% in 1982 and 16% in 1986;

(vii) the share of solid fuels in electricity generation increased from 45% in 1973 to 48% in 1982, but fell back to 42% in 1986;

(viii) the share of nuclear power in electricity generation, however, increased steadily from 8% in 1973 to 21% in 1982 and 37% in 1986.

These are significant changes, both with regard to the relative position of the individual energy sources and, partly as a consequence of this, the Community's dependence on imports (and hence vulnerability). How are events expected to develop until 1995? Are the 1982-86 developments in line with the prognoses? What is the importance of the internal market scheduled for 1992? These are some of the questions we shall consider in the next two chapters.

COMMUNITY OBJECTIVES

■ ENERGY OBJECTIVES FOR 1995

In spring 1985 the Commission presented its 1995 energy objectives. The following targets were set in the individual sectors:

- (i) the efficiency of final energy demand should be improved by at least 20%;
- (ii) oil consumption should be reduced to around 40% of energy consumption and net oil imports thus maintained at less than one-third of total energy consumption in the Community;
- (iii) the share of natural gas in the energy balance should be maintained in order to ensure secure and diversified supplies;
- (iv) the share of solid fuels in energy consumption should be increased;
- (v) efforts to promote consumption of solid fuels and to improve the competitiveness of

solid fuel production capacities in the Community should be continued;

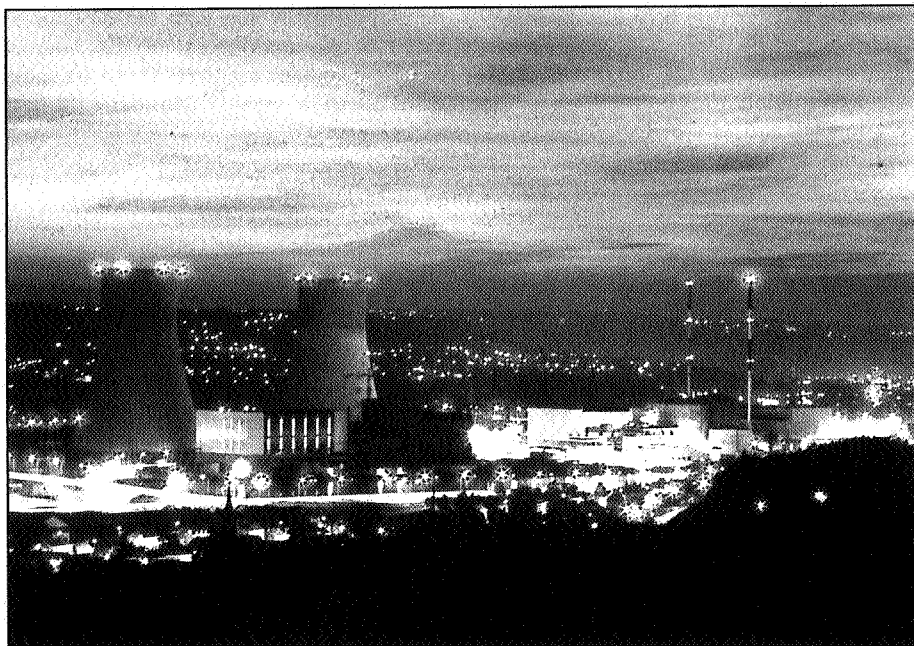
(vi) the share of electricity generated from oil and gas should be reduced to under 15% in 1995;

(vii) the output from new and renewable energy sources should be substantially increased to enable them to make a significant contribution to the total energy balance.

The first review undertaken by the Commission in spring 1988 on the basis of information from the Member States indicated that these objectives would probably be only partly achieved. The main results of the interim review were:

(i) the efficiency of final energy demand was unlikely to improve by the figure of at least 20% specified for 1995;

(ii) the share of oil in gross energy consumption was likely to drop to around 43%; Com-



munity net oil imports would represent about one-third of total energy consumption; (iii) the share of natural gas in the energy balance would probably be more or less maintained;

(iv) the share of solid fuels in gross energy consumption was likely to increase slightly;

(v) the share of oil and gas in electricity generation was likely to drop below 15%; the share of solid fuels and nuclear energy was likely to be 44% and 38% respectively; (vi) renewables would probably represent about 2% of the Community's total energy balance.

The Commission viewed these national projections with some degree of scepticism. It considered the estimates of future consumption of solid fuels to be too high and in fact did not exclude a drop in their market share. It believed that a 'comfortable degree of certainty' only existed with regard to the share

of oil and gas in electricity generation and the market share of natural gas. As far as nuclear energy is concerned, the after-effects of the Chernobyl accident were still in evidence at the time of the review (there is still disquiet in some countries, particularly when, as in the Federal Republic of Germany, the public gets to know of potentially serious incidents belatedly and seemingly purely by chance).

The most alarming finding in the Commission's view is that efforts to improve energy efficiency might not have the desired success. In this event, it estimates that energy consumption in 1995 may be between 70 and 110 million toe higher than the target. This would not only add between ECU 8 and 13 thousand million to the energy bill at current oil prices, but 'would be a serious setback making the Community much more vulnerable to supply shortages or price rises or both... A setback in this area of energy effi-



... but the subsequent costs, especially as regards the environment, are considerable. For example radioactive waste has to be 'disposed of' (plant in Tihange).

ciency would also worsen the Community's international economic competitiveness, jeopardize security of supply by increasing energy import needs and hinder environmental progress'.

The pursuit of energy efficiency was probably also the main motive for the Thermie programme presented by the Commission at the beginning of March 1989. It was designed to provide financial support and disseminate technological know-how in the following sectors:

- (i) energy efficiency,
- (ii) renewable energy sources,
- (iii) clean coal technologies,
- (iv) oil and gas prospecting and development.

The Commission therefore sounded an urgent warning in its review of Member States' energy policies, for the Community cannot afford to tolerate any weakening of its international competitiveness, particularly at a time when it is poised to reap the promised dividends of the internal market with the elimination of all barriers to the free movement of persons, goods, services and capital, and, by this token, improved competitiveness on world markets. When we consider that the internal energy market constitutes an important part of the internal market as a whole, the circle is complete. Let us therefore turn our attention to the internal energy market, which is one of the Commission's priority objectives.

■ THE INTERNAL ENERGY MARKET

We have already seen that energy is a special case and that an internal energy market will differ in some respects from the internal market in other sectors. The drive for greater competition reaches its limits where it interferes with the security of supply. A continuous, fine-meshed energy supply at reasonable prices is crucial to the smooth operation of the internal market in all other sectors and in order to secure and promote

competition. The Commission is therefore convinced that the public sector can continue to have a role in the internal energy market. Having said that, the internal energy market is a sector like any other and barriers must be removed. Indeed, the barriers in this sector may even be more deeply entrenched and more vigorously defended by those they have hitherto protected than in other areas. The firmness of purpose required is therefore all the greater.

Areas of action: 'Horizontal' barriers

The White Paper on completing the internal market adopted by the European Council in Milan at the end of June 1985 and the working paper on the internal energy market (COM(88) 238) set out the course to be followed. Specifically, the following areas are involved:

- (i) the application of Community law; this very general concept concerns action against Treaty infringements in relation to trade barriers, competition and subsidies;
- (ii) the removal of technical barriers through harmonization of statutory provisions and standards;
- (iii) the opening up of public procurement, including the Commission's plans to extend this principle to the energy sector;
- (iv) the removal of fiscal barriers, in particular the approximation of indirect taxation.

Removal of technical barriers

These barriers concern legally binding national regulations and standards of a generally voluntary character, both of which differ from one country to another. They affect not only the manufacture of equipment used by energy producers, but also the appliances used by the final consumers. Since the beginning of May 1985, the Council of Ministers has applied the 'new approach', which consists in defining only the essential health and safety requirements of machinery and equipment. The translation of these requirements into technical specifications is then a matter for the standardization committees of European industry, CEN and Cenelec. Herein lies

one of the keys to opening up public procurement markets.

In the case of hydrocarbons, for example, impediments arise from differences in formulations of petroleum products introduced by the refining industry to comply with differing requirements on national markets. Only a few criteria have been harmonized so far in Community legislation. For example, a standard (EN-28) for unleaded petrol defines a number of common characteristics for petrol, but leaves other specifications to Member States' discretion.

Opening up of public procurement

It is not only in the energy sector that the Community is entering uncharted territory. As the Commission noted: 'This is therefore an extremely vast area which is little known and where intervention by the public authorities, such as it is, is rarely official. It may, nevertheless, be very effective and, in a Community which is still in the making, national chauvinism is often a natural reaction. The Commission should examine whether these practices constitute an obstacle to a reduction in energy prices/costs, the first and foremost objective of the internal energy market, and whether they are compatible with the Treaty rules'. These 'behavioural anomalies' undoubtedly exist in the case of all energy equipment and all Member States.

Approximation of indirect taxation

The differences in the way in which energy is taxed in the Member States are widely considered to be a major, if not the biggest, obstacle on the road to an internal energy market, just as the approximation of the various systems of indirect taxation is generally considered to be the most difficult aspect of the whole internal market programme. The issue in the energy sector is above all VAT and the approximation of excise duties on petroleum products, particularly petrol and diesel. There are enormous differences between the Member States in this respect: the cumulative burden of VAT and excise duty on premium petrol ranged from ECU 250 to ECU 650/m³ at the

end of 1987. The Community average was ECU 400/m³, with the result that the deviation of the two extremes from this mean was —40% and +60% respectively. At the same time, the excise duty on heavy fuel oil varied from zero to nearly ECU 50/tonne. It is clear that such differences are bound to have an impact on competitiveness in the countries concerned.

Free movement of goods and services

Articles 30 to 36 on the free movement of goods are among the key provisions of the Treaty and are also by the same token a cornerstone of the internal market programme. These provisions also apply to energy except for coal, for which, however, Article 4a of the ECSC Treaty lays down the same principles. As the Commission noted in its 1988 paper on the internal energy market, the two provisions 'prohibit any measures by the Member States which either directly or indirectly, actually or potentially constitute a barrier to intra-Community trade. They lay down the principle that every product which is legally manufactured and commercialized in one Member State may circulate freely within the Community'. This principle was endorsed by the landmark 'Cassis de Dijon' judgment of the European Court in 1979, and it has been successfully used to dismantle some formidable historical trade barriers such as the national purity requirements for beer, spaghetti and sausage. Derogations from this principle are permitted only if justified on grounds of public security, protection of health and life of humans, animals or plants in accordance with Article 36 of the EEC Treaty.

Member States have, however, adopted a large variety of national measures on the basis of the provisions for exemptions, although it is by no means always certain that they can be justified pursuant to Article 36. They include, for example, import licence requirements, the requirement to present a certificate of origin, rules requiring bilateral reciprocity of imports and exports, provisions laying down different requirements for imports and exports, restrictions or re-

quirements regarding the storage of goods, restrictions on the use of national utilities, exhortations to buy national products, price controls and, last but not least, provisions specifying certain technical requirements of a product.

Such measures, to the extent that they cannot be justified, constitute an infringement of the Treaty. However, even where they are justified, there are limits to Member States' freedom to adopt measures on these grounds: they must respect the principle of proportionality, they have to be in pursuit of a legitimate aim and they have to be necessary to the attainment of this aim. If there are alternative measures which impose less damaging restrictions on the exchange of goods and services between Member States, then only these measures will be acceptable in Community law.

State monopolies

In view of the special quality of energy, in particular the need to guarantee security of supply, national monopolies are a common phenomenon in this sector. The oil market is characterized by import and distribution monopolies for products from non-Community countries. The Accession Treaties with Spain and Portugal specifically direct them gradually to open up such structures. In addition, Member States have retained and delegated to public or private enterprises exclusive rights to import and export other energy products. This is particularly the case in the gas and electricity sectors. Another practice is for States or regional authorities to give public or private enterprises exclusive rights of transport and distribution. It will therefore have to be examined whether such exclusive rights hinder or even prevent trade between Member States. In particular, it will have to be examined whether this situation is compatible with Articles 30 and 37 on the phasing out of monopolies of a commercial character. In the gas and electricity sectors in particular, the problem can be reduced to two issues, the resolution of which is likely to be crucial to the whole question of an internal energy market.

(i) How can the requirements of free trade in electricity and gas in the Community be reconciled with the need for a high level of quality and security of supply?

(ii) Under which conditions might large industrial customers of local and regional energy distributors be granted direct access to a given resource?

Common to both reflections is that they offer third parties the possibility of access to existing transport networks, so that one or more undertakings would pay for use of the transport infrastructure.

Rules of competition and State aid

Compliance with the Treaty rules of competition and the provisions on State aid (and Commission monitoring of this compliance) is essential to the creation and consolidation of the internal energy market. Any trade barriers resulting from the conduct of one or several undertakings are covered by the competition rules of the EEC Treaty. In view of their importance, the main provisions are set out on the page opposite.

It is worth emphasizing in this connection that public undertakings and undertakings which the national authorities have granted special or exclusive rights are also in principle subject to the competition rules of the Treaty.

An issue with a direct bearing on competition is State aid, for the granting of State aid almost always involves distortion, or at least impairment, of competition. However, levels of aid to the different energy production sectors vary considerably. The coal industry is the most prominent recipient of support, although the ECSC Treaty originally explicitly prohibited subsidies in order to prevent unfair competition on the Community coal market. However, unlike steel, the other 'pillar' of the Coal and Steel Community, coal did not fall victim to displacement competition, for the markets for coal have largely been national markets, intra-Community trade in coal being relatively insignificant. The purpose of the national aid granted subject to special Community permission was

Article 85

1. The following shall be prohibited as incompatible with the common market: all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the common market, and in particular those which:

- (a) directly or indirectly fix purchase or selling prices or any other trading conditions;
- (b) limit or control production, markets, technical development or investment;
- (c) share markets or sources of supply;
- (d) apply dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage;
- (e) make the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts.

2. Any agreements or decisions prohibited pursuant to this article shall be automatically void.

Article 86

Any abuse by one or more undertakings of a dominant position within the common market or in a substantial part of it shall be prohibited as incompatible with the common market in so far as it may affect trade between Member States.

Such abuse may, in particular, consist in:

- (a) directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions;
- (b) limiting production, markets or technical development to the prejudice of consumers;
- (c) applying dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage;
- (d) making the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts.

Article 90

1. In the case of public undertakings and undertakings to which Member States grant special or exclusive rights, Member States shall neither enact nor maintain in force any measure contrary to the rules contained in this Treaty, in particular to those rules provided for in Article 7 and Articles 85 to 94.

2. Undertakings entrusted with the operation of services of general economic interest or having the character of a revenue-producing monopoly shall be subject to the rules contained in this Treaty, in particular to the rules on competition, in so far as the application of such rules does not obstruct the performance, in law or in fact, of the particular tasks assigned to them. The development of trade must not be affected to such an extent as would be contrary to the interests of the Community.

3. The Commission shall ensure the application of the provisions of this article and shall, where necessary, address appropriate directives or decisions to Member States.

not to protect German coal from French competition or vice versa, but rather to prevent the total demise of domestic coal pro-

duction. An example of such State aid is the German hard coal levy, which is a source of irritation to the other Member States, in par-

particular France. For even though the coal levy, which is intended to make domestic coal a viable proposition for electricity generators, is financed by the final consumer through electricity prices and not by the State, there is no denying that it is equivalent to a subsidy to the coal producers. Whatever the merits of the case, the existing provisions on national coal aid expire at the end of 1993 when the whole issue will have to be renegotiated in the light of the internal market. We shall return to this aspect later.

However, aid is also granted in other energy sectors. It may not be so visible, but it is no less effective for that. It includes investment aid for power station construction and allocations to research and development or to nuclear energy with an effect equivalent to aid. The use of energy pricing practically as a form of aid to final consumers, in particular large industrial customers, also belongs in this category. This, too, is a practice which needs to be examined with a critical eye in order to ascertain whether, in its present form, it really is compatible with an internal energy market.

Costs, prices, tariffs

That the Community energy market today is characterized by major differences in costs, prices and tariffs requires no further explanation. The differences would already be considerable even without the differences in national taxation. In theory, the solution is simple: the principal driving forces of competition and trade should be 'realistic' costs, prices and tariffs, meaning that they are determined under objective, transparent conditions — in particular without interference from the public authorities, more often than not for reasons that have nothing to do with energy. This highly complex subject and possible remedies are considered in greater depth below. Commission surveys in this area reveal a number of recurring themes: differences in cost structures in the individual Member States, lack of transparency in price formation, particularly for major customers, and total inconsistency

between prices and tariff structures for the various energy types, especially between gas and electricity and with regard to price levels in the Member States.

As expected, this sector proved to be a highly sensitive one. The Member States have traditionally been reticent on the subject of energy pricing, as their reaction to a Commission paper of autumn 1984 entitled 'The application of the Community's energy pricing principles in Member States' demonstrated. In June 1985 the Council acknowledged that it was unable to reach agreement on the conclusions of this paper. However, the implications of the internal market are such that matters cannot be left there. If the compartmentalized markets of the energy sector are to be opened up to transnational competition, it is essential to have comparative data on energy prices in order to bring greater transparency to price formation with due regard for confidentiality. It will also be necessary to examine price structures in the Member States in order to ascertain whether differences in treatment between industrial customers and private households, between different sectors of industry and within a given sector are plausible and compatible with the requirements of the internal energy market. The transparency and objectivity of the terms, cost structure and pricing principles of energy supplies in the Community will also be the subject of scrutiny. The electricity industry is regarded by the Commission as something of a test case.

Differences in tariffs of industrial customers are immediately obvious. In 1986 these customers paid ECU 7.19/100 kWh in Paris, but ECU 9.84 in Düsseldorf, and ECU 10.92 in Milan compared with ECU 8.95 in Rotterdam.

This and other inconsistencies led the Commission to launch an initiative for greater transparency in price formation in spring 1989. A draft directive is designed to require the supply undertakings to notify the Commission of the prices and terms of gas and electricity supplies to industrial customers

GAS AND ELECTRICITY PRICES TO DOMESTIC CONSUMERS AND INDUSTRY IN THE MEMBER STATES IN 1986 (AVERAGE VALUES) AND 1987 (VALUES AT SET DATE)

	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Electricity prices:												
- Households (Dc) ¹ 1986 (ECU/100 Kwh)	12.31	10.60	12.63	7.21	8.86	11.96	10.04	17.19	9.14	11.59	10.64	9.00
- Industrie (Id) ² 1986 (ECU/100 Kwh)	8.11	6.38	9.84	7.51	7.16	7.19	9.69	10.92	7.71	8.95	8.51	7.22
Gas prices												
- Households ¹ (D ₂) (ECU/GI)	14.57 ³	20.43 ⁴	15.54 ³	—	14.61 ^{3, 4}	15.67 ³	19.96 ⁴	13.50 ³	12.67 ³	9.51 ³	11.28 ⁴	9.35 ³
- Industry ² (I ₂)	7.18 ³	12.24 ⁴	7.63 ³	—	6.99 ³	6.70 ³	8.61 ⁴	10.70 ^{3, 4}	6.78 ³	6.68 ³	10.44 ⁴	5.47 ³
Petrol prices (premium) ⁵ (ECU/1 000 l) (21.9.1987)	191.49	215.98	180.05	161.82	194.49	176.31	241.40	185.27	204.33	198.89	203.94	198.50
Fuel oil (ECU/1 000 l) (21.9.1987)	150.85	179.04	147.79	129.11	162.46	178.48	186.30	146.96	176.04	155.69	—	183.43

¹ Including all taxes and duties (including VAT).

² Excluding VAT.

³ Natural gas.

and to provide information on existing price systems and the breakdown of customers by consumer category. The Commission will treat these data confidentially to the extent that they are subject to commercial secrecy.

Infrastructures

Generally speaking, the Community already has efficient energy infrastructures. There are dense transport networks for natural gas, crude oil and oil products and more particularly for electricity. The integrated networks for public electricity supply extend beyond Community borders:

- (i) the UCPT grid takes in Belgium, the Federal Republic of Germany, France, Italy, Luxembourg, the Netherlands, Spain, Portugal and Greece. Austria, Switzerland and Yugoslavia are also connected. Denmark, too, is part of the grid and so, since 1985, is the UK;
- (ii) Nordel is the interlinked network of electricity supply companies in Denmark, Finland, Norway and Sweden;
- (iii) The Ufip grid is formed by the supply companies of France, Spain and Portugal;
- (iv) the Sudel grid links Italy, Yugoslavia, Greece and Austria.

Many Community countries are thus integrated in several grids. Ireland, by contrast, is not connected into any other system. One of the Commission's priorities is therefore to extend the integrated electricity network to Ireland and to improve the linkage with Greece. Expansion of the European long-distance gas pipeline network is perhaps an even more immediate priority. As yet, five Member States — UK, Ireland, Spain, Portugal and Greece — are not linked into this system. The conditions for a common natural gas market will be met only when these countries are also integrated.

The instruments dedicated to the achievement of greater economic and social cohesion of the Community by the European Council in February 1988 could also be used to improve Community infrastructures. A specific share to be determined of the struc-

tural Funds, which are to be doubled by 1993, could be allocated for this purpose, as well as resources from the European Investment Bank and other financial instruments specifically intended to impart fresh impetus to the drive for cohesion. It would, for instance, be worth clarifying how a regional policy programme such as Valoren, designed to improve the utilization of local energy sources in less developed regions, can contribute to this process. Another possibility which would, however, first have to be sanctioned by the Council, would involve the Commission's proposals for infrastructure projects of Community interest.

Three types of infrastructure should be considered here: reception infrastructure, storage infrastructure and transport and distribution infrastructure. Specifically, this could involve:

- (i) the development of port reception infrastructure for coal (coal terminals as main or transshipment ports) and natural gas (terminals for deliveries of gas in the unaltered state or as LNG);
- (ii) where transport infrastructure is concerned, the newly created legal form of the 'European economic interest grouping (EEIG)' which came into force in 1989 could serve as an instrument of common operation of existing networks, an increase in their capacity or the development of new networks;
- (iii) with regard to storage, the creation of a Community oil and/or natural gas storage capacity is conceivable, which, by virtue of its location and size, could reduce storage costs and increase security of supply in the event of supply difficulties.

Such infrastructure projects could cover all energy sources, e.g. in the case of solid fuels there is scope for long-distance pipelines to transport water-coal mixtures or oil-coal mixtures. Another possibility would be to expand the existing pipeline network for petroleum products. However, the most interesting prospects exist for electricity, where the first task would be to extend the existing grid interconnection to all Member States.

This is the background to a proposal for a directive presented by the Commission at the end of September 1989 (COM(89) 336) designed to increase the transit of electricity through transmission grids in the Community. The Commission advances the view that greater integration of the electricity industry and increased trade in electricity — which at present accounts for only 4% of consumption — could reduce the cost of supply to the consumer, improve security of supply and facilitate rapid, flexible reactions to sudden supply bottlenecks. The estimated savings speak for themselves. In the short term, i.e. up to 1992, ECU 1 300 million annually could be saved, in the medium term to the year 2 000 the annual saving ranges between ECU 2 300 and 5 300 million and the long-term forecast for the year 2010 is for a saving of between ECU 6 000 and 13 000 million. The breadth of the range in the medium- and long-term forecasts is explained by the different assumptions regarding construction of new power stations and/or modernization. The issue of third-party access — both for large industrial customers and energy distributors — to the transport network is currently being discussed in the context of an open internal market. The Netherlands and the UK already have fairly definite plans in this direction. The Commission is discussing this novel idea with all interested parties, namely the Member States and energy producers, distributors, network operators and consumers, including private consumers.

The Commission's proposal for a Council regulation requiring Member States to notify investments of Community interest in the energy sector (COM(89) 335) is another initiative with a similar purpose, i.e. optimum use of energy production and supply structures.

Obstacles and priority measures in the individual energy sectors

Solid fuels

In 1988 solid fuels accounted for around 28% of Community energy production. A

total of 185 million tonnes of coal equivalent (tce) were produced in the Community as a whole in this reference year. (The tce is a unit calculated in a similar way to the toe, namely in terms of equivalent calorific value. One tce is equivalent to 0.7 toe.) The UK accounted for 46% of this production, the Federal Republic of Germany 40%, while the remainder was distributed between Spain (7%), France (6%) and Belgium (1%). The Federal Republic of Germany is by far the largest producer of brown coal and peat (66%); it is followed by Greece (19%), Spain (8%) and Ireland (5%). For several years now, or at least since the beginning of the first oil crisis, there has been a trend towards higher imports of hard coal, which have shown a higher proportional increase than consumption. The most important Community suppliers by volume are the USA, Australia, South Africa and Poland. Intra-Community trade in coal amounted to approximately 8.0 million tce in 1988. This mainly concerned traditional supplies of coking coal and coke from Germany and much smaller volumes of steam coal from the UK.

Except in the United Kingdom, where major restructuring took place in the first half of the 1980s, the financial situation of the coal industry has deteriorated. The principal reason for this is the fall in prices of imported coal, expressed in national currencies, which have a considerable impact on prices of Community-produced coal.

All producers, whether private, public or mixed companies, have been hit by the decline in profits. This is despite the fact that mining companies in the three main producer countries at least (UK, Federal Republic of Germany and Spain) have guaranteed long-term sales contracts with large customers such as foundries and power stations, in the case of which the mechanism for fixing prices does not, in the words of the Commission, 'necessarily correspond to market realities'. The content of these agreements is as follows:

(i) in Germany, electricity producers have undertaken in the 'Jahrhundertvertrag' to

FINANCIAL SITUATION OF THE COAL INDUSTRY

	Production costs ¹				Revenue				Results		
	Ecu/t				Ecu/t				Ecu/t		
	1986	1987	1988	1988/87 %	1986	1987	1988	1988/87 %	1986	1987	1988
Belgium	120	108	107	— 0.9	63	50	44	— 12.3	— 57	— 58	— 63
Germany (FR)	117	122	125	+ 2.5	105	110	110	—	— 12	— 15	— 15
Spain	80	88	93	+ 5.7	56	57	60	+ 5.3	— 24	— 32	— 33
France	101	89	88	— 1.1	60	46	45	— 2.2	— 41	— 35	— 43
Portugal	59	54	61	+ 13.0	37	45	51	+ 13.3	— 22	— 9	— 10
United Kingdom	78	76	71	— 6.7	62	53	61	+ 5.2	— 16	— 18	— 10

¹ Total costs, including return on capital and depreciation.

purchase 640 million tce of German coal irrespective of their requirements (until 1995) and the economic situation (until 1991). A charge is levied on electricity consumption in the form of the 'Kohlepfennig'. The proceeds from this are used to compensate the electricity producers for the price difference between Community coal purchased at cost price and heavy fuel oil in respect of 22 million tce and for the price difference between Community-produced and imported coal in respect of 11 million tce;

(ii) in the UK, there are supply agreements between British Coal and the Central Electricity Generating Board;

(iii) in Spain, Carbuni3n, the mining companies' association, agreed on a system of awarding contracts for coal supplies to power stations with the electricity producers' association (Unesa).

These agreements do not explicitly rule out the use of coal from other Community countries. However, they do considerably restrict competition from imported coal and other energy sources. Between 1965 and 1986, some ECU 50 000 million were spent on aid schemes and other measures to support current production and this figure has recently increased significantly as a result of the fall in world prices for coal and the value of the dollar. Whereas in 1986 the average price for imported coal was about USD 50/t, the average cost price of Community-produced coal was more than USD 100/t, i.e. more than double.

It is clear in the light of such price differences that the Community coal industry will continue to have difficulty in standing on its own feet in future. Aid can still be paid until 1993, but the Commission makes authorization subject to compliance with the following aims:

- (i) improvement of the competitiveness of the coal industry, and thus greater security of supply;
- (ii) creation of new production capacities, provided that they are economically viable;

(iii) solution of the social and regional problems related to developments in the coal industry.

Oil and petroleum products

Despite two energy crises, oil is still the main primary energy source in the Community, and will remain so in the foreseeable future. In 1988 oil accounted for approximately 45% of the Community's primary energy requirements. Total oil consumption, including supplies to shipping and air transport, amounted to approximately 517 million tonnes. The Commission estimates that total energy consumption is likely to increase and with it oil consumption, although to a lesser extent, as the share of oil in primary energy consumption should fall slightly to between 42 and 45%. The share of oil products in energy consumption varies greatly according to sector of activity, ranging from 12% in electricity generation to 97% in transport. Unlike the other sectors, where substitute energy sources are already extensively used (nuclear power), in transport the consumption of oil products has grown steadily, and there are many signs that this trend will continue at least in the medium term.

By contrast to most other energy sectors, the oil market can be regarded as one which is already subject to extensive competition. A number of factors have helped to bring this about:

- (i) integration of the Community crude oil and petroleum products industry in the global markets, where national undertakings and independent distribution companies operate alongside international concerns;
- (ii) the ample supply of petroleum products from Community refineries, which can generally satisfy Community demand, and from refineries in non-Community countries;
- (iii) the lack of a network structure, which prevents distribution monopolies from arising: with oil, unlike natural gas and electricity, the consumer can choose between a number of competing suppliers;

CONSUMER PRICES FOR PETROLEUM PRODUCTS
(NET OF DUTIES AND TAXES)

Situation at 14 September 1987

Price net of tax:	Premium petrol	Regular petrol	Auto-motive gas oil	Heating gas oil	Residual fuel oil, high sulphur
	1 000 l	1 000 l	1 000 l	1 000 l	tonne
EEC average in ecu ¹	187	164	188	156	107
(%)					
Belgium	102	110	104	96	94
Denmark	115	132	114	115	108
FR of Germany	92	90	94	93	92
Greece	87	89	69	83	87
Spain	104	110	102	104	96
France	95	114	101	114	93
Ireland	128	140	133	119	142
Italy	102	99	102	97	94
Luxembourg	114	124	101	113	101
Netherlands	106	—	98	100	104
Portugal	109	113	97	—	133
United Kingdom	106	114	105	116	112

Source: Commission oil prices bulletin No 403.

¹ The average is obtained by weighting the quantities consumed in each country in 1985.

(iv) the transparency of international prices, which are formed in response to supply and demand on the Rotterdam and Genoa spot markets.

However, that is only one side of the story. There are still a great many obstacles to be removed before there can be talk of a true internal market in oil and petroleum products.

**TAXATION OF NATURAL GAS
VALUE-ADDED TAX (VAT) ON SALES OF
GAS (AS PERCENTAGE OF PRICE NET OF
VAT)**

1987	%
Belgium	17
Denmark	22
FR of Germany	14
Greece	?
Spain	12
France	18.6
Italy (domestic)	9
Italy (non-domestic)	9-18 ¹
Netherlands	20-6 ²
Luxembourg	6
United Kingdom	0
Ireland	10
Portugal	8

¹ The tax applied generally is 18% except for extractive and manufacturing industries (including printing and publishing) which benefit from a reduced tax of 9%.

² The 6% tax applies only to sales of gas to the horticultural sector.

As we have already seen, these include differences in consumer prices before tax. These already constitute considerable distortions, which are aggravated when differences in taxation are taken into account.

In addition, the Commission considers that the following obstacles in the oil sector should be removed as a matter of priority:

- (i) differences in the rules and technical standards applying to motor fuels and other petroleum products;
- (ii) differences in the quality standards for petroleum products, the principal problem being more stringent environmental standards in some Member States and thus the question of whether the principle of mutual recognition can be applied in this field;
- (iii) obstacles arising from the existence of oil monopolies;
- (iv) certain provisions concerning the monopolies which are at present permitted, such as exclusive rights of refining and of

marketing national products, and the prohibition of cross-frontier delivery;

(v) obstacles relating to internal transport in Community countries.

Natural gas

The widespread use of natural gas in the Community energy industry is a relatively recent phenomenon, but its progress has been almost meteoric. Natural gas really came into its own in Europe with the discovery in 1959 of the giant Groningen field in the Netherlands, followed by other significant finds in the North Sea. In the 15 years from 1971 to 1986, its share of primary energy consumption doubled from 9 to 18%. Large offshore fields were also discovered in Norway and the UK. Norway and other traditional suppliers such as the Soviet Union and Algeria are now the chief source of the Community's gas imports, which currently stand at around 35% of consumption and will probably reach 40% and more by the year 2000. Natural gas is likely to remain a major contributor to the Community's primary energy balance because of the security of supply it offers and, increasingly important, in view of its environmental advantages.

The following obstacles to completion of the internal market in natural gas must be overcome.

- (i) State of the European gas grid. The Commission feels that the Community should promote integration above all by connecting the UK, Ireland, Spain, Greece and Portugal into the interconnected network.
- (ii) Price transparency. This criterion is considered to be crucial to the completion of the internal market and concerns off-tariff sales of natural gas to industrial customers. Practices vary widely from one Member State to another: sales to industrial consumers are based on pre-set tariffs in France, Italy, the Netherlands and Belgium, while individual contracts for large consumers are concluded in the UK and Germany. However, even in countries with pre-set tariffs, individual large consumers or groups of undertakings from the same industry may obtain special rates.

The Commission has forwarded to the Council a proposal on greater transparency in off-tariff sales which safeguards the confidentiality of the individual contracts.

(iii) Differences in tax rates. Here, too, the problems are primarily due to differences in VAT rates. As in the case of oil, the solution will have to be sought in an approximation of the rates.

Electricity

Electricity is a vital part of the energy balance of the Community, as in every other part of the industrialized world. Most primary energy, including nuclear energy, solid fuels, hydropower and other renewables, is used to generate electricity which has made a significant contribution to reducing dependence on oil. In 1988, 34% of all primary energy on a Community average was used to generate electricity, and up to 42% in France. Electricity's share of Community final energy consumption is 18.1%.

In considering the internal market in electricity, it should be borne in mind that electricity is a very special form of energy. It is by far the most common, and hence almost the classic, form of secondary energy, and is generated from the primary sources listed in the preceding paragraph. It has two main characteristics: it cannot be stored, and it is essential to the running of a modern economy.

These two features determine the structure of the electricity sector. As electricity cannot be stockpiled, supply and demand must be matched at all times. However, supply structures must be efficient and flexible enough to cope with sudden surges in demand. It is for this reason that security of supply is as important with regard to electricity as to other energy sources. As we have already seen, Member States have responded in different ways to this requirement. The coexistence of different generation, transport and distribution structures, which have also developed differently in the individual countries for historical reasons, considerably complicate efforts to complete the internal market in

electricity. The Commission considers joint action in the following areas to be a matter of priority.

(i) Statutory standards and requirements. Technical requirements for the supply of electricity to consumers must be harmonized. National differences in environmental protection standards and security requirements which are important cost factors and thus have a direct effect on the competitive situation of individual undertakings, must be approximated. The same applies to the differing requirements for the authorization of new power stations.

(ii) Monopolies and exclusive rights. It should be examined whether existing supply monopolies can be allowed to continue. The same applies to exclusive rights to use the supply and interconnected transport systems, particularly where this affects customers' ability to obtain supplies from sources other than their allotted regional distributor. In addition, exclusive rights to operate high-voltage grids must be scrutinized, again in so far as they affect the use of low-cost production sources and the supply of electricity to distributors under the most economic conditions. Finally, electricity producers themselves are far from free in their choice of primary energy.

(iii) Electricity prices and costs. A minimum degree of harmonization of price and tariff structures is essential. There is also a need for transparency with regard to prices to large customers, production costs of electricity generation, prices at which electricity is transferred between national systems and prices of primary energy sources. Exactly what is required will have to be assessed in terms of the role of cost and price transparency in an open Community market.

(iv) Infrastructure. Ireland and Greece must be fully integrated into the interconnected grid system to put them on an equal footing with the other Member States. Another aspect worth examining would be the separation of electricity generation and operation of the grids (e.g. by setting up operating companies).

ENERGY AND THE ENVIRONMENT

It is broadly accepted that at least two important energy sources — oil and coal — pollute the environment. Nuclear energy poses environment problems of a quite different, but equally serious, nature concerning reactor safety and the risks attaching to the transport and storage of radioactive waste.

The Community finally agreed on maximum limits for pollutant emissions from power stations and motor vehicles only after protracted discussions. New upper limits for vehicle emissions have meanwhile been adopted which are considerably more stringent than the previous ceilings and make necessary the use of the regulated three-way catalytic convertor. Lengthy discussions also took place before maximum emission limits could be agreed for new large combustion installations.

The consultations for the directives on the lead content of petrol and the sulphur content of fuel oil were almost equally time-consuming. A common feature of all these measures is that they allow Member States leeway to adopt more stringent provisions. The legal basis for this is the new Article 100a of the EEC Treaty as amended by the Single European Act, paragraph 4 of which authorizes Member States to apply more rigorous measures on environmental or health grounds. This raises two questions relevant to the free movement of goods.

(i) Will Member States with stricter standards allow products meeting the less stringent criteria of other Community countries into free circulation in their territory from 1992?

(ii) What will be the effect of differing provisions on the respective imports? It is already emerging that imports of products meeting less rigorous quality criteria are on the increase in Community countries with laxer standards.

It will be extremely difficult to implement the various provisions introduced into the Treaty by the Single European Act in sectors such as

energy and environment policy, whose objectives appear to be at odds with each other. However, this is just the task set by the amended Treaty: 'Environmental protection requirements shall be a component of the Community's other policies'. The Community is also required to take as a basis a high level of protection, which translates to stringent statutory provisions (and compliance with them) in all Member States. The costs this will involve in individual Member States will differ owing to differences in their industrial structure. The Commission plans to relieve the burden in structurally underdeveloped countries by expanding the use of natural gas or electricity through co-financing of infrastructures of Community interest, in order to replace some of the energy systems based on coal or oil. Nevertheless, there are other issues to be considered. However much importance is attached to legitimate environmental concerns, the Community cannot afford to neglect the security of supply aspect and the requirements of the internal energy market — 'free movement of goods, persons ...'. The same is true of the Community's competitive situation in international markets. These divergent goals will have to be carefully weighed on the basis of cost-benefit analyses. The latter will also have to take account of the social and environmental costs of the individual energy options, even though calculating them is extremely difficult.

Of course, it remains true that the most environment-friendly energy is energy which is not consumed and therefore does not need to be generated. This is also the simple answer to the question of environmental cost. A survey among US electricity supply utilities has shown that investments of USD 19 000 million would be necessary in the next 10 years in order to create additional capacity of 30 000 MW, compared with only around USD 6 000 million that would be

needed to save this additional quantity of electricity through the use of more efficient equipment (least-cost planning).

While all this may appear obvious, willingness to conserve energy has dwindled rapidly in the Community in the last few years. The 1988 Commission finding still holds true, that the medium-term objective of a minimum 20% energy efficiency improvement by 1995 will not be possible if no new policy measures are introduced at Community and/or national level. The impressive improvements of the past — more than 20% improvement between 1973 and 1982, a period in which there were two oil crises — slowed down to a meagre 3% between 1982 and 1988. As the Commission noted in its autumn 1989 paper on Energy and the Environment (COM(89) 369) 'low energy prices acting as a disincentive to energy efficiency investments have not changed fundamentally in recent years and energy is still available in abundant quantities, although this situation is not in line with long-term expectations'.

The Commission has therefore taken the initiative. At the end of 1989 it announced the SAVE programme to improve efficiency of energy use and energy saving, which is to concentrate on measures that will yield the maximum savings fastest. SAVE is designed to supplement the Thermie programme for the promotion of technologies to increase energy efficiency. The Commission has also proposed a series of measures in other areas, all of which, however, are geared to the same objective. They include:

- (i) efficiency standards for energy technologies and for appliances;
- (ii) speed limits in the Community;
- (iii) standards for vehicle fuel consumption;
- (iv) measures to improve transport systems, such as support for public transport in cities;
- (v) criteria for insulation standards taking into account the different climatic conditions in the Community;
- (vi) elimination of legal and economic barriers to facilitate and increase sales of heat

and power to energy distributors and end-users.

The most direct means of getting the market to pay for the risk of environmental damage would be to raise energy prices sufficiently to reflect the full social costs. Higher costs would make it worthwhile to use energy more rationally. However, this brings us back to the problem of how to quantify precisely the social and environmental costs. The Commission's approach is to examine the practicality of fiscal measures as a means of promoting more rational use of energy. It is considering the following:

- (i) a CO₂ tax,
- (ii) differentiation of existing taxes to reward energy saving, and
- (iii) a system of 'anticyclical' taxes to promote energy efficiency, i.e. higher taxes when energy prices are low and vice versa.

This, briefly, is what the Commission considers to be the essential framework for an environmentally responsible energy policy. What is the situation on the supply side? What are the advantages and disadvantages of the various energy sources?

■ FOSSIL FUELS

The main emissions from fossil fuel use are sulphur dioxide, nitrogen oxides and carbon dioxide. Energy activities contribute about 90% of man-made SO₂ and NO_x emissions. Stationary combustion installations (chiefly power stations) are the largest source of SO₂ emissions, whereas transport is the main contributor to NO_x emissions. Technologies for the control and reduction of these emissions are available. Post-combustion control in particular necessitates high investment cost and occasionally involves increased energy consumption. The International Energy Agency has recently estimated that the capital cost of flue-gas desulphurization can account for 15% of the total investment costs for a coal-fired power station. The transport sector remains an area of concern for the Commission. Fuel consumption con-

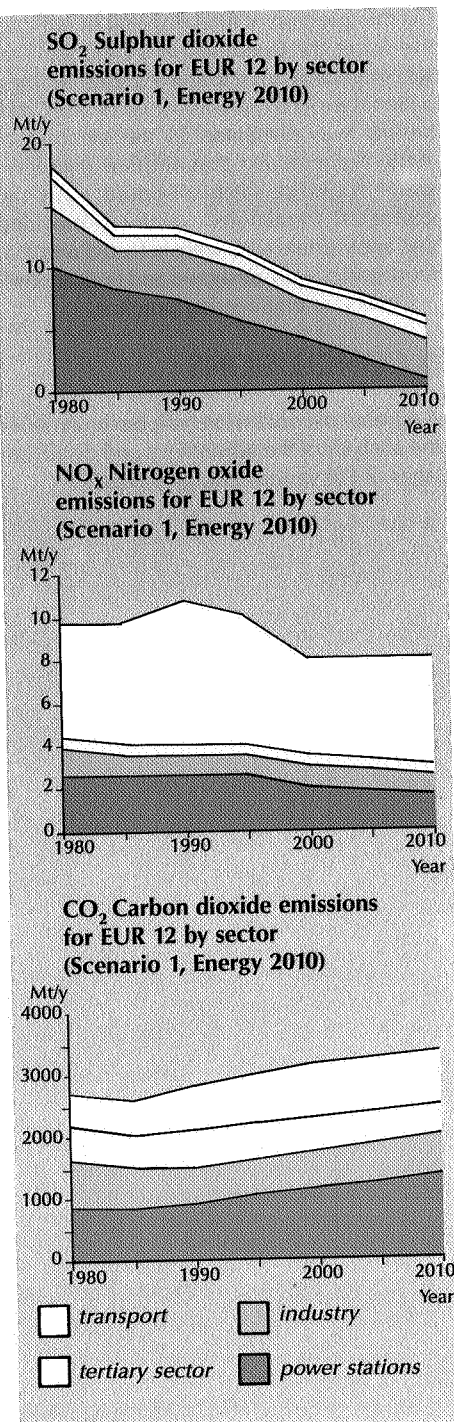
tinues to grow, and efficiency improvements as well as statutory and technical measures to reduce vehicle emissions are cancelled out by growing numbers of cars and bigger car engines.

As yet there are no emission limit values for the greenhouse gases produced in the combustion of fossil fuels, in particular carbon dioxide, which is responsible for over 50% of the greenhouse effect. The following diagrams show the likely development of the emissions to the year 2010 in the Community:

■ NUCLEAR ENERGY

From the point of view of pollutant emissions to the air, nuclear energy is indisputably a clean technology. Nuclear power stations do not emit any of the greenhouse gases. However, nuclear energy has social and environmental costs of a different, no less critical type. The nuclear fuel cycle itself and the dismantling of nuclear power stations at the end of their life create radioactive wastes which have to be dealt with.

The figures are nevertheless impressive. Nuclear energy currently accounts for 34% of electricity production in the Community. If the 140 or so nuclear reactors in operation in the Community were closed down and the electricity they generate had to be produced from coal, this would result in a further 550 million tonnes of CO₂ emissions in addition to the 785 million tonnes already produced from the burning of fossil fuels to generate electricity. CO₂ emissions would therefore increase by 70%. Replacing nuclear energy by natural gas would increase carbon dioxide emissions by 'only' 242 million tonnes. This relationship applies world-wide. If all the electricity currently produced in around 430 nuclear reactors throughout the world were to be generated from coal, the current global 21 000 million tonnes of CO₂ emissions from burning fossil fuels would increase by a further 16 000 million tonnes, i.e. almost four-fifths.



On the question of final disposal of radioactive waste, the Commission is confident that safe solutions can be found. A report by international experts commissioned by the Community was presented in the summer of 1988. It concluded that vitrified high-level waste could be safely disposed of in the geological formations examined, provided that appropriate sites were selected and that repositories were designed and built according to sound engineering practice.

■ CONCLUSIONS

A number of conclusions can be drawn from the analysis of the advantages and disadvantages of the various energy sources.

Emissions from fossil fuel use will decrease in the case of SO₂ and NO_x, but increase in the case of CO₂ unless political measures to prevent this are taken. As the Commission notes in its paper on energy and the environment: 'This is an inevitable consequence of growth, not only economic growth but also basic growth of population'. The Commission therefore stresses that it is essential to continue and intensify efforts to conserve energy. With regard to the supply side of the equation, the Commission has put up for discussion a number of initiatives with a positive environmental impact.



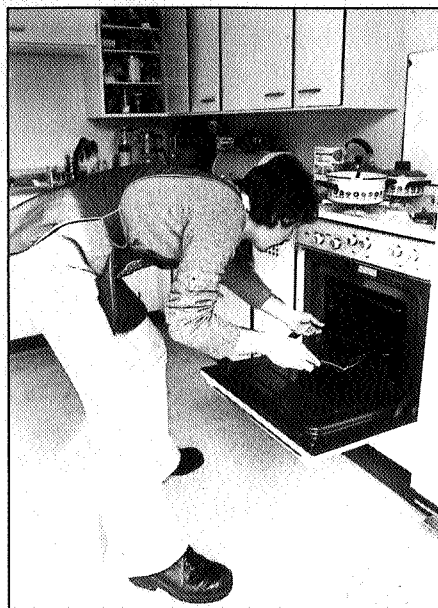
How much longer can we afford to waste energy?

OUTLOOK

Efficient production and use of energy is the key to future primary energy consumption. Energy intensity in the coming decades will be determined by the interaction of prices, technology, capital availability and environmental constraints. The dominant themes of the 1990s are the internal energy market and the environment.

Security of supply, energy production and consumption must be reconciled with a steady improvement in environment quality. The internal energy market will provide a stimulus to economic activity and create a more favourable business climate. It will provide the basis through economic growth for the development of more efficient technologies, facilitate penetration of these technologies and help to reduce energy consumption through more rational use of energy. Above all, this will lead to a decline in emissions.

The three objectives of (i) sustained economic growth, (ii) a clean environment, and (iii) a secure energy supply at competitive prices are not mutually exclusive. However, harmonious progress towards these goals is dependent on an effective common energy policy.



Energy consumers bear the brunt of the costs of market compartmentalization which the Commission estimates at half a percent of gross domestic product.

FURTHER READING

EC PUBLICATIONS

- ☐ **Community energy and completion of the internal market. Information report.**
Rapporteur: M. von der Decken.
Economic and Social Committee, Brussels, EC 1988.
- ☐ **Report on European coal policy.**
Rapporteur: Norman West.
European Parliament, Committee on energy, research and technology. Luxembourg, EP 1988, 39 pp. (PE 116.001/fin.) EP Documents 1988/0147 A2.
- ☐ **The main findings of the Commission's review of Member States' energy policies. The 1995 Community energy objectives.**
Commission, Brussels, EC 1988, 2 Vols, 137 pp.
COM Documents 1988/174 final/Vol. 1-2.
- ☐ Terence Daintith, Leigh Hancher:
Energy strategy in Europe: the legal framework.
European University Institute, Berlin, de Gruyter, 1986, IX, 190 pp., Series A: Law. 04.
- ☐ **Report on the follow-up to the 1995 EC energy objectives.**
Rapporteur: Gordon Adam. European Parliament, Committee on Energy, Research and Technology, Luxembourg, EP 1987, 21 pp. (PE 111.365/fin.). EP Documents 1986/242.
- ☐ **Towards a continuing policy for energy efficiency in the European Community.**
Ed, Commission, Brussels, EC 1987, 10 pp.
COM Documents 1987/223 final.
- ☐ **Report on research and energy policy measures to counteract the rising concentration of carbon dioxide in the atmosphere (the greenhouse effect).**
Rapporteur: James Fitzsimons. European Parliament, Committee on Energy, Research and Technology. Luxembourg, EP 1986, EP Documents 1986/68 A2.
- ☐ **Energy efficiency in the EEC.**
Commission, Brussels, EC 1985.
- ☐ **Evaluation report on the energy demonstration programme.**
Commission, Brussels, EC 1985, 48 pp.
COM Documents 1985/29 final/2.
- ☐ **New Community energy objectives.**
Commission, Brussels, EC 1985, 38 pp. + Annex.
COM Documents 1985/245 final.
- ☐ **Member States' energy policies: main issues for the future.**
Commission, Brussels, EC 1984, 10 pp.
COM Documents 1984/693 final.
- ☐ Draft Council Regulation (EEC) amending Regulation (EEC) No 1056/72 on notifying the Commission of investment projects of interest to the Community in the petroleum, natural gas and electricity sectors.
COM 89/335.
- ☐ Proposal for a Council Directive on the transit of natural gas through the major systems.
COM (89) 334 final.
- ☐ Towards completion of the internal market for natural gas.
Communication from the Commission
COM (89) 334.
- ☐ Amendment to the proposal for a Council Decision concerning the adoption of a community action programme for improving the efficiency of electricity use.
COM (89) 22.
- ☐ Proposal for a Council Regulation (EEC) concerning the promotion of energy technology in Europe.
COM (89) 121 final;
COM (89) 121 final/2 of 4.4.1989.
- ☐ European technologies for energy management — Thermie programme (Communication from the Commission).
COM (89) 021/1.

- Transparency of consumer energy prices (Communication from the Commission). COM (89) 123 final; COM (89) 123 final/2 of 30.5.1989.
- Evaluation of technological programmes in the field of energy. (Communication from the Commission to the Council). COM (89) 164.
- Amendment to the proposal for a Council Regulation (EEC) concerning the promotion of energy technology in Europe — Thermie. COM (90) 89 final. Official Journal C 111, 5.5.1990 p. 13.
- Proposal for a Council Regulation (EEC) amending Regulation (EEC) No 2592/79 laying down rules for carrying out the registration of crude oil imports in the Community provided for in Regulation (EEC) No 1893/79. COM (90) 43 final.
- Energy and the environment (Communication from the Commission to the Council). COM (89) 369 final.
- Nuclear industries in the Community, the nuclear power station design and construction industry and completion of the European single market (update of the illustrative nuclear programme for the Community — PINC, adopted by the Commission in 1984 under Article 40 of the Euratom Treaty and published in 1985 together with the opinion of the ESC). COM (89) 347 final.
- Proposal for a Council Directive on the transit of electricity through transmission grids. COM (89) 336 final — Syn 207.
- Increased intra-Community electricity exchanges. A fundamental step towards completing the internal energy market (Communication from the Commission). COM (89) 336.
- Draft Council Directive concerning a Community procedure to improve the transparency of gas and electricity prices charged to industrial end-users. COM (89) 332.

OTHER PUBLICATIONS

- ***Energy policies in an uncertain world.***
Ed. by Peter Pearson. Basingstoke, Macmillan 1989, XXXI, 113 pp.

J. G. van der Linde, R. Lefebvre:
 □ 'International Energy Agency captures the development of European Community energy law'.
Journal of world trade.
 1988, 22/05, pp. 5-25.

- ***The list of obstacles to be overcome to complete the single energy market. An initial European Commission analysis.***
 Suppl. a: EEC energy policy and the single market of 1993.
 Brussels, Prometheus 1988, 89 pp.

Buckens M. M.:

- ***EEC energy policy and the single market of 1993.***
 Suppl.: the list of obstacles to be overcome to complete the single energy market.
 Brussels, Prometheus 1988, IV, 382 pp.

Daintith T., Hancher L.:

- 'The management of diversity: Community law as an instrument of energy and other sectoral policies'.
Yearbook of European law, 1984, 04, pp. 123-167.

Andries M.:

- ***The EEC and energies of the future.***
 Brussels, European News Agency 1985, III, 45 pp. + annexes (VI).

Audland C. J.:

- 'European Community energy strategy and its legislative implications'.
Journal of Energy and Natural Resources Law.
 Vol. 1. No. 1, 1983, pp. 9-20.

Pearce D. W., Westoby R.:

- ***Britain within the European Community. The way forward.***
 London, ed. by Ali M. El-Agraa, Macmillan 1983, pp. 187-212.

- ***The European Community energy options in 1983.***
Survey prepared by Marie Martine Buckens.
Brussels, European News Agency 1983,
217 pp., ann. Europe in 1983.
- Mauil, Hans:
- ***Europe and world energy.***
London, Sussex European Research Centre:
Butterworths 1980, VIII, 342 pp., Bibliogr.
Butterworths European studies
- Turner L.:
- ***European and Japanese energy policies.***
- Carman Guy de, Pinder J.:
- ***The European alternatives: the Community energy policy: oil.***
- „Europäische Energie- und Umweltpolitik für das Ruhrgebiet.“
Europa und das Ruhrgebiet.
Duisburg: Braun 1988, 146 pp.
- Reichert K.:
- „Energiepolitik“.
Jahrbuch der Europäischen Integration.
1983, pp. 178-184.
- «Comentarios a la legislación comunitaria»,
Revista de derecho privado, tomo 09, 1987.
Dir. por Molina del Pozo C.F., Madrid:
Editoriales de Derecho Remides (Edersa),
1987 — Vol. 9.
Tomo 9: Política de transportes. Política de
energía.
Comentado por Gonzales-Blanch Roca F.,
Soloranica Sanchez-Neyra J. I., (e.a.), 1987,
IX, 915 pp.
- «La politique de l'énergie de la CEE dans la
perspective du marché unique de 1993».
Bruxelles: Prometheus 1989, V, 397 p. +
annexe «Le marché intérieur de l'énergie»
(document de travail de la Commission,
27. 4. 1988).
- Blumann C., Joly G.:
- «Énergie et Communautés européennes».
Revue trimestrielle de droit européen.
1984, 20/04, p. 571-642.
Revue trimestrielle de droit européen.
1986, 22/04, p. 613-680
- Touscoz J.:
- «Quelle politique énergétique pour
l'Europe? Propositions pour une relance».
Énergie et société (LXGOSCE).
Grenoble, Institut économique et juridique
de l'énergie.
Grenoble: PUG 1986, 153 pp., Bibliogr.
p. 133-147.
- D'Herbes J., Touscoz J. (e.a.)
- «L'Europe et la coopération internationale
dans le domaine énergétique».
***Actes du colloque internationale organisé
par l'Institut pour le développement de la
coopération internationale.***
- Lefebvre R., van der Linde J. G. (avec bibliogr.):
- «Europese integratie vergt een energie(k)
beleid».
Sociaal-economische wetgeving. 1987,
35/06, p. 452-470.
- Juricic A.:
- Financieringsactie van de Europese
Gemeenschap in de energiesector.
Kwartaloverzicht van de economie.
1985/03, ***Dossiers***, p. 67-84.
- Belaud J.F.:
- ***Énergie: actions financières et politiques de
la CEE.***
Bruxelles, Agence européenne
d'informations 1985, XIV, 212 p. + annexe
(VI).
- Andries M.:
- ***La CEE et les énergies du futur.***
Bruxelles: Agence européenne
d'informations 1985, III, 46 p. + annexe.
- «Les choix énergétiques de la Communauté
en 1983».
Dossiers de l'Europe en 1983. 04.
Dossier prep. par Marie-Martine Buckens
Brussels, European News Agency 1983, 216,
5 pp.

European Communities — Commission

ENERGY IN THE EUROPEAN COMMUNITY

(fourth edition)

Luxembourg: Office for Official Publications of the European Communities

1991 — 45 pp. — 16.2 x 22.9 cm

European Documentation series — 7/1990

ISBN 92-826-1737-8

Catalogue number: CB-56-89-538-EN-C

This booklet for non-specialists discusses the energy situation of the Community and the outlook to the year 2000.