ISSN 0256-6141

ENERGY IN EUROPE

Energy policies and trends in the European Community

Effects of falling oil prices in the European Community

Number 4 April 1986

Commission of the European Communities □ Directorate-General for Energy

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Manuscript completed on 17. 4. 1986.

Luxembourg: Office for Official Publications of the European Communities, 1986

Catalogue Number: CB-BI-86-001-EN-C

Printed in the FR of Germany

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)
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: 0.719 DM, 3.71 BFR, 1.31 FF, 0.14 LFR, 0.0878 UKL, 0.219 DKR, 140 LIT, 0.00871 IRL, 0.256 HFL, 1.15 DR
EUR 10	Total of member countries of the EC
I 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

The fall in oil prices: boon or bane for the European Community?

This edition of **Energy in Europe** *is dominated inevitably by falling oil prices. This lead article examines what the fall could mean to the European Community both in economic and energy terms. The news is mostly good. But the continuing pursuit of the Community's energy policy goals will be vital if we are to avoid the risk of future price hikes and consequent economic difficulties in the longer term.*

In the first quarter of every year the European Commission is invited by the Council of Ministers to re-examine the economic situation in the Community and the common guidelines for Community economic policy. The Commission published the results of its latest review in March 1986 in a new Communication to the Council entitled **The economic situation in the Community** (COM[86]114).

The developing oil market situation was at the heart of the review. It provided an opportunity to consider the purely macro-economic effects at a world level and at Community level as well as the likely impact on the energy sector itself. This article outlines and comments on the key issues.

The outlook for oil prices...

The Commission staff do not attempt to forecast oil prices even in the very short term. But like every other group of analysts we have to make some working assumptions for the purpose of economic and energy projections. Elsewhere in this issue of **Energy in Europe** we analyse the short-term energy outlook on the assumption that the average crude oil import price for the Community in 1986 will be around $20 per barrel (fob), and we also look at the effects of a $15 per barrel scenario. The remainder of this article is based on the assumption of a $20/bbl average in 1986.

While such a price level could well turn out to be higher than the reality, it would already represent a fall (year on year) of over 25% in the **dollar** price of crude imports and a fall of 45% in the price in **European currencies**, given the depreciation of the dollar since the beginning of last year. When allowance is made for inflation, the average real oil price in Europe in 1986 would be about that of 1979 — just **before** the second oil shock.

The corresponding falls in prices to the consumer would be smaller given the incidence of transport and refining costs, refiners' margins and taxation. But there will be substantial falls in product prices. Already since the beginning of the year consumer prices (before tax) have fallen on average by around 20%, with residual fuel oil registering a fall of some 30%.

...will be generally good for the world economy...

When oil prices shot up in the 1970s there was a major adverse impact on the world economy. The oil import bill of the OECD rose from $34 billion[1] in 1973 to $129 billion (money of the day) in 1978, pushing up the share of oil imports in the cost of total imports of goods from 11.9% in 1973 to 21% in 1978. In 1980 the oil import bill peaked at $264 billion dollars, reflecting a terms-of- trade loss equivalent to some 2% of GDP, while the oil import bill of the developing world rose to over $60 billion.

The effects of the second oil shock, accompanied by restrictive fiscal and monetary policies, were a marked slowdown in economic activity and fall in world trade in 1980-81. On OECD estimates the total loss of real income to the industrialized countries following the second oil price hike was 1 trillion dollars in the period 1979-81.[2]

As oil prices drop, the question is whether the reverse will occur.

The table below gives an estimate of the terms of trade gains and losses to different groups of countries resulting from an average oil import price of $20 per barrel (fob) in 1986 compared with an (estimated) price of $27 per barrel in 1985.

This is a **theoretical** indication of the terms-of-trade effects. It takes no account of changes in oil export/import volumes (which would reduce both the loss to OPEC and other oil exporters and the gain to the oil-importing countries)[3]. It also ignores the likely knock-on effects on gas and coal prices. But it indicates the magnitude of the changes — a possible loss of over $40 billion by OPEC, a sharp loss for other oil-exporting developing countries

(notably Mexico), a substantial fall in the hard-currency revenues of the Soviet Union, and a corresponding gain for OECD countries and for non-oil-exporting developing countries.

The consensus of the experts is that the effects on world trade should be positive. Some oil-exporting countries will undoubtedly be obliged to cut back on their imports because of the loss of export revenues. But others (and notably the Gulf States) have large foreign exchange reserves and external assets; and the loss of export revenues in the oil-exporting countries as a whole could be offset to some extent by increased capital flows. Lower oil prices in any case will reduce the balance-of-payments constraints of all the oil-importing countries — industrialized and developing countries alike — which in turn holds out the prospect of lower interest rates and lower rates of inflation, all of which should be good for the growth of internal demand, production and trade.

...and for the Community

Even if world trade as a whole picks up, the direct benefits to the Community may be a little weaker than for some other countries. This is because of the relative appreciation of European currencies against the dollar and because Community exports are more concentrated than those of other industrialized countries on OPEC Member States and on Eastern bloc countries, whose import capacity is likely to fall in 1986.

But the oil bill has been a very severe constraint on the Community's balance of payments (equivalent to 2.6% of GDP even in 1985 — table below) and crude oil imports still account for over one-fifth of total gross imports by value into the Community from third countries. The terms of trade gain to the Community of a $20 barrel would be less in reality than the theoretical $17 billion shown above because oil imports can be expected to increase a little in volume. But the real gain will still be substantial, providing the potential for non-inflationary growth in domestic demand and intra-Community trade and giving a fillip to business confidence.

Against that background, the latest published forecasts by the Commission's Directorate-General for Economic and Financial Affairs, on the basis of the $20/bbl hypothesis, suggest that:

- the rate of inflation will fall to 3.3% on average in the Community (5.3% in 1985)[4];
- there will be downward pressure on interest rates in the Community as a whole;
- GDP could increase by 2.8% (2.2% in 1985);

Table 1: Revenue gains/losses from a sharp fall in oil prices

Payments for/revenues from net imports of oil and oil products[1] by major groups of countries

	1985 net exports (+)/ imports (--) (estimate) (Mbd)	Revenue at (fob)[2] $ 27/bbl	$ 20/bbl	Gain (+)/ Loss (--)
		000 M dollars		000 M dollars
OPEC	+15.9	+157	+116	- 41
Other LDC net exporters[3]	+ 3.7	+ 36	+ 27	- 9
CPEs[4]	+ 2.6	+ 26	+ 19	- 7
OECD[5]	- 15.7	- 155	- 115	+40
(of which: EUR 12)	(- 6.6)	(- 65)	(- 48)	(+17)
Other net oil importers[6]	- 6.5	- 64	- 47	+17

[1] Figures based on estimate of net oil exports/imports in 1985. Volume effects of price changes are not considered.
[2] For simplicity the calculations are based solely on fob prices and assume the same value for crude, NGLs and products.
[3] Oil-exporting developing countries outside OPEC.
[4] Centrally-planned economies (USSR, other CMEA countries, China).
[5] This is the net gain, taking account of the losses in oil export revenues of the United Kingdom and Norway.
[6] All other net importing countries.

Table 2: Oil bill (net imports of oil and oil products) as a % of GDP

	1972	1973	1974	1978	1979	1980	1985	1986
USA	0.3	0.5	1.6	1.9	2.4	2.8	1.1	0.8
Japan	1.5	1.6	4.5	2.6	3.8	5.5	3.2	1.8
EUR 12	..	..	..	..	2.8	3.6	2.6	1.5
EUR 10	1.3	1.5	3.7	2.4	2.8	3.4	2.4	1.4

- unemployment could fall to 10.9% (11.2% in 1985);[5] and total employment could increase by 0.6% (0.5% in 1985).

This relatively buoyant economic outlook is not of course due simply to falling oil prices. But they will be an important contributory factor.

But some problems will need to be addressed

The effects of falling oil prices will vary sharply as between countries, both in the developing and developed worlds, and in the Eastern bloc.

Those **developing** countries who are likely to feel the coldest winds of change are those who are both major oil exporters **and** heavily indebted to the international financial system.

Mexico is a particular focus of attention because of the size of its external debt (97 billion in 1984) and because of its heavy dependence on oil exports (two-thirds of Mexico's export earnings are derived from oil).

Nigeria is even more strikingly dependent on oil export revenues (over 85% of export earnings); and countries such as **Algeria** (a major exporter of gas as well as oil), **Indonesia** (whose other principal exports are commodities that have also been falling in price), **Venezuela** and **Egypt** have large international debts. All of them will benefit from falling interest rates which should help to mitigate the negative effects. But the fall in oil prices underlines the urgency of solutions to the international debt problem, and the European Commission has already lent its support to the so-called Baker initiative to assure larger capital flows to heavily indebted LDCs.

As far as the **Soviet Union** is concerned, oil revenues account for over two-thirds of hard currency earnings and a fall to $20 per barrel could represent a net loss of $6 billion or more if export volumes fall along with prices (they are down at present). There will also be further losses due to falling natural gas prices. Other East European countries will also be affected (GDR and Romania through reduced oil product export revenues, Poland through the impact on coal prices). This could have important implications for East-West trade (see *Energy in Europe* No 3 of December 1985).

The economic effects will also vary across the European Community. The **United Kingdom** and the **Netherlands**, as major oil and natural gas producers, will see a fall in their net export earnings from energy products and a major loss of fiscal revenues from oil and gas production.

In the **United Kingdom** oil and gas production currently account for somewhat under 6% of GDP and total government revenues from oil in the fiscal year 1984-85 were nearly 10% of total government revenues. The shortfall in budget revenues attributable to the fall in oil prices would be equivalent to some 1% of GDP in a full year but this will be offset to some extent by higher VAT and corporation tax receipts due to faster economic growth. In practice the economic outlook will depend heavily on the prospects for sterling, interest rates and business confidence. The British Government's own projections for domestic and export demand against this background are now fairly bullish: the 18 March budget pointed to GDP growth of 3% in 1986. Some other commentators are less optimistic.

Gas revenues are relatively more important to the **Dutch** Government and there will be an important impact on budgetary revenues (albeit with a lag because gas prices will only follow those of oil with a delay). This is estimated at a figure equivalent to 0.5% of GDP in 1986. But the impact will be considerably greater in 1987 as the prices work through into a full year's figures.

Aside from these specific questions for some Member States, a more general issue arises for the Community on the economic front. This is the need to ensure that the transfer of revenues from falling oil prices does not lead simply to a short-lived **consumer boom**; that the Community's **international competitiveness** is maintained and, if possible improved, by the containment of real wages; and that sufficient resources are channelled into **investment** and the creation of **new long-term employment**. These are the key objectives of the Community's Cooperation Strategy for More Employment put forward by the European Commission in October last year.[6]

In the energy sector the short-term effects should be limited...

As indicated elsewhere in this issue, the elasticity of Community demand for oil and of Community energy and oil production with respect to the price of imported oil is likely to be very low in the **short term.**

...both in terms of demand for oil...

In the **electricity-generating** sector there has been a major shift away from oil over the past 12 years. In 1973 the Community's electricity industry was consuming 1.6 Mbd of oil and it provided 32% of the fuel used in power stations. Since then we have witnessed the introduction of nuclear power on a large scale in several countries, and it now meets well over 30% of Community (EUR 10) electricity requirements. Coal and other solid fuels have also grown substantially in importance. Taken together, nuclear and solid fuels provided some 72% of the inputs to electricity generation in 1984, thereby already meeting the Community's objective **for 1990** of 70-75%. In the same year (when fuel-oil consumption was actually boosted artificially by the UK miners' strike) the industry consumed less than 1 Mbd of oil, which provided only 15% of total fuel requirements.

This general shift away from oil has reduced the availability of capacity to take advantage of lower oil prices in the short term. The bulk of fuel-oil consumed in the electricity industry is currently used to meet peak rather than base- or middle-load demand. Some fuel-oil could of course be moved down the load curve to displace coal, if the fuel-oil/coal price differential were to move substantially further in favour of fuel-oil. But a good deal of the oil-fired capacity that exists is old and relatively inefficient, which will make it less attractive to use. One exception is the United Kingdom, where the availability of newer and more efficient oil-burning stations was demonstrated during the miners' strike in 1984 and early 1985, when oil-burn at its peak increased by over 0.3 Mbd. And in Italy some new oil-fired equipment is just coming onstream.

Industry (including non-energy uses) currently accounts for 22% of total oil use in the Community and over one-third of industrial energy demand is supplied by oil products (fuel-oil, naphtha and gasoil). The total volume of oil and other energies consumed by industry is likely to rise as a result of increased industrial output growth. And we could witness some upturn in oil's share of the total. But the ability of industry to take advantage of lower oil prices will be constrained in the short term by the limited availability of **dual-fired capacity**, which is less widespread in European industry than in the United States, and of mothballed oil- fired capacity. Available data on dual-firing are currently inadequate. But present information suggests that the only sector where the potential for short-term switching may be generally significant in terms of volume is the chemicals industry. It also seems, however, that the scope for rapid switching is greater in some Community countries (e.g. Belgium and FR of Germany) than in others (United Kingdom).

The **residential** and **tertiary** sectors currently account for about 28% of oil product demand in the Community and oil meets 40% of total energy demand in this sector. As far as households are concerned, the short-term **switching** possibilities are very limited. But questions do arise about the behavioural response of existing households with oil-fired boilers. Will they turn up their thermostats and enjoy higher levels of comfort rather than use the money saved on oil for other purposes? The available evidence gives no reason to suppose that lower prices will quickly induce a major change in habits generally, although lower-income households who have felt the financial pressures of high oil and energy prices could well increase their demands for heating in the autumn and winter — depending on the weather.

The **transport** sector is the most important single sector of demand for oil (accounting for 44% of the total), and oil provides some 98% of transport fuels.

The use of diesel in **freight transport** will enjoy some growth in response to the upturn in economic growth and industrial activity. But there is no reason to suppose that lower diesel prices will lead to less efficient running of the transport fleets (more running of empty loads). More likely the lower prices should reduce transport charges and boost company profits.

Passenger transport will also respond to a more favourable economic climate, with higher overall use of gasoline and diesel. Lower prices may also encourage increased leisure use of private cars (longer weekend motoring trips, travel by car rather than train or air for summer holidays). But the likely **direct** impact of low prices on short-term demand should not be great. We estimate the combined income and price effects as likely to produce a demand increase of 2.5% for motor gasoline in 1986. (Evidence from the United States, which is not, of course, directly transferable, points to an even more modest increase. Motor gasoline use there increased by less than 2% in the period 1981-84, when over the same period gasoline prices fell by 12% to retail consumers and GDP rose by 14%. Built into these figures is a significant improvement in specific energy consumption because of a major increase in the energy-efficiency of the US vehicle stock. Even so, the increase in overall demand is very modest.)

...and on the supply side

Falling oil prices will have no effect on the expected introduction of new **nuclear** stations this year (+ 12 GW of new capacity or 20% up on the 1985 figures).

As far as **coal** is concerned, the short-term effects on Community production seem unlikely to be great. World **coal** prices have already moved down and further substantial price reductions are foreseeable. To the extent that this continues and is translated into Community coal prices at the pit-head there will of course be important implications for the finances of the Community's own coal industry. The precise effects are complicated in practice by the long-term supply arrangements between the Community coal industry and its main consumers (the electricity and steel industries). But the level of national aids to current production (3 billion ECU in 1985) could rise substantially. The competitiveness of Community coal will also be further weakened if the dollar continues to fall against European currencies.

Will there not be a significant effect, however, on the production of **oil and natural gas** within the Community?

The economics at least suggest not. The reason is that the marginal costs of operating North Sea oil fields are low (significantly less than $10 per barrel in most cases), and in many cases probably not much above the cost to companies of shutting down wells temporarily. For natural gas the marginal costs are lower still than for oil. For a financially-viable company it will pay to continue producing — albeit at a temporary loss — rather than suffer an even bigger loss from not producing at all and incurring the costs associated with mothballing. But some of the smaller companies and traders may go to the wall because of the financial pressures; and as time goes on companies will reduce their spending on drilling and other work needed to sustain existing production levels. While the **short-term** effects on the Community's offshore production seem likely to be limited, the longer-term impact could be more substantial (see below). Moreover, falling oil prices could have a much more rapid effect on US onshore oil production. There are already indications of cutbacks in production from US stripper wells.

But if prices stay very low the longer-term effects could be much more significant

If oil prices stay very low for a number of years and the prices of other fuels stayed down with them, or even if investors and consumers **thought** that low prices were here to stay — there could be something of a reversal of the trends of the past 10 years away from oil towards a more diversified system of energy supply and a more efficient pattern of energy demand.

In their study of the energy outlook for the Community to 2000 — *Energy 2000* — the conclusions of which were summarized in *Energy in Europe* No 1,[7] — the Commission staff examined the possible effects on Community oil demand of sustained low oil prices. The conclusion was that if oil prices went on declining and then settled at around $20/bbl (1983 prices) throughout the 1990s, the Community's energy and oil demand could rise over the period to the end of the century by an additional 2 Mbd above the reference case ($35 barrel in the 1990s) — partly as a result of increased GDP growth, but more significantly because of a slow-down in the rate of reduction of energy- and oil-intensity in the Community economy.

There were very considerable uncertainties attached to this projection. It involved a good deal of judgment about the structural and conjunctural aspects of changes in energy efficiency (see below) and in respect of the long-term response of the prices of other fuels.

But if even anything like this demand increase were accompanied by a similar response in other industrialized countries (and notably the USA), and if some of the non-oil developing countries — with reduced constraints on their balances of payments — were at the same time to go for oil-based economic growth, the pressures on world oil supplies could increase substantially during the 1990s, leading inevitably to upward, perhaps sharply upward movements in price at some future point.

Against the possibility of sustained lower oil and energy prices, therefore, four main questions deserve closer scrutiny:

- The key element in determining the overall level of energy demand over time will be investment in **energy saving.** How will this be affected by sustained low oil prices? The answer is not straightforward (see box below). The effects of reduced interest in energy savings *per se* could be offset to some extent by the modernization of the capital stock through the increased stimulus to economic growth.

How could energy saving in the different sectors be affected by sustained low oil and energy prices?

(i) In a lower energy price climate **householders** and **housebuilders** could begin to pay less attention to good insulation and energy-efficient heating boilers. But the pace of improvements could be sustained by a strong regulatory environment.

(ii) In the **transport** sector the steady introduction of more fuel-efficient vehicles (and a consequent increase in the average fuel-efficiency of the vehicle stock) is likely to go on for several years as the fruits of earlier R&D programmes mature. But the pursuit of ever greater vehicle efficiency could be stymied by a lower price environment. And overall consumption of gasoline could be pushed up in any case by a gradual trading up of consumers to larger cars. Possible offsetting action could include new (voluntary) agreements with the motor manufacturers, regulatory measures and/or taxation.

(iii) In **industry**, the interest in **purely** energy-saving investments would undoubtedly fall. But the net effect on the energy efficiency of the industrial sector is far from clear. In the last issue of Energy in Europe we set out the results of a survey of industrial investment in energy saving, which indicated that the rate of purely 'energy' investment had **already** slowed down and that industry was primarily interested in reducing costs overall (and energy costs account for less than 5% of total costs for most industries). How much of industrial investment aimed at overall cost reduction is likely also to save energy as a by-product, and how much could actually increase energy demand? How far will the dynamic effects of a faster turnover of the capital stock and the more rapid introduction of new and more energy-efficient technology offset the reduced interest in energy saving *per se*? A key element of response will be to ensure that industrial consumers are aware of and have access to the most energy-efficient technology and processes.

- There could be a slowdown in investment in **nuclear power stations** and those fired by **coal and other solid fuels.**

  This is not going to happen overnight. But in those countries that are more heavily dependent on oil and gas for electricity generation than the Community average, programmes for conversion to coal and construction of new non-oil-fired stations could be adversely affected. This is not to say that there would be strong pressures on economic grounds to build **new** oil-fired stations — which would run counter in any case to a Community directive dating back to 1975. Any electricity utility contemplating new oil-fired investment would be well aware of the possibility that a large-scale return to oil-firing would push up the price of fuel-oil *vis-à-vis* its competitors and wipe out the immediate price advantages.

- The likelihood of reduced interest by industry and by governments in the development of **long-term alternatives to oil and new energy technologies.** In a low oil price climate it could become increasingly difficult to argue for resources to develop speculative and costly alternatives, despite their potential importance in a long-term perspective (see separate article on new and renewable energies).

- The effect on development of **new** North Sea oil and gas fields in the North Sea and in other high-cost areas inside and outside the Community. The prospect of low long- term prices would make it less attractive to develop new and more costly fields on the United Kingdom Continental Shelf and also new Norwegian fields. Last year's Brown Book — the British Government's annual report on North Sea activities — estimated that the average **new** North Sea field requires, to be profitable, an oil price of at least $17/bbl (1984 prices). While the real profitability will vary from field to field according to geology, likely production profiles, trends in development costs and taxation provisions, the official published estimate underlines the risk that sustained low prices would lead to a slowdown in the exploitation of fields already identified and a more rapid increase in Community dependence on oil and gas from non-OECD countries. There will also be an impact on the rate of **exploration** for new fields in high-cost areas, reducing the diversification of recoverable oil and gas resources in the long term. Indeed, there are already signs of some reining-in of expenditure.

So the maintenance of sound energy policies is essential...

The risks should not be exaggerated. Much will depend on the changing climate of expectations. But the risks will be real in the absence of clear commitments and appropriate policies to prevent their happening. Rather than reducing the need for effective energy policies, the prospect of lower oil prices for some time to come would make it even more necessary to keep on the course set after the first and second oil crises. The oil-importing countries — the Community and other industrialized countries, on the one hand, and the developing countries, on the other — should maximize the immediate economic benefits of falling oil prices, but without mortgaging our future economic security by running the risk of future oil price escalation.

...and agreement on new long-term energy objectives for the Community is a vital element

Last May the European Commission made proposals to the Council for new Community energy objectives to 1995. These were set out in detail in *Energy in Europe* No 2. The main elements are given in the box below.

Falling oil prices underline the importance of these objectives as a framework for national and Community action. They do not define the specific energy policy **measures** that may be required for their achievement (these will depend on when and where oil prices come to rest). But they provide a new set of essential policy **guidelines** to sustain progress in the efficiency of energy use, the diversification of energy supply, reduction in import dependence, the maintenance of non-oil investment programmes in electricity, and the promotion of longer-term alternatives to oil — all the key areas of concern listed below.

Progress is being made in discussion on these proposals by the Council of Ministers. No final decision was taken at the March 1986 Energy Council, but the prospects are now good for agreement — probably with compromises on some of the quantitative sectoral objectives originally proposed. (See Community news.)

In the meantime some governments have increased energy taxation...

Since the end of last year several Member States (Denmark, Greece, France, Ireland, Italy and the United Kingdom) have increased the taxation of energy — and especially of oil products. In some cases, these increases have reflected simply the normal indexation of excise duties, with respect to inflation. In others (notably Denmark, where there have been particularly large increases in taxes on gasoline, heating oil and heavy fuel oil, as well as increased taxes on coal and electricity; Italy; and Greece) the share of taxation in the total price of products to the consumer has increased much more sharply than warranted by inflation alone.

There seem to have been mixed motives in these decisions. Generally budgetary reasons have predominated;

Long-term energy objectives to 1995: the proposals on the table

Horizontal	Sectoral
— a coordinated Community approach to **external relations**	— greater **energy efficiency:** target reduction (25%) in the intensity of final energy demand by 1995
— greater integration of the **Community energy market**	
— promotion of **energy security**	— hold down dependence on **net oil imports** (to less than one-third in 1995) through continued oil substitution and promotion of exploration and development of Community oil
— progress in rational **energy pricing**	
— balanced pursuit of **energy and environmental aims**	
— support to the **regional** aspects of energy development	— maintain and, if possible, increase the market shares of **natural gas and solid fuels**
— continued promotion of **innovative technologies** through research, development and demonstration	— further progress in reducing dependence on **oil and gas for power generation** (limit to 10% by 1995) and increase nuclear share to 40%
	— substantial increase (tripling) in the contribution of **new and renewable energies** by 2000

but the increases have also been justified in part by reference to the declining price of crude and the desirability on energy policy grounds, of keeping the price of oil (and energy) up.

Oil product taxation provides over 20% of the receipts from indirect taxation in some Member States and falling oil product prices inevitably reduce the government tax take to the extent that the tax element is on *ad valorem* basis (VAT). Offsetting action may be attractive to some governments as a means of helping to reduce budget deficits. It also provides scope for shifting the burden of taxation from direct to indirect taxes with a view to stimulating investment rather than consumption. From a Community standpoint, it is clearly desirable that moves in this direction are taken in a coordinated manner so as to avoid widening the differences between Member States as far as the incidence of oil product taxation is concerned and creating potential distortions to competition.

In **energy policy terms**, increased taxation of oil products can be defended as one means of helping to restrain the growth in oil **demand.** But it does not, of course, encourage or protect oil **production.** In the United States, on the other hand, there has already been some discussion within Congress about the need to take fiscal action of a different kind, by imposing an oil import tax so as to protect domestic US oil producers. While some Administration officials have pronounced themselves firmly against such a tax, notably on commercial and industrial grounds, and President Reagan is reported to be opposed, renewed pressures in this sense could well arise in the USA and elsewhere if oil prices crash and are felt likely otherwise to stay at very low levels for some time. (Another, perhaps more attractive option for the USA, in budgetary terms, would be increased taxation of motor gasoline, which is low in comparison with Europe, although this would not of course help US oil producers.)

In the meantime Energy Ministers of the Community, meeting in the Council on 20 March, have clearly decided that in the developing oil market situation no new Community action is yet required on energy policy grounds (see Community news). The Governing Board of the International Energy Agency reached a similar conclusion at its meeting on 10 April.

* * *

The failures of the meetings of OPEC Ministers in March and April have sustained the uncertainty with respect to short-term oil market developments. It is impossible to judge how events will unfold over the coming weeks. But the Commission is monitoring the situation closely, bearing in mind the questions discussed above. It will make proposals to the Council of Ministers for action in the energy policy field as and when the developing situation requires. One immediate issue — highlighted by Ministers in the Energy Council — is the need to improve the **transparency** of the oil markets so that better and more rapid information is available on real market developments. With the spotlight on oil once again, it could also be timely to re-examine now whether to take steps to improve the **availability of security oil stocks** in the Community.

1 1 billion = 10^9. 1 trillion = 10^{12}.

2 *World energy outlook*, OECD/IEA, Paris, 1982.

3 It differs therefore from estimates published by other analysts and organizations (e.g. IMF) who have also tried to forecast volume changes in 1986. The aim here is simply to give an indication of the orders of magnitude of the revenue changes, all other things being equal.

4 EC 10.

5 EC 9 (excluding Greece).

6 COM(85) 570 final. Annual economic report 1985-86.

7 *Energy 2000* has recently been published in book form. See separate announcement in this issue.

Monitoring developments in oil refining and petroleum product imports

In line with the conclusions reached by the Energy Council on 15 March, 20 June and 11 November 1985 on oil refining and petroleum product imports, the Commission has continued to carefully monitor developments. The Commission set up a quarterly monitoring system in March 1985 and this was enlarged in July 1985 to cover all the OECD countries, following decisions taken at the IEA ministerial meeting.

At international level, the recent **major developments in Japan** are worth mentioning. Japan adopted a Law on 13 December 1985 permitting the importation of gasoline, gasoil and kerosene; it came into force on 6 January.

These changes in Japan's oil laws result from concerted efforts (a) by the Commission, acting at the invitation of the Council, in the form of bilateral contacts with the Japanese and American authorities during 1985, and (b) on the other hand, within the IEA/OECD.

The new Japanese law is a big step forward in that it permits certain products to be imported from now on, which, in practice, could not previously be placed on the Japanese market. It is not fully satisfactory, though, having regard to the IEA's conclusions of 9 July 1985, because in practice it reserves the right to import to refiners established in Japan. Nevertheless, only future developments in the pattern of imports will make it possible to assess the actual impact of these changes.

Concurrently with this progressive opening-up of the market the Japanese authorities decided to expedite the process of rationalizing the oil-refining sector. About 1 million barrels/day of capacity should be closed over the next three years, bringing total closures in Japan to approximately 30% by the end of 1988 — a level similar to that already attained in the USA and the Community.

Rationalization of the Community's oil-refining industry has continued: primary distillation capacity was cut from 666 Mt (579 Mt for EUR 10) at 1 January 1985 to 631 Mt (549 Mt for EUR 10) at 1 January 1986. Installed primary capacity in the Community at 1 January 1986 was 32% (35% for EUR 10) lower than the all-time high of 926 Mt in 1979 (844 Mt for EUR 10 in 1977).

Closures of refinery capacity announced so far by the oil companies for the period 1986-89 amount to 25 Mt and should reduce installed primary capacity to 606 Mt (524 Mt for EUR 10) by 1990.

The immediate effect of the fall in the oil price and the value of the dollar against the ECU has been to increase oil refining margins because oil product prices paid by consumers in national currencies have fallen less than the cost of crude oil delivered to refineries. The widespread introduction of netback contracts might also result in a more lasting boost for the profitability of oil refining.

Net oil product imports at Community level would appear from provisional 1985 data to have been about the same as in 1984, i.e. in the order of 29 Mt.

Total imports and exports of oil products changed little, **but the share of total product imports from non-Community countries continued to grow** (+10.8%), reaching 104 Mt.

The share imported from developing countries again rose, to the detriment of the industrialized countries in particular. Imports from developing countries now account for almost half the total (45%), with State-trading and industrialized countries supplying about 33% and 22% respectively.

Turning to the structure of imports, heavy oils (gasoils/fuel oils) now make up almost three-quarters of imports (73.4%), with light and medium oils relatively unchanged (17% and 0.7%); other products (8.5%) were down slightly on 1984.

In its forthcoming communication to the Council on oil refining and product imports — which the August 1986 issue of *Energy in Europe* will review — the Commission will examine the prospects for balance between refinery capacity and demand for oil products and give its estimate of future capacity needs. The situation will also be reviewed in the light of probable consumption trends resulting from oil prices which will probably be lower than previously envisaged and of oil product imports from non-Community countries.

The Euratom nuclear safeguards system (Part 2)

In the last issue of **Energy in Europe** *an introduction to the Euratom nuclear safeguards system was given. Following this description of the historical and political background, the operational side of safeguards is described in this article.*

Introduction

In the first article on the Euratom nuclear safeguards system, the history and operation of the system were described with particular attention being paid to the development of the legal structure. This article treats the practical implementation of operational safeguards activities in some detail. The resources required are explained, the important relationships with the International Atomic Energy Agency (IAEA) are described and the future outlook for safeguards is discussed.

Outline of safeguards activities

The Euratom safeguards **inspectors** conduct **verification activities** at the nuclear installations in order to:

(i) check, as mentioned in the first article, the operator's declaration of the basic technical characteristics;

(ii) check that the operator's system performs as described in the basic technical characteristics, and in a satisfactory manner;

(iii) check the internal consistency of the accounting system, for example, that issues from one account are correctly recorded as receipts into the second relevant account;

(iv) check the consistency of the operator's accounts with his operating records and with the reports he makes periodically to Euratom;

(v) check the consistency of the operator's accounting system with other accounting systems; a comprehensive system of checking across the Euratom area that material sent by one operator is correctly recorded and reported as being received by another operator is implemented at Euratom headquarters in Luxembourg;

(vi) check the consistency of the physical reality with the operator's records on inventory changes and physical inventory determinations; movements may be checked on a number of levels, namely movements between material accounting areas on the same site, movements between installations within a Member State, movements between two Member States and movements involving a Member State and a country outside the Community. In the first three cases, checks can be implemented at either shipper or receiver, if the shipment is sealed.

A comprehensive system of verification necessarily includes all of these activities. However, it is clear that most attention and most resources are concentrated on comparing the physical reality with the accounts, actions which are essential to obtain the assurance that no diversion from declared use has occurred.

The frequency and type of inspections vary from installation to installation depending on the quantity and nature of the materials handled and the foreseen operations. For example, some installations are inspected on a continuous basis while others may only be inspected once per year.

At Euratom headquarters in Luxembourg, there is a complex infrastructure of **support to inspection activities**. One section handles all accounting reports and notifications from operators, processes them and provides the basic data to the inspectors to perform their activities. Any outstanding queries are also provided to the inspector before he leaves. Inspection planning, including the use of instruments, is performed on a quarterly basis, updated monthly and, for those installations subject to both IAEA and Euratom inspections, coordinated with the IAEA. Another section provides logistical support in making measuring instruments, seals, cameras and other devices available to the inspection divisions, and in arranging for the destructive analysis of samples taken by the inspectors.

Evaluation of inspection activities and results is carried out at two levels. The first level consists of that checking and evaluation which is possible during the inspection, mostly concerned with consistency of data and absence of gross defects but not with detailed analysis. Evaluation at this level also includes the important task of check-

ing that the operator's declarations of basic technical characteristics are still valid.

Subsequent, second-level, evaluation is carried out at headquarters with the support of the laboratories of the Joint Research Centre (JRC) of the European Community and includes the following activities:

(i) checking seals which have been removed, the containment to which the seal related having, of course, already been checked during the inspection;

(ii) developing and reviewing surveillance films;

(iii) evaluation of the analysis of samples which have been destructively analysed;

(iv) evaluation of data from 'non-destructive assay' , i.e. from measurements of neutron and gamma ray emissions from nuclear material; these data, like the data from destructive analysis, are compared systematically with the operator's records and with reports concerning the relevant material;

(v) evaluation of shipper/receiver differences between installations;

(vi) evaluation of overall material balance data for each 'material balance area'; this may be a complicated exercise, depending on the kind of installation under consideration; the precision and accuracy of all the components of all the material balances need to be taken into consideration and computer tools have been developed to perform this analysis;

(vii) assessment of certain performance data over a period of time, e.g. data on the book-physical inventory difference resulting from a physical inventory exercise, data on discards and wastes, etc.

The results of the above evaluation can give rise to identification of anomalies which require explanation. In such cases, Euratom can initiate a number of follow-up actions following a graduated response. These follow-up actions can be:

(i) requests to the operator to explain apparent anomalies;

(ii) significant increase of inspection frequency and intensity, or a change in inspection strategy; and, ultimately,

(iii) sanctions as specified in Article 83 of the Euratom Treaty, ranging in severity from a warning to the withdrawal of source or special fissile material.

The criteria for inspection planning and the inspection goals are designed in such a way as to enable Euratom to fulfil its undertakings under the Treaty and the agreements referred to above.

Resources

To perform the activities mentioned above, the Commission employs a team of inspectors plus appropriate administrative and logistical support in Luxembourg. The staff of the Euratom Safeguards Directorate comprises presently 195 officials of whom over 70% are inspectors nominated by the Commission following an extensive security clearance procedure. The need for staff is continually assessed in relation to the increasing commitments. The Directorate, based in Luxembourg, is one of the six Directorates in the Directorate-General for Energy (DG XVII). The cost of operating the Directorate in 1985 will amount to approximately 15 MECU (excluding the research budgets, in support of safeguards, of the Joint Research Centre). In 1984, the Euratom inspection effort was approximately 6 100 man-days spent in installations during more than 1 400 inspections.

For verification and control of the material, Euratom has at its disposal a number of technological resources. Non-destructive assay (NDA) instruments are available to perform direct measurements on the quantity and isotopic quality of plutonium and uranium in different forms. For calibration purposes, materials including plant-specific reference materials, owned by Euratom, are in constant use. For certain bulk products such as uranium hexafluoride and input and output solutions in reprocessing plants, samples are routinely taken and sent for destructive analysis to the laboratories of the JRC. Finally, containment and surveillance measures ensure that the continuity of knowledge relating to specific nuclear material or a place of work is maintained. To this end, optical surveillance units are installed which, for example, take photographs at pre-determined intervals, are exchanged periodically, and the records reviewed. Extensive use is made of seals, particularly for material which may stay unchanged between verifications. For the massive task of storage, retrieval and analysis of the reported data, preparation of the reports for the IAEA and other tasks, the Directorate operates a dedicated central computer to which 36 terminals are connected. Several smaller computers are also used for tasks ranging from on-site

evaluation of measurement results to verification and evaluation of operators' data in the field.

The Euratom Safeguards Directorate does not itself conduct any research activities but relies heavily on the Commission's research facilities of the JRC. Instruments have been designed for general and specific use in the field and substantive advances made in containment and surveillance techniques. The JRC was also actively involved in the programme on plant-specific standards referred to above. Contact is maintained with research centres outside Europe, in particular in the USA, which has yielded particularly beneficial results in the field of NDA instrumentation.

In order to keep abreast of developments, Euratom participates in the European Safeguards Research and Development Association (ESARDA), a body which aims to coordinate research in safeguards within Europe and to promote exchanges of views and information between operators, research organizations and the Euratom Safeguards Directorate. Euratom is also involved in a number of research support programmes to the IAEA directed by countries in the Euratom area, and indeed Euratom, via the JRC research centres, has its own such programme of support to the IAEA.

Cooperation with the IAEA

As mentioned in the first article, the biggest part of Euratom inspection work also involves the IAEA. Euratom planning for inspections is discussed with the IAEA at regular meetings and there is cooperation in the areas of follow-up procedures for anomalies, control of nuclear material in transit, definition of inspection goals and criteria and implementation of advanced safeguards instruments, methods and techniques. In order to be able to implement the Verification Agreements described above, it was necessary to negotiate special understandings and working arrangements in the following areas:

(i) inspections in particularly sensitive installations; it was agreed, for the few plants in question, to form joint teams of inspectors to enable both inspectorates to draw their conclusions independently with a minimum of duplication and intrusion to the operators;

(ii) participation of IAEA inspectors in Euratom inspections in other installations; working arrangements were agreed for the level and nature of participation, with particular attention being given to light-water reactors and low-enriched uranium fuel fabrication plants;

(iii) activities which should be performed by IAEA inspectors through observation of Euratom inspectors and also, therefore, those activities which could be performed other than through such observation;

(iv) procedures for attributing the costs of the implementation of safeguards.

As noted in the first article, a large number of Facility Attachments have been successfully negotiated and more than 190 are in force but a certain number remain to be concluded, particularly for recently established installations. These negotiations have required, and will continue to require for some time to come, a major effort by the Euratom Safeguards Directorate implying as they do many rounds of discussions for each document, in some cases even spread over a number of years. The application of the special understandings and working arrangements agreed between the two organizations referred to earlier is kept under review by the Liaison Committee established at two levels, as provided for in the Verification Agreement.

Outlook

The technical means for safeguards implementation have been changing rapidly over the past few years and this trend is expected to continue. In the field of NDA instrumentation, major advances have been made in the range and applicability of available hardware. For example, instruments are now available to measure both fresh and irradiated fuel elements, something which was not possible even three years ago. In the field of optical surveillance, advanced video units are being brought into routine use to complement the twin film camera units which have been in use for some time and major advances in seal technology have meant that a variety of sophisticated seals are being used in the field, for instance seals which can be electronically interrogated *in situ*. All these advances have led to a need to rethink safeguards strategies in certain areas, the requirement to satisfy new training needs, a reorganization of the logistic support to the inspection divisions and changes in the ways in which inspections are carried out.

An important change in the design and operation of nuclear installations has become evident over the past few years. This has had important implications for safe-

guards implementation. In recognition of changing, more stringent safety and security requirements, in particular the need to reduce radiation uptake of personnel, installations are now designed in which the nuclear material subject to safeguards control is rendered less accessible than was the case previously. Installations are also becoming larger and more complex with the result that safeguards strategies have had to be adapted to accommodate these new features. Perhaps the main result is that there has been a marked increase in the number of devices specifically designed into installations for safeguards use. Examples of this trend are an installed level-monitoring device in a storage area handling large quantities of acidic solutions of plutonium nitrate, an installed system to monitor and record the movement of fuel between different inaccessible locations at a fast reactor and an installed device to count and sample automatically the input of fuel pebbles to a high-temperature pebble-bed reactor. All of these devices are designed to give information independent of the operating data leading to an objective safeguards assurance.

Following the start of the implementation of the NNWS Verification Agreement, the work of the Safeguards Directorate changed considerably, because of the presence of IAEA inspectors under different working schemes and arrangements. This was complicated by the need to maintain a certain level of safeguards in those installations not inspected by the IAEA. Subsequently, the number of staff and resources have increased considerably and will need to be further augmented as the additional inspection commitments are honoured, keeping pace with the accession of new members of the Community and with the growth of the peaceful use of nuclear energy in Europe.

The cost of both Euratom and IAEA safeguards in the European Community is negligible when compared to the cost of operating the nuclear fuel cycle and may be regarded as a worthwhile investment which allows the independent assurance to be given relating to peaceful use, which is essential to enable the continued supply of nuclear material for peaceful nuclear power programmes.

Community approach to develop new and renewable energy sources

On 20 January 1986 the Commission approved a communication to the Council on a Community approach to develop new and renewable energy sources. This article describes the general context and sums up the salient points. Solar energy, wind power, geothermal energy, biomass, energy from waste, hydroelectricity and energy from the sea are the sources considered.

Context

Since 1973 the Community has been making great efforts to reduce its dependence on oil imports and to boost its domestic supplies. But despite the successes in improving energy efficiency over the last few years and despite current energy price trends, the Community is still vulnerably dependent on oil imports. It must not relent, but must press ahead with its determined energy-saving and oil- substitution policy.

In this context, new and renewable sources have a definite role to play, particularly in the medium and long term. Today's schemes to make greater use of these sources offer an added long-term insurance policy for greater security of energy supply for the Community.

Benefits

The chief advantage of these sources is that they provide a means of producing more energy within the Community and, in the process, of diversifying supply and reducing the Community's dependence on energy imports.

What is more, most of them are decentralized sources, perceived as causing little pollution and, for that reason, more readily accepted by the public.

At the moment falling energy prices are making it difficult for these new sources to compete against conventional ones. But it would be a great mistake to abandon efforts to exploit these sources and negate all the research, development and demonstration work just as we are beginning to reap the benefits.

Why a Community approach?

Very often the prospects for harnessing new and renewable energy sources depend on local geographical conditions. Apart from biomass and waste, both of which can be used in every Member State, the availability of exploitable quantities of the other sources depends on climate, geology and hydrographical conditions. Consequently, they do not present the same interest in every part of the Community. None the less a degree of balance is essential to avoid uncoordinated or even disparate development and duplication of effort. By launching the Community R&D programme in 1974, and its demonstration programme in 1979, the Community provided the driving force to set the ball rolling with these new technologies. Technological development is the main thrust of all these programmes. Only if the R&D and demonstration projects and the funding are sustained can further appreciable advances in exploitation of new and renewable energy sources be expected.

The right legal, financial and administrative framework for developing the sources must also be created. All too often this is missing. Some Member States are pursuing policies to develop the sources to one degree or another, but generally speaking without consulting each other and with no coordination at Community level. Each of them is concentrating on its own most promising areas without sufficiently exploiting the possibilities for working together. Yet only a concerted European effort will enable Europe to keep up with the USA and Japan.

Another consideration is that the Community must keep a vigilant watch on development of these sources, not only because of the energy factors outlined above but also for industrial and commercial policy reasons. These technologies could be exported to large markets outside the Community. What is more, most of them are highly innovative: and investment in innovative energy technology creates employment in high-technology industries where such jobs are especially valuable.

This is the thinking behind the Commission's communication. It is designed first to provide clear, concise information on the real prospects for harnessing these sources by the turn of the century and, second, to stimulate the development and exploitation of new and renewable sources in the Community.

Potential

The theoretical potential of new and renewable energy sources is enormous, but only a very small fraction of it can be tapped at the present level of technological development. Technical imponderables, unresolved problems and price trends for conventional sources can confound any attempt to estimate the actual market penetration rate of these new sources in the Community in the years ahead. Commission staff once calculated that they could cover something like 5% of energy demand in the Community by the turn of the century.

But that was before the oil price collapse of recent weeks: it was an estimate based on the assumption that energy prices would remain stable. Persistently low oil prices would be bound to delay the breakthrough of these new sources on the energy market.

What is the approach?

The approach consists of a combination of general measures for all the sources in question and of sectoral measures for individual sources. They vary in type but are concerned with:

(i) coordinating and harmonizing existing or planned measures; or

(ii) appraising possible future measures.

These measures will be implemented step by step:

(i) studies by Commission staff or by specialized national agencies;

(ii) a Working Party of Community experts on the development of new and renewable energy sources, comprising leading figures from the worlds of science and industry, to assist the Commission in defining and implementing the activities called for by the Community approach and to bring about the necessary follow-up in the Member States;

(iii) collaboration with the consultants advising the Commission departments for the demonstration programme;

(iv) adoption of Community measures by the Council;

(v) monitoring of the Community measures by the Commission once they have been adopted.

Four **general measures** are planned:

(a) survey, examination and comparison of national legislation and measures to promote the use of new and renewable energy sources

The aims of this operation are: to coordinate action at Community level, to consider whether a Community legislative framework is needed in certain fields, and to remove the obstacles militating against development of these sources.

(b) examination of the need to set up agencies for new and renewable energy sources in Member States without such an agency

Special *ad hoc* bodies, perhaps in the form of government agencies, could help public authorities, local authorities and small firms to solve the legal, administrative and financial problems of project promotion, depending on the field concerned and the interests of the Member States.

(c) study of possible measures to market technologies exploiting new and renewable energy sources

Dissemination of technologies developed and tested in the research and demonstration projects both within and outside the Community, and in particular to developing countries, could create significant new markets for the industries concerned, whether for the equipment itself or for technology transfers. The need for such promotion measures should therefore be studied.

(d) setting up a system for collecting and disseminating information on new and renewable energy sources

At present the results of R&D and demonstration projects are disseminated via several media, including the Sesame data base, the Videotex system, publication of reports, brochures and newsletters, and the organization of seminars and meetings of promoters of similar projects.

This system should gradually evolve to handle information from sources other than the R, D&D programmes.

One other general measure is that the Council recently extended the R, D&D programmes to the period 1986- 89. The Commission will keep up the momentum of these programmes and ensure that they remain at the leading edge of technological progress.

The main **sectoral measures** proposed are:

Solar energy

Definition of methods of comparing solar equipment to facilitate performance comparisons and choice of installations.

Biomass and energy from waste

Setting up a system for helping to fund investment in equipment burning fuels derived from biomass and waste.

Geothermal energy

Consideration of a Community scheme to pass on geothermal data obtained in the course of oil and gas prospecting in the Community.

Examination of the feasibility of creating a guarantee system to cover the risks involved in sinking geothermal boreholes.

Wind power and low-power hydroelectricity

Coordination of the work done by the national wind turbine testing centres.

Establishment of common criteria governing contractual relations between public electricity producers and distributors and operators of wind power stations or low-power hydroelectricity plants.

Examination of financial measures to promote the exploitation of low-power hydroelectricity, in particular by local authorities and small businesses.

Community financial support (grants and loans) to the energy sector in 1984

In 1984 Community financial support (grants and loans) for the energy sector amounted to **3 900 MECU**, *of which* **1 458.7 MECU** *took the form of* **grants** *and* **2 455.1 MECU** *the form of* **loans.**

Grants from the general budget and the ECSC budget

From about 2 000 MECU in 1983, Community subsidies to the energy sector dropped considerably in 1984, to 1 460 MECU. The marked reduction in ERDF support and the lesser impact of the specific measures relating to energy strategy (in the Federal Republic of Germany and the United Kingdom) were not offset by the doubling of appropriations under the energy chapter of the general budget and the marked increase in subsidies from the ECSC budget. Expenditure under the chapter on energy R & D remained virtually unchanged. However, if the specific measures are left out of account, the drop is less pronounced, the fall for energy grants then being from 1 250 MECU to 1 000 MECU.

Table 1 gives a breakdown of these grants by budget heading for 1983 and 1984.

Table 1

	1983 MECU	1983 %	1984 MECU	1984 %
Chapter for energy policy	111.6	5.5	211.7	14.5
Specific measures (Federal Republic of Germany and United Kingdom, Chapter for energy research	340.4	16.9	348.0	23.9
ERDF	646.0	32.0	312.4	21.4
EMS interest subsidies	63.3	3.1	—	—
EAGGF Guidance Section	2.2	0.1	4.4	0.3
ECSC budget	71.6	3.6	126.2	8.7
Total	2 019.5	100.0	1 458.7	100.0

The very large increases from 1983 to 1984 in the energy chapter of the general budget and in the ECSC budget mentioned above largely went to the solid fuel sector, to which 346 MECU in grants (including demonstration projects) was allocated in 1984 (24% of the total).

Alongside the measures to promote the restructuring of the Community coal industry, which were decided on in 1984 and financed under the general budget, a much larger share of redeployment grants under Article 56(2)(b) of the ECSC Treaty went to colliery workers than to steelworkers in 1984, in contrast with previous years (see the 1984 ECSC Financial Report).

Table 2 gives a breakdown of these grants by sector. Table 3 gives a more detailed breakdown for 1984.

Table 2

	1983 MECU	1983 %	1984 MECU	1984 %
Solid fuels	248.0	12.3	352.6	24.2
Oil and gas	392.9	19.5	257.2	17.6
Nuclear energy	628.4	31.1	434.7	29.8
Electricity	663.4	32.7	283.6	19.5
New and renewable energy sources	49.5	2.5	53.0	3.6
Rational use of energy	28.1	1.4	49.2	3.4
Other	9.2	0.5	28.4	1.9
Total	2 019.5	100.0	1 458.7	100.0

Loans granted to the energy sector under the Community's financial instruments

The general levelling-off in overall Community lending was especially noticeable in the energy sector. After several years of continued rises, 1984 saw a reduction of about 10% compared with 1983, as loans allocated to energy projects under all the Community financial instruments fell from **2 720 MECU** in 1983 to **2 460 MECU** in 1984 (34.1% of the total compared with an average of about 42% during the period 1979-83).

The 1984 total of 2 460 MECU breaks down as follows:

(a) By source of funding

The EIB is the only Community lending body which stepped up its energy financing activities in 1984. Rising

Table 3:
Community grants for energy projects in 1984 by recipient sector and source of funding (general budget and ECSC budget)

	MECU	%
(a) Solid fuels	**352.6**	**24.2**
Demonstration projects	32.5	2.2
• New technologies	12.5	0.8
• Liquefaction and gasification	20.0	1.3
Restructuring of the coal industry	60.0	4.1
Specific measures	133.9	9.2
ECSC budget	126.2	8.6
• Interest subsidies	6.3	0.4
• Coking coal	6.0	0.4
• Research and development	18.9	1.3
• Redeployment of workers	95.0	6.5
(b) Oil and gas	**257.2**	**17.6**
Community technological development projects	36.0	2.4
Specific measures	28.0	1.9
ERDF	193.2	13.3
(c) Nuclear fission	**248.1**	**17.0**
Special measures	127.2	8.7
• Proven reactor types	56.5	3.9
• Prototype reactors	70.7	4.8
Transport of radioactive materials	0.3	—
Research and development	120.6	8.3
• Direct action — JRC	95.0	6.5
• Indirect action	24.7	1.8
• Studies (Chapter 72)	0.9	—
(d) Nuclear fusion	**186.6**	**12.8**
Research and development	186.6	12.8
• Direct action — JRC	15.8	1.1
• Indirect action	170.8	11.7
(e) Electricity	**283.6**	**19.5**
Specific measures	161.3	11.1
• Power stations	91.9	6.3
• Underwater interconnection	69.4	4.8
ERDF	117.9	8.1
EAGGF Guidance Section	4.4	0.3
(f) New and renewable energy sources	**53.0**	**3.6**
Demonstration projects	27.8	1.9
• Biomass and waste-derived energy	8.0	0.5
• Solar energy	7.0	0.5
• Wind energy	7.0	0.5
• Hydroelectric power	5.8	0.4
Specific measures	5.2	0.3
ERDF	1.3	0.1
Research and development (including solar, hydrogen and geothermal)	18.7	1.3
• Direct action — JRC	6.1	0.4
• Indirect action	12.6	0.9
(g) Rational use of energy	**49.2**	**3.4**
Demonstration projects	26.7	1.8
• Energy saving	21.0	1.4
• Electricity and coal	5.7	0.4
Specific measures	0.4	—
Research and development	22.1	1.5
• Direct action — JRC	4.7	0.3
• Indirect action	17.4	1.2
(h) Chapter 70 — others	**28.5**	**1.9**
Grand total	1 458.7	100.0

from 1 643 MECU in 1983 to 1 895 MECU in 1984, loans from the EIB's own resources showed a nominal increase of 15%. With about 77% of total loans granted in the energy sector, the EIB greatly increased its lead as the chief lender of funds to the energy sector in 1984.

NCI loans, however, which the EIB is empowered to grant and administer, fell steeply from 315 MECU in 1983 to 250 MECU in 1984.

Having remained stable at around 360 MECU for three years, Euratom loans fell sharply to 186.0 MECU, returning to their 1980 level.

The contribution of this Community financial instrument to nuclear investment, which should be its own special field, fell from 45-46% in 1982 and 1983 to 20% in 1984, the lowest level since it was set up.

ECSC loans for investment in the production and marketing of Community coal fell considerably: from 396.2 MECU in 1983 to 124.4 MECU in 1984. This drop was chiefly caused by the virtual drying-up of financial support for the coal industry (a single loan of 12.7 MECU to a German undertaking) and the cut-back in loans to finance thermal power stations.

(b) By recipient sector

The very low level of ECSC activity in support of the Community coal industry was reflected in both the absolute and relative levels of loans made to the **solid fuels** sector. At 38.8 MECU and 1.6% of the total, they were smaller than in 1981, already an exceptionally low year.

The **oil and gas** sector with 625.8 MECU took the second largest share of Community energy financing. Unlike the situation in 1983, projects to tap deposits on the Community Continental Shelf (North Sea and Adriatic Sea) took up about two-thirds of the total, the rest be-

Table 4: Loans granted (1984)

(MECU)

	Solid fuels	Oil and gas	Nuclear energy	Electricity	RUE and renewable soruces	Total	%
EIB	7.1	466.8	719.4	345.9	355.5	1 894.7	77.1
NCI	19.0	159.0	—	16.0	56.0	250.0	10.2
ECSC	12.7	—	—	65.8	45.9	124.4	5.1
Euratom	—	—	186.0	—	—	186.0	7.6
Total	38.8	625.8	905.4	427.7	457.4	2 455.1	
%	1.6	25.5	36.9	17.4	18.6		100.0

ing allocated to natural gas transport and distribution projects in the Federal Republic of Germany, Denmark and Italy.

More than 900 MECU in EIB and Euratom loans (36.9% of the total) were allocated to power-station construction projects and fuel storage and reprocessing facilities in all the Member States which are at present implementing nuclear energy development programmes. In 1984, the EIB (50.3 MECU) and Euratom (77.5 MECU) again provided financial support for the European project for the construction of the Super-Phénix nuclear power station. By 31 December 1984 the Commission had paid out a total of 1 777 MECU in Euratom loans since these began in 1977.

The financing of **electricity investments** in the Community by the ECSC (three loans of 65.9 MECU to undertakings established in France), the EIB (345.9 MECU for generation and long-distance transmission projects and the interconnection of the British and French high-voltage grids) and the NCI (16.0 MECU for a lignite-fired power station in Greece) together reached a total of 427.7 MECU, or 17.4% of all energy loans granted.

At 457.4 MECU, or 18.6% of the total, the proportion accounted for by loans for the **rational use of energy** and **new energy sources** almost doubled against 1983.

This operation was mainly carried out by the EIB (355.5 MECU), which gave support either directly or under the global loan system in the FR of Germany, Denmark, France and Italy for the financing of initiatives to reduce energy consumption and encourage the use of alternative sources in the energy infrastructure, construction and industrial sectors.

Only two global loans were granted to Italy for this purpose under the NCI (27.2 MECU) but that country also received the first Community loan (28.8 MECU from NCI resources) for solar energy to help finance an ENEL programme to install solar panels for the production of hot water in industrial and tertiary-sector buildings.

Still on the rational use of energy, the ECSC schemes to promote the consumption of Community coal started in 1983, took off on a larger scale in 1984 with the grant of nine loans carrying interest-rate subsidies to a total of 45.9 MECU to undertakings established in the Federal Republic of Germany and the United Kingdom.

(c) By recipient Member State

As in 1983, **Italy** received the largest share of Community energy financing in 1984: its share grew from 27% in 1983 to 34.5% in 1984.

The **United Kingdom** (23.8%) and **France** (14.8%) again came next after Italy with a steady flow of applications for Community loans to energy projects. All Community loans (EIB and NCI) for energy projects in **Denmark** (9.1%) went to the oil and gas sector: a platform for the exploitation of a North Sea oilfield and natural gas transport and distribution networks. As usual, **Belgium** (5.2%) made use of Community loans (EIB and Euratom) for nuclear electricity-generation projects.

Table 5: Loans (1984)

(MECU)

	B	D	DK	GR	F	I	UK	Community	%
EIB	32.5	134.3	125.9	88.6	206.3	729.6	577.5	1 894.7	77.1
NCI	—	—	97.7	35.0	—	117.3	—	250.0	10.2
ECSC	—	51.7	—	—	65.8	—	6.9	124.4	5.1
Euratom	95.1	—	—	—	90.9	—	—	186.0	7.6
Total	127.6	186.0	223.6	123.6	363.0	846.9	584.4	2 455.1	
%	5.2	7.6	9.1	5.0	14.8	34.5	23.8		100.0

Table 6: Energy loans granted by Community financial institutions (1974-84)

(MECU)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
BEI	406.7	373.3	376.3	379.5	737.8	997.0	1 112.2	1 451.4	1 228.5	1 643.3	1 894.7
NCI						149.5	108.0	93.6	131.4	315.4	250.0
Euratom				96.9	70.2	152.4	181.3	357.6	361.8	366.4	186.0
CECA	73.5	160.9	179.9	216.9	297.6	278.7	323.2	57.2	302.9	369.2	124.4
Total	480.2	534.4	556.2	693.3	1105.6	1577.6	1724.7	1 959.8	2 024.6	2 721.3	2 455.1

The **Federal Republic of Germany** (7.6 %), on the other hand, widened its use of Community loans to include small-scale waste-heat utilization projects, in addition to its more customary projects in the nuclear energy and oil and gas transport fields. In 1984 **Greece** (5.0%) continued to use EIB and NCI loans mainly to finance its open-cast lignite-mining programme and for building lignite-fired and hydroelecric power stations.

In 1984 **Ireland**, for energy at least, joined the **Netherlands** and **Luxembourg**, which do not usually borrow Community funds.

The history of Community energy policy

Energy in Europe No 3 discussed the first Community energy policy instrument, the Protocol of Agreement of 21 April 1964. Until 1968, when they were merged, the three institutions continued to make proposals and implement policies in their specific fields.

Thus, on 16 February 1966, the Commission of the European Economic Community sent the Council a first memorandum on Community policy on oil and natural gas which, being covered by the Treaty of Rome, were the responsibility of Mr Marjolin, Vice-President of the Commission in Brussels. The Commission memo told the Council what had already been done in these two sectors and suggested possible future paths.

The Commission had previously consulted the High Authority of the ECSC and the Euratom Commission and sought the opinion of the senior officials in the Member States responsible for oil and natural gas policies. These consultations were carried out in a working party chaired by the Commission, which met in an advisory capacity from one to three times a year.

The general policy outlines contained in the memo of 16 February 1966 reflected the objectives defined by the governments in the Protocol of 21 April 1964. It is worth recalling some of the ideas formulated at the time.

Oil

- The stated objective was 'to harmonize progressively the trade policies of the Member States so that conditions by the end of the transition period (1970) will be right for implementing a common policy'.

This was to include:

(i) where necessary, granting tax relief or aid in compliance with the Treaty to facilitate the marketing of Community output that was not fully competitive with imported crude oil, in order to promote the economically rational development of Community production;

(ii) pursuit of consultations with the oil companies to gain an overview of oil supply conditions in the Community, and continued negotiations with the governments of the non-member countries concerned (particularly the United States and United Kingdom) on contingency measures for a possible supply crisis, in order to diversify sources of supply at the lowest and most stable prices possible;

(iii) comparison of the tax provisions in the Member States and moves towards harmonization on the basis of the Treaty of Rome in the light of the objectives of the common energy policy, in order to harmonize tax arrangements for fuels and other oil products;

(iv) the memo also touches on two issues which were later to become the subject of Community legislation: the common policy on stocks and annual information on investment programmes in the oil sector covering research, production, refining and transport by pipeline.

Natural gas

- The memo remarks on the need for annual exchanges of information on investment programmes and recommends that common principles should be drawn up on the transport by pipeline of natural gas within the Community and that the safety regulations for the construction and operation of these pipelines should be harmonized.

The Council took formal note of this first Commission memo on Community oil and gas policy in its Decision of 10 July 1967, and approved the Committee of Permanent Representatives' report on basing future policy in this field on its conclusions.

The EEC, ECSC and Euratom executives were merged in 1968 and Mr Wilhelm Haferkamp was appointed the first Member for Energy in the new Commission.

On 18 December 1968 the Commission transmitted its first communication to the Council, entitled **'First Community energy policy guideline'**. The merger of the Community's civil service made it easier to devise global approaches to the energy policy issues affecting coal, oil, natural gas, nuclear energy and electricity. The Commission said it had based its policy paper on the 1964 Protocol and the 1967 Council Decision. The proposal was supplemented by two working papers, **'The current situation on the Community energy market'** aimed at establishing agreement on the principal features of the energy economy and **'Fundamental problems of a Community energy policy'** containing a general report on the various energy sectors.

This first policy guideline was presented against the background of growing energy consumption in the Community of Six. Energy consumption had risen from 289 Mtoe in 1950 to 461 Mtoe in 1960 and 636 Mtoe

in 1967 — annual rates of increase of 4.8% and 4.7% respectively. The percentage shares of the energy sources changed greatly during this period: coal dropped from a share of 74% in 1950 to 32% in 1967 whereas oil increased its share from 10% in 1950 to 51% in 1967.

This first policy guideline drew up a framework for action comprising estimates and medium-term goals, annual reviews of economic activity and contingency measures for supply problems. It aimed at creating the necessary conditions for implementing all the measures proposed.

This was the birth of the Community energy objectives, as the Commission was already proposing to make energy supply and demand forecasts for a period of about five years. These estimates had to be integrated with the longer-term outlook in order to take account of process developments and changing market structures. Such estimates were meant to be used for the different types of energy, e.g. for keeping on course towards the general objectives for coal as laid down in the ECSC Treaty, and for target programmes in the nuclear sector as provided for by the Euratom Treaty, extended to cover electricity.

The Commission also planned to draw up annual reports on the energy situation and develop a programme of adjustment measures, including suitable procedures for their implementation. Anticipating supply problems, it also introduced a Directive adopted by the Council in 1968 on maintaining stocks of crude oil and oil products. Other sections concerned free movement of goods, freedom of establishment, competition rules, indirect taxation, trade policy, investment policy, investment financing and research.

The paper contains much that is still relevant today.

For instance, the section devoted to investment policy warns of 'the risk of considerable over-investment in oil-refining capacity' and, with regard to electricity: 'lack of coordination of investment at Community level is an obstacle to effective power-station siting policy and threatens to impede optimum utilization of large-scale plant and the development of trade between the Member States. For this reason the Commission proposes to introduce a notification system for investment projects of Community interest in the fields of production, transport and distribution of energy, alongside the procedures applied under the ECSC and Euratom Treaties'.

In a next issue we shall recall the 1974 Washington Conference and a later article will discuss the CIEC (Conference on International Economic Cooperation) held in Paris from 1975 to 1977.

Third-party financing: an opportunity to realize energy savings

'Third-party financing' means the funding of energy saving investments by an outside company, using the energy savings themselves to pay for that investment. This approach is conceptually simple and attractive: for example a building owner, or factory owner, has an energy-inefficient facility but either does not possess the finance (or is unwilling to spend available finance) or the technical ability to undertake a programme to improve energy efficiency. However, this inefficiency can be exploited by an outside company whose business is the achievement of energy savings. The outside company is paid by taking a share of the energy savings produced. A study recently prepared for the Commission, by the Association for the Conservation of Energy, London, results from a belief that this approach — which has helped stimulate investment in energy saving in North America — could offer opportunities to Europe. The results of the study are.summarized below (the complete report will be published in English, in the summer[1]).

All available studies show that investment in energy efficiency within the European Community is not occurring at the optimum rate — because of numerous barriers in the market place. One such barrier is lack of finance, or often, an unwillingness to spend available finance on energy-saving investments even though many have very attractive rates of return.

This barrier, and others such as lack of technical knowledge or lack of credibility for energy-saving technologies, can be overcome by the use of third-party financing. **This approach could help to ensure that the Commission's ambitious energy efficiency target for the Community of an improvement of 25% in energy efficiency by 1995 can be met** (see *Energy in Europe* No 2 — New Community energy objectives).

Financial analysis

There are a number of specific financing approaches which can be categorized as third-party financing. These include shared savings, 'first out', leasing, and guaranteed savings. Of these the two most innovative and promising are shared savings — where an 'energy service company' (Esco) and the user split the savings —, and 'first out', where all of the savings go to the Esco until the capital and profit are reimbursed.

Shared savings offers a number of advantages to the user including not having to provide any up-front capital, off balance-sheet financing, and no risk since no fixed payments are guaranteed. There are conversely a number of barriers to the introduction of shared savings: contracts are complex, and must assure the necessary flexibility throughout the term.

The financial analysis of the study is intended to explore several key questions concerning third-party finance: how attractive is own funds or own borrowing to an energy user when compared to third-party finance; the financial impact on the Esco of various degrees of leverage; the impact of payback on the viability of the project; the sensitivity of third-party financing to changes in energy costs?

The study arrives at the conclusion that an Esco cannot viably fund projects with an average payback of longer than three years by third-party financing, or with an investment value of under 60 000 ECU.

The assets of an energy service company — i.e. the investment in energy-saving equipment in someone else's premises — is not considered sufficient security for loans by a financial institution. The income stream resulting from the investment is regarded as highly uncertain, the investment is physically installed outside the energy service company's premises, and the resale value of the equipment in case of default may be low.

The level and cost of borrowing which the energy service company can attract is crucial to the financial viability of the concept. However, because the project itself cannot be used as collateral, it is concluded that, in the absence of other forms of loans, loan guarantees or security, only energy service companies backed by a major company will be able to secure the necessary high proportion of low-cost bank borrowing.

[1] Third-party financing opportunities for energy efficiency in the European Community.

Demand for third-party finance

The potential level of investment needed to achieve the Community's efficiency objective is enormous. **The study estimates the potential market for third-party finance as approximately 86 000 MECU**, half in industry and half in the building sector.

Industrial sectors

In the **industrial sector**, third-party finance can help to overcome many of the barriers to energy saving in industry. These barriers include the insignificance of energy costs; technical barriers; and lack of finance — both perceived and real. Third-party finance assists in overcoming these problems by providing finance, technical assistance, and assuming the risk for a project.

Although there are difficulties that will slow the adoption of third-party finance — the principal one being the problem of measuring and attributing savings, these difficulties are solvable. Those energy service companies that are already operating in Europe believe that this difficulty does not represent a significant barrier. The study thus concludes that European industry offers a significant market for third-party finance.

Building sector

The **building** sector has been the principal market for third-party finance in the USA and Canada. Also in Europe the potential cost-effective energy-saving investment in this sector could develop a very substantial market.

Residential sector

The residential sector, however, is unlikely to represent a significant market for third-party finance. For single family dwellings the concept of financing **energy-saving investments** is not economic because of the large number of relatively small investments, and the importance of individual behaviour in determining energy use.

In multi-family dwellings the necessary economies of scale will only be reached where there is a single boiler/plant. Third-party financing could, however, assist in overcoming a serious obstacle to energy saving in rented property — the landlord/tenant problem. In many rented properties, the landlord is responsible for capital investments — i.e. energy-saving investments, while the tenant pays the heating bills. The landlord, therefore, in general, has little incentive to invest in energy conservation. However, if the capital costs are met by a third-party investor, and the share of savings due to the Esco is judged to be an operating expense — paid by the tenants — then third-party finance could assist in increasing the rate of investment in energy saving.

Commercial buildings

The comments made above about the landlord/tenant relationship in the residential sector are equally applicable in this sector.

In single-tenant commercial buildings, in those situations where the lease is shorter than the average length of an energy-savings financing contract (say seven years) third-party financing will not be attractive. However, if the lease is longer than the contract with the Esco, or if the commercial building is owner-occupied, third-party financing can play its part in encouraging energy-saving investment.

Public sector

In the public/institutional building sector third-party finance could assist in overcoming the barriers of lack of finance and lack of skill. However, the rate of penetration of performance contracting in this sector will be dependent on the removal of the following significant barriers:

- public procurement policies — in the form of competitive lowest bid — are frequently incompatible with performance contracting;
- the decision-making process is frequently very lengthy, imposing high marketing costs on the energy service companies;
- public officials need to have some motivation to invest the time and influence necessary to investigate a third-party-financed energy-saving project. Worthy of note in this regard is the example of the Netherlands, where schools are permitted to retain a percentage of the energy savings resulting from a conservation investment, to act as an incentive to the school to follow the project through.

Supply of energy services

There are fewer than 10 energy service companies currently operating in Europe and these companies are con-

centrated in only a small number of Member States. In view of the size of the potential market, outlined earlier, more energy service companies are needed to supply third-party financing in Europe.

The lengthy contract negotiation time, and high administrative and marketing overheads, imply a high entry cost. Energy service companies must fund all energy audits and engineering design expenses even before any direct investment in equipment is made.

Third-party finance is thus a very capital-intensive industry. As energy service companies fund 100% of the energy audit, specification and investment costs, their capital requirements can quickly become very large. In the absence of any Community or Member State scheme to provide security, potential suppliers will face very considerable difficulties in raising the necessary borrowing unless they are backed by a parent company. This is a major factor restricting the growth in the number of energy service companies in Europe.

Utilities could play a major role in the development of third-party financing in Europe. Utilities have the financial means, unrivalled contact with energy users, and some knowledge of energy efficiency technologies. However, it is concluded that in Europe many utilities are under no pressure to promote energy saving, and do not consider they have a role in either supporting or indeed entering the third-party financing business. Unless political pressure causes such publicly-owned utilities to change their position, there is little likelihood of European utilities supporting this concept in the near future.

Summary of the analysis by Member State

The activity of third-party financing is in its infancy in Europe — there are fewer than 10 energy service companies throughout Europe, and these are concentrated in only three countries — the UK, Belgium and Luxembourg. Of these, the country with the most developed existing market (relatively speaking) is the UK.

A detailed analysis of the potential and the barriers for third-party financing is given in the study report for each Member State.

Industrial market

Although the market for third-party finance in industry is considerable across the 12 Member States, this generalization hides a range of potential and barriers. Those countries where the most impact is likely in the short term are Italy, Spain, the UK and France.

Other Member States offer less potential either because much has already been achieved, as in Denmark and Germany, or because of specific problems, e.g. the unavailability of tax deductions to third-party-financed investments in Belgium.

Residential market

This market sector offers considerably less scope for third-party finance than other sectors. Those Member States which have a high proportion of multi-family dwellings and central boiler plant — Italy and Spain — both have mild climates and less potential for short payback savings.

Institutional and public-sector buildings market

The problems of restricted capital spending in the public sector are widespread throughout Europe. However, the potential for third-party finance to increase energy saving in this sector varies. In Belgium, the Netherlands and Spain, the concept could make an early contribution, while in other States, notably Germany, a considerable potential is not likely to be addressed in the short term unless public-sector procurement rules are adapted to accommodate performance contracting. The study says that in the UK, where much potential exists, the Treasury has ruled that third-party financing counts as public-sector spending — thus illogically preventing penetration of this sector.

Recommendations

The study leads finally to some recommendations for public action and support for the development of third- party finance. The form which this action should take is, in particular, the following:

- information of Member States on the barriers for third-party financing and the action to overcome them;

- education: seminars mainly for energy users explaining what third-party financing is;
- pilot projects: identification of 'typical' energy users in different sectors and technical guidance for potential users;
- financing: the study recommends using Community financing instruments (e.g. the NCI) for the financing of the activities of energy services companies;
- information: drafting of a model contract and a contract manual.

The Commission will carefully reflect on these recommendations. It has already informed the Member States' governments about the study report. It will probably elaborate in 1986 a model contract and guide and is planning to organize a seminar on third-party financing in mid-1987.

The development of lignite and peat in the European Community

When people think of solid fuels, they generally think of coal in its various forms. But brown-coal or lignite (a fossil fuel produced, like coal, from prehistoric vegetation, but, at 30-40 million years, only a tenth of its age) and peat (aged in thousands, rather than millions of years) also have to be considered. After all, they are fuels which are indigenous to the Community and which make a contribution to the replacement of imported fuels, especially when used in electricity generation; this is very much in keeping with the Community's energy objectives. Furthermore, as this article will show, both lignite and peat, although representing together only about 3.8 % of primary energy consumption in the Community, occupy quite an important part in the energy balances of several individual Member States.

Background

The importance of solid fuels as a whole in the Community's energy strategy has been recognized by the Council of Ministers since 1982, and since 1976 money to develop lignite and peat production and use has been made available through several Community financial instruments (see later). The most recent development in reaching an overall solid fuels policy occurred in November 1985 when the Council of Energy Ministers, at the request of Greece, asked the Commission to prepare a report enabling the March 1986 Energy Council to discuss the question of Community support for lignite and peat (see Community news). This report has now been sent by the Commission to the Council of Ministers.

The report, which in some ways updates an earlier report[1] made by the Commission, begins by identifying the places occupied by lignite and peat in national primary energy consumption (10% for lignite in Germany, 13% for peat in Ireland, 24% for lignite in Greece and 13% for lignite in Spain). It points out that these fuels are nearly all consumed in the countries which produce them, and there is hardly any cross-border trade in them.

Lignite production in the Community

Lignite production levels in the Member States concerned, which have been fairly constant over the years 1981-84:

Table 1: Production of lignite

	EC-12 Mt			
	1981	1982	1983	1984
Federal Republic of Germany	130.6	127.4	124.3	126.7
Greece	27.3	26.9	30.6	31.5
Spain	20.8	23.9	24.5	24.3
France	2.9	3.0	2.6	2.4
Italy	2.0	1.9	1.8	1.8
Total Community	183.6	183.1	183.8	186.7

As regards **future developments**, the report says, tentatively, that lignite production for the Community of 12 could increase from 187 Mt in 1984 to something like 215 Mt by 1990.

The situation regarding lignite production and use in the industrial Member States is briefly as follows:

The **Federal Republic of Germany** is the Community's largest producer, with steady levels of production in the Rhineland, Helmstedt and Lower Saxony. Productivity and competitivity with other fuels in power station use are good. Investment is almost entirely from retained profits, and will not increase markedly.

In **Greece** as in Germany, lignite is produced mainly by the electricity authority. It has become an important substitute for imported oil in power generation, and is at present competitive in this sector. Production is due to double between 1984 and 1990, requiring investment which can be expected to be very largely financed by external borrowing. As a result, interest charges as a proportion of electricity supply costs will rise, unless prices to the electricity consumer are increased more than is presently envisaged.

In **Spain**, both older and younger lignite are mined; the former is regarded by the authorities as sub-bituminous coal. Of the younger lignite, most is mined by the electricity authority and is competitive for power generation. Deep-mined older lignite is less economically produced than the open-cast older and younger lignite.

In the case of **France**, both older and younger lignite are mined by the coal and electricity authorities, though at a loss. Production of the younger lignite will be run down in most cases by 1990 or so. Production of older lignite will be maintained. Overall, quantities are very small.

In **Italy**, the small amount of lignite mined by the electricity company is adequately competitive with hard coal. Production will be kept steady.

In the **United Kingdom** (**Northern Ireland**), significant reserves of lignite have been found, and it is intended to mine it, mainly for use in a power station yet to be built. Government finance is not envisaged.

Peat production in the Community

Peat production levels vary with wet and dry summers from 5-8 Mt a year in Ireland, where the only thriving industry is situated. Peat production for energy use is significant in Ireland's overall energy supply. There is one large company producing peat (Bord na Mona) and its main customer is the electricity authority. Bord na Mona is in a good financial situation, but this does not mean that peat is competitive *vis-à-vis* imported hard coal for generating electricity, and this may create future problems.

Economics of Community lignite and peat production

The report investigates the **economics** of lignite and peat production, and of the associated electricity generation which is their main use. Attention is focused on two issues: the effects that **Community environmental legislation** might have in discouraging the future use of lignite (and peat); and the extent to which the financial problems of the fuel- and electricity-producing authorities could be solved or lessened by changes in their own **pricing and/or investment policy**, thus rendering Community funding unnecessary.

On the **environmental** question, the report concludes that the new limits which the Commission itself is proposing to reduce nitrous, sulphurous and particulate emissions from solid fuel burning would have no additional cost effects on lignite in Germany, because the national legislation is already more stringent. However, if other Member States have to conform, the cost of doing so will be substantial, and if electricity from lignite grows as planned in Greece, this Member State will face exceptionally difficult technical and economic problems in meeting the proposed legislation (see Environment Council, Community news).

On **pricing policies**, the report begins by quoting the Council's principles that prices should reflect the time cost of making energy available and should permit an adequate level of investment; they should not be kept artificially low for social or other reasons unconnected with the economics of energy.

In **Greece**, the major problem is, as already mentioned, the high level of **external borrowing** required by the lignite- and electricity-producing authority, the Public Power Corporation (PPC). The PPC's aim is substantially to increase the rate at which it can itself finance its total investment programme up to 1990, as part of which lignite production is scheduled to double. The report concludes that the electricity price increases proposed by the PPC to achieve this over the years 1986-90 are reasonable, and in line with Community pricing principles; but they would be quite inadequate to solve the problem of large inherited interest charges from **past** borrowing. Moreover, any proposal for making Community money available in respect of Greek lignite has to recognize that lignite investment represents only a comparatively minor part of total investment by the electricity authority.

Still on pricing and investment, the Commission's report also considers the question of whether Bord na Mona can continue to sell its peat to the electricity generating authority (the ESB) at prices which give it a reasonable return. But the Commission concludes that this question cannot be usefully discussed at present since the prices are currently being renegotiated.

Community role

The report next considers the **role for the Community** in assisting lignite and peat development. As mentioned earlier, Community financial instruments have been substantially used to foster peat and lignite since 1976. Total Community **subsidies** to lignite in Greece and peat in Ireland for the period 1979-84 were 301.2 MECU, as Table 2 shows:

Table 2: Community subsidies for lignite and peat production

(MECU)

	1979	1980	1981	1982	1983	1984
Greece (ERDF)		—	—	—	238.8	43.5
Ireland (EMS)	1.5	5.5	8.6	3.3	—	—
Total	1.5	5.5	8.6	3.3	238.8	43.5

And Community **loans** amounting to 265.4 MECU were made to lignite between 1982 and 1984, and 103.0 MECU to peat between 1976 and 1982, thus:

Table 3: Community loans for lignite and peat production

(MECU)

	1976	1979	1980	1981	1982	1983	1984
France, lignite	—	—	—	—	93.9	29.7	—
Greece, lignite	—	—	—	—	—	80.2	61.6
Total lignite	—	—	—	—	93.9	109.9	61.6
Ireland, peat	3.3	11.7	26.8	37.9	23.3	—	—
Total (lignite and peat)	3.3	11.7	26.8	37.9	117.2	109.9	61.6

Financial instruments available

Of the financing instruments available for the **future**, the Commission's report lists the following:

(i) measures provided for in Chapter 70 of the EEC budget (**demonstration projects**) and Chapter 73 (**R&D programme for non-nuclear energy**), which are aimed at encouraging the introduction of new technologies in the energy industry, including solid fuels;

(ii) the **Regional Fund**, which could help with investment and studies for lignite and peat depending on the geographical location of mines and the eligibility for aid of the regions concerned;

(iii) the **new ERDF energy programme** (**Valoren**), proposed by the Commission in its document COM(85) 838, based on Articles 7 to 9 of the new Regional Fund regulation, which provides for aid to small-scale peat and lignite production (deposits of less than 300 000 t per year). This might be of interest to some undertakings in Greece, Ireland and Spain. There are also possibilities for financing studies there and in Northern Ireland for improving knowledge of local lignite resources (see Community news);

(iv) the **integrated Mediterranean programmes** (Council EEC Regulation No 2088/85, of 23 July 1985), under which specific Community measures are envisaged for the southern areas of Greece, France and Italy, in order to improve socio-economic structures of these areas, especially in the case of Greece, so as to allow them to adapt to the new situation created by enlargement. These measures are taken by the Community only at the request of the Member State concerned. Because measures envisaged include those for the production and transportation of energy, the Community would be able to intervene in favour of lignite (and, as appropriate, peat) in almost all the producer regions of Greece, France and Italy;

(v) **loans**, which, as in the past, could be made by the **EIB** in favour of peat and lignite production on the basis of Article 130c of the Treaty of Rome. Even projects in areas which were not among the least developed of the Community could be financed, because they meet Community energy objectives. The **integrated Mediterranean programmes** also make possible loans estimated at 2.5 billion ECU over the period of seven years.

Conclusion

Lignite and peat are making a useful contribution to the attainment of the Community's energy objectives. The report also concludes that the lignite and peat industries are, generally speaking, economic, and that there is therefore no apparent need for new action at Community level. It does, however, recognize the particular Greek problem of heavy borrowing to finance investment in expanded lignite production, and it notes in passing that if its own proposal[2] for Community aid in solid fuels production had been adopted by the Council of Ministers, this would have contributed usefully to a solution of the problem. It ends by suggesting that the Community financial instruments listed above should be used in future to contribute to a solution of the problems of lignite and peat development in the Community.

1 Report on the brown-coal and peat industries of the European Community, COM(82) 649 final, 18.10.1982.

2 COM(84) 469 final, 7.9.1984.

Energy markets in the European Community – short-term outlook 1986

There have been major changes in the energy markets since the last short-term energy forecast published in **Energy in Europe** *in December 1985. Most importantly, there has been a much sharper fall in world oil prices than expected, coupled with a more substantial appreciation of the ECU against the dollar. Thus, in a period of a few months between the end of 1985 and the beginning of 1986 the Community's purchase price for its imported crude oil has fallen by over 40% —* **an unprecedented change.**

In these circumstances, forecasting is unusually difficult. There is no past experience on which to rely in estimating the reaction of consumers to such a sizeable and rapid decrease in oil price levels. An additional source of uncertainty is the likelihood, timing and magnitude of changes in oil or energy taxation. Nor is it possible at the time of writing to predict with any confidence the path of crude oil prices during the rest of the year, given the volatility and lack of transparency in the market and the unrepresentative nature of spot price quotations.

In what follows, therefore, we have chosen to analyze the possible effects of **two alternative scenarios,** *the first assuming an average crude oil import price level of $20 in 1986, and the second an average crude oil import price of $15 from the second quarter of 1986 onwards. Both scenarios represent a large reduction in price compared to the $25 average case analyzed in the last issue of* **Energy in Europe,** *but they do not of course by any means exhaust the range of possibilities for the rest of this year. Even lower prices cannot be ruled out. But these hypothetical scenarios have been chosen to illustrate, by a stepwise approach, the extent to which oil price reductions would influence the Community's energy situation. The analysis is also reinforced by a more detailed evaluation than usual of trends in the pattern of demand for the various main oil products over the past few years.*

Taking these reservations into account, **the first scenario — a reduction in the cost of crude oil from $27 in 1985 to an average of $20 a barrel in 1986** *— would probably result in the Community's energy consumption growing by about 2 to 2.5% in 1986, a lower rate of growth than the 3.8% recorded in 1985. Lower energy prices and higher economic growth will tend to be offset by continued improvements in energy efficiency in all sectors of the Community's economy. Community* **oil demand** *in this scenario is projected to increase by between 1 and 2% in 1986, with the risks weighed more towards the lower rather than the higher end of the range. Community* **oil production** *is assumed to be unaffected by the fall in oil prices in this timescale. The Community's natural* **gas consumption** *is not expected to increase by much in 1986, reflecting some loss of relative gas price competitiveness, assumed moderate growth in the chemical industry and milder weather. The Community's* **solid fuel demand** *would be close to the 1985 level, taking account of constraints in the power generation sector as more nuclear plants come on stream, together with stagnation in other markets partly due to the strong decrease in residual fuel oil prices.* **Nuclear electricity production** *— up by 22% in 1985 — could grow by a further 14% in 1986, thus providing over 35% of the Community's electricity production in 1986 and underpinning the 3.0% forecast growth for the* **Community's electricity demand.**

The second scenario — a $15 average crude oil import price from the second quarter of 1986 onwards *— could result in* **energy demand** *being about 0.5% higher than in the first scenario (i.e. an annual increase of 2.5-3.0%) mainly due to higher economic growth and even lower oil and energy prices. This marginal increase in Community energy consumption compared to the first scenario would* **be largely met by oil,** *consumption of which could edge up by a maximum of 2% in 1986.* **The average real energy price changes in the Community under this $15 scenario would be stagger-**

ing. *The Community's real crude oil import prices would be 55% lower than in 1985, imported gas prices 33% lower and heavy fuel oil prices over 50% lower. The Community's* **net oil import bill** *would be approximately halved, a saving of $20 billion — or over 1% of Community GDP.*

In this $15 scenario **coal demand** *would weaken by about 1% compared to the $20 scenario whereas* **gas demand** *could slightly increase because of improved economic growth.* **Nuclear output** *is assumed to be unaffected.*

Comparison with previous forecasts

EUR 10: Energy consumption (Mtoe)

		Energy in Europe				
		No 0 (Dec '84)	No 1 (Apr '85)	No 2 (Aug' 85)	No 3 (Dec '85)	No 4 (Apr '86)
Total primary energy consumption	1985	940.0	936.4	936.7	941.1	944.2[1]
	1986	:	:	964.0	965.1	965.7[2]
Oil	1985	426.5	421.7	415.6	418.9	415.5[1]
	1986	:	:	419.5	422.6	421.2[2]
Gas	1985	177.0	183.6	182.3	180.8	181.2[1]
	1986	:	:	187.7	186.5	183.3[2]
Nuclear	1985	117.4	116.4	120.1	113.4	116.4[1]
	1986	:	:	140.0	131.9	132.7[2]
Coal	1985	205.3	201.0	204.5	213.8	218.2[1]
	1986	:	:	202.4	209.6	214.7[2]
Electricity demand (TWH)	1985	1357.0	1338.0	1346.5	1347.5	1343.4[1]
	1986	:	:	1380.8	1385.9	1381.4[1]

[1] Actual.
[2] $ 20 scenario.
: = not included.

This table summarizes all the energy consumption forecasts published in *Energy in Europe* to date.

Although each forecast correctly predicted a strong increase in overall energy demand in 1985, the actual outturn for the year was even higher than forecast, partly due to the cold weather in the last quarter.

In terms of the individual fuels:

(i) **oil demand** tended to be slightly overestimated, although more correctly predicted towards the end of the year;

(ii) apart from the first forecast in December 1984, **gas demand** was estimated with reasonable accuracy;

(iii) the **nuclear output** forecasts for 1985 were also reasonably correct. The forecasting errors were mainly due to changing coefficients used in the measurement of nuclear heat;

(iv) the **least satisfactory** forecasts were those for **coal.** Consumption and production of solid fuels recovered much quicker than expected following the UK's coal industry dispute.

* * *

The remainder of this article presents in more detail the Commission's Directorate-General for Energy's (DG XVII) latest short-term energy forecast for the Community. **Unless otherwise stated, the results shown are those of the $20 scenario.** The results are mainly derived from a short-term forecast model — codenamed STEM — that has been developed by Directorates-General XII (Directorate-General for Science, Research and Development) and XVII. (A technical manual is available on request.)

A series of key assumptions underlie all the results, **and these are of particular importance in this current forecasting round.**

Forecasting assumptions

(a) Macroeconomic climate

The macroeconomic assumptions used for this forecast are derived from the Directorate-General for Economic and Financial Affairs (DG II).

The Community's key macroeconomic aggregates have recently been revised upwards following the fall in oil prices (see table). Assuming the same **average $20 crude oil import price for 1986,** Community GDP is now forecast to grow by at least 2.8% in 1986 — compared to 2.5% previously forecast. This would be the highest rate of economic growth since 1979. If oil prices fall further, such as in the $15 scenario, growth could be even higher.

The main stimulus to growth will be generated from **internal demand,** as exports slow down because of the strengthening European currencies and reduced sales to the oil-producing countries.

Consumers' expenditure could grow by as much as 3% in 1986 — a full percentage point higher than in 1985. Investment is also expected to remain buoyant, helped by improving company profits and lower interest rates. Equipment investment is expected to improve by 6% in 1986, whilst construction activity is expected to pick up slightly in 1986 after a poor 1985. The service sector is expected to be buoyant.

The Community's index of **industrial production** grew by 3.3% in 1985 and is expected to expand by 3% in 1986, with the growth concentrated in the second half of the year. The outlook for the steel industry is similar to that of 1985, whilst the chemical industry — another heavy energy consumer — is assumed to grow only modestly — by 2% in 1986.

Inflation in the Community is now estimated to be lower than previously forecast — with an average annual rate of 3.3% expected in 1986. The **$15 scenario** will result in even lower inflation.

The **Community's net savings on its oil bill** in 1986 could be of the order of $14-21 billion in 1986 depending on the scenario — about 1% of GDP. This is due not just to the falling dollar price of oil but also to the assumed 26% revaluation of the ECU against the US$ in 1986. The following table shows the ECU/$ exchange-rate movements in the period 1985 and the assumptions for 1986.

ECU/$ exchange rate (1 ECU = ...$)

Q1 1985	0.68	Q1 1986	0.92
Q2 1985	0.73	Q2 1986	0.98 (forecast)
Q3 1985	0.78	Q3 1986	0.98 (forecast)
Q4 1985	0.85	Q4 1986	0.98 (forecast)

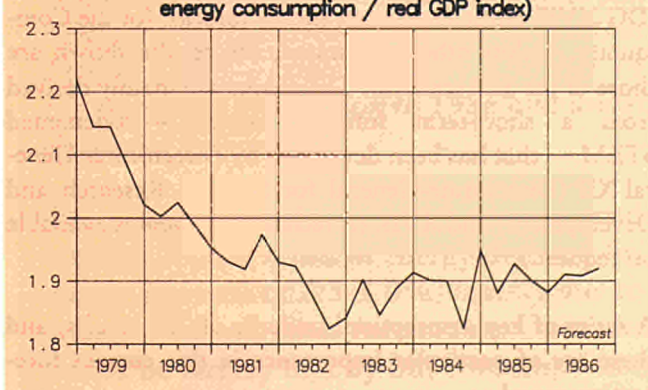
(b) Community crude oil production

This is forecast, exogeneously, to be around 150 Mtoe (3 Mbd) in 1986 — similar to 1985. It is assumed that there will be no shut-in of North Sea oil production since the marginal costs of operating North Sea fields are low (significantly less than $10/barrel in most cases).

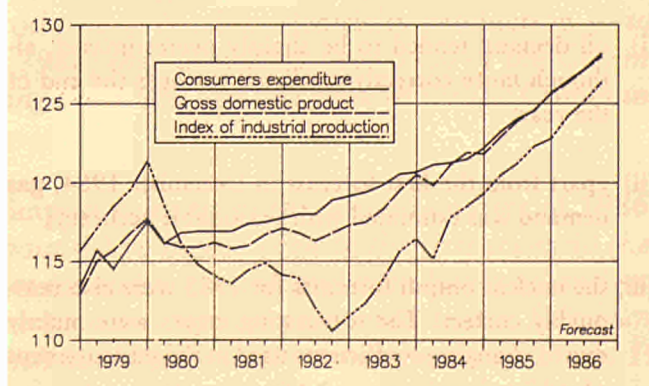
(c) Nuclear capacity

A continuing increase in the Community's nuclear capacity is forecast to take place during 1986. Several new nu-

Graph 1 – EUR 10: Quarterly energy ratio trend (volume of seasonally adjusted inland energy consumption / real GDP index)



Graph 2 – EUR 10: Quarterly macroeconomic indicators (1975 = 100)



clear plants will be commissioned in 1986, particularly in France (+6.3 GW) and the Federal Republic of Germany (+1.2 GW). Average nuclear capacity is expected to grow by about 20% in 1986, to register 79 GW by the end of the year.

(d) Temperature

The average temperature in 1985 was lower than normal, boosting consumption of natural gas, electricity and domestic heating oils. In the more recent months, November 1985 was unseasonally cold, whereas January 1986 was much milder than January 1985. Seasonally adjusted degree days in February 1986 were 30% higher than in February 1985. For the remainder of the period, average degree days over the past eight years are assumed.

Energy prices

(a) Crude oil prices

The recent trends in (fob) average crude oil import prices into the Community are as follows:

EUR 10: Average crude oil import prices (fob) (US$)

	1984	1985	1986 ($ 20 scenario)	1986 ($ 15 scenario)
Q1	28.67	27.3	21.8	21.8
Q2	28.7	27.3	19.4	15.0
Q3	28.0	26.4	19.4	15.0
Q4	27.7	27.3	19.4	15.0
Annual average	28.3	27.05	20.0	16.7

In the $20 scenario, the Community's average cost of crude oil imports (fob) is assumed to decline to $19.4/barrel in March 1986 and remain at this level until the end of the year (see Graphs 3 and 4). This results in an annual average import price of $20 in 1986. The **$15 scenario** gives an annual average crude oil import price of $16.7/barrel in 1986.

The implications for the Community are extremely important. With an assumed 26% revaluation of the ECU against the US$ and 3.3% inflation, the fall in real (deflated) crude oil prices in the **$20 scenario** would amount to 44% in just one year.

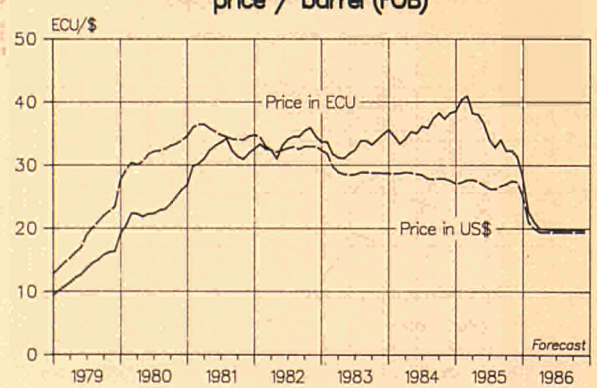
The real price of imported crude oil/barrel in 1986 would then be roughly at the same level before the second oil shock in 1979 (see Graph 4). The following table shows the theoretical annual average percentage fall of a range of 1986 crude oil prices for the Community and the approximate savings on the Community's oil bill.

EUR 10: Oil bill

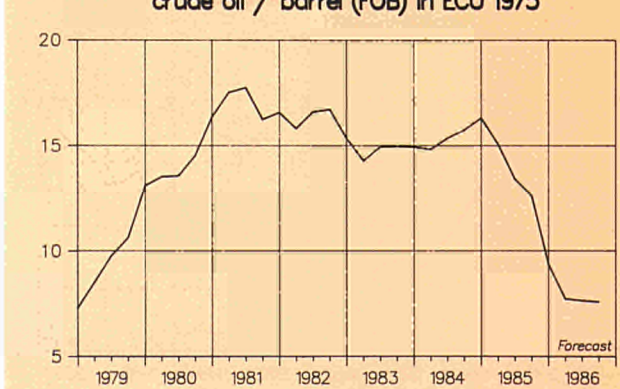
1986 Community real average crude oil import price (fob)	% fall in real oil price compared to 1985 (in ECU)	Net oil import bill savings (1986-85) Billion $ US	Billion ECU	1986 net oil import savings as % of Community GDP
$ 20 scenario	- 41%	- 14	- 30	1.0
$ 15 scenario	- 51%	- 21	- 37	1.2

The figures in this table differ slightly from those in the first article in this issue — because, firstly, they only cover EUR 10 and, secondly, they take volume effects into account.

Graph 3 – EUR 10: Average crude oil import price / barrel (FOB)



Graph 4 – EUR 10: Real price of imported crude oil / barrel (FOB) in ECU 1975



(b) Oil products prices

Rotterdam spot market quotations for the main oil products have fallen sharply since the end of 1985 reflecting oversupply and weak demand. Stocks of the main products are also low.

Consumer oil prices will fall in 1986, but the rate of decrease will be less than that for crude oil. In both scenarios, **it is assumed on average that the rates of duty and tax on motor gasoline, transport diesel oil and domestic heating oil will be 5% higher in real terms than if the fall in crude oil prices was allowed to feed completely through to the consumer.** This assumption is made on the grounds that a majority of Community Member States are likely to increase overall oil product taxation as oil prices fall. To date the governments of Ireland, Denmark, Greece, Italy, France and the United Kingdom have already increased taxation on oil products.

The forecast rates of change in the two scenarios in average Community real oil product prices in 1986, compared to 1985, are as follows:

EUR 10: Real oil product prices

	$ 20 scenario 1986/85	$ 15 scenario 1986/85
Motor gasoline (all taxes included)	-10%	-15%
Domestic heating oil (all taxes included)	-23%	-30%
Transport diesel (all taxes included)	-15%	-20%
Residual fuel oil (VAT excluded)	-45%	-51%

(c) Natural gas prices

The fall in crude oil, residual oil and gasoil prices has already driven down imported natural gas prices. In the fourth quarter of 1985 prices had already fallen by 8% over the third quarter of 1985 — and have continued to fall since.

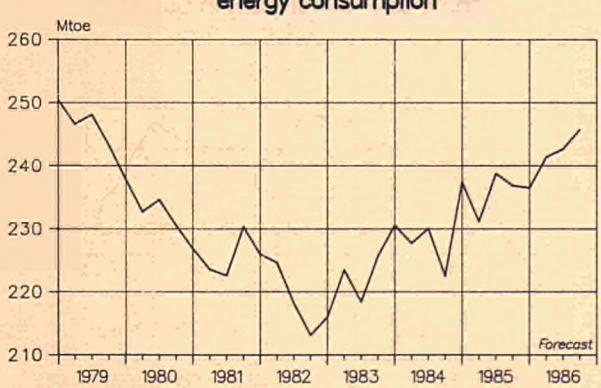
The 1984-85 renegotiated gas import contracts led to a greater weighting in the gas price formulae on the prices of competing fuels, especially on gasoil — and in some cases coal. This may help to slightly moderate the fall in gas prices, but overall, prices could still fall by 30% in real terms in 1986, with the fall concentrated in the last three quarters of the year. Due to the lagging mechanism specified in most gas import contracts, some gas could remain uncompetitive in the short term and some interruptible sales could be temporarily lost to fuel oil unless additional, rapid, downward price adjustments are made (see 'Natural gas' section).

Such downward movements in gas import prices are unprecedented in such a short time period. The fall in the revenues of the Community's gas suppliers will therefore be significant (mainly the Netherlands within the Community and Algeria, Norway and the USSR as the major external suppliers).

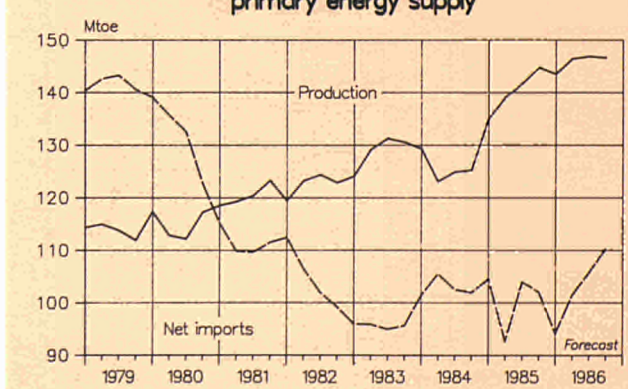
(d) Coal prices

Coal prices are also expected to weaken in 1986, but by significantly less than for oil or gas. Domestic coal prices are already significantly above world coal prices, and hence any fall in the world prices compounded by the strong ECU, will further increase national subsidies payable to sustain domestic Community coal production.

Graph 5 – EUR 10: Seasonally adjusted quarterly energy consumption



Graph 6 – EUR 10: Seasonally adjusted quarterly primary energy supply



There is still considerable overcapacity in the international coal market. Imported coal prices could weaken by 10-20% in real terms based on the $20 scenario.

Overall energy

The Community's energy consumption grew strongly in 1985, increasing by about 3.8%. The quarterly changes in the Community's energy consumption in recent years have been as follows:

EUR 10: Energy consumption % change on corresponding period of previous year
$ 20 scenario

Q1 1984	+6.9	Q1 1985	+3.1	Q1 1986	- 0.3
Q2 1984	+2.0	Q2 1985	+1.5	Q2 1986	+4.3
Q3 1984	+5.4	Q3 1985	+3.9	Q3 1986	+1.7
Q4 1984	- 1.7	Q4 1985	+6.3	Q4 1986	+3.7
1984 annual change: +3.1		**1985 annual change: +3.8**		**1986 annual change: +2.3**	

Part of the increase in energy consumption in 1985 was weather related, particularly in the first and fourth quarters. However, even allowing for this, the Community's energy consumption would appear to have slightly accelerated towards the end of 1985.

The prospects for economic growth in the Community have recently been revised upwards, with at least 2.8% growth expected in 1986. The expected quarterly rates of growth in 1986, compared to 1985, are as follows:

EUR 4: GDP at constant prices
% change from previous quarter at annual rate

Q1 1985	- 0.2	Q1 1986	+3.4
Q2 1985	+3.9	Q2 1986	+2.2
Q3 1985	+3.0	Q3 1986	+2.7
Q4 1987	+2.8	Q4 1986	+2.7

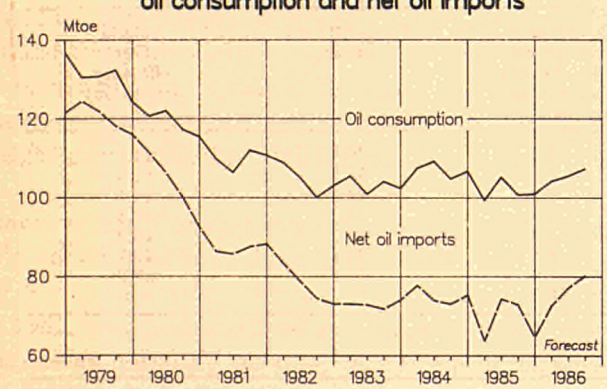
Industrial production is also expected to increase in 1986, by at least 3%, following on from 3.3% growth in 1985. **These factors and the sharp fall in oil and energy prices, suggest that the Community's energy consumption will increase again in 1986.** The projected increase in energy demand is in the 2-2.5% range — lower than the projected rate of growth of GDP. **In the $15 scenario,** energy demand could be about 0.5% higher due to higher economic growth and even lower energy prices.

On the supply side, the Community's domestic energy production is expected to reach its highest level ever (583 Mtoe) in 1986, sustained by improved nuclear output and higher solid fuel production. With only small stock movements anticipated, the Community's net import requirement should remain at about 41.6% of overall energy consumption — unchanged on 1985.

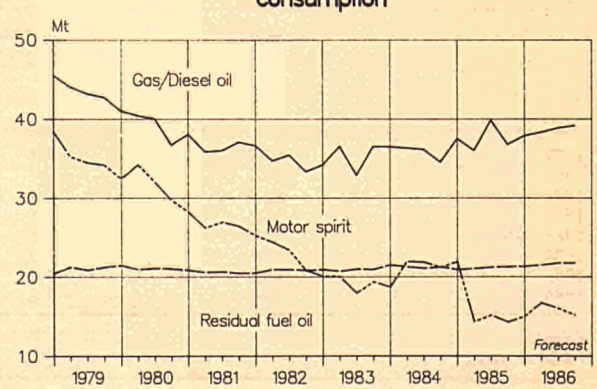
The latest trends in the Community's **energy intensity** (primary energy consumption/GDP) are still difficult to interpret (see Graph 1). Intensity appears to have increased in the first and fourth quarters of 1985, but this is partially due to the cold weather.

The forecast for 1986 suggests a slight improvement in the Community's overall energy intensity as the following table shows.

Graph 7 – EUR 10: Seasonally adjusted quarterly oil consumption and net oil imports



Graph 8 – EUR 10: Seasonally adjusted oil products consumption



EUR 10: Energy intensity trends (1979 = 100)

	Primary energy intensity	Oil intensity	Final energy demand intensity[1]
1979	100.0	100.0	100.0
1980	93.5	90.1	93.5
1981	90.6	82.8	89.7
1982	87.8	78.8	86.4
1983	87.2	76.0	85.4
1984	88.0	76.2	85.5
1985 (provisional)	89.6	72.6	86.7
1986 (forecast)[2]	88.8	71.7	86.0

[1] Including non-energy consumption.
[2] $ 20 scenario.

Oil

Recent trends in the Community's oil consumption are as follows:

EUR 10: Oil consumption

	% change on previous year	Increase/decrease in Mtoe
1979	+2.5	+12
1980	- 8.8	- 47
1981	- 8.2	- 40
1982	- 4.5	- 20
1983	- 2.6	- 11
1984	+2.4 (-1.5)[1]	+10 (-6)[1]
1985	- 2.6 (-0.4)[1]	- 11 (-2)[1]
1986[2]	+1.4	+6

[1] Excluding the effects of the UK coal dispute.
[2] $ 20 scenario.

This table shows that the rate of decrease in the Community's oil consumption (discounting the effects of the United Kingdom's coal mining dispute in the March 1984 to March 1985 period) has consistently slowed down since the second oil shock in 1979-80. Overall, the Community is consuming over 2.5 Mbd less oil than in 1979, even though Community GDP has increased (albeit by a modest 7%). **Is it now possible that in today's climate of rapidly falling oil prices and an improved economic outlook that Community oil consumption could increase?** To answer this, it is necessary to examine the evidence in each of the main oil products markets.

Motor gasoline

As the table below shows, the Community's consumption of motor gasoline has fluctuated in a very narrow band of 82.6 Mt (the minimum in 1981) to 85.1 Mt (the maximum in 1984) in the 1979-85 timeframe. Average weighted real motor gasoline prices in the Community have fallen since 1982, although the rates of fall have been small (and have varied considerably between Member States). In the same period, rough estimates of the stock of motor gasoline cars shows that there are about 15% more cars on the Community's roads in 1985 but distance travelled per car has fallen (two cars per household, saturation, etc.). Average fleet efficiency has improved by over 10%. In 1985, motor gasoline consumption increased in Italy, Luxembourg, the United Kingdom, Ireland, Denmark, Greece, Spain and Portugal. However, the German and French markets (49% of total Community motor gasoline sales) each declined by arround 2%

What are the prospects for 1986?

Balancing these factors and assuming a 1% gain in overall fleet efficiency and a further increase in the Community's car parc, it is forecast that motor gasoline consumption could increase in 1986 by about 2.5% over 1985.

EUR 10: Motor gasoline trends

	Consumption (Mt)	% change on previous year	% change in average real price of motor gasoline (all taxes included)	Estimated stock of cars	Vehicle fleet efficiency (l/100 km)
1979	83.9	+2.1	+ 3.5	79.4	11.1
1980	84.5	+0.7	+ 8.1	82.4	11.0
1981	82.6	- 2.2	+ 7.3	84.6	10.7
1982	83.3	+0.8	- 4.5	86.5	10.5
1983	83.7	+0.5	- 3.2	88.2	10.2
1984	85.1	+1.7	- 2.5	90.1	10.1
1985	84.5[1]	- 0.7	- 1.0	91.5[1]	9.9[1]
1986[2]	86.8	+2.6	- 10.0	:	:

[1] Estimate.
[2] $ 20 scenario.

What are the prospects for 1986?

Factors arguing for an increase in motor gasoline consumption	Factors arguing against an increase in motor gasoline consumption
— Higher consumer expenditure 1986 — at least +3% over 1985	— Continued improvements in vehicle efficiency
— Higher economic growth (commercial vehicles etc).	
— Much lower real gasoline prices $ 20 scenario: - 10% $ 15 scenario: - 15%	— Continued switching from motor gasoline to diesel cars
— An increase of only 250 km/car in average distance travelled would increase motor gasoline consumption by 2%	— No increase likely in distance travelled per car
— Tighter environmental emission standards	
— Some trading up to models with higher engine capacity	— Increase in motor fuel taxation
— Early statistical evidence in 1986	

Gas/diesel oil

The short-term data available allows the gas/diesel oil market to be split between Derv transport fuels on the one hand and the remaining gasoils (mainly used for domestic heating) on the other.

The trends since 1979 have been as follows:

EUR 10: Gas/diesel oil trends

	Transport diesel oil			Other gasoils (mainly domestic heating oils)		
	Consumption (Mt)	% change	Average Community weighted real price change over previous year	Consumption (Mt)	% change	Average Community weighted real price change over previous year
1979	45.7	+6.0	+10.0%	130.0[1]	- 0.1	+32.0%
1980	45.6	- 0.2	+12.3%	113.0	- 13.0	+19.0%
1981	47.1	+3.3	+ 4.4%	100.4	- 11.0	+ 7.5%
1982	48.6	+3.2	- 0.5%	91.7	- 8.7	+ 2.3%
1983	49.8	+2.5	- 4.2%	90.6	- 1.2	- 6.8%
1984	52.4	+5.2	- 1.8%	90.8	+ 0.2	- 0.8%
1985	55.0[1]	+5.0	+1.4%	94.0[1]	+ 3.5	+ 1.4%

[1] Rough estimate.

The trends in the two markets are very different. The demand for Derv has grown strongly every year since 1981 — and was particularly robust in 1984 and 1985. This growth has been sustained by strong increases in the numbers of diesel cars and trucks and increased road freight transport in the Community.

However, the Community's consumption of other gasoils, mainly used for heating, has declined by 40 Mt since 1979 — or 0.8 Mbd. The rate of decrease flattened out in 1982, and there was even an increase in 1985 (due to the unseasonally cold weather). The effects of the second oil shock, inducing extra home insulation and other energy-efficiency improvements, plus substantial switching away from gasoil to alternative fuels (gas and electricity), broadly explain this historical consumption pattern.

The outlook for 1986

For **diesel oil**, the increase in economic activity in the Community, spurred on by the forecast of 14% lower Derv prices, should ensure that consumption increases again. As for **the other gasoils**, there are several reasons to expect a similar level of demand as in 1985. Firstly, the cold weather in November 1985. Since consumers in general tend to fill their tanks before this month, the extra consumption required in November 1985 will spill over into the 1986 delivery schedules. With February 1986 also very cold, this could mean that consumer stocks of heating oil are as low this year as in 1985, implying that demand for heating oil will be similar to the 1985 figure. Consumers may also be tempted to fill their tanks higher than in recent years if prices remain very low. Some may also opt for a little greater comfort and increase the temperature control gauge.

Overall, in 1986, Community gasoil demand is expected to grow by between 2 and 3% in 1986.

Residual fuel oil

The market is split between the industrial and power generation sectors. (Industry here includes industrial self-producers of electricity.)

The trends since 1979 are as follows:

EUR 10: Residual fuel oil trends

	Residual fuel oil consumption for public-service power generation		Weighted Community average annual RFO prices (excl. VAT)	Residual fuel oil consumption in industry[2]	
	(Mt)	% change		(Mt)	% change
1979	58.4	+ 2.3	+19.0%	84.4	+ 1.8
1980	53.9	- 7.7	+29.0%	74.1	- 12.2
1981	44.7	- 17.1	+21.0%	63.4	- 14.4
1982	40.0	- 10.6	- 8.4%	53.6	- 15.5
1983	31.2	- 22.0	- 0.3%	46.6	- 13.0
1984	41.2 (25)[1]	(- 20)	+12.6%	42.0	- 9.9
1985	31.7 (24)[1]	(- 4)	- 9.6%	34.8	- 17.1

[1] Discounting the effects of the United Kingdom mining dispute.
[2] Including industrial self-producers of electricity.

In the power-generation sector, it is evident that discounting the effects of the UK miners' strike, the underlying rate of decrease in consumption declined in 1985, suggesting that the bulk of residual fuel oil has already been backed out of Community power stations. (The Community's 1985 oil burn figure of 31.7 Mt contained about 7.7 Mt of extra fuel-oil consumed in the first quarter of 1985 due to the UK coal mining dispute.) In fact, only one Community country, Italy, still maintains a substantial fuel oil burn. As for the industrial consumption of fuel oil, there has been a tremendous shake-out since 1979. Demand has fallen by over 60% with double digit rates of decline in every year.

However, in 1986 average real residual fuel oil prices could be over 45% lower than in 1985, and this could be a conservative estimate. **What are the demand prospects for residual fuel oil?**

These are particularly difficult to assess. In the first place, residual fuel oil is currently competitive in many power-generation markets in the Community. **But how many utilities/governments will agree to an increasing fuel oil burn?**

Secondly, how many dual-firing burners are there in the industrial sector that can use fuel oil? This is not accurately known. One indication is that approximately 20% of the Community's gas sales are based on interruptible contracts — equivalent to the total Community sales of fuel oil to the industrial sector in 1985. In addition, there are also further coal/fuel oil dual-fired installations which can be switched from coal to fuel oil if the economics are right.

Very approximately, if only 10% of interruptible gas sales switched to fuel oil, the Community's industrial consumption of residual fuel oil could increase by 10% in 1986 alone. Another uncertainty involves future stock behaviour. With residual fuel oil prices so low, will some industrial consumers replenish their stocks at bargain basement prices?

The net effect in 1986 could be a further fall of at least 6% in total fuel oil consumption. Although industrial consumption of fuel oil is expected to increase, total consumption will still fall because of the reduction in fuel oil consumption in power stations. This is a slower rate of decline than in previous years.

Other petroleum products

These are the aviation fuels, naphtha, lubricants, bitumen, waxes, etc. Aviation fuel demand is expected to increase strongly in 1986 and naphtha demand could also increase.

Oil demand in 1986

On the basis of the two scenarios outlined earlier and the above analysis, the Community's oil demand could in-

crease by a maximum of 1 to 2% in 1986, depending on the scenario. However, given the current conditions in the oil market, this must be regarded as particularly uncertain.

Natural gas

Natural gas consumption increased by about 4% in 1985. The two main reasons sustaining this growth were the cold temperatures in 1985 and favourable relative prices to residual fuel oil. Improved Community GDP and industrial output also played a part.

Recent annual trends in the Community's natural gas market are shown on the table below.

In 1985, the tertiary/domestic sector probably accounted for most of the increase in demand.

The ratio of average weighted residual fuel oil prices to natural gas prices has varied considerably during the last few years.

Approximate Community ratio of imported natural gas prices to residual fuel oil prices (Q1 1984 = 100)

	1983	1984	1985	1986 ($ 20 scenario)
Q1	112	100	95	144
Q2	116	104	115	166
Q3	108	108	133	151
Q4	105	100	129	103

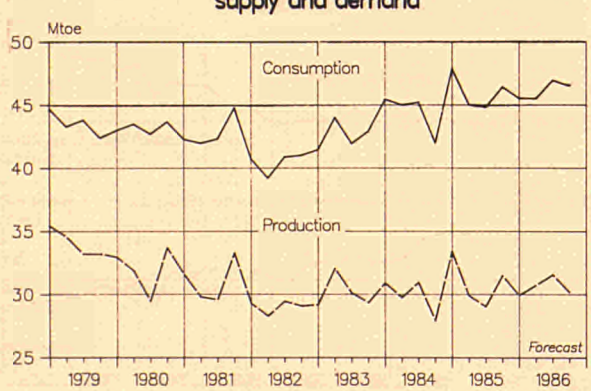
This illustrative table shows that relative gas prices are currently unfavourable, although they are likely to improve towards the second half of 1986 as the lagged pricing mechanisms work through to depress gas prices. Although some gas suppliers have reacted quickly to falling oil prices, nevertheless gas could lose some market share in the **interruptible market** although this will be counterbalanced to some extent by higher economic activity in some gas-consuming energy-intensive branches. Assuming average weather conditions for the remainder of 1986, tertiary and domestic gas sector demand could be lower than in 1985. **Gas burn in power stations** is also unlikely to increase in 1986 according to provisional in-

EUR 10: Natural gas consumption (by sector)

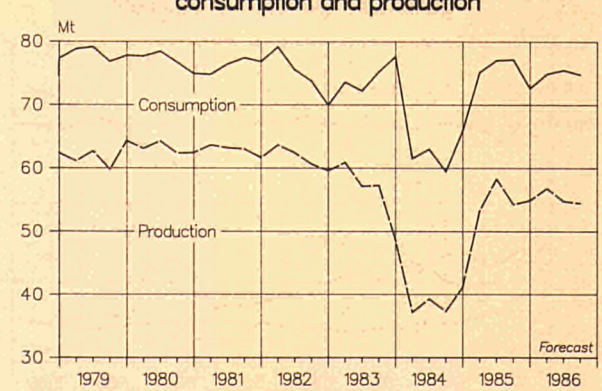
	Power generation[1]	Industry[2] domestic and others[3]	Tertiary	(toe) Total
1979	24.4	77.4	71.0	172.8
1980	20.3	73.2	75.5	169.0
1981	16.9	71.1	76.9	164.9
1982	16.6	66.5	75.4	158.5
1983	18.8	68.1	78.2	165.1
1984	20.6	72.2	81.5	174.3
1985	17.9	--163.3--		181.2
1986	18.2	--165.0--		183.2

[1] Public power plants only.
[2] Including non-energy uses and industrial self-producers of electricity.
[3] Transport.

Graph 9 – EUR 10: Seasonally adjusted natural gas supply and demand



Graph 10 – EUR 10: Seasonally adjusted hardcoal consumption and production



formation available to the Commission. However, it is possible that, if excess contracted supplies develop, the Community's gas burn in power stations could be slightly higher than envisaged.

Overall, in 1986 the outlook for gas is rather flat, with the balance of risks weighed towards slightly lower demand compared to 1985. In the $15 scenario, natural gas demand could slightly increase by 0.3% due to the likelihood of higher economic growth.

Solid fuels

Community consumption of solid fuels increased by about 9% in 1985 following the end of the United Kingdom mining dispute in March 1985. Although this represents a substantial improvement on 1984, solid fuel consumption is nevertheless still 14 Mtoe below the level recorded in 1979. In 1985, consumption of hard coal in public power stations increased by about 10% and deliveries of hard coal to other markets also improved (industry + 8%; household and tertiary + 15%; coking plants + 9%).

Community production of hard coal recovered to 206 Mt in 1985 (including recovered products), 45 Mt more than in 1984. The pick-up in the United Kingdom's coal consumption was faster than expected. There were also important stock movements in 1985, with a large decrease in stocks in collieries nearly matched by a rise in coal stocks at power plants. The main stock movements occurred in the United Kingdom. **Net imports** of hard coal increased strongly in 1985.

The prospects in 1986 for hard coal are rather flat. The three principal constraining factors are the Community's expanding nuclear capacity and therefore reduced requirement for conventionally-produced electricity; and secondly much lower oil prices, particularly residual fuel oil, which could substitute for some coal. Thirdly, the outlook in the steel industry is also rather flat during 1985. **In 1986** solid fuel demand should be close to the overall 1985 figure (218 Mtoe).

On the supply side, Community production of hard coal will be slightly higher than in 1985 (because the first quarter of 1985 was affected by the UK mining dispute). But hard coal production is expected to be reduced in the Federal Republic of Germany and France and so, with much smaller stock movements expected, the Community's net imports of solid fuels will be significantly lower in 1986.

Electricity

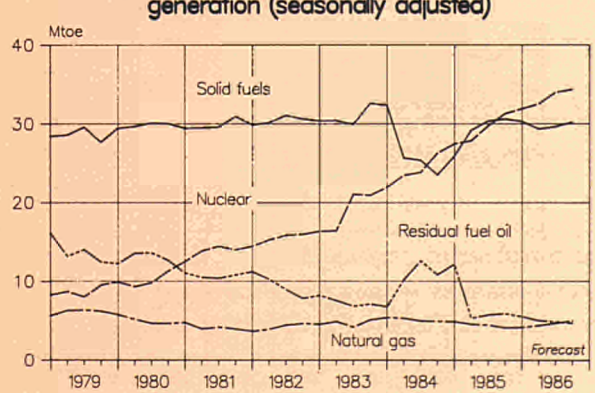
Electricity consumption increased by over 4% in 1985 — the second successive year of substantial growth.

The recent growth rates in each Community Member State were as follows:

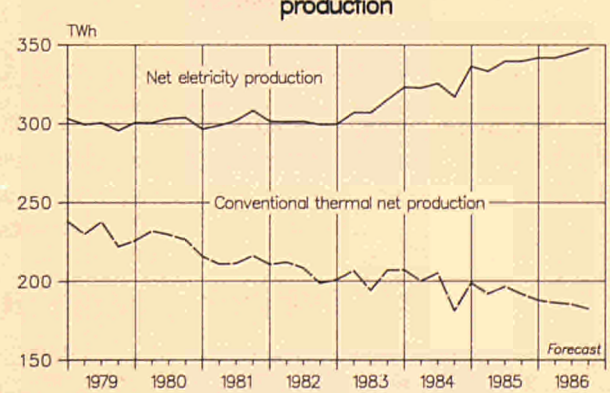
EUR 10: Electricity demand growth rates

	1984/83	1985/84	1986/85
Belgique	+4.9	+3.6	:
Danmark	+4.5	+6.3	:
BR Deutschland	+3.8	+2.7	:
Ellas	+6.2	+3.2	:
España	+4.8	+2.3	:
France	+5.3	+7.3	:
Ireland	+3.8	+4.0	:
Italia	+5.0	+2.8	:
Luxembourg	+5.7	+0.6	:
Nederland	+3.6	+2.5	:
Portugal	+4.3	+5.1	:
United Kingdom	+1.8	+5.2	:
EUR 10	+4.0	+4.3	+2.8
EUR 12	+4.0	+4.2	:

Graph 11 – EUR 10: Quarterly inputs for electricity generation (seasonally adjusted)



Graph 12 – EUR 10: Seasonally adjusted eletricity production



As the table shows, the increase in electricity demand in 1985 is generalized across the Community with the French and Danish electricity markets particularly buoyant. In 1985, the cold weather and further growth in the electricity-intensive sectors of the economy kept demand at a high level.

In 1986, around 3% growth in electricity demand is expected — lower than in 1985.

Once again, the outstanding feature on the supply side is the continuing increase in the penetration of nuclear-generated electricity.

The increase in nuclear power has permanently replaced a substantial volume of oil and gas generated electricity in the Community. As a result, the residual requirement for conventionally-generated electricity has fallen every year since 1979.

EUR 10: Nuclear developments

	Net nuclear production (TWH)	% increase	% total electricity production
1980	149.4	+17.0	12.3
1981	201.7	+35.0	16.7
1982	226.9	+12.5	18.9
1983	275.0	+21.2	22.4
1984	352.8	+28.3	27.4
1985	429.5	+21.7	31.9
1986 (forecast)	489.7	+14.0	35.6

In 1986, conventional thermally-generated electricity could be up to 5% lower than in 1985. Coal-fired electricity generation will slightly increase, but the Community's oil and gas burn in power stations is expected to decline. Nuclear electricity could increase by a further 14%, to cover over 35% of the Community's electricity production.

Lastly, intra-Community electricity trade is expected to expand strongly in 1986 mainly due to the recent commissioning of the France-UK undersea electricity link.

Table 1 — Primary energy balance for the European Community

(Mtoe)

	1979	1980	1981	1982	1983	1984	1985	1986
Primary production								
Solid fuels	181.6	186.5	186.8	183.8	175.7	131.8	157.9	166.9
Oil	89.5	91.5	101.7	115.1	131.4	144.2	147.6	149.1
Natural gas	136.8	129.4	125.5	116.1	119.9	119.2	125.7	121.7
Nuclear	34.6	40.5	54.7	61.5	74.5	95.6	116.4	132.7
Hydro	12.4	12.6	12.8	12.6	12.5	12.2	12.1	12.4
Total	**454.9**	**460.6**	**481.5**	**489.1**	**514.0**	**503.0**	**559.6**	**582.8**
Net imports								
Hard coal	39.6	48.9	44.2	46.1	38.4	51.9	55.3	52.1
Oil	488.2	435.7	354.0	326.5	292.2	300.4	287.8	296.1
Natural gas	37.4	43.5	46.2	45.8	50.1	57.9	59.4	62.4
Electricity	1.4	1.2	1.9	1.7	1.9	1.3	0.9	1.4
Total	**566.6**	**529.3**	**446.2**	**420.1**	**382.6**	**411.5**	**403.4**	**412.0**
Change in stocks								
Hard coal/coke	- 10.8	11.0	8.9	10.6	1.8	- 16.5	- 5.0	4.3
Oil	16.0	15.6	- 17.9	- 10.3	- 15.3	- 3.2	- 3.6	- 1.1
Natural gas	1.4	3.9	6.7	3.4	4.9	2.9	3.9	0.9
Bunkers	**26.6**	**23.8**	**25.9**	**24.2**	**22.3**	**21.2**	**23.4**	**25.1**
Estimated gross inland consumption								
Solid fuels	232.0	224.4	222.0	219.4	212.3	200.2	218.2	214.7
Oil	535.1	487.8	447.6	427.7	416.6	426.5	415.5	421.2
Natural gas	172.8	169.0	164.9	158.5	165.1	174.3	181.2	183.3
Nuclear	34.6	40.5	54.7	61.5	74.5	95.6	116.4	132.7
Hydro	12.4	12.6	12.8	12.6	12.5	12.2	12.1	12.4
Total	**988.3**	**935.6**	**904.0**	**881.3**	**882.9**	**910.1**	**944.2**	**965.7**
Net imports as % of consumption[1]								
Hard coal	17.1	21.8	19.9	21.0	18.1	25.9	25.3	24.3
Oil	86.9	85.2	74.7	72.3	66.6	67.1	65.6	66.3
Natural gas	21.6	25.7	28.0	28.9	30.3	33.2	32.8	34.1
Total	**55.8**	**55.2**	**48.0**	**46.4**	**42.3**	**44.2**	**41.7**	**41.6**

[1] Net imports/(gross inland consumption + bunkers).

Table 2 — Primary energy balance for the European Community

(Mtoe)

	1984				1985				1986			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Primary production												
Solid fuels	40.1	29.5	30.0	32.2	35.4	38.9	40.4	43.2	44.3	41.0	38.5	43.2
Oil	36.3	34.9	35.1	37.8	38.0	36.1	35.3	38.2	38.8	36.1	36.4	37.8
Natural gas	42.6	24.9	19.1	32.6	46.1	25.0	17.9	36.7	41.4	25.7	19.4	35.2
Nuclear	24.8	22.0	20.9	27.9	31.1	25.9	26.0	33.3	36.1	30.2	29.8	36.7
Hydro	2.9	3.5	2.8	3.0	3.0	3.7	3.0	2.4	3.0	3.5	3.0	2.9
Total	**146.7**	**114.8**	**108.0**	**133.4**	**153.5**	**129.7**	**122.6**	**153.8**	**163.6**	**136.5**	**127.1**	**155.7**
Net imports												
Hard coal	11.4	12.6	13.6	14.3	13.5	13.9	13.7	14.2	12.2	14.0	12.7	13.1
Oil	75.3	76.5	71.4	77.1	76.1	62.7	71.8	77.0	65.0	71.6	74.5	85.0
Natural gas	16.2	14.7	11.6	15.4	16.1	14.6	12.5	16.3	17.8	14.3	12.3	17.9
Electricity	0.1	0.3	0.5	0.4	0.2	0.4	0.5	- 0.1	0.0	0.5	0.7	0.3
Total	**103.0**	**104.1**	**97.2**	**107.1**	**105.8**	**91.6**	**98.5**	**107.5**	**95.1**	**100.4**	**100.2**	**116.3**
Change in stocks												
Hard coal/coke	- 11.9	- 2.4	1.0	- 3.2	- 6.8	0.3	5.0	- 3.6	- 2.5	4.1	4.3	- 1.7
Oil	- 3.4	4.3	- 1.9	- 2.3	- 5.3	- 1.7	1.4	2.1	- 10.2	2.3	4.4	2.5
Natural gas	- 2.9	3.2	3.8	- 1.3	- 4.5	4.8	3.9	- 0.4	- 4.6	3.3	4.0	- 1.8
Bunkers	**5.2**	**5.4**	**5.5**	**5.2**	**5.1**	**6.2**	**6.2**	**5.9**	**5.9**	**6.5**	**6.5**	**6.2**
Estimated gross inland consumption												
Solid fuels	63.3	44.6	42.7	49.6	55.6	52.5	49.1	61.0	59.0	50.9	46.9	58.0
Oil	109.8	101.8	103.0	112.0	114.3	94.3	99.6	107.3	108.1	99.0	100.0	114.1
Natural gas	61.7	36.4	26.9	49.2	66.7	34.7	26.5	53.3	63.8	36.7	27.8	54.9
Nuclear	24.8	22.0	20.9	27.9	31.1	25.9	26.0	33.3	36.1	30.2	29.8	36.7
Hydro	2.9	3.5	2.8	3.0	3.0	3.7	3.0	2.4	3.0	3.5	3.0	2.9
Total	**262.6**	**208.5**	**196.8**	**242.1**	**270.8**	**211.6**	**204.6**	**257.3**	**270.0**	**220.8**	**208.1**	**266.8**
Net imports as % of consumption[1]												
Hard coal	18.0	28.3	31.9	28.8	24.2	26.5	28.0	23.3	20.7	27.6	27.1	22.7
Oil	65.5	71.4	65.9	65.8	63.8	62.4	67.9	68.1	57.0	67.9	69.9	70.6
Natural gas	26.3	40.3	43.2	31.3	24.1	41.9	47.1	30.6	27.9	39.0	44.4	32.7
Total	**38.5**	**48.7**	**48.1**	**43.3**	**38.4**	**42.0**	**46.7**	**40.8**	**34.5**	**44.2**	**46.7**	**42.6**

[1] Net imports/(gross inland consumption + bunkers).

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

	1979	1980	1981	1982	1983	1984	1985	1986
1. Oil (Mt)								
Primary production	88.6	90.6	100.7	113.9	130.1	142.7	146.1	147.7
Change in stocks [1]	16.0	15.6	- 17.8	- 10.2	- 15.2	- 3.2	- 3.6	- 1.1
Net imports [1]	485.6	433.5	352.4	325.1	291.0	299.1	286.7	295.1
Bunkers	27.5	24.5	26.8	25.0	23.0	21.9	24.2	25.9
Apparent consumption	**530.8**	**484.0**	**444.1**	**424.3**	**413.3**	**423.2**	**412.2**	**417.9**
Inland deliveries:								
Motor gasoline	83.9	84.5	82.6	83.3	83.7	85.1	84.5	86.4
Gas/diesel oil	175.7	158.6	147.5	140.3	140.4	143.3	149.8	154.1
Heavy fuel oil	142.8	128.0	108.1	93.6	77.8	83.2	66.6	62.5
Other products	96.4	85.0	80.4	80.5	85.4	86.5	85.7	92.5
Total	**498.8**	**456.2**	**418.6**	**397.8**	**387.3**	**398.1**	**386.7**	**395.5**
Power stations:								
Consumption	58.4	53.9	44.7	40.0	31.2	41.2	31.7	20.9
Change in stocks	1.7	- 0.4	0.6	- 1.4	- 2.7	- 0.1	- 1.4	1.0
2. Natural gas (Mtoe)								
Primary production	136.8	129.4	125.5	116.1	119.9	119.2	125.7	121.7
Imports[2]	37.4	43.5	46.2	45.8	50.1	57.9	59.4	62.4
Apparent consumption	172.8	169.0	164.9	158.5	165.1	174.3	181.2	183.3
of which:								
in power stations	24.4	20.3	16.9	16.6	18.8	20.6	17.9	18.3

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

Table 4 — Solid fuels: supply and Disposal in the European Community

	1979	1980	1981	1982	1983	1984	1985	1986
1. Hard coal (Mt)								
Primary production	245.1	253.6	252.2	248.4	235.2	161.9	205.9	221.0
Change in stocks								
Collieries	- 5.6	10.7	8.9	4.2	0.5	- 8.3	- 10.4	- 2.9
Power plants	- 2.3	6.7	6.2	9.5	0.9	- 13.6	7.7	6.4
Net imports	58.4	74.2	66.5	70.0	57.0	78.9	85.3	79.8
Apparent consumption	311.4	310.3	303.6	304.6	290.8	262.7	293.9	297.3
Deliveries to:								
Power plants	166.4	179.2	176.5	184.0	175.8	131.9	172.6	176.8
Coking plants	87.6	88.4	85.2	80.1	69.7	69.8	76.4	76.3
All industries	22.4	22.7	24.0	24.5	25.4	26.1	28.3	26.8
Households	19.9	18.0	16.0	16.5	15.9	14.5	16.7	15.5
Total	296.3	308.4	301.7	305.2	286.8	242.2	294.0	295.5
2. Hard coke (Mt)								
Coking plants								
Production	67.3	66.6	64.2	60.2	53.5	52.8	57.1	56.0
Change in stocks	- 8.9	0.8	- 0.1	3.8	1.4	- 5.3	- 4.3	3.5
Deliveries to the iron and steel industry	58.4	54.3	52.6	46.3	41.8	48.5	49.8	48.3
3. Lignite								
Production (Mt)	158.2	157.0	162.4	159.3	158.7	162.0	158.9	157.6
Consumption in power stations (Mtoe)	25.9	26.2	27.6	26.6	27.3	27.0	26.0	26.0

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

	1979	1980	1981	1982	1983	1984	1985	1986
Electrical power (TWh)								
Total generation	1 267.5	1 277.6	1 274.6	1 271.4	1 299.8	1 360.7	1 426.9	1 456.7
Total net production	1 198.8	1 208.7	1 206.1	1 202.9	1 229.1	1 286.7	1 348.1	1 375.9
of which:								
Hydroelectrical	143.9	146.1	149.1	146.1	144.8	141.5	140.2	144.3
Nuclear	127.6	149.4	201.7	226.9	275.0	352.8	429.5	489.7
Conventional thermal	927.3	913.1	855.2	830.0	809.3	792.4	778.4	741.8
Gross inland consumption	1 283.9	1 291.7	1 296.8	1 290.8	1 321.6	1 375.3	1 437.6	1 473.1
Available for internal market	1 206.5	1 213.9	1 217.4	1 212.0	1 237.9	1 287.5	1 343.4	1 381.4
Input to thermal power stations[1] (Mtoe)								
Hard coal	88.1	92.9	91.9	94.7	96.1	80.8	89.1	93.6
Lignite	25.9	26.2	27.6	26.6	27.3	27.0	26.0	26.0
Petroleum products	56.1	51.7	43.0	38.4	29.9	39.6	30.4	20.1
Natural gas	24.4	20.3	16.9	16.6	18.8	20.6	17.9	18.3
Derived gas	1.7	1.7	1.8	1.5	1.3	1.5	1.5	1.5
Total	197.4	193.7	182.2	178.2	174.0	171.7	165.7	160.4
Net Nuclear capacity (GW)	22.8	26.7	34.4	40.2	43.8	50.7	62.1	74.0

[1] Conventional thermal plants in the public supply system.

Community news

Energy Council – 20 March 1986

This was the first opportunity that the Council of Ministers had to discuss the **fall in oil prices**, which was recognized as having beneficial effects on the economic outlook for the Community. The Energy Council agreed that the fall in oil prices witnessed over the preceding few weeks should not have any detrimental short-term energy policy effects and there was therefore no reason to adopt new specific energy policy measures now. This does not rule out however that there may be a need to re-examine the measures needed to attain long-term policy goals once the market has stabilized.

Ministers continued their examination of the new **1995 Community energy objectives**. They reached agreement on many of the outstanding specific objectives. The few remaining issues have been referred to Coreper for resolution, the aim being to have the objectives adopted as an 'A' point at a forthcoming Council.

There was a detailed debate on aspects of **solid fuels policy** where two issues were being dealt with. Firstly, there was the proposed new **State aids for coal regime**, where Ministers were able to clear up many of the issues identified at Working Group level. Further examination of the few remaining points to be resolved will now be undertaken at Coreper and it is expected that Ministers will be in a position to finally resolve this matter at their next meeting. The second aspect under the heading of solid fuels was **lignite and peat**. Some of the Member States who have significant peat and lignite reserves feel that the Council in the past has paid insufficient attention to the these fuels. To assist Council discussions, the Commission produced a new Communication examining the lignite and peat industries in the Community. The issues raised in the Communication will now be examined by the Energy Working Group and a report will be made to the next Council.

Another new Commission Communication, this time on **new and renewable energies**, was also discussed by Ministers. In this Communication the Commission highlights the present situation and outlook in relation to these fuels and makes suggestions as to how their potential can be maximized. Ministers agreed that, in the light of developments in the oil market, it was timely to focus attention on new and renewable energies. The Commission's proposals will now be examined in detail by the Energy Working Group.

The next Energy Council is likely to be held on Tuesday 3 June.

European Parliament: Committee on Energy, Research and Technology (CERT)

Fears that current market conditions could result in a return to heavy dependence on oil imports from outside the Community, opening the way to a new energy crisis in the 1990s, underlay the report on new EC energy objectives for 1995 which was adopted on 25 February by CERT.

While welcoming the sense of urgency which had prompted the Commission to bring forward its proposals now, CERT said that the objectives should have been more ambitious and specific. On the suggestion of its *rapporteur*, **Dr Gordon Adam**, CERT adopted an amendment to the objectives whereby the EC would strive 'to ensure that oil imports do not increase by more than 10% of the 1983 figure' between now and 1995. It also called for priority to be given to solid fuels in efforts to cut the role of oil and gas in the production of electricity. Among other points, CERT wants the Commission to promote the use of the ECU in energy transactions.

The Adam report was adopted on 17 March by the European Parliament in plenary session, with 13 amendments, which will now be examined by the Council at its next meeting on 3 June.

Solid fuels policy has continued to be a major preoccupation of the Committee, which on 25 February also adopted a report drafted by **Lambert Croux** calling for the present EC rules on State aids to be kept in force until the end of 1987. The Commission has been proposing a new set of rules to be brought in on 1 July this year. Meanwhile, the Croux report also proposes certain changes to the proposed new rules, designed to take greater account of regional and social problems while still confronting the problem of competition.

The report was adopted by the European Parliament on 13 March with 6 amendments on which the Commission has expressed its views. At the next Council meeting in June, the Commission will propose a final text incorporating agreed amendments.

On 20 February, at its plenary session, the European Parliament adopted a series of four Resolutions concerning the application of safety measures in the Sellafield reprocessing plant in the United Kingdom. One Resolution demands that operations at this plant should be suspended at least until the House of Commons' Committee of enquiry on nuclear waste policy has completed its work.

ECSC Consultative Committee: main activities in the energy field

At its 253rd session on 4 November 1985, the Committee was consulted, under Article 95 of the ECSC Treaty, on the Commission's proposals[1] for new Community rules for State aids to the coal industry (see *Energy in Europe* No 3 of December 1985, p.11-13).

After discussion, in which representatives of the Commission's Directorate-General for Energy took part, the Consultative Committee adopted an opinion in which it approved the general objectives behind the Commission's draft Decision (increased competitiveness of the national coal industries, enhanced transparency of the system of aids, awareness of social and regional problems). The opinion did however call for more emphasis on the security of supply of coal from Community countries, its contribution to the replacement of imported energy sources, and the removal of any ceiling on the amount of investment aid which could be granted. It also called for any new system of aids to have a lifetime of 10 years instead of the 5 years proposed by the Commission.

At its 255th session on 14 March 1986, the Committee was consulted by the Commission under Articles 19 and 46 of the ECSC Treaty on its report on the market for solid fuels in the Community in 1985 and the outlook for 1986.[2]

At the same session, the Committee was consulted under Article 55 of the ECSC Treaty concerning 60 projects on technical coal research, including mining techniques and coal use, totalling 22 MECU: the Committee noted this programme with approval.

Environment Council update

On the agenda of the **November 1985 Council** were three subjects which have a direct bearing on the energy sector:

(i) **restriction on pollutant emissions from large combustion plants;**

(ii) **sulphur content of gas oil;**

(iii) **air pollution caused by automobile exhaust fumes.**

No definite decisions were taken on any of these subjects.

Although the Commission representative, Mr Stanley Clinton Davis, expressed his disappointment at what little progress had been made on the proposed directive on **large combustion plants**, the importance of which as a means of combating air pollution was stressed by the European Council at its meeting in March 1985, the Ministers only engaged in an in-depth, but fruitless policy debate. Positions that were already known were restated, some delegations underlining once more the need for agreement soon, and others stressing that the proposed Community solution did not take sufficient account of the particular problems of their countries.

The Council discussed on first reading the Commission proposal for a directive amending Directive 75/716/EEC on the **sulphur content of gas oil.** The Commission proposal provides for a reduction in the sulphur content in gas oil to 0.3% (0.2% in certain specific circumstances) by July 1987. There was no agreement on first reading since the delegations differed on the harmonized gas oil standard for the Community (0.2% or 0.3% sulphur content).

Although the Council was able to enlarge on the general compromise of June 1985 on the reduction of **motor vehicle exhaust levels** (introduction of the 'clean' car) as regards a number of problems still outstanding — diesel engines with direct injection, automatic transmission, lead- free petrol — Denmark maintained its general reservation against this proposed directive.

The Environment Council met on **6 and 7 March 1986** and again discussed the subject of emissions from **large combustion installations and the sulphur content in gas-oil.** No agreement was reached. The Environment Council will meet again in June and the Commission has been asked to table compromise proposals on large com-

bustion installations. The sulphur content in gasoil question has been referred to Coreper for further consideration.

Eurostock – past – present – future

Past

The successful 1985 trial of Eurostock — a rapid reporting system on stocks of crude oil and petroleum products — is now over and Eurostock continues. It was a very interesting year's trial for those involved. Many lessons were learned and a lot of interesting information came to light for the first time. As the system developed, both speed and accuracy improved steadily. Speed speaks for itself. For example, Eurostock data for Friday 31 January were in the hands of participants within 6 working days. As far as accuracy is concerned, the following table shows, at Community level, how recent true stock reports, available after only several days, compare with the official statistics that become available 2-3 months later.

End-month stocks

(EUR 9 (excluding France))

(000 tonnes)

	Crude oil		Motor gasoline	
	Eurostock estimate[1]	Actual[2]	Eurostock estimate[1]	Actual[2]
Oct. 1985	34060	34781	9170	9328
Nov. 1985	35455	35956	9525	9673
Dec. 1985	34550	35200	9095	9178
	Middle distillates		**Residual fuel oil**	
	Eurostock estimate[1]	Actual[2]	Eurostock estimate[1]	Actual[2]
Oct. 1985	21695	21794	15150	15888
Nov. 1985	22180	22628	15740	16247
Dec. 1985	23130	23516	16160	16300

[1] First Eurostock estimates.
[2] Comparable figures from IEA monthly oil statistics.

Present

It had always been understood that, if Eurostock proved to be a success, its future ongoing organization and management would be taken over by the oil industry itself. Consequently we are now in a transition phase and making arrangements for the transfer of Eurostock to the industry. The industry working party, the audit firm KKC, the consultant firm Joe Roeber Associates and the Commission have been working together on this development and the Commission has extended its funding of the work to cover the transition which it is anticipated will be completed by the end of May.

The management of Eurostock will be undertaken by a new Dutch non-profit Foundation (a '*Stichting*') which will be controlled by a Council of elected oil company officials. The by-laws of the *Stichting* have been prepared in the official Dutch version and English and the *Stichting* is registered in Rotterdam. Existing and potential participants are being invited to join and to put forward nominees for election to the Council. When the Council has been duly elected it will take over responsibility for running Eurostock.

Another activity during the transition phase is expansion to include Greece, Spain and Portugal in the reporting system.

Future

The first job for the newly elected Council will be to decide upon financing future operations when Commission funding stops. Since Eurostock involves a widespread data collection system and the employment of an audit firm to guarantee confidentiality, there are operating costs that have to be covered. It is for this reason that the Council may choose to sell the information they give to participants to interested non-participants or the media. Current indications suggest that there is sufficient interest to yield an income that would cover a reasonable proportion of the estimated running cost.

Once under industry management, further expansion is expected to cover more countries in OECD Europe.

EC/OAPEC high-level meeting – Brussels, 9 and 10 December 1985

The fourth annual high-level meeting between the Commission of the European Communities (EC Commission) and the General Secretariat of the Organization of Arab Petroleum Exporting Countries (OAPEC) took place in Brussels on 9 and 10 December 1985. Delegations were headed respectively by Mr Christopher Audland, Director-General for Energy of the Commission, and Dr Ali Attiga, Secretary-General of OAPEC. Dr Ali Attiga met Mr Nic Mosar, Member of the Commission responsible for Energy.

The meeting reviewed cooperation between the two organizations in 1985. Both sides expressed their satisfaction at the positive character of the various activities undertaken since the last meeting, in particular the regular exchanges of staff and of information, and the development of technical cooperation which has led to the realization of joint projects and the preparation of further steps to be taken.

Both sides agreed that their exchanges of view had been useful in creating greater understanding of positions and perspectives, and that they should be continued.

As to joint technical cooperation activities, it was agreed to:

(i) continue the joint studies on energy planning including the establishment of energy balances of several Arab countries and to examine the possibility of broadening the coverage of joint activities in this field;

(ii) develop exchanges of staff and mutual participation in seminars and conferences organized by both organizations;

(iii) start cooperation in training with the Arab Petroleum Training Institute (APTI), the aims of which were explained during the meeting;

(iv) examine with the OPEC Secretariat the possibility of organizing a trilateral seminar on long term energy prospects.

The next OAPEC/EC high-level meeting will take place in Kuwait in the second half of 1986.

Energy planning – the Community's activities in 1985

In 1985 the Commission took on 61 energy programming projects totalling 5.8 MECU, the same as in 1984. Nearly one MECU was set aside for the financing of European regional energy studies and 4.8 million went towards continuing and extending the European Community's activities with Third World countries.

In **Europe**, while a number of operations begun in previous years were completed (in particular the analysis of energy flows in Berlin, regional energy plans in the counties of Storström and Bornholm in Denmark, energy plan for the region of Aquitaine in France), new regional studies were initiated for Greek regions (Cyclades Islands), British regions (North-West of England), German regions (Nordfriesland and the Island of Sylt) and for Luxembourg and Ireland. The Community's activity in energy planning at European regional level is thus highly diversified (a total of 20 regions being covered), and in May 1985 the Commission organized a seminar in conjunction with the German Government which provided a comparison of all experience gained in the establishment of regional energy balance sheets and plans.

Finally, the development of processing and display instruments for energy flows (Innotec model), obtained as part of a European regional project, is of particular importance. Coupled with older planning models developed by the Commission, it will thus be possible to provide energy planners with even more efficient decision-making aids to the benefit of both European and Third World decision makers.

In the Third World, methodological studies, the 'hard core' of this cooperation involving twelve institutes from Europe, Latin America, Africa and Asia, were continued. The Community network thus benefited from nearly **1 MECU** designed notably, on the basis of case studies, to test and improve the common energy planning methodology advocated for developing countries. One of the priorities of the 1985 energy programme was to provide practical energy planning instruments and to help establish energy plans — based on the results of the methodological work of the Community network of institutes — both at national level for some countries and at regional level. Funds for this activity amounted to **3.1 MECU.** These projects, combined with the training and information of energy planners (activities which received backing of **0.5 MECU** and helped to train more than 500 officers in developing countries), form the very

backbone of the Community energy planning programme, the basic aim being to improve data on energy and make them more consistent, and also to help master energy problems at world level, in particular through better planning, both nationally and regionally.

Finally, as in the past a number of visits by nationals from non-member countries were organized (financing = 0.2 MECU).

From the geographical angle, the division of funds in 1985 was practically equal between Asia and Latin America. In Asia, China, because of the potential it represents, received particular attention, as in previous years. Exemplary cooperation has now been established with China in the energy sector and covers the entire range of available instruments (studies, training, technical assistance, study and information visits, organization of seminars).

Accordingly, in 1985 some 300 Chinese experts received training in energy planning and energy management techniques with active European backing. In three key regions for the economic development of the country (Xinjiang, Zhejiang and Hunan) the analysis of energy flows and regional energy planning were refined, the accent being placed on specific problems in rural areas.

Specific cooperation was initiated with **Thailand:** the setting up of a vast project providing for the cooperation of European experts and the attendant training of Thai personnel (20 in all) will help to establish the appropriate instruments for analysing the demand for energy in the medium and long term.

Energy planning with **Latin America** was also continued and intensified. With **Argentina** and **Brazil** the accent was placed on a more detailed regional energy analysis (state of Rio de Janeiro in Brazil, North-East of Argentina). With **Ecuador** efforts made since 1979 in energy planning with the active support of the Community have allowed the Ecuadorian authorities to manage the problems connected with energy more efficiently and to promote more appropriate policies.

1985 was a year of consolidation, the planning instruments created and made available over five years being progressively taken over by the nationals themselves with less and less outside support. Finally, cooperation began in 1985 with **Mexico,** the aim being for the Mexican administration to analyse the country's energy system better while improving the techniques for collecting, processing and utilizing energy data.

Finally, a degree of activity was maintained with **Arab countries,** in particular through the **OAPEC secretariat in Kuwait** (energy analyses in **Syria, Tunisia** and the **United Arab Emirates**). In addition, specific support in energy planning was given to **Jordan** through the provision of an expert at the Ministry of Energy and the preparation of training programmes for Jordanian personnel.

Community action in energy planning is now sufficiently well known and appreciated by the 'users'. For 1986 the budgetary authority has decided on an increased budget (6.6 MECU), which will allow this activity to develop still further since it is entirely consistent with the objectives of European energy policy, especially the need to promote balanced external relations in the energy sector.

The Valoren programme: regional exploitation of indigenous energy potential

The Commission transmitted to the Council on 20 January 1986 a proposal for a regulation instituting a Community programme for the development of certain less-favoured regions of the Community by exploiting indigenous energy potential (the Valoren programme).

With the entry into force in 1985 of a new regulation governing the European Regional Development Fund (ERDF), the Community has established new means of better coping with the diversity of the problems to be solved. Conscious of the major contribution regional measures defined at the European level can make to the solution of serious problems affecting the economic situation of certain regions, the Community has, among its means of intervention, made provision for 'Community programmes'. These programmes are designed amongst other things to ensure a better link between the objectives of regional development and the objectives of the other Community policies, including the energy policy. The Council of Ministers also recently adopted the general energy objective of implementing, for the benefit of less-favoured regions, measures aimed at improving the Community's energy balance.

Studies undertaken by the Commission have shown that the Community's most underdeveloped regions are often

those situated in Member States affected by an unfavourable energy situation overall. Some islands and peripheral regions are confronted with similar problems with regard to the supply of energy.

In addition, these same regions possess energy potential not yet sufficiently mobilized, in particular in the exploitation of local energy resources and in the rational use of energy.

In supporting national initiatives, the ERDF has already made a considerable contribution to the financing of energy projects and will continue to do so. The justification of a Community programme lies in the specific features of the measures for developing indigenous potential. **The aim of the Valoren programme is to exploit limited localized pools of energy resources which could have a significant local and regional impact.** This impact can be assessed through three parameters: the energy produced is for the most part consumed locally; its exploitation involves a high local labour content; and, finally, the technological spinoff will benefit the basic economic fabric.

Accordingly, the measures included in the Valoren programme concern firstly the exploitation of local energy resources, such as alternative and renewable sources of energy, and small deposits of peat and lignite. The programme also centres on the rational use of energy, notably energy saving and oil substitution. These measures are aimed primarily at small and medium-sized enterprises. These two categories of operations are completed by a promotion campaign on analysis and programming at regional and local level, advisory services and technical assistance to small and medium-sized enterprises, and the dissemination of knowledge.

The Valoren programme proposed by the Commission concerns the regions of Greece, Ireland, the Mezzogiorno, Northern Ireland, Corsica and the French overseas departments plus certain regions of Spain and Portugal yet to be determined.

As for the intervention mechanism, the Valoren programme is covered by the provisions of the new Regulation governing the Regional Fund. Community co-financing is not by project, but by annual batches of coherent measures. This approach favours multiannual planning of projects and financing with the cooperation of the various national and regional authorities. The intervention programmes are to be drawn up by the Member States in the six months following the adoption by the Council of the Regulation instituting the Valoren programme. The programmes are then submitted to the Commission which will adopt them in the form of 'programme agreements' with the Member States in question. **Community funding will normally be to the tune of 55% of all the public expenditure taken into account in the programme agreement.**

In strengthening the economic base of underdeveloped regions, the Valoren programme will help to attain the energy policy objectives that the Community has set. The present drop in the price of oil lends further economic justification to the Valoren programme, to the extent that this drop in price may discourage in the medium term the investments needed to use energy more rationally. In the long term, a trend of this kind would leave underdeveloped regions in an even worse situation in terms of energy than in previous years and bring with it the inevitable negative repercussions on their competitiveness and thus development.

Nuclear cooperation agreement between the European Community and Canada

Chapter X of the Euratom Treaty sets out provisions in Articles 101-106 on the Community's external relations in the nuclear field. Under Article 101, the Commission may negotiate agreements (or revisions to agreements) on behalf of the Community with third States and international organizations, in accordance with a negotiating mandate (or directives) approved by the Council of Ministers.

The Community has major nuclear agreements with a number of significant nuclear supplier countries.

The agreement between **Canada and the European Community** (Euratom) for cooperation on the peaceful uses of nuclear energy first entered into force in November 1959. It has, however, since been amended in 1978, 1981 and most recently in June 1985.

The agreement that came into force in 1959 provided, *inter alia*, for the supply of nuclear material, the procurement of equipment and devices and the supply of information between the parties on research and development and problems of health and safety. Cooperation also included a joint programme of research and development

connected with the natural uranium fuelled heavy water moderated nuclear reactor. This programme has been successfully concluded.

Following the Indian nuclear explosion in 1974, the Canadian Government sought to re-negotiate its nuclear cooperation agreements. This attempt led eventually to an embargo on nuclear supplies to the Community of some 12 months in 1977, which was resolved by an exchange of letters between Canada and the Community in January 1978. This exchange of letters, and a further exchange in December 1981, brought the 1959 agreement into line with Canadian nuclear non-proliferation policy in a way that can be regarded as acceptable to the Community.

The Euratom/Canada agreement was further revised in June 1985. The text of an exchange of letters between the Community and Canada, together with agreed minutes, was published in the *Official Journal of the European Communities* on 31 July 1985 (reference C 191). Under this exchange of letters, the agreement was renewed for a further 20 years, with provision for automatic renewal thereafter. Improved procedures have been put in place for the retransfer to third countries from the Community of Canadian nuclear material or equipment; and agreement was reached on the principle of exchanging safeguards obligations attached to identical quantities of nuclear material in different locations (a procedure also referred to as a 'flag-swap', which avoids the need for physical movement of nuclear material between countries and consequent risks to the security of such material, when in transit).

Work is continuing between Commission and Canadian Government officials to ensure the continued satisfactory operation of the agreement and to ensure that following the recent enlargement of the Community no difficulties arise.

Sesame

Previous issues of *Energy in Europe* have carried articles on some of the many innovative projects supported by the European Community's energy demonstration programme. This is one way of disseminating information concerning such projects, however due to their large number and extensive sectorial coverage, only a limited idea can be given of the broad range of technologies supported by the Community.

Therefore, in order to reach a large public and present the information which is of interest to them, various dissemination tools have been developed; one of these is the **computer documentary data base 'Sesame'.** Set up in 1982 in response to a need for an ongoing evaluation of projects supported by the Community, and particularly a much improved dissemination of information, the data base was designed from the outset as an appropriate tool for the public. Since that time it has developed from a local DG XII/DG XVII data base (Directorates-General for Science, Research and Technology/Energy respectively) to one which is now open to the staff of the European Commission and a restricted group of Member State energy administrations.

Sesame information coverage is expanding rapidly. All those energy demonstration and technology projects which have been completed or are successfully underway are included, together with a substantial number of R&D projects administered by DG XII. Of note is also the interest which has been shown by Member States to use this data base as a host for information on their own energy demonstration projects. Sesame, which currently holds over 2 500 project profiles, is thus becoming an important source of data covering both Community and Member State activities.

Whilst many data bases, particularly those dealing with the energy field, are bibliographical data bases, Sesame is a factual data base whose contents are frequently updated; as each project matures from the moment of its inception through to the construction, installation, monitoring and final phases, information on the financial, technical and operational details is added. Furthermore, Sesame not only represents a library of information on projects, but also contains equally valuable information on the many contractors who carry out the project work and also on the manufacturers of the hardware which is being demonstrated.

Much of this information can already be obtained from the Directorate-General for Energy. However, once the present trial period is completed, during which time the data base will be transferred onto one of the most powerful computers owned by the Commission, public access to the information contained on Sesame will be possible. Moreover, taking into account the current relatively limited use of teleprocessing terminals in the Community, access by way of the more common videotex(t) systems will be arranged.

'Replication' – the fate of successful demonstration projects

Recently a new word called 'replication' has crept into the European Community's vocabulary.

Replication has taken on the meaning of **'encompassing the development of sustained markets in the technology supported and demonstrated under the Community's energy demonstration programme'.**

Readers of this review will have noted the regular articles describing some of the successful demonstration projects being funded by the European Community. The objective of the demonstration programme is to encourage this process. 'Replication' is therefore the successful commercialization of these demonstration projects.

To date nearly a thousand demonstration projects have been accepted for Community support, of which about 200 have now been completed whilst the remainder are still ongoing. As expected, a small proportion of the completed projects failed to come up to expectations and although yielding valuable information on the technology, they must either be substantially improved upon or left for posterity. However, many others have shown new ways to save energy and exploit alternative energy sources, and in many cases have lead to improved working environments and product quality. **The task to be accomplished now is that of introducing this new and innovative technology onto European markets.** Clearly over the past months many of the economic parameters influencing these markets have changed; some projects which were marginally competitive are no longer so. However, many more do still have a place in these markets and it is the work of the European Commission to help our contractors, who have often taken on board considerable risks in carrying through a project. This is done in two ways.

Firstly, by disseminating the results. This is clearly an immense task considering the size and diversity of the European Community. However, it leads to an efficient transfer of the right information to those who can really benefit from it.

The dissemination of information alone is, however, not enough to build up markets for demonstration projects; here we must not only make people aware of the projects but demonstrate how a particular technology can reduce costs. Many different techniques are employed to do this. One of the most successful is that of workshops held at the project site for a relatively small number of invited participants all of whom could profit from the project.

Secondly, by putting specific industries and our contractors in direct contact. Inspite of our common market it is a fact of commercial life that many contractors find that national and language frontiers are barriers to the expansion of markets. Here the Commission can help. By virtue of the wide geographical coverage of its programme, contacts between people operating in different markets can often be set up.

In the final analysis though, it is the contractor's responsibility to exploit the results of his demonstration project as much as possible. The Commission however can often facilitate the process of commercial exploitation with the concomitant effects on not only the Community's present and future energy balance but also the development of new markets.

Action on replication and successful projects which are now widely commercialized will be described in future articles.

Third non-nuclear energy R&D programme (1985-88)

Results of the first call for proposals

In 1975 the European Community launched its first four-year non-nuclear energy R&D programme (59 MECU). This was followed in 1979 by the second programme (105 MECU) and on 12 March 1985[3] by the third in the series (175 MECU). It is coordinated with Joint Research Centre (JRC) projects and constitutes the non-nuclear energy research action programme (RAP). These Community R&D activities are carried out by means of shared-cost contracts with research establishments in the Member States: universities, public research centres and the industries concerned.

The third programme (1985-88) consists of nine sub-programmes:

(a) Development of renewable sources of energy:
1. Solar energy,
2. Energy from biomass,
3. Wind energy,
4. Geothermal energy;

(b) Rational use of energy:
5. Energy conservation,
6. Utilization of solid fuels,
7. Production and utilization of new energy vectors,
8. Optimization of hydrocarbon production and use,
9. Energy systems analysis and modelling.

The first call for proposals covered all the sub-programmes except energy systems analysis and modelling.

Some 130 MECU of the 156 MECU available for contracts were allocated to this first call for proposals. The remaining 26 MECU have been set aside to issue further calls for very specific proposals for the following subprogrammes in 1986:

(i) solar energy,
(ii) energy from biomass,
(iii) wind energy,
(iv) new energy vectors.

A plethora of proposals were submitted in response to this first call and, as the following figures indicate, the total funds applied for were over four times the resources available:

number of proposals:	1 451
total cost of the research projects:	1 031 MECU
Community funding applied for:	552 MECU

60% of the applications were from industry and 20% from universities.

After intensive preparation and eight days of CGC (Management and Coordination Advisory Committee) meetings, all the proposals were examined for their conformity to the programme and on their respective merits. A total of 557 projects were selected for negotiations with a view to concluding contracts. The total amount of Community funding proposed is approximately 129.6 MECU.

In many cases it was necessary to reduce the amount of work proposed and in some cases cut the percentage of Community funding due to budget restraints. An additional saving was achieved by grouping together several potential contractors by means of careful coordination. Some 20% of the proposals had in fact been submitted as joint projects.

The Council's request that only 95 MECU should be committed in the first two years of the programme has in many cases entailed including a cancellation clause in a number of contracts or splitting research projects up into different stages according to the availability of funds.

The potential of the proposals selected should make it possible to consolidate what has been achieved in earlier programmes. They should help European industry and research compete with the United States and Japan. They should encourage activity in some strategically-important energy technology sectors (energy production, conversion and utilization). They should act as a catalyst and help to combine efforts that were previously dispersed throughout the Community.

Energy 2000 now available as a book

Energy in Europe No 1 (April 1985) gave a summary of the main findings of a study by the Commission staff of the energy outlook for the Community up to 2000.

The detailed study has now been published as a 340-page book in French by Économica, rue Héricart, 75015 Paris, price FF 98, under the title: *Énergie 2000 : une projection de référence et ses variantes pour la Communauté européenne et le monde à l'horizon 2000.* The English version will be published shortly by Cambridge University Press, UK.

The study analyses the outlook for the Community on the basis of different assumptions relating to the world oil price (including a price of $20 a barrel in the 1990s) and the price of other fuels; economic growth; environmental legislation; the pace of introduction of nuclear power, and so on. It also sets the Community outlook in a world context by looking at world demand and supply for fuels over the period.

Energy 2000 served as a point of reference in the definition of the Commission's proposals for new Community energy objectives (see separate article on falling oil prices in this issue).

The European Community's new 'Energy statistics bulletin' (published by the Statistical Office of the European Communities)

As from January 1986, Eurostat is publishing a new **monthly energy statistics bulletin** for the Community of Twelve, which replaces the three former monthly publications on coal, hydrocarbons and electrical energy.

In the first three sections, the reader will find the usual series describing short-term movements in supply and consumption of the main sources of energy. Particular emphasis has, however, been placed on rapid updating, if necessary by estimates, of the statistical series which most closely monitor the short-term energy situation. Also more information is provided on changes observed since the beginning of the year.

This standard part of the publication is accompanied by a **new section** largely devoted to general data on the overall energy situation and the factors influencing the short-term development of the energy economy, e.g. **economic indicators, energy prices and climatic conditions**. Although this section is as yet incomplete, it will be expanded during the course of 1986.

Eurostat hopes that the amount of information provided and the speed with which it is available will ensure that this publication is an essential statistical tool for monitoring energy developments in the European Community and in each of its 12 Member States.

The subscription rates for 1986 are as follows:

ECU 40.1, BFR 1 800, IRL 28.75, UKL 23.50, FF 270, US$ 34.

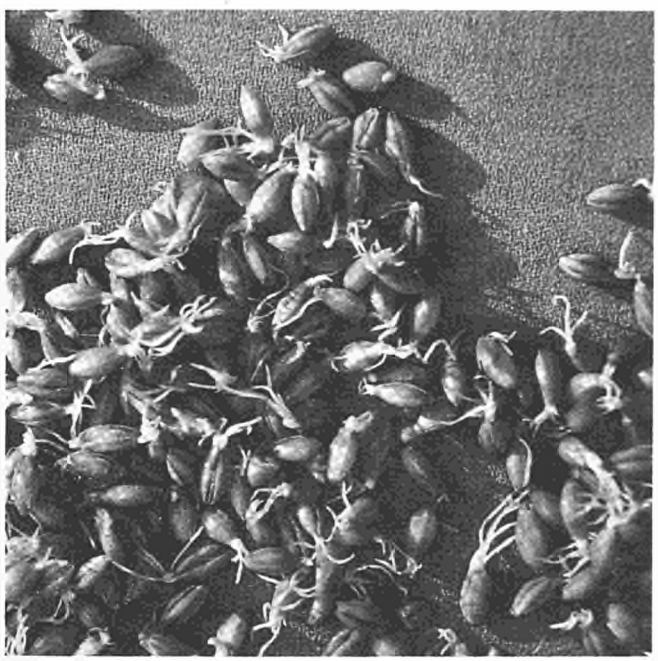
1 COM(85) 525 final, 25.9.1985.

2 COM(85) 115. The Commission's final report will now be notified, but not published in the Official Journal: copies will be obtainable on request.

3 OJ L 83, 25.3.1985.

Technology focus

Demonstration project cofunded by the European Community: energy recovery by heat pump at the Soufflet malthouse at Polisy (Aube), France



Raw material: sprouted barley

There is still enormous scope for making greater energy savings in industry using conventional methods or more sophisticated technology.

Potential energy savings are put at 25% of specific consumption up to the year 2000 or around 60 Mtoe per year for Community industry as a whole.

The most obvious sectors include the agri-foodstuffs sector where drying and evaporation techniques generate large quantities of waste heat which are often discharged into the air or in washing water.

Significant energy savings can already be achieved by simply recycling this waste heat to pre-heat fluids. There are, however, more sophisticated techniques such as the heat pump or mechanical steam recompression which can give much greater energy savings as they recover latent as well as sensible heat.

The heat pump installed at the Soufflet works at Polisy illustrates the possibilities offered by this technology in malthouses.

Soufflet, which specialise in the collection, international trading, storage and processing of grain (cereals, maize, brewing barley, feed barley, soy-bean cake, malt-making, milling, etc), are located at quai Général Sarrail, 10400 Nogent-sur-Seine, France.

They now have a new two-floor kiln at Polisy (Aube), France, to increase the barley drying capacity of their malthouse at Nogent-sur-Seine.

The barley, 170 t of which is processed per floor to produce 140 t of malt, is dried by hot air which flows through the kiln at a rate of between 438 000 and 212 000 kg/h and its temperature is raised from 55°C to 80-85°C.

The air leaves the upper floor of the kiln at a temperature of around 28°C and is saturated with steam.

In view of its distance from the gas network, the Soufflet malthouse could not use natural gas to reheat the air in the kiln. It was impossible to reheat directly using an oil burner because of European legislation on the authorized level of nitrosamines (which can cause cancer) in barley.

After an initial feasibility study a coal-fired boiler was rejected since, in view of the distance from an inland waterway, it would have to be carried by road and a storage area and heavy investment would be required.

The system chosen had to be reliable and simple to operate in an industry which does not have staff experienced in the operation of energy systems. It also had to reduce the energy bill as far as possible since this is a major factor in the selling price per tonne of malt produced and competition is fierce in this sector.

After carrying out a technical and economic study, Soufflet opted for a heat pump which would ensure maximum energy recovery and optimum security of supply at an additional investment cost of FF 4 million and a payback period of a little over two years.

The system consists of a glass tube air/air exchanger and a two-stage heat pump and covers all the kiln's heat requirements.

Latent heat is recovered from the heat pump's evaporator and used in the condenser to reheat the air blown into the lower floor of the kiln to the required temperature.

Only the first stage of the heat pump is used to heat the air to 60°C. It is only when that part of the cycle where the temperature of the air in the kiln is above 60°C is reached that the second stage is required.

In the first stage two compressors work in parallel.

The performance of the heat pump is improved by cooling the cycle fluid to as low a temperature as possible and recovering as much of the heat lost as possible. This means that the fresh air is also preheated by the heat recovered from the oil coolers.

A propane gas burner reheats the air in the kiln which is preheated in the glass tube exchanger during electricity peak days and as a back-up to the heat pump.

There is a programmable automatic control system for the heat pump system. This calculates the coefficient of performance from the measured parameter values and ensures that it is optimized to enable the system to operate under the best possible conditions. It is connected to the malthouse control unit which controls the air inlet temperature on the lower floor.

All the development problems encountered, which are to be expected for an ambitious innovation of this kind, have been resolved and the entire system has been operating satisfactorily since February 1985.

The performances achieved compared with an oil-fired boiler for 360 cycles a year are given below:

The cost of the project (excluding replacement of the evaporator which would not arise in future projects in view of the experience acquired) was:

Design, studies, follow-up	FF	275 000
Heat pump	FF	4 694 000
Civil engineering	FF	2 103 000
Conversion	FF	86 000
Programming and instrumentation	FF	373 500
Total	FF	7 531 500

The extra investment required compared with an oil-fired boiler, which would have required an investment of FF 2 700 000 in 1981, was FF 4 832 000.

At 1981 French energy prices, a saving of FF 1 686 000 was obtained on the energy bill giving, in the light of the heat pump's actual performances, a payback period of 2.85 years.

In 1985 the saving on the energy bill was FF 3 million.

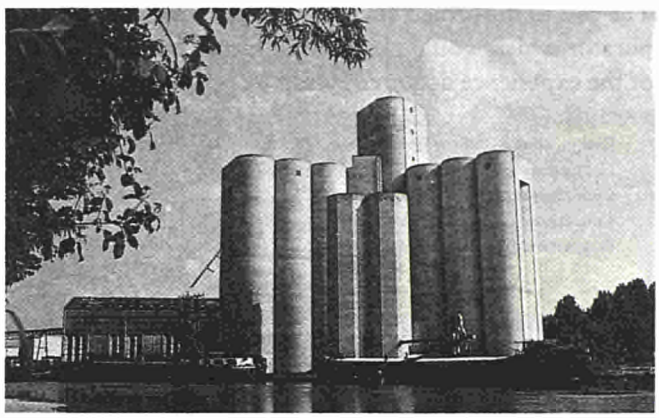
The energy consumption of the kiln per tonne of malt produced is 195 th/t malt.

In December 1985 the cost of energy required to produce one tonne of malt was FF 95.

Although the performances achieved are slightly lower than expected, the operation has been a success both in terms of the reheating temperatures of the air in the heat pump and the volume of heat recovered.

The system has proved reliable and simple to use. Now that this technique has proved itself it could easily be used in other malthouses or other industries which discharge low-temperature waste gases.

System	Oil-fired boiler	Heat pump	
		Average coefficient of performance	Maximum coefficient of performance
Heat requirements toe/year	2642.3	2642.3	
Output or coefficient of performance	82.5%	3.25	3.57
Number of annual kilnings	360	338 with heat pumps + butane gas burner 22 (peak days) with butane gas burner alone	
		Electricity	
Annual energy consumption	3336.2 t	8 358 MWh + butane back-up and peak days (th = million calories)	7609 MWh 1614738.4 th 1462864 th 3077602.4 th
Annual primary energy consumption toe	3202.8	2397.3	2210.0
Primary energy savings toe	—	805.5	992.8



Silo at Nogent sur-Seine

Further information can be obtained from the Commission of the European Communities, quoting Project No EEC/095/81, or directly from:

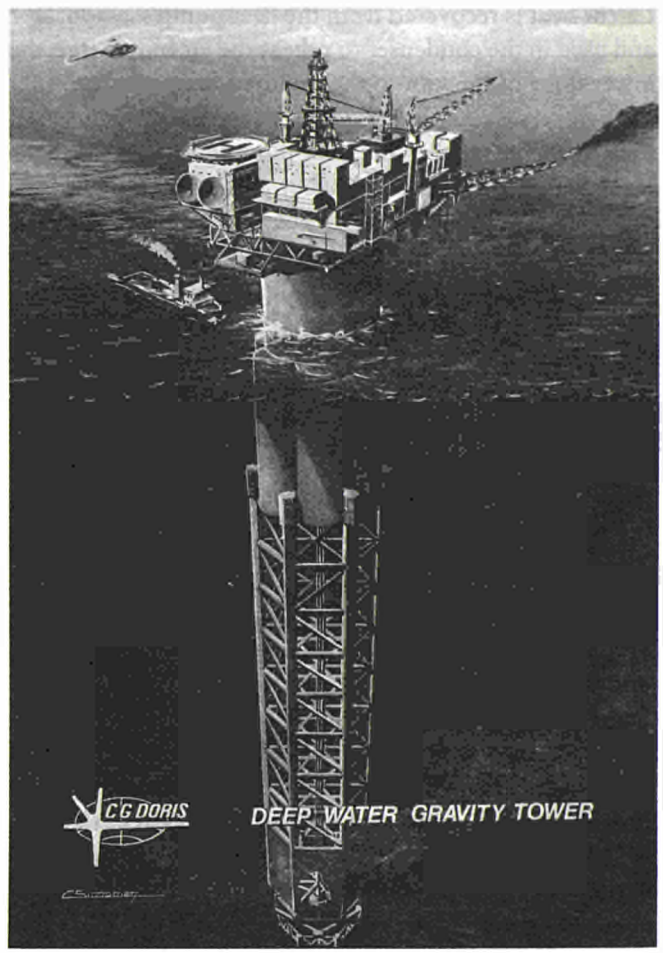
J. Soufflet S A
Quai du Général Sarrail
F-10400 Nogent-sur-Seine
Tel.: 25 39 98 10

The gravity tower: a deep-water oil and gas production structure

Advances in offshore oil production techniques during the last twenty years have made it possible to tap oil and gas deposits on the continental shelf at depths below 200m.

However, exploration successes have revealed new deposits situated in deep waters in extreme environments. New concepts will have to be developed in order to recover these resources, which will secure future energy supplies, under acceptable technical and economic conditions.

For this reason, the Commission has promoted technological development work designed to define, study and test new concepts for bringing deepwater deposits into production as part of the support programme for Community oil and gas projects.[1]



The 'gravity tower' project

In 1976, C G Doris began developing an articulated tower for work in water from 300-900m deep, capable of supporting the heavy superstructure of a drilling and production rig. Two support contracts (TH 03.72/79 and TH 03.127/82) have been concerned with studying the gravity tower. The first examined the technical and economic feasibility of a structure with a head load of 30 000 t designed for water depth of 350m in North Sea conditions. Work under the second contract concentrated on dynamic analysis, fabrication and assembly methods and estimates of costs.

The technology developed

The gravity tower is a flexible structure consisting of a hexagonal lattice column with a concrete floater at the top supporting the platform deck. The structure is kept on the seabed by a ballast chamber at the bottom of the column. A special ball joint with rubber pads absorbs the gentle rocking motions of the structure. The whole gravity tower rests on a piled steel foundation.

Results of the project

The new gravity tower concept is cost-effective as proven technologies are used in its manufacture. In addition, the concept has been optimized to reduce material input and to ensure that the structure is assembled using existing methods and equipment.

Dynamic studies based on the whole range of parameters (wind, currents, sea conditions) have shown that the structure is stable. The design has been improved in the light of fatigue studies, and special tests on the seismic behaviour of the tower have been favourable. The ball joint was the object of numerous tests to assess the behaviour of the rubber pads, with positive results. In addition, a procedure has been devised for replacing the pads.

The studies conducted by C G Doris with Community support have led to the development of a highly sophisticated concept for the exploitation of oil deposits in deep waters.

Additional information can be obtained from:

C G Doris,
58, rue du Dessous des Berges,
F — 75013 Paris.

New support programme for Community oil and gas projects

On 20 December 1985, the Council adopted Regulation No 3639/85 on a programme of support for technological development in the oil and gas sector.[2] This Regulation replaces Regulation No 3056/73 which had been in force for eleven years.

On the basis of this new Regulation, the Commission initiated a call for tender for projects to be granted financial support under the 1986 budget.[3] Proposals had to be submitted by 3 April 1986.

The projects eligible for support concern **exploration, production, storage and transport activities**. They must develop innovatory techniques, processes or products, offer promising prospects of industrial, economic and commercial viability and present financing difficulties because of the considerable technical and economic risks involved, to the extent that they would very probably not be carried out without Community financial support.

Moreover, priority will be given to projects designed to reduce costs, improve safety and increase operating efficiency in respect of about ten specified techniques.

Finally, Regulation No 3639/85 provides that preference may be given under certain conditions to projects submitted jointly by several independent undertakings established in different Member States and to projects submitted by small and medium-sized undertakings, either individually or in association.

The Commission will decide whether to grant support to the projects selected after examining the proposals with the aid of an Advisory Committee made up of representatives of the Member States. **The procedure is expected to be completed by about September 1986.**

The Community's Ispra Mark 13A process for flue gas desulphurization

During the 1970s, the European Commission's R&D programme on 'Hydrogen production, energy storage and transport' was carried out. An important part of this programme was represented by the direct action programme performed at the Joint Research Centre (JRC) Ispra, concerning the thermochemical decomposition of water for hydrogen production. **This work led to the development and testing of a closed cycle process, called the Mark 13A process.**

A variant of the same thermochemical process was then developed during the early 1980s as a desulphurization process for flue gases emitted by thermal power stations. The development of this process, denominated the Ispra Mark 13A process, is thus a direct spin-off from the hydrogen programme.

The emission of sulphur dioxide and other pollutants from power stations is nowadays an intensively-discussed subject. New, even more severe regulations for the maximum emission levels are proposed and the widespread application of the flue gas desulphurization process is inevitable.

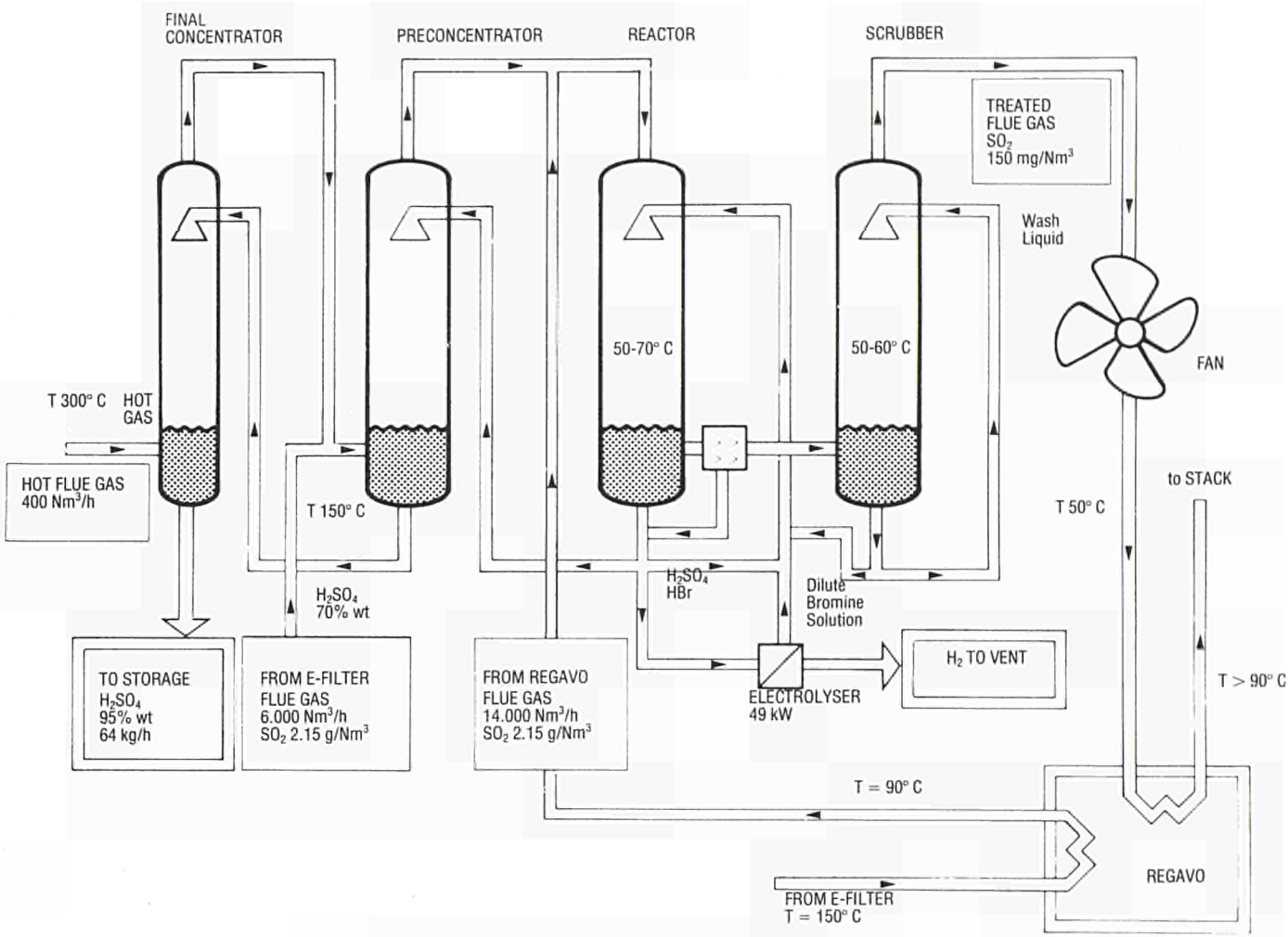


Figure 1 – Pilot plant Mark 13A - Block scheme

Most of today's industrially-applied processes consist of treating the flue gas with a slurry of limestone, converting the sulphur dioxide into calcium or magnesium sulphites and sulphates. These processes produce a very large amount of solid by-products (gypsum) which are difficult to utilize and usually must be disposed of.

The Ispra Mark 13A process is a completely new process, producing sulphuric acid and hydrogen. Both products are valuable chemicals which can be sold and recycled. The process is based on the following chemical reactions:

(i) $SO_2 + 2H_2O + Br_2 = H_2SO_4 + 2HBr$;

(ii) 2HBr (electrolysis) = $Br_2 + H_2$.

The flue gas is brought into contact with an aqueous solution containing a small amount of bromine. The sulphuric acid and hydrogen bromide thus formed stay in the solution and the HBr is subsequently reconverted into bromine by electrolysis.

A part of the acid mixture is brought into contact in countercurrent with the hot incoming flue gases, water and HBr are evaporated and a sulphuric acid of about 95% wt is produced. It follows that all reagents (water and bromine) are generated inside the process so that the introduction of reagents and the disposal of solid products are not needed.

The process comprises three major sections:

(i) the sulphuric acid concentration section;

(ii) the SO_2 removal reaction section;

(iii) the electrolysis section.

A block scheme of the process is given in Figure 1.

Process development

Development work on the process started in 1981 and comprised preliminary laboratory tests, a feasibility study, the development of a bench-scale unit and operation of this unit with flue gases from an oil-fired power station. This work has been followed by an extensive test campaign with flue gases from a coal-fired experimental furnace, a project carried out in close collaboration with the Centro di Ricerca Termica e Nucleare (CRTN) of ENEL, the Italian utility. The experimental work has been carried out at the test site of the CRTN at Livorno in Italy.

The outcome of the project is a flue gas desulphurization process, which, under present conditions, at least rivals its major competitors and may possibly be less expensive.

A prime advantage of the process is its freedom from the typical difficulties experienced by many rival processes in arranging mass transportation of lime or in using and storing gypsum. The by-product of the Ispra process is not gypsum, but highly-concentrated sulphuric acid of an acceptable purity.

Moreover, the reagent and product flow rates in the process are small. A 400 MWe power plant burning coal with 1% wt sulphur will produce about 3.9 t/h of 95% wt H_2SO_4 and 75 kg/h of hydrogen, as compared with about 3 t/h of lime required and the production of 10 t/h of gypsum slurry by limestone scrubbing processes.

The Ispra Mark 13A pilot plant project

The economic viability of the process has to be evaluated by constructing and operating a pilot plant which will have to simulate as closely as possible conditions in a typical large-scale plant and to desulphurize a flue gas throughput of approximately 20 000 m^3/h. **For environmental and industrial policy reasons, the Commission of the European Communities decided to support the construction of a pilot plant of this type.**

The preparatory and accompanying work concerning the pilot plant project is now completed. Among the proposals received, an interesting one was from the firm Ferlini Technology, Genoa (Italy). This applicant proposed to install the pilot plant on the site of a refinery, Saras at Saroch (Sardinia, Italy). The process had to be used for the desulphurization of the flue gas from a furnace fired with a fuel oil/fuel gas mixture. A particularly interesting feature of the proposal was that the sulphuric acid produced was able to be directly used in the refinery for the regeneration of ion exchange resins for boiler feed water preparation.

The applicant wanted to apply the Ispra Mark 13A pilot plant for a gas flow rate of 32 000 Nm^3/h instead of 20 000 Nm^3/h. A further proposal was made to try and test the process pilot plant in a second stage for the desulphurization of flue gases from an incinerator for tail gases originating from a Claus unit present at the refinery.

The pilot plant project will be organized in such a way that there will be one main contractor and two major sub-contractors. The main contractor (Ferlini Technology) will be responsible for the total project and, in particular, for the commercial part of the project. The subject matter of the first sub-contract will be the leasing of the site of the future pilot plant. The sub-contractor will be the Saras refinery. The second sub-contract covers the design and engineering of the plant, the organization of the supply of all process equipment, the construction of the plant, the commissioning, start-up and trial operation. The second sub-contract will be passed to the chemical engineering contractor firm Kraftanlagen Heidelberg (FR of Germany). **Contracts were signed in January 1986.** The Community's financial contribution to the project is some 5 MECU spread over four years. The construction of the pilot plant is due to be finished by the end of 1987 and the process will be in operation during the years 1988 and 1989.

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1 OJ L 350, 27.12.1985.

2 Regulation No 3056/73 replaced on 27.12.1985 by Regulation No 3639/85.

3 OJ C 1, 3.1.1986 — this invitation to submit project proposals is valid until 3 April 1986.

Document update

Main Commission energy documents, proposals, directives, etc. in 1986

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COM(85) 12 Communication from the Commission to the Council on a Community orientation to develop new and renewable energy sources

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Energy saving policy in industry
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Solid fuels

SEC(85) 1584 Commission staff paper on statistical data on trends in the Community coal industry since 1975

COM(86) 95 Communication from the Commission to the Council. Second report on the lignite and peat industries of the European Community

COM(86) 107 Memorandum submitted to the Council by the Commission concerning the financial assistance to a coal research programme under the terms of Article 55 para 2(c) of the ECSC Treaty (budgetary year 1986)

COM(86) 115/2 Report of the Commission on the market for solid fuels in the Community in 1985 and the outlook for 1986

Oil

Forthcoming document on refining and oil product imports

Energy policy

SEC(323) Commission staff paper on financial support (grants and loans) given by the Community to the energy sector in 1984

COM(85) 838 Proposal for a Council regulation (EEC) instituting a Community programme for the development of certain less-favoured regions of the Community by exploiting indigenous energy potential (Valoren programme)

Nuclear

COM(85) 598 Communication from the Commission to the Council concerning an R&D cooperation agreement in the field of radioactive waste management with the Swedish nuclear fuel and waste management company, SKB, to be concluded by the Commission in pursuance of the third paragraph of Article 101 of the Treaty establishing the European Atomic Energy Community

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