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ENERGY IN EUROPE

Energy policies and trends in the European Community

Number 8 October 1987

Commission of the European Communities □ Directorate-General for Energy

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Contents

Abbreviations and symbols

:	no data available
-	nil
0	figure less than half the unit used
kg oe	kilogram of oil equivalent (41 860 kjoules NCV / kg)
M	million (10^6)
t	tonne (metric ton)
t = t	tonne for tonne
toe	tonne of oil equivalent (41 860 kjoules NCV / kg)
fob	free on board
cif	cost-insurance-freight
MW	megawatt = 10^3 kWh
kWh	kilowatt hour
GWh	gigawatt hour = 10^6 kWh
J	joule
kJ	kilojoule
TJ	terajoule = 10^9 kJ
NCV	net calorific value
GCV	gross calorific value
ECU	European currency unit. The ECU is a composite monetary unit consisting of a basket of the following amounts of each Community currency:

BFR	3,71	HFL	0,256
DKR	0,219	IRL	0,00871
DM	0,719	LFR	0,14
DR	1,15	LIT	140
FF	1,31	UKL	0,0878

EUR 10	Total of member conutries of the EC before accession of Spain and Portugal in 1986
EUR 12	Total of member countries of the EC
| or —	discontinuity in series
of which	the words 'of which' indicate the presence of all the subdivisions of the total
among which	the words 'among which' indicate the presence of certain subdivisions only

Introduction

Energy policies and trends in the European Community

Energy resources are a crucial factor in supplying the needs of the population, maintaining industrial production and ensuring that the entire political and economic system can continue to function.

Since the two major oil shocks in the 1970s, the European Community has made great strides in using energy more efficiently, in reducing its dependence on oil and in securing more diversified energy supplies.

The European Commission and the 12 Member States are unanimous that progress must continue. This means encouraging the right conditions both within the Community and in the international energy markets.

To this end the European Commission has a responsibility to inform and to stimulate discussion. That is the main aim of the publication of the periodical *Energy in Europe* by the European Commission's Directorate-General for Energy.

Energy in Europe is published as a guide to the energy activities of the European Community and is a compilation of the latest news about energy policy, trends and prospects, markets, planning and technology.

Recent issues of *Energy in Europe* have included:

(i) effects of falling oil prices in the Community;

(ii) oil and energy prospects in the European Community;

(iii) natural gas in the Community — prospects to 2000;

(iv) the rational use of energy in industry and transport;

(v) development of solid fuel technology in the Community;

(vi) the Chernobyl accident and Euratom;

together with regular items such as the 'Short-term energy outlook', 'Community news' and 'Technology focus'.

Energy in Europe is directed at a broad international readership: those policy makers and decision takers who need to keep abreast of the thinking in the European Community about energy priorities; and those who wish to have the best possible understanding of the operation of energy markets and their future evolution.

Energy in Europe is published three times a year in each of the following languages: English, French, German, Spanish.

The international market for natural gas and the situation in the EC

This article examines the main features of the natural gas market in the three regional markets of the OECD area which together represent over 50% of world natural gas consumption: the United States, the European Community and Japan.

It then goes on to consider the position of natural gas in the various Community Member States: the role of natural gas in the primary energy balance, the inroads made by natural gas in the three main final consumption sectors — the residential and commercial sector, industry and power stations.

Where the level of future demand is concerned, the article mentions a number of factors which, if they were to materialize, could in the Commission's view lead to consumption levels in excess of those at present forecast by the Member States (see the latest Communication from the Commission to the Council on natural gas).[1]

The substance of this article was the subject of a paper given at the seminar on natural gas and the security of energy supplies in Europe held in Paris on 21 and 22 May 1987 by the Centre de géopolitique de l'énergie et des matières premières.

Comparison between the natural gas markets in the United States, the EC and Japan

Background

Natural gas started to be used in the United States towards the middle of the 19th century following the discovery of significant reserves. In Western Europe, until the end of the 1950s, the gas industry was mainly based on the production of gas from coal and subsequently from oil products. The use of natural gas was very localized and based on comparatively small reserves discovered in France, Italy and the Federal Republic of Germany. The situation changed completely with the discovery in 1959 of the enormous Groningen field in the Netherlands and the subsequent discovery of significant reserves in the North Sea. Groningen gas played a vital role in the development of a natural gas industry in Europe as a result of exports to Belgium, France, Germany, Italy and Switzerland.

In Japan the natural gas industry is based almost entirely on imports of liquified natural gas (LNG), mainly for use in power stations.

Features of the international market for natural gas

Before making a detailed comparison between the three markets concerned, it should be emphasized that, while the international oil market is highly diversified, the natural gas market is more homogeneous since the high costs and technical constraints involved in transporting natural gas and the limited number of operators make the gas market less fragmented than the oil market. International trade in natural gas is therefore comparatively less significant than trade in oil. International trade in oil represents between 42 and 45% of world consumption compared with 13% in the case of natural gas.

A more detailed analysis of the natural gas market in the United States, the EC and Japan brings out the considerable differences between the three markets in question as regards:

(i) the role of natural gas in the primary energy balance;

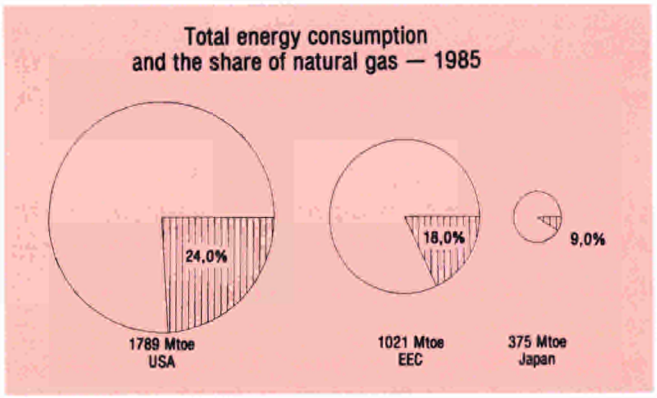
(ii) the significance of the gas market, and the way in which it is organized;

(iii) the structure of consumption;

(iv) coverage of demand by indigenous production.

Role of natural gas in the primary energy balance

Natural gas accounted for approximately one-third of primary energy consumption in the United States towards the end of the 1960s; it now covers one-quarter of total energy consumption. The figure is 18% for the European Community of Twelve and 9% for Japan.



Significance of the natural gas market, and the way in which it is organized

At over 450 Mtoe, the market in the United States is more than twice the size of the European Community market which at present stands at 187 Mtoe. The Japanese market is much smaller (approximately 35 Mtoe).

The natural gas industry in the United States is organized very differently from the industry in the Community.

In the United States there are a large number of operators, regulations differ from State to State and contracts tend to be for shorter periods than in Europe. In addition, natural gas is frequently transported by pipeline companies for third parties, and a spot market has emerged and expanded very considerably in the space of a few years.

In the **European Community** there are a small number of importing gas companies which supply the consumer countries on the basis of long-term contracts lasting 20 to 25 years on average. However, there have recently been additional gas purchases for very limited periods of time, mostly to meet winter consumption peaks. It will be interesting to see whether this type of shorter contract will develop as it has in the United States.

In addition, in the Community there are import, transport and distribution monopolies or virtual monopolies. This has prompted the Member States to endeavour to ensure that the markets are not distorted. The Commission has several means at its disposal to monitor the markets at Community level.

(i) Price transparency, a principle enshrined in the Council Recommendation of April 1983 on natural gas prices and tariffs.[2] This is essential to guarantee effective competition on the gas market. At present it can be considered that transparency is guaranteed except in the case of sales to large industrial consumers. In two countries (United Kingdom and Germany) there does not seem to be adequate transparency in such cases.

(ii) The competition rules laid down in the EEC Treaty concerning State aid (Article 92), abuse of dominant positions (Article 86) and unlawful agreements (Article 85).

Structure of consumption

The consumption structure is also very different.

In the United States natural gas is the dominant fuel on the industry and residential sector market. For example, natural gas consumption in the industrial sector accounts for almost half the total energy consumption in this segment of the market. Where power stations are concerned, however, the share of natural gas is less than that of coal.

In Europe natural gas plays a significant but not dominant role in the industrial market, with a market share of approximately 25%. It has made greater inroads into the residential and commercial market (32%).

In Japan natural gas covers only about 3% of the energy requirements of the industrial market. It has a greater share in the residential and commercial sector (approximately 17%). The biggest market is power stations which consume approximately three-quarters of the LNG imported. Natural gas represents some 25% of the fuels used in power stations. The growing use of natural gas to generate electricity in Japan, compared with the downward trend in the United States and in the EC is attributable to the environmental problems posed mainly in urban areas and the fact that Japanese legislation on air pollution is amongst the most stringent in the world.

As regards the **use of natural gas in power stations in the EC,** the philosophy adopted following the first oil shock was to reserve natural gas for more worthwhile applications offering the greatest return. In 1975 the Council of Ministers of the EC adopted a directive restricting the use of natural gas in power stations.[3] However, provision was made for exceptions on technical, economic or environmental grounds. The share of natural gas in the Community's total net electricity production, which amounted to nearly 14% in 1975, has now been reduced to some 7% (see Table 1). Overall, therefore, there has been a constant reduction in gas consumption in EC power stations, if certain countries are disregarded.

Table 1
The share of natural gas in total net electricity production (as%)

	1975	1980	1981	1982	1983	1984	1985
EUR 12	-	-	-	-	-	-	6.6
EUR 10	13.7	8.9	7.5	7.1	7.8	8.3	7.2
D	10.3	16.8	13.0	10.3	10.0	8.7	6.0
F	6.4	2.6	2.1	2.0	1.7	1.2	0.9
I	5.1	4.9	4.7	6.4	7.4	13.4	13.1
NL	81.7	39.9	36.4	44.4	57.3	60.4	61.0
B	21.9	10.9	9.5	4.5	6.9	4.9	4.0
L	15.8	19.4	7.3	0.2	1.7	1.5	0.5
UK	3.4	0.8	0.5	0.6	0.6	1.0	1.0
IRL	-	15.1	31.8	46.0	51.8	52.6	50.0
DK	-	-	-	-	-	-	1.1
GR	-	-	-	-	-	-	-
E	-	-	-	-	-	-	1.6
P	-	-	-	-	-	-	-

Coverage of demand by indigenous gas

At present, demand is covered by indigenous gas to the extent of 95% in the United States, 65% in the Community as a whole and approximately 5% in Japan. In the Community's case, therefore, the rate of dependence on imports is at present 35%. In view of the expected reduction in domestic production this is likely to rise to 40% or more after the turn of the century.

The situation on the natural gas market in the EC

Situation in the Community in 1986

After a period of constant expansion between 1973 and 1979, natural gas consumption in the EC fell for three years in succession, in line with the reduction in energy consumption in general. Since 1983 demand has picked up at a fairly steady rate but this slowed down in 1986. The increase compared with 1981 was 1.2% and natural gas consumption reached almost 187 Mtoe, its highest-ever level.

The slowdown in the increase in natural gas consumption in 1986 is due mainly to the slump in the prices of oil products to which gas prices are linked in most Member States, albeit with a delay of six months or more. This delay, which benefited natural gas during the successive increases in the prices of oil products, was detrimental to it in 1986 by delaying the adjustment of gas prices and by making gas less competitive in the short term.

This temporary loss of competitiveness occurred mainly in the case of interruptible sales to industry and power stations. However, the fall in gas prices towards the end of 1986 enabled it to regain its competitive position to a large extent.

Structure of the gas industry in the Member States

There are very great differences in the role of natural gas in the primary energy balance of the Community countries and the structure of gas consumption. The role of natural gas in the Member States' economies depends mainly on the size of domestic gas resources and the point in time when the gas industry was established.

A distinction can be made between countries whose markets are of comparatively long standing such as France, Italy, Germany, the United Kingdom and Belgium and those of more recent vintage such as Denmark, Ireland and Spain. Two countries, namely Greece and Portugal, intend to bring natural gas into their primary energy balance.

There is a link between the size of a country's domestic resources and the role of gas in its primary energy balance (see Table 2). In France, Germany and Italy where natural gas accounts for 12, 15 and 22% respectively of total energy consumption, domestic production at present covers 15, 27 and 46% respectively of gas consumption.

In the United Kingdom where domestic resources cover 78% of total gas consumption, gas accounts for 23% of the primary energy balance.

In the Netherlands where, at over 50%, the rate of penetration of natural gas is the highest, domestic production covers 95% of gas consumption.

Belgium is to some extent a case apart since, even though there are no indigenous resources there, natural gas plays a major role in Belgium's primary energy balance as a result of imports — initially from the Netherlands.

Table 2

	Proportion of gross internal consumption covered by natural gas in 1986 (as%)	Role of natural gas in the primary energy balance in 1986 (as %)
EUR 12	65.4	18.1
D	26.8	15.5
F	14.6	12.5
I	46.1	21.7
N	95.4	53.3
B	0.5	14.7
L	-	9.7
UK	78.0	23.5
IRL	100.0	15.6
DK	100.0	5.9
GR	100.0	0.6[1]
E	12.8	3.6

[1] Small quantities used as feedstocks.

There are also very considerable differences as regards the **structure of the gas market** in the Community countries. The relative size of the three main areas of final use, namely residential and commercial, industry, and power stations, varies from one country to another depending on factors such as the availability of domestic resources, import possibilities, the competitive position of the different energy sources, environmental rules, industrial structures, land use intensity, the geography of the country and government policies.

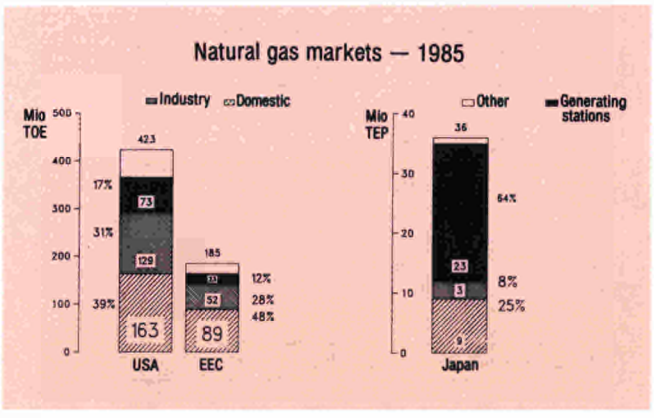
In the Community as a whole the **residential and commercial sector** is an expanding market for natural gas. At Community level 48% of gas sales, representing some 90 Mtoe, were made in this sector in 1985.

There are considerable differences between the situation in the Netherlands, for example, where 97% of households are connected to the natural gas network and the United Kingdom where the proportion is 73% and the situation in Spain, for example, where only 23% of households are connected to the natural gas network.

The potential for an increase in gas consumption in the residential sector therefore varies from one country to another. The market would seem to be virtually saturated in the Netherlands. However, there are prospects of growth in other countries, e.g. Germany, Italy, France and Spain, although heating oil and electricity in particular will continue to exert strong competitive pressure.

The industrial market (including feedstocks) accounted for some 35% of total natural gas sales in the Community in 1985, corresponding to a volume of about 65 Mtoe.

There is very keen competition on this market, in particular from heavy fuel oil but also from coal and electricity, and gas must be able to compete with them in order to be sold.



The **power station market** represented some 23 Mtoe in the Community in 1985, corresponding to 12% of total sales of natural gas.

Future demand

It is generally expected that there will be a moderate increase in consumption in the 1990s, since new markets are starting to develop, e.g. in Denmark, or will shortly be developing, e.g. in Greece and Portugal. In other countries such as Italy and Spain the gas markets are expanding with the development of gas infrastructure. If a number of factors materialize this could lead to consumption levels higher than those forecast at present.

Examples of these factors are:

(i) the tightening-up of environmental protection legislation, particularly concerning air pollution;

(ii) uncertainty about the future of nuclear energy in certain Community countries;

(iii) progress with the technologies for using natural gas;

(iv) the development of an increasingly abundant supply of natural gas which in certain conditions could break the link between the price of gas and the price of oil.

In view of these factors, the demand for natural gas in the Community could in the most favourable case exceed the 200 Mtoe at present forecast by the Member States by the end of the century.

While there are reasonable grounds for optimism about the future of natural gas in the Community, the fact nevertheless remains that natural gas must face up to numerous challenges since it could be held back in the event of tough interfuel competition on the end-use markets, greater energy conservation efforts or a lower rate of economic growth than that forecast at present.

[1] COM(86) 518 final, 11.5.1985. See also *Energy in Europe No 6*, December1986.
[2] OJ L 123 of 11.5.1983.
[3] Directive 75/404/EEC, OJ L 178 of 9.7.1975.

Export prospects for Soviet oil

An examination of Soviet oil exports is of interest in two respects:

(i) the USSR is a major non-OPEC producer; its market share is 10% in the case of crude and 12% if all oil products are taken into consideration;

(ii) the Eastern bloc's trade with the West is dominated by energy exports which alone account for some three-quarters of its hard currency revenue.

Recently a series of reforms have been adopted and part of the Soviet Union's leadership has been replaced. The XIIth Plan (1986-90) clearly demonstrates Mr Gorbachev's desire to speed up growth by modernizing the economy, a desire which he expressed at the 27th Congress of the Communist Party of the Soviet Union in March 1986.

It therefore seems worthwhile to examine the Soviet Union's export possibilities and the behaviour of Soviet leaders in relation to the oil market.

Export forecasts for Soviet oil

Despite a falling-off in production in 1984 and 1985, the USSR is still the leading world oil producer with a volume of 597 Mt in 1985 and some 615 Mt in 1986.

Consumption in the Soviet Union is the second largest in the world with a level of 440 Mtoe of oil products in 1984 and some 448 Mtoe in 1985; and the USSR is a major exporter: 166 Mtoe of oil products in 1985, including 68 Mtoe to the West.

The development of Soviet oil exports is therefore a key factor in the long-term energy market and in world trade as a whole.

Oil and gas, but especially oil, have in the past played a crucial role in the Eastern bloc's balance of payments. As a result of the hard currency obtained in return for energy exports to the West, it can acquire the quantities of cereals it requires for its food supplies and the high-tech equipment which is crucial for its development.

As long as oil was being produced in the required quantities the planners more or less relied on oil exports for achieving balance-of-payments equilibrium. But when production showed signs of flagging and the price of oil products on world markets fell, the system was confronted with the external equilibrium constraint, especially as the fall in the value of the dollar was worsening the terms of trade.

Oil production now seems to be picking up again, but it remains to be seen whether the recovery will last or whether it is merely a lull in an inevitable decline which will ultimately oblige the Soviet leadership to radically alter its policy and envisage a different type of growth.

1. Between now and 1995 Soviet production will depend less on the absolute level of resources than on the ability to exploit them

1.1. The level of reserves means that the USSR can produce for several decades at the present rate

The level of oil resources is a State secret. Estimates therefore vary considerably between 8 and 30 years of production at the present rate (600 Mt/year).

The estimate of the *Comité professionnel du pétrole,* for example, is 8 300 Mt in 1986, representing 14 years of production. However, there has been a levelling-off in recent years, possibly because of inadequate prospecting. It is probable that the Russians have not carried out a complete inventory, considering that the fields already known will suffice to cover their requirements, and that bringing new areas onstream would involve tricky technical problems. It is therefore to be expected that known reserves will remain at around 15 years of production, meaning that prospecting would simply be intended to make up for the quantities produced. To this end, it might be necessary for the planners to consider active cooperation with Western companies, possibly in the form of joint ventures.

1.2. In future oil will continue to play a vital role in Soviet energy production even if its relative share is bound to fall

Oil is not the Soviet Union's only energy resource. We should not forget the spectacular development of gas production; the USSR has approximately 40% of world gas reserves.

The following table illustrates Soviet energy production.

Energy production in the USSR

	1975	1980	1981	1982	1983	1984	1985	1986	1990 Plan
Oil									
Mt	491	603	609	613	616	613	597	615	626-640
Gas									
Gm^3	290	534	465	500	536	587	643	687	835-850
Coal									
Mt	645	653	638	647	642	636	643	686	715
Nuclear electricity									
TWh	24	73	86	96	110	142	170	193	390

Source: CPDP (Comité professionnel du pétrole) Economist Intelligence Unit Narodnoe khoziaistro S. L. Gadon 'La politique énergétique en URSS: bilans et stratégie' IFP 1986.

It is clear that the Russians are basing the developing of primary energy production on gas, and the doubling of nuclear capacity foreseen by 1990 will probably not be achieved by that date because of delays in the nuclear electricity programme.

Respective shares of the various fuels in Soviet primary energy production (%)

	Oil	Gas	Coal	Nuclear
1975	44	21	28	0.4
1980	44	26	23	1.2
1985	34	38	19	2.5
1990[1]	34	39	19	1.8

[1] Figures obtained by taking the median of the range given in the Plan.

1.3. Oil production will entail increasingly complex logistic and technical problems

Soviet oil production has in the past been concentrated on a few very large and very productive fields. The Samotlor field in Western Siberia accounts for virtually one-quarter of total production, while Romashkino in Ural-Volga produces some 50 Mt/year. However, the oil fields in the European regions which were the first to be brought onstream are on the decline and the policy of overproducing the large fields has reduced the total output. In the opinion of several Western experts inadequate mastery of secondary recovery techniques is the cause of the largely suboptimal production.

Any new fields will in future be dispersed and less productive. The production areas are shifting towards the East, thus increasing the costs and the logistic problems.

In future the USSR will have to rely to a large extent on Siberia for its oil production. The XIIth Plan (1986-90) places particular emphasis on this area. In 1990 Western Siberia should account for two-thirds of oil production.

1.4. Flagging production in 1984 and 1985 has prompted the Soviet leaders to focus their efforts on the oil industry

The measures taken seem to have had a particularly rapid effect, since shortly after the poor performance in 1985 (597 Mt) there was a particularly large recovery and the XIIth five-year Plan provides for production between 626 and 640 Mt in 1990, the last year of the Plan.

A not insignificant factor is no doubt the fresh blood brought by Mr Gorbachev to the leadership. The Minister for the Oil Industry has been replaced by Mr Dinkov, the former Minister for Gas, whose arrival has brought new life to an administration whose policy had been officially criticized.

In the final analysis, however, investment in the energy sector will detemine whether the Russians can achieve the Plan's particularly ambitious objectives.

The following table highlights the efforts made.

Energy sector investment in absolute terms (000 million roubles)

	1970	1975	1980	1981	1982	1983	1984	1985	1986
Oil	2.9	4.2	7.5	8.9	9.6	10.0	9.9	12.9	15.7
Gas	1.2	2.0	2.3	2.3	2.7	3.1	3.7	4.5	5.4
Coal	1.7	2.0	2.4	2.4	2.6	2.8	2.8	3.4	4.3
Subtotal	5.9	8.2	12.2	13.6	14.9	15.9	16.4	19.9	25.4
Electricity production	3.9	4.3	5.2	5.3	5.3	5.4	5.8	7.1	8.8
Total	9.8	12.5	17.4	19.9	20.2	21.3	22.2	27.0	34.2

The effort made in terms of the allocation of resources to the oil industry is very significant and is the result of a deliberate policy.

In his address when presenting the Plan, Prime Minister Ryjkov announced a 47% increase in energy sector investment. In 1986 alone oil sector investment rose by 31%.

The significance of this is brought home when one compares it with overall investment growth (8.6% up on 1985).

These measures and the 'Dinkov effect' are the Soviet authorities' reaction to the particularly low production levels of 1985. It should be emphasized that the winter was particularly bad that year, destroying the equipment used to inject water into the wells which was not designed to withstand temperatures below - 35°C.

According to the Soviet press the weather was not the only cause, since the Minister for Infrastructure had failed to achieve the targets assigned by the Plan concerning drilling equipment (11% down on the forecasts) and the Minister for Heavy Industry was 25% below the Plan's targets. To ensure that the financial outlay has an effect, it is necessary for the oil industry to satisfy the requirements as regards developing production in terms of quantity and quality.

Where physical investments are concerned, the Western press has often emphasized the external dependence of the Soviet economy which suffers from numerous bottlenecks. However, industry has done much to satisfy the needs as regards producing and processing oil and gas; there has even been technological innovation in this sector.

To be sure, industry in the Eastern bloc is not always in a position to supply equipment in the quantities and especially of the quality required, but imports of high-tech equipment from the West are still of marginal significance in relation to the volume of transactions concerned even if they are decisive in technical terms.

In a period of depressed demand for oil-related equipment and services, the Russians could, if they so wished, undoubtedly cooperate with Western companies and obtain favourable conditions.

2. The broad lines of energy consumption in the Eastern bloc make it possible to reduce the consumption of oil products

In this connection, in order to understand the gravity of the problem it is necessary to consider the situation in the West prior to 1973. Growth in the Soviet Union and to a large extent in the other Comecon countries has been generated as a result of exploiting abundant and cheap resources. However, since 1980 efforts have been made to restrict total energy consumption and especially oil consumption in the USSR and in the other Eastern bloc countries.

2.1. Oil still plays a leading role in the USSR's energy balance

Demand for oil and gas is considerable, amounting to 68% of total demand, while demand for nuclear electricity and hydroelectricity remains low: primary electricity production amounts to between 80 and 85 Mtoe (37 Mtoe for nuclear electricity and 45 Mtoe for hydroelectricity). To obtain the total electricity production figures, the 260 Mtoe produced in thermal power stations should be added. Nuclear electricity accounts for only 10% of total electricity generated (compared with around 70% in France).

Soviet energy consumption (Mtoe)

	1980	1982	1983	1984	1985
Coal	319	326	327	324	331
Oil	450	452	448	442	449
Gas	311	366	394	434	473
Primary elec.	54.5	57.8	61.3	73.4	80.1
Other	59.2	60.5	60.7	58.9	60.5
Total	1199	1262	1291	1331	1393

It should also be noted that the consumption structure is peculiar, since industry is the biggest consuming sector (accounting for 55 to 65% of total energy used compared with 32% in the case of North America). Transport accounts for only just over 10% of total energy consumption (compared with about one-third in the United States). The other end-uses, mainly in the residential /tertiary and agricultural sectors are on the low side (23%) compared with the industrialized countries in the West.

The Russians have been clearly aware of the need to restrict oil consumption since the beginning of the 1970s. Subsequent events: soaring export prices and flagging production made this objective even more urgent. They therefore endeavoured to save energy and promote substitutes.

(a) Considerable energy conservation potential

The average annual rate of increase in energy consumption has been falling since 1970. It fell from 4.7% in the period 1971-75 to 3.5% in the period 1976-80 and 2.2% in the period 1981-84. However, the fall in energy consumption has resulted both from slow economic growth and from structural changes.

If consumption is related to net material output, it can be seen that there has been a reduction in energy intensity.

Be that as it may, a comparison with the countries of Western Europe or North America indicates that the USSR is well behind the rate achieved in the industrialized countries in question. For example, its energy intensity is twice as high as that of the EEC.

Even if the energy-saving potential is considerable there are grounds for doubting whether the Russians are able to exploit this potential, since:

(i) the economic system is geared to the supply side rather than the demand side, and because of the way prices are set the final consumer does not have a clear idea of the cost of the resources used;

(ii) despite a few examples reported in the Soviet press there has been little technological innovation designed to save energy;

(iii) industrial obsolescence and inadequate investment mean that there is little hope of a rapid improvement, and using Western technology means spending hard currency;

(iv) old, inefficient units are still being used because of the delays in the nuclear electricity programme.

All in all, the planned objective of reducing energy intensity by 1.7% per annum by 1990 seems very ambitious, especially as the Plan focuses investment on production rather than on energy saving.

Breakdown of oil and gas consumption in the USSR by sector

	1975	1980	1985
Oil	100	100	100
for: Electricity and heating	26	30	30
Industry	31	28	27
Transport	24	24	25
Agriculture	8	8	8
Other	11	10	10
Gas	100	100	100
for: Electricity and heating	50	51	51
Industry	28	25	25
Households	13	12	10
Other	9	12	15

(b) The promotion of substitutes will undoubtedly have a very marked impact on oil consumption

The success of the plans to substitute gas for oil should be emphasized. The reduction in oil consumption is directly correlated to the increase in gas consumption. These two fuels now each account for approximately one-third of total consumption.

The Russians have an obvious interest in promoting this changeover:

(i) they have very considerable gas reserves (at least 43 years of production at the present rate);

(ii) gas-field production entails fewer technical problems than oil-field production;

(iii) the cost of investing in this substitution is about half the cost of extending oil-production capacity;

(iv) they are rationed in their plans for the delivery of gas to the West;

(v) the shortage of investment is jeopardizing an increase in the use of gas in the small Comecon countries;

(vi) planned production is very considerable: 835 - 850 Gm^3 in 1990 as compared with 687 Gm^3 at present.

It would also seem that oil has been used more for convenience than by necessity, since the requirements traditionally regarded as being non-substitutable only account for one-half of total consumption. It is therefore possible that Soviet oil consumption will remain at its present level until 1990.

2.2. Soviet oil exports to other Eastern bloc countries

The Comecon countries (Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Romania and Poland) cover barely one-quarter of their internal oil consumption and until 1981 were not rationed in their demand for Soviet oil. The 10% reduction announced unilaterally by the USSR at the end of 1981 surprised all the Comecon countries. As a result, deliveries of Soviet crude fell from 72.4 Mt in 1981 to 66.2 Mt in 1982. The

cutbacks continued in the following years and Comecon's share of Soviet crude exports fell from 60% in 1981 to 47% in 1984, the West's share increasing from 36 to 45.5% over the same period.

The price formula adopted for deliveries of oil to the Eastern bloc was scarcely advantageous to the USSR as it was based on the moving average of world prices over the previous five years. As a result, for a period of 10 years following the first oil shock the USSR subsidized its allies' oil bills, sacrificing currency in order to consolidate the Eastern bloc.

Nowadays, as a result of the fall in oil prices, the calculation method results in a price which is higher than the world market price, and it has to be paid in hard currency or in transferable roubles, and the USSR grants fewer payment facilities. Hence at a time when countries in the West are benefiting from the fall of the value of the dollar and the fall in the price of oil, the small Eastern bloc countries are feeling the effects of the second oil shock at a time when their external position has deteriorated.

It is highly likely that in future Soviet oil deliveries to the Eastern bloc will decline or will be paid for at the world price, thus neutralizing their economic effect. If so, however, the small Eastern bloc countries will themselves have to obtain hard currency or offer the USSR better-quality equipment and products. Hence the need for them to step up their cooperation with the West.

Henceforth, as provided for in the Plan, the economies of the Eastern bloc countries must:

(i) develop their indigenous energy production;

(ii) increase their energy efficiency and gear their economies to less energy-consuming growth;

(iii) diversify energy sources, stepping up the use of alternatives to oil.

In fact, these objectives are likely to entail greater use of coal, though this already covers 57% of primary energy requirements in the small State-trading countries. There will also need to be a significant increase in nuclear electricity capacity.

3. Oil and the Soviet Union's balance of payments

3.1. Oil has enabled the Russians to engage in international trade

Although historically the USSR has sought self-sufficiency as a result of a hostile political environment, it has gradually become integrated into international trade since economic development on a self-sufficient basis entailed rapidly increasing economic costs because of the depletion of indigenous resources. Consequently, in the early 1970s there was a radical change in the Eastern bloc's commercial policy. In a political climate of *détente,* the USSR showed signs of opening up in order to gain access to Western technology which could speed up its development. From being an exporter of cereals, the Soviet Union became the second largest importer in the world. Gradually, at the same time as an increase in the volume of exports, energy began to play an increasingly important role, moving from just under one-third of hard currency resources before the first oil shock to 80% after the second.

The continual increases in energy prices enabled the planners constantly to exceed the estimates of hard currency gains. To be sure, there was a boom in sales of natural gas in the period 1973-87, but oil, accounting for two-thirds of the energy sold to the West, remains the main strategic item.

It is permissible to conclude that the development of oil exports has enabled the USSR to abandon self-sufficiency and hence promote its economic growth. However, as a result of engaging in international trade, especially on a market with unstable prices, the Soviet bloc has lost some of its economic stability and commercial invulnerability.

3.2. Oil now plays a crucial role in the balance of payments

Apart from accounting for over one-half of hard currency revenue, oil products offer the leadership a degree of flexibility which the system particularly needs, since imports from the West, mainly cereals and mechanical equipment, depend from one year to the next on the Soviet harvests and cannot therefore be planned exactly. Consequently, if imports of a commodity, and hence the hard currency expenditure, exceed the planned level the leaders cannot immediately adjust other items downwards. Let us therefore examine the means at their disposal to achieve balance-of-payments equilibrium.

(a) **Gas** exports offer only very limited flexibility. Unlike oil, the method of supply (pipeline) calls for long-term contracts and agreements. Installing supply capacity does not have an immediate positive effect on the currency balance because initially the gas sold serves to reimburse the equipment imported from the West. On the demand side there is a certain amount of inertia to changes in relative prices and, despite a few non-contractual sales, the West does not appear to wish to increase its dependence on Soviet gas.

(b) **Gold** sales raise delicate problems. The USSR is the second biggest gold producer after South Africa. Its production could reach a level of 500 t in 1990. According to estimates, its reserves represent 6 to 7 years of production. However, selling gold is a rather uncertain business as the market is comparatively limited in terms of the quantities involved, and very speculative, and additional quantities would push prices down. In recent times the Russians have sold gold only as a final resort in order to solve temporary problems, e.g. poor harvests. In addition, South Africa might also shortly be selling gold on the market in order to obtain funds, and this would push prices down even further.

(c) **Oil**, with constantly increasing prices, supply flexibility and a sufficiently large market to ensure that variations in Soviet deliveries do not make prices fluctuate excessively, has played a vital role in the short-term adjustment of the balance of payments. This aspect is emphasized in a study by the Oxford Institute for Energy Studies (Soviet oil exports: trade adjustments, refining constraints and market behaviour — M. Chadwick, D. Long, N. Nissanke, Oxford University press).

Eastern bloc exports to the OECD: crude oil and products

(Mt)

	1981	1982	1983	1984	1985	1986
Crude						
USSR	29.4	36.8	43.7	49.6	37.8	45.7
Other Eastern bloc countries	2.8	1.8	2.8	1.9	1.3	1.8
	32.2	38.6	46.3	51.5	39.1	47.5
Products						
USSR	24.1	32.2	33.3	31.6	29.7	32.4
Other Eastern bloc countries	12.4	11.2	15.3	14.9	14.7	17.5
	36.5	33.4	48.6	46.5	44.4	49.9

Sources: OECD — IEA

3.3. The oil reversal has been very damaging to the Soviet economy

(a) The Soviet Union's oil imports are very limited. They are in response to political motivations and probably serve as an argument to demonstrate the Soviet Union's desire to maintain good relations with OPEC. They take the form of barter, probably against arms-related equipment. At all events the level of oil imports is low: 14 Mt in 1984 and 13 Mt in 1985. Finally, the improvement in the terms of trade in this area may be partially offset by the loss of orders resulting from the insolvency of oil producers, some of which are customers of the USSR.

The planners are now confronted with a real balance-of-payments problem.

(b) It does not appear that the planners have found a solution. The fall in the prices of crude oil and oil products caused a shortfall of USD 7 000 million for 1986 alone, representing about one-third of the Soviet Union's hard-currency revenue. This is a major loss for the Soviet bloc, since in view of the non-convertibility of their currencies, when a decision to import commodities is taken this means that they are really of vital importance to future economic development, except where cereals are concerned. Even though in 1985 and 1986 the Russians had excellent harvests which reduced their cereals deficit, this deficit will nevertheless remain a structural one at least in the medium term.

Last year, the Soviet Union had to reduce its purchases from the West, while increasing its indebtedness. Although the Russians have always been concerned to control the level of their debt, in the near future it will be very difficult to modernize without greater recourse to debt since oil prices are remaining stable and oil production will not enable the reduction in prices to be offset by an increase in volume.

4. Future prospects

Soviet energy exports depend on numerous factors and cannot be directly extrapolated or mechanically deduced from production and consumption.

The balance of payments must be taken into consideration as regards competition with the West and the political stability of the Eastern bloc must be taken into consideration as regards trade within Comecon.

Oil and gas are two factors of the Soviet economy around which the planners must organize a consistent strategy while taking into account the general context, namely:

(i) oil is a resource which is becoming increasingly expensive to produce, and a considerable increase in prices seems increasingly improbable;

(ii) gas is an abundant and cheap resource but there are problems as regards outlets within the Eastern bloc (because of the need for massive investment) and in the West because of the Western countries' objective of diversifying their supplies.

The coming to power of Mr Gorbachev has resulted in genuine reforms, e.g. the setting-up of joint ventures and decentralization of external trade.The recourse to Western technology and know-how which the leadership seems to be envisaging is undoubtedly the best way of facilitating the quantum leap which the Soviet economy obviously needs in order to meet the objectives of the Plan.

However, any imports will necessitate currency which the USSR will have to obtain by exporting energy in particular until the modernized industrial machinery makes it possible to diversify exports. Specialization in products with a high energy content would make it possible to develop the use of gas, and it is now difficult to see what the outlets will be for the enormous quantities foreseen in the Plan.

Within the Eastern bloc the Soviet Union's partners will no doubt be rationed and paradoxically the efforts to save energy and the investment in extraction will culminate at a time when oil prices are falling.

It is therefore highly likely that the USSR will remain present on the oil market as a factor of not insignificant importance for the rest of the century.

Energy efficiency of buildings

In a previous edition of *Energy in Europe*,[1] the Danish experience in the rational use of energy in buildings was examined. Since then the Danish Administration has established a compulsory system of providing information on the energy efficiency of buildings (in the case of sale, an energy audit must be carried out and the results transmitted to potential buyers), and investments are no longer subventioned.

A second study, carried out by the Directorate-General for Energy, underlined the largely positive impact of an information system: the principle conclusion is that the investment decisions in improving the energy efficiency of buildings were accelerated and oriented towards the most profitable solutions.

As a result of these investigations, and after consulting a group of experts, the services of the Commission considered that the time was opportune to submit for adoption by the Council a proposal for a directive concerning information on the energy efficiency of buildings. The following text explains some of the factors relating to this procedure.

After adoption by the Commission the draft directive in question was transmitted to the Council of Ministers early in September 1987.

Introduction

The building sector (residential and tertiary) is the one which consumes the most energy: more than 38% of final energy consumption in the Community, i.e. some 260 Mtoe (EUR 12) in 1985.

The potential for energy saving in this sector is considerable: in a previous document,[2] the Commission estimated (for EUR 10) the potential energy savings by improving existing buildings at 35 Mtoe/year, and that which could be saved in the construction of new buildings at 20 Mtoe/year.[3]

The overall energy efficiency of the Community has improved by 20% since 1973, and a further improvement of at least 20% has recently been adopted by the Council as the objective for 1995.[4] The housing sector must play its part in the general effort to attain this objective.

This document is in response to two resolutions and a declaration of the Council[5] in which it:

(i) invited Member States to pursue and, where necessary, increase their efforts to promote the more rational use of energy by the further development of integrated energy-saving policies;

(ii) noted that these policies should in particular have recourse to standards where the forces obtaining on the market and its transparency are not sufficient to guarantee efficient use of energy;

(iii) also noted that the Commission, in consultation with experts from the Member States, would examine questions relating to the placarding of the energy consumption of buildings by a process of certification, in order to improve the flow of information to the parties concerned on the state of the real estate market and to give credit to the efforts made by the builders/owners;

(iv) agreed that the Community and the individual Member States would publicize the needs for greater energy efficiency, making available full information and advice on how this can be achieved.

The Commission has therefore examined questions concerning the placarding of the energy consumption of buildings in greater detail.

In particular, it has:

(a) investigated in detail the operation and results of the only compulsory procedure so far in force in the Community;[6]

(b) convened an *ad hoc* working group of experts designated by the Member States, in which:

(i) the results of the studies mentioned above have been presented, and

(ii) similar actions already initiated or in preparation in the Member States have been reviewed.

The need for information

The lack of information is rightly seen as a **major obstacle to investment in improving the energy efficiency of buildings,** notably during the periods of low energy prices. A rational approach to the capital outlay required demands that not only the current energy performance, but also the possibilities for improving that performance

should be identified, and that the cost of and return on each possible improvement should be known with sufficient accuracy.

Those Member States which have given encouragement to, or even rendered compulsory, the use of information procedures on the energy efficiency of buildings have generally found that this gave a significant stimulus to economic operators' efforts: **investment decisions were not only accelerated, but also guided towards the most profitable action to take.**

Furthermore, such a lack of information constitutes a **serious obstacle to the mechanism of market forces**: the theory of free choice assumes that a person buying or renting property makes his or her decision in full knowledge of the facts, and in particular on the basis of the true state of supply. However, in the absence of appropriate information the criterion of energy efficiency is hardly ever taken into account, although in most cases expenditure on energy makes up a significant proportion of the cost of using the property.

Expected results

An information procedure on the energy efficiency of buildings should:

(i) stimulate investments,

(ii) create or preserve jobs,

(iii) improve the overall energy balance sheet, and

(iv) reduce pollution.

The Commission believes that, through a modest increase in expenditure, the financial outlay undertaken by potential investors can be stimulated very substantially, while complying strictly with the laws of the market.

Regarding job creation, previous studies have estimated that the investment required to save one Mtoe/year creates 2 000 man-years of employment (average ratio across all sectors). Building (as a sector of economic activity), being much more labour-intensive than industry, shows a much higher ratio, perhaps of the order of 5 000 man-years.[7] Since the social cost of an unemployed person is of the order of 10 000 ECU/year, **the benefit to society of one toe saved in the building sector may be estimated at 50 ECU.**

As a significant proportion of buildings are sold every year (some 5 to 7%), it may be expected that **over a period of 15 to 20 years, the vast majority of the building stock constructed before the oil crisis will have been covered by energy audits.**[8]

Furthermore, various knock-on effects could show appreciable benefits:

(i) demonstrating the profitability of the investments recommended in an energy audit report should make it easier to obtain bank loans;

(ii) where no transaction (sale or letting) takes place, a parallel procedure should develop spontaneously at the initiative of joint owners or managers of buildings (bandwagon effect);

(iii) in the medium term, Member States' Governments could have at their disposal data on the overall energy efficiency of their building stocks, together with their current potential for improvement.

Options retained

In the light of the above the Commission submitted its proposal for a directive for adoption by the Council. The Commission has opted for the following:[9]

Recent buildings:

(a) sale or renting of the building (or of part of the building): indication by means of a suitable scale of comparison of the energy efficiency compared with the level laid down in the most recent regulation in force;

Old buildings:

(b) sale of the entire building: production of an energy audit;

(c) renting of the entire building: indication of the theoretical energy consumption, where the building is above a certain size;

(d) renting of part of the building: indication of the observed energy consumption, where the building is above a certain size and the building has at least collective central heating or is connected to a district heating system.

Implementation

As this proposal for a directive defines only the general principles of an information procedure, Member States will retain a degree of latitude in applying national implementing measures. **These measures must in no event disrupt programmes already started**: implementation must be as practical as possible and based largely on the various procedures already in use (calculation methods, heating regulations for new constructions, energy audits, coordinated programmes for the upgrading of existing buildings, etc.).

Various points must, however, govern the preparation of the measures:

The cost of surveys must be reasonable:

(i) economies of scale are possible, given a **minimum degree of codification** of methods[10] and presentation of results;[11]

(ii) the prospects of a rapidly expanding market justify the **invoiced price** of services being regulated or at least governed by a voluntary agreement with the trade.

The information must be credible and impartial: precautions must be taken to ensure that the experts authorized to provide it meet certain requirements (qualifications, experience, in-service training, etc.) and are indeed impartial, in particular with regard to the technical options (forms and sources of energy, materials, equipment) and builders or building managers.

Estate agents, being the direct users of the information procedures, play an important part in the process: they must be closely associated with the preparation of regulations.

An information campaign must make the public aware of the procedures; it is particularly important to draw attention to the dates of entry into force once they are laid down.

Different deadlines are scheduled for national implementing measures to take effect, these being respectively three years (sale) and five years (rent). This time difference will allow the experts to 'run in' the procedure before it becomes widespread.

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1 No 3, December 1985, pages 28-32.

2 'Towards a European policy for the rational use of energy in the building sector', a Communication from the Commission to the Council (COM (84) 614, 13 November 1984).

3 Compared with the pre-1974 reference situation. This figure includes the effect of legislation on heating in new buildings plus that of new measures to be introduced.

4 Council Resolution of 16 September 1986 concerning new Community energy policy objectives for 1995 and convergence of the policies of the Member States (OJ C 241, 25.9.1986, p. 1).

5 Council Resolution of 15 January 1985 on the improvement of energy-saving programmes in the Member States (OJ C 20, 22.1.1985, p. 1); Council Resolution of 15 March 1985 on the rational use of energy in the building sector (OJ C 78, 26.3.1985, p. 1); Council Declaration of 26 November 1986 on energy efficiency.

6 'Labelling of the energy efficiency in buildings by a process of certification: the Danish experience' (19 August 1985); 'Cost-benefit efficiency of energy reports for buildings: the impact of the heat survey reports in Denmark since 1 January 1985' (1 October 1986) (Consultant: Birch & Krogboe, DK-Virum).

7 'Jobs and energy conservation', Association for the Conservation of Energy, London, February 1983. The study 'Employment effects of energy conservation in EC countries' (EUR 10199) mentions, for building insulation in four Member States, ratios of from 3 100 to 8 400 man-years of employment per Mtoe saved.

8 Except for publicly owned buildings (which are outside the scope of property transactions) and property passed on by inheritance.

9 In order to take into account local circumstances it is planned to let the competent authority in each Member State determine — in consultation with the Commission Services — the relevant sizes.

10 At the very least, survey methods and several basic parameters must be defined. The Eurocode 'Rational use of energy in buildings', which is currently being prepared, will prove a useful basis for the codification of methods.

11 A standard form should be drawn up; in addition, a standardized financial table laying down, for several investment amounts and several levels of taxable income, the repayment schedule for a bank loan, would provide valuable additional information.

Maximum permitted radioactivity levels in food

In the aftermath of the Chernobyl nuclear accident the Community was confronted by the fact that there were no Community or international standards laying down radioactivity limits for food. Because of the threat of a disruption of the common market as a result of the diversity of national protection measures, on 30 May 1986 the Council adopted interim provisions which have since been extended until 31 October 1987. The Commission undertook to consult scientific circles and then to submit a proposal for a permanent system to deal with emergencies. This has now been done. The Commission sent its formal proposal to the Council on 16 June 1987.[1]

The new proposal fits in with the basic standards

The Commission's proposal fits in with and supplements the Council directives (adopted under Chapter III of the Euratom Treaty) laying down the basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation.[2]

The basic standards specify the upper dose limits for members of the public which apply in all cases of controllable cases of exposure, i.e. exposure resulting from the normal operation of nuclear installations.[3]

The basic standards also specify that all exposures should be kept as low as reasonably possible below the prescribed limits, taking into account economic and social factors.

Where accidents are concerned, the basic standards call upon the Member States to lay down intervention levels at which protective measures must be taken. These levels may be defined both in terms of doses and in terms of levels of activity in the environment corresponding to these doses.[4] In order to guarantee the flexibility needed in order to deal with an accident situation it is usual to make provision for two intervention levels in the event of an accident for each type of protection measure envisaged:

(i) a lower limit below which it is extremely unlikely that action is called for on the grounds of radiological protection;

(ii) an upper limit above which it is practically certain that action must be taken on the grounds of radiological protection.

The intervention level at which steps will actually be taken following an accident will in practice lie between these two predetermined levels and will depend on the particular circumstances of the accident, and in particular economic and social factors.

The present basic standards do not require the intervention levels laid down by the Member States to be harmonized. However, guidelines for setting intervention levels drawn up by the Group of Experts set up under Article 31 of the Euratom Treaty have been published.[5] The Commission's new proposal is intended to define the intervention level for withdrawal from the market of foodstuffs contaminated by radioactivity and to incorporate this level in Community law.

The proposed levels do not include doses from existing sources of exposure, whether natural or medical. In addition, the levels only apply following an accident. They cannot be taken as a basis for accepting contamination of the same order of magnitude in normal operating circumstances, as this would contravene the principle of keeping exposure as low as reasonably possible.

In the aftermath of Chernobyl it is quite clear that the essential feature of the protection system is speed of implementation and that it is vital that values should be set in advance. However, it should also be recognized that an accident situation does not always fit in perfectly with a predetermined arrangement. For this reason, the Commission is proposing that the levels suggested by it should enter into force immediately following an accident and that they should then be adapted, within three months, to the specific nature and extent of the accident in question after experts have been consulted. This would make it possible to react with the desired speed and flexibility.

The procedure followed

Seeking maximum permitted levels of radioactivity in foodstuffs was a new problem both at Community and at

international level. In preparing its proposal, the Commission called upon the advice of the widest possible range of international experts. In addition to the Group of Experts set up under Article 31 of the Euratom Treaty, who must be consulted, the Commission asked for the opinion of a 'Committee of Wise Men' specially set up after Chernobyl to advise it on its future radiation protection measures. Lastly, aware of the international dimension, the Commission organized an international seminar on the subject which took place in Luxembourg from 27 to 30 April 1987. The seminar brought together some 100 radiation protection experts from 27 countries and representatives from five international organizations, i.e. WHO, ICRP, FAO, NEA-OECD and IAEA.

The aim of the seminar was to organize a vast exchange of views and to seek consensus on the approach to be adopted. In particular, the concept of intervention level was recognized as being valid for the problem in question. In terms of dose, the 5 mSv value was regarded as valid for choosing the lowest reference level, below which it is extremely improbable that action is justified.[6] Nevertheless, translating the dose level (5 mSv) into levels of radioactivity of products (expressed as becquerel/kg or becquerel/litre) calls for a number of choices in the calculation assumptions on which a general consensus could not be achieved among the experts. Consequently, opinion was divided about the values to be given to the levels of radioactivity.

In the light of this work, on 5 May the Group of Experts set up under Article 31 finalized its recommendation which on 6 May was approved by Euratom's Scientific and Technical Committee. The recommendation by the Group of Experts under Article 31 is based on the 5 mSv dose level and endeavours to derive the maximum permitted radioactivity levels in foodstuffs. To this end, a distinction should be made between the various radioactive elements (radionuclides) and account should be taken of the morphology and diet of individuals likely to absorb them. The Article 31 Group considered 19 radionuclides and three age groups (infant, 10-year-old child and adult) and for each of them evaluated the typical annual consumption of five categories of food: dairy products, drinking water, meat, fruit and vegetables and cereals.

The Group assigned to each category of food one-fifth of the total dose level adopted, i.e. 1 mSv, and calculated the level of a given radionuclide in a foodstuff category producing this dose for each age group considered. All in all, this gives rise to nearly 300 different combinations (19 nuclides x 3 age groups x 5 foodstuff categories).

In order to obtain a more readily usable result, the radionuclides were then grouped into three groups and the number of categories of food products was also reduced to three by grouping meat, fruit, vegetables and cereals in a single category called 'other major foodstuffs'. Lastly, in each case the value corresponding to the most sensitive age group was adopted. The groupings make it possible to have only nine different combinations (3 categories of foodstuffs x 3 types of radionuclides).

The working method used by the Article 31 Group of Experts is based on several pessimistic assumptions which introduce safety margins:

(a) in each nuclide group the value adopted corresponds to that of the most dangerous nuclide; applying it to the other nuclides entails a lower dose than the dose level adopted;[7]

(b) for each nuclide group and each foodstuff category the value adopted corresponds to the most sensitive age group; applying it to the other age groups entails a lower dose than the dose level adopted;

(c) the Article 31 Group assumed that on average over a year 10% of an individual's food intake would comprise products contaminated at the maximum permitted levels. This assumption entails an appreciable safety margin:

  (i) some categories of food (vegetables) are mainly contaminated through the deposition of atmospheric contamination which is itself limited in time;

  (ii) some nuclides disappear rapidly because of radioactive decay or because of processes in the terrestrial environment (iodine);

(d) the maximum activity levels are derived from the intervention level in terms of the lowest dose. Levels defined on the basis of the highest intervention level would be 10 times as high;

(e) the first numerical applications of optimization methods to verify that intervention does not entail risks and social costs in excess of those related to the radiological exposure avoided were presented in

Luxembourg. They give values which are generally higher than those adopted by the Article 31 Group.

The values recommended by the Group are set out in Table 1 below.

Table 1
Levels recommended by the Article 31 Group as the basis for the control of foodstuffs following an accident (Bq/kg)

	Dairy products	Other major foodstuffs	Drinking water
Isotopes of iodine and strontium, in particular I 131 and Sr 90[1]	500	3 000	400
Alpha-emitting isotopes of plutonium and transplutonium elements, in particular Pu 239 and Am 241[1]	20	80	10
All other nuclides with a halflife greater than 10 days, in particular Cs 134 and Cs 137[1,2]	4 000	5 000	800

[1] Within each group of nuclides, the values relate to the total activity of all the nuclides in the group. Each group can then be treated as completely independent of the other groups.
[2] Carbon 14 and tritium are not included in this group because of their low contribution to the doses for any foreseeable accident.

It will be seen that these values are considerably higher than the interim values adopted by the Council following the Chernobyl accident and extended until 31 October 1987. However, it has to be acknowledged that the interim system set up in the weeks following the accident was far from perfect. The experts were working in difficult conditions and were dealing with an emergency. The question of radioactive contamination of foodstuffs was tackled from the regulatory angle for the first time since the beginning of nuclear energy.

The Commission's proposal

In arriving at its proposal the Commission based itself firmly on the scientific advice it received. In particular, this means the opinion of the Article 31 Group of Experts, but the Commission also took into account the range of views expressed at the Luxembourg seminar. The Commission is satisfied that as far as the main objective of the Regulation — the protection of public health — is concerned the scientific advice offered to it is probably the most thorough available anywhere.

However, the Commission also felt it necessary to take other factors into account in setting the levels. In particular, the proposed system must have sufficient public and political credibility to be capable of attracting Community agreement and to be operable in the event of a nuclear accident — bearing in mind the very high level of public concern which is likely to prevail at such a time. Otherwise, Community trade in certain agricultural products could be seriously disturbed. One major aspect of this credibility is the relationship between the levels set by the Community and those in use elsewhere in the world.

The values adopted by the Commission are set out in Table 2. In the case of iodine, strontium and plutonium, the values are those recommended by the Article 31 Group. Tougher values have been adopted for nuclides with a half-life greater than 10 days, in particular caesium, for dairy products and other foodstuffs. This reflects the fact that these isotopes with a longer half-life cause lasting problems in relation to trade and the fact that adopting less tough levels could be detrimental to Community exporters by causing public concern in certain non-Community countries and making importers reluctant to import Community produce.

The Commission has also proposed maximum permitted levels for animal feedingstuffs. The proposed values are intended to guarantee that livestock products, in particular meat, are not unfit for human consumption. The

Table 2
Maximum permissible levels for foodstuffs, feedingstuffs and drinking water (Bq/kg or Bq/l)

	Dairy products[1]	Other major foodstuffs[2]	Drinking water and liquids for human consumption	Animal feedingstuffs
Isotopes of iodine and strontium, in particular I 131 and Sr 90	500	3 000	400	—[3]
Alpha-emitting isotopes of plutonium and trans-plutonium elements, in particular Pu 239 and Am 241	20	80	10	—[3]
All other nuclides with a half-life greater than 10 days, in particular Cs 134 and Cs 137	1 000	1 250	800	2 500

[1] Dairy products are milk and foodstuffs for the feeding of infants.
[2] A level of contamination 10 times that indicated in this column may be tolerated for minor foodstuffs such as coffee, tea and spices.
[3] No values for immediate application.

health of livestock is not threatened at this level of activity. For the first two groups of radionuclides the dilution factor in animals is so high that no maximum permitted levels need to be laid down.[8] For the third group of radionuclides containing the caesium isotopes a dilution factor of 2 has been recommended by the experts concerned.

The Commission has also examined the developments still in progress in this area. In this connection, it welcomes the fact that work on this subject is continuing within the Community, in non-Community countries and in the main international organizations concerned. This is the only way of reaching a general consensus, and of guaranteeing security for economic operators. The Commission will follow progress closely, will contribute actively to it, and will keep under constant review the need to adjust the regulation in the light of developments.

1 COM (87) 281 final of 16.6.1987 — proposal for a Council Regulation (Euratom) laying down maximum permitted radioactivity levels for foodstuffs, feedingstuffs and drinking water in the case of abnormal levels of radioactivity or of a nuclear accident.

2 OJ L 246 of 17.9.1980 and OJ L 265 of 5.10.1984.

3 The dose, or to be more precise, the dose equivalent, is a measure of the energy transferred by radiation to the body's organic matter weighted by certain coefficients depending on the type of radiation and the sensitivity of the organs mainly affected. The dose unit is the Sievert (Sv) which corresponds to the absorption of 1 joule (J) of energy per kg of matter. In the sphere of radiation protection the millisievert (mSv), i.e. one thousandth of a Sievert, is used.
By way of an example, the upper limit for the annual dose for members of the public is 5 mSv. Natural radiation produces a dose of 1-2 mSv per annum.

4 Activity is the number of spontaneous nuclear transformations (sources of radiation) which occur in a given quantity or volume per unit of time. The activity unit is the becquerel (Bq) which corresponds to one nuclear disintegration per second. The level of activity envisaged for the control of food is activity per unit of mass or volume. The unit is the becquerel/kg or the becquerel/litre.

5 Radiological protection criteria for controlling doses to the public in the event of accidental releases of radioactive material. Guide to reference dose levels drawn up by the Group of Experts set up under Article 31 of the Euratom Treaty. Commission of the European Communities, Luxembourg, July 1982.

6 This dose reference level is several orders of magnitude lower than the level corresponding to measurable effects on health.

7 Exceptionally, the nuclide levels for dairy products are not based on the lowest value for the nuclide category containing caesium radionuclides but on caesium 134. This is justified in view of the likely foodstuff contamination routes following nuclear reactor accidents.

8 The dilution factor is the ratio between the level of activity of the animal feedingstuff and the level of activity of the meat produced by it.

Market trends in solid fuels

Developments in the solid fuels market in 1986, and the outlook for 1987, are the subject of an annual report by the Commission which has just been finalized.[1] It shows that the outlook for solid fuels remains far from rosy, confirming the assessment made in the short-term energy forecast elsewhere in this issue.

1986

The Commission's report, prepared on the basis of information supplied by Member States, covers a period in which oil prices fell from 36 ECU a barrel to less than 14 ECU on average in 1986.

Prices on world coal markets also declined sharply; and with the depreciation of the dollar against EC currencies, the gap between imported coal prices and the cost of Community production widened again.

But the fall in oil prices drove down the price of other fuels more sharply than that of coal, with the result that the price advantage coal held over competing fuels rapidly vanished during 1986 in its main sectors of application.

Sharper inter-fuel competition led to a decline in solid fuels consumption in the EC in 1986 of some 3.5% or 8 Mtoe, perhaps less than might have been expected but significant none the less. The share of solid fuels in gross inland energy consumption fell to about 22%, a decline of 0.9% compared to 1985. The share of solid fuels increased in four Member States (United Kingdom, Portugal, Greece, and Ireland) but this was offset by a decline in the others, ranging from 1% in Germany to about 3% in France, Belgium and Luxembourg.

Share of solid fuels in gross primary energy consumption, by country

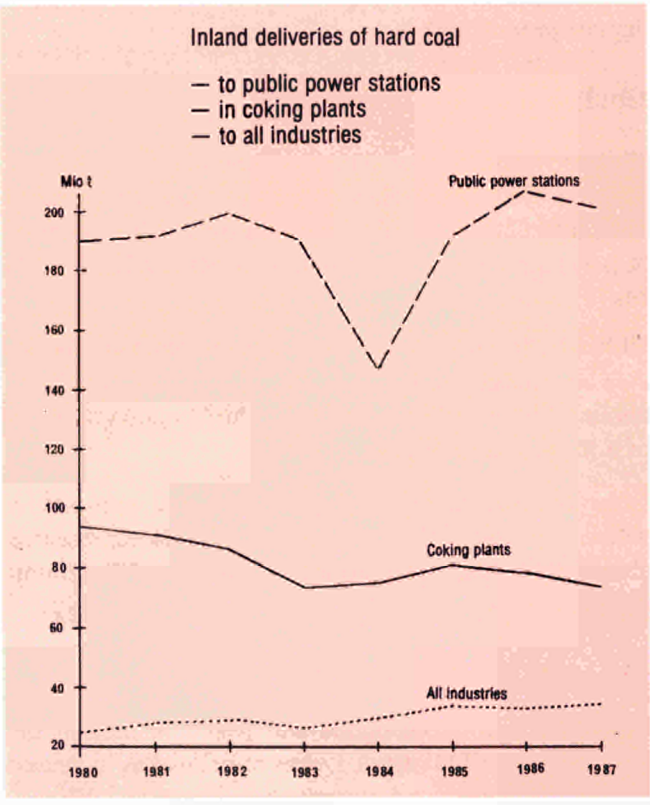
	1984	1985	1986
B	24.8	22.6	19.8
DK	34.4	39.5	38.8
D	32.5	30.9	30.1
E	26.1	27.8	25.4
F	13.2	12.6	10.0
EL	32.3	34.8	35.5
IRL	29.7	29.5	33.1
IT	10.8	11.1	9.8
L	47.3	45.5	42.6
NL	10.9	10.6	9.0
P	4.2	6.6	10.7
UK	24.3	30.8	32.4
EUR 12	22.1	23.1	22.2

The trends in consumption varied, however, as between the different solid fuels and in different sectors of use, with a decline in total hard coal consumption of less than 1%, an 8% decline in coke deliveries and an increase in deliveries of lignite and peat.

Hard coal use

Hard coal use declined by some 6% in general industry and the residential sector. The increased competition from oil, in combination with a falling dollar, were the main reason for the decline, particularly in the industrial sector and in the following Member States: Italy (-21%), United Kingdom (-23%), France (-24%) and the Netherlands (-50%). In this sector conversions to coal have nearly come to a halt.

On the other hand, hard coal consumed in electricity generation went up by 2% to 194 Mt. Although this is partially to be explained by the recovery after the miners' strike in the United Kingdom, long-term commitments of electricity utilities (particularly in the coal-producing Member States) to burn indigenous coal played an



important role in this result. Accounting for 63% of all hard coal consumed in the EC, the electricity sector remained by far the most important market for coal. This relatively satisfactory development in 1986 for the Community as a whole masks, however, different trends in individual Member States. Little variation was registered in Denmark, Greece, Italy and Luxembourg; an upward trend was recorded in Germany, Spain, Ireland, the Netherlands, Portugal and the UK; while in France and Belgium, due to further development of nuclear power, the downward trend continued.

Coke demand

Overall coke consumption, by contrast, declined by 8% from 63 to 58 Mt. This was due, firstly, to a 10% decrease in demand from the steel industry, where pig iron production fell by 7%, and where specific coke was reduced; secondly to a sharp fall in coke consumption in industry and in the domestic sector as a result of inter-fuel competition. The reduction occurred in all Member States (except Denmark) and ranged from a drop of 2% in the Netherlands to over 30% in Portugal. Coal input to coking plants fell only by 4% to a level of 78 Mt, affecting both indigenous and third country coal.

The depressed state of demand in this market sector is underlined by the increase in coke stocks of 56% to 6 Mt at year end 1986 (equivalent to about 40 calendar days of production).

Coal production

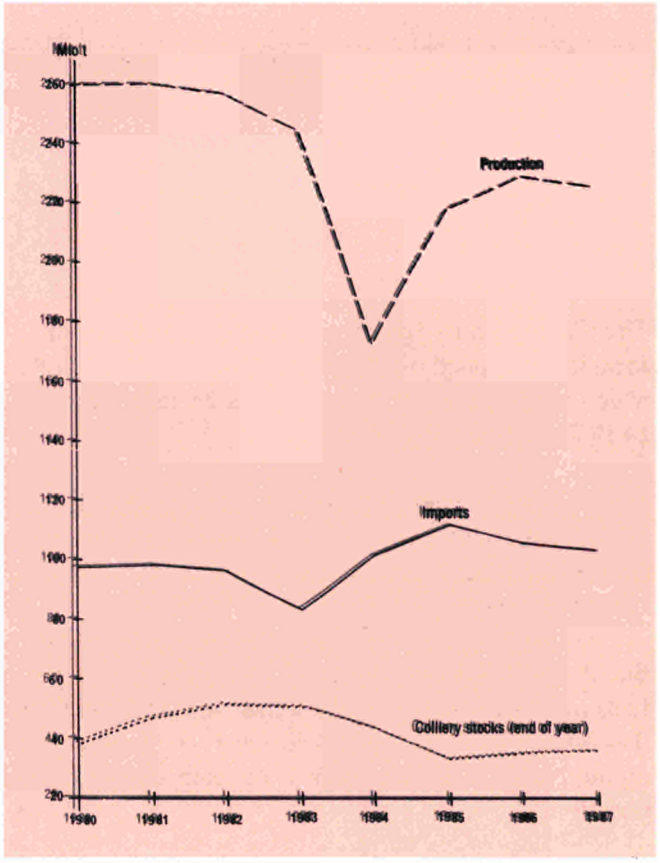
With the recovery of coal production in the UK (up by 15 Mt over the 1985 level, which more than compensated for the reduction in all other coal-producing Member States) output of coal increased by 10 Mt to a level of 234 Mt.

However, in view of the slight fall in demand, the increased production led to a rise in producer stocks of about 1 Mt, as well as a decline in third country supplies of 3 Mt (down to 95 Mt).

Total coal stocks held by producers and consumers, which stood at 107 Mt at year end 1986 represented about 118 days of consumption or 164 days of Community production.

Lignite and peat

Community-produced lignite and peat remained at the level of 1985 or 179 Mt; deliveries of briquettes increased by 6%; deliveries to power stations were up by 40%.



1987

Current indications point to a further decline in coal deliveries, perhaps even sharper than in 1986, as well as a decline in Community coal production. Coal consumption in coking plants could decline by over 5% and in the domestic sector by 15-20% compared to 1986. Only the effective consumption by power stations is likely to show an increase in 1987.

In contrast, some increase could be expected to occur in general industry as long as comparative prices do not evolve to coal's disadvantage.

This forecast is based on the analysis of the impact of various factors including the time-lagged effects of falling oil prices (which are expected to work through in 1987) as well as a further increase in nuclear capacity this year and next.

Since the beginning of this year, there has been increased downward pressure on coal prices in international markets and this is expected to continue given international

oversupply. This, together with the low level of the US dollar, will increase pressure on Community coal.

EC coal production is therefore estimated to be around 227 Mt, down by 7 Mt.

[1] "The market for solid fuels in the Community in 1986 and the outlook for 1987": report by the Commission, available shortly on request, announced in the *Official Journal of the European Communities*, C 207, 4.8.1987.

Community measures to ensure oil price transparency

In its Resolution of 13 February 1975 concerning measures to be implemented to achieve the Community energy policy objectives, the Council stated that a consumer price policy based on competition and the transparency of costs and prices was an essential component of the measures to be taken concerning oil.[1]

In 1977 the Commission adopted a Decision implementing the Council Directive regarding a Community procedure for information and consultation on the prices of crude oil and petroleum products in the Community.[2] The purpose of this procedure was to ensure the transparency of the costs and prices of petroleum products necessary for the satisfactory operation of the market and in particular for the free movement of goods within the Community.

At the end of 1979, in view of the considerable tension on the spot markets for petroleum products, the Commission decided to publish a weekly bulletin in order to increase the transparency of the prices charged net of tax and duty in all the Member States and in this way to help maintain fair conditions of competition on the market.

The Directive

The Directive calls upon the Member States to communicate to the Commission no later than 45 days after the end of each quarter aggregated data supplied by the oil companies.

The information communicated to the Commission concerns:

(a) *The crude oil supply cost*

Each Member State communicates data on the fob and cif prices and the volumes involved for each main type of crude oil imported during the previous quarter, and an overall supply cost for crude oil, including the oil produced and consumed in the Member State in question.

The Directive specifies that the figures supplied must cover at least 85% of the quantities imported; in practice they cover all imports.

(b) *The supply cost for imported petroleum products*

The information concerns the quantities and average cif prices for the main petroleum products imported (premium gasoline, regular gasoline, gas oil, naphtha, jet fuel, kerosene, and high-sulphur and low-sulphur heavy fuel oil).

(c) *The consumer prices of petroleum products*

The figures supplied concern the consumer prices in force on the 15th of each month. These prices are given both net and inclusive of duty and tax. They concern the main petroleum products, i.e. premium and regular gasoline, automotive gas oil, heating gas oil and industrial heavy fuel oil.

(d) *The inland market sales proceeds by product*

These figures correspond to the proceeds from the sale of petroleum products on the inland market, less rebates. The information includes the total ex-refinery netback per tonne of crude oil processed. This netback is the difference between the average proceeds and the cost of distribution.

To ensure that the information in question is supplied in a uniform manner, in a decision implementing the Directive[3] the Commission set out model questionnaires indicating how the data is to be presented.

On the basis of this information the Commission draws up a quarterly summary report which is analysed in conjunction with representatives of the national authorities and oil industry experts. On the basis of opinions expressed during this examination the Commission and the national authorities endeavour to improve the transparency and uniformity of the information supplied.

The oil bulletin[4]

The Commission started publishing a weekly consumer price bulletin in 1979. This bulletin, which has a wide circulation in the specialized press, indicates for each of the 12 Member States the prices of the main petroleum products (premium and regular gasoline, automotive gas oil, heating gas oil and high-sulphur heavy fuel oil) in national currency, USD and ECU (see tables below). These prices reflect the actual conditions on the various markets, i.e. they take account of the rebates generally granted. In addition, the bulletin publishes the monthly cif crude oil supply cost for the Community as a whole and the consumer prices for petroleum products in force

in the various Member States on the 15th of each month (figures obtained pursuant to Directive 76/491/EEC). These prices, which also relate to the five major products, are published in national currency and in USD.

The oil bulletin has undoubtedly helped to improve the transparency of prices and helped bring the prices net of duty and tax in the various Member States closer together, especially in the countries where there are no price controls. In addition, some of the countries where prices are controlled take the figures published in the bulletin as a basis for calculating their own prices.

[1] OJ C 153 of 9.7.1975, p. 8, Section 3(III)(1).
[2] Directive 76/491/EEC of 4.5.1976.
[3] Implementing Decision of 26.1.1977 (77/190/EEC).
[4] The bulletin can be obtained by telephoning Brussels (02) 235 35 75.

Weekly indicative price levels, taxes and duties excluded

Prices as at: 29.6.1987

Table 1 In national currencies	Premium gasoline 1000 L[1]	Regular gasoline 1000 L[1]	Automotive gas oil 1000 L[1]	Heating gas oil 1000 L[2]	Residual F.O. BSC t[3]
Belgium (BFR)	9 056	8 496	8 118	6 368	4 697
Denmark (DKR)	1 765	1 770 +	1 650	1 390	945
Germany (DM)	393	337	361	309	203
Greece (DR)	23 914	21 432	18 880	18 880	15 058
Spain (PTA)	29 025	26 430	26 117	21 900	14 181
France (FF)	1 240	1 280	1 270	1 195	725
Ireland (IRL)	201.03	193.59	196.94	135.95	116.81
Italy (LIT)	285 020	242 640	279 140	218 811	152 193
Luxembourg (LFR)	9 520	8 900	7 660	7 030	4 950
Netherlands (HFL)	490	494 *	426	361	269
Portugal (ESC)	31 053	28 346	28 526	-	20 913
United Kingdom (UKL)	136.92	129.97	141.32	113.67	84.04

Table 2 In USD	Premium gasoline 1000 L[1]	Regular gasoline 1000 L[1]	Automotive gas oil 1000 L[1]	Heating gas oil 1000 L[2]	Residual F.O. BSC t[3]
Belgium	238.90	224.12	214.15	167.99	123.91
Denmark	254.87	255.60	238.27	200.72	136.46
Germany	215.05	184.40	197.54	169.08	111.08
Greece	174.22	156.14	137.55	137.55	109.70
Spain	229.63	209.10	206.62	173.26	112.19
France	203.31	209.87	208.23	195.93	118.87
Ireland	295.02	284.11	289.02	199.52	171.43
Italy	215.11	183.12	210.67	165.14	114.86
Luxembourg	251.14	234.78	202.07	185.45	130.58
Netherlands	238.16	240.11	207.06	175.46	130.75
Portugal	216.85	197.95	199.20	-	146.04
United Kingdom	219.42	208.29	226.47	182.16	134.68
EEC					
(a) Average	216.75	195.77	208.47	176.00	121.69
(b) Average of all products			222.01		

Table 3 In ECU	Premium gasoline 1000 L[1]	Regular gasoline 1000 L[1]	Automotive gas oil 1000 L[1]	Heating gas oil 1000 L[2]	Residual F.O. BSC t[3]
Belgium	210.80	197.76	188.96	148.23	109.33
Denmark	224.90	225.53	210.24	177.11	120.41
Germany	189.75	162.72	174.30	149.20	98.02
Greece	153.73	137.78	121.37	121.37	96.80
Spain	202.62	184.50	182.32	152.88	99.00
France	179.40	185.19	183.74	172.89	104.89
Ireland	259.96	250.34	254.67	175.80	151.05
Italy	189.81	161.59	185.89	145.72	101.35
Luxembourg	221.60	207.17	178.30	163.64	115.22
Netherlands	210.15	211.87	182.70	154.83	115.37
Portugal	191.35	174.66	175.77	-	128.86
United Kingdom	193.55	183.72	199.77	160.68	118.80
EEC					
Average[4]	191.23	172.74	183.94	155.30	107.36

[1] Pump price.
[2] Prices for delivery of 2 000 to 5 000 litres. For Ireland this size of delivery occurs mainly in the industrial sector.
[3] Prices for offtakes of less than 2 000 tons per month or less than 24 000 tons per year (delivered consumer prices). For Ireland deliveries are in the range of 500 to 1 000 tons per month.
[4] The result of weighting the prices of the products concerned by the quantities consumed during 1986.
*Prices quoted refer to unleaded gasoline.
+Mixed gasoline, 96 octane.

Short-term energy outlook — European Community

*Our previous forecast (***Energy in Europe** *No 7) suggested that 1987 would be a year of readjustment after the major price changes of 1986. Assuming that the crude oil price would stabilize in the USD 15-17 (fob) per barrel range we argued that energy demand would grow only modestly (1-2%); that demand for some oil products (notably heating oil) would be met in part from the large consumer stocks accumulated in the first half of 1986, with the result that inland deliveries of oil products would be flat; but that demand for natural gas could be more buoyant (up by 2%) because of a significant improvement in its price relative to oil as the lagged effects of price indexation systems worked themselves through.*

The data now available for the first few months of 1987 tend in general to support the earlier assessment. Inland energy demand grew by 1.3% in the first quarter of 1987 compared with the first quarter of 1986, while inland oil demand fell by 3.6% (figures for EUR 12).

Estimates for the second quarter suggest an even larger fall in inland oil demand compared with the same period in 1986, principally because of a further significant drop in oil deliveries in Germany (where a large share of the stocks of heating oil were built up last year). This implies that there has been no further stocking of gas oil by consumers so far this year and that almost certainly some expected destocking did occur.

At the same time natural gas demand has been relatively buoyant, registering a 7% increase in inland demand. An important element here seems to have been the weather, which was considerably colder than in the corresponding quarter of 1986, reinforcing the expected effects of improved competitiveness. The consumption of solid fuels, on the other hand, was down.

OPEC member countries have been relatively successful in restraining crude oil production, and crude oil prices have held up firmly since the beginning of 1987 despite a generally weak market. The latest agreed OPEC quotas for the third and fourth quarters of 1987 (16.6 Mb/d), if they are adhered to, should make it possible to maintain relatively stable prices through to the end of the year, despite continuing weak demand world-wide, with fob prices fluctuating around USD 17-18 per barrel. This presupposes, of course, no significant change in the military and political situation in the Gulf.

With these factors and the latest forecasts of modest GDP growth in the Community (2.2%), our latest assessment is that energy and oil consumption in the Community **in 1987** *could be, if anything, even less buoyant than we previously expected. Overall energy demand could increase by no more than 0.5% with apparent oil demand falling marginally, demand for solid fuels also down, and natural gas and electricity alone continuing to register growth.*

At this stage the environment **for 1988** *is difficult to discern with much clarity. But our working hypothesis is that there will be little change in oil and energy prices (with crude oil prices still not exceeding an average of USD 18 per barrel) while GDP growth in the Community will register only a modest pick-up from the 1987 rate (the European Commission's Directorate-General for Economic and Financial Affairs is currently forecasting GDP growth of 2.3%). On that basis and assuming average weather conditions, energy demand seems unlikely to increase by much more than 1% unless there is a sharp slowdown in improvements in energy efficiency. Oil demand as a whole seems likely to grow only marginally above its expected 1987 level. But transport fuel demand will continue*

to rise, offsetting the expected declines in fuel-oil and heating oil requirements as natural gas demand continues a gentle upward path (+2%) in industry and the residential sectors. The use of solid fuels for electricity generation should be advantaged somewhat by some slowdown in the growth of additions to nuclear capacity. But even a growth of 2.5% in electricity demand would be unlikely to give a boost to solid fuels consumption in electricity sufficient to offset less satisfactory trends in other sectors.

The remainder of this article presents in more detail the Commission's Directorate-General for Energy's latest short-term forecast for the European Community.

Forecasting assumptions

EUR 12
% change over previous year

Macro-economic	1985	1986	1987	1988
GDP	2.4	2.5	2.2	2.3
Consumers' expenditure	2.3	3.7	3.1	2.8
Industrial production	3.3	2.0	2.2	2.1
Inflation	5.7	3.8	3.1	3.3
1 ECU = USD	0.76	0.98	1.14	1.18

Source: Directorate-General for Economic and Financial Affairs: *Economic Forecasts 1987-88*, April-May 1987, and STEM (Short-term energy model)

EUR 10

Energy variables				
Community oil production (Mb/d)	2.98	2.98	2.90	2.90
Average net nuclear capacity (GWe)	60.5	70	82	89.5
Degree days (average = 232)	237	220	232	232
Average Community crude oil import price (fob) USD	27.09	13.9	17	18
ECU	35.8	14.3	15	15

Energy prices

(i) Crude oil

Crude oil import prices into the Community hardened steadily in the first few months of 1987, following OPEC's decision in December 1986 to return to production quotas and to aim at a USD 18 per barrel reference price. After falling to USD 11 per barrel in the third quarter of 1986, the average cost of crude oil imports into the Community in the first quarter of 1987 was up to USD 16.5. Looked at on a monthly basis the change is even more striking, with crude oil prices rising from USD 10 in July 1986 to USD 17.5 in May 1987, with a steady rise in average prices month by month from the beginning of this year (see Table A).

European Community average crude oil import price (fob)

(Mb/d)

	USD	ECU	% of change on previous quarter (in ECU)
1985 Q1	27.31	39.9	+ 5.2
1985 Q2	27.27	37.6	— 5.8
1985 Q3	26.37	33.6	— 10.6
1985 Q4	27.27	32.1	— 4.5
Average 1985	27.09	35.8	
1986 Q1	20.2	21.9	— 32.1
1986 Q2	12.2	12.7	— 42.0
1986 Q3	10.4	10.3	— 18.9
1986 Q4	12.8	12.3	+ 19.4
Average 1986	13.9	14.3	
1987 Q1	16.5	14.7	+ 19.5
1987 Q2	17.5	15.2	+ 3.4
1987 Jan.	16.18	14.55	
1987 Febr.	16.76	14.84	
1987 Mar.	16.90	14.93	
1987 April	17.38	15.19	
1987 May	17.49	15.05	
1987 June	17.62	15.44	
Average 1987 Jan. - June	16.98	14.93	

Will this continue? The latest OPEC decision to hold total production to 16.6 Mb/d during the remainder of 1987 should help to prevent any significant fall in price this year, provided that discipline is maintained. But supply from non-OPEC producers seems likely to be slightly up this year compared with 1986. Moreover, worldwide demand increases are expected to be very modest (not much more than 1% or 25-30 Mtoe) which should rule out any significant demand side pressure on prices. The outlook is complicated, of course, by uncertainty about the behaviour of **primary stocks** (those held by the companies and by governments, as distinct from consumer-held stocks). So far this year, stocks have been drawn down more slowly than many observers expected. The stock draw in the first quarter of 1987 was on a par with that of the first quarter of 1986 and in the second quarter of 1987 there was some reconstitution of stocks, which remain higher than in the corresponding period for last year. Even if stocks for the remainder of the year stay a little higher than expected, this will be insufficient to tighten significantly the crude oil market.

Our projection for **1987** is based therefore on relatively stable prices (USD 17-18 fob to the end of the year,

which would mean an average for the year of about USD 17). Such a hypothesis presupposes, of course, that there is no further deterioration in the military and political situation in the Gulf. For **1988** the evolution of the crude oil price will depend (aside from unforeseeable political factors) on the maintenance of OPEC discipline (will they wish to and succeed in restraining production at 1987 levels?); on non-OPEC supplies (will the decline in US production be halted or reversed; will Soviet oil exports be sustained at the new high levels recorded in the first half of 1987?); on stock movements (is there any reason to suppose that companies will choose to build up stocks at a time when the price is broadly stable?); and on consumer demand (unlikely to break out of the 1-2% range world-wide given sluggish world economic growth). Current judgment about these market factors, taken together, would not seem to justify much hardening in average prices next year. Our forecast for 1988 is based therefore on prices fluctuating in the range of USD 17-19 fob (USD 18-20 cif), with an average price of USD 18 fob. This would mean broadly stable import prices in terms of European currencies because of an expected further fall in the value of the dollar.

(ii) Oil products

The first table below shows the monthly evolution of Rotterdam spot market values for products. These broadly parallel the trends in crude oil prices, helping to sustain the latter.

In general, prices to the consumer have also firmed (see the second table below).

However, the trends have varied across the Community. In a number of countries (e.g. Germany, Belgium) oil product taxes have remained broadly unchanged this year and prices to the final consumer have followed the trends of world crude prices. In others (notably Greece, Spain) an anti-cyclical taxation policy has been followed, and earlier increases in excise duties have been offset in part by sharp reductions in the second quarter of 1987 as pre-tax prices moved up. In Denmark, on the other

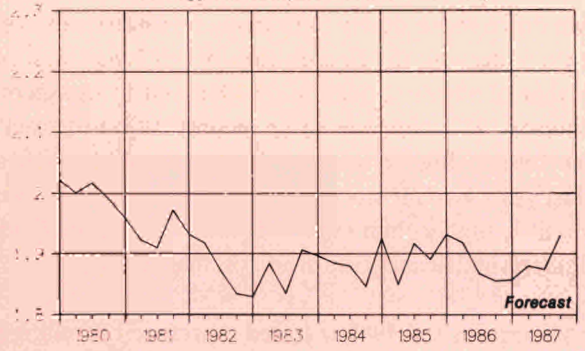
Approximate average monthly spot-market quotations (USD/tonne) Barges (fob) Rotterdam

	Motor gasoline (premium)	EEC gasoil	RFO (1% S)
August 1986	145	122	75
September 1986	157	122	86
October 1986	145	117	80
November 1986	136	123	89
December 1986	141	129	98
January 1987	177	165	130
February 1987	166	144	106
March 1987	182	146	107
April 1987	193	147	112
May 1987	196	154	110
June 1987	198	156	109
July 1987	197	166	117
August 1987	178	161	113

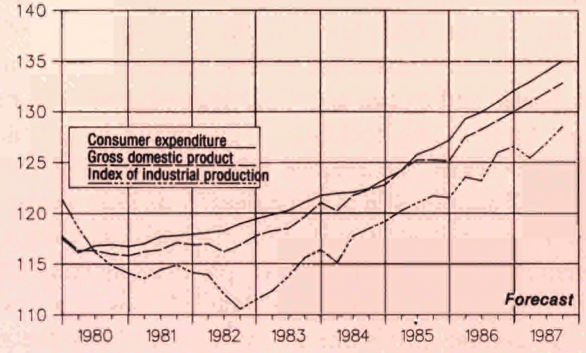
Average estimated European Community oil product prices (all taxes included) % change on previous quarter

	Mogas	Diesel oil	Heating oil	RFO (3.5%S) (ex-VAT)
1985 Q1	+ 0.0	+ 4.2	+ 9.5	+ 9.3
1985 Q2	+ 4.9	+ 0.4	— 4.7	—16.0
1985 Q3	— 2.6	— 4.4	— 7.0	—14.4
1985 Q4	— 2.6	+ 1.8	+ 1.9	— 5.1
1985/4	+ 4.6	+ 7.1	+ 7.1	— 4.5
1986 Q1	— 9.4	—10.8	—16.3	—20.7
1986 Q2	— 5.8	— 8.3	—15.0	—31.6
1986 Q3	— 1.4	— 8.4	—18.0	— 9.3
1986 Q4	— 2.2	— 3.8	+ 1.8	+10.9
1986/3	—16.2	—21.1	—34.2	—50.0
1987 Q1	+ 2.1	+ 6.6	+11.1	+12.1
1987 Q2	+ 1.8	— 0.1	— 4.6	+ 3.4

EUR 10: Quarterly energy ratio trend (volume of seasonally adjusted inland energy consumption/real GDP index)



EUR 10: Quarterly macroeconomic indicators (1975 = 100)



hand, the new high levels of excise duty introduced last year have been maintained, with oil product prices to the final consumer in January 1987 actually **above** those of January 1986.

For the remainder of 1987 we do not foresee any major change in these trends, with prices to the final consumer rising a little in most countries broadly in line with the crude oil price. Our projection for 1988 is also based on unchanged taxation provisions.

(iii) Natural gas

The table below shows how the price of imported gas has fallen steadily from the first quarter of 1986, as the falls in crude oil prices and in the prices of oil products (fuel oil and gas oil) have worked gradually through the indexation mechanisms in gas pricing contracts.

Index of average price of imported natural gas into the Community (1985 Q 4 = 100)

1985 Q2	100	1986 Q4	56
1986 Q1	93	1987 Q1	46
1986 Q2	86	1987 Q2	47
1986 Q3	73	1987 Q3	

Gas prices are now once again significantly more competitive than those of fuel oil. Unless there is a significant weakening in RFO and gas oil prices during the remainder of 1987 gas should be in a favourable competitive position for the rest of the year and beyond.

European Community — Average relative price index of residual fuel oil to imported natural gas (1985 Q4 = 100)

1985 Q4	100	1986 Q4	98
1986 Q1	85	1987 Q1	132
1986 Q2	63	1987 Q2	134
1986 Q3	67	1987 Q3	

(iv) Coal

Average Community import prices of both steam and coking coal fell steadily throughout 1986. And prices have **not** firmed in parallel to the movement in crude oil and oil products. Prices seem likely to remain low given the oversupply on the international coal market, depressed steel demand world-wide and modest increases in the electricity sector.

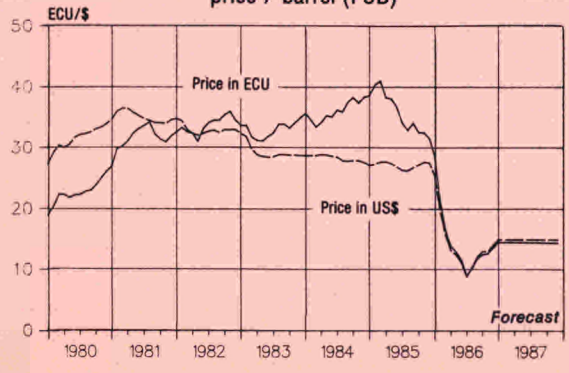
European Community
Average cif imported steam and coking coal prices (price per tonne of coal equivalent)

	Steam coal		Coking coal	
	USD	ECU	USD	ECU
1986 Q1	50.2	54.4	58.3	63.0
1986 Q2	49.4	51.5	54.8	57.1
1986 Q3	47.8	47.2	53.8	53.1
1986 Q4	45.8	44.1	53.5	51.6
1987 Q1	43.0*	38.2	53.3	47.4
1987 Q2			50.1	43.6
1987 Q3			49.8	43.3

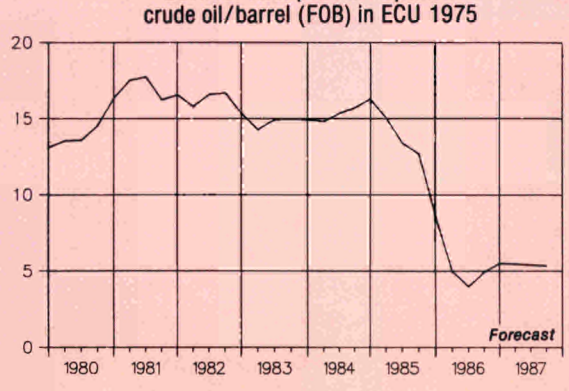
* Estimate

In the box below we summarize some of the recent trends in real fuel price relativities.

EUR 10: Average crude oil import price / barrel (FOB)



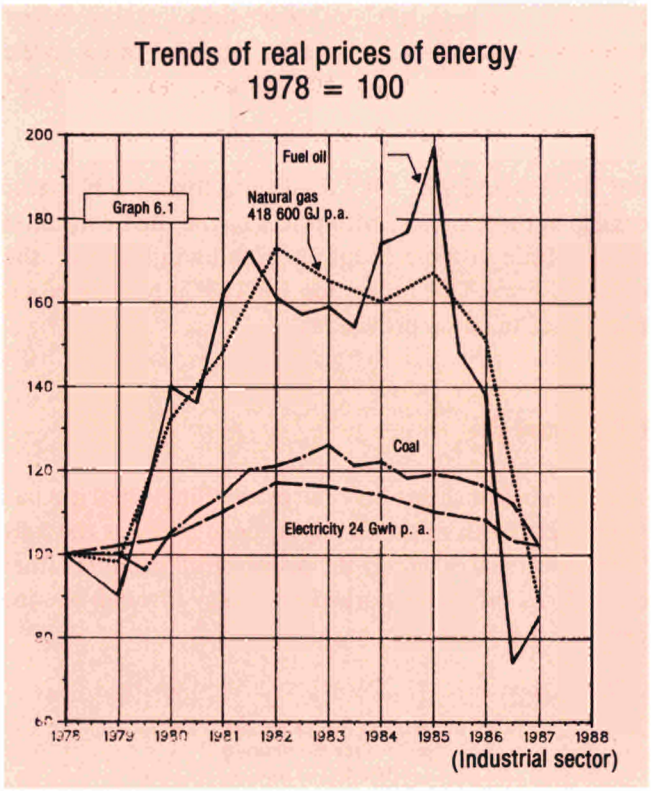
EUR 10: Real price of imported crude oil/barrel (FOB) in ECU 1975



Real prices to the final consumer

The latest available data on prices of energy to the final consumer are analysed in detail in the forthcoming edition of the Commission's *Bulletin of energy prices*. This shows that after the price changes in 1986 and subsequent readjustments, the gaps between the prices of **oil products, natural gas** and **coal** have now narrowed considerably when measured on the basis of thermal equivalence (falling into the range of 3-4 ECU per GJ in industry and 7-8 ECU per GJ in the domestic sector). And in real terms (after taking account of inflation) prices for each of the fuels are little above their levels just before the second oil shock 7 years ago.

Real electricity prices on average have been on a downward trend for 3-4 years, notably in the industrial sector. This trend has been most clear in those countries where a large share of electricity continues to be generated from oil and gas (which have registered the sharpest real price falls).



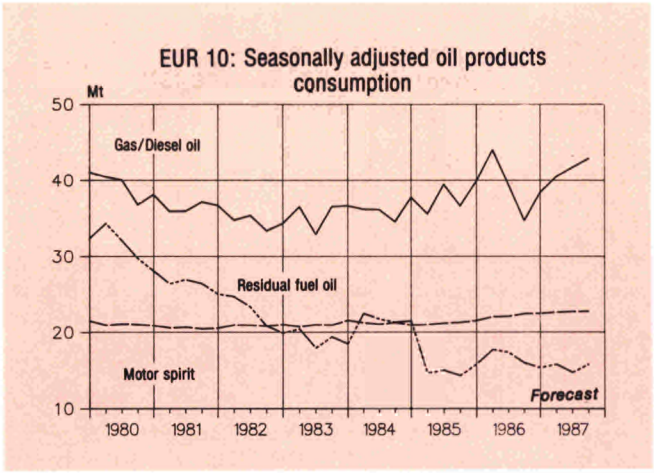
The energy balance

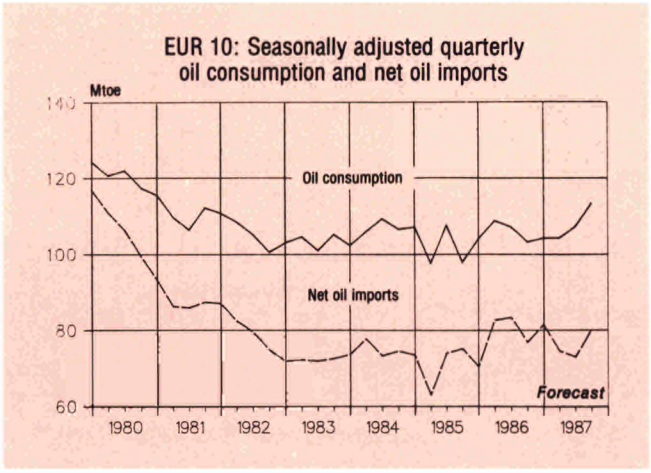
(i) Overall demand

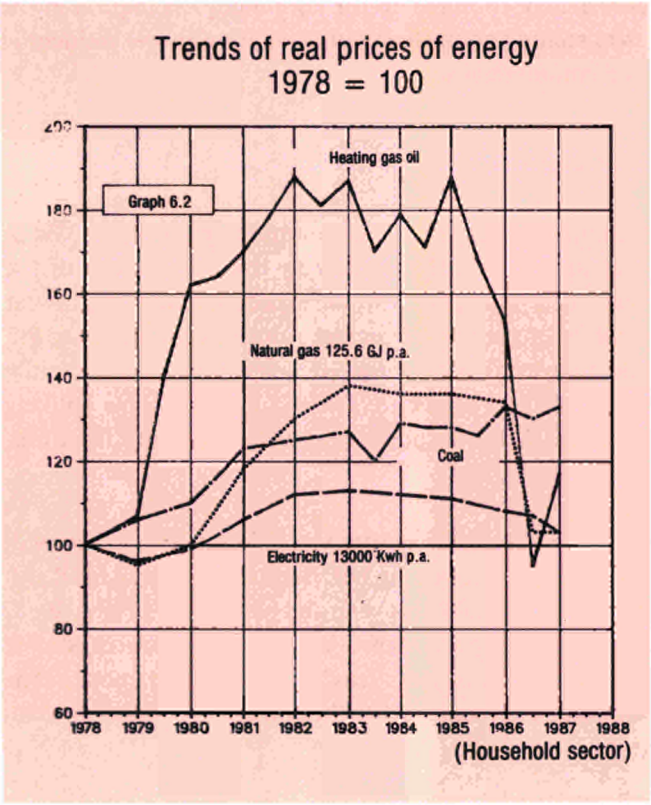
Total inland energy demand in 1986 grew by less than 1%, with electricity demand growing by 2.3%, oil by 1.7% (including the constitution of consumer stocks of heating oil), natural gas by around 1.3%, and solid fuels consumption falling by some 3.4%.

This year energy prices are likely to be much more stable than in 1986 and GDP growth more sluggish. Against that background overall energy demand **in 1987** is most unlikely to grow by more than 1% and our current assessment is that the outturn could be lower still (+0.5%).

This assessment is supported by data available on trends in the first few months of 1987. In the first quarter of 1987 there was an increase in energy demand of some







1.3% (EUR 12) and 0.5% (EUR 10) compared with the same quarter in 1986. Natural gas registered a major gain of over 7%. Part of this increase can be explained by the weather (which was on average some 5% colder than during the first quarter 1986). Even then the overall increase in energy demand was **only half** that registered the previous year (energy demand grew by 2.5% between the first quarter of 1985 and the first quarter of 1986) and lower still than the rise between the first quarter of 1984 and the first quarter of 1985 (3.4%).

EUR 10 primary energy consumption
% change on same quarter of previous years

	1986 Q3	1986 Q4	1987 Q1	1987 Q1[1]
Solid fuels	— 7.7	— 12.4	— 3.0	— 0.6
Oil	— 0.4	+ 0.5	— 4.4	— 3.6
Natural gas	+ 9.3	— 3.0	+ 7.4	+ 7.3
Nuclear	+ 4.1	+ 0.5	+ 8.9	+ 10.2
Total energy	— 0.4	— 3.3	+ 0.5	— 1.3

[1] Figures for EUR 12.

Provisional data for the second quarter of 1987 also tend to confirm the expectation of modest demand growth. Oil demand, which fell by around 3.6% in the first quarter of 1987 (compared with the first quarter of 1986) appears to have fallen at least as sharply thereafter, led by a sharp decrease in German oil deliveries, notably for heating oil (in the second quarter of 1986 deliveries of heating oil were abnormally high because of consumer stocking).

The tables following this article also give our first tentative assessment of the outturn for **1988**, which can be summarized essentially as 'more of the same'. GDP growth is expected to be only slightly above that for 1987 and energy prices to be more or less stable. Therefore, unless there is a significant fall-off in energy efficiency (there could be some negative effects from investment foregone in 1986) we do not see any reason why overall primary energy demand should grow by more than 1-1.5% in 1988.

While overall demand growth is expected to be modest this year and next, it is worth noting, however, that real growth in inland consumption of energy has been registered now in **every year since 1982** (at the bottom of the recession). For EUR 10 the top of the range in the current forecast for inland energy demand in 1988 (973 Mtoe) is 20 Mtoe (or 2%) short of the projection for the Community for **1990** that can be derived from the latest medium-term projections made in Member States. Similarly, our estimate for EUR 12 in 1988 is 30 Mtoe off the upper bound of the corresponding 1990 projection:

Short- and medium-term projections — inland primary energy demand

Mtoe

	This forecast		Member States	Commission study *Energy 2000*[1]
	1987	1988	1990	1990
EUR 10	955	963- 973	994	1 034
EUR 12	1 037	1 048- 1 059	1 089	1 129

[1] Based on higher GDP growth assumptions.
Sources: Submissions for Member States and *Energy 2000: a reference projection and alternative outlooks for the European Community and the World to the year 2000*, eds Guilmot, McGlue, Vallete, Walterloos, Cambridge University Press, Cambridge and Economica, Paris.

(ii) Oil demand

Bearing in mind the build-up of consumer stocks of gas oil for heating last year, and the indications from the second quarter of 1987 that this has not been repeated, oil demand seems likely to fall slightly rather than to rise in **1987** overall. Demand for gas oils for heating seems likely to be down and continuing growth in diesel demand is unlikely to offset the trends. We expect motor gasoline consumption to maintain some upward growth (perhaps by 2%), but heavy fuel oil demand will be down following the increased competitiveness of natural gas

EUR 10% change on same quarter of previous year

	Total oil	Mogas	Gas oils	RFO	Other products
1986 Q1	— 3.7	+ 3.1	+ 5.7	— 27.8	— 0.5
1986 Q2	+ 12.6	+ 5.0	+ 24.2	+ 19.2	— 0.3
1986 Q3	+ 4.6	+ 4.4	— 0.3	+ 16.2	+ 5.9
1986 Q4	+ 1.2	+ 5.4	— 4.8	+ 3.6	+ 6.2
1987 Q1	— 0.8	+ 2.0	— 5.1	+ 0.1	+ 5.2
1987 Q2	— 5.8	+ 2.0	— 13.2	— 8.8	+ 1.2

(even if RFO continues to remain competitive against coal).

(iii) **Solid fuels**

There has been little change in the rather gloomy outlook for consumption of solid fuels since the assessment in *Energy in Europe No 7*. Deliveries of coal overall are expected to fall by a further 3% in 1987, with deliveries to coking plants down by 5% (because of the depressed state of the steel industry) and those to power stations down by 2% (because of increased nuclear capacity, relatively modest growth rates of electricity demand and high levels of power station stocks).

As a result of expansion of consumption in Greece, however, lignite could fare rather better with increased utilization in the electricity industry.

In **1988** hard coal could be less hard hit because fewer new nuclear plants will be coming on stream. But the perhaps better prospects in the electricity sector will be insufficient to make up for continuing stagnation in the steel sector and declining consumption in the residential and commercial sectors.

(iv) **Electricity**

Community electricity consumption grew by 2.3% in 1986 and tailed off very sharply towards the end of the year. This year and next we expect demand to grow at most by a similar percentage, unless economic growth and industrial production pick up much more rapidly than currently projected. In 1988 growth seems unlikely to exceed 2.5% on present expectations about the Community economy.

The share of electricity derived from nuclear power will continue to increase as net nuclear capacity (EUR 10) goes above 80 GW this year and close to 90 GW in 1988. The rate of growth, however, will be somewhat slower than in previous years leaving coal a little more scope than in the recent past to help meet base-load production.

(v) **Net imports**

The Community's net import requirements are likely to fall in 1987 from last year's relatively high levels. In EUR 10 both oil and coal imports will be down, and only natural gas will be up a little. The share of net imports in primary energy demand should therefore fall to less than 42% and net oil imports to around 30% of the total.

Table 1 — Primary energy balance for the European Community

(Mtoe)

	1980	1981	1982	1983	1984	1985	1986	1987[2]	1988[3]
Primary production									
Solid fuels	186.5	186.8	183.8	175.7	131.8	157.9	163.8	157	155-158
Oil	91.5	101.7	115.1	131.4	144.2	149.0	146.9	145	140-145
Natural gas	129.4	125.5	116.1	119.9	119.2	126.5	123.5	120	120-122
Nuclear	40.5	54.7	61.5	74.5	95.6	116.4	123.2	135	142-145
Hydro	12.6	12.8	12.6	12.5	12.2	11.8	12.0	12	12
Total	460.6	481.5	489.1	514.0	503.0	561.6	569.5	569	568-584
Net imports									
Hard coal	48.9	44.2	46.1	38.4	51.9	56.0	52.8	50	48-50
Oil	435.3	354.6	325.1	289.6	300.3	286.4	307.7	291	296-306
Natural gas	43.5	46.2	45.8	50.1	57.9	59.3	64.3	70	68-70
Electricity	1.2	1.9	1.7	1.9	1.3	1.1	1.2	—	—
Total	528.9	446.8	418.7	379.9	411.3	402.8	426.0	411	412-426
Change in stocks									
Hard coal/coke	11.0	8.9	10.6	1.8	- 16.5	- 4.0	6.0	2	—
Oil	15.2	- 17.3	- 11.7	- 18.0	- 3.3	- 0.8	7.7	-5	—
Natural gas	3.9	6.7	3.4	4.9	2.9	3.6	3.4	2	—
Bunkers	23.8	25.9	24.2	22.3	21.2	23.3	26.3	26	26
Estimated gross inland consumption									
Solid fuels	224.4	222.0	219.4	212.3	200.2	218.0	210.6	205	203-205
Oil	487.8	447.6	427.7	416.6	426.5	412.9	420.1	415	415-420
Natural gas	169.0	164.9	158.5	165.1	174.3	182.1	184.5	188	190-191
Nuclear	40.5	54.7	61.5	74.5	95.6	116.4	123.2	135	142-145
Hydro	12.6	12.8	12.6	12.5	12.2	11.8	12.0	12	12
Total	935.6	904.0	881.3	882.9	910.0	942.4	951.6	955	936-973
Net imports as % of consumption[1]									
Hard coal	21.8	19.9	21.0	18.1	25.9	25.7	25.1	27	26-27
Oil	85.1	74.9	72.0	66.0	67.1	65.7	68.9	66	67-68
Natural gas	25.7	28.0	28.9	30.3	33.2	32.6	34.9	37	36-37
Total	55.1	48.1	46.2	42.0	44.2	41.7	43.5	42	42-44

[1] Net imports/(gross inland consumption + bunkers). [2] Provisional. [3] Forecast.

Table 2 — Quarterly energy consumption in the European Community

(Mtoe)

	1986				1987[1]			
	I	II	III	IV	I	II	III	IV
Estimated gross inland consumption								
Solid fuels	62.2	49.8	45.3	53.2	58.0	46	44	57
Oil	111.1	105.1	101.2	103.7	105.4	98	103	109
Natural gas	66.6	36.3	28.9	52.4	71.5	38	29	49
Nuclear	34.7	28.0	27.1	33.5	36.7	32	32	34
Hydro	2.7	4.0	2.9	2.4	2.8	3	3	3
Total	177.5	222.9	205.8	245.2	274.4	217	211	251

[1] Forecast.

Table 3 — Hydrocarbons: supply and disposal in the European Community

	1980	1981	1982	1983	1984	1985	1986	1987[3]	1988[4]
1. Oil (Mt)									
Primary production	90.6	100.7	113.9	130.1	142.7	147.6	145.4	144	140-145
Change in stocks[1]	15.1	- 17.2	- 11.6	- 17.9	- 3.3	- 0.8	7.6	- 6	—
Net imports[1]	433.0	353.0	323.7	288.4	299.0	285.4	306.7	292	297-307
Bunkers	24.5	26.8	25.0	23.0	21.9	24.1	27.7	27	27
Apparent consumption	484.0	444.1	424.3	413.3	423.2	409.6	416.7	417	415-420
Inland deliveries:									
Motor gasoline	84.5	82.6	83.3	83.7	85.2	84.5	88.3	90	91-92
Gas/diesel oil	158.6	147.5	140.3	140.4	143.3	149.1	157.2	153	151-153
Heavy fuel oil	128.0	108.1	93.6	77.8	83.3	66.6	65.2	65	64-65
Other products	85.0	80.4	80.5	85.4	86.5	87.1	89.1	87	86-87
Total	456.2	418.6	397.8	387.3	398.2	387.3	399.8	394	392-397
Power stations:									
Consumption	53.9	44.7	40.0	31.2	41.2	31.6	27.5	24	24
Change in stocks	- 0.4	0.6	- 1.4	- 2.7	- 0.1	- 1.2	1.6	—	—
2. Natural gas (Mtoe)									
Primary production	129.4	125.5	116.1	119.9	119.2	126.5	123.5	120.	120-122
Imports[2]	43.5	46.2	45.8	50.1	57.9	59.3	64.3	70	68-70
Apparent consumption	169.0	164.9	158.5	165.1	174.3	182.1	184.5	189	190-191
of which:									
in power stations	20.3	16.9	16.6	18.8	20.6	18.0	17.0	17	16

[1] Crude oil and petroleum products.
[2] Imports from third-party countries.
[3] Provisional.
[4] Forecast.

Table 4 — Solid fuels: Supply and disposal in the European Community

	1980	1981	1982	1983	1984	1985	1986	1987[1]
1. Hard coal (Mt)								
Primary production	253.6	252.2	248.4	235.2	161.9	205.9	217.1	210.0
Change in stocks								
Collieries	10.7	8.9	4.2	0.5	- 8.3	- 10.4	- 0.3	- 1.5
Power plants	6.7	6.2	9.5	0.9	- 13.6	8.8	8.6	—
Net imports	74.2	66.5	70.0	57.0	78.9	86.5	81.2	82.0
Apparent consumption	310.3	303.6	304.6	290.8	262.7	294.0	290.1	294.0
Deliveries to:								
Power plants	179.2	176.5	184.0	175.8	131.9	172.9	177.6	178.1
Coking plants	88.4	85.2	80.1	69.7	69.8	76.3	73.3	67.4
All industries	22.7	24.0	24.5	25.4	26.1	29.1	29.1	28.8
Households	18.0	16.0	16.5	15.9	14.5	17.3	17.1	17.5
Total	308.4	301.7	305.2	286.8	242.2	295.6	297.1	291.8
2. Hard coke (Mt)								
Coking plants								
Production	66.6	64.2	60.2	53.5	52.8	57.1	54.9	50.1
Change in stocks	0.8	- 0.1	3.8	1.4	- 5.3	- 3.9	1.9	—
Deliveries to the iron and steel industry	54.3	52.6	46.3	41.8	48.5	49.8	44.5	42.2
3. Lignite								
Production (Mt)	157.0	162.4	159.3	158.7	162.0	159.2	154.6	165.0
Consumption in power stations (Mtoe)	26.2	27.6	26.6	27.3	27.0	25.7	23.7	25.0

[1] Provisional.

Table 5 — Electricity: Supply, disposal and generating structure in the European Community

	1980	1981	1982	1983	1984	1985	1986	1987[2]	1988[3]
Electrical power (TWh)									
Total generation	1 277.6	1 274.6	1 271.4	1 299.8	1 360.7	1 425.8	1 456.2	1490	1527
Total net production	1 208.7	1 206.1	1 202.9	1 229.1	1 286.7	1 347.3	1 377.2	1410	1445
of which:									
Hydroelectrical	146.1	149.1	146.1	144.8	141.5	137.7	139.4	140	140
Nuclear	149.4	201.7	226.9	275.0	352.8	429.4	454.8	506	535-540
Conventional thermal	913.1	855.2	830.0	809.3	792.4	780.2	783.0	764	765-770
Gross inland consumption	1 291.7	1 296.8	1 290.8	1 321.6	1 375.3	1 438.5	1 469.8	1504	1538
Available for internal market	1 213.9	1 217.4	1 212.0	1 237.9	1 287.5	1 343.7	1 375.0	1407	1440
Input to thermal power stations[1] (Mtoe)									
Hard coal	92.9	91.9	94.7	96.1	80.8	90.9	95.3	94	95-96
Lignite	26.2	27.6	26.6	27.3	27.0	25.7	23.7	25	26
Petroleum products	51.7	43.0	38.4	29.9	39.6	30.3	26.4	24	24
Natural gas	20.3	16.9	16.6	18.8	20.6	18.0	17.0	17	16
Derived gas	1.7	1.8	1.5	1.3	1.5	1.5	1.4	1.4	1.4
Total	193.7	182.2	178.2	174.0	171.7	167.7	165.5	162	162-163
Net nuclear capacity (GW)	26.7	34.4	40.2	43.8	50.7	60.5	70.5	81.8	89.5

[1] Conventional thermal plants in the public supply system.
[2] Provisional.
[3] Forecast.

Community news

Energy Council — 2 June 1987

The Energy Council met on 2 June 1987 in Luxembourg. It was chaired by Mr Philippe Maystadt, Vice Prime Minister and Minister for Economic Affairs (Belgium). The Commission was represented by Mr Nic Mosar, Commissioner for Energy.

The current situation and outlook on the energy market was reviewed by the Ministers on the basis of an analysis prepared by the Commission Services. Generally, the feeling of the Ministers was that, while the short-time energy outlook was relatively favourable, there were a number of uncertainties such as the outlook for oil demand both inside and outside the EC, the situation in the Middle East, etc., all of which could effect the EC's long-term energy security. The Commission will be examining these areas of uncertainty in greater detail. Some aspects of this further analysis will be incorporated into the review of Member States' energy policies which is being undertaken this autumn and which it is hoped will be presented to the Council early in 1988.

One of the major areas of uncertainty about the future is the outlook for energy efficiency. The evidence available to the Commission suggests that there may be a slowing down in the rate of improvement in energy efficiency. This is a cause for concern. At the Energy Council in November 1986, the Ministers adopted a resolution designed to give renewed impetus to this policy area. As part of the follow-up to that resolution, the Commission has produced a paper identifying a number of instruments which could help to ensure the continuity of energy efficiency improvements. This was discussed on 2 June by the Ministers. Specific aspects (such as third-party financing, energy efficiency in buildings, etc.) will be discussed in more detail at future meetings.

There was an important first discussion on the role that the energy sector could play in achieving a properly functioning internal Community market by the end of 1992. It is clear that energy has an important role to play in this regard. Commissioner Mosar's explanation to the Ministers of the Commission's suggested approach to this issue received a very positive reception. As a first step the Commission will, in consultation with Member States, draw up a list of the obstacles to an internal market that exist in the energy area. It is hoped to have this list ready in early 1988. The Commission would then go on to bring forward specific proposals for the removal of these barriers.

The Council had a detailed discussion on natural gas on the basis of a Commission Communication. The conclusions adopted by the Council on natural gas represent a landmark in the consideration of this topic at Community level. This is the first comprehensive statement on natural gas made by the Council and it embraces such areas as security of supply, interconnections and the need for convergence in approach to natural gas policy.

Following on from their discussions at the November 1986 Council, the Ministers reviewed the state of play of the various aspects of the post-Chernobyl follow-up which are under consideration at other Councils, notably the General Affairs Council. The importance of concluding the debate on these issues was stressed by the Ministers.

The Council also considered the regular report by the Commission Services on the outlook for the refining industry and oil product trade, in addition to a new report on the effect of differing environmental regulations in Member States on the refining industry. This latter issue has been referred to the Energy Working Group for further examination.

European Parliament

At the end of May, the Committee on Energy, Research and Technology met with the Portuguese authorities in Lisbon and had a series of exchanges of views with the Minister for Industry and officials directly responsible for energy policy. Mr Maniatopoulos, Director-General for Energy, also participated in these discussions. Parliament's representatives, while not taking a position on the question of the future development of nuclear power in Portugal — a matter which will be decided by the Portuguese authorities over the next few years — insisted that Portugal be given priority status in participation in Community research programmes and demonstration projects so that as much Community aid as possible be provided for the development of alternative energy sources.

At its July part-session, the European Parliament voted on Mr Ippolito's (Italy, LDR) report on the dangers of the **privatization of nuclear energy**. This report points out the heavy responsibility of public authorities in the introduction of nuclear energy and called on the Commission to draw up a directive aimed at subjecting the building and running of nuclear power stations and of in-

dustrial activities involved in the fuel cycle to the strictest possible supervision.

In the course of his statement to the Parliament, Mr Nic Mosar, the Commissioner for Energy, made the following remarks on this subject:

'The main instrument available to the Commission is Chapter III of the Euratom Treaty. In practical terms, the Council Directive laying down the basic standards for protection against the dangers of ionizing radiation already acknowledges that the health protection of the general public necessitates arrangements for monitoring inspections carried out by the public authorities in the Member States. Where the technological and industrial aspects are concerned, back in 1975 the Council recognized that appropriate Community action was needed in order to take account of the consequences of ionizing radiation on health and the environment.

In its Resolution the Council also considered that the national authorities, the energy producers and the designers could benefit from a harmonized approach at Community level. The Commission has not remained idle. It organizes cooperation between the national authorities responsible for approving nuclear installations and administers the mutual information system. It should not be imagined that this is purely a symbolic task, though much remains to be done. In April the Commission sent Parliament and the Council a progress report on the implementation of the 1975 Resolution and on new measures to be taken. The recommendations made in the report go further than the mere continuation of the gradual process of harmonizing technical criteria, since the Commission proposes an overall approach which is more in line with the post-Chernobyl situation. The strategy advocated by the Commission does not call for the establishment of new legal instruments and can be implemented with the existing structures and cooperation mechanisms with a view to achieving satisfactory practical results within a reasonable period of time.'

At the same session, a report in the name of the Chairman of the Committee, Mr Poniatowski (France, LDR) on the **development of fast-breeder reactors** was sent back to Committee at the request of Mr Poniatowski. Members of Parliament felt that the recent incidents at the Superphénix at Creys-Malville necessitated further study and that the report should be updated to take account of these developments. The Committee is asking the Commission to provide a report on recent incidents and to take account of them in its projections for future developments.

On the subject of Mr Poniatowski's report, Mr Mosar made the following remarks:

'What has been achieved in the European Community is undoubtedly the result of initiatives at national level, but it is also to a very large extent the end-product of considerable cooperation which has developed over the many years, in particular within the framework of the Community or with its support. Given the present technological challenges in the world, should the Community, as certain groups in the European Parliament would like, abandon this advanced technology in which it has a lead over its main competitors? The recent incidents concerning Superphénix should not allow us to forget, as emphasized in the Commission's Illustrative Nuclear Programme, that the commercial development of fast breeder reactors will turn nuclear energy into virtually a renewable source of energy.

Fast-breeder reactors are beneficial not only in terms of the Community's security of supply in relation to imported oil, one of our main concerns, but also in relation to uranium imports. However, steps must be taken to ensure that fast-breeders are competitive and safe. Studies carried out for the Commission indicate that the objective of fast-breeder reactors being competitive with light-water reactors by the year 2010 is a realistic one. Moreover, that is when a start will be made on renewing the nuclear electricity capacity and a new market will be created for nuclear power stations. Where safety is concerned, an area which is primarily the responsibility of the individual Member States, allow me to emphasize, however, that in its recent Communication on the technological problems of nuclear safety the Commission undertook to continue to help bring about a complete range of criteria, codes of conduct, quotas and standards for fast-breeder reactors. It will very shortly be publishing its first report on this subject.'

The Committee, at the beginning of December (1-2 December 1987), is organizing a public hearing on the future of European Community coal policy. The rapporteur, Mr West (United Kingdom, S), suggests that this hearing concentrate on the market prospects for coal, the application of new technologies to coal and on the environmental questions related to coal production and combustion. The hearing will be open to the public.

The European Parliament's **Scientific and Technology Option Assessment (STOA)** project is now underway. One of the first studies being commissioned concerns the future of thermonuclear fusion. Further details on that study and the project itself can be obtained from the secretariat of the Committee on Energy, Research and Technology (administrator responsible: Mr Holdsworth, Tel: Luxembourg 4300 2511).

Among items coming up for examination in the next few months are Mrs Bloch von Blottnitz's (Federal Republic of Germany, ARC) report on the nominating of a year for alternative energies; Mr Metten's (Netherlands, S) report on the revision of the thermonuclear fusion multi-annual research programme and Mr Gauthier's (France, RDE) report on the multi-annual research programme on non-nuclear energy.

Economic and Social Committee

Section for Energy, Nuclear Questions and Research

Sharing the Commission's analysis of the Chernobyl nuclear accident, at its February 1987 plenary session the Economic and Social Committee approved the idea of setting up a **Community system of rapid exchange of information in cases of unusually high levels of radioactivity or of a nuclear accident** (rapporteur: Mr Saïu — France — Workers' Group).

In accordance with Article 31 of the Euratom Treaty, the Economic and Social Committee's Opinion will accompany the Commission's proposal for a Council Decision.

However, the Committee takes the view that this Community system of rapid exchange of information is only a first step and that its effectiveness should be substantially increased. It suggests, in this connection, that detailed consideration should be given to the matter, and where necessary steps or decisions should be taken, e.g. concerning the consistency of information, and how to present it and put it into the system, information for the public and preventive training/information, including advice on how to behave in a situation such as that resulting from Chernobyl.

The Committee considers that the Community system of rapid exchange of information should rapidly be supplemented by a mutual assistance arrangement in the event of a nuclear accident or radiological emergency.

The Committee also makes some comments about the draft proposal for a Decision and, without calling into question the specific features of the system of rapid exchange of information to be implemented at Community level, calls for greater consistency between the provisions of the Decision and those of the Convention on early notification of a nuclear accident (prepared in the IAEA framework) which entered into force on 27 October 1986.

This comment applies in particular to the list of information which Member States would be required to send to the Commission in cases of unusually high levels of radioactivity or of a nuclear accident.

Other suggestions and proposals are made, leading the Committee to propose to the Commission a draft Decision which is attached to the Opinion.

The Committee welcomed the Commission's draft proposal for a Regulation laying down **maximum permitted radioactivity levels for agricultural products and drinking water**, and supported this particularly important measure at its May 1987 plenary session (rapporteur: Mr Saïu — France — Workers' Group).

However, the Committee emphasized that the establishment of a Community system of rapid exchange of information and accession by the Community to the Convention on early notification of a nuclear accident were essential for the smooth functioning of the procedure proposed by the Commission for setting maximum permitted radioactivity levels, so that it could also be rapidly informed of such an accident in a non-Community country.

The Committee therefore called upon the Council to adopt as soon as possible the two draft Decisions sent to it by the Commission, and called upon the Commission to make specific reference to this in the wording of the proposed Regulation.

The Committee considered that in addition to adopting such a Regulation it was also necessary to define and implement at Community level an emergency plan specifying in particular the safety measures to be taken, depending on the degree of contamination of agricultural products, by the public authorities, producers, dealers and the general public as a whole.

The Committee also emphasized the importance of ensuring uniformity in the measures to be taken by the Member States, so that agricultural products not meeting the maximum permitted radioactivity levels set by the Commission would not be marketed or exported.

In a second Opinion adopted at its July 1987 plenary session, the Committee approved the Commission's proposals concerning the maximum permitted radioactivity levels for agricultural products and drinking water not included in the draft proposal for a Regulation referred to it earlier.

The Committee considers that these proposals are justified politically, commercially and from the point of view of public health, specifying in particular that they are such as to maintain public confidence in the general radiation protection system, whilst being in conformity with the principles on which this system is based.

The Committee also considers that these proposals are likely to make an active contribution to attaining the goal of reaching an international consensus on a universally acceptable scientific basis.

ECSC Consultative Committee

At its 263rd session of 26 June 1987, the Consultative Committee was consulted, in accordance with Articles 19 and 46 of the ECSC Treaty, on the Commission's report on the market for solid fuels in the Community in 1986 and the outlook for 1987. The Consultative Committee agreed with the presentation and conclusions of the report, which shows a lack of development in the use of solid fuels (see article on p. 24).

United Nations Conference on nuclear energy

The United Nations Conference for the promotion of international cooperation in the peaceful uses of nuclear energy took place in Geneva from 23 March to 10 April 1987. The Conference was attended by delegations from over 100 countries, as well as representatives of United Nations Agencies, inter-governmental organizations and non-governmental organizations. All 12 Member States of the European Community were represented at the Conference, as was the European Commission.

The Conference was stated to be the first global effort by the United Nations designed specifically for the purpose of promoting international cooperation in the peaceful uses of nuclear energy — ranging from the production of electricity to the various applications of nuclear techniques in food and agriculture, health and medicine, hydrology, scientific research and industry — for economic and social development.

The question of convening such a conference was first considered by the UN General Assembly in 1977 which adopted the following four principles on the subject:

(i) the use of nuclear energy for peaceful purposes is of great importance for the economic and social development of many countries;

(ii) all States have the right, in accordance with the principle of sovereign equality, to develop their programme for the peaceful use of nuclear technology for economic and social development, in conformity with their priorities, interests and needs;

(iii) all States, without discrimination, should have access to and should be free to acquire technology, equipment and materials for the peaceful use of nuclear energy; and

(iv) international cooperation in the field covered by the present resolution should be under agreed and appropriate international safeguards applied through the International Atomic Energy Agency (IAEA) on a non-discriminatory basis in order to prevent effectively proliferation of nuclear weapons.

At the same time, the UN General Assembly invited all States as well as the international organizations concerned to respect and observe those principles. Since then, the General Assembly has each year reaffirmed the

principles and provisions of its Resolution of 1977 which formed the basis for the Conference. In its latest Resolution, the General Assembly appealed to all governments to ensure that the highest standards of safety in the design and operation of nuclear plants were applied in order to minimize risks to life and health.

After three weeks of working sessions, the Conference adopted on 10 April a report to the UN General Assembly. The Conference recognized that nuclear energy could contribute to economic and social development and to the well-being of many countries. It reviewed the widespread and varied forms of international cooperation in the peaceful uses of nuclear energy that were already occurring, and reviewed existing constraints on such cooperation. The Conference urged that international peaceful nuclear cooperation be enhanced and broadened.

On the Conference's two major technical issues — the role of nuclear power for social and economic development and the role of other peaceful applications of nuclear energy — the Conference's report stated that its discussion of those matters had 'highlighted issues of interest to developing and developed countries and the ways that nuclear energy could be useful to them'.

This part of the Conference's work covered in particular:

(i) nuclear energy planning;

(ii) nuclear production;

(iii) other applications of nuclear energy (scientific research, health and medicine, food, agriculture and hydrology, radiation and isotope technology, etc.);

(iv) nuclear safety and radiological protection;

(v) spent fuel and radioactive waste management;

(vi) legal, administrative and regulatory aspects;

(vii) personnel training.

The Conference expressed the view that the technical reports presented to it and the discussions that occurred may 'be used in planning national programmes for development, use and safety of nuclear energy for peaceful purposes'.

In its report to the General Assembly, the Conference stated that extensive efforts had been made to reach agreement on the major political issues on its agenda — principles universally acceptable for international cooperation in the peaceful uses of nuclear energy and appropriate ways and means for the promotion of such cooperation. While the discussion reaffirmed that such matters were of importance and a major concern to participants, 'it also showed that differences of opinion remained, and the Conference was not able to surmount these differences'. Thus, despite its efforts, the Conference was not able to reach agreement on 'Principles for international cooperation in the peaceful uses of nuclear energy' or on 'Ways and means for the promotion of such cooperation'.

The Conference's report expressed the hope 'that its active and comprehensive exchange of views will lead to a better appreciation of respective positions on these matters and to further mutual understanding'. It expressed the belief that the IAEA and other international organizations might benefit from those exchanges.

Mr Mohamed Shaker (Egypt), the Conference President, in his closing remarks, said the Conference had had an intensive debate. It was no exaggeration to suggest that that debate had raised and would continue to raise questions of the highest importance.

Recalling that the Conference had been 'unable to reach agreement' on principles acceptable to all, he appealed to all States to make every effort possible to overcome the differences. The Conference was the first of its kind, and had provided a high-level international forum for the expression of views and the exchange of experiences at the highest level. It had enabled States to have 'much greater understanding' of each other's positions.

He said the Conference was not the end of the road. On the contrary, as a result of it, the road had become clearer. Participating governments had become more enlightened as to what should be done in the future. All States were urged to make every endeavour, through the United Nations system, the specialized agencies, intergovernmental and non-governmental organizations to overcome the differences.

During the Conference, the 30th anniversary of the signature of the Euratom Treaty of Rome took place. A statement was made to the Conference in the name of the European Community. A copy of this statement can be obtained from the editor on request.

Energy cooperation between China and the EC — official visit by Commissioner Mosar

At the inviation of the Chinese Government, Mr Mosar, the Energy Commissioner, made an official visit to China from 5 to 15 June 1987. The main purpose of the visit was to take stock of energy cooperation between the Community and China, verify on the spot the results achieved so far and discuss future policy directions. The visit also gave rise to a detailed exchange of views on the energy policies pursued in China and in Europe and an assessment of the world energy situation.

Background to the visit

Commissioner Mosar's visit was in response to an invitation from the Chinese Government and visits by Chinese leaders responsible for energy matters. It was therefore a continuation in the energy sphere of the talks started at political level some six years ago and consolidated in Brussels in March by Mr Song Jian, the President of the State Science and Technology Commission.

Mr Mosar had talks in Peking with Mr Song Jian, the Vice-Presidents of the State Commissions for the Economy, Science and Technology and the Ministers and Vice-Ministers for Coal, Electricity, Oil and Industry.

In particular, this visit provided an opportunity for an exchange of views on the energy situation in China, in Europe and in the world as a whole, and a broad measure of agreement was reached in the assessment of energy problems. In this connection, it would perhaps be worthwhile to give a short description of the energy situation in China.

The energy situation in China

China's hydroelectricity potential is the biggest in the world, but at present only 5% of this potential is exploited. China's coal potential is the second largest in the world, after the USSR.

China is in sixth place in the world league table of crude oil production (130 Mt) and has vast oil and natural gas reserves which are as yet unexploited. 'Soft' or alternative sources of energy cover between 25 and 30% of China's present energy requirements.

However, the existing transport infrastructure (railways and ports) is inadequate to enable all the resources produced to be used efficiently or exported on a large scale. In addition, electricity generation cannot keep up with demand; power cuts are becoming increasingly frequent and affect industrial production. Where energy consumption is concerned, there is still very considerable scope in China for making more efficient use of the energy available.

Energy production and the Chinese economy as a whole are dominated by coal which accounts for some 70% of all the commercial energy resources. Coal production in China is twice the level in the Community, but the quality of the coal is often poor. Oil production, standing at around 125 Mt, is more or less on a par with the level in the Community. Some of it is exported, and this accounts for a major proportion of export revenue. Gas and electricity production is on the low side; no nuclear electricity will be generated for at least three or four years.

China's energy policy objectives

China has set itself the ambitious objective of quadrupling the gross national product by the end of the century while using only twice as much energy as it does today. Developing the energy sector is also part of the programme for modernizing the Chinese economy.

China has set itself a series of energy policy objectives, many of which are similar to those of the Community:

(i) to make better use of energy resources at the production, transformation and final consumption stages;

(ii) to increase coal, oil and electricity production;

(iii) to improve transport systems (railways and ports);

(iv) to link up the six main regional electricity grids in order to establish a single national grid with a control centre in Peking;

(v) to promote oil and natural gas exploration;

(vi) to build nuclear power stations; the first wholly Chinese 300 MW station near Shanghai should be operational in 1989;

(vii) to gradually introduce energy prices based on actual costs;

(viii) to develop energy balances, analyses and forecasting methods, data banks and energy plans;

(ix) to improve organization and management in the energy industry;

(x) to train the officials needed to achieve these objectives.

In the rural areas where 80% of the population lives (and where the rate of population growth is well in excess of the rate in urban areas), decentralized systems using in particular new and renewable sources of energy (straw, biogas, solar energy, wind energy, and small hydroelectric schemes) will be developed.

Energy cooperation

In order to achieve its ambitious goals, China must rely on cooperation with the industrialized countries. It has therefore opened the door to cooperation with the European Community. The first document signed by China's State Science and Technology Commission (SSTC) and the EC Commission's Directorate-General for Energy in 1981 related to the development of energy sources (coal and electricity) and in particular the development of analytical tools and the training of officials.

The cooperation has rapidly expanded. Over 100 projects have been carried out so far, with financial support totalling 6 MECU. The **results** have been considerable:

(i) **training** of over 2 200 Chinese managerial staff: mainly in China in seven centres in Peking, Tianjin, Harbin, Nanjing and Hangzhou, but also in Europe (universities in Germany, France and the United Kingdom, and technical institutes in Belgium, Italy and the Netherlands). The staff in question are mainly from industry and energy institutes or from central, regional or local government authorities;

(ii) **development of energy planning** and policy instruments: supply and demand analysis methods, energy balances, and statistical tools in particular in conjunction with the INET Institute of Tsinghua University in Peking and University Institutes in Wuhan and Hangzhou;

(iii) **exchange schemes:** in the fields of energy planning, coal, electricity and energy conservation, some 100 Chinese experts have been received in Europe and some 50 European experts have been sent to China; they have prepared cooperative schemes subsequently taken over by private industry, institutions in the Member States or the EC Commission;

(iv) organization of numerous **study trips,** seminars and conferences in China and in Europe.

The **two linchpins** of this cooperation are undoubtedly the development of energy planning and policy instruments and the training of officials.

Energy plans for various Chinese regions (the provinces of Xinjiang, Hubei and Zhejiang) and energy data banks have now been developed as a result of cooperation with the EC Commission. Various studies have been carried out which have enabled the Chinese State Commissions to steer their work in the right direction.

The **training** of 2 200 Chinese managerial staff between 1982 and June 1987 has produced a number of practical results:

(i) Officials returning to China after four to eight weeks training in the efficient use of energy have reorganized the energy systems in their firms, achieving energy savings (and hence savings in yuan dollars) often in excess of 20 or even 30%.

(ii) Other officials have introduced planning aids (energy balances, accounting systems, forecasting instruments, etc.) in the national, regional and municipal authorities. Mr Mosar and senior energy officials were able to meet EEC 'former pupils' in the Chinese Commissions and in the ministries and provincial authorities.

(iii) Two energy buses which carry out energy audits in industry (fitted out by the EC Commission and with staff trained by the EC Commission) bearing the 'China-EC' cooperation logo tour the Chinese provinces.

Commissioner Mosar was able to take note of some of these results during his visit to China. The meetings with political personalities, managerial staff in firms, and training centre students confirmed that the Chinese appreciate this energy cooperation very much.

Mr Song Jian also emphasized that this cooperation has made a very considerable contribution towards establishing an excellent political climate, that it is regarded as an

important component of EC/China relations and that it often performs a pilot function for subsequent operations in conjunction with Community Member States.

Mr Mosar therefore noted the very practical results of this cooperation and was able to appreciate its effectiveness and pragmatism on the spot. A protocol was signed setting out the conclusions of his official visit and the framework for cooperation for the years ahead.

Visit by Chinese uranium experts

Within the framework of DG XVII's EC-China energy cooperation programme, a team of six Chinese uranium geologists visited selected uranium mines and mills and remote sensing centres in the Community, in May 1987. The team was led by Mr Yang Shiwen, Vice-Director and Senior Engineer of the Bureau of Geology, Ministry of Nuclear Industry.

In France, the visits met with representatives of the Commissariat à l'énergie atomique (CEA) who reviewed for them the uranium geology, resources and production of Europe. This was followed by visits to uranium mines and mills belonging to Total Compagnie minière and Cogema in the Massif Central. The visit to France was completed by a day spent at the Bureau de recherches géologique et minières (Orléans) where a wide range of exploration techniques were demonstrated.

In Italy the Chinese visited Telespazio's Space Centre at Fucino and its head office in Rome, where particular interest was shown in remote sensing methods and especially in the recovery and interpretation of 'Landsat' and 'Spot' images. The team then went on to visit Agip's uranium deposit at Novazza in the Italian Alps.

Finally, the two-week technical tour ended in Portugal with a visit to Empresa Nacional de Uranio's (ENU) uranium mine and mill at Urgeiriça and a presentation on the geology and planning for the exploitation of the Nisa deposit.

At the completion of the visit the Chinese expressed great interest in cooperating with organizations within the European Community in the study of, and prospection for, uranium in large, relatively unexplored areas of China.

Visit by high-level representatives of various energy sectors in Morocco (29 June to 1 July 1987)

Following the visit by Commissioner Mosar and Energy Director-General Maniatopoulos to Rabat in February 1987, which laid the foundations for energy cooperation between Morocco and the EEC, high-level representatives of various energy sectors in Morocco visited the Commission from 29 June to 1 July 1987.

It would now appear that practical initiatives could rapidly be organized in the following areas:

(i) in order to encourage the efficient use of energy, particularly in small and medium-sized industries, Morocco will be able to benefit from the Community's experience with energy buses. Energy buses adapted to the situation in Morocco will gradually be brought into service in the course of 1988;

(ii) in conjunction with this, and on the basis of existing infrastructure in Morocco, a (Mediterranean-orientated) technical training course for technical staff and engineers responsible for energy-conservation programmes in firms will be organized at the ENIM (Ecole nationale de l'industries minérale). In addition, in the course of 1988 a seminar will be held at the ENIM for representatives of the various Mediterranean countries on the subject of energy planning;

(iii) where new and renewable energy sources are concerned (wind energy, solar energy, etc.), it has been decided that better use should be made of mutual experience. Accordingly, and in particular on the basis of the Community's experience with demonstration projects in this area, a symposium will be held in Morocco to provide an opportunity for direct contacts between Moroccan and European industrialists. The possibilities of joint investment and of making use of the provision for venture capital in the Financial Protocol will be explored in order to ensure that appropriate technology is developed and marketed in Morocco;

(iv) lastly, specific small hydroelectricity schemes will be examined and funded in the context of the Financial Protocol.

The refining industry and the environment

At the request of the German delegation, the Council called on the Commission to study the costs borne by the refining industry in the Member States in order to comply with environmental legislation.

In response to this, and in view of the technical and economic complexity of the question, the Commission called in a firm of consultants, Chem Systems International Ltd.

A technical meeting was held on 30 January 1987 with national officials accompanied by oil experts in order to discuss the study. On the basis of a Commission staff paper, the Energy Council meeting on 2 June 1987 carried out a preliminary exchange of views on the subject.

The aim of the study was to evaluate the costs borne by the refining industry in the Member States in order to comply with environmental legislation. For reasons of time and money, the study was limited to seven Member States: Belgium, France, Germany, Italy, the Netherlands, Spain and the United Kingdom. Two dates were considered: 1985 and 1993.

In order to isolate the costs due essentially to environmental measures from other normal manufacturing costs, working assumptions had to be adopted which inevitably entailed certain simplifications. In view of these simplifying assumptions, the results of the study must be read with caution. It would be preferable to consider trends and orders of magnitude for the environmental costs as between Member States rather than exact figures. The study does not make it possible to arrive at a precise estimate of the actual costs incurred by each individual refinery.

By way of example, in 1985 operating costs, including capital charges, came to about 3 ECU/t of crude processed for the Federal Republic of Germany, 1 ECU/t for Belgium, France and the Netherlands and 0.3 ECU/t for Italy, Spain and the United Kingdom.

In 1993 the national and Community measures which will then be in force will increase operating costs in all the Member States considered and will widen the differences between refiners.

Costs will be over 15 ECU/t in the Federal Republic of Germany and the Netherlands, about 7-8 ECU/t in Belgium and the United Kingdom and between 2 and 5 ECU/t in France, Italy and Spain. These figures should be compared with total present refining costs of about 15 ECU/t and 25 ECU/t for simple and complex refineries respectively.

The study puts the total amounts of investment required for the seven Member States in question at over 600 MECU in 1985 and over 7 000 MECU in 1993 in order to comply with new legislation.

Operating costs, including capital charges, are estimated at nearly 500 MECU/year in 1985 and nearly 4 000 M ECU/year in 1993.

The breakdown of operating costs shows the impact of national environmental measures relating to the quality of refined products (unleaded petrol, low-sulphur gas oil and the restriction of the sulphur content of fuel oil), in particular in Germany and the Netherlands. For these two countries, especially Germany, there is also the impact of legislation concerning large combustion plants and flue-gas emission limits (SO_2, NO_x, dust). In Germany these measures account for nearly 30% of the total cost of meeting environmental standards.

Depending on the impact of other cost factors, these differences could influence the competitive position of refineries in the Member States and the flow of imports from non-Community countries. Source-country refineries, even though they must meet European specifications for products delivered, have the advantage of operating under less strict environmental constraints. The closure rate for some types of plant, the speed of refinery rationalization and the level of investments required will to some extent be influenced by these factors.

Nevertheless, it should be borne in mind that the Single European Act sets the aim of completing the internal market by 31 December 1992, meaning an area without internal frontiers in which the free movement of goods is guaranteed. For the oil market, this entails the harmonization of standards and specifications for refined products, and, as the Single Act also provides, the harmonization of taxes and excise duties.

The Single European Act sets the same aim for environmental and consumer protection, starting from a basis of high standards. By the 1990s the Community's refining industries should therefore enjoy similar conditions of operation and competition.

Refining and petroleum product imports

At its meeting on 2 June 1987, the Council took note of an analysis carried out by Commission staff of developments in refining and petroleum product imports in the Community in 1986.

This analysis is part of the regular reviews which the Commission has undertaken to carry out in the context of the system for monitoring trends in these areas decided upon by the Community and the International Energy Agency (see *Energy in Europe No 6*).

In the Community (EUR 12) refinery output increased for the first time since 1979, rising from 454 Mt in 1985 to 480 Mt in 1986, a 5.7% increase.

The trend towards a reduction in the primary distillation capacity observed since 1979 continued in 1986 but the rate of closures slowed down; primary capacity fell from 613 Mt on 1 January 1986 to 600 Mt on 1 January 1987, a 2.1% reduction.

The rate of utilization of primary capacity improved considerably in 1986 as a result of the combined effect of the increase in production and the reduction in capacity; on average for the year the rate was 79% compared with 71% in 1985. However, it should be borne in mind that situations differ from one Member State to another and that there is excess primary capacity in some of them.

The conversion capacity increased by 4% in the course of 1986, reaching 143 Mt/year on 1 January 1987 (capacity expressed in terms of catalytic cracker equivalent units).

The product balance for the Community shows a surplus of production relative to consumption for petrol and kerosene, but a deficit for LPG, naphtha and especially gas oil (some 18 Mt for the latter product in 1986). In the case of fuel oil, the Community moved from a deficit of 7 Mt in 1985 to a surplus of 1.5 Mt in 1986. If the fuel oil surplus observed in 1986 should continue, the need to set up new conversion equipment will become more urgent in future.

The situation of the Community as regards external trade in refined petroleum products also improved in 1986, since product imports from non-Community countries fell by 2.6% and exports to such countries increased by 6.2%. The Community's net import balance for petroleum products thus increased, rising from 25 Mt in 1985 to 18 Mt in 1986.

Mt/Year	Refining capacity at 1. 1. 1987 (estimate)								Changes foreseen in 1987
	Primary Distillation	Reforming	Cracking			Visbreaking	Deep conversion		
			Therm.	Catal.	Hydro		Coking	Other	
EUR 12	600.3	86.6	18.5	81.8	13.5	51.7	6.4	1.6	- 5/ - 10 Dist? + 0.9 CC + 1.6 VB
Belgium	33.6	4.4	—	5.1	—	4.0	—	—	
Denmark	8.4	1.4	1.4	—	—	2.4	—	—	
F. R. of Germany	85.8	15.4	6.2	9.2	4.9	5.3	4.6	—	-6.9 Dist? - 0.6 Ref - 0.7 CC
Greece	18.0	1.3	—	0.8	—	0.6	—	—	+ 0.6 Ref + 1.3 CC + 1.1 VB
Spain	63.6	7.6	—	7.1	0.8	8.1	0.7	—	+ 0.3 CC + 0.5 VB
France	96.8	13.5	2.5	13.9	0.7	6.7	—	—	
Ireland	2.9	0.6	—	—	—	—	—	—	
Italy	119.0	17.5	2.2	18.4	2.5	17.1	1.1	-	—7.3 Dist in 87/88
Netherlands	67.8	7.6	3.1	6.7	1.6	4.0	—	1.6 Flexi Cok.	-2.9 Dist
Portugal	14.4	2.2	—	0.7	0.5	0.6	—	—	
United Kingdom	90.0	15.1	3.1	19.9	2.5	2.9	—	—	

Source: Commission — DG XVII.

EUR 12 — Petroleum products imports of the European Community from third-party countries

ooo/t

Petroleum prod. imports from third-party countries to the EC	1985	1986	Variations 1986/1985 000 t	%
All products/all uses, of which:	104 301	101 554	−2 747	− 2.6
— light oils	18 831	21 055	+2 224	+11.8
— medium oils	732	961	+ 229	+31.3
— gas oil	28 000	29 212	+1 212	+ 4.3
— fuel oils	46 527	38 414	−8 113	−17.4
— other products	10 211	11 912	+1 701	+16.7
All products/all uses, of which:	104 301	101 554	−2 747	− 2.6
— specific treatment or chemical conversion	48 416	48 107	− 309	— 0.6
— other uses (destined for consumption)	55 884	53 447	−2 437	− 4.4
All products/all uses, from:	104 301	101 554	−2 747	− 2.6
— industrialized third countries, of which:	19 516	20 547	+1 031	+ 5.3
EFTA (without Portugal)	8 752	8 089	− 663	− 7.6
United States	7 922	9 810	+1 888	+23.8
— developing countries, of which:	49 884	44 770	−5 114	−10.3
OPEC (total)	38 440	37 413	−1 027	− 2.7
— Venezuela	4 357	2 566	−1 791	−41.1
Oapec (total) (Egypt incl.)	37 239	37 994	+ 755	+ 2.0
— Algeria	8 594	7 392	−1 202	−14.0
— Libya	5 094	7 439	+2 345	+46.0
GCC (total)	16 555	16 520	− 35	− 0.2
— Saudi Arabia	4 788	5 737	+ 949	+19.8
— Kuwait	10 601	9 686	− 915	− 8.6
— Countries with State trade of which:	34 901	36 237	+1 336	+ 3.8
— USSR	27 658	27 704	+ 46	+ 0.2
— Romania	4 297	5 358	+1 061	+24.7

Source: External trade statistics of the Community (customs declarations: Nimexe system); feedstocks included.

In addition, the trend in petroleum product imports into the United States and Japan indicates that the efforts deployed since 1985 to open up or keep open the markets of OECD partners have been successful. However, protectionist pressure in the American Congress for the introduction of an import duty cannot be ruled out. It also remains to be seen what progress has been achieved by the OECD partners, and in particular Japan, with the restructuring of its refining industry.

In 1988 the Commission will submit to the Council a further, more detailed analysis of problems concerning refining and product imports and conclusions about the policy to be pursued in the years ahead.

Conferences on solid fuels technology

The **Coal '87 Conference** held in London on 9 to 11 June had as Chairman of its Advisory Committee Mr José Sierra, the European Commission's Director for Coal. The Conference, which was staged as an integral part of the European Community's 'European Year of the Environment', was largely geared to appraising the impact on coal use of projected developments in European legislation for environmental standards, but the associated exhibition was international in character with exhibits from the UK, USA, Finland, the Federal Republic of Germany, Australia, France and the Netherlands. In his address, Mr Sierra spoke of the importance, for increased trade in and consumption of coal, of programmes of technological research such as those being partly financed by the European Community. Such programmes, including techniques like coal preparation to remove sulphur, fluidized bed combustion and gasification, all contributed to increase the role of coal by making it more environmentally acceptable.

The same message was the keynote of Commissioner for Energy Mr Nic Mosar's opening address at the symposium on **'Coal in the heat market'** organized by the Commission on 22 and 23 June as part of the 750th anniversary celebrations of the City of Berlin. The symposium was concerned with the technical possibilities and economic repercussions of the most up-to-date coal firing techniques, and with their current and foreseeable effects on the European heat market, particularly in view of environmental considerations. In his address, Mr Mosar spoke of the achievement of the Community's energy objectives for 1995, including that of increasing the share of solid fuels in consumption, and of the need for continuing national and Community research, development and demonstration projects to make it easier for solid fuels to meet future environmental standards and thus to penetrate more deeply into the heat market.

Seminar on third-party financing — Luxembourg, October 8 and 9, 1987

The unavailability of finance has been identified as a major constraint to investments in energy efficiency technologies. Many technologies which would considerably

improve the rational use of energy have been proven both technically and economically viable but their market penetration has been impeded by the inability of potential investors to locate suitable sources of funds.

Third-party finance is a means of mobilizing private capital to fund energy saving investments by an outside company, using the cost savings themselves to pay for that investment. Therefore, the energy savings are viewed as a 'stream of income' which can support a business: the business of investing in, and providing performance guarantees for energy conservation, by an energy service company (ESCO).

The European Commission has been examining the potential for third-party financing in Europe and is establishing model contracts and guidelines for use in a European context. This seminar aims to promote the awareness of the opportunities presented by third-party financing for both investors in energy saving and potential energy service companies. The seminar will review the evolution of third-party financing in North America and will look at some of the experiences with the mechanism there. The role of the energy service company is central to the application of the third-party financing mechanism and this topic will be explored by the major European companies already in this market. The seminar should be of interest to senior management in industry and in the utilities, senior civil servants and local government officials, bankers and those interested in establishing energy service companies.

For details concerning this seminar, please contact: Mr Derek Fee, Commission of the European Communities, Directorate-General for Energy, 200 rue de la Loi, B-1049, Brussels.

Energy planning seminar

The annual seminar on energy planning in the Community and in the Third World was held in Marseille from 13 to 17 October 1987. It was organized and financed by the Directorate-General for Energy and Arene (Agence régionale de l'énergie) in Provence-Alpes-Cote d'Azur, with whom DG XVII has an ongoing regional project.

Participants were invited from national and non-governmental bodies in the Community and from countries within the Third World with which the EC is cooperating in the field of energy planning.

The objectives of the seminar were:

(i) to promote the pooling of experience between energy experts from Community countries and from the Third World;

(ii) to probe deeper into the technical and organizational problems of energy projects;

(iii) to disseminate the experience gained beyond the regions involved in the programme;

(iv) to discuss in detail the energy-planning regional project being conducted by Arene for the Provence-Alpes-Cote d'Azur region and to visit energy installations in that area.

Natural gas seminar — Brussels and Bruges, 18 and 19 May 1987

On 18 and 19 May 1987 the Commission held a seminar on natural gas which was opened by Mr Maniatopoulos, the Director-General for Energy, who talked about natural gas in the context of the Community's energy policy.

In holding this seminar, the Commission wished to promote an exchange of information between the gas companies in the Community countries which already have very considerable experience in this sphere and those such as Spain, Greece, Ireland and Portugal which are in the process of or are about to start developing a nation-wide gas industry.

During the two days of the seminar 50 or so participants from the Community Member States and from Peru, a country with which the Community is cooperating on natural gas, were able to compare notes and experience during working sessions on the following four topics:

(i) organization of the gas industry;

(ii) development of the market;

(iii) gas purchases;

(iv) planning the infrastructure required.

After the Greek and Spanish participants had talked about the problems which they are encountering in establishing and developing a nation-wide gas industry, addresses were given by senior representatives of the gas industry in Europe who were only too willing to pass on their know-how in this way in a spirit of cooperation. Very detailed papers were given by representatives of Ruhrgas (Germany), Distrigaz (Belgium), Dangas (Denmark), GDF (France), SNAM (Italy), Gasunie (the Netherlands), BG Plc (United Kingdom) and Cometec-gaz (Comité d'études économiques de l'industrie du gaz) on the above topics.

Energy technology projects news

Oil and gas

Financial support for technological development projects in the oil and gas sector

In accordance with Regulation No 3639/85, on 29 July 1987 the Commission granted financial support totalling 36.6 MECU for 76 technological development projects in the oil and gas sector.

This decision completed the support-granting process set in motion for 1987 on 22 July 1986 with the publication in Official Journal No C 183 of an invitation to submit proposals. A total of 143 proposals concerning technological development projects involving an estimated total cost of 333 MECU were received, representing a 40% increase over the total for 1986. After consulting the Advisory Committee for oil and gas projects, the Commission selected the projects to be supported in the light of the criteria set out in Regulation No 3639/85.

Priority was given to projects designed to reduce costs, increase safety and improve the efficiency of operations in areas of advanced technology. Preference was also given to projects involving at least two firms based in two different Member States or involving smaller firms.

The projects for which support was granted concern all the sectors of activity covered by the programme (see table). Production remains the biggest area, both in terms of the number of projects and in terms of the amount of support received (24%), followed by exploration (19%) and drilling (13%). No support was granted for secondary and enhanced recovery. In the other areas the numbers of projects supported were similar to the 1986 figures, except as regards the environment where more projects were supported.

There was a considerable increase in the number of projects submitted compared with earlier years (143 as compared with 122 in 1986 and 96 in 1985). Among the promoters there were many firms and research institutes which had not hitherto applied for support. French and British firms were particularly well represented.

The Council, the European Parliament, and the Member States were notified of the Commission's decision on 30 July 1987. It became applicable on expiry of a period of 15 working days from the period of notification, since no Member State had referred the Commission's decision to the Council.

The invitation to submit new proposals for the 1988 financial year was published in Official Journal No C 210 of 7 August 1987. The time limit for the submission of proposals is 15 January 1988.

Breakdown of support granted in 1987 to the various areas of technology

Area	Number of projects	Eligible investment (ECU)	Amount of support (ECU)	%
Geophysics and prospecting	13	19 859 969	6 950 990	18.98
Drilling	7	14 463 004	5 062 051	13.82
Production systems	18	24 913 105	8 719 589	23.81
Effect on environment	9	6 028 969	2 110 140	5.76
Auxiliary and submersible vessels	1	2 815 899	985 565	2.69
Pipelines	4	9 190 618	3 216 716	8.78
Transport	3	2 934 768	1 027 168	2.80
Naturalgas technology	1	619 986	216 995	0.59
Energy sources	2	2 763 845	967 346	2.64
Storage	1	1 977 184	692 014	1.89
Miscellaneous	17	19 085 740	6 680 010	18.24
Total	76	104 653 087	36 628 584	100.00

Symposium on new oil and natural gas exploration and production technologies

(Luxembourg, 22, 23 and 24 March 1988)

The third symposium on new oil technologies, following on from the ones held in 1979 and 1984, will be held by

the Commission from 22 to 24 March 1988 in Luxembourg.

At the symposium, the firms whose projects have received financial support from the Community will be presenting the main technological developments and innovations since 1984 concerning oil and gas exploration, production, transportation and storage.

The future of the Community's support programme and possible further action by the Community concerning new oil technologies will also be discussed at this symposium.

For further information, please contact:

Mr Enzo Millich, Directorate-General for Energy, Commission of the European Communities, 200 rue de la Loi, B — 1049 Brussels (Tel: 235 36 25).

Technology focus

'Poseidon': a new technology to reduce the costs of offshore oil-field production

Offshore oil production, especially at great depths and in hostile environments, forces operators to make a considerable capital outlay. The oil industry as a whole has to make a constant effort to develop technology in order to reduce the size of this capital outlay while enabling new resources to be developed.

Consequently, recognizing the importance of these efforts in order to attain the energy objectives, the Community grants support for Community projects to develop innovative oil and gas production methods. The reduction of costs is recognized as one of the priorities in the selection of projects submitted under the regulation on support for the development of oil and gas technology (Regulation 3639/85).

In this connection, the Commission has decided to grant support to the 'Poseidon' project involving the French company Total-CFP, a Norwegian company Statoil, and a research body *Institut français du pétrole*. Accordingly, the Community has concluded three contracts (TH. 03.145/83, TH. 03.164/84, TH. 03.172/85) with the *Groupement européen de recherches technologiques sur les hydrocarbures* (Gerth) concerning support for the development work by the French bodies involved.

The 'Poseidon' project

This project is designed to reduce costs by developing a completely sub-sea production system, thus doing away with offshore platforms. Production installations arranged on the seabed would enable the multiphase effluent (oil, gas, water, etc.) extracted from the sub-sea wells to be pumped to land-based installations where the effluent would be separated and treated.

The technologies developed

The 'Poseidon' sub-sea production system adds to the existing offshore oil and gas production techniques technologies for the sub-sea pumping and pipeline transport over long distances of untreated production effluent.

In addition to overall production system definition, work carried out by the French bodies covers the following subsystems:

(i) sub-sea multiphase effluent pumping system (operator: IFP);

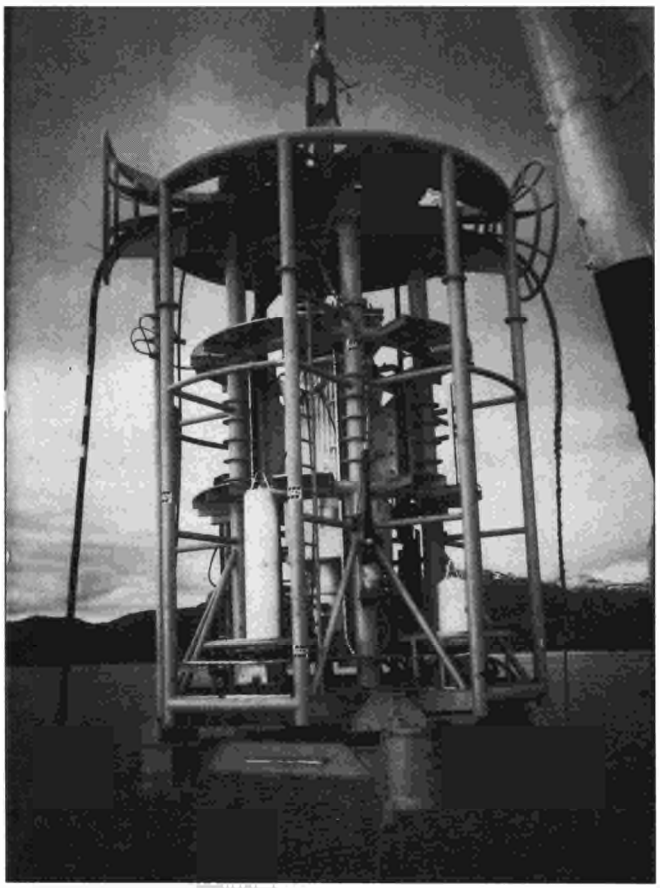
(ii) sub-sea pump motor unit including an electric power connector (operator: Total-CFP);

(iii) components of the sub-sea production station specific to the 'Poseidon' system: pipeline connection to the sub-sea station, scraping devices and injection of inhibitors to avoid the formation of hydrates and pipeline corrosion (operator: Total-CP).

Statoil is studying the problems concerning the removal of untreated production effluent: formation of hydrates, hydraulic behaviour, pipeline erosion and corrosion.

The results of the project so far

The economic benefits of the 'Poseidon' concept and its areas of application have been defined by studies carried out under the first contract which has now been completed. One of the areas of interest is fields located less than 200 km from the coast at a depth of water in excess of 200 m.



All the engineering studies, covered by the second contract, have also been completed. They have made it possible to design the production station in detail.

The development of the two-phase pump, the key to the project, has reached the stage of a prototype for long-term testing in the sub-sea environment. Test-bench tests will be carried out at the end of 1988.

The pump motor unit, including the electric sub-sea connector, has been developed; long-term tests in deep water are in progress.

The work carried out as part of the 'Poseidon' project will make available to offshore oil-field and gas-field operators a new production system offering a wide range of applications which should improve the security of the Community's energy supplies.

Further information on the 'Poseidon' project can be obtained from: Groupement européen de recherches technologiques sur les hydrocarbures, 4, avenue du Bois Préau, 92502 Rueil-Malmaison, France — Tel. 47 52 61 39.

Conversion of a 40t/h steam boiler from heavy oil

1. Summary

The aim of the project was to convert a boiler producing 40 t of steam per hour from heavy oil to pulverized coal firing.

This aim was achieved and the boiler has been in service since late September 1984. The fuel saving target was met, as was the desired reduction in toxic emissions (NO_x, SO_2) in the flue gas. It was thus demonstrated that the conversion of oil or gas-fired steam boilers to pulverized coal firing was basically possible, except in isolated, specific instances.

The operating results provided further knowledge enabling the future conversion of boilers of this type to pulverized coal firing to be further simplified and improved.

2. Measures

2.1. Boilers

The conventional Babcock vertical radiation boiler, built in 1962, has a firebox 3.3 x 3.9 m^2 in cross-section and is about 8 m high. Superheaters 2 and 3 are arranged above the firebox in both of the flues downstream of superheater 1, as are feedwater and air preheaters. Three heavy-oil Babcock Y burners were located on the front face.

2.2. Reasons for the conversion

These were:

(a) fuel-cost savings;

(b) reduction in toxic emissions (SO_2, NO_x).

2.3. Fuel

Pulverized Rhenish brown coal was chosen as the fuel, for the following reasons:

(a) low price;

(b) low sulphur content;

(c) alkaline ash (predominantly CaO and MgO) which binds sulphur;

(d) with the type of burners used, this fuel gives a particularly low level of NO_x formation.

3. Timetable

The conversion decision was taken in late 1983 after detailed preparations. Design work began in January 1984.

The first retrofit parts arrived on site in early June 1984 and conversion began in late June of the same year. The boiler was put back into service in September 1984.

4. Description of the pulverized coal equipment

The previous oil burners were removed and four Dr Schoppe-system pulverized coal burners, each producing 10 MW, were installed. They are arranged around the upper part of the firebox and fire obliquely downwards at flame-jet speeds of more than 100 m/sec., thus promoting intensive gas swirl throughout the firebox.

Each burner has its own coal supply, consisting of one pulverized coal silo with a content of 120 m³ and a pulverized coal feed and metering machine located below it.

An ash conveyer is situated below the firebox, while two compressed air-cleaned bag filters act as dust traps. The induced draught was increased in order to overcome the additional resistance of the flue gas filters.

Conventional steam blowers were installed in order to clean the firebox and downstream heating surfaces.

Deutsche Babcock Werke AG carried out all of the work on the boiler, including the supply of the steam blowers.

5. Output, efficiency, burn-up

After the appropriate adjustments had been made, the boiler achieved its full output of 40 t/h at 75 bar and 520°C.

At full load the flue-gas temperature was 170-180°C, roughly the same as with oil firing. The planned combustion air excess was 20% and therefore slightly higher than in the case of oil firing.

Analysis of the ash revealed the burn-up rate to be 99.8% and thus almost complete. Admittedly, there had earlier been problems with the coarse fraction of the pulverized coal.

6. Environmental pollution

The measurements carried out by the Bavarian Technical Inspection Authority in January 1985 produced excellent results:

SO_2 = 673 mg/m³
NO_x = 440 mg/m³
CO_2 = 52 mg/m³

All of the values have been converted to 6 Vol. % O_2 in accordance with the Technical Manual on Air.

7. Fuel costs

Considerable fuel savings can be made — depending upon the mode of operation and the cost of heating oil — despite higher energy and maintenance costs at times.

The economic target has thus largely been met.

Just published: — *Risk analysis for offshore structures and equipment*

Asteo. Ed.: Graham & Trotman

This study has been carried out by Asteo for the Commission of the European Communities. It indicates ways of improving the safety of offshore oil operations, following an analysis on the basis of criteria used in the fields of nuclear power, aviation and space.

The study describes the existing procedures and indicates the procedures which should be followed in the programmes for the inspection, maintenance and repair of offshore structures in order to deal with the risks involved in offshore activities, especially in difficult environments such as the North Sea.

A number of suggestions are made for priority measures (regarding coordination and promotion) which the Community authorities could implement in the main areas of offshore activity.

Document update

Main Commission energy documents, proposals, directives, etc. in 1987

Energy saving

COM/87/223 Communication from the Commission towards a continuing policy for energy efficiency in the European Community

Nuclear

SEC/87/1107 Report by the Commission Services on the situation as regards the reprocessing and storage of irradiated nuclear fuel

Solid fuels

SEC/87/959 Report of the Commission — The market for solid fuels in the Community in 1986 and the outlook for 1987

New energy publications

Energy saving

No 45 Continuous quenching and tempering of forged material (with recrystallization of residual heat)

No 46 High-temperature carburizing (generating carburizing atmosphere directly inside the furnace)

No 47 Medit — A wind turbine generator optimized for Mediterranean sites

No 48 Projet de carénage sur voitures ferroviaires — Une nouvelle amélioration du Cx.

Eurostat — Statistical Office of the European Communities
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