ISSN 0256-6141

ENERGY IN EUROPE

Energy policies and trends in the European Community

Number 3 December 1985

Commission of the European Communities □ Directorate-General for Energy

Commission of the European Communities

Directorate-General for Energy

ENERGY IN EUROPE

Energy policies and trends in the European Community

Number 3 December 1985

Manuscript completed on 29. 11. 1985.

Luxembourg: Office for Official Publications of the European Communities, 1985

Catalogue Number: CB-BI-85-003-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 entry of Spain and Portugal into the European Community

Messages from the Spanish and Portuguese Directors-General for Energy

A. Spanish energy policy

I am grateful for the opportunity given me by the Directorate-General for Energy to explain briefly to the readers of this publication how Spain fits into the energy context of this new Europe of Twelve, which we are all keen to see develop.

There is one negative feature which immediately distinguishes us from most of the other industrialized countries, namely that Spain is now using more energy per unit of GDP than in 1973. The reason would seem to lie in a domestic energy pricing policy which is not sufficiently flexible and realistic and in the lack of a specific energy-saving programme.

Another factor which also causes problems for energy policy is our heavy dependence on oil, which in 1984 accounted for 52.7% of primary energy consumption and 68.5% of final energy consumption.

This is offset to some extent by the contribution made by hydroelectric power, which in 1984 accounted for 29.4% of all electricity generated. Nuclear energy generated a further 20.0% and this is expected to rise to 27.8% by 1989. Accordingly, only 8.4% of electricity was generated in oil- and gas-fired power stations in 1984, and in 1985 this figure is not expected to exceed 4.3%.

In June 1984 the Spanish Parliament approved the National Energy Plan which sets out main energy policies and objectives until 1992. This is the first serious attempt made in Spain to adjust the energy-producing sectors to the actual growth in demand, since far higher economic and energy growth was expected in the past than actually occurred and this led to a large surplus in production capacity, particularly in the electricity and oil sectors. One of the basic aims of the Plan is to restore some balance to the sector and to tackle the financial consequences. (NB:Figures taken from the 1984 report to Parliament.)

A brief review of Spain's current energy policy would seem to indicate that we are broadly following the objectives the EEC has set itself until 1995.

For example, one of our main policy objectives is to reduce dependence on oil. In recent years demand for oil products in Spain has dropped and this trend should continue over the next few years, although easing off somewhat. At the same time it is essential to begin work on restructuring our refining industry and to adjust it to changing market demands, which are bound to alter considerably when Spain becomes a member of the European Communities. I should also mention that the Spanish market is to be fully deregulated by 1992, the end of the transitional period provided for in the Treaty of Accession.

By 1992, gas should double its share of the energy balance from 3.2% to 7% as a result of heavy investment in gas transport and distribution networks and of a policy of setting appropriate relative prices for the substitute energy sources.

Finally I would like to mention the major efforts being made with our programme of energy saving and diversification. The National Energy Plan put investment in this field during the three years from 1984 to 1986 at some 14 000 million pesetas, compared with only 4 219 million pesetas in the previous three-year period. The Spanish Institute of Energy Saving and Diversification (IDAE), which was set up only recently, is designed to play a key role in developing this policy. Its aims are to provide information, particularly for industry, on en-

ergy-saving techniques, to encourage and assist the development of renewable energy sources and to encourage industry to replace oil products by coal and gas.

Thus, in spite of the uncertainties and vicissitudes of international markets since the first oil crisis, Spain's energy policy endeavours to ensure that the country will be able to cope with any future difficulties by rationalizing the use of energy, increasing diversification and encouraging the replacement of oil by other energy sources.

Carmen Mestre
Director-General for Energy

B. Portuguese energy policy

Portugal has the weakest energy situation in Europe in terms of dependence on oil but has a much lower per capita energy consumption than in the other Member States of the Community.

The contribution of Portugal's own energy resources to its overall energy needs is at present low, and there is little prospect of its rising. However, certain supply sectors, such as renewable energy sources, look very promising, particularly in the context of regional development.

1. The national energy situation

Portugal's energy and economic situation is characterized by the following features:

(a) Per capita consumption of goods and energy is still low. Progress in economic and social development, which is essential to an improvement in the Portuguese standard of living, will mean higher consumption of useful energy which must be provided under satisfactory security conditions and at as low a cost as possible.

(b) The crisis sparked off by the oil shock of 1973-74 hit Portugal at a time when it was switching increasingly to oil. Since then, despite the formulation of policies aimed at checking the growth of oil consumtpion, the switch to oil has become even more accentuated in recent years. Excessve dependence on imported oil is the main weakness in Portugal's energy system.

(c) Portugal has at present only three primary energy sources of any significance: one imported, oil, which is by far the largest, and two domestic, hydro power and wood.

This low level of diversification of sources is a second weakness introducing an element of fragility and insecurity in the energy supply system.

(d) The national development policy formulated in the early 1970s required the development of energy-intensive sectors, especially dependent on increasing oil product use, with the result that there has been increasing specific energy consumption per unit of GDP. This trend in the Portuguese economy is a third weakness in the energy system.

(e) There has been a significant increase in the share of imported energy in total Portuguese imports, due to the trends in oil import prices, and to the dollar exchange rate due to increasing use of oil for electricity generation in the past few years.

(f) The energy sector is intensive in fixed capital, its share of gross fixed capital formation varying in the 1970s from around 6% to around 14%. In addition, oil substitution and energy saving policies inevitably lead to additional investment. This is the fifth weakness in what is a difficult financial climate.

2. Domestic energy sources in Portugal

With the exception of uranium Portugal has very few known non-renewable energy sources. No exploitable oil or natural gas reserves have so far been discovered despite the exploration and prospecting that has been carried out to date.

Known proved recoverable coal reserves are extremely limited, consisting solely of anthracite now being mined (1.4 Mtoe) and lignite from the Rio Maior (4.6 Mtoe).

Proven domestic uranium reserves are at present estimated to be around 11 500 tonnes. In addition to these, probable reserves are estimated to be between 20 000 and 80 000 tonnes.

In contrast to the situation as regards fossil energy reserves, Portugal is potentially rich in renewable energy sources.

Average annual hydroelectricity production capacity is at present around 10 TWh; this is approximately 50% of the total potential which could be exploited for large and medium-scale applications. This is in addition an important potential for more small-scale use.

A second source is biomass, which up to now has been used mainly in the form of wood. It is estimated that available raw materials could, if used in full, amount to 2.4 Mtoe a year.

As regards solar energy, Portugal has an advantage over most European countries although it is not yet a very highly exploited source. With technologies which are currently economic, this form of energy is converted mainly into low-temperature heat which could be developed on a large scale since the amount of solar radiation in Portugal is high (0.14-0.16 toe per m^2 per year).

Portugal has a signficant wind energy potential, although no systematic estimates have been made as yet.

3. The future for the energy sector in Portugal

Two versions of the national energy plan drawn up on the basis of economic and social development scenarios and trends in the prices of primary energy sources using methods to project useful energy supply and improvements in the overall energy system have been used to work out long-range alternative strategies for the national energy system.

The most important complementary objectives of these alternative strategies are:

(a) minimizing the cost of energy to the consumer;

(b) greater security of energy supply;

(c) reduction in the country's energy dependence on external sources and the foreign exchange burden;

(d) reduction in the impact on the environment and regional planning.

Although the national energy plan has not yet been adopted by the relevant authorities (with the exception of those relating to nuclear energy and natural gas), the main elements have served as guidelines for the development of Portuguese energy policy.

4. Portuguese energy policy and accession to the Community

Main problems and advantages

Generally speaking Portuguese energy policy does not differ very much from Community strategy since the measures proposed in the national energy plan clearly dovetail with the strategies adopted and decisions taken in the Community. However, account must be taken of the fact that according to the latest studies, Portugal will, at least up to the end of the century, have higher rates of energy consumption than the Community average and a greater dependence on oil than the average of the other Member States.

In our view, accession to the Community could speed up policy to diversify sources and give an impetus to technological innovation, chiefly in the use of renewable resources.

Facts and figures on enlargement [1]

	Spain	Portugal	European Community	
			before	after
Energy and the economy				
Population (millions)	38	10	272	320
GDP (1980 prices) ('000 million ECU)	161	18.4	2 102	2 281.4
Primary energy demand				
(Mtoe) Total	70	11.8	934	1 015
Oil	45	10	446	500
Energy production				
Total	21	1.8	510	534
Solid fuels	13	0.9	134	148
Nuclear	2.8	—	96	99
Hydro, geothermal, etc	2.5	0.18	15.2	18.5
Net imports				
Total	48	10.3	406	465
Oil	42.0	9.9	298	350

[1] All figures for 1983.

Institutional changes — number of members

	Before	After
European Commission	14	17 (2 Spanish, 1 Portugese)
European Parliament	434	518 (60 Spanish, 24 Portuguese)
Court of Justice	11	13 (1 Spanish, 1 Portuguese)
Economic and Social Committee	156	189 (21 Spanish, 12 Portugese)
Consultative Committee of the European Coal and Steel Community	84	96 (8 Spanish, 3 Portuguese, 1 additional Italian)

The country's accession to the Community may also mean greater access to credit facilities for the development of the energy system. National energy development programmes require considerable financial resources and it is hoped that Portugal's accession to the Community will make it easier to obtain credit from Community financial institutions, using the established procedures, including the financing of energy infrastructure projects and projects of regional as well as national interest.

Sidónio Paes
Director-General for Energy

East-West energy trade

Energy imports from the Soviet Union and Eastern Europe accounted for one-quarter of the Community's total energy imports from third countries in 1984 and covered 11% of the Community's primary energy needs. By far the largest elements were Soviet crude oil and oil products. The outlook for East-West trade in oil is difficult to predict. But natural gas exports to the Community will remain much less important to the Soviet Union as earners of hard currency than oil for the foreseeable future.

Trade patterns

The flow of trade in energy from Eastern to Western Europe reached a record level in 1984 of over 100 Mtoe (or the equivalent of 2 mbd of oil). Oil and oil products themselves, mostly from the USSR, accounted for 70% of the total; natural gas for around one-fifth; and coal from Poland around 10%. This trade was worth more than 20 000 MECU.

This year's figures seem likely to be significantly down on these totals. Data for the first half of 1985 indicate a fall in imports of crude oil of nearly 50% and some reductions in trade in other fuels. Some of the ground may have been regained in the second half of the year but not enough to bring trade back to the level of 1984 or even, very probably, that of 1983. The sharp fall in Soviet oil exports to the Community is the major explanation for a sharp reduction this year in the overall Soviet trade surplus with the European Community.

East-West trade and Community energy demand

Net energy imports from the Soviet Union and Eastern Europe represented last year one-quarter of the Community's total energy imports from third countries. Crude oil and products from the East provided one-third of our total net oil import requirements; natural gas 35% of total natural gas imports; and coal 21% of total coal imports. Energy trade with Eastern bloc countries accounted, thereby, for about 11% of the Community's total primary energy requirements. Even though the volume of East-West trade may have fallen sharply this year, the contribution to the Community's energy needs is still far from negligible.

Soviet energy production

The Soviet Union is the world's largest producer of oil and natural gas, with output of natural gas now close to that of oil. But, while natural gas output has been expanding steadily, oil production now seems to be flagging. The fact that oil exports this year were down is due in large part to a fall in oil production inside the Soviet Union. Official Soviet figures show a fall of over 4% in oil output in the first seven months of 1985 and total oil production in 1985 seems likely to be significantly below last year's output of 12.3 mbd. Over the coming years the Russians hope to see a continuing rapid expansion of gas output (up to perhaps 14 mbd in 1990), increased coal production (up to 8 mbd) and a doubling of nuclear output. The prospects for oil are, however, much less clear (see below).

Trade prospects

Against that background, what role is East-West trade likely to play in meeting the Community's energy needs over the coming years?

Coal

Coal imports from Poland have now recovered from the slump that followed the Polish miners' strike in 1981. Indeed, in 1984 (at the time of the UK miners' strike) they were over 1 million tonnes up on their 1980 level. The Community can expect to increase its total coal imports over the coming years as consumption expands. But there is likely to be considerable competition too from other coal suppliers, which will constrain substantial further growth in East-West trade.

Natural gas

As far as gas is concerned the Community can expect to see a further steady growth in trade during the 1980s and beyond as the Community's import requirements increase and new contracts for Soviet gas come into force. Current indications are that imports of Soviet gas could rise to more than 30 Mtoe by the end of the 1980s.

Oil

The outlook for oil trade, however, will depend on a number of factors that are more difficult to predict, notably:

- **Soviet oil production levels.** The new Soviet leadership seems determined to overcome the technical difficulties that appear to have bedevilled Soviet Union production lately, thereby averting a further decline in production. Western experts are divided on the prospects for success but most agree that it will be difficult to sustain a level of 12 mbd into the medium and long-term;
- the progress of energy **conservation and substitution** within the Soviet Union. At present oil meets about 35% of the Soviet Union's energy needs and natural gas about 31%. With growing gas production, natural gas can be expected to substitute significantly for oil at home. This has already been happening in the electricity sector where conversion from oil to gas has helped slow down the rate of growth of domestic oil demand. The scope for greater energy efficiency is also vast and there are signs of increasing attention to this area. This too should help to constrain domestic demand for oil and increase potential export availabilities, but it will take time for the new efforts to pay off;
- the needs of other Comecon countries. The Soviet Union has been the main supplier of oil to other East European countries. Volumes have fallen a little over the past few years (including, apparently, this year), but intra-Comecon oil trade is still important. Some other East European countries are making renewed efforts to improve energy saving; coal is a key key alternative source of fuel; nuclear power is being developed in some countries (Czechoslovakia); and natural gas imports from the Soviet Union seem likely to be an increasingly important substitute for Soviet oil imports in some East European countries. But some East European countries are experiencing short-term energy difficulties, and even if changes occur rapidly, the call for Soviet oil exports could remain significant;
- **Soviet oil import policy.** Even if Soviet oil production declines, however, the Soviet Union may seek to maintain its export capacity to hard currency markets by increasing imports of oil from suppliers in North Africa and the Middle East on a barter basis (some 13 Mtoe was imported in this way in 1983);
- **Soviet foreign currency requirements.** Energy exports to members of the OECD currently provide around 80% of Soviet hard currency income, with crude oil and products alone accounting for 60%. There are in-

dications that the Soviet Union is beginning to seek payments in hard currencies for energy exports to other countries too, but as yet the amounts involved are much less significant. Natural gas will become an increasingly important hard currency earner, but even if natural gas exports expand much more quickly over the coming years than now seems likely, earnings from gas sales will be nowhere near those of oil today. Soviet natural gas exports would have to **quadruple** from their present level to produce the same hard currency earnings as Soviet sales of oil to Western Europe in 1984. Even taking into account the other important earners of foreign currency for the Soviet Union (notably gold sales) oil export availabilities seem likely to remain a key factor in the management of Soviet foreign exchange requirements.

Future levels of East-West oil trade will also depend of course on the Community's import demand and competition from other suppliers. The forecast of Community energy demand presented elsewhere in this issue suggests only a modest recovery in Community oil import requirements in 1986. Unless demand picks up substantially in the industrialised countries, and always barring unforeseeable political events, competitive pressures among oil suppliers may increase still further.

Taking all these elements together, the likelihood is that trade in oil between Eastern and Western Europe will remain of significance over the coming years, but the amounts involved seem more likely to fall than to rise. The oil price, however, is a joker in the pack. If world oil (and subsequently gas) prices fell from their present levels the hard currency earnings from a given volume of oil (and gas) would likewise diminish. This could make decisions on priorities for Soviet oil use even more acute. The potential feedback on the oil markets themselves cannot be ignored: a significant change up or down in the level of Soviet oil exports to the West as a whole (a little less than 2 mbd in 1984) would probably have less effect in a falling than in a rising market, but could not be neglected.

Net energy imports from the Soviet Union and Eastern Europe into the European Community, 1980-84

	1980		1981		1982		1983		1984	
	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%
Total	78.6	100	68.8	100	81.9	100	90.45	100	102.4	100
of which:	56.7	72	54.7	79	67.6	82	73.6	81	82.2	80
Crude oil and freedstocks	22.8	29	20.8	30	26.7	33	31.55	35	38.0	37
of which:										
USSR	21.0	27	18.0	26	25.2	31	30.7	34	37.6	36.8
Romania	0.6	0.8	1.4	2	0.8	1	0.15	0.2	0.2	0.2
Petroleum products	26.8	34	25.5	37	31.3	38	34.1	38	33.0	32
of which: USSR	15.6	20	16.9	25	24.0	29	24.6	27	23.1	23
Natural gas										
USSR	18.5	23	19.4	28	18.1	22	17.6	19	20.6	20
Coal	10.5	13	3.1	4.5	5.8	7	7.2	8	10.8	10.5
of which: Poland:	8.9	11	2.7[1]	4	5.5	7	6.5	7	9.9[2]	10
USSR	1.6	2	0.4	0.6	0.3	0.4	0.7	0.8	0.9	0.9
Total as % of Community energy imports (net)	—	14.9	—	15.5	—	19.7	—	24.0	—	25.0

Sources: Statistical Office of the European Communities and IEA/OECD.
[1] Polish strike.
[2] UK Miner's strike.

New Community rules for State aids to the coal industry

On 25 September 1985, the Commission approved a proposal for new Community rules concerning State aids to the coal industry for the period from 1 July 1986 to 31 December 1990. This article outlines the background to the Commission's proposals, the energy 'environment' within which they were made and explains the new proposals, criteria and procedures.

Background

Every Member State of the Community which produces coal has for many years had some system of paying subsidies — often in the form of deficit grants — to its coal industry. This is because it has always been felt that the coal industry is so important to the economy and as an employer that it must be kept as a going concern even at considerable cost to the taxpayer.

However, the granting of national subsidies is prohibited under the rules of the European Coal and Steel Community. For such aids not to fall foul of Article 4(c) of the ECSC Treaty, they have to be scrutinized by the European Commission, and authorized on the grounds that they are compatible with the common market because they do not, for example, distort competition between Community coal producers.

These authorizations have been carried out under a Commission Decision[1] which dates back to 1976 and is due to expire at the end of this year. It must be replaced by another Decision if Member States are to go on being allowed to pay national subsidies. Hence the Commission's proposal for a new Decision, with different rules from those of the current Decision 528. But why is here a need for different rules?

The energy environment

The current rules were meant to enable the Community's coal-producing Member States (Belgium, France, Germany and the UK) to maintain a given level of coal production under satisfactory economic conditions. The idea of a given level of coal production was a natural result of the 1973 oil crisis, and it was Community policy to produce coal in quantities which would help us minimize dependence on imported oil. But, 10 years later, the situation — the energy environment to the Commission's new proposals — is quite different. There are now much more dependable supplies of oil and coal on world markets, while the demand for energy is now reduced, and spread over a wider range of energy sources. The maintaining of a fixed volume of coal production in the Community no longer has to be a prime objective (for coal supplies, see Table 1).

The cost of maintaining a given production level has, meanwhile, proved to be high. Large subsidies are required to enable Community production to match the prices of imported coal due to lower coalmining productivity in the Community (see Table 2). The result has been a very considerable increase in national subsidies over the period 1975-83: see Tables 3, 4 and 5. These show, incidentally, that the subsidies are of several kinds. There are aids to current production, mostly to cover the difference between what the coal costs to mine and what it sells for. There are aids to cover inherited liabilities such as subsidence caused by earlier closures; and there are social payments to miners displaced by those closures. The total in 1983 for all forms of aid (Table 5) was more than 10 000 million ECU, a very large burden on national budgets and the economy of the Community.

It seemed to the Commission, in making its new proposals, that it ought to recognize the need to reduce this burden where possible. As a result, it is proposing that the objective of the new Decision should be to increase the competitiveness of the Community's coal industry, so as to bring it into line with the new market conditions (cheap imports) at less expense to the taxpayer.

This process of adjustment has been going on in the Member States for some years, with closures of uneconomic mines and a consequent reduction in the labour force (see Table 6). It is the Commission's view that this restructuring should continue and that the new rules should help towards its achievement in satisfactory economic, social and regional conditions. By the very nature of restructuring, the aids for social payments cannot be expected to decrease in the short term: they may well increase. But it should be possible to contain, and eventually reduce, the aids to current production.

[1] Commission Decision No 528/76/ECSC of 25 February 1976, Official Journal L 63, 11 March 1976.

The new rules

The new rules are based largely on the current ones, though the criteria behind them are rather different. They are:

- **Social measures**, such as early retirement payments to miners, and **inherited liabilities** resulting from ongoing costs following pit closures, will continue to benefit from State aids as they do at present.
- **Aids to investment** in new mines or existing mines which are economic or close to being so, and aids to cover losses, will remain unchanged.
- Aids such as those to finance cyclical or strategic stocks of coal and aids to recruitment **will no longer be granted.**[1]

The aim of reducing the number of types of aids which can be granted is to improve the transparency of the financing of the coal industry by showing the consumer and the taxpayer more clearly what is involved and the extent of public funding and subsidy.

New criteria for authorization of State aids

The box below summarizes the changes:

Present Criteria	New Criteria
To be acceptable, State aids should:	State aids should:
— correspond to realistic estimates production levels at the time they are paid;	— contribute to improvedof competitiveness in the coal industry;
— have a neutral effect on the formation of consumer prices;	— have a neutral effect on the formation of consumer prices;
— have a beneficial effect on production capacities;	— create new, profitable production capacities;
— prevent serious problems in the economic activity of a region.	— show consideration of social and regional problems;
	— enhance the transparency of the system of aids.

New procedures for State aids

Together with the new criteria shown above, the Commission is proposing that those Member States who want to grant aids from 1986 will have to **declare their intentions and objectives for their coal industries over the next four years.** This requirement breaks new ground. Apart from this, there are few other changes proposed, but the Commission is concerned that all the steps which form part of those procedures, **such as timely notification by Member States of the aids they propose to pay**, should be strictly observed when the new rules come into force.

The next steps

The introduction of the new rules cannot be achieved overnight. Firstly, the Commission's communication of its proposals, made to the ECSC Consultative Committee, the Council of Ministers and the European Parliament in early October, has to be thoroughly examined by those bodies in order for the Commission to legislate by adopting a final Decision, following agreement in the Council of Ministers. **All this needs time.**

Timing

The Commission would like to introduce the new system on 1 July 1986 and the Council, on 11 November, agreed to prolong the existing Decision 528/76 until then.

[1] With the exception of the German 'Bergmannsprämie' which is for maintaining a skilled labour force.

When the new system of aids is introduced, its application will be staged. There will be a **transitional period of one year, until July 1987**, during which the new authorization procedures and the new criteria will be applied, but all the types of aid allowed can still continue. This will give governments and the industry time to adjust to the new rules.

Conclusion

The Commission, in putting forward its proposals for new rules on State aids, is convinced that they will assist coal production in the Community. They will help to keep an important energy and economic sector alive and, at the same time, create conditions that, in the medium and long term, will lead to greater competitiveness without acting against the social and regional interests of the citizens of the Community.

Table 1: Coal supplies

(EUR-10; millions of tonnes)

	Production without recoveries)		Imports		Supplies	
1975	256.9	(86.2%)	41.1	(13.8%)	298.0	(100.0%)
1977	240.4	(83.9%)	46.0	(16.1%)	286.4	(100.0%)
1979	238.7	(80.1%)	59.3	(19.9%)	298.0	(100.0%)
1981	245.6	(77.5%)	71.2	(22.5%)	316.8	(100.0%)
1982	241.2	(77.0%)	72.1	(23.0%)	313.3	(100.0%)
1983	229.3	(78.9%)	61.3	(21.1%)	290.6	(100.0%)
1984[1]	157.4	(66.5%)	79.3	(33.5%)	236.7	(100.0%)
1985[1]	201.4	(71.0%)	82.2	(29.0%)	283.6	(100.0%)

[1] Estimate.
The firgures for 1984 and 1985 are affected by the United Kingdom miners' strike.

Table 2: International productivity levels[1]

(1982)

USA	2.403	Germany	785
South Africa	2.255	United Kingdom	616
Australia	2.030	France	549
Canada	1.344	(Spain)	470
		Belgium	409

[1] Based on underground coal production (total coal production in the case of South Africa, ie: including open cast) per man/year, expressed in tonnes.

Table 3: State subsidies to coal industry

(1983 ECU)

	1965-1973	1975-1983	Increase
Social insurance schemes plus inherited liabilities	36.4 000 million	53.6 000 million	+ 47%
Aids for current production	15.8 000 million	26.9 000 million	+ 70%

Table 4: State aids and loses[1]

(1983 ECU)

	Production costs	Proceeds[2]	Results (+ = profits) (— = losses)	State aids for current production
1975	68	62	— 6	3.0
1976	75	68	— 7	4.9
1977	75	65	— 10	6.7
1978	78	66	— 12	11.1
1979	81	67	— 14	12.6
1980	87	72	— 15	11.1
1981	94	78	— 16	10.4
1982	93	77	— 16	9.7
1983	93	76	— 17	13.8

[1] Community averages per tonne produced.
[2] Includes aids paid by Germany electricity consumer under the *Drittes Verstromungsgesetz.*

Table 5: Levels of State aids (1983)[1]

(MECU)

	For current production	For social purposes and inherited liabilities[2]
Germany[3]	1 834.8	3 161.5
Belgium	160.9	924.5
France	557.4	1 818.7
United Kingdom	1 492.4	524.9
	4 045.5	6 429.6

[1] Last year for which representative figures are available.
[2] This means ongoing charges resulting from earlier pit closures.
[3] Including aids under the *Dritte Verstromungsgesetz* (see footnote 2 to Table 4).

Table 6:
Workforce employed in the Community's coal industry
(situation at end of year)

(1 000)

	Germany	Belgium	France	UK	EUR-10
1975	168.8	24.5	68.7	245.2	507.2
1977	159.9	20.7	59.0	238.7	478.3
1979	151.3	19.1	50.1	232.6	453.1
1981	156.5	17.8	45.5	215.3	435.1
1982	153.9	17.6	45.4	205.7	422.6
1983	149.2	17.1	42.9	186.6	395.8
1984	140.6	18.0	38.8	173.8	371.2

The Euratom nuclear safeguards system[1]

This article sets out the history and operation of the Euratom nuclear safeguards system. Particular attention is paid to the development of the legal structure surrounding safeguards activities and the changing environment for safeguards following the rapid expansion of the peaceful use of nuclear energy. In the next issue the operational side of Euratom Safeguards and the relationship with the International Atomic Energy Agency (IAEA) will be described.

Introduction

A certain duality has long been recognized in the potential for the use of nuclear energy. On the one hand, the military application of nuclear energy has already cost many lives and the awesome destructive power of the nuclear weapons available today continues to threaten the existence of mankind. On the other hand, the peaceful exploitation of nuclear energy for, for example, electricity production has provided an immensely valuable contribution to the solution of world energy supply in a clean and economic way. Since nuclear technology became widely available, one problem to be resolved has been to promote the peaceful uses to the overall benefit of mankind, whilst ensuring that nuclear material, equipment and technology meant for such peaceful use are not diverted to development and manufacture of nuclear weapons and explosive devices. Nuclear safeguards control has been the principal tool to achieve this end.

The word safeguards as it is used in this article is not widely current but means the set of measures performed to verify nuclear material and equipment to obtain the required assurance that their use continues to be as declared. It does not touch on physical protection, industrial safety, radiation protection or release of radioactive materials to the environment which are covered by other national and international bodies.

Safeguards – a worldwide concern

After the Second World War the first resolution of the General Assembly of the newly created United Nations established a Commission to study a proposal, known as the Baruch Plan, to set up an international authority that would control all nuclear material in all forms of nuclear activity throughout the world. Even though the Plan was subsequently modified to encompass only the less ambitious objective of covering reprocessing and enrichment facilities, it would have involved too great an abdication of national sovereign rights to be acceptable.

No further progress was made for some time until President Eisenhower made his 'Atoms for Peace' speech which called for the establishment of an International Atomic Energy Agency (IAEA) which would help to disseminate the benefits of nuclear energy whilst ensuring that civil nuclear material remained in peaceful nuclear programmes through submission to international safeguards control. The IAEA was thus established in Vienna in 1957. Also in 1957 following the Treaties of Rome, the Euratom multinational safeguards system covering the Member States of the European Community was established.

Another important kind of control has been aimed at hindering the spread of nuclear weapons. Countries supplying the nuclear material, or providing nuclear technology and know-how, either alone or as part of various groups which have been formed, impose conditions of supply on recipient countries. These conditions have principally amounted to the requirement for safeguards to be accepted by the receiving country before there could be any transfer of nuclear material, equipment, know-how or certain other non-nuclear materials, such as heavy water, related to the nuclear fuel cycle. In the case of the Euratom Member States, these safeguards have always been applied by the Euratom Safeguards Directorate of the Commission of the European Communities.

The systems of safeguards adopted initially by the IAEA, mainly outside Europe, were limited in scope having been conceived primarily for application to reactors, and did not imply that a State had to submit all its nuclear activities to international safeguards. In the deliberations to arrive at a somewhat more complete system of control, a stumbling block was that it was intended to subject Non-Nuclear Weapon States (NNWS) to a full system of control, whereas the Nuclear Weapon States (NWS) would have been free of obligations. The vital breakthrough in the discussions came however when the Nuclear Weapon States agreed to accept obligations relating to nuclear disarmament.

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was opened for signature in 1968 and has now been signed by over 120 countries including, from

[1] Treaty establishing the European Atomic Energy Community, signed in Rome on 25 March 1957.

the European Community, the eight current Non-Nuclear Weapon States and the United Kingdom. The Treaty combines the undertakings on the part of the NNWS to submit all their nuclear material to IAEA safeguards with the undertakings on the part of the NWS relating to disarmament.

Safeguards in Europe

The Euratom nuclear safeguards system was established by the Euratom Treaty[1] and is currently implemented in practice, notably through Euratom Regulation 3227/76. The general objectives of the Euratom safeguards system, as defined in the Euratom Treaty include making '.....certain, by appropriate supervision, that nuclear materials are not diverted to purposes other than those for which they are intended'. The Treaty provides for the definition by the Commission of the specific requirements for keeping and producing operating records to permit accounting for nuclear materials to enable the implementation of safeguards measures. The materials referred to include all forms and qualities of uranium, plutonium and thorium, including ores. To this end, and to fulfil other requirements of the Treaty, two Regulations were brought into force in 1959 and inspections were started around this time. These Regulations provided the framework for the application of Euratom safeguards for many years.

The tasks of the IAEA and Euratom are, to a large extent, similar, although the IAEA system is on a contractual rather than a regulatory basis. In addition the IAEA deals with States, whereas Euratom deals with the individual nuclear operators. To implement the NPT, a large number of agreements between the IAEA and individual countries or groups of countries was necessary. One of these, referred to as the Verification Agreement, was negotiated by the Community, its (then) 7 Non-Nuclear Weapon Member States and the IAEA and came into force in 1977. It defines the application of NPT safeguards in Euratom Non-Nuclear Weapon States, maintaining the prior role of Euratom. It, like all NPT agreements, was based on a model agreement, issued by the IAEA in 1971 after a series of consultations.

To ensure that the objectives of both safeguarding organizations were met, and that no unnecessary burden was imposed on operators due to a double control system, a series of understandings and working arrangements have been agreed and are kept under review for the planning and conduct of inspections. To ensure that the Euratom safeguards system was adequate for the implementation of the Verification Agreement, a revised Regulation (No 3227/76) was issued in 1976, superseding the earlier Regulations referred to above.

Since 1978, a long, difficult and protracted series of negotiations has been conducted to agree the 'Facility Attachments', documents which give the specific requirements and inspection activities for each facility under NPT safeguards. Such facilities are: reactors, critical assemblies, conversion plants, isotope separation plants, fuel fabrication plants, reprocessing plants for irradiated fuel, storage installations and so on. More than 190 Facility Attachments are now in force. All the material subject to the Verification Agreement with the IAEA has of course been under Euratom safeguards continuously, and even where no Facility Attachment has been in force also subject to IAEA safeguards under *ad-hoc* arrangements in line with the working understandings developed between the two organizations. Greece, as a Non-Nuclear Weapon State which joined the Communitty during the above developments, has been brought within the same arrangements.

In a parallel development, two Nuclear Weapons States in Euratom, the United Kingdom and France, each made 'Voluntary Offers' to accept IAEA safeguards on their territory. The UK Offer resulted in an agreement being signed with Euratom and the IAEA in 1976. A fundamental difference, as compared with the NNWS Verification Agreement is that routine IAEA inspections apply only to facilities designated by the IAEA (from a facilities list provided by the UK) from time to time for this purpose. The French Offer resulted in an agreement being signed with Euratom and the IAEA in 1978. Its scope is limited to materials specifically designated by France. It should be noted in this connection, that all 'civil' nuclear material in both France and the UK is subject to Euratom safeguards under the Euratom Treaty on the same basis as that applying in the NNWS.

Scope of Euratom safeguards

A total of 560 installations are subject to Euratom safeguards. They currently hold some 90 tonnes of plutonium, 13 tonnes of highly enriched uranium, 111 000 tonnes of other grades of uranium and 570 tonnes of thorium. The reports by operators current-

[1] Treaty establishing the European Atomic Energy Community, signed in Rome on 25 March 1957.

ly amount to 350 000 entry lines per year. Controls are systematically applied to these reports; and, for that material subject to IAEA safeguards, the reports are converted at Euratom headquarters in Luxembourg to a form suitable for transmission to Vienna.

As noted above, the Euratom safeguards system is founded in European law and includes, as an ultimate step, strong sanctions for infringements. It applies to all civil nuclear materials from the moment they are mined on Community territory or arrive, in any form, from non-Community countries. The system, whilst principally concerned with detecting diversion from peaceful to non-peaceful use is also concerned with checking that declarations of specific use are correct and that obligations imposed by material suppliers are respected.

The legal basis of the Euratom safeguards system

The basis for the Euratom safeguards activities lies in Chapter VII (Articles 77-85) of the 1957 Euratom Treaty.

Article 77 of the Treaty states:

'In accordance with the provisions of this Chapter, the Commission shall satisfy itself, that in the territories of the Member States,

(a) ores, source materials and special fissile materials are not diverted from their intended use as declared by the user;

(b) the provisions relating to supply and any particular safeguarding obligations assumed by the Community under an agreement concluded with a third State or an international organization are complied with.'

Sub-paragraph (a) implies a scheme of reporting and verification in relation to the use of nuclear material of all types. Sub-paragraph (b) covers a number of important agreements for the supply of nuclear material from, for example, USA, Canada and Australia. These agreements include requirements for safeguarding the material while it remains in the Community. This sub-paragraph also covers the agreements concluded between Euratom, its Member States and the IAEA.

The subsequent Articles state:

— the basic requirement that all nuclear installations are subject to safeguards;

— the requirement for approval from the Commission, for techniques to be used for reprocessing irradiated fuel;

— the right of the Commission to appoint inspectors;

— the right of inspectors to have access at all times to the nuclear material in the installations concerned, to data and to people concerned;

— possible sanctions in the event of infringement of the Treaty;

— the exclusion from safeguards of nuclear material specifically intended to meet defence requirements.

In order to translate the requirements of the Treaty into an applicable scheme of safeguards measures the Euratom Regulation No 3227/76 defines the obligations for operators of nuclear plants, the major ones being the following:

— the operator has to provide Euratom with the 'basic technical characteristics' of his installation following a detailed questionnaire. The information required includes an account of the arrangements for the handling of nuclear material, a description of the nuclear material to be handled, and a description of the system for nuclear material accountancy and control. Any changes to the basic technical characteristics must be communicated to the Commission. On receipt of the basic technical characteristics, Euratom can send inspectors to verify the information (which may be reverified subsequently as necessary);

— one of the principal obligations on the operator is to establish and maintain a system of nuclear material accounts when he starts to handle such material. Features of this material accounting system are that all parts of the installation in which nuclear material may be found have to be allocated to a series of material balance areas (MBA). For each MBA the accounts must record the details of all material which enters and leaves the area ie: details on quantity, type, composition of material, safeguarding obligation, etc. All other changes to the inventory, e.g.: nuclear transformation by irradiation or change of category, must also be recorded. Separate accounts must be maintained for plutonium, highly enriched uranium, low enriched uranium, natural uranium, depleted uranium and thorium. Provisions must be included in the material accounting system for taking a physical inventory from time to time, (typically between one and four times per year) the results of which should be reflected in the accounts and reported to Euratom;

— the outline programme of activities must be notified regularly;

— the intention to perform a physical inventory and the programme for doing it must be notified;

— the intention to shut down a reactor for reloading must be notified;

— certain transfers, imports and exports of nuclear material must be notified in advance;

— precision and accuracy of all determinations and measurements must be established and submitted to Euratom as part of the declaration of basic technical characteristics referred to above.

The details of the above obligations, specific to each installation under safeguards, are laid down in the 'Particular Safeguards Provisions' (PSPs), a legally binding document issued by the Commission after consultation between the Commission, the Member State and the operator concerned.

In the next issue of *Energy in Europe* this introduction to Euratom safeguards will be continued by a description of the operational side of safeguards activities.

Petroleum product pricing in the Community

One of the Commission's objectives for Community energy policy is to improve the price transparency of petroleum products consumed in the Community. Commission staff have recently submitted a report on the formation of petroleum product prices and movements of them during the period 1979-84.[1] This article summarizes the findings.

In view of the imminent accession of two new Member States, it is worthwhile reviewing what the Commission has done and what the Council has decided in recent years about the transparency of petroleum product prices.

— In 1977 the Council adopted a Directive[2] setting up a Community procedure for information and consultation on the prices of crude oil and petroleum products, since transparency of the costs and prices of petroleum products is a necessary condition for the satisfactory operation of the market, and particularly for the free movement of goods within the Community;

— severe tightness on the spot markets for petroleum products led the Commission, at the end of 1979, to begin publishing a weekly oil price bulletin in order to provide information on consumer prices net of duty and taxes in the various Community markets;

— finally, following its Communication to the Council of 19 October 1982 on energy pricing,[3] the Commission appointed a consultant to analyse the price regimes for petroleum products in force in most of the Member States, and their compatibility with the energy pricing principles adopted by the Council.

The information from this study and the statistical data at the Commission's disposal made it possible to conduct an in-depth analysis of the functioning of the various oil markets in the Member States.

The following points will be dealt with in turn:

— present price regimes in the Member States;

— trends in supply costs for crude oil and average ex-refinery proceeds;

— trends in the consumer prices, net of duty and tax, of petroleum products;

— trends in prices of petroleum products with all duties and taxes included.

Present price regimes in the Member States

There are now three main systems of petroleum product pricing:

(a) free market prices

this applies to all the products in Germany, in the United Kingdom since May 1979 and in the Netherlands since August 1982. France removed price controls on motor fuels on 31 January 1985, while heavy fuel oil and naphtha prices were decontrolled several years ago;

(b) price ceilings fixed automatically by application of a formula, with reference to world market conditions

this system is applied to domestic heating oil in Belgium, Denmark, Ireland, Italy, Luxembourg and France; the criteria applied and methods used vary from one country to the other (movements of crude-oil supply costs and prices of petroleum products on the spot markets, variations in the dollar exchange rate, etc.);

(c) price ceilings fixed by the State

this is the method in Greece, where prices depend more on theoretical costs than on short-term fluctuations on the world market.

This analysis of price regimes shows that there has been a trend towards price decontrol during the last few years and that in all the Member States, except Greece, prices reflect the short-term fluctuations in supply conditions on the world market.

Movements of crude-oil supply costs and in the average ex-refinery proceeds

The second oil crisis in 1979 triggered off a sharp, substantial rise in crude-oil supply costs. In addition, the Community cif price in current dollars rose from about USD 110 per tonne (USD 15 per barrel) in the first quarter of 1979 to over USD 250 (USD 35 per barrel) in the

[1] SEC(85) 1301, 18. 9. 1985.
[2] Directive 76/491/EEC, 4 May 1976.
[3] COM(82)651 final, 19 October 1982.

fourth quarter of 1980. The return to a more normal supply situation which began in the first quarter of 1982 led to a gradual fall in dollar prices in a more competitive market and resulted in basically similar supply conditions in all the Member States. The fall in prices in current dollars amounted to USD 67 per tonne, or 25%, between the first quarter of 1981 and December 1984. However, the average cost of supply in the Community increased by 70 ECU in current terms, ie: about 30%, owing to the strengthening of the dollar against the ECU during that period.

Proceeds at the refinery gate generally reflected movements of supply costs, but they were also influenced by the increasingly tough competition on the market and by the inflexibility of the price regimes in force in several Member States. To sum up, it can be said that, when markets are tight, ex-refinery proceeds are sufficient to cover refining costs, whereas the proceeds in normal supply conditions do not provide a satisfactory margin.

The low profitability of refining which marked the period from June 1982 to the end of 1984 should be seen against its background: continuing decline in oil consumption and substantial over-capacity in refining and distribution.

The recent Communication from the Commission to the Council on trends in the oil-refining industry demonstrates with the aid of statistics the importance of the restructuring process under way in this sector, and the need to continue it in future.[1]

Trends in consumer prices of petroleum products, net of duty and tax

— The rise in the prices of the main petroleum products between 1980 and 1981 reflected the trend in the supply cost cif of crude oil. The increases were highest in the countries where there were no price controls, and fluctuations on world markets were passed on to consumers directly. Price controls moderated the increases in the short term. **Price differences for comparable products varied considerably during this period, and in particular for motor fuels.**

The differences in current dollars between the highest and lowest prices on 15 January 1980 were as follows:

- USD 88/1 000 litres for premium petrol
- USD 60/1 000 litres for automotive gasoil
- USD 57/1 000 litres for domestic heating oil
- USD 35/tonne for heavy fuel oil.

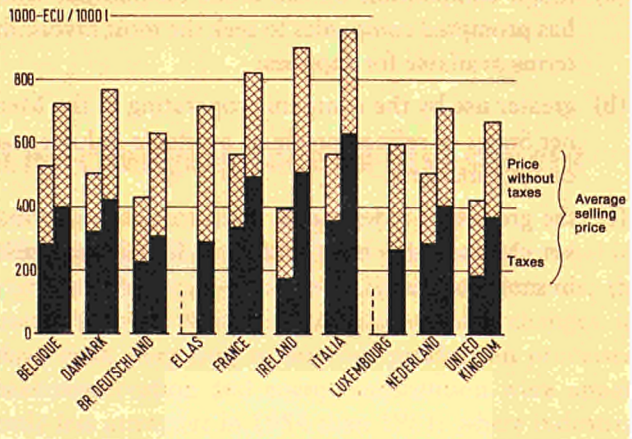
— Prices in current dollars have fallen steadily in all the countries since 1982 as a result of the depreciation of European currencies against the dollar.

By contrast, prices in current ECU net of duty and tax in the Member States as a whole rose in the period from January 1982 to January 1985 by about 4% for petrol, 12% for gasoil and 48% for heavy fuel oil; prices for heavy fuel oil were influenced by exceptional demand resulting from an interruption in coal supplies (miners strike in the United Kingdom). During the period in question, the price differences narrowed steadily.

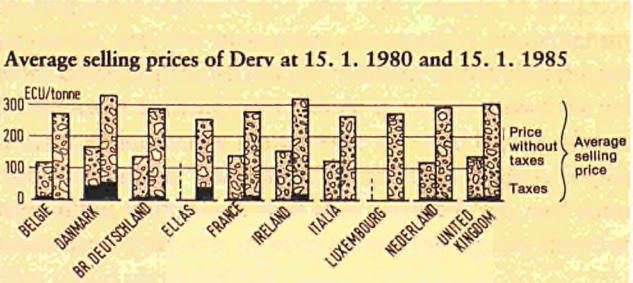
Thus the price differences in current dollars on 15 January 1985 were:

- USD 29/1 000 litres for premium petrol
- USD 20/1 000 litres for automotive gasoil
- USD 18/1 000 litres for heating oil
- USD 20/tonne for heavy fuel oil.

Average selling prices of premium gasoline at 15. 1. 1980 and 15. 1. 1985

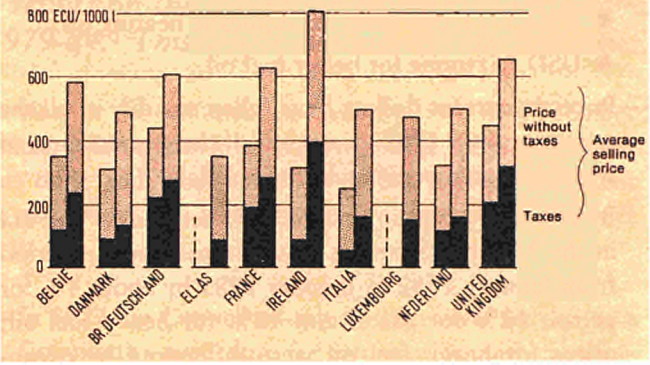


Average selling prices of Derv at 15. 1. 1980 and 15. 1. 1985

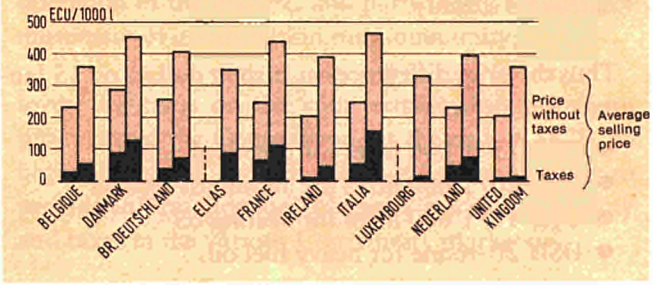


[1] COM(85)32 final, 1 March 1985.

Average selling prices of heating gasoil at 15. 1. 1980 and 15. 1. 1985



Prix de vente moyen du fuel lourd (hts) au 15. 1. 1980 et au 15. 1. 1985



The main reasons for this convergence of prices are:

(a) tough competition on the crude-oil market, which has prompted companies to seek the most favourable terms available for supplies;

(b) greater use by the companies operating in the Member States of refined products available at lower cost on spot markets;

(c) the growth of independent operators and supermarket chains which have unleashed fierce competition in some countries;

(d) the deregulation of prices in some countries and the relaxing of price controls in others;

(e) the increased transparency made possible by publication of the Commission's weekly oil price bulletin. Some countries, such as France and Italy, which have maintained price controls, incorporate the data published in this bulletin in their price formulae.

Trends in petroleum product prices including tax

While prices net of tax are tending to converge, the same is not true of consumer prices. This is mainly due to the disparities in the Member States' tax systems. Price differences, already sizeable before the second oil price shock, have to all intents and purposes not been reduced since then, and indeed have widened in one case:

Price differences in current dollars

	15. 1. 1980	15. 1. 1985
Premium petrol	USD 239/1 000 l	USD 249/1 000 l
Automotive gasoil	USD 268/1 000 l	USD 228/1 000 l
Domestic heating oil	USD 120/1 000 l	USD 84/1 000 l
Heavy fuel oil	USD 76/tonne	USD 42/tonne

Such large price differences can distort competition, particularly in the industrial and transport sectors. Although taxation matters are the responsibility of the Member States, the Commission, in keeping with the guidelines set out in the White Paper on completing the internal market, should make concrete proposals for achieving real harmonization of taxes and duties, above all on mineral oils in the Community.

Industrial investments to improve energy use in Europe

Information on investment in fixed assets in the energy industries is published regularly by the national and Community statistical offices. This is not so, however, with energy-related investment in industries outside the energy sector proper.

In order to gain a better insight into this expenditure the Commission decided to have heads of firms polled by institutions specializing in this kind of work.[1] *The surveys deal with capital spending directed towards reducing expenditure on energy.*[2] *They are to be carried out in conjunction with surveys of a more general nature on industrial investment in Europe; these will also be carried out by the Commission in collaboration with the same institutions. The key trends are summarized below.*

Two of these polls have been carried out so far: the results of the first became available in November 1982 (generally from the spring '82 survey) and the results of the second in 1985 (spring '85 or autumn '84 survey).

They have provided extensive information on the scale and purpose of investments, and a comparison between them has shown how energy-related investment changed between 1981 and 1984.

The results from the four major European countries (Germany, France, Italy and the United Kingdom) are analysed later and some comments are added on the other countries covered by the poll.

Slight decline

The share of industrial investment to save energy or replace one form with another in 1984 was between 3.8% and 8% of total industrial investment depending on the country concerned. Generally speaking this is smaller than in 1981:

for example, it fell from 11% to 8% in France, though in this country the relative share of energy-related investment is still the highest; it was steady in Germany, though at a lower level (4% in 1981 and 3.8% in 1984); the results for Italy and the United Kingdom were between the two. A similar trend emerged in the other countries surveyed.

The fall in the share of investment directed to the efficient use of energy reflects a fall in the absolute level of such investment (in constant money terms), whilst total industrial investment in 1984 is believed from the relevant half-yearly surveys on the topic to be only slightly higher, if not actually lower, than in 1981.

This general trend might be due to the primary industries, where a fall in energy-saving investment coincides with an even more marked fall in total investment.

Prospects for 1985, however, would appear more encouraging, since an appreciable rise in energy-related investment is forecast for Italy and the United Kingdom, while Germany and France are expected to maintain the 1984 level. The results from the other countries are also rather optimistic.

The changing face of investment

While the share of energy-related investment (in total investment) has stayed within fairly narrow bounds, the uses to which it is put have undergone major changes. Its three main purposes, to improve production processes, heat conservation and energy substitution were apparently less attractive in 1984 than 1981: where industrial managements were then giving priority to savings on heating, heat recovery and any other means of heat conservation, they are now more attracted by implementing more efficient production processes or improving the performance of existing ones. Table 2, which shows the percentage of industries which have invested in one of these three categories, reflects the structural changes. Replies were often multiple in that they covered two and sometimes three purposes of investment (the figures therefore do not add up to 100%).

1 The bodies concerned were as follows: Banque Nationale de Belgique (B), IFO — Institüt für Wirtschaftsforschung (RFA), INSEE — Institut national de la statistique et des études économiques (F), ESRI — Economic and Social Research Institute (IRL), ISCO — Istituto nazionale per lo studio della congiuntura (I), STATEC — Service central de la statistique et des études économiques (L), CBI — Confederation of British Industry (UK).

2 The forms of investment in question relate to action to save energy, to reduce the cost of energy, to replace one energy source by another or to enhance security of supply.

Table 1: Share of energy-related investment in total investment (estimates/forecasts)

	Germany			France			Italy			United Kingdom		
	1981	1984	1985	1981	1984	1985	1981	1984	1985	1981	1984	1985
Primary industries	8.7	5.6	5.1	14	10	11	13.1	8.4	10.4	(N.A.)	7.0	6.5
Metals manufacture	5.5	8.7	8.8	6	14	12	4.1	5.7	17.3	(N.A.)	6.4	12.8
Engineering (incl. elec.)	2.5	2.9	2.6	8	4	5	2.2	1.6	1.9	(N.A.)	3.0	3.4
Manufacturing & process.	4.2	2.9	2.2	9	12	6	11.1	12.4	15.3	(N.A.)	3.8	9.6
Extractive industries	2.1	0.5	1.1	8	12	13	3.4	8.7	6.5	(N.A.)	5.7	7.1
Food	6.4	5.1	5.0	20	11	14	3.6	9.8	9.0	(N.A.)	6.7	7.0
Weighted average	4.0	3.8	3.6	11	8	8	6.5	4.4	6.8	5.7	4.8	6.7

Table 2: Purposes of energy-related investment (estimates/forecasts)

(% of replies)

	Germany			Italy			United Kingdom		
	1981	1984	1985	1981	1984	1985	1981	1984	1985
More efficient production processes	50.5	59.1	59.8	51.1	70.1	67.5	(56 + 22)[1]	(40 + 18)	(45 + 30)
Heat conservation	77.2	76.9	72.0	60.8	61.2	58.2	55	43	48
Energy substitution	31.4	35.5	37.5	11.2	16.3	17.5	nd	33	47

	France		
	1981	1984	1985
Automation, introduction of new methods	70	69	69
Energy saving	13	13	13
Energy substitution	2	3	3

[1] The first figure is for the improvement of existing processes, the second for the introduction of new processes.

The United Kingdom figures in Table 2 prompt the following remark: the results for 1981 make no distinction between changes in production processes and energy substitution. Even though it is legitimate to believe that the percentage of replies for the latter purpose is included in the one for the former, comparison between the 1981 and 1984 figures is still difficult.

The survey in France, moreover, was such as to preclude direct comparisons. The French results show, however, a degree of stability in the pattern of the estimates.

Results requiring confirmation

There are no surprises in the results, which, overall, subscribe to the 'industrial logic' prevailing today.

Energy is becoming a less binding constraint and capital spending projects often followed the second oil shock of 1979-80. The apparent fall in energy-related investment no doubt flows from this.

The quest for gains in competitiveness forces manufacturers into making their production processes more efficient. The 'Energy Survey' illustrates this form of behaviour and the half-yearly industrial investment underlines it for 1984, which saw a clear recovery in investment compared with previous years.

Is it not, then, more difficult to allocate a portion of total investment by industry to the efficient use of energy when a large share of energy saving arises automatically from the introduction of new production processes? Are not the occasional disparity between countries in the results and the apparent slight fall in energy-related investment at least partly due to the increasing difficulty of identifying which investments are meant to save energy? The Commission's 1986 survey should provide clearer answers to these questions.

The historical background to Community energy policy

This occasional series of historical articles is intended to inform readers of past events relating to Community energy policy.

This first article sets out to remind readers of how the ECSC High Authority, the Euratom Commission and the EEC Commission — which were separate entities until 1967 — collaborated to prepare the first Community instrument on energy.

Later articles will recall highlights of proposals put forward by the single Commission as well as some international events such as the 1972 Washington Conference and the CIEC (Conference on International Economic Cooperation) held in Paris in 1976.

The concept of 'energy policy' as such is not mentioned in either the Treaty establishing the European Coal and Steel Community (ECSC), the Treaty establishing the European Economic Community (EEC) or the Treaty establishing the European Atomic Energy Community (Euratom), although all three are concerned with the energy sector. Realizing this, the governments called upon the ECSC High Authority at the 1956 Messina Conference to draw up proposals which culminated in the Protocol of 8 October 1957 on a coordinated energy policy. The result of this Protocol, adopted by the Council and the ECSC High Authority, was the setting up of a Joint Committee, comprising representatives of the governments and the High Authority to examine the prospects, and conditions required for economic growth and expansion in the consumption of the various forms of energy.

Once the EEC and Euratom had been established in Brussels, a combined Working Party was set up. It was chaired by Mr P O Lapie (F), Member of the High Authority, and included representatives of the Commission of the European Economic Community (Mr Marjolin (F) and Mr von der Groeben (D) who were responsible respectively for economic and financial policy and competition policy) and of Euratom (Mr De Groote [B]), Member of the Commission).

The duties of the Working Party covered the following topics:

— forecasting short- and long-term energy requirements and supplies;

— preparation of energy balances combined with the most economic ways of making them balance;

— putting together documentation on the investments required for energy production;

— the effects of energy programmes on the balance of payments and available labour;

— price structures and price formation methods for various sources of energy and factors affecting prices (aids, customs duties, taxes);

— any innovations that might affect the consumption of various energy products.

The first documents published by the Working Party in 1962 were a memorandum on Community energy policy and a major study of the European Community's long-term energy prospects (1962-64 Official Journals).

It proved impossible to reach any real agreement on a long-term energy policy but the Governments of the Member States nevertheless signed the first energy policy instrument known as the Protocol[1] in Luxembourg on 21 April 1964.

The Protocol enshrined the principle that no decision on the basic options of an energy policy should be taken before a single Community was established (as was done in 1967). It was proposed that, in the meantime, national policies should be suitably harmonized in preparation for the creation of a common energy market. After recalling the main objectives of this policy, the Governments of the six Member States set out the principles that were to apply to each form of energy.

In the case of coal the Protocol stressed the need to provide State aids in support of measures such as rationalization undertaken by the coal enterprises, and the governments called upon the High Authority to propose a procedure for implementing a system of Community aid.

Where oil and natural gas were concerned, the governments expressed their willingness to implement a common policy under the Treaty of Rome which would guarantee highly diversified supplies at the lowest most stable prices possible and under arrangements capable of ad-

aptation to suit the circumstances. The governments decided to hold permanent consultations with the Commission of the European Economic Community on all questions relating to this sector.

On nuclear energy the Ministers stated that they were prepared to promote and step up research, trials and aid for the industrial development of this form of energy.

As can be seen, the Protocol simply laid the foundations for a common energy policy. Thereafter it would be for the High Authority and the two Commissions to cooperate with the Governments to work out the specific action to be taken to achieve the separate objectives set for each form of energy.

The next edition of *Energy in Europe* will continue with an article on the next historical stage of the Community's energy policy.

1 Official Journal 69, 30 April 1964.

Energy saving in buildings in Denmark (1981-84)

Between July 1981 and December 1984 Denmark[1] invested 1 125 MECU in upgrading the energy performance of homes, cutting energy consumption by 480 000 toe a year in the process.

To attain such an impressive result so fast, the Danish Government had put through an imaginative programme mobilizing all sectors of the economy. The result was that energy audits were carried out on 865 000 homes (over 40% of the total housing stock) over the period. Government grants accounted for 256 MECU of the total investment of 1 125 MECU.

The Directorate-General for Energy receeeently investigated this highly attractive scheme in depth: it fffound a logical, meticulously planned programme which has proved its worth and surpassed the original expectations.

This article is intended to spread the news of the Danish scheme to a wider audience. Soon the Directorate-General for Energy will be starting talks with a group of experts appointed by the Member States to hear their responses and attitudes to this idea. Once this has been done, the Commission will decide whether the matter should be discussed by the Council of Ministers.

The 1981 law

In the wake of the first (1973-74) oil crisis, Denmark, like most other Member States, introduced a series of schemes offering financial incentives. But the 1979-80 oil crisis, with its far-reaching consequences for all sectors of the economy, shook the government into setting its sights higher.

On 19 June 1981 the law on the reduction of energy consumption in buildings entered into force, replacing all the previous aid schemes to promote energy saving.

The objective was to bring the energy performance standards for all pre-February 1969 buildings in Denmark up to those for new ones.

The standards for new buildings were set out in the 1982 Danish building code, which includes specifications on thermal insulation, air change rates and boiler control. The rules on energy saving remained the same as in the 1977 code which entered into force on 1 February 1979.

The law envisaged the following means to attain this general objective:

- Obligation to take sufficient energy-saving measures to attain satisfactory energy standards in all public buildings by 1987.

- A scheme to assist energy-saving investments in privately owned sector residential buildings,[2] subject to a ceiling of 850 ECU per home up to the end of 1984. The main features of the scheme were:
  - the aid payments were staggered over three periods (1981-82, 1983, and 1984), the idea being to speed up implementation of energy-saving measures;
  - to offset the differences in the after-tax return on the investments, in each phase rented accommodation qualified for a higher aid rate (30%, 15% and 10%) than owner-occupied housing (20%, 10% and 7.5%);
  - aid was granted only subject to the following conditions:
    - a registered energy consultant must have conducted an energy audit and written an energy audit report on the building;[3]
    - all the investments proposed in the report must have been made. However, an upper limit (the aid ceiling divided by the percentage aid rate) was set on these investments;
  - the consultant's fees were included in the 850 ECU ceiling.

- Once the jobs have been one the energy consultant re-inspects the building. Provided the investment prog-

[1] Population: 5 million.

[2] Private non-residential buildings do not qualify for aid under this scheme. They are, however, covered by the energy audit/certificate procedure.

[3] The energy audit report is a list of measures to be taken to make a given building reasonably energy efficient, i.e.: to bring it up to the energy standards for new buildings, as far as economic.

ramme has been duly carried through, the consultant then issues an energy certificate to indicate that reasonable energy-saving measures have been taken in the building.

• Since 1 January 1985 sellers have been legally bound to inform prospective buyers of the energy-saving measures taken in the building. One way of doing this is to show them the energy audit report or the energy certificate.

A well-orchestrated publicity campaign was run to encourage the public to take advantage of the system.

However, it soon became clear that the conditions imposed were too stringent. As can be seen from **Figure 1**, there was little demand for aid in 1981 or 1982.

The investment programme could well be beyond the means of the house owner. There was always the risk that the investment programme advocated in the consultant's energy audit could cost more than the owner was willing or able to pay. If so, the owner received no aid at all, not even the cost of the consultant's fees.

Under these circumstances, very few applications were received for aid for energy-saving measures in owner-occupied housing. By the end of 1982, thermal audits had been carried out on less than 5% of the owner-occupied housing stock. There was a far livelier response in respect of rented accommodation, with audits being made on almost 18% of all accommodation in blocks of flats. The Danish legislation also allows rent increases to pay for the improvements, with the tenants paying for the investments but receiving lower energy bills in return.

1982 improvements

Appreciable improvements were made to the 1981 law in June 1982:

— No longer was an energy audit report needed before aid was granted. Just as before 1981, aid was granted as long as the jobs done were on the approved list.

— Step-by-step investment was also allowed. In this case, the house owners concerned were allowed to submit several different applications, though still subject to the 850 ECU total aid ceiling.

— The energy consultant's fees were refunded in full and included in the 850 ECU limit.

In December 1982 the payments were rephased. Since the 1981 law had got off to such a slow start the first phase was extended until mid-1983, instead of the end of 1982.

The aid rates remained:

— owner-occupied housing: 20% and 10%;

— rented accommodation: 30% and 15%.

How the system works

The consultant conducting the energy audit checks the building against the approved list.

At the end of the inspection the consultant completes his energy audit report, entering details of the energy-saving measures needed, a cost estimate, a calculation of the approximate energy savings expected from each of the investments advocated and the payback time. Provided the measures proposed are technically feasible and economic, all the parts of the building and installations covered will then be up to today's energy-saving standards for new buildings. The age, use, method of construction, heating system and return on the investment are all taken into account when calculating the total investment required. A copy of the energy audit report is sent to a secretariat set up specially for the energy consultancy service. There the details are checked and statistics compiled. The property owner can then have the jobs done.

Once the jobs have been completed, the government grant is paid out following the rules laid down in the law, i.e.: on the basis of the audit and of the tradesmen's and contractors' bills. As long as all the actions listed in the energy audit report have been taken, the consultant can then issue an energy certificate for the building. An extensive public awareness campaign[1] was started as soon as the law was published.

In 1981 it was estimated that 140 MECU would be needed for the aid payments, representing a total investment of 600 MECU by the end of 1984[2]. But the public response has been far greater than expected.

Investment and aid[3]

According to the reports available at the end of 1984, an estimated total of 256 MECU was paid out under the aid

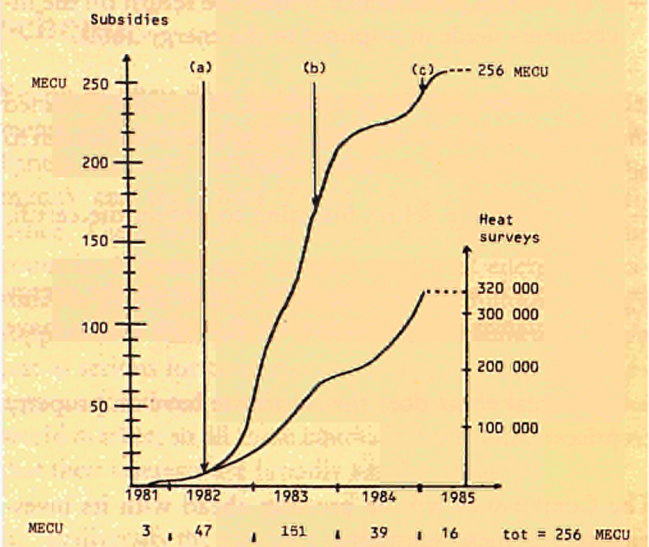
1 A total of 2.2 MECU was spent on this campaign between 1981 and 1984.

2 According to estimates for the same period, a total of 300 MECU needed to be invested in energy-saving measures in public buildings by 1987.

3 All the statistics refer to residential buildings only, since non-residential buildings are not covered by the aid scheme.

scheme, representing a total investment of some 1 125 MECU. Even after allowing for inflation, it is therefore fair to conclude that the aid scheme has aroused far greater public interest than anticipated. As can be seen from the figure below, the liberalization of the scheme in 1982 was the main reason for this:

Cumulative aid payments 1981-84



(a) liberalization
(b) reduction in subsidy rate
(c) end of subsidy scheme

This figure clearly illustrates that the aid payments picked up sharply after June 1982 when three improvements were made:

— the obligations to have an energy audit carried out were relaxed;

— step-by-step investments were allowed;

— the consultants' fees were refunded in full.

The greatest fillip to public demand was the fact that the investor no longer needed to make all the investments needed to attain a reasonable level of energy-saving at the same time in order to qualify for aid. In all 59% of the 256 MECU outlay went on rented accommodation and the remaining 41% on owner-occupied houses and flats. Energy-saving investments proved particularly popular with housing associations building and renting out low-cost housing on a non-profit-making basis.

A far lower response rate was achieved from the private rented accommodation sector, where there is considerably less motivation. To overcome this, in 1983 a law was adopted allowing tenants to request an energy audit and ordering energy-saving investments whenever the heating bill topped 50% of the rent. Even so, the response rate from private rented accommodation was still higher than that from owner-occupied housing. There are two possible explanations:

— rented accommodation has certain organizational advantages, in that once a decision to upgrade the energy performance of a building has been taken, several homes benefit;

— the householders themselves do much of the maintenance and energy-saving work in owner-occupied housing. Since only jobs done by undertakings liable to VAT qualify for aid (to guarantee that the jobs done have an impact on employment), it is only natural that the response rate from owner-occupied housing should be lower.

The average cost (including consultants' fees) of the investment programmes qualifying for aid was 850 ECU per home in buildings belonging to low-cost housing associations and 1 250 ECU per owner-occupied home. On average, the energy audit report called for investments totalling 2 200 ECU per house or flat (including consultants' fees). In other words, almost half the investments possible have yet to be made.

Energy audits

By the end of 1984, 320 000 energy audits covering 865 000 homes had been made. In other words, 40% of all homes in Denmark (61% of the flats and 20% of the private houses) had been audited.

But since energy consumption is, on average, far higher in private houses, the relative impact of the programme in terms of energy savings has been disappointing.

Energy saving

The difficulties of finding a method of assessing the impact of any given measure on energy savings in an age when there are so many incentives for cutting back energy consumption are all too familiar.

At the end of 1984 the Danish Ministry of Energy attempted such an analysis in its 1984 energy plan. On comparing the 1983 and 1975 energy consumption figures

for the residential sector it found that energy consumption per square metre was 33% lower in 1983 than it had been in 1975. Had energy efficiency and consumption per square metre remained unchanged since 1975, energy consumption in 1983 would have been 2.4 Mtoe higher than it actually was.

Estimates based on the 1983 energy audits suggest that on average the investments subsidized under the 1981 law pay for themselves within seven years. Together, these aid schemes have saved an estimated 480 000 toe a year.

Conclusions

Since 1981 Denmark has been pursuing a highly integrated approach, with each part of the strategy bolstering the others. Thanks to this interaction, in all more energy has been saved than would have been possible had the individual measures been taken in isolation.

It is therefore fair to conclude that the package of measures taken have attained the Danish Government's energy policy objectives, even if the investments qualifying for aid have failed to tap the full energy-saving potential in the buildings concerned.

The grant scheme ended on schedule in December 1984. Since 1 January 1985 property sellers in Denmark have been under an obligation to show prospective buyers either an energy certificate or an energy audit report for the housing concerned. This procedure serves two purposes:

— It demonstrates whether a reasonable level of energy efficiency has been achieved and thus encourages property owners to complete their investment programme.

— It is a selling point which boosts the return on the investments made in response to the energy audit.

It is, of course, too early to assess the results obtained since the grants scheme ended. Three questions remain to be answered now:

— How much are sellers investing to obtain the certificate?

— How much work is being done to upgrade the energy performance of buildings now that the grants have gone?

— What real effect does the certificate have on property prices?

The Commission will be pressing ahead with its investigations on these questions.

Community cooperation on energy planning with developing countries[1]

For nearly six years now the European Community has had a special scheme for cooperating with developing countries on energy planning. This scheme has been producing increasingly positive results. A brief look at this Community scheme shows that it is an important and relevant factor in the development of relations between Europe and the Third World and, more generally, between the North and South (and between different areas of the South).

Why the need for a Community scheme?

Energy markets now develop on a global scale. Developments and problems over the last 12 years have highlighted the need for stable relations between the Community and the Third World based on mutual confidence. The economic and social development of all our countries is based on a reliable supply of energy at reasonable prices. Any uncertainties surrounding energy supplies and their prices will cause problems which are just as serious for countries producing and exporting energy as for those which have to obtain energy on the world market; so all these countries have come to realize that their interests are broadly similar, namely:

(i) to diversify the structure of their energy consumption;

(ii) to rationalize the use of energy sources;

(iii) to avoid sudden changes in energy prices, energy production and energy consumption.

Because these common objectives were obviously shared by all its Member States, the European Community decided to define its own policy in this area.

Obviously, if there is to be cooperation between the North and the South, the countries concerned must speak the same language, ie: they must use the same methods and criteria of analysis. The main problem in this connection is **the availability for everyone of sufficient, reliable information.**

This problem came to the fore in the second half of the 1970s. Although there was a clear need to improve market analysis and forecasting (by incorporating structural changes resulting from energy saving), it quickly became apparent that there was virtually a total lack of relevant information.

This prompted the authorities and specialized institutes in the Community and in the developing countries to look into this problem. The first task was to create tools and methods for the collection and analysis of energy data. In October 1979 the Community decided to analyse energy problems in cooperation with the countries of the Third World. At the same time a group of research workers from these countries and from the Community asked the Commission of the European Communities to help finance improvements to these tools and methods.

To answer this request the Commission took the first steps towards cooperation in the field of energy planning in January 1980.

What results have been achieved?

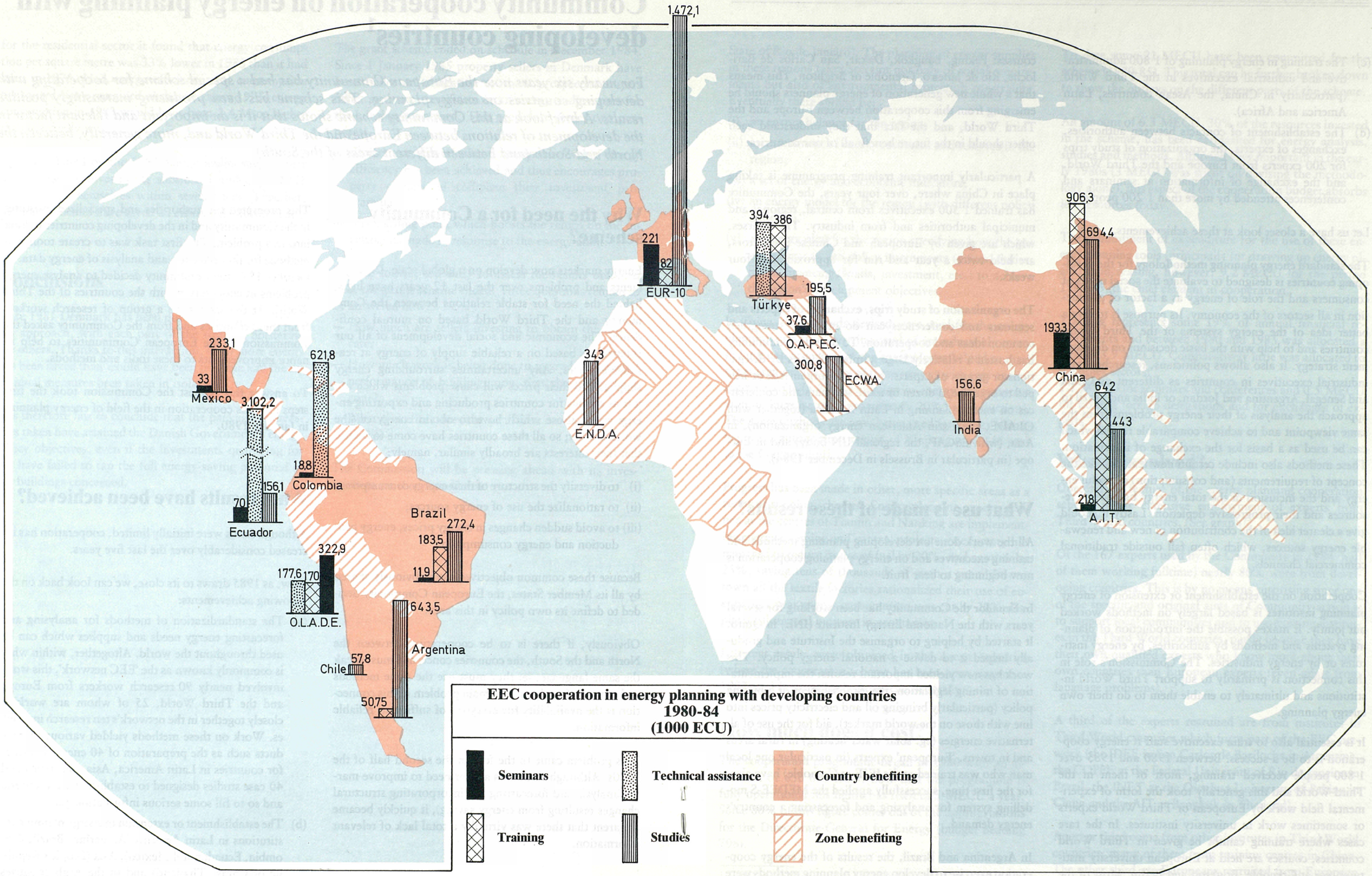
Although funds were initially limited, cooperation has increased considerably over the last five years.

Now, as 1985 draws to its close, we can look back on the following achievements:

(a) The standardization of methods for analysing and forecasting energy needs and supplies which can be used throughout the world. Altogether, within what is commonly known as the 'EEC network', this work involved nearly 90 research workers from Europe and the Third World, 25 of whom are working closely together in the network's ten research institutes. Work on these methods yielded various by-products such as the preparation of 40 energy balances for countries in Latin America, Asia and Africa and 40 case studies designed to establish analysis criteria and so to fill some serious information gaps.

(b) The establishment or extension of energy planning institutions in Latin America (Argentina, Brazil, Colombia, Ecuador and Mexico), Asia (People's Republic of China, Thailand) and in the Arab countries (the OAPEC Secretariat in Kuwait, the Jordanian Energy Ministry).

[1] The Community energy planning cooperation scheme also includes a section on the regions of the Member States of the Community.


1.472,1
221
82
EUR-10
394
386
Türkye
195,5
37,6
O.A.P.E.C.
300,8
E.C.W.A.
343
E.N.D.A.
906,3
694,4
193,3
China
156,6
India
642
443
218
A.I.T.
233,1
33
Mexico
621,8
188
Colombia
3.102,2
70
156,1
Ecuador
Brazil
272,4
183,5
11,9
322,9
177,6
170
O.L.A.D.E.
643,5
Argentina
57,8
Chile
50,75
EEC cooperation in energy planning with developing countries
1980-84
(1000 ECU)
Seminars
Technical assistance
Country benefiting
Training
Studies
Zone benefiting

(c) The training in energy planning of 1 800 administrative and industrial executives in the Third World (particularly in China, the Asean countries, Latin America and Africa).

(d) The establishment of contacts between authorities, exchanges of experts, the organization of study trips for 200 experts from Europe and the Third World, and the exchange of information at seminars and conferences attended by more than 1 200 people.

Let us have a closer look at these achievements.

The standard energy planning methodology for the developing countries is designed to evaluate the social needs of consumers and the role of energy as a factor of production in all sectors of the economy. Its purpose is to give a better idea of the energy systems of the Third World countries and to help with the basic decisions on development strategy. It also allows politicians, researchers and industrial executives in countries as different as China and Senegal, Argentina and Jordan, or India and Brazil to approach the analysis of their energy problems from the same viewpoint and to achieve comparable results which can be used as a basis for the exchange of information. These methods also include certain new features like the concept of requirements (and consumption) of useful energy and the inclusion in the total energy balance of resources and their progressive depletion. Lastly it should give a clearer idea of the contribution of new and renewable energy sources, which often fall outside traditional commercial channels.

Cooperation on the establishment or extension of **energy planning institutes** is based largely on methods worked out jointly. It makes possible the introduction of planning systems and methods by authorities, by energy institutes or by energy industries. The Commission's role in this connection is primarily to support Third World institutions and ultimately to enable them to do their own energy planning.

It is essential also to **train executive staff** if energy cooperation is to be a success. Between 1980 and 1985 over 1 800 people received training, most of them in the Third World and this generally took the form of experimental field work by European or Third World experts or sometimes work in university institutes. In the rare cases where training cannot be given in Third World countries, courses are held at European university institutes, eg: at Grenoble, Brighton and Berlin. Most of the research centres of institutes working on the development of methods within the EEC network hold regular training courses: Peking, Bangkok, Dakar, San Carlos de Bariloche, Rio de Janeiro, Grenoble or Brighton. This means that a whole new generation of energy planners should be emerging from this cooperation between Europe and the Third World, and the fact that they understand each other should in the future benefit all of our countries.

A particularly important training programme is taking place in China where, over four years, the Community has trained 1 500 executives from central, regional and municipal authorities and from industry. The courses, which are given by European and Chinese instructors, are held twice a year and run for approximately four weeks.

The organization of study trips, exchanges of experts and seminars and conferences can do much to strengthen common ideas and cooperation. To date the Community has hosted a relatively large number of visits by delegations or groups of experts. It has also organized, or helped to organize, a dozen or more seminars and conferences on energy planning in Latin America (together with OLADE, the Latin American energy organization), in Asia, (with ESCAP, the regional UN body) and in Europe (in particular in Brussels in December 1984).

What use is made of these results?

All the work done on developing planning methods and training executives and on energy planning cooperation is now beginning to bear fruit.

In Ecuador the Community has been working for several years with the National Energy Institute (INE) in Quito. It started by helping to organise the Institute and gradually helped it to devise a national energy policy. This work has now yielded important results: the implementation of mining legislation, the establishment of a pricing policy (particularly bringing oil and electricity prices into line with those on the world market), aid for the use of alternative energies (eg: solar water heating) in rural areas and in towns. 'European' experts (in particular one local man who was trained at the IEJE at Grenoble) have also, for the first time, successfully applied the MEDEE-S modelling system for analysing and forecasting a country's energy demand.

In **Argentina** and **Brazil**, the results of the energy cooperation exercise to develop energy planning methods were somewhat different, since work on regional planning started in these two countries (Noreste Province and the

State of Rio de Janeiro). The planning of energy supplies in these regions takes account not only of social requirements but also of environmental protection constraints. Eventually there should be:

(i) an energy balance for the region;

(ii) an assessment of energy resources and reserves in the region;

(iii) a set of energy and economic indicators;

(iv) an energy model for the region (with different policy options);

(v) an energy plan for the region specifying how the government can use policy instruments (prices, duties, taxes, financing, loans, investment, etc.) to achieve the region's development objectives.

In China, the methods devised were used for the energy planning of a rural province and of an industrial centre. In both cases, control of the energy input helped to meet the energy requirements of these regions with very encouraging results (a 20% reduction in energy consumption with an increase of approximately 20% in production). The same methods are now being used for energy planning in the autonomous region of Xinjiang (equal in area to the Community!).

Progress has been made in other, more specific areas as a result of training schemes. Energy planning experts trained at the centres of Tianjin and Nanking are implementing energy planning and control projects: one factory has managed to reduce its use of fuel by 20%, and another by 25%, saving tens of thousands of yuan a year.[1] In one town all the textile factories rationalized their use of energy: in a year energy consumption was cut by 20% despite a substantial increase in production.

Different results were obtained in the Asean countries (where the cooperation scheme has been operating since 1982) and in other Latin American countries.

How much does it cost?

The cooperation programme began in 1980 with an allocation of 650 000 ECU: now that the programme is fully operational this figure has risen to 5 MECU a year. Some 80% of this figure comes out of the appropriations for the Directorate-General for Energy (budget heading 706).

[1] 1 USD = 18.27 yuans. This is because projects were begun later (not until 1983 or 1984 in the Arab world) or because of local difficulties (in Africa).

To date some 21 MECU have been committed for the scheme (1980-85). This total can be further broken down to show the outlays on the different parts of the scheme.

An amount of 6.3 MECU, 30% of the resources invested in the scheme, has been earmarked for energy analysis, studies and methods. Although very important in the early 1980s (3 MECU was spent on devising the methodology alone), this aspect of the cooperation budget absorbs less resources today.

The commitment of expenditure for the use of these energy planning tools (principally for drawing up energy plans) is increasing, however: 9.2 MECU for the period 1980-85, the chief element in cooperation.

Training represents some 19% of annual financial requirements and between 1980 and 1985 was allocated a total of 3.9 MECU. Comparatively little was allocated to the other sectors:
1.1 MECU for seminars and conferences and 0.5 MECU for hosting foreign delegations and for exchanges of experts.

Who is involved?

One original feature of the energy planning cooperation scheme is the extensive employment of experts from Third World countries. (See graph).

Of the 167 experts used by the Community in 1984 (half of them working fulltime) nearly 80% were from developing countries. This is by no means surprising since one of the specific and original aims of Community action is to support local communities and to use existing institutes in the Third World countries, partly because they have their own qualified experts who know more about their own countries than European experts (even apart from language problems).

A third of the experts recruited are from institutes in Third World countries which form part of the EEC network (the IDEE in San Carlos de Bariloche in Argentina, the COPPE at the Federal University of Rio de Janeiro in Brazil, the INET at the Qinghua University of Peking in China and the AIT at Bangkok in Thailand).

Another third come from other institutes in Third World countries, many of them from training centres in China. The other third are Europeans recruited from European institutes (the IEJE at Grenoble and the SPRU at the University of Sussex) or from consultancies.

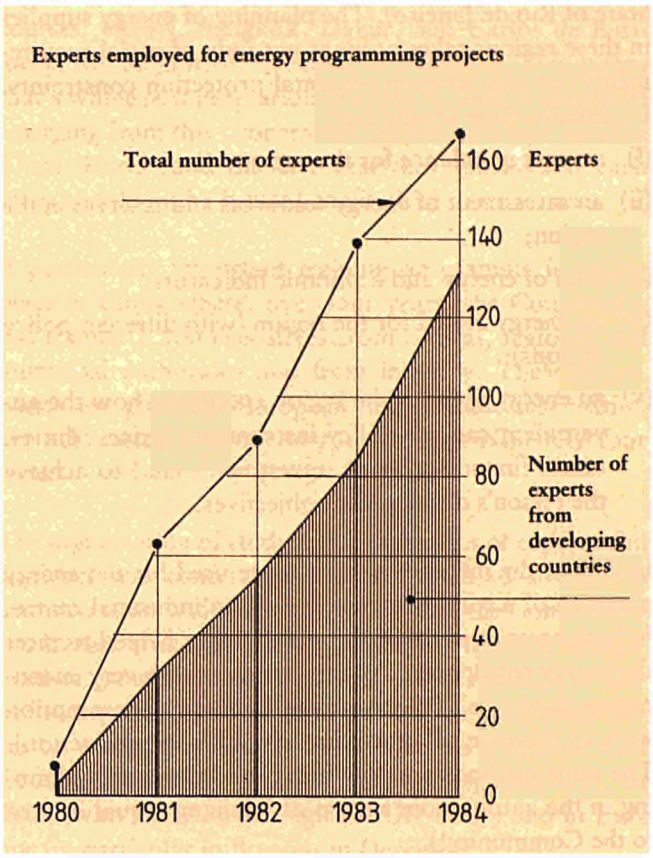
Since beginning this cooperation scheme the Community has used the services of some 500 experts.

Where does the money go?

Because of its very nature, this energy cooperation scheme is directed principally towards those countries which are relatively developed economically; most of these are in Latin America and Asia. (See map).

The table clearly shows that in 1980-85 most of the aid went to Latin America (45%) and China (20%). Most of the aid allocated in Europe went to Turkey to finance a project to produce an energy balance and an energy plan. Other projects in Europe include evaluation studies, the organization of seminars and exchanges of experts.

To sum up, the Community energy planning cooperation scheme is expanding day by day, learning from past experience and responding to emerging needs. This is proof of the vitality of the scheme and the interest shown in it. *Energy in Europe* will continue to monitor its progress.



Energy markets in the European Community – short-term outlook 1985/86

The Community's energy consumption could increase by about 3.0% this year and by about 2.5% in 1986. The main factors pointing towards inceased energy demand are the expected growth in the Community's GDP (2.3% in 1985 and 2.5% in 1986), higher industrial output, stronger consumer expenditure and generally weaker energy prices. The base case outlined below **assumes** *that the Community will be paying an average of USD 25 (fob) per barrel for its crude oil from March 1986 onwards. This fall in the dollar price of oil would be compounded for the Community by an assumed 13% revaluation of the ECU against the dollar in 1986. Under these circumstances, the Community would experience the first substantial fall in energy prices since the 1979/80 oil shock, with crude oil prices falling by 20% next year in real ECU terms. There is little past experience from which to judge the reaction of the markets to such a price decline, so this factor introduces an extra degree of uncertainty in the present forecasts.*

In terms of the different fuels, **oil** *demand will fall by around 2-3% in 1985, following the end of the UK miners' dispute, and could then remain fairly constant in 1986 on the base case assumptions.* **Gas** *demand and* **electricity** *demand should each increase by 3-4% annually over the two years and* **nuclear** *power will continue to surge, covering around 14% of the Community's total energy needs in 1986. Following the ending of the UK dispute,* **coal** *demand has predictably picked up in 1985, but the outlook for 1986 is less optimistic as nuclear energy continues to replace coal in several key countries in the electricity sector.*

Comparison with previous forecasts

Energy consumption

(Mtoe)

		Energy in Europe			
		No O (Dec. '84)	No 1 (Apr. '85)	No 2 Aug. '85)	No 3 (Dec. '85)
Total primary energy consumption	1985	940.0	936.4	936.7	941.1
	1986	:	:	964.0	965.1
Oil	1985	426.5	421.7	415.6	418.9
	1986	:	:	419.5	422.6
Gas	1985	177.0	183.6	182.3	180.8
	1986	:	:	187.7	186.5
Nuclear	1985	117.4	116.4	120.1	113.4
	1986	:	:	140.0	131.9
Coal	1985	205.3	201.0	204.5	213.8
	1986	:	:	202.4	209.6
Electricity demand (TWH)	1985	1 357.0	1 338.0	1 346.5	1 347.5
	1986	:	:	1 380.8	1 385.9

: = not included.

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

Whilst the forecast for overall Community energy demand for both 1985 and 1986 has scarcely been modified from issue No 0 to issue No 3, there have been changes at the individual fuel level.

— **Oil demand** has tended to be overestimated, in particular residual fuel oil consumption. As can be seen between *Energy in Europe* No 2 and No 3, a further slight increase in oil demand is foreseen. But this must be seen in the context of a more optimistic macroeconomic and oil price scenario in the latest forecast.

— The reason why the forecast 1985 and 1986 nuclear production has fallen in *Energy in Europe* No 3 is that the conversion factor from nuclear net production to nuclear heat generation changed in 1984 — and this new factor was used in the latest forecast.

— As for coal, the latest forecast shows that consumption is expected to be higher than in previous forecasts published in editions 0-2. The main reason for this is that the United Kingdom's coal production recovered more quickly than expected following the end of the UK miners' strike in March 1985.

* * *

The remainder of this article presents the Commission's Directorate-General for Energy's (DG XVII) latest Community energy forecast covering the period 1985 and 1986. The results are mainly derived from a short-term forecast model — code named STEM — that has been jointly developed by DGs XVII and XII (the Directorate-General for Science, Research and Development). A ser-

ies of key assumptions underlie all the results. Some alternative scenarios are, however, presented to test the sensitivity of the main results to different assumptions.

Forecasting assumptions

(i) Macroeconomic climate

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

The expansion of economic activity in the Community has been underway for three years. Community GDP is forecast to grow by 2.3% in 1985 and 2.5% in 1986 (0.2% higher than in the previous forecast).

Amongst the principal aggregates of demand, the major stimulus will come from growing consumers expenditure (2.7% in 1986, compared to 1.7% in 1985). Equipment investment is also expected to remain buoyant through the forecast period, whilst construction activity, which declined in 1985, is expected to pick up slightly in 1986. The index of industrial production is expected to increase by 3.4% in 1985 and 3.2% in 1986. The table below summarize the macroeconomic forecasts.

The Community's consumer price inflation rate is expected to fall to 4% in 1986 from 5.2% in 1985.

Energy imports are an extremely important item in the Community's economy — representing in value about 30% of the Community's total imports. Since most energy is priced in US dollars, the local cost of these imports is dependent on the ECU/USD exchange rate. The projection for 1986 is for a 13% revaluation of the ECU against the dollar. This would have the effect of sharpening the projected fall in energy prices.

Community demand components (at 1980 prices and 1980 PPS)

	% change on previous years		
	1984	1985	1986
Private consumption	1.0	1.7	2.7
Government consumption	1.2	1.2	1.1
Gross-fixed capital formation	2.3	1.6	3.7
of which: construction	1.1	−4.1	1.6
equipment	3.6	7.8	5.6
Domestic demand	1.8	1.8	2.7
Gross domestic product	2.2	2.3	2.5

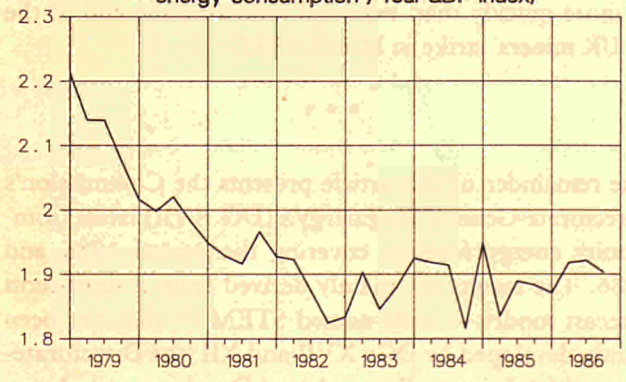
Contribution to change in GDP

	1984	1985	1986
Domestic demand (excluding stock changes)	1.3	1.6	2.5
Change in stocks	0.5	0.2	0.1
Balance of trade in goods and services	0.2	0.4	−0.2

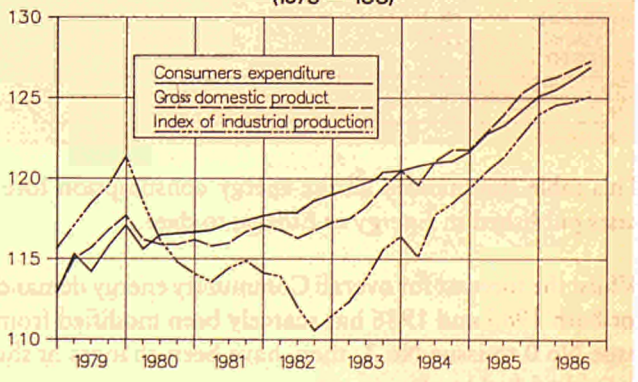
(ii) Community crude oil production

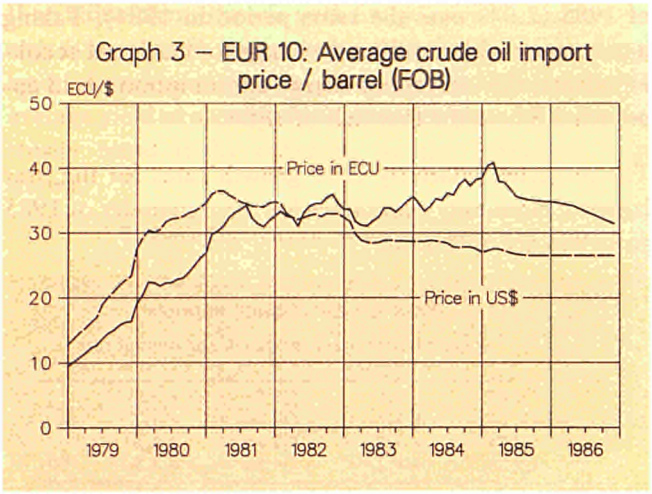
This is forecast, exogenously, to be around 149 Mtoe (3 mbd) in 1986 — close to the 1985 level. UK North Sea oil (including condensate) production is expected to reach its peak levels in this two-year period.

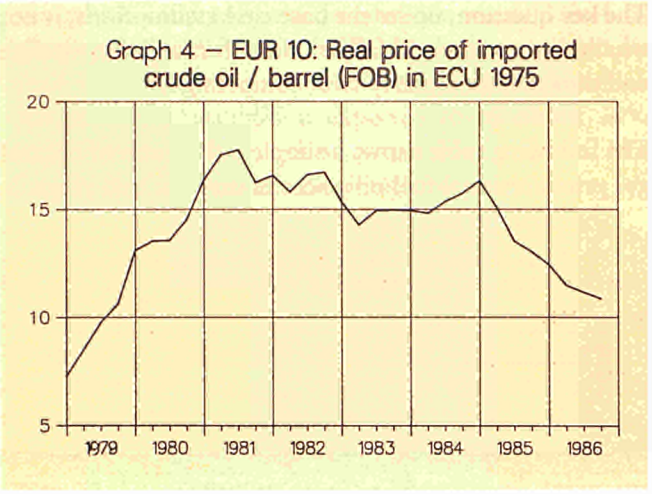
Graph 1 – EUR 10: Quarterly energy ratio trend (volume of seasonally adjusted inland energy consumption / real GDP index)



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







(iii) Nuclear capacity

The recent surge of newly-commissioned nuclear power stations in France, Germany and Belgium is having a profound effect on the Community's energy economy. Average net nuclear capacity in the Community was about 62 gigawatts (GW) in 1985 and is expected to increase to 74 GW in 1986. By the end of 1986, the Community's nuclear capacity could reach 79 GW.

(iv) Temperature

Average weighted degree days in the Community were 20% higher in the first quarter of 1985, compared to the corresponding period of 1984, increasing the consumption of natural gas, electricity and domestic heating oils. Degree days in the fourth quarter of 1985 will also be colder than Q4 84. For the remainder of the forecast period average degree days over the past eight years have been assumed.

Energy prices

(i) Crude oil prices

The base case assumption for this forecast is that the Community's average cost of crude oil imports (fob) will decline to USD 25/barrel in March 1986 and remain at this level until the end of the year (see graphs 3 and 4).

The implications for the Community are important. In 1986, with the exchange rate and inflation rate assumptions outlined earlier, the fall in real (deflated) crude oil prices in ECU terms would amount to a 20% decline in just one year. The Community's net oil import bill could fall by over USD 5 000 million.

(ii) Oil products prices

Since the end of the first quarter of 1985, the Rotterdam spot quotations for residual fuel oil have fallen by USD 70/tonne. Motor gasoline and gas oil prices have however maintained their levels in 1985 because of low stocks, and reasonably firm transport demand. Residual fuel oil prices fell immediately after the end of the UK coal industry dispute.

Oil product prices are expected to fall in 1986, but the rates of decrease will be less than that assumed for crude oil prices, except for heavy fuel oil.

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

	1986/1985 %
Mogas (all taxes included)	– 5
Domestic heating oil (all taxes included)	– 6
Transport diesel oil (all taxes included)	– 9
Residual fuel oil (VAT excluded)	– 25

(iii) Natural gas prices

The fall in residual fuel oil prices is already beginning to drive down industrial natural gas prices and this trend would be accentuated by the projected fall in crude oil prices in 1986. Already the European market has seen a substantial number of gas supply contracts renegotiated.

The key question, under the base case assumptions, is not whether gas prices will fall, but how fast will they decline and thus maintain parity with competing fuels.

The following table shows a simple index ratio of natural gas prices:residual fuel oil prices in the past two years.

Ratio of imported natural gas: residual fuel oil prices (excluding VAT)

(Q 1 1984 = 100)

	1983	1984	1985
Q1	112	100	95
Q2	115	104	114
Q3	108	108	121 (forecast)
Q4	105	100	134 (forecast)

As can be seen, the competitive position of gas is currently unfavourable. But assuming that the index-linking mechanism with a basket of oil product prices still holds into 1986 and on the base assumptions, overall natural gas prices could fall by between 10 and 20% in real terms in 1986 — perhaps the largest downward movement ever experienced in such a timescale.

(iv) Coal prices

Along with other energy prices, coal prices under the base case scenario are expected to weaken in 1986. Average annual falls of up to 10% in real ECU terms are possible for both imported coking coal and steam coal. Low coal demand in the Community and plentiful supply could help to sustain this price path.

Overall energy

The Community's energy consumption increased by 2.8% in 1984, and continued increasing in the first half of 1985 (2.0% over the same period in 1984). Taking into account additional stock changes of hard coal at coking plants, the increase in energy consumption could approach 2.8% in the first half of 1986.

The projected quarterly GDP growth rates for the four largest Community economies for the remainder of 1985 and 1986 are as follows:

EUR-4: GDP at constant prices

% change from previous quarter at annual rate

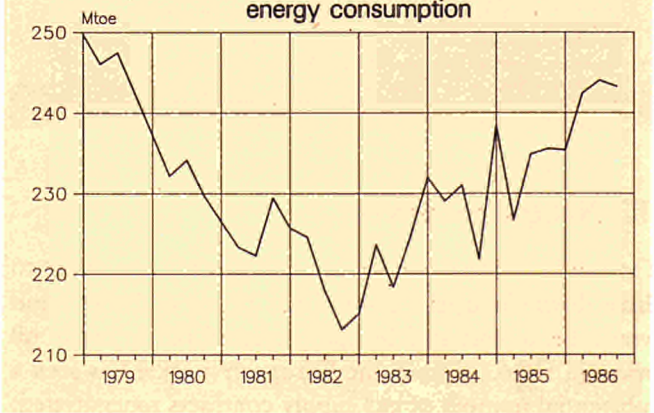
Q1 85	– 0.1	Q1 86	+ 2.2
Q2 85	+ 3.7	Q2 86	+ 1.3
Q3 85	+ 3.6	Q3 86	+ 1.6
Q4 85	+ 4.2	Q4 86	+ 1.5

This suggests strong economic growth in the last half of 1985, with attendant consequences for energy demand. Furthermore, the last quarter of 1984 was particularly mild, depressing energy consumption. **Overall therefore, Community energy consumption is forecast to increase by 3.0% in 1985.**

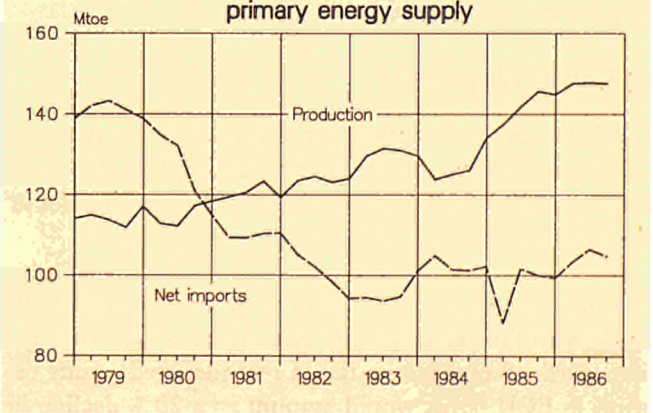
The prospect for 1986 is for a further increase in Community energy consumption of around 2.5%. The main driving variables will be GDP growth, 3% industrial expansion and the assumed large fall in oil prices.

The latest trends in the Community's **energy intensity** (primary energy consumption divided by GDP) are difficult to interpret. The accompanying graph shows that energy intensity appears to have flattened since the end of 1982 and recently even slightly increased. This is partly due to increased nuclear electricity production and the upturn in some of the Community's energy-intensive industries.

Graph 5 – EUR 10: Seasonally adjusted quarterly energy consumption



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



If an adjustment is made in the way in which nuclear energy is measured, ie: assuming that the thermal equivalence of nuclear electricity production is the same as the average yield of a conventional power plant, then the intensity trend looks different, as the following table shows:

EUR-10: Energy intensity trends (1982 = 100)

	Primary energy intensity			
	SOEC methodology[1]	Nuclear adjusted methodology	Oil intensity	Final energy demand intensity[2]
1982	100.0	100.0	100.0	100.0
1983	98.7	98.6	96.4	99.3
1984	100.0	99.6	97.0	99.4
1985 (forecast)	100.6	99.9	92.7	:
1986 (forecast)	100.8	99.9	91.3	:

[1] Statistical Office of the European Communities' methodology used by the Community. See SOEC document 'Principles and Methods of Energy Balances — 1982'.
[2] Including non-energy consumption.

However, the Community's oil intensity (primary oil consumption/GDP) has fallen sharply since 1982. Oil intensity did level in 1984 due to the extra oil consumption in the United Kingdom resulting from the mining dispute, but oil intensity is expected to have decreased in 1985 very sharply, and to continue decreasing in 1986. Final energy demand intensity (final energy and non-energy demand/GDP) decreased in 1983, but flattened out in 1984.

A clearer indication of trends overall can only be established by a more detailed sectoral analysis.

Oil

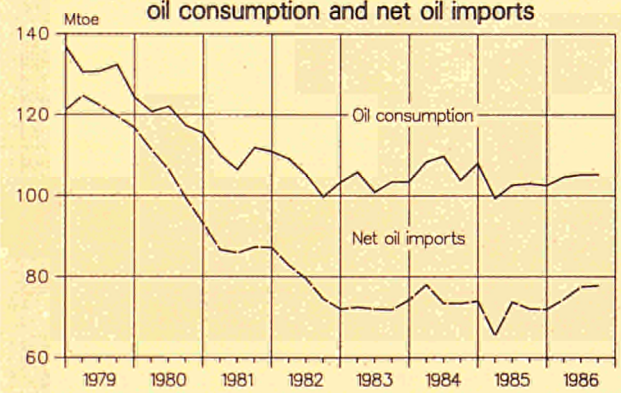
Oil demand is expected to fall by around 2.3% in 1985, following the ending of the United Kingdom mining dispute which inflated the Community's residual fuel oil consumption in 1984. The fall in the Community's oil demand is concentrated at the heavy end of the barrel — with fuel oil consumption expected to be about 20% lower than in 1984. Fuel oil prices have reflected this sharp decline in demand. Previous forecasts in *Energy in Europe* have tended to overestimate fuel oil demand.

For the lighter fractions, motor gasoline demand was slightly lower at the mid-year point, but some pick-up in demand over the forecast period is possible if consumers' expenditure increases as forecast and pump prices edge down as the dollar weakens. Gas/diesel oil and jet fuel demand remain the brightest prospects among the oil products. Low consumer stocks of heating oil, following the harsh weather in the first quarter and increased transport demand, suggest strong growth for this product in 1985.

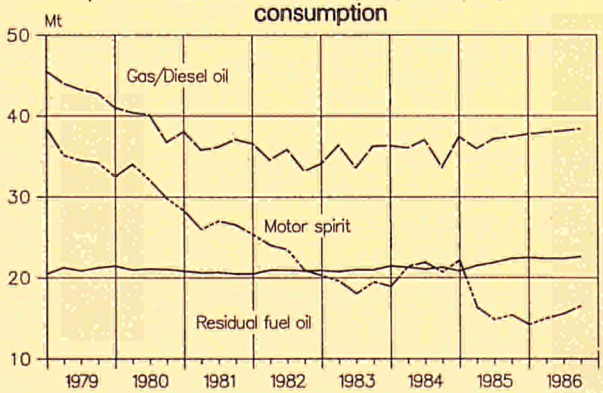
The prospects for oil in 1986 are particularly difficult to assess. If crude oil prices weaken, as the base case assumes, and the dollar weakens against the basket of European currencies, real crude oil import prices could be much lower than in 1985. Under this scenario, the next uncertainty is whether governments would increase taxes and duties on oil products to offset the fall in crude oil prices and maintain consumer price levels. Other important variables are the expected increases in consumers' expenditure, industrial output and GDP and the relative prices of fuel oil and natural gas. Taking all those factors into account, oil demand in 1986 is forecast to be close to the 1985 level, with the risks weighted more towards a fall in demand than an increase.

Two interesting factors on the supply side are whether Community oil production will in fact peak in the 1985-86 period and the behaviour of oil stocks. Commercially-

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



Graph 8 – EUR 10: Seasonally adjusted oil products consumption



available Community oil stocks are at low levels, and could remain low, given the price uncertainty in the market and the low level of oil demand. This could help to sustain spot product prices. As for the Community's crude oil suppliers, the following table shows that there have been some changes in the first half of 1985.

EUR-10: Total crude oil imports from third countries

(1 000 t)

	1st half-year 1983	1st half-year 1984	1st half-year 1985	% change 1985/84
Total	134 551	145 434	125 988	– 13.4
of which:				
Western hemisphere	10 634	9 721	10 457	+ 7.6
of which: Mexico	4 415	5 040	5 703	+ 13.1
Venezuela	5 744	4 342	4 182	– 3.7
Africa	43 494	52 438	55 219	+ 5.3
of which: Nigeria	12 429	17 908	19 384	+ 8.2
Libya	17 251	16 873	15 866	– 6.0
Algeria	6 867	7 256	7 877	+ 8.6
Egypt	4 117	5 877	6 138	+ 4.4
Near and Middle East	55 603	55 462	38 385	– 30.8
of which: Saudi Arabia	25 480	20 134	10 412	– 48.3
Iran	11 524	15 245	8 408	– 44.8
Iraq	6 266	6 764	8 262	+ 22.2
Kuwait	3 367	4 595	5 085	+ 10.7
UAE	5 117	5 453	3 237	– 40.6
Eastern Europe	13 355	17 375	9 041	– 48.0
of which: USSR	11 540	17 132	8 921	– 47.9
Other third party countries	11 465	10 438	12 886	+ 23.5
of which: Norway	8 256	8 079	10 217	+ 26.5

EUR-10: supplies from the United Kingdom (1 000 t)

19 066	24 093	30 100	+ 24.9

As the table shows, there have been some large movements, notably falls in imports from Saudi Arabia, Iran and the USSR. Supplies from the United Kingdom and Nigeria increased strongly. **The Community's petroleum product imports from third countries increased** by about 16% in the first half of 1985. The main change being a substantial increase in imports from OPEC Member States, partially compensating for the fall in crude oil exports to the Community.

Natural gas

Natural gas consumption increased by 2.6% in the first half of 1985 — a slower rate than the 5.5% expansion in 1984. Recent quarter-on-quarter changes in the Community's natural gas market have been volatile.

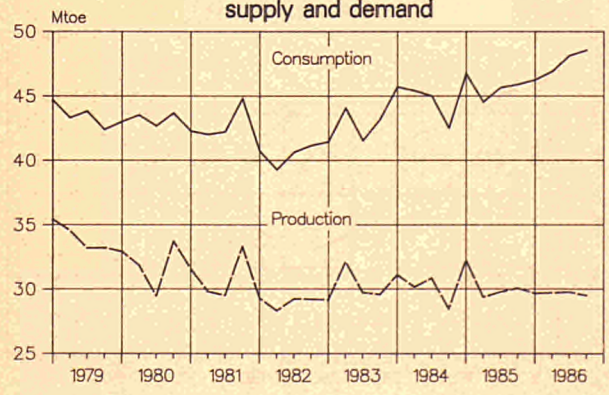
% changes over same quarter of previous year

Q1 84	+ 10.1
Q2 84	+ 6.1
Q3 84	+ 13.4
Q4 84	– 1.3
Q1 85	+ 7.4
Q2 85	— 5.4

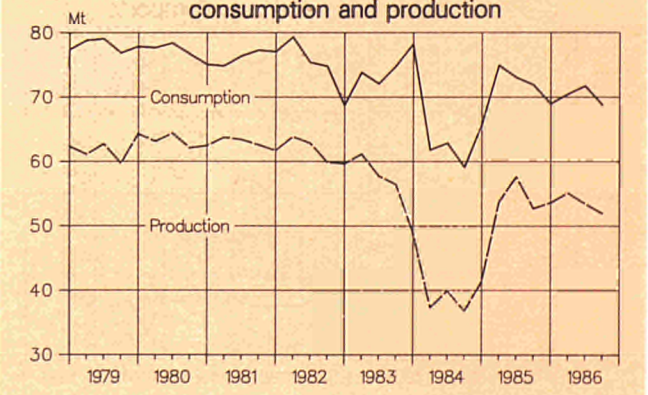
The strong growth in the early quarters of 1984 was mainly due to a revival in demand from the energy-intensive industries, whilst the growth in Q1 85 was largely weather related. In Q2 85, there was a sharp fall in natural gas consumption which is possibly explained by a slowdown in the big gas-consuming industries (particularly chemicals), milder-than-average weather and perhaps a less favourable relative price *vis-à-vis* fuel oil. Less gas was also burnt in Community power stations.

The 1985 forecast is for 3-4% growth in overall gas demand. Colder weather in the last quarter of 1985, plus the continuation of 3% industrial production growth, point towards such an outcome.

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



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



In 1986, under the base case assumptions, natural gas prices should fall considerably. Indeed, there are already signs that this is happening. Natural gas contract formulae are still largely indexed on a basket of oil prices with a lag of three to six months. The very sharp fall in fuel oil prices (see graph) will work through into the gas markets in 1986. (Those gas contracts with a large 'gas-oil' component in them, however, will fall by less, since gasoil prices have remained firm in 1985.) Coupled with industrial output growth, these factors will help to increase demand. Milder weather is assumed for Q1 86 which will act in the opposite direction. The maximum growth rate possible in 1986 would be of the order of 3%.

Electricity

The Community's electricity consumption is forecast to increase by around 4% in 1985, the second successive year of strong growth. The prospects for 1986 are for a further 3% expansion. Electricity consumption is still strongly correlated to the economic development of the Community.

The following table shows how the Community's electricity demand correlates with a constructed electricity 'income index', calculated by weighting the Community's industrial production, GDP and consumers expenditure indices by the structure of the Community's electricity consumption.

The quarterly electricity consumption changes for the remainder of 1985 and 1986 are forecast as follows:

On the supply side, the surge in newly-commissioned nuclear plant is continuing to displace conventional thermal power. In the first half of 1985, electricity consumption increased by 4%, nuclear electricity production by 22%, and conventionally-produced electricity fell by 4%. This important development will continue as the Community's nuclear capacity increases. In 1986, nuclear could cover about 35% of the Community's electricity production, 4% more than in 1985. The potential for an expansion in coal-based electricity therefore appears constrained in the short term. By the end of 1986, the Community's nuclear capacity could reach 79 GW.

EUR-10

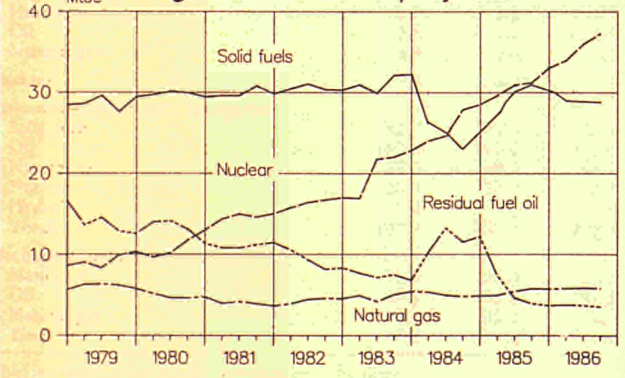
	Electricity growth rates	Weighted electricity 'income index'
Q1 84	+ 6.7	+ 5.8
Q2 84	+ 3.6	+ 4.2
Q3 84	+ 4.9	+ 4.8
Q4 84	+ 0.9 (mild weather)	+ 2.8
Q1 85	+ 4.4 (harsh weather)	+ 1.7
Q2 85	+ 3.4	+ 3.4

Q3 84	+ 3.4
Q4 85	+ 6.5
Q1 86	+ 1.6
Q2 86	+ 4.2
Q3 86	+ 3.4
Q4 86	+ 3.1

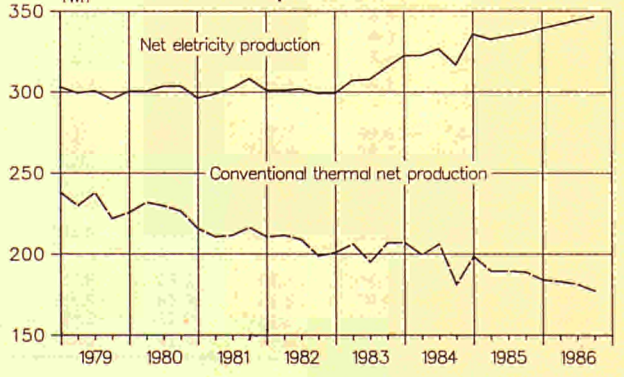
Coal

In the 1984-85 period, there have been abnormal trends in the Community's coal market. Because of the United Kingdom's mining dispute, solid fuel demand fell by 5% in 1984. The ending of the dispute at the end of the first quarter of 1985 has improved the prospects for coal and consumption in 1985 could be 5-6% higher than in the previous year. The outlook for 1986 is rather flat, with coal being constrained in the power generation sector by

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



Graph 12 – EUR 10: Seasonally adjusted eletricity production



the onset of new nuclear capacity. Furthermore, activity in the steel industry is not expected to increase by very much, thereby limiting coke production.

On the supply side, Community hard coal production (including recovered products) could reach about 207 Mt in 1985 and about 222 Mt in 1986. Destocking of coal at collieries in 1985 will be substantial (mainly in the UK), but almost entirely offset by a stock rebuild at the UK's power stations. But this stockbuild at power stations is unlikely to continue at the same rate in 1986. The Community's net coal import requirements could fall in 1986.

Alternative scenarios

(i) No ECU revaluation against the US dollar in 1986

Under this scenario the average value of the ECU against the US dollar in 1986 was kept at the same annual rate as in 1985. In order to obtain this result, the value of the ECU is projected to weaken slowly against the dollar throughout 1986. In this scenario, the base case assumption for crude oil prices is retained, namely a USD 25/barrel from March 1986 onwards.

The main effect of this simulation is that all Community energy prices will be more expensive in 1986 than under the base case — thereby depressing energy consumption, as the following table shows:

	% difference from base case in 1986
Total energy consumption	**– 0.4%**
Oil	– 1.0%
Coal	+ 0.6%
Natural gas	– 0.2%

(ii) A USD 20 oil price scenario in 1986

In this alternative, the Community's average cost of imported crude oil (fob) is assumed to fall to USD 20 in April 1986 and to remain at this level throughout the remainder of 1986. This is a very substantial price fall and would mean in real terms that the cost of crude oil imported into the Community would fall by 35% in 1986 alone. (This scenario continues to assume 13% ECU revaluation against the dollar.)

Under this alternative, Community energy consumption would be higher than in the base case. Overall primary energy consumption would increase by 3.3% — about 0.8% more than in the base case.

	% difference from base case in 1986
Overall energy consumption	**+ 0.8%**
Oil	+ 1.8%
Natural gas	+ 0.3%
Coal	– 0.7%

Table 1 — Primary energy balance for the European Community

(Mtoe)

	1979	1980	1981	1982	1983	1984	1985 [2]	1986 [2]
Primary production								
Solid fuels	181.6	186.5	186.8	183.8	175.7	132.0	158.2	166.8
Oil	89.5	91.5	101.7	115.1	131.4	143.4	146.2	149.1
Natural gas	136.8	129.4	125.5	116.1	119.9	120.4	123.3	121.1
Nuclear	34.6	40.5	54.7	61.5	74.5	95.6	113.4	131.9
Hydro	12.4	12.6	12.8	12.6	12.5	12.2	12.8	12.8
Total	454.9	460.6	481.5	489.1	514.0	503.5	553.9	581.8
Net imports								
Hard coal	39.6	48.9	44.2	46.2	38.3	51.9	53.3	47.0
Oil	488.2	435.7	354.0	326.5	292.2	300.3	284.5	302.9
Natural gas	37.4	43.5	46.2	45.8	50.1	57.9	60.5	67.1
Electricity	1.4	1.2	1.9	1.7	1.9	1.3	1.3	1.7
Total	566.6	529.3	446.2	420.2	382.5	411.4	399.6	418.6
Change in stocks								
Hard coal/coke	- 10.8	11.0	8.9	9.7	2.7	- 16.5	- 2.2	4.2
Oil	16.0	15.6	- 17.2	- 10.3	- 15.3	- 5.8	- 12.2	5.0
Natural gas	1.4	3.9	6.7	3.4	4.9	2.8	2.9	1.8
Bunkers	26.6	23.8	25.9	24.2	22.3	21.2	24.0	24.4
Estimated gross inland consumption								
Solid fuels	232.0	224.4	222.0	220.4	211.3	200.4	213.8	209.6
Oil	535.1	487.8	447.6	427.7	416.6	428.3	418.9	422.6
Natural gas	172.8	169.0	164.9	158.5	165.1	175.4	180.8	186.5
Nuclear	34.6	40.5	54.7	61.5	74.5	95.6	113.4	131.9
Hydro	12.4	12.6	12.8	12.6	12.5	12.2	12.8	12.8
Total	988.3	935.6	904.0	882.3	881.9	913.2	941.1	965.1
Net imports as % of consumption [1]								
Hard coal	17.1	21.8	19.9	21.0	18.1	25.9	24.9	22.4
Oil	86.9	85.2	74.7	72.3	66.6	66.8	64.2	67.8
Natural gas	21.6	25.7	28.0	28.9	30.3	33.0	33.4	36.0
Total	55.8	55.2	48.0	46.3	42.3	44.0	41.4	42.3

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

Table 2 — Primary energy balance for the European Community

(Mtoe)

	1984		1985				1986 [2]			
	III	IV	I	II [2]	III [2]	IV [2]	I	II	III	IV
Primary production										
Solid fuels	30.0	32.2	35.4	39.0	40.2	43.6	44.0	41.0	38.3	43.5
Oil	34.8	37.8	37.7	35.8	34.8	38.0	38.7	36.0	36.5	37.8
Natural gas	19.4	32.8	46.1	25.0	18.3	33.8	41.7	25.2	19.2	35.0
Nuclear	20.9	27.9	31.1	25.9	25.6	30.8	35.5	30.0	29.8	36.5
Hydro	2.8	3.0	3.0	3.7	3.0	3.0	3.1	3.6	3.1	3.1
Total	108.0	133.7	153.2	129.5	121.9	149.3	163.1	135.9	126.9	156.0
Net imports										
Hard coal	13.6	14.3	13.0	13.8	13.0	13.5	10.5	12.9	12.7	10.9
Oil	71.4	77.1	75.9	63.3	68.5	76.7	75.9	74.2	72.9	79.9
Natural gas	11.6	15.3	16.1	14.6	12.7	17.2	18.3	15.9	13.5	19.4
Electricity	0.5	0.4	0.2	0.4	0.6	0.2	0.2	0.6	0.7	0.3
Total	97.2	107.0	105.1	92.1	94.8	107.7	104.9	103.5	99.7	110.4
Change in stocks										
Hard coal/coke	1.0	- 3.2	- 6.9	0.7	5.1	- 1.1	- 2.7	4.3	4.4	- 1.7
Oil	- 2.8	- 2.3	- 6.9	- 1.0	- 1.6	- 2.7	- 2.4	4.3	3.9	- 0.7
Natural gas	3.8	- 1.3	- 4.5	4.8	4.1	- 1.6	- 4.1	3.4	4.4	- 1.9
Bunkers	5.5	5.2	5.1	6.1	6.4	6.4	6.1	6.3	6.1	5.9
Estimated gross inland consumption										
Solid fuels	42.7	49.7	55.3	52.1	48.1	58.3	57.3	49.6	46.5	56.1
Oil	103.6	112.0	115.3	94.0	98.5	111.1	110.9	99.7	99.4	112.6
Natural gas	27.2	49.4	66.7	34.7	26.8	52.6	64.1	37.8	28.3	56.3
Nuclear	20.9	27.9	31.1	25.9	25.6	30.8	35.5	30.0	29.8	36.5
Hydro	2.8	3.0	3.0	3.7	3.0	3.0	3.1	3.6	3.1	3.1
Total	197.7	242.3	271.4	210.9	202.6	256.1	271.2	221.2	207.8	264.9
Net imports as % of consumption [1]										
Hard coal	31.9	28.8	23.5	26.5	27.0	23.2	18.3	26.0	27.3	19.4
Oil	65.5	65.8	63.0	63.2	65.3	65.3	64.8	70.0	69.1	67.5
Natural gas	42.7	31.0	24.1	41.9	47.2	32.7	28.6	42.2	47.7	34.4
Total	47.8	43.2	38.0	42.4	45.3	41.0	37.8	45.5	46.6	40.8

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

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

	1979	1980	1981	1982	1983	1984	1985 [3]	1986 [3]
1. Oil (Mt)								
Primary production	88.6	90.6	100.7	113.9	130.1	142.0	144.8	147.6
Change in stocks [1]	16.0	15.6	- 17.8	- 10.2	- 15.2	- 5.8	- 12.2	5.0
Net imports [1]	485.6	433.5	352.4	325.1	291.0	299.1	283.4	301.7
Bunkers	27.5	24.5	26.8	25.0	23.0	21.9	24.8	25.2
Apparent consumption	**530.8**	**484.0**	444.1	424.3	413.3	424.9	415.6	419.2
Inland deliveries:								
Motor spirit	83.9	84.5	82.6	83.3	83.7	85.1	85.2	88.9
Gas/diesel oil	175.7	158.6	147.5	140.3	140.4	142.5	150.8	151.4
Heavy fuel oil	142.8	128.0	108.1	93.6	77.8	82.5	70.1	65.2
Other production	96.4	85.0	80.4	80.5	85.4	87.0	87.0	89.4
Total	498.8	456.2	418.6	397.8	**387.3**	**397.1**	**393.1**	394.9
Power stations:								
Consumption	58.4	53.9	44.7	40.0	31.2	41.2	31.6	20.5
Change in stocks	1.7	- 0.4	0.6	- 1.4	- 2.7	0.1	- 0.5	- 1.2
2. Natural gas (Mtoe)								
Primary production	136.8	129.4	125.5	116.1	119.9	120.4	123.1	121.1
Imports[2]	37.4	43.5	46.2	45.8	50.1	57.9	60.5	67.1
Apparent consumption	172.8	169.0	164.9	158.5	165.1	175.4	180.8	186.5
of which:								
in power stations	24.4	20.3	16.9	16.6	18.8	20.6	18.6	19.0

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

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

	1979	1980	1981	1982	1983	1984	1985 [1]	1986 [1]
1. Hard coal (Mt)								
Primary production	245.1	253.6	252.2	248.4	235.2	162.2	206.7	221.7
Change in stocks								
Collieries	- 5.6	10.7	8.9	4.2	0.5	- 8.3	- 10.2	- 2.1
Power plants	- 2.3	6.7	6.2	7.9	2.5	- 13.7	11.4	6.2
Net imports	58.4	74.2	66.5	70.0	57.0	78.9	82.4	71.5
Apparent consumption	311.4	310.3	303.6	306.2	289.2	263.1	287.9	289.1
Deliveries to:								
Power plants	166.4	179.2	176.5	184.0	175.8	131.9	170.8	167.6
Coking plants	87.6	88.4	85.2	80.1	69.7	69.8	75.4	76.1
All industries	22.4	22.7	24.0	24.5	25.4	24.8	28.1	28.3
Households	19.9	18.0	16.0	16.5	15.9	13.1	16.0	15.4
Total	296.3	308.4	301.7	305.2	286.8	239.7	290.3	287.4
2. Hard coke (Mt)								
Coking plants								
Production	67.3	66.6	64.2	60.2	53.5	52.8	56.2	55.8
Change in stocks	- 8.9	0.8	- 0.1	3.8	1.4	- 5.3	- 3.6	3.0
Deliveries to the iron and steel industry	58.4	54.3	52.6	46.3	41.8	48.5	48.5	48.6
3. Lignite								
Production (Mt)	158.2	157.0	162.4	159.3	158.7	162.0	158.1	155.7
Consumption in power stations (Mtoe)	25.9	26.2	27.6	26.6	27.3	27.0	26.8	26.0

[1] Forecast.

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

	1979	1980	1981	1982	1983	1984	1985 [2]	1986 [2]
Electrical power (TWh)								
Total generation	1 267.5	1 277.6	1 274.6	1 271.4	1 299.8	1 360.5	1 424.1	1 457.8
Total net production	1 198.8	1 208.7	1 206.1	1 202.9	1 229.1	1 286.6	1 345.8	1 376.9
of which:								
Hydroelectrical	143.9	146.1	149.1	146.1	144.8	141.5	149.0	148.9
Nuclear	127.6	149.4	201.7	226.9	275.0	352.8	418.3	486.9
Conventional thermal	927.3	913.1	855.2	830.0	809.3	792.3	778.5	741.1
Gross inland consumption	1 283.9	1 291.7	1 296.8	1 290.8	1 321.6	1 375.1	1 439.7	1 477.7
Available for internal market	1 206.5	1 213.9	1 217.4	1 212.0	1 237.9	1 287.3	1 347.5	1 385.9
Input to thermal power stations[1] (Mtoe)								
Hard coal	88.1	92.9	91.9	94.7	96.1	80.8	89.4	93.4
Lignite	25.9	26.2	27.6	26.6	27.3	27.0	26.8	26.0
Petroleum products	56.1	51.7	43.0	38.4	29.9	39.6	30.3	19.6
Natural gas	24.4	20.3	16.9	16.6	18.8	20.6	18.6	19.0
Derived gas	1.7	1.7	1.8	1.5	1.3	1.5	1.4	1.4
Total	197.4	193.7	182.2	178.2	174.0	171.7	167.4	160.3
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.
[2] Forecast.

Community news

Energy Council 11 November 1985

The Council of Energy Ministers, under the chairmanship of Mr Marcel Schelchter, Luxembourg Minister for Energy, met in Brussels on 11 November. The Commission was represented by Energy Commissioner Mr Nic Mosar. **The Council approved the much discussed Directive providing for the addition of substitute fuels to petrol.** This directive provides for the addition of certain products, mainly alcohol and ethers, to petrol. Member States have until 1 January 1988 to implement the necessary domestic measures to give effect to the Directive.

After their agreement in June last on the main political points that needed to be resolved in relation to the new draft regulations to apply to the **Hydrocarbon Technology and Demonstration Projects Scheme**, Ministers concluded their debate on these items. **Subject to Parliament's agreement, the new regulations will enter into force shortly for a period of four years.** Call for tenders for both schemes will open in January.

At their last meeting, Ministers gave a first reading to the proposed **new energy objectives for 1995.** They returned to consider this issue in more detail on 11 November. The Council held a full discussion on some of the key questions relating to these objectives. They agreed that quantified objectives should be adopted and that they should cover such important areas as more efficient use of energy, oil, natural gas, solid fuels, electricity generation and new and renewable energies. **The Ministers instructed Coreper to prepare a draft resolution for their consideration at their next meeting.**

The most detailed debate of the meeting took place on the various items that were included under the rubrique of **solid fuels. The Council agreed on a six months extension to the present regime governing the provision of State aids to the coal industry** (which was due to expire on 31 December 1985) to allow detailed consideration to be given to the Commission proposals for a new regime. **The Council also agreed on the level of tonnage, i.e.: 8.5 Mt, of coking coal eligible for financial assistance in 1986.** No decision was reached however on the proposed social volet for coal whereby it is proposed to transfer funds from the general EC budget to the ECSC budget to alleviate the social problems caused by redundancies in the coal industry. The ministers agreed to set aside time at an early meeting of the Council in 1986 to discuss in detail all aspects of solid fuel policy.

Commissioner Mosar reported to Ministers on the follow-up that had taken place since the IEA Ministerial in July on the question of oil product imports. He has had further discussions with US Secretary for Energy, Mr Herrington, and will be meeting Japanese Minister Murata in December. The Council agreed that developments will need to be carefully monitored over the coming months to ensure that commitments to open markets are being adhered to. The Commission will make further reports to the Council on this matter.

Finally, there was a discussion on a Commission proposal to increase the level of Euratom loans (for nuclear power station construction, etc.). Ministers agreed that from an energy policy viewpoint this would be a worthwhile development. Their views have been sent to their Ecofin colleagues who take the necessary decisions on such items.

The next Energy Council will be held in the early part of 1986 under the Dutch Presidency.

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

The work of the European Parliament's Committee on Energy, Research and Technology was dominated throughout the summer and early autumn by preparations for the 'Europe 2000' events in Strasbourg from 5-11 October (see following article). In addition to organizing the exhibition and symposiums held on that occasion, the Committee drafted seven reports on different aspects of the new technologies and their social and economic impact for parliamentary debate.

* * *

The Commissioner for Energy, Nic Mosar, attended the Committee's meeting in Brussels on 16 October to explain the Commission's approach to extend the current regime of coal State aids for another six months. Following a proposal from its rapporteur, Lambert Croux, the Committee duly approved this interim measure.

* * *

Gordon Adam, Vice-Chairman of the Committee and rapporteur on the Community's 1995 energy objectives, opened the discussion on the Commission's Communication on this subject at the meeting on 15 October. Further discussions will take place at future meetings of the Committee. (The '1995 energy objectives' were reviewed in *Energy in Europe* No 2.)

European Parliament: Exhibition on the theme of 'Europe 2000'

Whilst new technologies were being debated, Parliament wanted to show the general public some of the achievements of Europe's researchers and manufacturers and so held an exhibition in Strasbourg's Parc de l'Orangerie, between 5 and 10 October 1985.

The exhibition was officially opened by Mr Hubert Curien, the French Minister for Research and Technology, on Saturday, 5 October, at 11.00 a.m. Many public figures were present including Mr P Pflimlin, President of the European Parliament.

At the exhibition the Commission of the European Communities presented some of the latest projects completed under the auspices of the Directorate-General for Science, Research and Development (e.g. the JET project, thermonuclear fusion, biotechnology and work by the JRC on remote sensing), the Directorate-General for the Information Market and Innovation (e.g. Euronet, Diane, Heraeus, Burger, Irsis, Ruggieri, etc.), the Directorate-General for Energy (demonstration projects carried out by, among others Elf Aquitaine, Alfa Romeo and the British Gas Corporation) and the Task Force for Information Technology and Telecommunications (e.g. the Esprit programme which involved Nixdorf, Olivetti, Siemens, Honeywell Bull, etc.).

Some 36 000 people visited the exhibition. Mr Michel Poniatowski, President of the Parliamentary Committee on Energy, Research and Technology and the man who suggested the exhibition, and Mr Nic Mosar, the Member of the Commission responsible for Energy, were at the EEC stand to receive several foreign delegations including one of Chinese and one of Australian MPs who were visiting Strasbourg during that week.

In addition to exhibitors from the Commission of the European Communities the following private European and international firms should be mentioned: Philips, AEG Telefunken, CERN, Eutelsat, CNES, Alcatel/Thomson, Italtel, Bull, Siemens, Interatom (a photovoltaic lorry) and Olivetti. One tent was devoted to European achievements in space (in cooperation with the European Space Agency).

With the Chinese, from left to right: Mr Mosar, Mr Zeng Tao of the National People's Congress of China and Mr Poniatowski.

For this exhibition the Directorate-General for Energy selected several successful demonstration projects. For each project there was a panel featuring photographs and describing, in the language of the contractor, the technique developed and the results obtained. The first two panels explained what was meant by a demonstration project and gave some of the statistics gathered so far.

Another panel illustrated the programme of Community support for hydrocarbon technology.

DG XVII stand

Visitors were also able to watch two videos one on the demonstration programme and the other on laying gas pipelines between Tunisia and Italy.

Mr Davis, a Director in the Directorate-General for Energy, outlined the main projects and then asked representatives of the firms awarded contracts for three of the demonstration projects shown in model form to complete the presentation.

Economic and Social Committee

Energy and nuclear affairs section

The new energy objectives for 1995

At the plenary session in October 1985, subject only to a few observations, the Economic and Social Committee

subscribed to the new energy objectives for 1995 presented by the Commission (Rapporteur: Mr Margot (Belgium) Workers Group).

In 1979 the Committee had submitted its opinion on the energy objectives for 1990. Since then the Community has made a major effort to reduce its dependence on imported energy, particularly oil, and ensure greater security of supplies, particularly by diversifying its sources of energy and reducing its overall energy consumption.

In spite of these results the Committee agreed with the Commission that the effort must be pursued and stepped up.

In particular the Committee doubts whether it will be possible to reduce final energy demand by 25% by 1995. The psychological effect of the oil crisis has worn off and because of the changes in heavy industry it will be difficult to save even more energy. The savings potential in the various user sectors will therefore have to be clearly evaluated so that a realistic increase in energy efficiency can be programmed.

As Community production might well decrease the Committee is concerned that greater dependence on third countries might result from the increase in the proportion of energy supplies the Commission sees being covered by natural gas.

Whilst agreeing that we should emphasize the effort made so far to intensify the development and marketing of new and renewable forms of energy, the Committee feels that the proposal to triple their contribution towards substituting other forms of energy for conventional fuels between now and the end of the century is ambitious. Economic factors such as price movements which could hamper the growth of alternative energy supplies should be taken into account.

Where electricity generation is concerned the Committee fully subscribes to the priority given to solid fuels and nuclear energy. The Committee reaffirms the need for sustained attention to matters of safety where nuclear energy is concerned and for giving the general public sufficient information.

Generally speaking the Committee welcomes those Commission proposals aimed at pursuing energy policy and environment policy objectives in a balanced and coordinated manner and is pleased to see that for the first time the regional dimension of energy policy questions is taken into account. This suggests the possibility of measures to benefit the Community's least-favoured regions.

ECSC Consultative Committee: main activities in the energy field

At its 251st Session on 26 and 27 September 1985, the Committee was consulted on a working document[1] prepared by the Commission's services, revising the outlook for the solid fuels market in 1985.[2] The Commission's revised forecasts, which indicated for 1985 a market situation roughly comparable with that in 1983, were approved.

At the same Session, the Committee debated a proposal by the Commission to amend the coking coal Decision.[3] The Commission's proposal was to reduce the maximum volume for which the Community's sales aid to coking coal is paid from 10 million tonnes in 1984-85 to 8 million tonnes in 1986. The Committee informed the Commission of its view that a figure of 9 million tonnes would be more appropriate.

Eurostock

The 1985 trial phase of the European Community financed European rapid oil stock reporting system has now been declared a success by its oil industry participants. At a meeting in Brussels on 1 October 1985 representatives of more than 90 oil companies operating in the EEC met to discuss the Eurostock trial. The meeting, chaired by the Commission's Director-General for Energy Mr C J Audland, examined the results that Eurostock had so far achieved. The system, modelled on the long established API (American Petroleum Institute) procedure that is considered to work very effectively in the USA, determines stock levels of crude and each main product group on a country by country basis. In the trial, end-month stock data has been produced within eight working days of month end. Other sources only provide data after between 2 and 3 months.

Thus on one important element — timing — Eurostock has clearly proved successful.

1 COM(85)419 final.

2 Official Journal C 177, 15. 7. 1985.

3 73/287/ECSC of 25 July 1973; Official Journal L 63, 11. 9. 1976.

Overall coverage has also been excellent. Participant reports account for around 85% of all industry stocks. Regarding accuracy, measured as an average over the first five months of 1985 participants were pleased to note that after only 10 months of operation, Europe has developed a system with accuracy comparable to the US API system of 50 years' standing.

At Community level (excluding France and Greece), the average monthly error was around 2% for each of the products measured (crude, mogas, middle distillates and residual fuel oil).

Following company reactions at the meeting where the great majority considered that Eurostock has passed its trial and should be adopted as a regular industry reporting system the Commission will now, following further technical discussions, prepare specific proposals to this end and it is hoped that suitable organization will be arranged so that the oil industry itself can take over the management and the funding of the operation when the Commission's role in the activity is completed at the end of 1985. Commission services have nevertheless agreed to provide assistance in the transition stage and the early phase of industry management.

Relations with Algeria in the energy sector

While attending the Third Arab Energy Conference in Algiers in May this year, Mr N Mosar, Member of the Commission, took the opportunity to hold talks with Mr Nabi, the Algerian Energy Minister.

On the conclusion of their discussions Mr Mosar and Mr Nabi agreed that it would be beneficial to hold regular talks at departmental level to exchange views on energy matters and, where necessary, identify practical forms of cooperation in this field.

The first meeting to arise from this decision was held in Brussels on 25 October between an Algerian delegation under Mr Bouhafs, Director-General for Energy Coordination and Marketing in the Ministry of Energy, and a Commission delegation led by Mr C J Audland, Director-General for Energy.

The chief points discussed were:

— the energy situation in the Community and in Algeria;

— the forms of cooperation between the Community and developing countries in the energy sector;

— Algeria's contribution to the Community's energy supplies;

— the involvement of European economic operators in developing Algeria's potential in the energy and industrial sectors;

— exchange of experience in the efficient use of energy.

These discussions led to an improved mutual understanding of problems facing both Algeria and the Community, with regard to gas and oil supplies in particular. From the talks there also emerged an initial approach to cooperation in energy planning and training.

Both sides welcomed the outcome of this first meeting and decided to make arrangements for regular contacts.

Surveillance of petroleum product imports

A procedure for the surveillance of flows of petroleum product imports has now been instituted by both the Community and the IEA/OECD; this arises from the guidelines decided upon at the meetings of the Energy Council on 15 March and 20 June and from the conclusions of the Governing Board of the International Energy Agency when it met at ministerial level on 9 July.

The surveillance scheme will operate on a quarterly basis and will produce data on:

— petroleum product imports broken down by category and origin for each OECD member country and for the EEC as such;

— developments in refinery capacity within and outside the OECD;

— commercial, tariff and non-tariff measures applicable to petroleum product imports in OECD member countries.

With regard to the last-mentioned point the Japanese delegation at the meeting of the IEA's Governing Board on 23 October disclosed its intentions regarding the implementation of the conclusions reached at the meeting of 9 July on liberalizing oil imports. The Japanese delegation stated that this should be effective from January 1986.

Recent developments in energy pricing policy

Energy pricing policy, part of the new energy strategy developed by the Commission after the second oil shock, has repeatedly been on the agenda of the Energy Council since 1980. As a result, the Council has approved a number of general pricing principles, as well as two recommendations, relating to the pricing of electricity and gas — which are dependent on power lines and pipelines respectively.

The Commission has been endeavouring to ensure that these principles of realistic pricing are more widely applied in the energy sector. To this end, it reported to the Council on energy pricing practices in the Member States of the Community, and early this year submitted to the Council a draft resolution on this subject. The draft dealt with electricity and gas supplies, areas in which there is a large degree of monopoly on technical and economic grounds, and focused on the following key questions:

- **in view of the differences in approach, what fundamental principle should prices be based on — the costs of the respective forms of energy or the cost of substituting other forms of energy?**
- **what steps could be taken to ensure that energy prices are not misused — in particular by national utilities — in pursuit of other non-energy objectives, thereby distorting the situation on the energy markets?**
- **in view of the requirements of the energy business and competition, how can utilities maintain (or regain) financial viability?**
- **how can price transparency be improved, particularly as regards deliveries to large industrial consumers?**

During two rounds of discussions, the Council reached a large measure of agreement on the individual points but, despite considerable efforts at its various working levels, was unable to secure unanimity. **Consequently, Mr Mosar, Member of the Commission, indicated in a statement to the Council in June that the Commission would continue to attach particular importance to energy pricing and therefore intended to make use of its powers and to pursue the responsibilities assigned to it under the Treaties, even if no political solution could be reached in the Council.**

To this end the Commission will continue in its efforts to apply the **Competition Rules.** For example, various complaints have been brought before the European Court of Justice in Luxembourg pursuant to Article 93 of the EEC Treaty (Misuse of State Aid) relating to the granting of special tariffs for natural gas; on 3 May 1985, the Court issued an interim decision in favour of the Commission. In addition to these efforts in the sphere of competition policy, the Commission will continue to bring up particular energy pricing problems for discussion at political level.

Visit of Chinese officials

Led by its General Director, Mr Chen Yinbin, a delegation of the State Economic Commission of the PR of China visited the EC from 7-25 September 1985. This contact, following closely on a similar one with the State Science Technology Commission in June (see *Energy in Europe* No 2) shows clearly the growing interest and the strengthening of energy cooperation between China and Europe.

The five-member delegation had intensive talks on energy policy, energy production and energy management in the European Community's headquarters in Brussels, as well as in Paris, London, Berlin and Bonn. In these places, numerous visits were organized to see some Community-funded energy saving and new energy technology demonstration projects.

The delegation was particularly interested in industrial energy conservation, the utilization of waste heat, and electricity management. In its energy programme, China is giving high priority to increasing the efficiency of energy use and to improving electricity production and transmission. The Chinese authorities intend, in this context, to expand training programmes for energy planners and managers and to cooperate as closely as possible with industrialized countries experienced in these fields. It is important to note that, whilst China aims to double its GDP in the five-year period 1985-89, it is planning that energy consumption will increase by only 50%. This ambitious target requires an important effort in the whole energy management system.

The Chinese visitors were impressed by the standards of the EC's activity in energy planning and demonstration projects. The intensive use of informatics in energy

planning to increase information on project management, and the development of proper instruments for energy analysis and forecasting (energy flow analysis, EFOM and MEDEE models) aroused much interest. As for demonstration projects, those favouring waste incineration, high-temperature compression, heat pump and electricity production by fluidized bed combustion process were of particular interest to the delegation.

What were the concrete results of the visit?

An increase in cooperation in the field of energy planning and management. This cooperation started in 1982 with the establishment of a China-EC Training Centre for energy managers. There will now be a new joint training activity in the field of electricity and heat management.

Concerning the training of energy managers, the following issues were discussed:

— the training courses in the China-EC Centre in Nankin (where 620 energy managers have been trained since 1982) will be extended to train Chinese instructors so that this type of course can be multiplied through China;

— a similar energy management training activity, including energy auditing for industries, will be carried out in Peking in the Municipal Energy Conservation Centre;

— to demonstrate a successful result of energy management in a factory, a model enterprise would be chosen in Changzhou to complement the training courses in the Nankin Centre (and later in other provincial centres).

Concerning the area of electricity and heat management, the following actions were agreed:

— organization of training courses for experts (2 sessions per year) in the Nankin Centre;

— establishment of a similar centre in the North of China.

The EC is requested to cooperate, as in the past, by providing experts (2 or 3 experts for two weeks each session) and some teaching equipment.

The details of the projects and of the means of cooperation were discussed by experts during the visit of the EC delegation led by Mr Audland (see following article in this issue). Subject to sufficient funding in 1986, these cooperation activities should be launched in the spring of 1986.

Energy missions to Australia and China

Commission delegations led by Director-General for Energy Christopher Audland visited Australia (5-11 October) and China (12-20 October) recently.

Australia

In Australia the delegation met with Minister for Energy and Resources Evans, Minister for Trade Dawkins, members of the Opposition, senior administration officers from all Commonwealth Departments concerned and private industry representatives. Apart from an exchange of views on energy policy developments in the EC and Australia, there were detailed discussions on coal and uranium affairs. The Australians very much want to increase their coal exports to the EC and have the capacity to bring an additional + /— 60 Mt quickly onto the world market if demand warrants it. The determined efforts made in improving industrial relations in this sector have paid off, with the result that Australia has been able to increase its total coal exports by 75% in the past three years.

There have been difficulties between the EC and Australia in the nuclear area recently, brought about by the Australian ban on uranium sales to France — the country which accounts for half of the Community's total nuclear output. The Australian Government's policy limiting uranium production to three mines is another area of concern to the EC. During his visit Mr Audland stressed to all concerned the importance of nuclear to Europe's energy needs and security. If Australia was to take its share of Europe's growing needs for uranium then the Australian Government needed to create a greater sense of security about continuity of supplies. He pointed out that Europe is already buying around 10% of its uranium requirements from Australia and the potential existed for greatly increasing this amount if the right climate existed in Australia.

China

The principal reason for the mission to China was to review the operation of the Community's joint energy planning cooperation programme and to settle the lines of action for 1986, following up discussions held in Brussels in September 1985 (see article in this issue). Given

the importance of China as a major energy consumer, it was also important to find out more about energy prospects.

Discussions were held with senior officials from the State Science and Technology Commission, the State Economic Commission, the State Planning Commission and certain Ministries, as well as Deputy Governors of the Provinces of Jiangsu and Zhejiang.

The Chinese take a very pragmatic attitude to this programme, being mainly interested in learning and applying new techniques that the energy cooperation programme is funding.

For 1986 it was decided to continue the broad line of our existing cooperation and to add the following new elements:

— to assist with the establishment of four new energy training centres;

— the provision of energy buses and/or equipment — in conjunction with France.

As with most developing countries there is a shortage of investment funds for infrastructural and other capital needs in China. This means that limits on electricity and coal production will, for the foreseeable future, tend to put a brake on their overall economic development. They are trying to counteract this bottleneck in the energy sector through the development of alternative energies and more importantly through radically improving their energy efficiency. Much of the Community's support is directed to these areas. Although China has the resources to be a major world exporter of coal and possibly uranium, the lack of infrastructure will probably keep exports at their current modest level for the next few years.

IAEA General Conference – Vienna 23-27 September 1985

The 29th Annual General Conference of the International Atomic Energy Agency (IAEA) took place in Vienna from 23-27 September 1985. More than 90 States, out of the 112 Member States of the Agency, were represented, as also were inter-governmental and non-governmental organizations.

The European Community participates in the General Conference by virtue of the cooperation agreement between the Community and the IAEA of December 1975. The Commission delegation to the Conference was led, as in recent years, by Mr C J Audland, Director-General for Energy.

The conference provides an opportunity for those from government and other international circles responsible for the direction of nuclear policy to meet and to conduct business at the Conference or on a bilateral basis. Subjects among the routine business of the annual General Conference are the approval of the IAEA annual report and approval of the budget for the following year amounting to some USD 100 M. This year the General Conference re-appointed Dr H Blix as Director-General of the IAEA for a second term of four years from 1 December 1985.

More specifically, the General Conference adopted on 27 September resolutions on South Africa and Israel. The resolution on South Africa, *inter alia,* calls on all IAEA Member States which had not yet done so to halt all nuclear cooperation with South Africa and to end any transfer of fissionable materials and technology and to stop all purchases of uranium from South Africa; it calls on all IAEA Member States which had not yet done so, to stop all purchases of Namibian uranium. The resolution on Israel noted that Israel had now committed itself not to attack peaceful nuclear facilities in Iraq, elsewhere in the Middle East, or anywhere else, called upon Israel urgently to place all its nuclear facilities under IAEA safeguards and re-affirmed that any attack on a peaceful nuclear facility subject to IAEA safeguards would constitute a serious threat to the safeguards system of the IAEA.

In a statement to the General Conference on 23 September Dr Blix reported that during 1984 the total installed nuclear capacity in the world increased by 17%. In both absolute and relative terms this is the largest annual increase since the beginning of the large-scale introduction of nuclear power in the early 1970s. Dr Blix said that 'for the foreseeable future, only conservation, coal and nuclear can have a substantial impact on the world's energy situation.'

Dr Blix also made certain references in his statement to the European Commission's 'Illustrative Nuclear Programme for the Community',[1] which had been adopted by the Commission in November 1984 and published in 1985. He referred, in particular, to conclusions reached on the additional cost of electricity produced from coal in comparison with the cost of electricity of nuclear origin,

[1] For a review of this programme, see *Energy in Europe* No 1, April 1985, pp 25-29.

and to arguments developed by the Commission in favour of a regional approach to the problem of nuclear waste disposal.

The general debate of the General Conference provides an opportunity for statements to be made on behalf of individual countries about the progress of their national nuclear policies. A development of major significance was the statement by Mr Zhou Ping, Vice-Minister in the Chinese Ministry of Nuclear Industry that the Chinese Government had decided to offer voluntarily to place some of its civilian nuclear installations under IAEA safeguards at an appropriate time.

In his statement to the General Conference, on behalf of the European Community, Mr Audland spoke about the enlargement of the Community, the role of nuclear energy in Community energy policy, and the Community's nuclear research and development programme, with special reference to the nuclear fusion programme. Lastly, Mr Audland developed one of the themes of the General Conference, in speaking about energy cooperation between the Community and developing countries.

The Third Non-Proliferation Treaty Review Conference

86 states gathered in Geneva for four weeks (27 August — 21 September 1985) to review for the third time the operation of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), now adhered to by a total of 130 States. Such review conferences have taken place every five years since the Treaty came into force in 1970.

The Commission has a clear interest in a number of issues dealt with by the conference, such as nuclear trade conditions, safeguards implementation and nuclear cooperation, by virtue of its responsibilities under the Euratom Treaty (i.e.: nuclear supplies, safeguards and external relations). Officials from the Commission's Directorate-General for Energy therefore attended the Conference throughout.

The NPT is considered as a cornerstone in international efforts to avoid the further spread of nuclear weapons and hence in creating the degree of confidence which is needed for the development of peaceful nuclear cooperation and trade. Its main objectives are:

(i) the prevention of proliferation of nuclear weapons and nuclear explosive devices;

(ii) the promotion of cooperation between States party to the Treaty in peaceful uses of nuclear energy; and

(iii) the cessation of the nuclear arms race and complete disarmament.

Because of the importance of the Treaty itself, the outcome of this conference attracted considerable interest, in particular against the background of the 1980 Review Conference, which failed to reach agreement on a concluding statement.

This time, however, the Review Conference reached agreement by consensus on a very substantial Final Declaration. This was a considerable achievement, and should strengthen the authority of the Treaty as well as the whole non-proliferation regime.

Inter alia, it concluded that both Nuclear Weapon States and Non-Nuclear Weapon States party to the Treaty had kept their respective obligation not to transfer, and not to receive or otherwise acquire, nuclear weapons or explosive devices; and that the international safeguards system, which verifies these undertakings, had performed effectively.

As regards measures to strengthen the Treaty, the Declaration urged adherence to the NPT by additional States; pointed to the advantages of international fuel cycle facilities, e.g.: in the fields of the storage of spent nuclear fuel and nuclear waste disposal; and recommended the establishment of an International Plutonium Storage system.

The Conference finally urged fresh initiatives to deal with the many obstacles (technical and financial) facing the introduction of nuclear energy production into developing countries.

Energy and economic development

A key question for energy economists and forecasters, as well as for planners in the developing world, is how energy demand in LDCs will respond to growth and development. Are there fixed relationships between the intensity of energy use (energy per unit of gross domestic product) and level of economic development? Must the developing countries necessarily follow the pattern of steeply rising energy consumption that the industrialized countries experienced during industrialization? Can high levels of economic growth be achieved in the developing

world without increasing pressures on the world oil markets in the longer-term?

A study made for the Commission jointly by the International Institute for Environment and Development in London and ATW-Research in Regensburg[1] address these questions. It provides a comparative analysis of the relationship between the use of energy in its various forms and economic development in 13 countries at different levels of development: India, Pakistan, Kenya and Sri Lanka in the low income group; the Philippines, Chile, Brazil and Portugal among the middle-income countries; and the United Kingdom, France, the Federal Republic of Germany, Japan and the USA in the high income industrialized group.

Its conclusions cast doubt on the simple thesis that as a country matures energy intensity must grow sharply to a peak before it eventually begins to decline. The study demonstrates how the reality depends not only on the broad mix of economic activities between industry, agriculture and transport, but also on the structure of production and consumption within sectors and within industries.

It is sometimes argued that LDCs with only limited energy reserves should either do without, or at least restrict, the development of energy-intensive industries such as iron and steel, aluminium, chemicals, and so on. In reality, the study argues, the development of an iron and steel industry, for example, need not mean such a big upsurge in energy demand in LDCs as it has meant to the industrialized world: some LDCs at least can take a much more energy-efficient approach to iron production (through the use of gas for direct reduction) and to the transformation of iron into steel (a shift from open hearth to the oxygen process). Cement too can be produced in many different ways involving very different intensities of energy use. LDCs should look carefully at industrial technologies most appropriate to their energy situations.

Similar points can be made about agriculture. More efficient and mechanized agriculture production certainly brings with it a more than proportionate increase in agricultural energy demand, directly through the needs of irrigation and traction and indirectly through recourse to chemical fertilizers. But the growth need not be as rapid as it has been in the developed countries if proper attention is paid to land and crop management — the timing of fertilizer and water application, crop rotation, new mixes of crop types — and to the prices of energy-based goods and services.

Particular attention is paid by the study to the role of biomass in the development process. In many countries a fairly rapid substitution of biomass fuels by commercial fossil fuels has been taking place in the household sector and the growth of conventional fossil energy demand has been high and faster than that of total energy. But this does not mean that demand by households will continue to grow at past rates. Indeed the evidence from the study suggests that in most developing countries household consumption will saturate at much lower levels than in the industrialized countries because of the generally more limited role for space heating. Planners may get a distorted view of the prospects for energy demand growth if they calculate future energy requirements on the false assumption of an exponential growth in household demand.

Finally, the study also examines the important issue of energy pricing in developing countries. LDCs sometimes shy away from realistic energy pricing because of fears about possible damage to industrial competitiveness and harm to the poor.

The study concludes that these fears are often misplaced. Firstly, in most countries, energy accounts for a relatively small share of total costs of production and the exceptions (cement, fertilizer or aluminium) do not represent a large share of industrial production in most developing countries. Secondly, most energy consumption surveys, particularly in the poorer countries, have shown that the use of commercial energy is largely concentrated among the middle and upper income groups, while the poor rely principally on wood and other non-commercial fuels. Realistic pricing will be an important factor in constraining wasteful energy consumption and in influencing the choice of appropriate energy technologies for energy-efficient development. At the same time, the study concludes, the energy needs of the poor could be better served if some of the resources currently spent on subsidizing commercial fuels were diverted to other objectives such as the expansion of fuel-wood production or the more widespread dissemination of more efficient wood stoves.

* * *

The full study, which contains detailed data on all 13 countries, will be published shortly in English.

[1] *Energy and Development: a comparative analysis of energy demand structures of countries at different levels of economic development.*

Outcome of 1985 demonstration call for tender

Following recent Commission decisions, financial grants totalling 102 MECU supporting in general up to 40% of eligible costs will be given to 204 energy projects; about a third of the 594 proposals which the Commission had received in response to an invitation to tender published in December 1984.

The incoming proposals were analysed by the Commission Services with the help of experts from all sectors concerned. Subsequent study by an Advisory Committee, made up of representatives of the Member States, took place during the summer.

A first decision concerning 17 projects in the field of substitution of hydrocarbons by solid fuels and of liquefaction and gasification of solid fuels, was already adopted in July 1985 whereas the second on all the other projects was taken in November 1985. (At the time of the writing of this article the latter decision had been notified to the Member States; if none of these raise the matter in Council, the decision will be communicated to the proposers in December 1985).

The following table gives an overview on the outcome of the 1985 call for tender (a further decision concerning 1.4 MECU still has to be taken):

	Accepted projects		Total grant (MECU)	
Energy saving	60		25.97	
of which:				
Industry		27		13.67
Energy industry		10		6.89
Buildings		11		1.28
Transport		12		4.13
Alternative sources	118		33.77	
of which:				
Biomass		24		9.98
Solar		38		6.86
Wind		20		5.48
Geothermal		14		6.04
Hydro-electric		22		5.41
Substitution of hydrocarbons	19		21.42	
of which:				
Electricity + heat		9		5.18
Solid fuels		10		16.24
Liquefaction/ gasification of solid fuels	7		20.4	
Total	204		101.6	

The following examples which cannot show the total range of technologies covered by the programme nevertheless they illustrate the kind of projects which in the Commission's view, merit demonstration of their technical and economic viability:

— Energy saving in industry: the increase in efficiency of a cogeneration plant by using oxygen contained in the exhaust gas of diesel engines of 12 750 KW, of additional combustion.

— Energy saving in buildings: the warm air heating of apartments using heat from the same energy source as for the sanitary hot water.

— Energy saving in transport: local public transport bus with diesel-electric drive and intermediate energy storage.

— Biomass and waste disposal: upgrading of solid waste of heavy petroleum fraction (pitch) in a hydrocatalytic process.

— Solar energy: application of thermosyphon air panels for greenhouse heating.

— Geothermal energy: heating of the Liège hospital (drilling to 2 000 m, water at 70°C, 200 m^3/h).

— Hydro-electricity: hydro-electric turbines with factory assembled moulded plastic components.

— Wind energy: independent power generation from combined wind, water and diesel plant with pumped storage.

— Electricity and heat: cost reduction in heat transport using ductile cast-iron pre-insulated pipes.

— Substitution of hydrocarbons by solid fuels: direct burning of pulverized coal in boilers; conversion of a coal-fired power station to operate with coal-water mixtures.

— Liquefaction/gasification: gasification of lignite; pilot plant for the extraction of hydrocarbons from coal by means of liquid solvents.

Energy demonstration: invitation to tender 1986

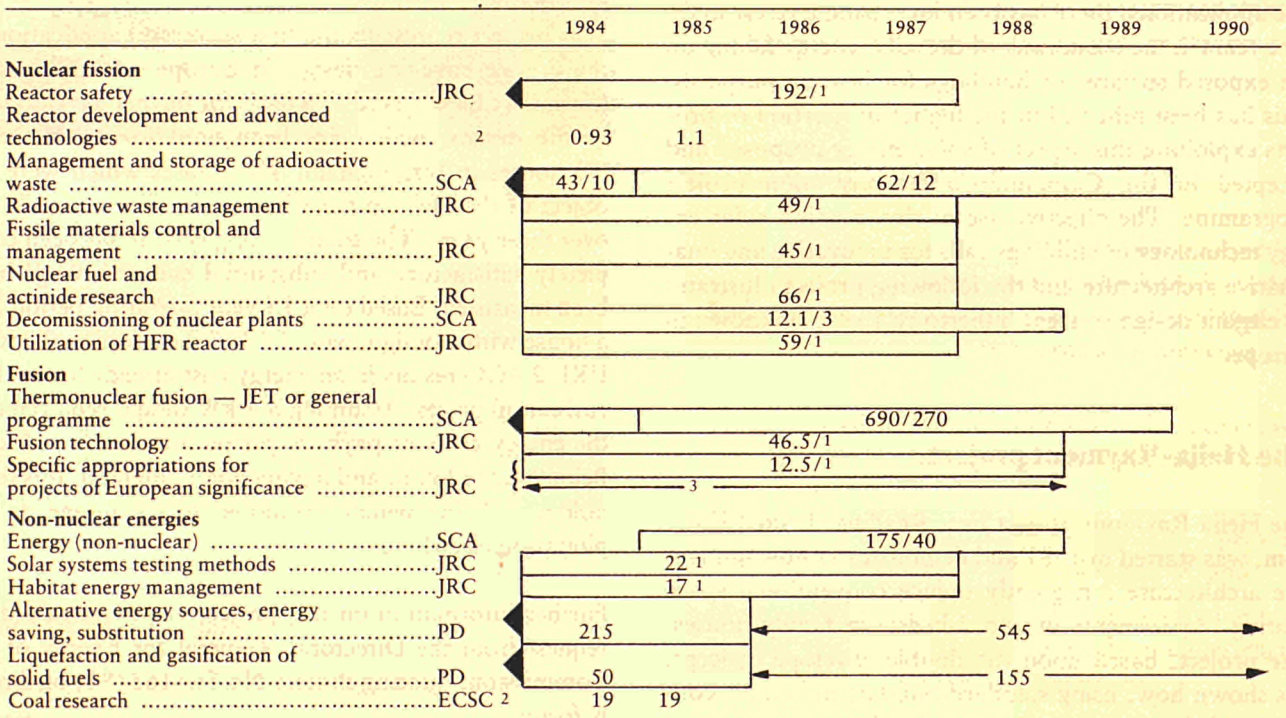
The Commission intends to publish, at the beginning of 1986, a new call for tender in the framework of the new Energy Demonstration Programme 1986-89.

This call for tender will be open until the end of April 1986.

When the manuscript of this issue of *Energy in Europe* was completed, the exact dates however, had not been fixed.

For more information on dates, procedure, scope and priorities of the 1986 call for tender, please contact either the Community Press and Information Offices in the Member States, or the Directorate-General for Energy, DG XVII — Demonstration Projects — in Brussels.

Corrigendum — Energy: research and development 1984—90



The figures given in the colums show, respectively, the sum allocated to the activity in million ECU and staff, wherever these are mentioned in the decision (million ECU/staff).

[1] JRC's staff for the whole programme: 2 260 staff members.

[2] Annual budget appropriation
SCA: Shared-cost action
PD: Pilot/demonstration
ECSC: European Coal and Steel Community
JRC: Joint Research Centre

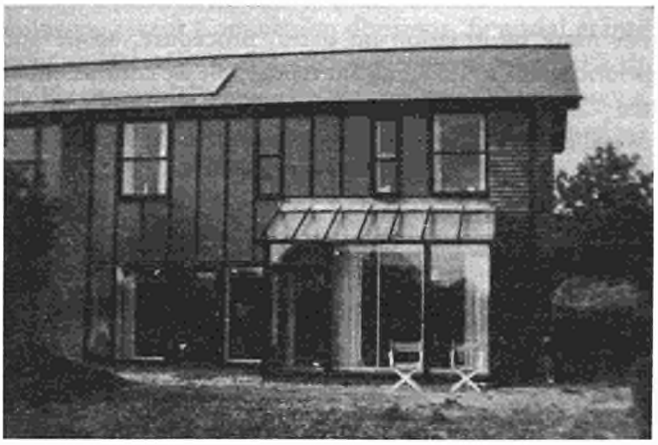
[3] Tritium-handling laboratory.

Programme decided by the Council

Programme proposed by the Commission

Technology focus

Energy demonstration project programme: passive solar heating of buildings



Whilst solar energy is often thought of in terms of its use for water heating, or even steam raising, and in photovoltaic applications, there has been increasing interest in recent years in the harnessing of the solar energy falling on the exposed surfaces of buildings for heating purposes. This has been reflected in the higher proportion of projects exploiting this aspect of solar energy proposed and accepted in the Community's demonstration project programme. The effective use of this 'passive' solar energy technology in buildings calls for innovative and imaginative architecture and the following project illustrates an elegant design concept hitherto relatively unknown in Europe.

The Helix-Raymont project

The Helix-Raymont project near Reading, United Kingdom, was started in 1981 and demonstrates how innovative architecture can greatly reduce conventional space heating requirements in two 3-bedroom family houses. The project, based upon the double envelope concept, has shown how, using standard building materials, conventional fuel consumption can be drastically reduced whilst maintaining acceptable comfort levels for the occupants.

This is how the system works:

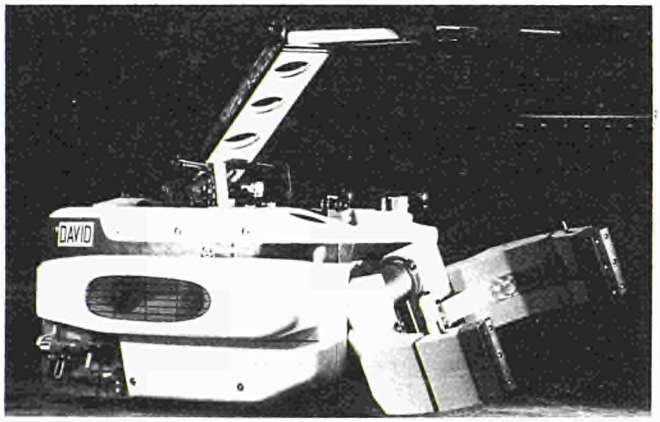
A south-facing wall supports a collector comprising an outer single glazed layer admitting a maximum amount of solar energy, an air gap sufficiently small to prevent large thermosyphon currents and an absorber surface mounted onto a thin aluminium sheet behind which, in a narrow air space, flows the heated air. Behind the narrow air space an insulation layer prevents excessive heat losses into the south-facing rooms. Air heated in the air space then is ducted over the top floor ceiling of the house to the top of the north-facing wall. (During the summer months air can, of course, be vented directly into the loft and out into the open.) This wall, a key element in the transfer of heat into the living spaces, is made up of: an outside brick/tile weathershield; an insulation layer; an air duct so dimensioned as to encourage turbulent conditions and therefore good heat transfer and an inner wall of dense concrete blocks providing high thermal mass. The air gradually cools as it descends the north wall and once at ground level is ducted under the floor, which again acts as a heat storage element, to the base of the south-facing collectors. The inclusion of standard cross-flow fans between the underfloor section of the loop and the south wall ensure sufficient circulation of the air during the day and non-return plastic foil valves prevent reverse syphoning at nights. To complete the system a simple control device was added to ensure the optimum functioning of the fans.

This project represents the first successful application of the double envelope design in Europe and the lessons learnt here have served as a basis for further development of the design, which has been used for an estate of 9O houses in Birmingham. The houses which were the object of the Helix project have now been occupied for over three years. The solar heating system has been completely satisfactory and substantial energy savings have been measured. Based on a 15-year operating period and a house with a design load of 4 kW the additional cost of UKL 2 4OO results in an energy cost already lower than current oil prices. Assuming a 6 kW design requirement, the energy costs or payback period are further reduced. Being easy to build, and having good potential, this technology is being widely promoted to encourage its exploitation elsewhere.

Further information on this project can be obtained on request from the Directorate-General for Energy of the Commission, quoting Project No SE/163/81, or directly from:
Helix Multi-Professional Services,
Mortimer Hill,
Mortimer,
UK - Reading RG7 3PG.

DAVID: A cheaper, safer technology for sub-sea oil operations

Offshore oil and gas development — particularly bringing into production North Sea gas and oil fields since the early 1970s — requires the use of large metal structures in a hostile environment. The very high capital cost involved and the need for a high safety level make it incumbent on the operators to carry out inspection, maintenance and repairs and this means that divers have to be sent down to work on underwater structures.



Owing to the high cost of the facilities needed for diving, such as dynamically positioned diving support vessels, the diving time required for a job must be kept to a minimum. Consequently, the diver's task must be made as easy and safe as possible.

Hence the interest taken by the Commission in the development of equipment that can enhance the efficiency of diving and reduce its cost as part of the programme of support for Community projects in the hydrocarbons sector.[1]

The DAVID project

Against this background a German firm, Z. F. Herion Systemtechnik GmbH, put to the Commission a project called DAVID (Diver Assistance Vehicle for Underwater Inspection Duties).

The project was awarded four contracts (TH 07.22/79, TH 07.33/79, TH 07.43/81 and TH 07.51/83). The first three covered the design, manufacture and testing of the prototype vehicle, and the fourth converting the submersible for remote control, and certification and sea trials.

The technology developed

The complete DAVID system consists of a submersible vehicle capable of operating to a maximum depth of 500 m and the ancillary equipment needed for launching, handling the umbilical cable, remote control and power supply.

The submersible is a remotely operated vehicle (ROV) but can also be controlled by the diver until attached to the structure by means of a claw adjustable in diameter. It provides the diver with a working platform, a set of hydraulic tools, and with lifting and pumping capabilities. It is fitted with TV cameras and a sonar for scanning obstacles.

The project's results

The sea trials, during which the submersible was used for work on the underwater structure of the Auk. A platform in the British sector of the North Sea, confirmed that DAVID embodies an innovatory approach of immense value to underwater operations:

— the time saved on the various tasks undertaken was as forecast, varying from 34 to 56% depending on the type of job;

— the vehicle demonstrated full capability to operate as an inspection and observation submersible; and

— its versatility makes DAVID effective in a wide range of tasks including cleaning-up welds, non-destructive testing, lifting, transport and pumping.

Further information can be obtained from:

Z. F. Herion Systemtechnik GmbH,
Postfach 2168,
7012 Fellbach,
Federal Republic of Germany.

[1] Regulation No 3056/73. A new regulation is being discussed by the Council of the European Communities.

Document update

Main Commission energy documents, proposals, directives, etc. in 1985

Energy saving

C/85/1454 Commission Decision amending the Commission Decision of 14 November 1984 on the granting of financial support for demonstration projects in the field of energy saving.

Hydrocarbons

COM(85)0453 Amendment of the Proposal for a Council Regulation (EEC) on a programme of support for technological development in the hydrocarbons sector (COM(84)658 final).

COM(85)0389 Proposal for a Council Regulation (EEC) amending Regulations (EEC) No 1893/79 and No 2592/79 concerning registration for crude oil imports in the Community.

COM(85)0385 Proposal for a Council Decision on the granting of support for Community projects in the hydrocarbons sector (1985).

SEC(85)1301 Working Document of the Commission services on petroleum product pricing in the Community.

Solid fuels

C/85/1207 Commission Decision of 24 July 1985 on the granting of financial support for pilot industrial and demonstration projects in the field of liquefaction and gasification of solid fuels.

C/85/1208 Commission Decision of 24 July 1985 on the granting of financial support for demonstration projects in the field of substitution of hydrocarbons by solid fuels.

COM(85)0419 Communication by the Commission to the Council — Commission Decision ECSC amending Decision 73/287/ECSC of 15 July 1973 concerning coal and coke for the iron and steel industry in the Community (coking coal system).

COM(85)0525 Communication by the Commission to the Council concerning new Community rules for State aids to the coal industry.

New energy publications

Commission of the European Communites

Energy pricing

— Bulletin of Energy Prices Cat. No CB-B6-85-002-2A-C (4.41 ECU).

Energy saving

— European Community demonstration projects for energy saving and alternative energy sources — Flag brochures

No 22 Coal gasification at Westfield
No 23 Heat pump with absorber heat exchanger for a block of flats
No 24 Geothermal project in the new town of CergyPontoise
No 25 Project of the utilization of a high-temperature water-dominated geothermal reservoir: the Latera back-pressure power plant
No 26 Geothermal urban heating at Pessac
No 27 Plant for the production of biogas from poultry breeding residue

— Energy efficiency in the EEC

(Obtainable from:
The Directorate-General for Energy,
200 rue de la Loi,
B — 1049 Brussels).

Miscellaneous

— Regional energy planning in the Federal Republic of Germany and the European Community — Proceedings of Symposium, Berlin, 23-24 May 1985.
(Obtainable from:
The Directorate-General for Energy,
200 rue de la Loi,
B—1049 Brussels).

— Glossary of terms of alternative energy sources (2 500 headings; six languages (FR, EN, DE, IT, NL, DK); 36 000 terms and references). Cat. No CB-18-83-001-6A-C.
002
(Obtainable from:
Office for Official Publications of the European Communities,
L—2985 Luxembourg (USD 18).

Statistical Office of the European Communities

Gas prices 1980-85 ISBN 92-825-5375-2 (Price — 11.11 ECU)

Electricity prices 1980-85 ISBN 92-825-5654-9 (Price — 9.94 ECU)

Operation of nuclear power stations 1984 ISBN 92-825-5623-9 (Price — 13.25 ECU)

Salg og abonnement · Verkauf und Abonnement · Πωλήσεις και συνδρομές · Sales and subscriptions Vente et abonnements · Vendita e abbonamenti · Verkoop en abonnementen

BELGIQUE/BELGIË

Moniteur belge/Belgisch Staatsblad
Rue de Louvain 40-42/Leuvensestraat 40-42
1000 Bruxelles/1000 Brussel
Tél. 512 00 26
CCP/Postrekening 000-2005502-27

Sous-dépôts/Agentschappen:

Librairie européenne/ Europese Boekhandel
Rue de la Loi 244/Wetstraat 244
1040 Bruxelles/1040 Brussel

CREDOC
Rue de la Montagne 34/Bergstraat 34
Bte 11/Bus 11
1000 Bruxelles/1000 Brussel

DANMARK

Schultz Forlag
Møntergade 21
1116 København K
Tlf: (01) 12 11 95
Girokonto 200 11 95

BR DEUTSCHLAND

Verlag Bundesanzeiger
Breite Straße
Postfach 01 80 06
5000 Köln 1
Tel. (02 21) 20 29-0
Fernschreiber:
ANZEIGER BONN 8 882 595

GREECE

G.C. Eleftheroudakis SA
International Bookstore
4 Nikis Street
Athens
Tel. 322 22 55
Telex 219410 ELEF

Sub-agent for Northern Greece:

Molho's Bookstore
The Business Bookshop
10 Tsimiski Street
Thessaloniki
Tel. 275 271
Telex 412885 LIMO

FRANCE

Service de vente en France des publications des Communautés européennes

Journal officiel
26, rue Desaix
75732 Paris Cedex 15
Tél. (1) 578 61 39

IRELAND

Government Publications Sales Office
Sun Alliance House
Molesworth Street
Dublin 2
Tel. 71 03 09

or by post

Stationery Office
St Martin's House
Waterloo Road
Dublin 4
Tel. 68 90 66

ITALIA

Licosa Spa
Via Lamarmora, 45
Casella postale 552
50 121 Firenze
Tel. 57 97 51
Telex 570466 LICOSA I
CCP 343 509

Subagenti:

Libreria scientifica Lucio de Biasio - AEIOU
Via Meravigli, 16
20 123 Milano
Tel. 80 76 79

Libreria Tassi
Via A. Farnese, 28
00 192 Roma
Tel. 31 05 90

Libreria giuridica
Via 12 Ottobre, 172/R
16 121 Genova
Tel. 59 56 93

GRAND-DUCHÉ DE LUXEMBOURG

Office des publications officielles des Communautés européennes
5, rue du Commerce
L-2985 Luxembourg
Tél. 49 00 81 - 49 01 91
Télex PUBOF - Lu 1322
CCP 19190-81
CC bancaire BIL 8-109/6003/200

Messageries Paul Kraus
11, rue Christophe Plantin
L-2339 Luxembourg
Tél. 48 21 31
Télex 2515
CCP 49242-63

NEDERLAND

Staatsdrukkerij- en uitgeverijbedrijf
Christoffel Plantijnstraat
Postbus 20014
2500 EA 's-Gravenhage
Tel. (070) 78 99 11

UNITED KINGDOM

HM Stationery Office
HMSO Publications Centre
51 Nine Elms Lane
London SW8 5DR
Tel. 01-211 56 56

Sub-agent:

Alan Armstrong & Associates Ltd
72 Park Road
London NW1 4SH
Tel. 01-723 39 02
Telex 297635 AAALTD G

ESPAÑA

Mundi-Prensa Libros, S.A.
Castello 37
E-28001 Madrid
Tel. (91) 276 02 53 - 275 46 55
Telex 49370-MPLI-E

PORTUGAL

Livraria Bertrand, s.a.r.l.
Rua João de Deus
Venda Nova
Amadora
Tél. 493 90 50 - 494 87 88
Telex 12709-LITRAN-P

SCHWEIZ/SUISSE/SVIZZERA

Librairie Payot
6, rue Grenus
1211 Genève
Tél. 31 89 50
CCP 12-236

UNITED STATES OF AMERICA

European Community Information Service
2100 M Street, NW
Suite 707
Washington, DC 20037
Tel. (202) 862 9500

CANADA

Renouf Publishing Co., Ltd
61 Sparks Street
Ottawa
Ontario K1P 5R1
Tel. Toll Free 1 (800) 267 4164
Ottawa Region (613) 238 8985-6
Telex 053-4936

JAPAN

Kinokuniya Company Ltd
17-7 Shinjuku 3-Chome
Shiniuku-ku
Tokyo 160-91
Tel. (03) 354 0131

Journal Department
PO Box 55 Chitose
Tokyo 156
Tel. (03) 439 0124

OFFICE FOR OFFICIAL PUBLICATIONS
OF THE EUROPEAN COMMUNITIES

L-2985 Luxembourg

CB-BI-85-003-EN-C