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ENERGY IN EUROPE

Energy policies and trends in the European Community

Number 7 July 1987

Commission of the European Communities □ Directorate-General for Energy

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Contents

Abbreviations and symbols

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

BFR	3.71	HFL	0.256
DKR	0.219	IRL	0.00871
DM	0.719	LIT	140
DR	1.15	LFR	0.14
FF	1.31	UKL	0.0878

EUR 10	Total of member countries of the EC before accession of Spain and Portugal in 1986
EUR 12	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

Message from Mr C. S. Maniatopoulos, Director-General for Energy, Commission of the European Communities

After a long career in the private sector in Greece, I took up the duties of Director-General for Energy of the Commission of the European Communities a few months ago.

I feel that I am starting with the Commission at a very significant point in time. This year we are celebrating the 30th anniversary of the signature of the Treaty of Rome. After many difficulties and efforts, crises and successes, we are now entering a changed European scene: 12 countries working together to build a common future by bridging gaps, identifying common interests, assisted by the coming into force of the 'Single European Act'. With a population of 320 million there is a greater awareness among Europeans that the only way forward is through the establishment of an integrated Europe — not just a 'common market'. This is an important moment for the European Community: there is no other way forward than through a new, more dynamic, much more promising start.

In this context, the energy sector continues and will continue to play a crucial role in contributing to our economic and social development. It would be short-sighted and superficial to think that an integrated market can be created without the achievement of a coherent energy strategy at Community level.

For me as a newcomer to the Commission's Directorate-General for Energy, this is a very challenging task. My role will be to stimulate the creative and imaginative capabilities of my staff in the Directorate-General, to propose reasonable, well-balanced and effective issues in our own area of responsibility and then take appropriate and decisive action in order to reach the major target, i.e. to achieve the goals of the Single European Act.

In the absence of a supply crisis the continuing importance of the energy sector tends to be neglected. However, the energy sector is still the largest area for investment in our economic system. Furthermore, energy is a basic factor for the overall economic growth of our national and Community economies. Energy production and distribution is also crucially influencing our environment, our social structures, our standards of living. And we must not therefore lessen our efforts to use energy rationally, sparingly and sensibly.

The Council has provided us with a basic tool by its decision in September 1986 to adopt new 1995 energy objectives for the Community. This will ensure the continuity of our energy policies. Our aim should be to achieve these objectives in parallel with the implementation of the principles of the Single European Act.

During the last few months I have been having informal discussions with national administrations, State bodies and private industry both within and outside the Community, to get as broad a spectrum of views as possible as to where Community energy actions might be most effective. I am highly optimistic and encouraged by the positive and constructive responses I have so far received.

We are now in the process of examining how the Directorate-General for Energy can best adapt its experience of past developments for the future. The progress already achieved by the efforts of my predecessor Sir Christopher Audland and of the staff of DG XVII are encouraging. I have no doubt that the Commission's Directorate-General for Energy will, with the assistance of national energy authorities, respond positively to meet all the new challenges ahead.

C. S. Maniatopoulos
Director-General for Energy

Nuclear power in the European Community: one year after Chernobyl

The situation in April 1986

In April 1986, the European Community had 114 nuclear power reactors in commercial operation with a total electricity-generating capacity of around 75 GWe net (about one-fifth of the Community's total installed capacity), producing nearly one-third of the Community's electricity.

In the 15 years since the early 1970s, nuclear power had increased its share of total primary energy demand in the Community as a whole from 2% to 13%. But there were, of course, major differences between Member States. Both France and Belgium were generating over 60% of their electricity from nuclear plants while five other Member States had no nuclear programmes at all (see Table, p. 9). These differences were more or less reflected in the public's views of nuclear power. The most recent Eurobarometer opinion poll covering nuclear power had been undertaken in October 1984 and it was unlikely that the opinions on nuclear power had significantly changed in the 18 months before the Chernobyl accident in April 1986. In general, public opinion in the Community's larger nuclear States was in favour of nuclear technology while in smaller, non-nuclear States public opinion was against it. Community-wide, there were more people in favour of nuclear power than against it.

Chernobyl and initial reactions

The Chernobyl accident on 26 April 1986 altered the picture. Europe, which had looked on at the events at Three Mile Island in the United States, now came under the radioactive cloud of Chernobyl. The main response of the various authorities in the Member States was to offer advice on what not to eat and drink and to specify allowed levels of contamination for foodstuffs and drinking water. Despite the efforts made by the European Commission, there was a very marked lack of coordination between the different national organizations. This added a great deal of confusion to basic fears.

Following the accident, there was a large and rapid growth in anti-nuclear feeling throughout the Community. Public opinion which had recently been rather in favour of nuclear power swung very much against it. The subject suddenly became a major political issue in many Member States with calls, usually from those in opposition to governments, to stop the progress of nuclear power or even to close down existing stations.

As a result, there was a strong polarization of views between the governments of Member States as to the future role of nuclear power in the Community. This was reflected in the new energy objectives adopted by the Energy Council in September 1986. Instead of agreeing on the specific target that nuclear power should generate 40% of electricity in the Community (the Commission's initial proposal), the Energy Council agreed only that 'the proportion of electricity generation should be reduced to less than 15% in 1995 from hydrocarbons', and recognized the substantial part played by nuclear power in the Community's energy supply.

Developments in the Community

In the year since the accident a great deal has been said and written about the future of nuclear power in the Community. Not all of this has been as negative as the previous section may imply. Very strong support for nuclear power came immediately after the Chernobyl accident from the Tokyo Summit in May 1986. At the end of June the European Council meeting in The Hague recognized that nuclear energy constitutes an important source of energy for many countries. The special session of the General Conference of the International Atomic Energy Agency (IAEA) in September 1986 — attended at ministerial level by many of the 94 countries represented — adopted by concensus a resolution on the safety of nuclear power which starts by stating that nuclear power will continue to be an important source of energy for social and economic development.

The debates are still continuing (see *Community News: European Parliament*). General agreement has already been reached in several areas. The first is that, because of the major differences in technology between the Chernobyl reactor and the nuclear reactors in operation in Western Europe, **the Community has very little to learn in terms of the technical aspects of nuclear safety from the accident.** Secondly, human error played a very major part in the Chernobyl accident. The operating procedures, operator training and the engineered 'defence in depth' of Western reactors would have combined to help prevent a Chernobyl-type disaster.

However, in spite of the highly developed 'safety culture' already practised within the Community, Chernobyl has

taught the international community several lessons. The first among these is the international repercussions that result from any nuclear accident involving the release of large quantities of radiation. Radionuclides do not respect international boundaries. Therefore, preventing nuclear accidents and reacting to any that might occur are tasks that need to involve a **high degree of international cooperation — especially in the areas of nuclear safety, radiation protection and information.**

On a world scale, the ideal forum for this international cooperation is the International Atomic Energy Agency in Vienna. All the Community's Member States, together with the Commission, are giving full support to the Agency in its post-Chernobyl programme. Indeed, it has become clear that the European Community — the world's largest producer of nuclear electricity — has a very important lead role to play. In June 1986 a document was adopted by the Commission ([1]) which outlined the basis for common action by the Community and set out the action areas. This 'framework communication' has guided much of the post-Chernobyl work of the Commission (see *Energy in Europe*, No 5).

This communication was followed in August 1986 by one which discussed the development of Community measures for the application of that part (Chapter III) of the Euratom Treaty dealing with health and safety.

The next document to be presented by the Commission (in November 1986) was a paper describing the Chernobyl accident and its impact on the Community.([2]) An extract from this document was published in the last edition of *Energy in Europe*, No 6.

Some of the data on which the above publication were based were drawn from a report prepared for the Commission by the **National Radiation Protection Board (NRPB) in the United Kingdom**([3]) and published in March 1987 which, *inter alia*, made **preliminary** estimates as to the number of fatalities that could result in the Community from the release of radioactivity from Chernobyl (see also *Energy in Europe*, No 6).

The assessment was made using the environmental measurements carried out during the month after the accident and on calculations using mathematical models of radionuclide transfer in the environment and estimated risk factors for cancers as a result of irradiation. To see the results in context, it is necessary to compare them with the number of cancers that would occur in the population if Chernobyl had not happened. Without the Chernobyl release, during the next 50 years about 30 million people in the Community are expected to die of cancer. The number of additional fatalities from **cancers of all types** due to Chernobyl, approximately 1 000, are expected to occur over roughly the same period. Similarly, the number of thyroid cancers expected in EC countries over the next 50 years, even if the Chernobyl release had not happened, is of the order of 300 000, while the accident itself, on the NRPB figures, is expected to give rise to a further 2 000. Of these 2 000, approximately 5% are expected to result in fatality.

It is also possible to calculate on a similar basis the number of fatalities that might be expected in the Community over the same 50-year period as a result of irradiation by natural sources — **cosmic rays, terrestrial radiation and irradiation from naturally-occurring materials in the diet.** This results in an estimate of 8 000 fatal cancers per year, or nearly half a million over a 50- year period. **This is nearly 500 times greater than the excess cancer fatalities predicted due to Chernobyl.**

The authors of the report stress that during the coming months and years, improved assessments will be made of the radiological impact of the Chernobyl accident and that their results should be regarded as preliminary.

Another major report, which was adopted by the Commission, concerns the technological problems of **nuclear safety**. There is a common interest to work together to ensure that nuclear installations are safe in all circumstances and to provide the public and decision-makers with clear explanations of the means used to ensure safety. There have been some who would propose to achieve this goal by a Community system of binding safety criteria. However, the Commission prefers to follow the course of **harmonization,** placing emphasis on the principal objective of the Council Resolution of July 1975 'to provide an equivalent and satisfactory degree of protection of the population and of the environment against the risks of radiation resulting from nuclear activities'.

The report critically reviews what has been achieved, on the Community level, in the field of harmonization of codes and standards in nuclear safety. In view of the experience accumulated in the course of implementation of the Council Resolution and the lessons learned from accidents such as Three Mile Island, **the actions recommended in the communication go beyond a continuation of the harmonization process.**

The proposals represent a comprehensive approach concerning the **promotion of further common options for safety and for assuring an equal level of protection for the population of the Community as a whole which is more adapted to the post-Chernobyl situation.** They do not, however, require new legally-binding regulations and could probably be carried out through the existing collaborative arrangements.

There are four major aspects to the strategy:

(a) continuing and bringing to an interim conclusion the harmonization process initiated in response to the Council Resolution of 22 July 1975, by publishing the criteria and guidelines that are most important for the safety of light-water reactors, together with statements of convergence/divergence;

(b) promoting cooperation in the field of reactor safety reviews at Community level in order to ensure the mutual transparency of the methodologies, plans, scope, input data and results of such reviews;

(c) undertaking an examination of the situation with regard to the human resources and main installations dedicated to nuclear-plant safety in order to ensure that economic pressures and some decline in the pace of development of nuclear power do not jeopardize the assets on which are based the considerable achievements in the Community in the nuclear-safety field;

(d) supporting the IAEA, which has an essential role to play on the broadest international level in the process aimed at ensuring that stringent safety standards are applied in the different regions of the world.

In one area the Commission has had to move rather more slowly than hoped. Within days of the Chernobyl accident the Council agreed values for the **maximum permissible levels of radioactivity in foodstuffs and water.** These values were designated as 'temporary' until detailed recommendations could be made and agreed by the Council. In December 1986 the Commission adopted a draft proposal concerning the limits on the radioactive contamination of agricultural products and drinking water following a nuclear accident.(4) However, at that time, the precise limits for the permanent system of controls had not been agreed. A scientific seminar on the subject of radioactive contamination of agricultural products was held in Luxembourg in April 1987. Following this seminar the Commission adopted its proposals concerning the maximum permissible levels. These will now be submitted to the Council for a decision. The temporary measures have been extended until the end of October 1987.

The Commission has also very recently adopted and submitted to the Council a formal proposal for a Community **system of rapid exchange of information**. On the information to be reported, the Commission proposal follows closely that of the Vienna (IAEA) Convention on '**early notification**' but adds two items to the list. The first of these concerns reporting the measures introduced for agricultural products and drinking water. This would allow the Commission to fulfil its duties of maintaining a unified market and protecting the health of the population. The second concerns reporting measures taken or planned, by which the public is advised how best to protect itself. For example, if the public is advised not to eat certain foodstuffs this would be reported and would help to avoid a repetition of the confusion over these matters which followed the Chernobyl accident. An essential difference between the Vienna Convention and a Community system is the 'two way' nature of the latter. It is not only the country in which an accident occurs that reports, but also any country which detects the radiation. Under this system, each reporting country would also be informed of the actions taken by others. Unnecessary duplication would not arise because, by supplying the information specified by the Community system, the Member State would at the same time be fulfilling the requirements of the Vienna Convention.

Concerning the Vienna Convention on '**early notification**' and that on '**mutual assistance**' (adopted together by the General Conference of the IAEA in September 1986), the Commission considers that it is advisable for the Community to accede to both these conventions. A proposal to this effect is presently before the Council.

April 1987

In the past 12 months, nine new reactors have entered commercial operation to boost the Community's nuclear capacity to over 86 GWe, close to a 15% increase. Eight of these new stations are in France.

Within the Community over 30 nuclear power stations are at various stages of construction (see Table, p. 9). It is likely that the large majority of these stations will be put into commercial service within the next five or six years. This will add another 30 or so gigawatts electrical capacity to the grids.

Nuclear power plants in EC 12

Country	April 1986		April 1987		Under construction	
	Number	GWe	Number	Gwe	Number	GWe
Belgium	7	5.5	7	5.5	—	—
France	40	35.3	48	45.1	13	16.3
Germany	16	16.1	17	17.4	7[1]	5.6
Italy	3	1.3	3	1.3	4	3.9
Netherlands	2	0.5	2	0.5	—	—
Spain	8	5.5	8	5.5	7[2]	6.5
U.K.	38[3]	10.6	38	10.6	4	2.4
Total	**114**	**74.8**	**123**	**85.9**	**35**	**34.7**

[1] Includes one reactor which is operating but not in full commercial service and two reactors whose construction is completed.
[2] Includes two reactors the construction of which has been 'deferred' and three reactors on which construction has been halted temporarily.
[3] Includes five advanced gas cooled reactors (AGRs) which are feeding electricity into the grid but which are not yet fully commissioned.

Nuclear power will clearly continue to play a major role in providing the Community's energy in the future, but it is still too early to make predictions concerning its continuing growth in the longer term. There are some preliminary indications that public opinion may be slowly returning to its support — at least in some countries. And pointers to Europe's nuclear future could be the achievement of 100% power by the Community's first commercial-size fast reactor, Super Phenix, and the UK Government's approval for Sizewell B, which is reviewed below.

In January 1981 the Central Electricity Generating Board (CEGB) in the United Kingdom applied for consent to build a pressurized water reactor (PWR) at Sizewell on the Suffolk coast.

A public inquiry into the CEGB's application was convened in January 1983 under Sir Frank Layfield as Inspector. This inquiry — the longest in British history — finished taking evidence in March 1985. The inquiry touched on all aspects of civilian nuclear power. However, the emphasis was on three main issues — safety, economics and the consequences to the environment of building a PWR at Sizewell.

The report was presented to the Department of Energy in December 1986 and made public in January 1987.

On the question of safety, the report concludes that **'there should be good confidence that Sizewell B, if built, would be sufficiently safe to be tolerable, providing that there is expected to be economic benefit sufficient to justify the risks incurred'.**

On the question of economics, the report concluded that **'Sizewell B is likely to be the least-cost choice for new generating capacity'** and that the probability of a coal station having lower costs than Sizewell B was **'about one chance in 40'.**

On the subject of the consequences to the environment, the Inspector found that 'the detrimental visual effect of Sizewell B on the local landscape would be so great that unless the proposal is held to be justified in the national interest, consent and permission should be refused'. He also concluded that 'the greatest harm to the local ecology would be caused by the construction of the proposed new access road' and recommended that permission to construct the road be refused.

The general conclusions were:

(a) **'There is a national interest in building a PWR; that national interest can be best met at Sizewell B.'**

(b) **'The expected national economic benefits are sufficient to justify the risks that would be granted.'**

The report was debated in both Houses of the British Parliament. In March, the Secretary of State for Energy, Peter Walker, announced that the government had decided to give its consent to the CEGB's application to construct Sizewell B.

In taking this decision, the Secretary of State said that consideration had been given to the relevance of Chernobyl to the safety of the proposed station and account had also been taken of recent changes in electricity demand and fossil-fuel prices.

[1] COM(86)327 final of 12 June 1986, 'Outline communication from the Commission to the Council on the consequences of the Chernobyl accident'.
[2] COM(86)607 final, 'The Chernobyl nuclear power plant accident and its consequences in the framework of the European Community'.
[3] 'A preliminary assessment of the radiological impact of the Chernobyl reactor accident on the population of the European Community'.
[4] COM(87)28 final.

Regional energy planning in the Community (1982-86)

One of the new Community energy policy objectives for 1995 (see **Energy in Europe**, *No 6) is '...the implementation, in appropriate frameworks, for those regions which are less-favoured, including those less-favoured from the point of view of energy infrastructure, of measures designed to improve the Community's energy balance...'*

The Commission's regional energy planning activities in the context of energy planning in general (see **Energy in Europe**, *No 3, where the developing countries are concerned) are entirely consistent with this objective.*

The need for action by the Community

Firms, both private and public, municipalities, regions, Member States and the Community have for a long time been concerned with analysing the energy situation and making forecasts. The findings of the work in question are of value to the public authorities as guides to decision-making and to firms when assessing their investment projects. Until the early 1970s the energy situation did not present any major problems, so there was no particular reason for making detailed and extensive analyses of the energy market at regional or local level. However, in the wake of the massive increases in oil prices and the resulting consequences for the energy market, it became clear that there were considerable information gaps:

(a) Generally speaking, there was a lack of reliable data for an assessment of the energy situation, especially on the demand side.

(b) The forecasts made in Europe soon turned out to be wrong. The crux of the problem was the assessment of energy demand.

What did consumers expect of the energy market in the foreseeable future? Which and how much useful energy did they plan to buy at a given price, etc.?

How the action developed

After discussions within the Council of Energy Ministers in October 1978, the Commission of the European Communities decided to carry out energy analyses in developing countries. It soon became apparent that specific instruments and simple methods could be developed to reduce some of the effects of uncertainty on forecasting future energy supply and demand requirements.

At the same time more systematic and more basic work was being carried out at regional and local level in certain Community countries, e.g. studies by the regional energy agencies set up in France as part of the regionalization programme, local and regional energy supply schemes encouraged by the German Government, energy planning activities in Denmark even at municipality level, and regional energy analyses in Belgium and the Netherlands.

Towards the end of 1982 the Commission decided to contribute towards this work. The immediate objective was to organize an exchange of experience between the various institutions working on similar problems within the Community, to circulate the information obtained, to take account of experience in non-member countries and finally to help carry out studies.

In the period 1982-86 the Commission made comparative assessments and analyses of the very varied approaches pursued within the Community, held a number of seminars and gave increasing support to local and regional energy analyses.

The objectives

After five years of experience in the European Community and 30 or so analyses in progress or completed, it is possible to give a general outline of action by the Commission in this sphere.

The main objectives are as follows:

(a) to improve the stock of information — especially concerning energy demand, the opportunities for making more efficient use of energy, and regional energy sources;

(b) to promote exchanges of experience between the authorities, institutions and firms concerned;

(c) to transfer and circulate the experience acquired in certain countries or regions;

(d) to develop methods for carrying out interface analyses (e.g. energy/environment, energy/employment): municipalities and regions lend themselves particularly well to this type of analysis.

The Commission's activities therefore concern producing energy balance sheets, energy demand analyses (useful energy), energy demand forecasts and the use of energy sources indigenous to the regions (including energy efficiency).

With the exception of the indigenous potential of the regions, the supply side has therefore deliberately been left out, since it would be ill-advised — and even quite often wrong — to attempt to study oil, natural gas, coal or electricity supplies in the context of geographically very limited areas. Studies of this kind can only be carried out rationally at firm level, etc., where the responsibility for an investment decision actually lies.

This is how the Commission sees its contribution to energy planning, energy market studies, energy schemes, energy analyses, etc. The main objective is to make energy data available to prospective users in order to make the market more transparent.

The present situation

The Commission has made a number of assessments which show the differences in organizational set-ups, the objectives and the content of the regional and local energy studies and the methods used. Priorities also vary from country to country. In **Denmark**, emphasis is placed on the preparation of decision-making bases, and detailed feasibility and planning studies, because of the specific nature of the analyses, which are mostly confined to the heat market. In **Belgium**, the analyses are primarily geared to the preparation of data and assembling an appropriate data base. In the **Federal Republic of Germany**, **France** and **Italy** efforts are also being made to improve the stock of information, although additional work is also carried out ranging from decision-making bases to detailed planning in the case of certain projects (e.g. the development of energy sources indigenous to the regions).

In some countries, the European Community makes only a small contribution to project financing. This is the case, for example, in **Denmark**, **Germany**, **Italy** and **France** where regional energy analyses have already been carried out for a number of years on a vast scale (mainly concerning the heat market in the case of the first two countries), and generally as a result of national promotion programmes and/or legal provisions calling for regional and local energy planning.

In a second group of countries, comprising **Belgium**, **Greece**, **Ireland**, **Luxembourg** and the **United Kingdom**, all the energy analyses carried out are co-financed to a considerable extent by the European Community. Some of them have been prepared with the help of Commission staff and experts from other European Community countries on the basis of work over a considerable period of time.

All in all, the Community has helped finance the 30 regional studies listed in Table 1, since 1982.

These 30 analyses may be classified as follows in terms of the type of area studied:

(a) 12 predominantly rural regions varying widely in size (from 100 to 70 000 square kilometres and 50 000 to 4 million inhabitants), ranging from a borough to an entire country;

(b) 7 predominantly urban or industrial towns, cities or areas;

(c) 11 mixed regions with major development areas.

All in all, there are over 70 million inhabitants in the 30 regions studied and their total energy consumption amounts to approximately 170 million toe.

The administrative structure involved ranges from a city to conurbations and major regions (provinces, *Länder*) to entire countries (**Luxembourg** and **Ireland**).

Table 1

European Regions
Belgium
Flanders
Brussels
Wallonie
Denmark
Bornholm
Soenderjylland
Storstrøm
F.R.G.
Berlin (Neukölln)
Berlin (Senat)
Nordfriesland
Nordfriesland (Sylt Island)
Oberpfalz-Nord
Saarland
Schleswig-Holstein
Spain
Catalonia
País-Vasco
France
Aquitaine
Lozère
Provence-Alpes-Côte d'Azur
Rhône-Alpes
Greece
Cyclades Islands
Ireland
Data base
Italy
Lombardia
Puglia
Luxembourg
Energy analysis
Netherlands
North Brabant
Westland
Rijnmond
Portugal
Energy saving
U.K.
North-West
Cornwall

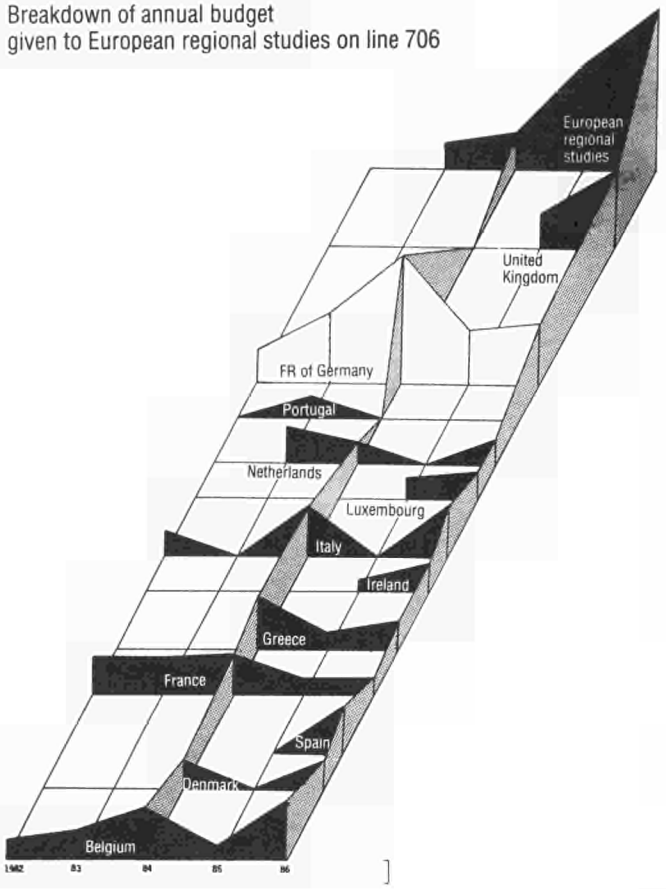
Table 2

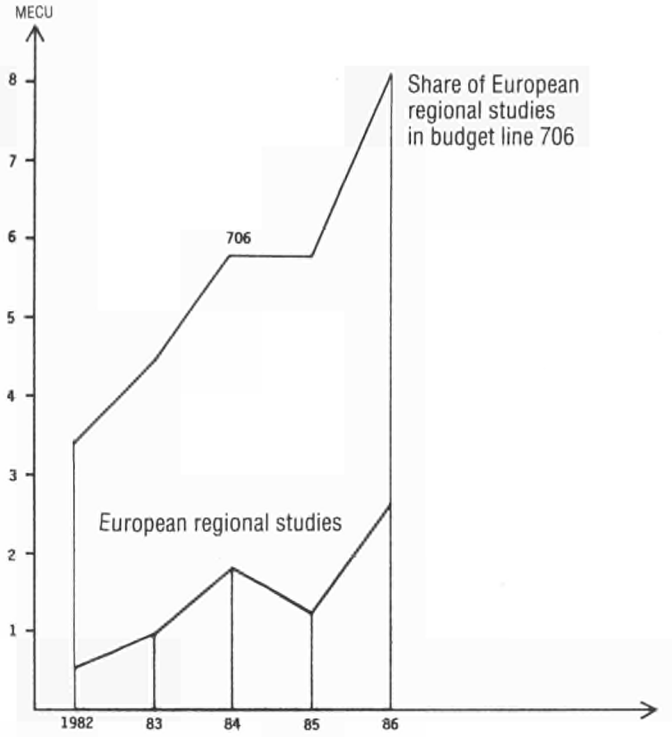
Regions	Population 84 (Millions of inhabitants)	Regional Energy Consumption Mtoe	Community Aid (Article 706 1982-1986)	% of aid to the regions Article 706
Aquitaine (F)	2.7	7.7	306 900	
Berlin-Neukölln (D)	0.15	0.27	127 039	
Berlin (D)	1.90	3.47	516 460	
Bornholm (DK)	0.05	0.23	67 000	
Bruxelles/Brussels (B)	0.95		55 270	
Catalonia (E)	6.10	7.90	130 000	
Cornwall (UK)			125 300	
Cyclades (GR)	0.9	1.16	433 000	
Vlaanderen (B)	5.60	20.00	320 378	
IRL	3.40	5.76	169 790	
Lombardia (I)	8.90	19.63	320 000	
Lozère (F)	0.07	0.13	65 886	
Luxembourg	0.36	2.86	222 000	
Noord-Brabant (NL)	2.10		99 443	
Nordfriesland (D)	0.16	0.33	148 000	
Nordfriesland (Sylt) (D)	0.02	0.08	67 000	
North-West England (UK)	6.75	16.10	360 553	
Oberpfalz-Nord (D)	0.48	1.30	267 300	
País Vasco (E)	2.20	3.90	85 000	
Portugal (Energy saving)	9.95	10.79	98 000	
Puglia (I)	3.90	4.97	225 000	
Provence-Alpes-Côte d'Azur (F)	3.91	12.04	224 350	
Rhône-Alpes (F)	5.10	15.80	72 850	
Rijnmond (NL)			105 000	
Saarland (D)	1.10	6.62	258 600	
Schleswig-Holstein (D)	2.60	7.25	140 200	
Soenderjylland (DK)	0.25	0.22	113 000	
Storstrøm (DK)	0.26	0.21	61 275	
Wallonie (B)	3.20	11.70	374 343	
Westland (NL)	1.00	0.80	158 000	
Total	73.24	161.22	5 716 937	20.64%

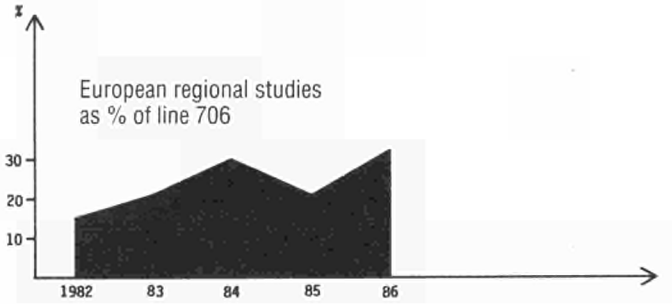
General studies for Europe

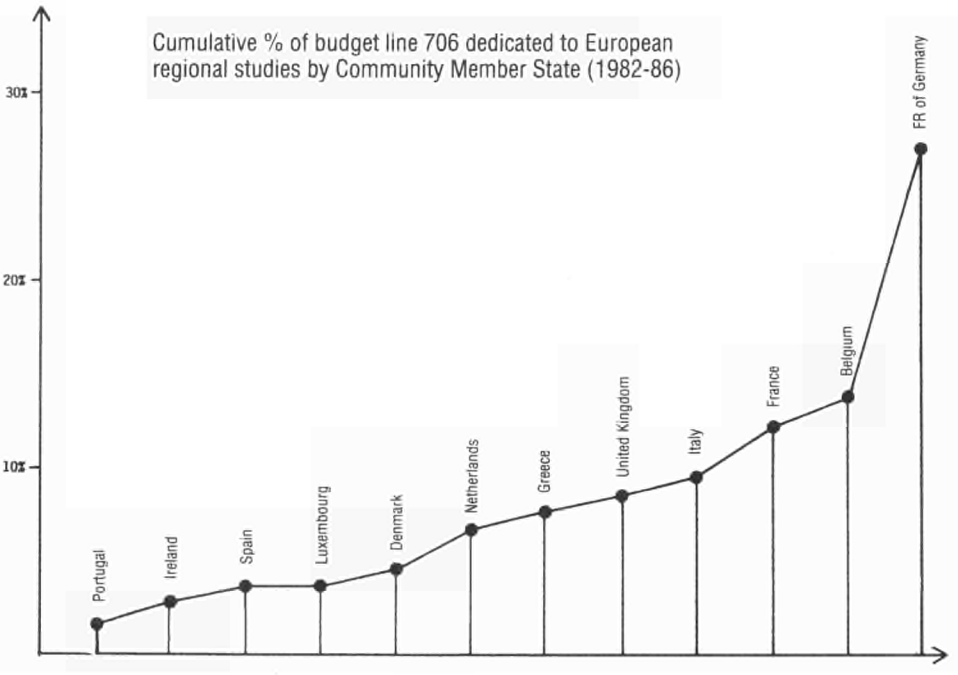
Regional evaluation studies			261 900	
Follow-up evaluation studies			245 800	
Energy fluxes in the EEC			593 620	
Regional balances			93 000	
Methodology guide			47 000	
Seminar (Berlin + Luxembourg)			98 000	
Study of supply concepts			114 600	
Total 2	/	/	1 453 920	5.25%
Total 1 + 2	/	/	7 170 857	25.89%
Total Budget for Article 706:			27 699 380	

Breakdown of annual budget
given to European regional studies on line 706









The results

To date 15 analyses have been completed and a dozen others have already yielded partial results. In line with the objectives laid down by the European Community, the results obtained primarily concern data collection, balance sheets and energy demand analyses. They also cover data for assessing investment in energy efficiency, new and renewable energy sources and traditional energy sources (gas, electricity and heat) as well as electricity and gas supplies and district heating.

Belgium is an interesting case, since it is entirely covered by three analyses (Wallonia, Flanders and Brussels). Belgium's national energy statistics have been improved as a result of the work.

In addition, three projects have made a significant contribution to the development of analysis methods and instruments:

(a) **The energy flow analysis by the City of Berlin.** An instrument for analysing and displaying energy flows using microcomputers has been developed. It enables experts or policy-makers rapidly to see the interactions between the energy flows of final demand (useful energy) in relation to supply. It also displays the flows concerning harmful emissions (SO_2, NO_x, etc.), prices and jobs. It is now available to the Statistical Office of the European Communities for the presentation of the energy flows of the 12 Community Member States. A number of regions in Europe (Schleswig Holstein) and in developing countries (Peking, Rio de Janeiro) are going to use it for their own requirements.

(b) **Cost-benefit analysis** at municipal/regional/national level and in monetary and employment terms has been developed in the context of the **Storstrøm** project (Denmark). This approach is now used in other regional studies.

(c) **The Walloon region study** has yielded excellent methodological results for the preparation of energy balance sheets and atlases. This exercise will be extended to other Community regions.

Table 2 contains details of the funds granted under the Community budget (25.9% of the appropriation in Article 706) over the period 1982-86. A breakdown of the funds is given in the figures.

They can be compared with the funds allocated by the various regions themselves for specific energy planning projects:

(a) heat networks in Saarland and Denmark;

(b) a significant regional and national budget in France (Aquitaine, Provence-Alpes, Côte d'Anjou and Rhône-Alpes);

(c) structuring of national energy data (Ireland, Luxembourg and Belgium).

Energy cooperation with Latin America

The European Community has been cooperating on energy planning with developing countries since 1980. The underlying philosophy and details were set out in **Energy in Europe**, *No 3.*

Latin America occupies a special position in this connection since the Community's energy cooperation scheme is particularly well-suited to the situation and the energy problems of the Latin-American continent, as confirmed once again during missions by personnel of the Directorate-General for Energy in December 1986 (Venezuela, Ecuador, Peru, Brazil and Argentina) and February 1987 (Mexico).

The energy situation in Latin America

The Latin-American continent has impressive energy potential: according to Olade (the Latin-American energy organization), energy reserves totalled 127 billion toe in 1984 whereas commercial energy production was below 500 million toe, giving a reserves-production ratio of 250 years. However:

(a) There is a considerable imbalance between reserves, utilization and production. For example, hydroelectricity accounts for 77% of total reserves but only 13% of the reserves are used, while oil accounts for only 10% of reserves but 63% of primary energy production. Latin America is therefore very dependent on a single source of energy: oil.

(b) The situations of the various Latin-American countries vary quite considerably, since over 90% of the energy reserves in the region are located in six countries: **Brazil** with 24%, **Mexico** with 20%, **Venezuela** with 19%, **Colombia** with 15%, **Argentina** with 8% and **Chile** with 6%. The following subdivisions should be made:

(i) net exporters: **Mexico, Venezuela, Ecuador, Peru** and **Colombia**;

(ii) net importers with substantial potential markets: **Bolivia, Brazil** and **Chile**;

(iii) one country which is just about self-sufficient: **Argentina**;

(iv) all the others, which are significant importers: **Central America, Uruguay, Paraguay** and the main **Caribbean islands**.

Latin America exports one-third of its production, but half of the Olade countries are net oil importers.

The map gives the main indicators of the Latin-American energy situation.

One final point which should be noted is that although trade in energy products with the EEC is at present rather on the low side, it is steadily increasing. There can be no doubt, therefore, that the potential for Latin America to increase its energy production and exports of energy are promising.

The energy stakes in Latin America

But for the chronic foreign debt problems which — to various degrees — afflict all the Latin-American countries, their energy situation could be viewed with optimism.

The energy potential figures are being revised upwards everywhere, and the Latin-American continent should in all probability consolidate its position as a net energy exporter by the end of the century or at least be self-sufficient. Here are some examples:

(a) **Venezuela** has 40 years of oil and gas reserves at present consumption levels, without taking into account the enormous heavy oil reserves of the Orinoco basin. According to the results of technological research in progress at present — with the cooperation of VEBA (Federal Republic of Germany) — these deposits could rapidly become economic (at a price per barrel of over $15). Some would even go so far as to assert that **Venezuela**'s oil and gas reserves are on a par with those of the Middle East.

(b) In **Ecuador** the pessimistic figures published in 1985 (reserves-production ratio of only 13 years) have also been revised upwards and,

with a marginal cost of exploitation very close to $10 per barrel with present technology, the economic conditions are acceptable. Of course, recently Ecuador has suffered a dent to its oil production due to a devastating earthquake. This country also has very significant hydroelectric potential.

(c) **Peru** was very recently successful in oil and gas exploration (doubling its reserves) and has so far only exploited 3% of its hydroelectric reserves.

(d) **Brazil** is rapidly reaching the stage of energy self- sufficiency (recent oil and gas discoveries in Amazonia and off shore, considerable hydroelectric potential, progress achieved with biomass) and its export capacity should rapidly be consolidated.

(e) **Argentina** is forecasting significant energy surpluses in its Energy Plan 2000, and the resources of Patagonia in particular have by no means been systematically explored.

(f) **Colombia** has considerable coal reserves and now exports coal to the world market.

SOURCE: OLADE + IMF

Total population of Latin America: 344 M hab
Final energy consumption of Latin America: 270 M toe (82)

This potential could increase still further in the decades ahead and give the Latin-American continent a significant role to play on the world energy stage.

Table 1 — Estimate of energy exchange between Latin America and the EEC (oil and petroleum products)

(1984 — x 1000 toe)

Country of origin \ Country of destination	B	DK	E	F	IRL	GR	I	L	NL	P	D	UK	Total imports EUR 12	% of supply
ECUADOR													0	0.00%
VENEZUELA	655	48	849	953			2475		416	473	4363	1441	11673	31.22%
Total OPEC:	655	48	849	953	0	0	2475	0	416	473	4363	1441	11673	31.22%
ARGENTINA													0	
BRAZIL				3					229		9	13	254	0.68%
COLOMBIA (only coal)			65										65	0.17%
MEXICO	209		9521	3562			1740		3691	523		896	20142	53.87%
DUTCH ANTILLES	238	44		278					665	1	22	2230	3278	8.77%
TRINIDAD & TOBAGO				36			14		32		11	1888	1981	5.30%
TOTAL	1102	92	10434	4832	0	0	4229	0	4833	997	4405	6467	37392	100.00%
Total supply of Community countries	36136	11959	96276	96869	16583	1220	94704	0	78171	10601	115072	57662	575253	/
Dependence on Latin America	3.05%	0.77%	18.54%	4.99%	0.00%	0.00%	4.47%	0.00%	6.18%	9.41%	3.83%	11.22%	6.50%	/
Dependence on OPEC members	1.81%	0.40%	1.51%	0.98%	0.00%	0.00%	2.61%		0.53%	4.46%	3.79%	2.50%	2.03%	

Source: (IEA Anual statistics, 1986, in tonnes) + (Conversion coefficient toe/tonne: 1 for crude oil; 1.1 for petroleum products; 0.667 for Colombian coal).

Energy policy considerations

However, before this can happen there are a number of energy policy conditions which have to be met. There must also be a genuine desire to husband energy resources in such a way as to satisfy requirements while controlling energy demand. This is where the foreign debt constraint is most in evidence since it drastically curbs the investment capacity. However, this constraint does have one beneficial effect, since it obliges those responsible to appreciate the real investment requirements of the energy sector and hence formulate healthier energy policies. In other words, to plan more efficiently in order to choose more efficiently.

The past energy position of the countries in question — whether exporters or importers — has also affected whether or not more appropriate energy policies have been formulated. **Argentina** and **Brazil** are more advanced because they were affected earlier by the external debt constraint (as a result of oil price increases in 1973 and 1979-80), whereas in the oil-exporting countries there was a certain amount of laxity. The recent reversal of the trend on the oil market must be regarded as salutary for these exporting countries (**Venezuela, Mexico** and **Ecuador**) from the point of view of overall management of the energy sector. It is prompting them to be more supportive of improvements in energy policy.

However, that is not the end of the story, since quite apart from the medium-term guide and consensus-forming function of an energy plan (to be regarded not only as a framework document but also as part of an ongoing process), energy pricing policy remains vitally important, and there is still progress to be made in this respect.

In addition to these commercial stakes, there are also specific problems arising from non-development or under-development, since, as on other continents, firewood is an essential resource for large sections of the Latin-American peoples. Intensive exploitation of this energy source — in particular as a result of population growth — creates grave environmental problems and so priority must be given to developing alternative energy resources.

Energy cooperation schemes with Latin America

Since 1980 energy cooperation schemes have been launched to assist Latin America in the light of the general situation described above. The Latin-American continent has rapidly become one of the main beneficiaries of this type of cooperation since the general objectives and axes of the Community's energy cooperation activities apply perfectly to the Latin-American energy situation:

(a) **Local energy planning expertise** must be improved. This is, of course, a long-term task and the training of managerial staff will continue to have priority for a long time to come.

(b) **Energy information** should be improved both in content and in presentation. Although Latin America is better off here than in some continents or areas, major efforts must be made to harmonize and update energy information and produce energy forecasts of quality.

(c) The **development of local energy sources**, essentially new and renewable ones, should be promoted.

(d) **Energy technology exchanges** between the EEC and Latin America should gradually be organized. Europe's experience in the sphere of rational use of energy (demonstration projects in particular) is of interest to Latin America (with a view to diversifying energy sources and conserving energy) and a forum for exchanges needs to be organized.

(e) Lastly, in accordance with the broad lines of its policy *vis-à-vis* Latin America, the Commission intends to assist the **economic integration** of Latin America. In the energy sector this will entail supporting bodies such as **Olade**, the **Andean Pact**, and the **Central American Common Market.**

Since 1980 nearly 14 million ECU have been committed by the EEC in this area to assist Latin America, mainly from two budget sources — Article 706, energy planning, administered by DG XVII, and Article 933, energy development, administered by DGs VIII (Development) and I (External Relations).

Table 2 — Energy cooperation with Latin America

(Mio ECU)

1979-86	Article 706						Article 993	
	Technical assistance	Methodology development	Training	Seminars/ Information	Studies	*Total*	Energy cooperation	**Total**
Mexico	1.102	0.295		0.033	0.255	*1.685*	0.65	**2.335**
Central America							0.70[1]	**0.07**
Venezuela				0.058		*0.058*		**0.058**
Columbia	0.621			0.018		*0.639*	0.150[1]	**0.789**
Ecuador	3.42		0.01	0.007	0.137	*3.574*	0.060	**4.174**
Argentina	0.05	0.643	0.289	0.035	0.315	*1.332*		**1.332**
Chile		0.100				*0.100*		**0.100**
Brazil		0.653	0.37	0.28	0.588	*1.891*		**1.891**
Olade	0.177		0.115	0.291		*0.583*	0.79	**1.373**
Andean Pact							0.5[2]	**0.5**
Miscellaneous (all countries)				0.25	0.397	*0.647*		**0.647**
Total	5.37	1.691	0.784	0.972	1.692	*10.509*	3.39	**13.899**

[1] Forecasts.
[2] From Article 930.

Comments concerning Table 2

(a) The Latin-American energy research centres (IDEE-Bariloche, COPPE-Brazil and IIE-Mexico) have a very important role to play in formulating a **common energy planning methodology** adapted to the economic and social realities of developing countries. They play a very active part in the work of the international network bringing together 14 institutes in various continents of the Third World (see *Energy in Europe*, No 3).

(b) The methodological work supported by the Commisson of the European Communities is linked with **training activities**, since Latin America's total requirements in terms of energy planners, given constant staffing levels and only taking into account requirements at national level, have been estimated at nearly 1 000 managerial staff to be trained. The Commission supports the training efforts and contributes towards the annual courses organized by the IDEE in **Argentina** and the COPPE in **Brazil**.

(c) The Commission also supports the **planning exercises** carried out by various countries at national and regional level. The main objectives are:

(i) to help build up a more efficient energy information system which can be periodically updated;

(ii) to make available or help create more efficient analysis and forecasting tools adapted to the realities of the Latin American economies and establish the impact of the energy sector on structural changes in these economies;

(iii) to help set up or strengthen planning teams comprising academics, planners from the ministries concerned (generally the planning and energy ministries) and managerial staff from companies (oil companies, electricity companies).

Two countries have already received substantial technical assistance in this connection: **Ecuador** (National Energy Institute) and **Mexico** (Energy Secretariat). Regional planning exercises have also been supported (**North-East Argentina**, and the **state of Rio in Brazil**).

Lastly, the Commission of the European Communities has organized numerous exchanges of experts and seminars in order to facilitate exchanges of experience concerning energy between Europe and Latin America.

The world oil market: prospects and uncertainties

Perceptions have been changing recently about the future evolution of the world oil markets. The conventional wisdom used to be that burgeoning demand for oil in developing countries would be the main point of pressure, sustaining high and rising real prices through to the end of the century. But there are signs now that more pressure could come from the industrialized countries than the developing world, with increased oil demand and falling oil supply in the United States by far the most significant element.

Previous editions of *Energy in Europe* have discussed the prospects for energy demand and supply to 1995 and beyond **within** the European Community, notably in the context of low oil and energy prices. (1) One undisputed conclusion from the analysis underlying each of these articles is that the Community's dependence on the outside world for energy supplies is going to grow rather than to diminish over the coming years. As a result, the Community is likely to remain the world's single largest importer of natural gas, coal and, of course, oil. Developments on all world energy markets in general, and on the world oil market in particular, are therefore bound to play a critical role in determining our energy security and our energy future. This article sketches out the main questions about world oil demand and supply that will arise over the coming 10 to 15 years.

World oil market developments since 1973

Between 1973 and 1985 **world oil demand** outside the centrally-planned economies (CPEs) fell by some 3.2 Mb/d, with the fall in OECD demand of 6.5 Mb/d offset by a rise of 3.3 Mb/d in demand from the developing countries.

Table 1
World oil demand and supply

(Mb/d)

	1973	1980	1985
World oil demand[1]	**48.8**	**49.7**	**45.6**
OECD:	40.5	38.7	34.0
of which: USA	16.2	16.2	14.6
Non-OECD	8.3	11.0	11.6
Non-OPEC oil supply			
OECD:	13.9	14.8	17.2
of which: EC	0.3	1.8	3.0
USA	10.4	9.7	10.0
CPE net exports	0.7	1.2	1.6
Developing countries	2.7	5.8	8.6
OPEC production	31.3	27.6	17.2

Source: Eurostat and IEA.
[1] Excluding CPE internal consumption.

Over the same period OECD **oil supply** rose by 3.3 Mb/d, principally as a result of North Sea production; while production in developing countries outside OPEC rose by 5.9 Mb/d.

Net exports from CPEs to the world market also rose from 0.7 Mb/d to 1.6 Mb/d.

So the need for OPEC oil fell by a staggering 45% or 14 Mb/d.

Oil market prospects: the old 'conventional wisdom'

In a major study of energy demand and supply in the longer term — *Energy 2000* (2) — the Commission staff drew together a number of assessments of the world energy outlook to the end of the century which had been developed by oil companies, consulting groups and other analysts in the early 1980s.

The picture drawn from these assessments, based usually on the assumption that oil prices would remain high in real terms throughout the period, suggested that:

(a) **oil demand in the OECD** in 2000 would be at or below its actual 1985 level, with demand in the USA alone down by a further 1 Mb/d;

(b) **oil demand in developing countries**, on the other hand, was generally expected to rocket to well over 18 Mb/d, nearly 6.5 Mb/d above its 1985 level;

(c) during the same period **oil production in the OECD** woud decline by 3.6 Mb/d compared with 1985, with US output falling by some 1.6 Mb/d;

(d) oil production in **non-OPEC LDCs** would continue to increase, but only at a relatively modest rate compared with the 1970s;

(e) the **CPEs** as a group (essentially USSR and China) would cease to be net exporters of oil because of

growing internal demand and production problems in the USSR;

(f) so the call on OPEC would rise to 29 Mb/d, only 2 Mb/d below its 1973 level.

Table 2
World oil demand — the Energy 2000 conspectus

(Mb/d)

	1985	2000
Oil demand	**45.6**	**51.9**
OECD	34.0	33.5
USA	14.6	13.6
Non-OECD	11.6	18.4
Oil supply		
OECD	17.2	13.4
USA	10.0	8.3
CPE net exports	1.6	- 0.3
Non-OPEC LDCs	8.6	9.5
OPEC	**17.2**	**29.0**

Source: Energy 2000 and Table 1.

In short, the general expectation was that the major pressures on the oil markets would come from the **developing world**, with the OECD very much in second place. Moreover, the pressures would be so great as to ensure continuing high prices for oil, given that the potential call on OPEC would be well over 80% of OPEC production capacity (which many experts feel to be the point at which the market would tighten severely).

Oil market prospects: some recent reassessments

Two years on, and with the oil price little more than half its 1985 level, many analysts see the prospects rather differently. In the view of many, pressures from LDCs are now less of a worry for the future of the oil markets than possible developments in the OECD, and particularly in the USA:

(a) Assuming oil and energy prices stay low, **OECD oil demand** could be up by 10% or more (3 Mb/d +) in 1995 compared with its 1985 level. According to recent US Government estimates, US demand alone could grow by up to 1.8 Mb/d over the period to 1995 as a result of increased demand and falling supply. Our own study of Community energy prospects to 1995 also suggested that Community oil demand could grow by at least 0.7 Mb/d, and possibly considerably more, if continuing attention were not paid to energy efficiency improvements and to substitution away from oil (see *Energy in Europe*, No 6).

(b) Over the same period **OECD oil production** could fall much more sharply than thought earlier. Official US Government projections point to a fall in US supply of up to 3.3 Mb/d 1985-95, and indeed some 800 000 b/d have already been lost, at least temporarily, as a result of cutbacks in 1986. (The box below outlines the background to these projections.) In the Community the projected rate of decline will also be a little sharper than previously expected. By 1995 Community oil production could be 1 Mb/d lower than at present.

(c) On the other hand, generally speaking, projections of **LDC oil demand** in the mid-1990s and beyond have been scaled down by most analysts because of the poor economic growth performance in developing countries in recent years, the burden of debt which will constrain their oil import possibilities and improvements in energy management.

(d) **Oil production estimates** in LDCs could, however, be somewhat higher than projected earlier, at least into the earlier 1990s because of faster rates of production increase to date than many observers thought likely, the commitments involved in existing programmes, and recent exploration successes (e.g. Brazil, Venezuela).

(e) On the level of **CPEs' net exports** there is still a wide measure of disagreement amongst the experts. But few now believe that they are likely to become net importers as a group.

Taking these factors together, the OECD could require an additional 5 Mb/d or more from world markets by the mid-1990s, developing countries perhaps only 1-2 Mb/d. Even then the call on OPEC could be significantly below the figures in the upper 20s suggested earlier (see Table 2) which would reduce, though by no means eliminate, the risks of market tightening.

The USA — how large could oil imports grow?

Towards the end of 1986 President Reagan commissioned an energy security study to be used as a basis for US energy policy planning. The report, prepared by the US Department of Energy, examined at some length two future oil market projections and the associated growth in US net import dependence. It points to a growth in US net oil imports of 3.2 Mb/d between 1985 and 1995 if oil prices increase steadily in real terms, and a rise in net imports of 5.9 Mb/d over the same 10-year period if oil prices in real terms pick up only slightly from their current level. These projections for US oil dependence of course raise many questions concerning energy security, energy policies and options (including taxes) which the text goes on to address. The table below compares these figures with various other recent US projections.

Net oil import growth from 1985 — Various US projections
Growth (Mb/d) — Price ($ 1985/bbl)

Source	1990		1995	
DoE[1] — high price case	1.4	($ 22.50)	3.2	($ 27.50)
— low price case	3.2	($ 15.50)	5.9	($ 21.50)
NPC[2] — high price case	n.a.	($ 21.90)	3.6	($ 27.92)
— low price case	n.a.	($ 14.04)	7.1	($ 17.08)
Oil industry scenario	1.3	($ 21.00)	2.6	($ 27.00)

[1] US Department of Energy Security Study — March 1987.
[2] National Petroleum Council.

Oil market prospects: plausible ranges of uncertainty

Against this background the Commission staff have recently undertaken some preliminary work with two aims:

(a) to **analyse the circumstances under which low oil prices could be sustained over a relatively long period of time (to 1995)**;

(b) to identify **'plausible ranges of uncertainty'** for the main variables. This work has been undertaken using a new medium-term oil model developed especially for the Commission.

Some of the results are presented in two tables below.

The first (Table 3) presents one simulation under which the world price of crude would rise gradually by 1995 to a little over $21 per barrel in 1986 prices. It presupposes growth in LDC oil consumption of around 2.2% p.a.; continuing growth in LDC oil output through the early 1990s; a relatively optimistic outlook for US oil production; and continuing high levels of net exports from CPEs. If all these conditions held, the net call on OPEC would rise to about 23 Mb/d by 1995.

Table 3
World oil demand and supply to 1995 — one 'low oil price' simulation

(Mb/d)

	1985	1990	1995
Demand	**45.6**	**49.0**	**51.6**
OECD	34.0	35.8	37.2
Developing countries (incl. oil exporters)	11.6	13.2	14.4
Non-OPEC supply[1]			
OECD	17.2	15.4	14.8
CPE net exports	1.4	1.7	1.9
Non-OPEC developing countries	8.6	10.3	11.0
OPEC	**17.2**	**20.6**	**22.9**

Source: Aisling — World oil model.
[1] Excluding processing gains (net of losses) of around 1 Mb/d in each year.

The second (Table 4) takes into account differences of judgment relating to each of these latter elements and uncertainty about the progress of OECD oil demand. In this table, OPEC production is treated as a balancing item. If OECD (and particularly US) oil production slowed down more slowly than some of the recent estimates suggest, if the momentum of production in non-OPEC developing countries were sustained, and if net exports from the centrally-planned economies were kept at high levels, the potential requirements for OPEC oil could be as low as 21.8 Mb/d. But if US production slowed down rapidly, if investment were not maintained in developing countries, and if — for one reason or another — net exports from CPEs fell sharply, the call could be as high as 26.4 Mb/d — a difference of over 4.5 Mb/d.

Associated with this call are, of course, different price paths for crude oil. At the bottom end of the range the price could be sustained in real terms at below $20 per barrel. At the top end of the range the price would rise up to the mid-$20s.

Table 4
World oil demand and supply to 1995 — ranges of uncertainty

(Mb/d)

	1985	1990	1995
Demand	45.6	48.4—49.4	51.0—52.2
OECD	34.0	35.4—36.0	36.9—37.6
Developing countries (incl. oil exporters)	11.6	13.0—13.4	14.1—14.6
Non-OPEC supply[1]			
OECD	17.2	15.2—15.6	14.2—14.9
CPE net exports	1.4	1.0—1.8	0— 1.9
Non-OPEC developing countries	8.6	9.8—10.4	10.5—11.4
OPEC	17.2	19.6—22.4	21.8—26.4

Source: Aisling — World oil model.
[1] Excluding processing gains (net of losses) of around 1 Mb/d in each year.

These are only simulations and not predictions of price, demand or output.

As such they do not give a very clear-cut message to policy-makers. But two rather simple conclusions can be drawn:

Firstly, relatively low oil prices through to the 1995s are not inconceivable, particularly if world economic growth fails to get back into higher gear, if, nevertheless, investment can be sustained in oil production and development in developing countries and if the Soviet Union remains an important player on world markets.

But **secondly**, the more consumers and investors worldwide behave as if sustained low prices are the most likely outturn (by giving less attention to energy saving and reducing investment both in alternatives to oil and in oil exploration and development), the higher the probability that the reality will be different, with the prospect of oil markets tightening more quickly than envisaged in the 'low price' situation and much higher prices.

These issues now need to be explored further. But these latest simulations reinforce the arguments for encouraging further improvements in energy management in developing countries and in the centrally-planned economies, promoting world-wide exploration and development for hydrocarbons, and sustaining and, where necessary, reinforcing energy policies within the Community and other OECD countries. The latter will be of particular importance in the United States as the single main potential source of pressure on the world market.

* * * * * *

This article is based on a paper given by the Commission staff at the recent EC/OAPEC/OPEC Conference in March 1987 (reported elsewhere in this issue). Interested readers may obtain a copy of the full text by writing to the Directorate-General for Energy, Rue de la Loi 200, B—1049 Brussels.

[1] See '*Energy 2000*: the long-term outlook for the European Community', *Energy in Europe*, No 1; 'How much oil will the European Community need in 1990 if oil prices stay low?', *Energy in Europe*, No 5; 'Oil and energy prospects in the European Community: possible pressure points in 1995', *Energy in Europe*, No 6.

[2] *Energy 2000:* a reference projection and alternative outlooks for the European Community and the world to the year 2000, Cambridge University Press, Cambridge, and Economica, Paris, 1986.

What has been happening to energy efficiency?

There are signs that energy efficiency improvements in the Community have been slowing down in the mid-1980s. This article summarizes the findings of a detailed analysis of the trends since the second oil shock which comes to this conclusion. The findings underline the importance of continuing attention to energy savings if the Community's 1995 objective in this field is to be achieved.

Energy demand in the Community in 1985 was less than 2% above its 1973 level, whereas Community GDP was up by 24%. This dramatic 'decoupling' of energy demand from economic growth is one of the major success stories of the past decade. But how much of the change has been due to genuine improvements in energy efficiency; how much to the effects of the business cycle; and how much to longer-term structural changes represented by the secular trend away from energy-intensive industrial production and the shift from the manufacturing industries to services?

Satisfactory answers to these questions are important in improving our understanding of the mechanics at work in the energy system and our assessments of the outlook for energy demand in the coming years. They are particularly important in assessing real progress towards the new Community objective for 1995 of improving the efficiency of final energy demand by at least 20%. ([1])

Against that background the European Commission invited the Fraunhofer Institute, ([2]) with the advice of experts from organizations such as the *Agence française pour la maîtrise de l'énergie* in Paris, to analyse in detail the changes in Community energy demand in recent years. The ultimate aim was to devise meaningful and workable indicators of energy efficiency that can be used by the Commission staff to monitor trends in the future. Their first report, which was submitted recently to the Commission, covers the period 1979-84 and analyses data for EUR 10. Work is now beginning on the analysis of more recent data covering Spain and Portugal as well as the previous 10 Community members.

Main findings

(a) 1979-83

The study concentrates on energy demand by **final consumers,** ([3]) which fell by some 12% (90 Mtoe) in EUR 10 between 1979-83.

Table 1 — Factors explaining final energy demand EUR 10 — 1979-83

(Mtoe)

Sector	Final energy consumption 1979	Final energy consumption 1983	Influence of: Climate[1]	Level of activity	inter-sectoral change	interfuel substitution	other factors including energy efficiency
Residential							
— space heating	136.3	121.1	- 7.25	dwelling +6.7	-	- 1.3	- 13.4
— cooking etc.	9.3	8.5	-	household +0.4	-	-	- 1.2
— water heating	23.0	23.7	-	capita +0.3	-	0.1	+ 0.5
— electric appliances[2]	9.0	(9.9)	-	household +0.3	+0.7	-	- 0.5
Agric./Commercial/Public[3]							
— fuels	78.6	63.3	- 3.5	value added +4.1	+0.3	- 0.3[4]	- 15.9
— electricity	18.8	21.3	- 0.2	value added +1.1	+0.05	+0.2[4]	+ 1.4
Manufacturing industry							
— fuels	190.8	144.9	-	value added -6.5	- 6.6	- 0.7[3,5]	- 32.5
— electricity	43.4	40.6	-	value added -1.4	- 0.1	+0.1[3,5]	- 1.3
— non-energy consumption	65.9	57.2	-	value added -2.5	-	-	- 6.1
Transportation[3]							
— passenger	87.8	93.2	-	pass.-km +5.1	+0.8	-	- 0.5
— freight	42.1	42.6	-	ton-km - 1.-0	+1.4	-	+ 0.2
Sectors and countries not analysed	33.7	24.2	[6]	[6]	[6]	[6]	[6]
Sum final energy demand sectors	673.6	593.1					
— including non-energy consumption	739.4	650.4	-10.9	+6.5	- 3.4	- 2.2	- 68.9

Sources: Energy Statistic Yearbook, 1981-86; Eurostat, 1986; evaluations by ISI.

[1] A minus means lower consumption in 1983 due to a warmer climate in 1983 as compared to 1979 (data do not include climate effects for France).
[2] Six major electric appliances; data available only up to 1982. Estimate for 1983.
[3] Ireland not included.
[4] Ireland and Luxembourg not included.
[5] Intra-industrial structural change (cement, steel, aluminium).
[6] Not analysed.

The main conclusion is that, during this period, less than one-quarter of the fall can be attributed to the combined effects of:

(i) **climate** (1983 was warmer than 1979);

(ii) **levels of economic activity** (in much of this period the European economies were in recession and GDP in 1983 was only a modest 2.5% up on 1979);

(iii) **changes in the structure of economic output** (energy-intensive industries suffered disproportionately from the recession);

(iv) the substitution of **gas and electricity** (with higher end-use efficiency) for oil products.

The bulk of the remaining 75% therefore seems to be attributable to genuine improvements in efficiency, whether through better house-keeping, discrete energy savings investments or improved technology.

By sector

The results are most clear-cut for the **residential** sector where 'energy efficiency' improvements (insulation, higher-performance boilers, etc.) reduced energy demand by nearly twice as much as climatic factors.

In the **industrial** sector the picture is more complicated. On the face of it the overwhelming share of the reduction in demand for energy was the result of 'energy efficiency' improvements and only a small share was due to structural change (the relative decline of the energy-intensive industries).

But what about the effects of structural change **within** industrial branches as a result of process changes, substitution of materials or changes in the nature of products? The data available did not permit a detailed evaluation of this aspect. But the analysis by Fraunhofer of three industrial branches (construction materials, notably cement; iron and steel; and non-ferrous metals, especially aluminium) points to some conflicting trends: the gradual shift to production of steel from electric-arc systems (a process change) has of course been **increasing** specific electricity demand, while energy intensity in the construction materials industry on the other hand has been **falling** because of a shift away from the use of cement to the use of other somewhat less energy-intensive products (substitution of materials). On balance the effects have been to push down total energy demand for the three branches combined, although not by very large amounts.

The most disappointing sector from an energy efficiency standpoint has been **transport**. Passenger transport registered a net improvement in efficiency because of a technically more efficient vehicle stock, but this was insufficient to compensate for the upward pressures on demand of increased travel and the shift from public transport (train, city buses, etc.) to the private car. In the **freight** transport sector technical improvements in vehicle efficiency were more than offset by poor load factors in a period of recession.

(b) **1983-84**

In this second period, final (uncorrected) energy demand increased by about 1.7% against the background of economic growth of over 2.5%. The increase in demand can be attributed essentially to:

(i) **climate** (1984 was colder than 1983)

(ii) the upward swing in the **business cycle**, and

(iii) the consequently fast growth of the **energy-intensive** sectors (in direct contrast to the earlier period).

These upward pressures on energy demand more than wiped out the effects of continuing improvements in 'energy efficiency'. **But this was partly because those same 'energy efficiency' improvements were themselves slowing down.** The rate of improvement in 'energy efficiency' in 1983-84 was less than half (6.4 Mtoe) that of the average annual rate for 1979-83 (17 Mtoe).

The decline in 'energy efficiency' was particularly evident in the **manufacturing industry** where the effects of the business cycle were most pronounced. In the **residential** sector, in contrast (and notably in space-heating) the signs are that progress continued more or less as before.

Some pointers to the future

The conclusions of this first attempt to establish adjusted data for energy demand in the European Community are consistent with indications from other sources that continuing improvements in energy efficiency should not be taken for granted. A similar tentative conclusion can

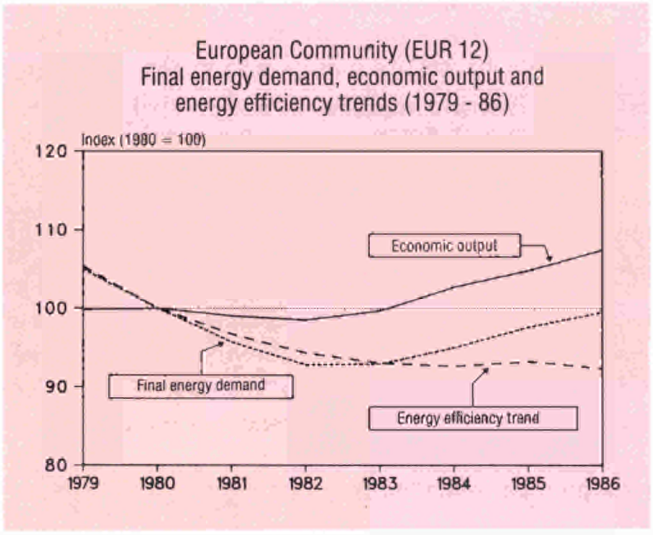
Table 2: Factors explaining final energy demand EUR 10 1983-84

(Mtoe)

Sector	Final energy consumption 1983	Final energy consumption 1984	Influence of					
			Climate[1]	Level of activity		inter-sectoral change	interfuel substitution	other factors including energy efficiency
Residential								
— space heating	121.1	124.8	+5.8	dwelling	+1.4	-	+0.02	- 3.5
— cooking etc.	8.5	8.4	-	household	+0.07	-	-	- 0.25
— water heating	23.7	23.7	-	capita	+0.03	-	- 0.05	+0.1
— electric appliances[2]	-	-	-	household	-	-	-	-
Agric./Commercial/Public[3]								
— fuels	63.3	64.8	+1.2	value added	+1.4	+0.3	- 0.05	- 1.2
— electricity	21.3	22.1	+0.1	value added	+0.5	+0.06	+0.03	+0.2
Manufacturing industry[4]								
— fuels	140.6	144.2	-	value added	+4.2	+3.06	- 0.2 [5]	- 3.5
— electricity	39.5	41.3	-	value added	+1.2	+0.7	+0.02[5]	- 0.06
— non-energy consumption[6]	49.6	52.6	-	value added	+1.2	-	+0.1	+1.9
Transportation[3]								
— passenger	93.2	95.5	-	pass.-km	+1.9	+0.2	-	+0.2
— freight	42.6	43.8	-	ton-km	+1.3	+0.3	-	- 0.3
Sectors and countries not analysed	39.6	32.5	[8]		[8]	[8]	[8]	[8]
Sum final energy demand sectors	593.1	601.1						
— including non-energy consumption[6]	642.7	653.8	+7.1		+13.1	+4.5	- 0.3	- 6.4

Sources: Energy Statistics Yearbook, 1981-86; Eurostat, 1986; evaluations by ISI.
[1] A minus means a smaller consumption in 1983 due to a warmer climate in 1983 as compared to 1979 (data do not include climate effects for France).
[2] Six major electric appliances; data available only up to 1982.
[3] Ireland and Luxembourg not included.
[4] Luxembourg and Greece not included.
[5] Intra-industrial structural change (cement, steel, aluminium).
[6] Incomplete coverage of non-energy use. Data for 1983 do not therefore correspond exactly to Table 1.
[7] Ireland not included.
[8] Not analysed.

be drawn from the energy intensity data presented in *Energy in Europe*, No 6 (pp. 44-46), based on a much less sophisticated process of adjustment. These are summarized in Figure 1 below.



The conclusion is also reinforced by the findings of recent surveys of industrial energy investment, which suggest some slowdown in discrete energy savings investment (also reported in *Energy in Europe*, No 6).

The picture should be clearer once the data for 1985 and, as far as possible, for 1986 (when the relative price of energy dropped so sharply) have also been examined. But there is already enough evidence to warrant particular attention to energy efficiency trends in the context of the monitoring of progress towards the Community's energy objectives for 1995 and in particular the Community's 20% energy efficiency improvement target.

* * * * *

The Fraunhofer study is to be published in its entirety during the next few months for the Commission by the Springer-Verlag, Heidelberg.

1 'New Community energy policy objectives for 1995', *Energy in Europe*, No 6.

2 Institut für Systemtechnik & Innovationsforschung, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung eV, Karlsruhe.

3 The full study also analyses more briefly energy efficiency trends in the transformation sector (electricity generation, refining, etc.).

Towards a continuing policy for energy efficiency in the European Community

The Community and the Member States have already initiated a series of energy-saving programmes which have led, either directly or indirectly, to the achievement of a 20% improvement of energy efficiency in the Community between 1973 and 1985.

However, between 1983 and 1985 energy intensity (energy consumption/GDP) seems to have increased in seven Member States and these increases have led to an overall increase for EUR 12 of 0.5% per annum during this period.

In September of 1986 the Council of Ministers set new energy objectives which the Community should achieve by the year 1995. These objectives included a further improvement in 'the efficiency of final energy demand' of at least 20% (OJ 86/C 241/01). If this objective is to be achieved then the Community will have to not only maintain its momentum in energy efficiency but may have to increase it. This fact was recognized in the declaration on energy efficiency made by the Council of Ministers on 26 November 1986. This increased effort will be particularly necessary if the phenomenon of low fossil fuel prices persists.

According to a preliminary analysis by the Commission's services, (1) and under certain assumptions (2.6% GDP, $15 oil price from 1986 to 1995), Community energy intensity would improve by only 15% or less, instead of the minimum of 20% set out in the 1995 objectives.

In order to maintain the momentum of energy saving in the Community and so achieve the 20% energy-saving target by 1995 the Commission is fully aware of the efforts that need to be made. With this in mind, the Commission tabled a document at the recent Energy Council identifying those energy-saving policy instruments necessary for continuing effective energy-saving policies.

What are these instruments?

Information

(a) Decision-makers, whether they be in industry or householders or in the public sector, must be made aware of the **energy-saving-equipment options** available and of the necessity of basing their investments on the long-term cost of energy and not short-term fluctuations.

(b) The Commission is active in all aspects of **publicizing the benefits of the new saving technologies** that have evolved under the EEC energy demonstration programme supplementing the substantial efforts already made by some of the Member States.

(c) **Consulting** is another effective method of transmitting the energy-saving message and is particularly applicable to households, small and medium-sized enterprises and public institutions, the sectors where the greatest lack of information regarding potential energy savings exist. An on-the-spot energy audit (e.g. the European Energy Bus) followed by a counselling session to indicate where energy savings can be made is one cost-effective method of improving energy efficiency.

(d) The Commission has financed **energy audits** on the main energy-intensive industries, e.g. aluminium, glass, brick, ceramic, steel, etc.

(e) Comprehensive **training** of professional planners, architects, plant managers and boiler house staff, etc., is also an effective way of implementing energy-saving measures.

(f) The Commission is currently examining the possibility of encouraging training courses for energy managers in small and medium-sized enterprises and has been instrumental in setting up the **European Federation of Energy Managers** — a European forum for exchanging information on energy savings and enhancing the role of the energy manager.

(g) **Public procurement** policies can also assist new energy-saving technologies penetrate the market because new suppliers often need a minimum number of orders to proceed with the necessary investment before launching their new technologies. Public

bodies can help establish, through their procurement procedures, demonstrated energy-saving technologies.

(h) The Commission has assisted this process by inviting representatives of public bodies to attend **workshops and seminars** which present the successfully demonstrated technologies from the Community's energy-saving demonstration programme.

(i) The Commission and the Member States should also actively encourage the setting up of centres of excellence for the transfer of these new energy-saving technologies.

Regulations

(a) **Energy labelling** has an important informational role in informing the public of the energy consumption of various appliances.

A framework EEC directive (together with an implementing directive for electric ovens) has been adopted by the Council of Energy Ministers and other implementing directives should be adopted soon. This directive stipulates in practice that domestic appliances should have labels indicating, *inter alia*, the energy consumption on the basis of standardized testing procedures. All Member States should introduce such a scheme in their legislations.

With a view to submitting to the Council the implementing directives, the Commission has already instructed the European standards bodies, CEN and Cenelec, to accelerate their work in order to allow the Council to approve these directives.

(b) **Regulation and standards** help to ensure that industry not only produces goods in an energy-efficient way, but that the goods themselves are energy-efficient. Standards are required in particular for boilers of central heating systems, ventilation, air conditioning and heat recovery and buildings. Target standards can also be applied to consumer mass-market products.

(c) As in the domestic appliance area, an **information scheme for buildings** would stimulate improved energy efficiency by designers, builders and landlords as well as assisting in market transparency. The Commission intends to submit soon a proposal for a directive in this specific area. Moreover, the Commission is active through its contacts with CEN in setting up RUE standards for equipment, e.g. heat exchangers. The Commission will also report on the heat generator directives.

(d) **Combined heat and power** is another valuable way of increasing efficiency of primary energy use. However, there are currently many barriers which are impeding its wider adoption. Efforts should be made to minimize these obstacles, particularly with regard to the sale of electricity to the public grid.

(e) The State can greatly assist in supporting the energy efficiency efforts of industry by concluding **sector-specific voluntary agreements**. These types of voluntary agreements have been in operation since 1979 and have been successful in improving energy efficiency particularly in the automotive and domestic appliance industries. There is, however, scope for further agreements which could substantially improve the energy efficiency of equipment and assist in the achieving of the Community's 1995 energy-saving objective. The immediate areas for the negotiation of voluntary agreements are electrical appliances, boilers, air-conditioning equipment, and cars, buses and trucks.

Stimulating energy-saving investments

(a) During periods of low fuel prices or anticipated low fuel prices the internal rate of return of an energy-saving project may be reduced below the minimum acceptable. Member States can improve the profitability of these projects by continuing to provide **project finance** through the provision of grants or soft loans. They may also support them by the provision of tax incentives.

(b) At Community level both the **EEC financial support** for demonstration projects and **EIB loans** contribute preciously to stimulate energy efficient investments and are continuing during this low energy price period. Financial incentives are most useful when applied to longer-term investments such as buildings, control equipment, heat exchangers, heat pumps, district heat, combined heat and power small hydro plants and wind converters.

(c) Another new possibility is through **third-party financing**. This is a means of funding energy saving investments by an outside company, using the energy savings themselves to pay for that investment

(see *Energy in Europe*, No 4). At the core of this new approach is the energy service company (ESCO) which brings together the financial capacity and energy/engineering ability to ensure profitable energy-saving investments. This mechanism for assisting investment in energy saving has already been widely applied in North America particularly in California. The Commission urges the Member States to consider seriously how they can assist the establishment and successful operation of energy service companies within their own jurisdiction.

(d) The Commission carried out a study on the potential for **third-party financing** in Europe and will hold a seminar on the subject in Luxembourg on 8 and 9 October 1987. A model European contract for third-party financing will be presented at this seminar.

(e) The energy **utilities** must be brought more into the energy-saving process. As professionals in the energy sector these institutions represent a vast repository of energy expertise which is as yet untapped in the cause of energy saving. The utilities should be encouraged to view themselves as energy service companies and not simply producers and distributors of power.

The Commission is going to examine with the electricity, gas, and district heating utilities the mechanisms whereby they would provide an integrated package to small energy consumers which should include experts employed by the utilities visiting private homes and small and medium-sized enterprises on request to advise on measures to improve energy economy; the provision of low-interest loans for the recommended investment; and close cooperation with electronic firms and manufacturers of space heating systems in the development and testing of improved and new products.

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[1] 'The Community energy outlook to 1995', 7 November 1986.

Development of solid fuel technology in the Community

The European Community grants financial support for the development of solid fuel technology through the medium of three major programmes:

(a) the ECSC coal research programme;
(b) the EEC non-nuclear energy R&D programme (1985-88);
(c) the EEC energy demonstration programme.

Although these programmes differ in their aims and administrative details, they nevertheless give a comprehensive and balanced coverage of the field of solid fuel R, D&D and serve a common purpose in that respect: to encourage the more widespread use of coal and other solid fossil fuels (peat and lignite) as an alternative to oil and gas. Solid fuel-related activities within the three programmes are described in this article.

The ECSC coal research programme

The ECSC coal and steel research programmes were established in the late 1950s to meet the requirements of Article 55 of the Treaty of Paris, and are thus the oldest Community R&D programmes in any sector.

The overall aims of the coal research programme are laid down for a periodically-revised set of guidelines. The current objectives are:

(a) to reduce coal production costs, particularly by increasing productivity (particularly important for Europe, where the cost of mining is high);

(b) to improve the upgrading and utilization of the coal industry's products;

(c) to improve safety and working conditions;

(d) to meet the requirements of environmental protection.

(The two latter points are also covered by a series of smaller programmes on health and safety which will not be discussed here.)

From small beginnings, the annual budget for ECSC coal research has risen to 22 million ECU and today over 170 projects are being supported. The budget is used to give aid to projects selected from the hundred or so research proposals submitted to the Commission each year. A small sum is also set aside to cover the cost of disseminating the research results, which is also a requirement of the Treaty. On average, about 60% of the available funds are allocated to R&D in the field of mining technology, and the remainder goes to support work on coal cleaning, coke production, basic coal science and process development for various aspects of coal utilization.

Mining technology

Remarkable progress has been made in recent years in **increasing underground coal-winning rates** through increased mechanization and automation. An important research objective is to extend this result to more difficult coal seams but, at the same time, it is necessary to achieve similar improvements in other areas — **tunnelling, transport,** and **mine management and control techniques** (e.g. use of computers, improved communications, improved prospecting) — if production bottlenecks are to be avoided. Moreover, the closest attention has always to be paid to the problems of **safety and working conditions** that arise as a result of more intensive operations and the increasing depth and extension of mines in the Community: **methane emission** and the **associated problems of ventilation** become more severe, and **strata control** (i.e. assuring the physical in-

tegrity of mine workings) and the regulation of mine climate become increasingly difficult as a result of these factors. Research is under way in those areas and all work related to safety is fully coordinated with the relevant health and safety R&D programmes in the social affairs sector.

Coal upgrading and utilization

As a consequence of developments in mining technology and of closer attention to dust suppression underground, run-of-mine coal now contains more dirt, water and fine material than in the past, and research efforts are being devoted to adapting coal preparation technology to meet these changes. Notable progress has also been made in the automation of washeries, and this has helped not only to reduce the need for manual labour in a noisy, dirty environment but also to improve the quality and consistency of the final products.

Coal cleaning has traditionally been concerned with the elimination of mineral matter (ash) in general but because of environmental considerations attention is now turning towards the problem of enhanced sulphur removal.

The manufacture of coke for the blast furnace still represents a major outlet for coal, despite the reduction of the Community's steel output in recent years, and research on this topic, aimed at improving the economy of the production process and the quality of the product and at tackling pollution problems, absorbs about 15% of the budget. R&D related to coke is also of considerable interest to the steel industry, and regular round-table meetings are organized at which experts from the coal, steel and social affairs sectors exchange research results and experience.

The development of new and existing processes for coal utilization demands a knowledge of the extremely complex chemical and physical nature of coal, and international collaborative work on this topic has been supported for many years. A particular current interest lies in the standardization of analytical techniques which will enable results obtained in different laboratories to be compared on a sounder basis.

The research programme has included much work, some of which is being continued on a larger scale in the energy demonstration programme, on the conversion of coal into liquid and gaseous products for use as fuels or as raw materials for the chemical industry. Other studies are devoted to improving the manufacture of electrodes for the aluminium and steel industries from coal products, to developing uses for colliery spoil (whose disposal presents increasing difficulties) in the construction and civil engineering industries, and to improving the transport, storage and handling of coal on industrial sites.

A special feature of ECSC research deserves to be noted: the programmes are organized in much more direct collaboration with industry than is generally the case for other Community R,D&D activities. For coal research, guidelines are established and projects selected in consultation with a main research committee comprising representatives of the coal industry and its R&D centres, and of universities; work in progress is monitored by a group of similarly-constituted committees of technical experts. The close international cooperation engendered by these committees was the first of its kind, and is regarded as a highly effective means of making the best use of research facilities and expertise in the Community as well as of circulating up-to-date results.

As a further means of disseminating information the Commission publishes a variety of research reports and abstracts and organizes a series of round-table meetings and international symposia, the proceedings of which are also published.

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

Some time ago the Commission, in common with the IEA and many national governments, concluded that there was considerable scope for increased solid fuel use in the general industrial sector. Switching away from oil had already taken place for reasons of cost in certain special cases, such as the cement industry, but it was felt that further incentives were needed to exchange conversion by other energy users, notably through the promotion of R, D&D to make solid fuels cleaner and more convenient to use, and thus a more attractive alternative to other fuels.

A small amount of work in this field had been supported within the ECSC coal research programme but a major expansion could not be envisaged because of budget limitations. Moreover, activities within the ECSC framework are limited almost exclusively to bituminous coal, whereas it was desired also to promote the use of lignite

and peat, which are of particular importance to some regions of the Community.

For these reasons, it was decided to include a subprogramme on solid fuel use in the EEC's non-nuclear energy R&D programme (1985-88). This is the third programme of its kind but the first explicitly to include research on solid fuels. The subprogramme in question covers the development of new combustion techniques (fluidized bed combustion, solid fuel-liquid mixtures, new and improved burners, the use of solid fuels for combined cycle electricity generation, protection of the environment, transport and handling of solid fuels, and basic research). **The budget for the period of the programme is 20 million ECU (out of a total of 175 million ECU for the overall R&D programme)** and this has now been largely allocated to projects submitted in response to an invitation to submit proposals that was issued in 1985. Approximately 60 projects are currently being supported.

Fluidized bed combustion, a technique for burning a wide range of fuels in a convenient way with minimum repercussion on the environment, forms the main topic of the subprogramme, and work on all forms of this technology (stationary beds, circulating beds, combustion at atmospheric and elevated pressures) is included. Research directly aimed at the prevention of pollution takes second place (although most R&D related to solid fuel use has, of its very nature, an environmental content): the projects in this area are concerned principally with the elimination of emissions of oxides of sulphur and nitrogen to the atmosphere, and with ensuring that ash from combustion installations can be dumped without causing pollution of ground water.

The research is being carried out by a wide range of industrial and university laboratories, many of the projects involving collaboration among organizations in several Community countries. As in the case of the ECSC programme, the results of the research will be publicized by means of publication and through meetings of various kinds.

The EEC energy demonstration programme

The Community's energy demonstration progamme includes two topics related to solid fuel utilization: **conversion of such fuels to liquid and gaseous products, and direct substitution of liquid and gaseous hydrocarbon fuels.** The former was included from the start of the programme in 1978 when liquefaction and gasification were seen as potentially attractive techniques for providing substitutes for oil products and natural gas. With the passage of time, the commercial prospects for these technologies have receded further into the future, particularly in the case of liquefaction, which is technically more complex. Nevertheless, it is considered that their development should be continued as a form of insurance against future disturbances on the energy market, despite the high costs involved. In recognition of this imperative, provision was later made to include industrial pilot projects in the demonstration programme.

Total expenditure on solid fuel liquefaction and gasification projects under this programme has reached a total of 159 million ECU since 1970. The 75 projects supported relate mainly to gasification but cover the three main liquefaction routes:

(a) direct liquefaction by solvent extraction;
(b) indirect production of liquids from synthesis gas; and
(c) hydropyrolysis.

A range of technologies for **the gasification of lignite and hard coal** has received support, work being aimed mainly at the production of synthesis gas or medium calorific value fuel gas; the manufacture of substitute natural gas (SNG) is seen as a longer-term option and the programme also includes development work on underground gasification. Some success has been achieved and this technology could eventually provide a means of utilizing deep-lying coal reserves that cannot be exploited by conventional mining techniques.

For the reasons outlined above in connection with the non-nuclear energy R&D programme, the field of direct substitution of hydrocarbons by solid fuels has been included in the demonstration programme since 1983. Support has been given mainly to projects on combustion but work related to fuel treatment and handling and to protection of the environment has also been included. **The main emphasis is again on fluidized bed combustion.** As in the case of the non-nuclear energy R&D programme, virtually all forms of this technology are represented, with particular attention to the burning of cheap, low-grade indigenous fuels (i.e. those with high ash and sulphur contents) in such a way as to meet the most stringent restrictions on emissions of dust, sulphur dioxide and oxides of nitrogen to the atmosphere. **Projects on the**

ENERGY IN EUROPE INDEX (1984-86)

Edition:
No O — December 1984
No 1 — April 1985
No 2 — August 1985
No 3 — December 1985
No 4 — April 1986
No 5 — September 1986
No 6 — December 1986

ENERGY DEMONSTRATION PROJECTS

ENERGY DOCUMENTS

ENERGY FORECASTS, ENERGY MARKETS, ENERGY STATISTICS

ENERGY MODELS

ENERGY POLICY

ENERGY SAVING, RATIONAL USE OF ENERGY, ETC.

EUROPEAN COMMUNITY INSTITUTIONS

GAS

GENERAL ENERGY RELATIONS, ENERGY COOPERATION AND PLANNING

HYDROCARBON TECHNOLOGY PROJECTS

INTERNATIONAL ENERGY ORGANIZATIONS

INVESTMENT

NEW AND RENEWABLES

NUCLEAR

OIL

PERSONNEL

PRICES

REGIONS

RESEARCH AND DEVELOPMENT

SOLID FUELS

production and use of coal-water mixtures as a substitute for fuel oil, the improved utilization of pulverized fuel, flue gas cleaning and disposal of combustion residues, are also supported. The aid granted to date totals 63.8 million ECU and commitments to solid fuel technology as a whole (liquefaction, gasification and combustion) currently absorb 30% of the total demonstration budget, a fact that highlights the importance of solid fuels as an alternative energy source.

The amounts of aid granted since 1983 for the three programmes described above are shown in the table.

In conclusion a number of projects supported within the demonstration programme follow on from and complement earlier work from the ECSC coal research programme. Similarly, developments from the non-nuclear energy R&D programme will certainly also flow through into the demonstration phase in the near future, and from thence into wider industrial use.

More detailed information about the programmes (grant application procedures etc.) can be obtained from: Commission of the European Communities, DG XVII/B/3, Rue de la Loi 200, B—1049 Brussels.

Community grants for solid fuel research, development and demonstration 1983-86

(MECU)

	1983	1984	1985	1986
ECSC coal research	19.5	19.0	19.0	22.4
EEC solid fuel R&D (combustion)	-	-	11.4	6.1
EEC demonstration projects:				
of which:				
— liquefaction and gasification of solid fuels	27.7	20.3	21.9	18.4
— substitution of solid fuels by hydrocarbons (combustion)	19.6	12.9	16.2	15.2
Total	**66.8**	**52.2**	**68.5**	**62.1**

Short-term energy outlook in the European Community — 1987

Despite the sharp fall in oil and energy prices there appears to have been little growth in energy consumption in the European Community last year. Provisional data indicate that Community energy demand increased by only about 1% over 1985 — at first view a surprisingly low result given the lower price regime. Nor was this result specific to the Community. In the OECD as a whole, the current estimate is that energy demand increased by only 0.5% in 1986. Past experience suggests however that it takes some time for the effects of price changes to work through.

Even so, in the European Community, oil consumption was at least 2% higher, the first significant increase in oil use since 1979. In 1986, solid fuel demand declined by about 3%, natural gas edged up by about 1% while nuclear energy expanded by a further 6%. A substantial part of the measured increase in oil demand was due to increased consumer stocking — so the underlying increase in Community energy consumption was probably no more than 0.5 to 1% — lower than the rate of increase in GDP. However, the weather in 1986 was milder than 1985, particularly in the last quarter when energy consumption fell unexpectedly by over 3% in comparison with the last quarter of the previous year. These provisional statistics seem to confirm two things:

(a) *that the price elasticity of energy demand in the European Community is very low in the very short term;*

(b) *that although the rate of improvement may have slowed down, there is no real sign of a 'recoupling' of energy demand and economic growth.*

On the supply side, Community energy production again increased. Community coal production recovered from the UK strike levels of 1984/1985, oil production maintained the peak 1985 level and nuclear electricity output expanded by 6% as noted above. On the other hand, natural gas production fell by 2%. Overall, the Community's net import requirement in 1986 increased slightly to around 43.5% of energy consumption.

Since the last short-term energy forecast published in **Energy in Europe** *No 6 in December, there have been other significant changes affecting the Community's short-term energy outlook. In the* **first place** *early data in 1987 suggest that the average US dollar price of the Community's crude oil imports has increased by some 30% since the end of last year to nearly $17/barrel in February. This reflects OPEC's determination to defend a higher oil price through cutbacks in oil production. Spot prices for the main refined oil products have also increased to at least 40% above their lowest values recorded in July 1986, which in turn is helping to sustain prices for crude oil.* **Secondly,** *the economic growth prospects for the Community have been shaded downwards since the last forecast. Previous Commission forecasts had hoped for 2.8% real GDP growth for the Community in 1987, but this expectation has now been reduced to 2.1%, mainly due to the effect of the dollar's depreciation on the Community's exports. In 1988 the current estimate is for a slight improvement in GDP growth to 2.4%.*

Two other factors are of importance. Firstly, on the oil side, relatively high levels of primary and consumer stocks were built up and carried forward from 1986 when oil prices were low. Secondly, there were changes in relative fuel prices in many Community energy markets at the beginning of 1987 which tended to favour gas over oil.

Assuming the maintenance of $15-17 crude oil prices, the prospects in 1987-88 are for rather low growth in Community energy demand. On this oil price assumption, Community energy prices, particularly oil prices, should be slightly higher than in 1986. But the rate of increase will probably be moderate, assuming that the US dollar remains weak. There is also the fact that new energy-saving technologies and processes are continuing to be injected into the stock of energy-using equipment (see article on 'What has been happening to energy efficiency?' in this issue) — improving the Community's energy/GDP ratio (energy intensity). For these reasons and bearing in mind the apparent low level of increase in energy demand in 1986, it is difficult to foresee more than a 1-2% growth in Community energy demand in 1987-88, with the final result dependent on the weather. (As a rule of thumb, if the weather turned out to be bad, energy demand would be 1% higher than otherwise.)

The possible outcome for fuels in 1987-88 would be for little growth in oil demand (reflecting a run-down of high levels of consumer stocks particularly in the Federal Republic of Germany), a small increase for natural gas (helped by an improved relative price to fuel oil), around 2% electricity growth and possibly a 1% decline in coal consumption.

The remainder of this article presents in more detail the latest short-term forecast for the Community of the Commission's Directorate-General for Energy (DG XVII). Whilst use has been made of the short-term forecasting model (Stem) developed with the Directorate-General for Research (DG XII), considerable reliance is also placed on market information.

EUR 10

	1985	1986	1987
Community oil production in Mtoe	149	149	146
in Mb/d	2.98	2.98	2.92
Average net nuclear capacity	60.5	70	81
Degree days (average = 232)	237	220	232
Average Community crude oil import price (fob)			
$US	27.09	13.9	15-17
ECU	35.8	14.3	13.2-15

Forecasting assumptions

The key assumptions underlying this European Community energy forecast are shown in the box below.

Forecasting assumptions
% growth over previous year

(Mb/d)

Macroeconomic	1985	1986	1987	(1988)
GDP	2.4	2.5	2.1	(2.4)
Consumer expenditure	2.3	3.7	3.1	(2.8)
Industrial production	3.3	2.0	2.2	(2.0)
Inflation	5.7	3.6	3.1	(3.2)
1 ECU = $	0.762	0.984	1.14	(1.18)

Source: Directorate-General for Economic and Financial Affairs: Economic forecasts April/May 1987.

Energy prices

(a) Crude oil prices

Following OPEC's decision in December 1986 to seek as quickly as possible a fixed $18 reference oil price from 1 January, crude-oil import prices into the Community have hardened in early 1987. First indications suggest that in the first quarter of 1987 the average fob import price for crude oil was around $16.7/barrel — over 30% more than in the last quarter of 1986. The following table plots the recent quarterly trends.

European Community average crude-oil import price (fob)

(Mb/d)

	$	ECU	% change on previous quarter (in ECU)
1985 Q1	27.31	39.9	+ 5.2
1985 Q2	27.27	37.6	- 5.8
1985 Q3	26.37	33.6	- 10.6
1985 Q4	27.27	32.1	- 4.5
Average 1985	27.09	35.8	
1986 Q1	20.2	21.9	- 32.1
1986 Q2	12.2	12.7	- 42.0
1986 Q3	10.4	10.3	- 18.9
1986 Q4	12.8	12.3	+19.4
Average 1986	13.9	14.3	
1987 Q1[1]	16.7	14.8	+20

Source: DG VII.
[1] Estimate.

The dramatic quarter-by-quarter collapse in 1986 in the Community's imported crude oil price can be seen in the table. The 1986 average (fob) crude oil import price for the Community was about $13.9/barrel, 50% lower than in 1985 in nominal dollar terms — and 60% lower in ECU terms (equivalent to a net saving on the Community's oil import bill of about $25 billion or over 1% of GDP). The current forecast assumes the fob price of imported crude oil will remain in the $15-17 range in 1987. Given the assumption of a further devaluation in the dollar, even the higher figure would mean at most a 5% crude oil price increase this year in ECU terms.

European Community average crude-oil-import price (fob)

	$	ECU	% change on previous year (in ECU)
1985	27.09	35.8	- 0.0
1986	13.9	14.3	-60
1987[1]	15.0-17	13.2-15	(-7.7 to +5)

[1] Assumption.

(b) Oil product prices

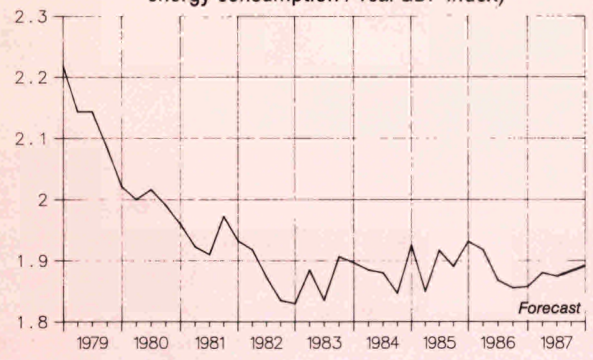
Rotterdam spot-market values have increased in 1987 as the likelihood of sustained higher crude-oil prices increased. Recent monthly movements can be seen in the table below.

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

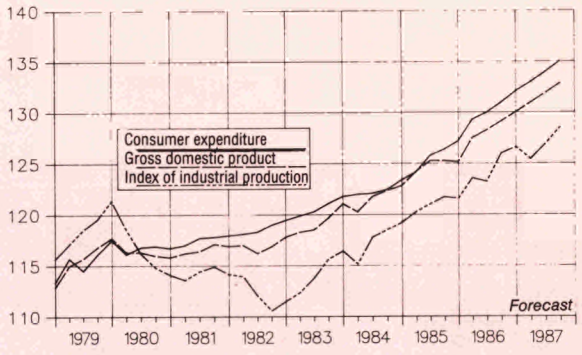
	Motor gasoline (premium)	EEC gasoil	RFO (1%S)
July 1986[1]	126	94	52
August 1986	145	122	75
September 1986	157	122	86
October 1986	145	117	80
November 1986	136	123	89
December 1986	141	129	98
January 1987	177	165	130
February 1987	166	144	106
March 1987	182	146	107
April 1987	193	147	112

Source: Platts oilgram.
[1] Lowest average monthly quotations in 1986.

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)



Future short-term movements will be determined by a range of factors — including perceptions of the sustainability of crude-oil prices, levels of product demand and primary and secondary stock levels of the main products, both of which are at higher levels than in 1986. The stock draw in the first quarter of 1987 was similar to that of the first quarter of 1986 — resulting in primary stock levels at the end of the first quarter of 1987 being about 10 Mtoe (0.2 Mb/d) above the corresponding period of 1986.

As for the prices to the consumer, the last issue of *Energy in Europe* (No 6, December 1986) reported that only three European Community governments (Belgium, Luxembourg and the Federal Republic of Germany) had left their oil-product taxation unchanged in 1986. Since then further changes in oil-product taxation have been made by France, Spain, Ireland, Italy, the Netherlands, Portugal and Greece. The recent changes are summarized in the following table.

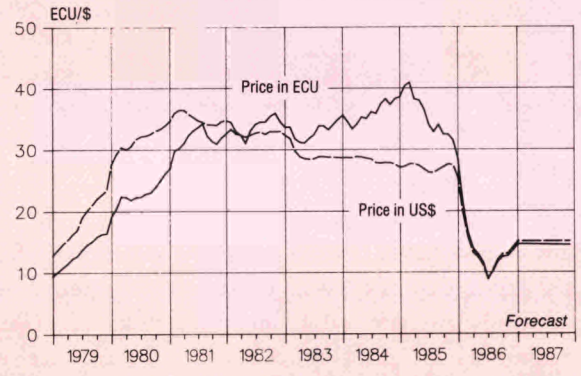
Community oil product taxation — Situation at March 1987 compared to December 1986 in % change

	Excise taxes and other taxes		VAT
France	Premium gasoline	+ 3.1%	No change
	Diesel oil	+ 3.9%	
	Heating oil	+ 2.3%	
	RFO	- 37.6%	
Greece	Premium gasoline	- 35.5%	Introduced on 11.1.87 at 36% for main products. 6% for RFO.
	Diesel oil	- 50.2%	
	Heating oil	- 50.2%	
	RFO	- 14.4%	
Ireland	Premium gasoline	+ 2.6%	No change
	Diesel oil	+ 2.5%	
	Heating oil	+11.3%	
	RFO	—	
The Netherlands	Premium gasoline	+ 2.6%	No change
	Diesel oil	+ 7.5%	
	Heating oil	+19.2%	
	RFO	—	
Italy	Consumer oil prices frozen. Excise and other taxes automatically increase/decrease as ex-refinery prices of oil products decrease/increase	No change	
Denmark	No changes recorded		No change
United Kingdom	No change except for slight decrease for lead-free petrol		No change
Spain	Premium gasoline	Excise tax +34.5%	No change
		Renta - 75%	
	Diesel oil	Excise tax +63.6%	
		Renta - 58%	
	Heating oil	Excise tax —	
		Renta - 54.8%	
	RFO	Excise tax —	
		Renta to 3 PES/t	
Portugal	Premium gasoline	Excise tax to 35.2 ESC/1 000 l	No change
		ISP - 0.6%	
	Diesel oil	Excise tax —	
		ISP - 7.8%	
	Heating oil	Excise tax —	
		ISP —	
	RFO	Excise tax —	
		ISP - 56.7%	

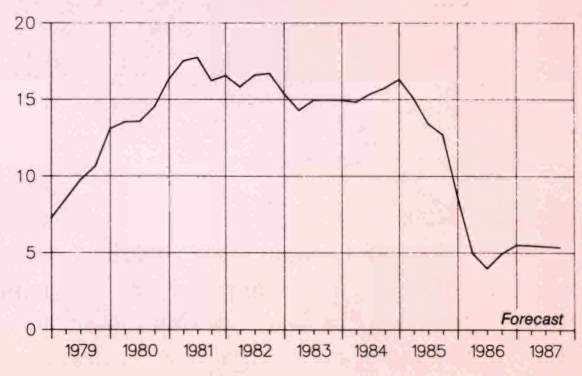
Average Community oil product prices

Weighted Community average consumer oil product prices are estimated to have evolved as shown on the following page, upper left column.

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



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



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

	Mogas	Diesel oil	Heating oil	RFO (3.5%S) (ex-VAT)
1985 Q1	+ 0.0	+ 4.2	+ 9.5	+ 9.3
1985 Q2	+ 4.9	+ 0.4	— 4.7	—16.0
1985 Q3	— 2.6	— 4.4	— 7.0	—14.4
1985 Q4	— 2.6	+ 1.8	+ 1.9	— 5.1
1985/4	+ 4.6	+ 7.1	+ 7.1	— 4.5
1986 Q1	— 9.4	—10.8	—16.3	—20.7
1986 Q2	— 5.8	— 8.3	—15.0	—31.6
1986 Q3	— 1.4	— 8.4	—18.0	— 9.3
1986 Q4	— 2.2	— 3.8	+ 1.8	+10.9
1986/5	—16.2	—21.1	—34.2	—50.0
1987 Q1[1]	+ 2.1	+ 6.6	+11.1	+12.1

[1] Estimate.

The expected devaluation of the dollar shall help to offset moderate potential increases in oil prices to the Community consumer in 1987.

(c) Natural gas prices

As forecast in previous issues of *Energy in Europe*, natural gas import prices declined steadily throughout 1986, ending 44% down in the fourth quarter of 1986. This was because the main gas import contracts are based on pricing mechanisms linked to fuel oil and gas oil prices, but lagged by 3 to 6 months.

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

1985 Q1	107	1986 Q1	93
1985 Q2	109	1986 Q2	86
1985 Q3	108	1986 Q3[1]	73
1985 Q4	100	1986 Q4[1]	56

By the end of 1986 the price of imported gas was just over 50% its level of 12 months earlier and the relative position of natural gas had improved in many Community energy markets. The average Community relative price of residual fuel oil to imported natural gas has evolved over the past two years (see following table).

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

1985 Q1	136	1986 Q1	85	1987 Q1	120
1985 Q2	112	1986 Q2	63		
1985 Q3	97	1986 Q3	67		
1985 Q4	100	1986 Q4	98		

Provided gas oil and residual fuel oil prices remain firm in 1987, then natural gas prices should be relatively favourable, leaving gas in a position to reverse any market losses to fuel oil in 1986. However, it should be noted that, should the dollar continue to devalue, consumer oil prices will tend to stay low, whereas some gas import contracts which are specified in European currencies will not benefit from this factor.

(d) Coal prices

In ECU terms, average Community import prices of both steam and coking coal fell steadily and substantially throughout 1986, as can be seen in the following table.

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

(Mb/d)

	Steam coal		Coking coal	
	$	ECU	$	ECU
1985 Q1	51.1	74.7	59.1	86.4
1985 Q2	52.4	72.1	59.0	81.3
1985 Q3	50.7	64.6	58.5	74.5
1985 Q4	52.5	61.5	58.3	68.3
1986 Q1	50.1	54.2	58.3	63.0
1986 Q2	48.85	50.9	54.8	57.1
1986 Q3	47.15	46.5	53.8	53.1
1986 Q4	45.95	44.2	53.5	51.6
1987 Q1			53.3	47.2

The international coal market is still oversupplied. Substantial excess export capacity exists in the United States, Canada and Australia, whilst newcomers such as China and Columbia are pressing for export shares. Steel demand, worldwide, is sluggish — and in the Community

steel production levels were considerably lower in 1986 than in 1985. Consumption of coal in Community power stations also showed no increase in 1986. The prospects for increased coal prices in the short term seem to be rather slender.

Overall energy

Provisional data from the Statistical Office of the European Communities suggest that the Community's energy consumption increased by just over 1% in 1986 — a very low rate of increase given the huge fall in most energy prices, the level of economic growth (2.5% for the year), industrial production (+2%) coupled with buoyant consumer spending. The most surprising development was the apparent 3.3% fall in energy consumption in the last quarter of 1986 (compared to the same quarter of the previous year). The weather in that quarter was particularly mild and clearly one of the main reasons for this trend. But oil deliveries did not fall, despite a high level of stocks. The quarter-by-quarter changes in 1986 were as follows:

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

	1986 Q1	1986 Q2	1986 Q3	1986 Q4
Solid fuels	+11.9[1]	— 5.0	—7.7	—12.4
Oil	— 3.3	+11.5	—0.4	+ 0.5
Natural gas	— 0.1	+ 4.5	+9.3	— 3.0
Nuclear	+11.7	+ 7.8	+4.1	+ 0.5
Total energy	+ 2.2	+ 5.8	—0.4	— 3.3

[1] Affected by the UK miners' strike.

These rather wide quarterly variations suggest that it would be unwise to draw too many conclusions before final data are available. But the provisional results indicate a low response of the Community's energy demand to changes in energy prices and suggest that the restructuring of the Community's energy economy is continuing, perhaps at a slower rate than before, but nevertheless at a sufficient pace to largely outweigh any income-driven demand (see short-term forecast and previous *Energy in Europe* No 6).

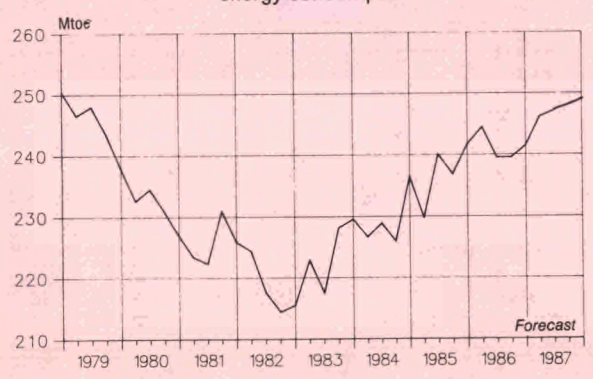
European Community energy consumption versus GDP in the 1980s (1980 = 100)

	Energy consumption	GDP
1980	100	100
1981	96.6	99.8
1982	94.1	100.4
1983	94.2	101.8
1984	97.1	104.0
1985	100.6	106.5
1986[1]	101.7	109.2

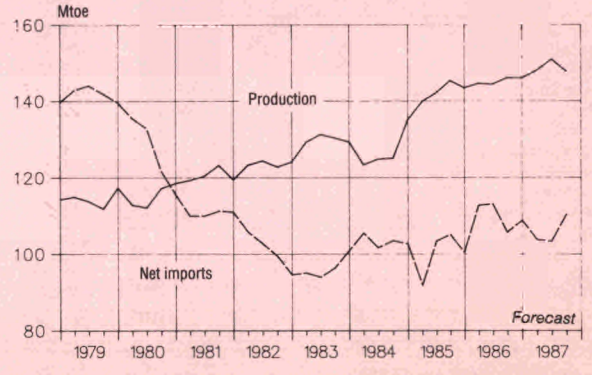
[1] Provisional.

The variations of the 1986 consumption trends by Community country are quite large with energy consumption decreasing in Denmark, more or less flat in some other countries (FR of Germany, The Netherlands, Luxembourg, United Kingdom) whilst elsewhere demand increased (France, Italy, Belgium, Ireland, Greece, Spain and Portugal).

Graph 5 – EUR 10: Seasonally adjusted quarterly energy consumption



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



The table below looks at energy consumption in each Community country since 1979. The interesting question for energy forecasters is whether the 1986 data suggest that the structural changes that have taken place in the Community's energy economy since the two oil shocks, coupled with the decline in many energy-intensive industries and the introduction of new energy-saving processes, means that energy consumption is now permanently on a low growth path for the longer term, almost irrespective of energy prices.

Given the results of 1986 and assuming normal weather (deliveries) in 1987, it is difficult to find reasons why Community energy demand could increase by more than 1-2% in 1987. Economic growth is forecast to be lower than in 1986 and, if oil prices average $17/barrel, energy prices will be slightly higher. Industrial production in 1987 may grow only at a modest pace. Consumer stocks of energy may be reduced. All these reasons point towards the lower end of the 1-2% range.

The other side of the Community's energy balance concerns supply. In this respect the European Community has made substantial progress. In 1980 imported energy covered over 55% of energy demand but now accounts for no more than 43%. Indeed, since 1980 the Community has added over 2 Mb/d (100 Mtoe) to its own domestic energy supply. This fast rate of progress since 1980 is, however, now slowing down. In 1986 Community energy supply increased, but only by 1.4%. Some

Total energy consumption

(1 000 toe)

	1979	1980	1981	1982	1983	1984	1985	1986
FR of Germany	281 525	270 274	257 775	248 758	248 807	257 994	266 194	264 847
France	185 283	184 549	180 474	175 208	177 330	186 461	193 659	196 728
Italy	135 879	134 439	132 971	127 182	126 509	129 325	132 069	133 280
Netherlands	67 562	65 020	60 664	56 719	57 621	60 196	61 179	60 834
Belgium	48 519	45 736	43 333	41 330	40 344	41 853	43 444	44 150
Luxembourg	3 848	3 628	3 167	2 980	2 844	3 026	3 115	3 068
United Kingdom	219 807	19 9892	19 4447	19 3933	19 3619	19 2259	20 3727	20 5224
Ireland	8 428	8 111	7 952	8 094	7 970	8 335	8 764	8 957
Denmark	20 280	18 905	16 840	16 941	16 214	16 481	18 629	18 740
Greece	15 098	15 096	14 760	15 204	15 862	16 179	17 472	17 052
EUR-10	986 229	945 650	912 383	886 349	887 122	912 109	948 252	952 880
Spain		69 606	69 340	67 009	67 035	68 383	69 632	70 004
Portugal		9 528	9 373	10 376	10 454	10 437	10 283	10 770
EUR-12		1024 784	991 096	963 734	964 614	990 929	1028 167	1033 653

Of which oil consumption

(1 000 toe)

	1979	1980	1981	1982	1983	1984	1985	1986
FR of Germany	142 951	128 864	114 824	109 311	107 999	107 748	108 848	112 530
France	114 890	109 151	96 620	91 428	87 112	85 454	84 099	84 558
Italy	95 583	92 870	90 768	83 563	83 154	79 117	80 479	81 246
Netherlands	30 636	29 141	26 777	22 697	21 854	21 398	20 839	21 564
Belgium	25 105	22 890	20 619	19 622	17 641	17 024	17 450	19 053
Luxembourg	1 286	1 099	1 057	1 037	998	989	1 057	1 129
United Kingdom	92 863	79 378	73 677	76 282	71 914	87 574	77 523	74 232
Ireland	6 213	5 624	5 084	4 583	4 211	3 922	4 161	4 552
Denmark	15 669	13 231	11 488	10 964	10 374	10 279	10 660	10 342
Greece	11 435	11 568	10 859	10 952	10 666	10 406	11 015	10 502
EUR-10	536 631	493 816	451 773	430 439	415 923	423 911	416 131	419 708
Spain		49 292	45 623	42 843	42 286	39 398	38 125	37 597
Portugal		8256	8297	9143	9155	8972	8417	8634
EUR-12		551 364	505 693	482 425	467 364	472 281	462 673	465 939

Source: Eurostat (28 April 1987).

further increase is still possible in 1987 as further nuclear units enter commercial production. But Community energy supply is now approaching its plateau level, at least for the medium term. Any increase in energy demand in the next few years will probably have to be met from imported energy supplies.

Oil

According to the Statistical Office of the European Communities, primary oil demand in the Community increased by 2% in 1986 — the first underlying increase in 'demand' since the second oil shock in 1979. Deliveries of oil products into consumption were, however, 3% higher than in 1985. It is now clear that up to half of this increase was used to build up consumer stocks, reflecting bargain prices in the spring and summer of 1986. Some fuel switching in industry from gas to oil occurred (e.g. in Belgium and the UK), but this was rather limited. There was also no significant increase in the consumption of oil for electricity generation. Power stations, however, built up their oil stocks. The main element of genuine increased oil demand continues to be the transport sector. Here, inland deliveries of motor gasoline in 1986 were some 4.5% above 1985 figures, and kerosenes and jet fuels 5% higher. Gas oil deliveries (heating oil and diesel fuel) also grew by 5% — but a large portion of this was again increased consumer stocks of heating oil. Consumption of diesel oil surged by nearly 9%. Although the statistics show a fall in residual fuel oil (RFO) deliveries in 1986 (see Table 3 in annex), the underlying trend was a 4% growth, taking into account the extra 5 Mtoe of fuel oil used in the United Kingdom in the first quarter of 1985 during the miners' strike — the first underlying increase in fuel-oil use for many years and reflective of some limited inter-fuel switching to fuel oil during the year.

The recent quarterly changes for the inland deliveries of the main products were as follows:

EUR 10 — % change on same quarter of previous year

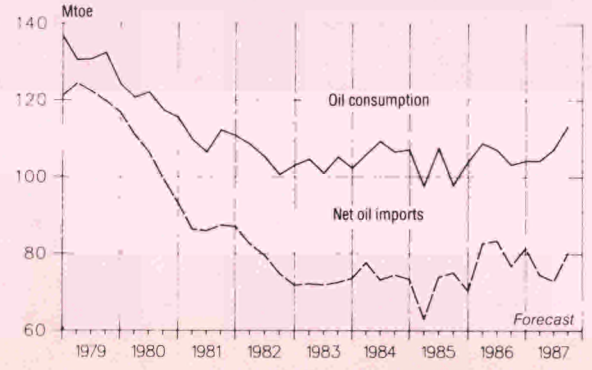
	Total oil	Mogas	Gasoils	RFO	Other products
1986 Q1	— 3.3	+3.1	+ 5.7	—26.8	+0.4
1986 Q2	+12.8	+5.0	+24.2	+20.6	—0.1
1986 Q3	+ 4.2	+4.4	— 0.3	+16.2	+4.2
1986 Q4	+ 0.9	+5.4	— 4.8	+ 3.7	+4.7

What are the prospects in 1987?

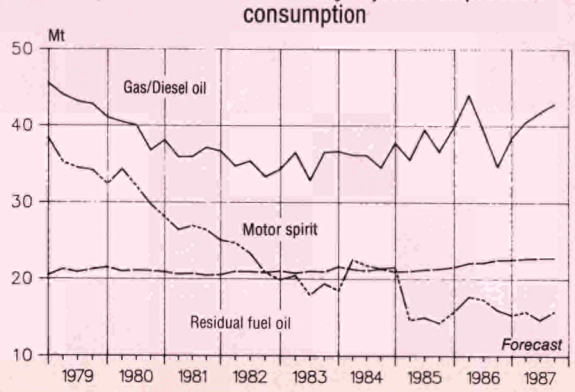
Some small growth in motor gasoline demand seems possible given the expanding car stock in the Community and the increasing numbers of people of driving age. A maximum of 1-2% growth seems possible. For the middle distillates, kerosene/jet fuel demand could also slightly edge up — buoyed on by a sustained consumer boom. Again the projected increase in demand should be modest.

The prospects for the gasoils and RFO are more difficult to disentangle. Assuming consumer prices of heating oil increase slightly, stock levels could fall to more normal levels. Should this be the case, then heating oil deliveries in 1987, particularly after the slightly milder 1986/87 heating period, should be lower than last year. But diesel-oil use can be expected to continue growing along with GDP.

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



Graph 8 – EUR 10: Seasonally adjusted oil products consumption



As for fuel oil two influences are at work. Lower gas prices could push RFO out of some 'dual-fired' business but RFO prices are nevertheless still low and therefore competitive, in some industrial processes, against coal. A slight decline in RFO deliveries is expected in 1987 — particularly as consumer stocks were also built to high levels in 1986.

Overall, a tentative projection would indicate flat oil demand in 1987 — with the risks perhaps weighted more towards a decrease than an increase.

Gas

In spite of an unfavourable pricing environment for the first 2-3 quarters of 1986, natural gas consumption increased in the full year. This reflects firstly defensive pricing to maintain market share as oil prices collapsed throughout the year, and secondly the expanding natural gas network in the Community. Captive domestic sector gas consumption held up better overall than industrial demand, but consumption in power stations fell strikingly (particularly in Ireland and Belgium).

In 1986 35% of the Community's gas supplies came from third-party countries — with the Soviet Union supplying the largest proportion, overtaking Norway for the first time.

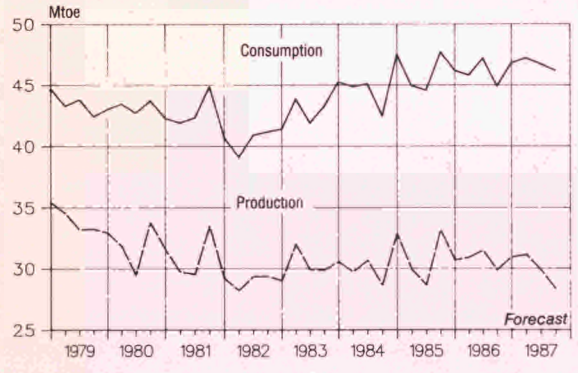
EUR 12: Natural gas imports from third party countries

(Mtoe)

	Norway	USSR	Algeria	Libya	Others	Total
1979	19.2	16.2	3.7	2.8	—	41.9
1984	23.5	20.3	14.9	1.1	0.0	59.8
1985	22.1	21.1	17.2	1.0	0.0	61.4
1986	22.5	26.1	17.1	0.9	0.0	66.6

Source: SOEC Rapid Energy Reports, No 1, 1987.

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



Community gas production fell by about 2% in 1986, with only Italy and the United Kingdom among the main producers showing increased output.

In 1987 natural gas consumption could record another modest increase helped by an improved price position — but the rate of growth is unlikely to be more than 2%, depending on the severity of the winter. Natural gas imports should increase again in 1987.

Solid fuels

In 1986 solid-fuel consumption decreased by more than 3%. This was a disappointing result. Three main factors seemed to work against coal in the year.

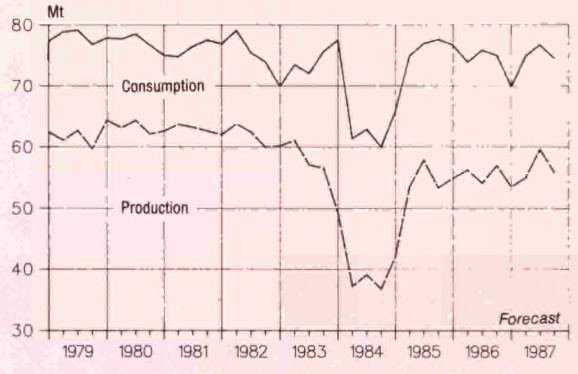
(i) Very low levels of output in the steel industry. For example pig iron production in the Community declined by 7% and crude steel production by 7.5% in 1986. Coke production in the Community fell by over 4% in 1986.

(ii) Lower sales to industry where fuel oil made inroads, as well as continuing decreases in the domestic sector.

(iii) Retrenchment of the coal industry in some Community countries (e.g. France, Belgium) as nuclear-fired electricity generation continues to grow.

Even in the power generation sector, deliveries of hard coal were only slightly higher than in 1985 (actual consumption hardly changed because stocks at power stations increased). Lignite consumption in power stations declined. EUR 12 Community coal production revived

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



in 1986 to reach 228 million tonnes (excluding recovered products), but this was still substantially below the pre-strike levels of 1983. Net coal imports also declined in 1986 as previous *Energy in Europe* short-term forecasts had predicted.

According to submissions made by Member States to the Commission, the prospects for 1987 appear to be no brighter. Deliveries of coal are expected to fall by a further 3% in 1987 with declines expected of over 5% in deliveries to coking plants and 2% to power stations. Particularly sharp falls in consumption are expected in France.

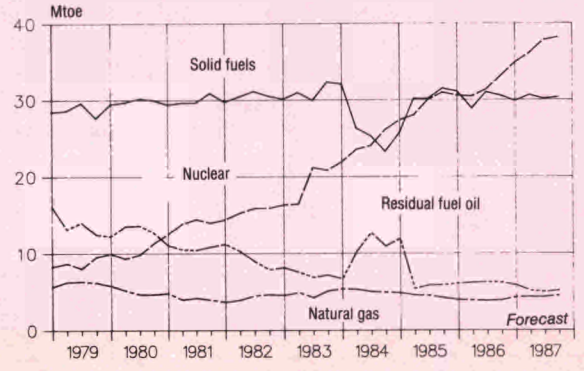
As for lignite and peat a slightly improved picture is foreseen, mainly due to the expansion of lignite consumption in Greece.

As far as supply in 1987 is concerned, preliminary estimates suggest a 2% decline in coal production and a 3% decline in coal imports from third countries.

European Community
Index of electricity consumption and GDP in the 1980s
(1980 = 100)

	GDP	Electricity consumption	Electricity intensity (Ratio electricity consumption/GDP)
1980	100	100	100
1981	99.8	100.4	100.6
1982	100.4	99.9	100.5
1983	101.8	102.3	100.5
1984	104.0	106.5	102.4
1985	106.5	111.4	104.6
1986	109.2	113.8	104.2

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



Electricity

Community electricity consumption and production increased by 2.3% in 1986, the fourth consecutive year of growth. Electricity consumption has increased faster than economic growth since the bottom of the recession in 1982 as the electricity intensity ratio shows.

The rate of growth in 1986, however was the slowest since 1983 — with demand particularly low in the last quarter. As for electricity production, nuclear production increased by 6% in 1986, hydroelectric generation was more or less unchanged, and thermal generation very slightly higher than in 1985. Solid fuel consumption for electricity generation increased very slightly at the expense of natural gas. Oil consumption in power stations declined — but netting out the effects of the United Kingdom strike in 1985 the underlying trend was unchanged. Fuel oil prices, of course, were particularly attractive in 1986 and many utilities took the opportunity of building up their stocks of oil at low prices.

With the Community's nuclear capacity expected to expand to over 80 GW of commercial production in 1987 (figures for EUR 10) nuclear electricity production is again forecast to increase. The rate of growth is, however, likely to be lower than previously forecast due to the delays in the start up of some nuclear reactors. This expansion continues to shrink the volume of base load electricity production required from coal.

Electricity consumption should increase by around 2% in 1987, depending on the performance of the electricity intensive industries (chemicals, engineering, steel, non-ferrous metals) and the usual unpredictable weather patterns.

Graph 12 – EUR 10: Seasonally adjusted electricity production

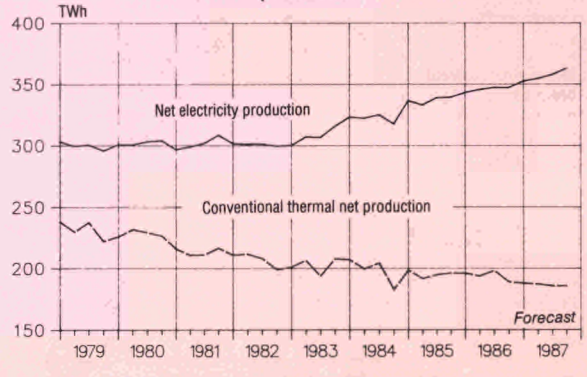


TABLE 1 — Primary energy balance for the European Community

(Mtoe)

	1980	1981	1982	1983	1984	1985	1986	1987 [1]
Primary production								
Solid fuels	186.5	186.8	183.8	175.7	131.8	157.9	163.8	160
Oil	91.5	101.7	115.1	131.4	144.2	149.0	146.9	146
Natural gas	129.4	125.5	116.1	119.9	119.2	126.5	123.5	121
Nuclear	40.5	54.7	61.5	74.5	95.6	116.4	123.2	130-135
Hydro	12.6	12.8	12.6	12.5	12.2	11.8	12.0	12
Total	460.6	481.5	489.1	514.0	503.0	561.6	569.5	569-574
Net imports								
Hard coal	48.9	44.2	46.1	38.4	51.9	56.0	52.8	52
Oil	435.3	354.6	325.1	289.6	300.3	286.4	307.7	288-293
Natural gas	43.5	46.2	45.8	50.1	57.9	59.3	64.3	67
Electricity	1.2	1.9	1.7	1.9	1.3	1.1	1.2	-0.3
Total	528.9	446.8	418.7	379.9	411.3	402.8	426.0	406.7-411.7
Change in stocks								
Hard coal/coke	11.0	8.9	10.6	1.8	- 16.5	- 4.0	6.0	2
Oil	15.2	- 17.3	- 11.7	- 18.0	- 3.3	- 0.8	7.7	-12
Natural gas	3.9	6.7	3.4	4.9	2.9	3.6	3.4	2
Bunkers	23.8	25.9	24.2	22.3	21.2	23.3	26.8	26
Estimated gross inland consumption								
Solid fuels	224.4	222.0	219.4	212.3	200.2	218.0	210.6	210
Oil	487.8	447.6	427.7	416.6	426.5	412.9	420.1	420-425
Natural gas	169.0	164.9	158.5	165.1	174.3	182.1	184.5	186
Nuclear	40.5	54.7	61.5	74.5	95.6	116.4	123.2	130-135
Hydro	12.6	12.8	12.6	12.5	12.2	11.8	12.0	12
Total	935.6	904.0	881.3	882.9	910.0	942.4	951.6	958-968
Net imports as % of consumption*								
Hard coal	21.8	19.9	21.0	18.1	25.9	25.7	25.1	24.4
Oil	85.1	74.9	72.0	66.0	67.1	65.7	68.9	65.0
Natural gas	25.7	28.0	28.9	30.3	33.2	32.6	34.9	36.0
Total	55.1	48.1	46.2	42.0	44.2	41.7	43.5	41.3

* Net imports/(gross inland consumption + bunkers).

[1] Forecast.

TABLE 2 — Primary energy balance for the European Community

(Mtoe)

	1985				1986				1987[1]			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Primary production												
Solid fuels	35.4	38.9	40.4	43.3	43.3	40.5	37.9	42.2	41.9	37.2	39.1	43.6
Oil	38.2	36.5	35.9	38.5	38.8	35.5	36.9	35.6	38.0	35.6	35.5	36.6
Natural gas	46.1	25.0	17.9	37.4	43.4	25.7	20.5	33.9	45.0	25.8	18.8	31.3
Nuclear	31.1	25.9	26.0	33.3	34.7	28.0	27.1	33.5	37.3	31.0	30.9	36.8
Hydro	3.0	3.7	3.0	2.2	2.7	4.0	2.9	2.4	2.9	3.6	3.0	2.6
Total	153.7	130.1	123.2	154.6	162.9	133.8	125.2	147.6	165.0	133.1	127.2	151.0
Net imports												
Hard coal	13.5	13.9	13.8	14.8	12.9	14.6	12.6	12.6	8.5	13.1	14.8	15.3
Oil	74.6	62.8	72.1	76.9	71.7	82.5	82.2	71.3	68.1	73.8	73.1	78.6
Natural gas	16.1	14.6	12.5	16.2	17.4	14.5	14.1	18.3	18.4	15.4	13.5	19.7
Electricity	0.2	0.4	0.5	0.1	0.1	0.6	0.4	- 0.0	0.1	0.3	0.1	- 0.8
Total	104.2	91.7	98.8	108.1	102.2	112.3	109.4	102.2	95.1	102.6	101.5	112.8
Change in stocks												
Hard coal/coke	- 6.8	0.3	5.0	- 2.6	- 6.0	5.3	5.2	1.6	- 5.2	0.8	6.9	- 0.5
Oil	- 7.3	- 1.4	0.1	7.9	- 6.9	5.6	10.8	- 1.9	- 8.8	1.9	- 1.3	- 4.1
Natural gas	- 4.5	4.8	3.9	- 0.7	- 5.8	4.0	5.7	- 0.5	- 4.8	4.0	4.2	- 1.5
Bunkers	5.1	6.2	6.2	5.8	6.4	7.1	6.9	6.5	6.3	6.8	6.8	6.4
Estimated gross inland consumption												
Solid fuels	55.6	52.5	49.1	60.7	62.2	49.8	45.4	53.2	55.6	49.5	47.0	59.3
Oil	114.9	94.5	101.8	101.8	111.1	105.3	101.4	102.3	108.5	100.6	103.1	112.9
Natural gas	66.7	34.7	26.5	54.3	66.6	36.3	28.9	52.6	68.2	37.2	28.0	52.6
Nuclear	31.1	25.9	26.0	33.3	34.7	28.0	27.1	33.5	37.3	31.0	30.9	36.8
Hydro	3.0	3.7	3.0	2.2	2.7	4.0	2.9	2.4	2.9	3.6	3.0	2.6
Total	271.4	211.8	206.9	252.4	277.5	224.1	206.0	244.0	272.6	222.2	212.1	263.4
Net imports as % of consumption*												
Hard coal	24.2	26.5	28.1	24.4	20.8	29.4	27.9	23.6	15.3	26.5	31.4	25.7
Oil	62.1	62.4	66.8	71.5	61.1	73.4	75.9	65.5	59.3	68.7	66.5	65.9
Natural gas	24.1	41.9	47.1	29.9	26.1	40.1	48.8	34.7	27.0	41.5	48.0	37.5
Total	37.7	42.1	46.4	41.9	36.0	48.6	51.4	40.8	34.1	44.8	46.3	41.8

* Net imports/(gross inland consumption + bunkers).

[1] Forecast.

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

	1980	1981	1982	1983	1984	1985	1986	1987[1]
1. Oil (Mt)								
Primary production	**90.6**	100.7	113.9	130.1	142.7	147.6	145.4	144.2
Change in stocks*	**15.1**	- 17.2	- 11.6	- 17.9	- 3.3	- 0.8	7.6	-12.2
Net imports*	433.0	353.0	323.7	288.4	299.0	285.4	306.7	292.6
Bunkers	24.5	26.8	25.0	23.0	21.9	24.1	27.7	27.2
Apparent consumption	**484.0**	**444.1**	424.3	413.3	423.2	409.6	416.7	**421.8**
Inland deliveries:								
Motor gasoline	84.5	82.6	83.3	83.7	85.2	84.5	88.3	90.6
Gas/diesel oil	158.6	147.5	140.3	140.4	143.3	149.1	157.2	158.9
Heavy fuel oil	128.0	108.1	93.6	77.8	83.3	66.6	65.2	65.2
Other products	85.0	80.4	80.5	85.4	86.5	87.1	89.1	88.5
Total	456.2	418.6	397.8	387.3	398.2	387.3	399.8	403.2
Power stations:								
Consumption	53.9	44.7	40.0	31.2	41.2	31.6	27.5	26.0
Change in stocks	- 0.4	0.6	- 1.4	- 2.7	- 0.1	- 1.2	1.6	0.0
2. Natural gas (Mtoe)								
Primary production	129.4	125.5	116.1	119.9	119.2	126.5	123.5	120.8
Imports(**)	43.5	46.2	45.8	50.1	57.9	59.3	64.3	67.0
Apparent consumption	**169.0**	164.9	158.5	165.1	174.3	182.1	184.5	186.0
of which:								
in power stations	20.3	16.9	16.6	18.8	20.6	18.0	17.0	20.2

* Crude oil and petroleum products.
** Imports from third-party countries.

[1] Forecast.

TABLE 4 — Solid fuels: supply and disposal in the European Community

	1980	1981	1982	1983	1984	1985	1986	1987[1]
1. Hard coal (Mt)								
Primary production	253.6	252.2	248.4	235.2	161.9	205.9	217.1	215.0
Change in stocks								
Collieries	**10.7**	8.9	4.2	0.5	- 8.3	-10.4	- 0.3	1.5
Power plants	**6.7**	6.2	9.5	0.9	- 13.6	8.8	8.6	1.8
Net imports	**74.2**	66.5	70.0	57.0	78.9	86.5	81.2	79.0
Apparent consumption	310.3	303.6	304.6	290.8	262.7	294.0	290.1	290.8
Deliveries to:								
Power plants	**179.2**	176.5	184.0	175.8	131.9	172.9	177.6	178.9
Coking plants	**88.4**	85.2	80.1	69.7	69.8	76.3	73.3	66.4
All industries	**22.7**	24.0	24.5	25.4	26.1	29.1	29.1	22.1
Households	**18.0**	16.0	16.5	15.9	14.5	17.3	17.1	17.6
Total	**308.4**	301.7	305.2	286.8	242.2	295.6	297.1	285.1
2. Hard coke (Mt)								
Coking plants								
Production	**66.6**	64.2	60.2	53.5	52.8	57.1	54.9	50.7
Change in stocks	**0.8**	- 0.1	3.8	1.4	- 5.3	- 3.9	1.9	0.0
Deliveries to the iron and steel industry	54.3	52.6	46.3	41.8	48.5	49.8	44.5	46.6
3. Lignite								
Production (Mt)	157.0	162.4	159.3	158.7	162.0	159.2	154.6	150.5
Consumption in power stations (Mtoe)	**26.2**	27.6	26.6	27.3	27.0	25.7	23.7	25.2

[1] Forecast.

TABLE 5 — Electricity: supply, disposal and generating structure in the European Community

	1980	1981	1982	1983	1984	1985	1986	1987[1]
Electrical power (TWh)								
Total generation	1 277.6	1 274.6	1 271.4	1 299.8	1 360.7	1 425.8	1 456.2	1513.8
Total net production	1 208.7	1 206.1	1 202.9	1 229.1	1 286.7	1 347.3	1 377.2	1429.5
of which:								
Hydroelectrical	**146.1**	149.1	146.1	144.8	141.5	137.7	139.4	140.2
Nuclear	**149.4**	201.7	226.9	275.0	352.8	429.4	454.8	501.8
Conventional thermal	913.1	855.2	830.0	809.3	792.4	780.2	783.0	787.4
Gross inland consumption	1 291.7	1 296.8	1 290.8	1 321.6	1 375.3	1 438.5	1 469.8	1510.2
Available for internal market	1 213.9	1 217.4	1 212.0	1 237.9	1 287.5	1 343.7	1 375.0	1414.7
Input to thermal power stations* (Mtoe)								
Hard coal	92.9	91.9	94.7	96.1	80.8	90.9	95.3	97.3
Lignite	26.2	27.6	26.6	27.3	27.0	25.7	23.7	25.2
Petroleum products	51.7	43.0	38.4	29.9	39.6	30.3	26.4	25.0
Natural gas	20.3	16.9	16.6	18.8	20.6	18.0	17.0	20.2
Derived gas	1.7	1.8	1.5	1.3	1.5	1.5	1.4	1.4
Total	**193.7**	**182.2**	178.2	**174.0**	**171.7**	**167.7**	**165.5**	**170.2**
Net nuclear capacity (GW)	26.7	34.4	40.2	43.8	50.7	60.5	70.5	81.8

* Conventional thermal plants in the public supply system.

[1] Forecast.

Community news

Environment Council — 19 and 20 March 1987

The Council of Ministers adopted the Directive amending Directive 75/716/EEC on the alignment of the sulphur content of heating oil and diesel oil (gas oil).

This new Directive, with which Member States must comply by 1 January 1989, will enable substantial progress to be made in the combating of air pollution, particularly in urban areas, by limiting the sulphur content of gas oil to 0.3% by weight. In addition, Member States may make the use of gas oils with a 0.2% sulphur content compulsory in certain areas where this is necessary on environmental grounds (because of the environmental damage caused by sulphur dioxide emissions). The respective sulphur contents laid down in Directive 75/716/EEC were 0.3% and 0.5%.

The Council of Ministers was unable to take any final decisions about reducing emissions from petrol-driven and diesel-driven motor vehicles. However, with the exception of Denmark, they confirmed the importance of the Luxembourg Agreement of 27 June 1985 concerning the reduction of pollutant emissions from motor vehicles. Denmark was again unable to subscribe to this Agreement, as it considered that the emission values agreed on in Luxembourg were not strict enough. Progress was made on the technical aspects of the Commission's proposals to reduce diesel and particle emissions.

As at its meeting on 24 November 1986, the Council of Ministers was favourably inclined towards the possibility of a Member State banning leaded regular petrol. It called upon the Permanent Representatives Committee to prepare a formal decision for the next Council meeting in May in the light of the Opinions expected from the European Parliament and the Economic and Social Committee.

Despite pressure from the Belgian Presidency which circulated new compromise proposals, no significant progress was made on the proposal for a Directive on the limitation of emissions from large combustion plants. The three main stumbling blocks were the levels of the final reduction targets for SO_2 and NO_x emissions, the final date by which the reduction will be achieved and the phasing within this time frame. However, the positions regarding the emission limit values for new plants had moved closer together.

At this meeting the Environment Ministers formally opened the European Year of the Environment.

European Parliament

The Committee on Energy, Research and Technology's main work in 1987 has been the preparation and examination of a series of reports on the Community's energy objectives, the future of nuclear energy and the aftermath of the Chernobyl accident, leading up to the European Parliament's full plenary session debate on nuclear energy and security issues following the Chernobyl accident which took place on 8 April 1987.

At its meeting of 24 February, the Committee adopted the three reports after a series of close votes.

The report by Mr Seligman (UK, ED) on the future of nuclear energy was adopted by 15 votes to 14 against. Some of the key points in this important report which were the subject of lively controversy within the Committee are as follows:

'The European Parliament considers that electricity generated by nuclear fission or fusion will for many years be a vital source of the intense energy needed for industry, for rail transport and for commercial and domestic consumption;'

'Whereas, notwithstanding the desirability of increasing the use of solid fuels in the Community as a means of reducing dependence on imported oil, an increase in the use of solid fuels on a massive enough scale to replace nuclear power in the generation of electricity would cause (a) an unacceptable increase in coal imports from outside the EC; and (b) unacceptable harm to the environment;'

'The European Parliament calls for a reorientation of the policies of the Member States and of the Community, based on a priority for energy savings and rational use, development and use of renewable energies;'

'The European Parliament insists, in addition to all national approval procedures, on the principle that no new nuclear reactors be constructed in the European Community until the safety of their design has been verified by competent, international experts, paying due attention to environmental factors'.

In particular, the Commission was asked to take a whole series of measures concerning reactor safety, improvement of provision of information to the public, the formulation of new proposals concerning the siting of nuclear plants in frontier areas, the promotion of small scale nuclear power plants, and to propose a new code of practice embodying emergency procedures and rules for immediate accident notification, to limit environmental danger and decontamination measures.

The report by **Mr Adam (UK, SOC)** on the update of the EC energy objectives was also adopted after a series of close votes, the final text being adopted by 15 votes to 11 with two abstentions. Among amendments now incorporated in the text, the Chernobyl accident is seen as a 'spur to the development of really effective cooperation which ensures that all national projects are subject to scrutiny by the international scientific community'.

The original text proposed by the rapporteur envisaged a gradual phasing out of nuclear energy; this notion was deleted by means of amendments.

The new resolution calls for stepping-up research and experimentation relating to new energy sources and prospecting and production for oil and natural gas within the Community.

The report by **Mr Späth (D, PPE)** also adopted after a lengthy voting session, establishes in some detail the practical consequences of the Chernobyl accident, as regards safety procedures, and international action relating to nuclear power plant, design and construction. These reports will be debated in the May part session (11-15 May).

The Committee also decided to set up a working party to examine the operation of the Euratom Treaty with a view to drawing up a draft energy treaty for the EC. Finally the Committee is also about to embark on a major own initiative report on Community coal policy.

Plenary session, 8 April 1987

The Parliament voted against all amendments demanding the gradual abandonment of nuclear power.

In the ensuing parliamentary debate the Seligman, Adam and Späth reports were adopted along with three others from the Parliament's Environment Committee — by varying majorities — with the vote on the Seligman report being rather close. The debate centred on the nuclear energy option and was split between the pro- and contra-nuclear energy lobbies with the pro-nuclear lobby in the majority. There was, however, a convergence between the two camps around the position that, whatever the Parliamentarians basic philosophy on nuclear energy, that security measures must be as comprehensive as possible, irrespective of the cost, international construction norms and controls should be increased as well as international control inspectors and an early warning and information system.

Both Commissioners Mosar (Energy) and Clinton Davis (Environment) spoke in the debate and stated the importance the Commission attaches to its responsibilities under the Euratom Treaties and that the Commission is acting to improve nuclear security and information on nuclear matters to the public.

ECSC Consultative Committee: main activities in the energy field

At its 261st session of 23-24 March 1987, the Consultative Committee discussed the achievement of the Community's 1995 energy objectives on the basis of the document submitted by Mr Mosar to Energy Ministers at last November's Energy Council (see *Energy in Europe*, No 6, pp. 10-11), and an oral statement made by the Commission staff. It was agreed that the next important step would be the evaluation of progress made in the Member States, as reflected in the Commission's monitoring report, expected for the end of 1987.

At the same session, the Consultative Committee gave a favourable opinion on the Commission's proposals for a 1987 ECSC coal research programme, with a total value of 22 million ECU (first priority projects) and 5 million ECU (second priority).

The fields covered by the research programme were: roadway drivage, mine gases, ventilation and climate, methods of working and techniques of coal winning, mine infrastructure, modern management techniques, preparation and transport of products, coking of coal, and coal upgrading. The overall budget included a small sum for dissemination of results and associated costs.

Economic and Social Committee

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

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

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

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

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

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

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

DG XVII personnel changes

Retirement of Karlheinz Reichert, former Director for Coal (1972-86) at the Commission of the European Communities

Mr Reichert, who retired from the Commission in August 1986, was born in 1925 and trained as an econo-

mist. From 1952 to 1958 he worked with the Federation of the German Iron and Steel Industry, Düsseldorf. He entered into the service of the European Coal and Steel Community on 1 May 1958 as Deputy Chef de Cabinet of Mr Franz Blücher, a Member of the High Authority. When Mr Blücher's successor, Mr Fritz Hellwig, was nominated Vice-President of the Commission of the European Communities, Mr Reichert was promoted to be his Chef de Cabinet from 1968-70.

On 1 August 1970 Mr Reichert was appointed as Director of financial management in the Commission's Directorate-General for Personnel and Administration with responsibility for administrative expenditure, salaries, sickness fund, purchasing, missions and external offices.

From there in January 1972, Mr Reichert moved on to become Director of DG XVII's Coal Directorate. He had direct responsibility for State aids for coal, the monitoring of Community and world coal markets, support for coal research and development under Article 55 of the ECSC Treaty, demonstration projects in the technology of converting solid fuels to liquid and gaseous fuels, etc., and Community policy for lignite and peat. Mr Reichert's responsibilities also included reports to the European Parliament, ECSC Consultative Committee and Economic and Social Committee, and representation of the Commission at international symposia, etc. Indirectly, he participated in other areas of ECSC activity such as trade policy, market rules, investment loans and transport questions.

The European Commission's new Director for Coal, Mr José Sierra

The Commission's new Director for Coal is Mr José Sierra from Spain. Mr Sierra took up his post in October 1986 replacing Mr Karlheinz Reichert on retirement.

Mr Sierra was born in 1938 in Badajoz and is married. He has a degree and doctorate in mining engineering from the Madrid School of Mines and a diploma from the Royal School of Mines, London (Imperial College). He also has a diploma from the Institute of High Business Administration, Madrid and is trilingual (Spanish, French, English).

Mr Sierra has wide experience in industry, research and public administration. During long service in the Spanish State-owned minerals company Adaro (INI), he has conducted research in applied metallogeny and geochemis-

try, coal and other mineral exploration in France, Spain, North Africa and Latin America. In public administration, he was a member, from 1969-71, of the Executive Committee of the National Mining Plan with responsibility for the National Mineral Exploration Programme and the Spanish Metallogenetic Map. From 1972-76 he was a member of the National Geology Commission and represented Spain in several international forums, including the International Energy Agency (1974). From 1975-80 he was General Director of Mines and Construction Industries in the Ministry of Industry and Energy.

In 1980, the year in which the State-owned company Sociedad Espanola de Carbon Exterior (Carboex) was founded, Mr Sierra became its Chairman and First Executive Officer.

Mr Sierra has lectured widely on mineral resources and is the author of more than 100 publications and conferences in Europe and America. He was a member of the Advisory Board of **Coaltech** (1985) and the Steering Committee of **Coaltrans** (1986).

Euroilstock

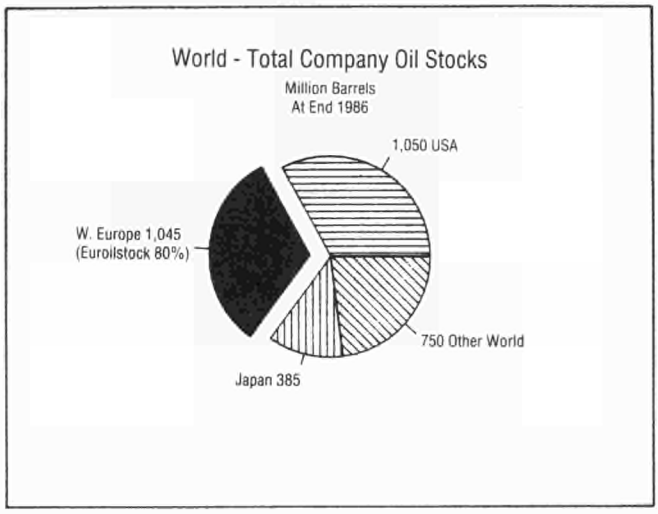
Summary of recent developments

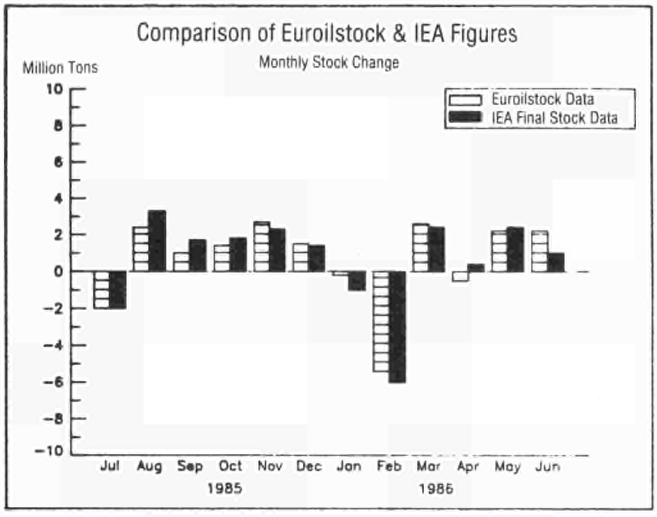
Since the beginning of January this year **Euroilstock**, the rapid reporting system for stocks of crude oil and petroleum products in the member countries of the Community, has been available publicly. Since the start up under the initiative of the Commission in 1985 the monthly Euroilstock data were restricted only to the participating companies.

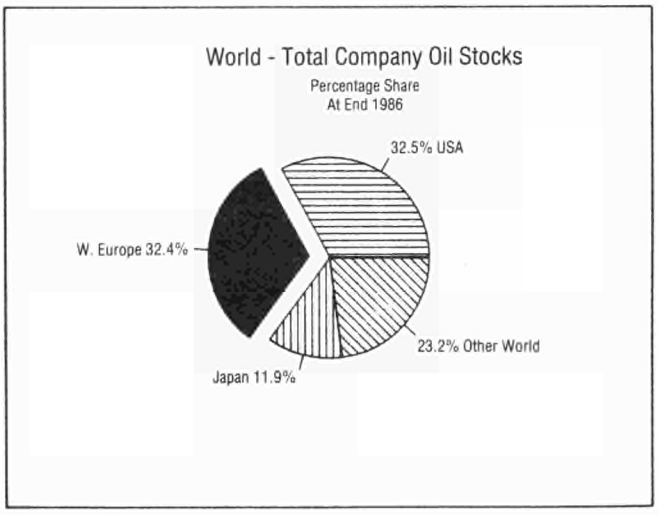
The monthly stocks figures are still compiled by the Dutch audit firm KKC, with strict copyright held by the Euroilstock Foundation (the 'Stichting') which was established in the middle of 1986 to take over responsibility for running the system from the Commission.

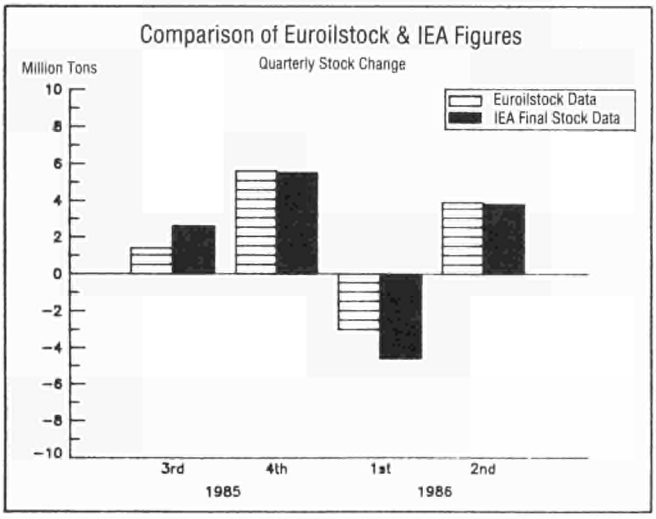
Towards the end of last year the Euroilstock Foundation granted an exclusive marketing licence to Euroildata, a company jointly owned by Petroleum Economics Limited (PEL) of London and Energy Security Analysis Inc. (ESAI) of Washington DC, USA. The Euroilstock data are now available on a subscription basis from Euroildata, with the information released simultaneously to subscribers and participants. It is planned that the revenues obtained by Euroildata from marketing the Euroilstock figures will cover the running costs of collecting and assessing the monthly returns from the participants and other reporting entities.

The public launch of Euroilstock in January coincided with the addition of Spain and Portugal to the reporting system — Greece joined during the middle of last year, so now Euroilstock covers all the member countries of the Community. End-month stock data is rapidly sent by reporting entities to KKC after the end of the month. After the data have been processed by KKC, estimating formulae are used to scale up the figures to reach national totals compatible with the stock data compiled by the









International Energy Agency. The results are made available on the seventh working day of each month.

Now that the coverage of Euroilstock includes all the member countries of the Community, the oil stocks reported by Euroilstock account for about 85% of all stocks held in Western Europe (see graph). Thus Euroilstock gives a good indication of latest developments in European oil stocks, which are in aggregate as large as those held by oil companies in the USA (and in the case of middle distillates and residual fuel oil, considerably larger). Together these two areas contain a large proportion of world oil stocks, so the establishment of Euroilstock has added a vital element in knowing the short-term oil stock position in the world.

Euroilstock ensures that information on Community oil stocks is now available two to three months before figures are released by other sources. Comparison of Euroilstock data with final stocks figures demonstrates that Euroilstock has maintained an accuracy of within 3%. Euroilstock has also given a good indication of monthly changes in oil stocks during a period in which the price of oil had fallen by over half and when many changes were taking place in the oil industry.

Security stocks

A great deal of emphasis has recently been placed on the subject of security stocks of oil. Community countries were the first to make the holding of security stocks compulsory. The EEC legislation goes back to 1968. Today, largely through the activity of the International Energy Agency (IEA), all OECD countries hold security stocks and headway is being made towards international agreement on their use in times of supply difficulty.

When security stocks were first built up, it was intended that they would be used to supplement supplies when severe disruptions dramatically reduce the flow of oil available from normal sources. This represented very much a 'last resort' policy for stock use. Against this background it is therefore not surprising that, in the various oil crises that we have had during the last 15 years, since physical shortage of oil supply never became critical, security stocks were never used. However, it is now generally appreciated that, in spite of the limited volumetric losses of supply involved, the situations did, in most cases, represent real crises, particularly because of the associated price developments. Today's perceptions suggest that the most dangerous risk in cases of disruption is not so much the risk of physical shortage, it is much more the risk of totally unrealistic price increases which would be potentially very damaging to both consumers and producers and to the overall health of the world economy.

It is against this background that a change in attitude towards security stocks has been taking place. Most countries now consider that early use of stocks, or at least a part of them, could have a calming effect, eliminate panic and prevent destabilization of the market and its attendant unrealistic price increases. This highly desirable objective would not be achieved by stock use alone. Several other measures would be used as well and an appropriate mix of measures would need to be selected in the light of the circumstances. Most Community countries consider that in times of supply problems, one of the most important requirements will be to ensure that every effort is made to economize in the use of oil. The consequential consumption reductions would also contribute very significantly to the stabilization exercise.

Early and fast reaction to imminent problems will depend upon having the ability to move quickly. Stock release would probably be one of the first measures to produce visible effects, but the question has become, how quickly could stock release be arranged. The answer varies from country to country because of significant differences between the way countries hold their security stocks and the form and coverage of national legislation.

In some cases security stocks are owned by the government, or they may be owned by special stockholding entities specially established for the purpose. In other cases they are owned by the oil companies, with each company holding part of the national obligation within its normal infrastructural facilities. These differences were unimportant when stock use was reserved for the last resort, but now that early use is foreseen as part of future policy, it has become necessary to examine each system to establish whether there would be any problems if the decision is made to use stocks early.

The Commission has been discussing early use capabilities individually with Member States. From these discussions it has become clear that almost all Member States could implement early stock use if it is agreed upon as an international course of action. In some countries it would be easier than in others and consequently there may need to be some modifications to existing arrangements to

make the system easier and smoother to operate at high speed and short notice.

EC/OPEC/OAPEC seminar: medium- and long-term energy outlook

Luxembourg, 17 to 19 March 1987

At the EC/OPEC/OAPEC seminar, 17 March 1987 — from left to right: Dr F. Al-Chalabi (Deputy Secretary-General, OPEC), Mr M. Schlechter (Minister for Energy, Luxembourg), Mr N. Mosar (Commissioner for Energy, Commission of the European Communities), Mr A. Al-Wattari (Assistant Secretary-General, OAPEC), and Mr. C. S. Maniatopoulos (Director-General for Energy, Commission of the European Communities).

The Commission has been endeavouring for a number of years to create the right conditions for constructive informal exchanges of views between oil-exporting and oil-importing countries.

In that context, close contacts have been established over the past few years between the Commission, on the one hand, and individual oil-producing countries and international organizations such as OAPEC to which they belong, on the other.

This has created a good climate of confidence, leading to regular exchanges of useful information on energy market developments. In addition, within the framework of the Commission's actions in support of energy planning in developing countries, the Commission has brought successfully into operation with these countries a number of technical cooperation projects taking the form of seminars, studies and training courses.

In October 1984, the Commission and OAPEC jointly organized a seminar on energy data. The success of that experience led the Commission to envisage a second seminar on the medium- and long-term outlook on the energy markets with which OPEC, as well as OAPEC, could be associated.

This Tripartite Seminar was opened by Mr N. Mosar on 17 March 1987 in the 'Jean Monnet' building in Luxembourg, with Dr F. Al-Chalabi, Deputy Secretary-General of OPEC acting for the Secretary-General and with Mr A. Al-Wattari, Assistant Secretary-General of OAPEC.

The aim of the seminar was to have an informal but structured exchange of views about the future. This objective was achieved.

One hundred participants coming from the staffs of the three organizing bodies, from their Member States' administrations and from academic institutions had informal exchanges of views on four main subjects:

(i) medium- and long-term energy supply and demand outlook;
(ii) energy policy responses, strategies and planning;
(iii) oil market situation: impact on development and future supplies;
(iv) outlook for the refining industry and trade in oil products.

A final panel composed of representatives from the oil, financial and academic worlds concluded the seminar in discussing the following theme: 'Energy balances — interdependence and international cooperation'.

The discussions were frank and friendly and of a very high technical quality. Satisfaction was also expressed by the participants at the way in which the exchanges of views took place.

It was considered that such exchanges of views play an important role in the efforts of oil producers and consumers to help each other to be better informed about their mutual perceptions and expectations of the future. It was felt, in particular, that sound energy policies and broader international cooperation would help to reduce

the risk of violent price fluctuations which are damaging for both producers and consumers and for the world economy.

It was agreed that the three organizing bodies would remain in contact and continue to exchange views on the evolution of the energy market.

Mr Schlechter, Minister for Energy of Luxembourg attended the opening session of the seminar and made a welcome speech. Mr J. Santer, President of the Luxembourg Government and Mr Schlechter participated in the dinner that OAPEC/OPEC hosted on 18 March 1987 and to which Arab and OPEC member countries' ambassadors also participated.

Mission to Algeria

A DG XVII delegation headed by Mr Maniatopoulos, the Director-General for Energy, was in Algiers from 21 to 24 March:

(i) to continue the consultations started in October 1985 between the Directorate-General for Energy and the Algerian Ministry for Energy and the Chemical and Petrochemical Industries (MEICP);

(ii) to take part in the closing session of the energy planning workshop jointly organized by DG XVII and the MEICP.

In addition to holding exchanges of views on oil and gas matters, and in particular the new law concerning oil and gas exploration activities in Algeria, DG XVII and the MEICP agreed on new energy cooperation activities, including technical visits by Algerian officials to the Commission concerning coal, nuclear energy, oil and gas production technologies and energy conservation. Energy planning training schemes will also be set up.

The delegation noted that the rational use of energy in particular is now a major concern in Algeria, as can be seen from the recent creation of the Apure (Agency for the rational use of energy).

The delegation also visited the Hassi R'Mel gas field 520 kilometres to the south of Algiers which is one of the biggest gas fields in the world with reserves estimated at over 3 trillion cubic metres. Under existing contracts, the gas from this field is exported by pipeline to Italy and in liquified form to Spain, France and Belgium.

Mr Maniatopoulos also met the Vice-Minister for Energy and the Chemical and Petrochemical Industries, Mr Fergani and the Secretary-General of the Ministry, Mr Boussena.

Commission energy mission to Morocco

Following an invitation by the Moroccan government, Commissioner Mosar led a team of Commission officials for a series of ministerial discussions on energy matters — the first contact of this type with Morocco. The Commission delegation met the Prime Minister (Mr Aziddine Karaki), the Energy Minister (Mr Mohamed Fettah), the Equipment Minister (Mr Mohamed Kabbaj) and the Secretary of State responsible for relations with the European Community (Mr Mohamed Seqqat). The Energy Minister, Mr Fettah, expressed Morocco's interest in being able to benefit from the Commission's DG XVII experience in energy cooperation. He outlined the energy situation in Morocco — indicating the heavy burden of Morocco's oil bill (some 50% of export revenue) the need for higher energy investment in the rural sector, the importance of developing Morocco's domestic energy production potential and the evident need to use energy sparingly.

The discussions led to a fruitful exchange of ideas on future areas for cooperation between the EEC and Morocco and identified energy planning, heavy oil, new and renewable energies (especially mini-hydro) and energy saving as the subjects of most interest.

Working level contacts are continuing to draw up appropriate agreements and details will be published in future editions of *Energy in Europe*.

Analysis of the oil-related sector in Europe

At a meeting held in Brussels on 3 March 1987 on the basis of a study prepared by a consultant at the Commis-

sion's request, experts from the Member States acknowledged the value of periodically analysing the situation in Europe's oil-related sector, its strong points and its weak points, in comparison with that of the main competing non-member countries (USA, Scandinavia, South-East Asia).

The oil services and equipment industry (also referred to as the oil-related sector) is particularly important to the Community's economy: its turnover totalled 7.5 billion ECU in 1985, repesenting some 20% of the world market. It is an export-orientated, job-creating industry which makes products with a high value added.

It plays a decisive role in the development of the Community's oil resources but its existence also closely depends on the investment decisions of the oil companies. The recent cutbacks in this area in the wake of the fall in crude oil prices have had an adverse effect on firms operating in this sector in Europe.

They are confronted with a situation of overcapacity which inevitably entails extremely keen competition in the marketplace. One of the results of this is that there is a strong tendency for the companies in question to cut their research and development budgets and shed personnel.

It is essential that these companies can keep their research teams and centres going pending a recovery in oil company investment. Otherwise, they will no longer be able to provide the technology required to exploit European oil resources in the 1990s.

Energy cooperation with Jordan

A programme of cooperation has been carried out between Directorate-General XVII of the Commission of the European Communities and the Jordanian Energy Ministry since April 1985, essentially concerning energy planning.

During a visit from the Community in October 1986, it emerged that very encouraging results had been achieved, namely:

(i) Assistance for the setting-up and organization of a service responsible for collecting and processing energy-related information (establishment of an energy and socio-economic data base).

(ii) Development of energy planning methods adapted to the conditions in the country (in particular oil supplies and the use of solar energy).

This cooperation also takes the form of support for training schemes for Jordanian staff and other countries in the Arab World.

For example, from 6-11 December 1986 a regional seminar was held in Amman bringing together representatives from several Middle-Eastern countries (Algeria, Bahrain, Egypt, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, Sudan and Tunisia). At the opening session, Mr C. Jones, (Deputy Director-General in the Commission's Directorate-General for Energy) gave an account of how the Community is cooperating with developing countries on energy planning.

In December 1986 an agreement was signed whereby European assistance will continue to be provided for an additional 18 months, entailing the continued presence of a European expert at the Jordanian Energy Ministry and technical support from Community specialists.

Energy technology projects news

Hydrocarbons

Programme of support for technological development projects in the oil and gas sector (Regulation No 3639/85) — Results of the 1987 invitation

Following the invitation published in Official Journal C 183 of 22 July 1986, **the Commission received applications for support for 143 technological development projects in the oil and gas sector entailing investment totalling 333 million ECU, an 86 million ECU increase over the previous invitation.**

European firms seem to be concentrating their innovation efforts to a greater extent than hitherto on **production** (35%), **prospecting** (16%), and **drilling** (12%), thus confirming one of the main research and development objectives of the oil and oil-related industries in the Community, namely to reduce oil and gas exploration and development costs by developing more efficient technologies (see Table 2).

The results of the 1987 invitation also confirm the abandonment of efforts in the sphere of secondary and enhanced recovery, probably as a direct result of the fall in crude oil prices in 1986.

Table 1 — 1987 invitation
Breakdown of projects and investments among Member States

Country	Number of projects	Investment (ECU)	%
Belgium	1	950 000	0.29
Denmark	4	2 883 470	0.87
Spain	2	2 562 267	0.77
France	33	122 249 863	36.71
Ireland	1	407 187	0.12
Italy	6	12 740 453	3.83
Netherlands	6	37 617 298	11.30
Portugal	2	1 806 189	0.55
Germany	17	27 489 982	8.23
United Kingdom	71	124 318 395	37.33
Total	143	333 025 104	100.00

Table 2 — 1987 invitation
Breakdown of projects and investments among the various areas of technology

Area	Number of projects	Investment (ECU)	%
01. Geophysics and prospecting	27	52 658 368	15.81
02. Drilling	41	39 788 748	11.95
03. Production systems	41	117 344 564	35.24
05. Secondary and enhanced recovery	1	353 696	0.11
06. Effect of environment on offshore structures	13	13 642 033	4.10
07. Auxiliary and submersible vessels	4	17 679 454	5.31
09. Pipelines	8	18 925 666	5.68
10. Transportation	4	15 490 602	4.65
12. Natural-gas technology	1	619 986	0.19
13. Energy sources	4	7 273 699	2.18
14. Storage	1	1 977 184	0.59
15. Miscellaneous	28	47 271 104	14.19
Total	143	333 025 104	100.00

Examination of the proposals submitted will be completed towards the end of April. The Commission will then consult the Advisory Committee for oil and gas projects on 16, 17 and 18 June. A decision on the granting of support should be taken in July.

Symposium on new oil and natural gas exploration and exploitation technologies — (Luxembourg, 22, 23 and 24 March 1988)

The third symposium on new oil technologies, following on from the ones held in 1979 and 1984, will be held by the Commission from 22-24 March 1988 in Luxembourg.

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

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

For further information, please contact:

Mr E. Millich, Directorate-General for Energy, Rue de la Loi 200, B—1049 Brussels (tel: 235 3625).

Demonstration projects

Conference on energy efficiency in industry — Berlin, 19 and 20 October 1987

The competitive pressures on industry have never been greater and no company can afford to ignore ways of reducing costs or of using its resources more efficiently. Energy is an input of major significance for many industries, and an appreciable cost element for many others. Furthermore, energy prices are a volatile factor which could again increase significantly in the future.

This conference, being organized by the European Commission, aims to make firms fully aware of the different opportunities for improving the efficiency of energy use, and reviews the latest techniques and systems including:

(i) **process integration;**
(ii) **industrial plant — process control and optimization;**
(iii) **new techniques for low temperature heat recovery;**
(iv) **the energy management of utilities;**
(v) **sources of finance for energy efficiency investments.**

The accent will be on what economic benefits can be achieved and how to go about applying the techniques described. Case studies will be used in which independent industrial users will relate their own experiences and there will be plenty of opportunity for discussion. **The conference should be of interest to senior management in industry responsible for achieving energy cost savings and those advising them, as well as other research or consultancy workers in these areas.**

Talks will be in English, French, German and Italian with simultaneous interpretation into these languages and Spanish. There will be no conference fee, but places will be allocated on a first come first served basis. A programme (with registration form and hotel booking procedures) will be distributed in May 1987 on request.

For details concerning the conference, please contact: Mr J. Sirchis, Commission of the European Communities, Directorate-General for Energy, Rue de la Loi 200, B—1049 Brussels; tel: 235 36 33.

Seminar on the use of plastic waste — Paris, 30 September, and 1-2 October 1987

Over 5 million tonnes of plastic waste is produced annually in Europe, 1 200 000 tonnes in France alone.

Some of it is collected with domestic refuse and subsequently recovered as heat.

A small fraction is used as a raw material.

New sorting and collection processes have been developed in recent years to increase the amount of recycling. New procedures are also employed to regenerate plastics reclaimed from general refuse and/or to permit the use of mixtures, in some cases for entirely new applications.

The seminar, which is organized jointly by the Commission of the European Communities (Directorates-General for the Environment, Research, and Energy) and ANRED (the French National Agency for Waste Reclamation and Disposal) will review research, development and demonstration projects in Europe.

The results of the latest experience will provide material for subsequent projects.

The programme for the seminar is built around the following subjects and round-table discussions:

(i) assessment of plastic waste arisings; economic constraints;
(ii) sorting and collection — experience;
(iii) new applications for recycled plastics:
- regeneration of reclaimed plastics,
- recycling of mixed plastics,
- process economics and markets for recycled plastics.

The seminar is to be held on 30 September and 1-2 October 1987 in Paris, at Science City, La Villette, as part of Environment Month and will be one of the events marking ANRED's tenth anniversary.

For further information (programmes) and registration contact: Mr B. Lajouanie, ANRED, 2 Square Lafayette, B.P. 406, F—49004 Angers; tel: 41 87 29 24, or Dr G.L. Ferrero, Commission of the European Communities, Directorate-General for Energy, Rue de la Loi 200, B—1049, Brussels; tel: 235 79 72.

International conference on pyrolysis and gasification — Luxembourg, November 1988

The Commission of the European Communities is organizing an international conference on the **pyrolysis and gasification of waste materials (including plastics, rubber and wood wastes, various forms of biomass and other low-grade solid fuels)** as a potential resource for:

(i) the production of storable fuels, chemical intermediates, synthesis gas, monomers, or activated carbon;

(ii) the fuelling of spark ignited engines, gas turbines or retrofitted boilers.

The conference will be held in Luxembourg on 15 to 17 November 1988.

Discussion of these themes, in particular those related to energy or the environment, will assist the Commission in defining its course for further actions.

Those who are active in the sector of pyrolysis and gasification are invited to participate in this conference and present a paper on the work which they have done. For this purpose they may send a summary of their paper of not more than two typewritten pages of the presentation they intend to give.

The deadline for receipt of the summary is 1 January 1988. The original of the summary plus eight copies should be sent to:

Professor A. Buekens, Vrije Universiteit Brussel, Pleinlaan 2, B—1050 Brussel.

The authors will be notified regarding the decision of the selection committee of the summaries on **1 June 1988.**

The emphasis of the conference will be on the practical results of past and current work in the EEC and worldwide, rather than on fundamental analysis. The latter will be amply covered by a few invited contributions.

Conference programme

The conference will be held on three days and will be divided into plenary sessions with oral presentations on the main themes and into a poster session which will cover the entire programme. The subjects will be:

1. **Technical aspects**

1.1. Preparation of the feedstock (drying, screening, sizing, pelletizing, briquetting and size reduction).

1.2. Feeding and residue extraction.

1.3. Gas purification and filtration (dust separation, aerosol separation, methanation, and synthesis gas production).

1.4. Wastewater problems (oil/water separation, and treatment of condensates and wastewaters).

2. **Uses for gas** (retrofitting of boilers, uses for producer gas, spark ignited engines, synthesis gas, and enrichment of blast).

3. **Uses for pyrolysis oil** (properties and their enhancement, fuel uses, engine uses, monomers, chemicals and intermediates).

4. **Uses for the carbonaceous residue** (fuel uses, activated carbon, carbon black and disposal).

5. **Case studies** (EEC funded R&D and demonstration projects, funded by international organizations and private).

All accepted papers will be published in the conference proceedings. Those who would like to participate in the conference or receive the final programme should write to:

Professor A. Buekens, Vrije Universiteit Brussel, Pleinlaan 2, B—Brussel; tel: (02) 641 32 50/ (02) 641 32 47 or Dr G.L. Ferrero, Commission of the European Communities, Directorate-General for Energy, Rue de la Loi 200, B—1049 Brussels; tel: (02) 235 79 72; Telex: 21877 COMEU B.

Technology focus

Energy consumption decrease with the use of oleopholic drum skimmer (ODS)

In the framework of the European Community's demonstration programme, Elf Anvar has developed, in cooperation with the Institut National des Sciences Appliquées de Toulouse, an oleopholic drum skimmer. This is a new technology for the continuous, selective recovery of oil collecting on the surface of gravity-type water/oil separators. The oleopholic drum skimmer (ODS) reduces evaporation losses and reduces the cost of removing water from the recovered oil prior to recycling.

The ODS saves energy in two ways: **firstly** by recovering water-free oil, and **secondly** by operating continuously it reduces the oil's residence time on the surface and thereby reduces evaporation losses.

The operation of the ODS
The oil recovery drum consists of a cylinder coated with oleopholic material. It is rotated continuously through the surface layer of the water so as to selectively pick up the oil, which is then recovered by a fixed scraper and piped to the existing collection system.

The results of the demonstration project
In all, eight water/oil separators were equipped with oleopholic drum skimmers. The separators are used as a means of primary gravity treatment for the removal of oil from aqueous effluents and the cumulative quantity of oily water treated was between 700-900 m3/hour. The energy saving measured during the test programme was 2200 toe/year (1500 toe/year from the removal of water and 700 toe/year due to reduced evaporation). The capital cost of fitting the ODS to all eight separators was FF 1 million (1981 prices) and the aggregate cost of the demonstration programme, including instrumentation and data-logging, was FF 2.8 million. The resulting capital cost per unit saving was FF 450/toe.

Besides the energy saving, four additional benefits of the technology were recorded during the programme:

(i) reduced evaporation means the separators produce less smell;

(ii) because the process is continuous, the operation of the separators was improved leading to a labour saving of one person/shift;

(iii) the process can be introduced without modifying the separators;

(iv) operating and maintenance costs recorded were negligible owing to the simplicity of the technology.

The field of application of the technique

The ODS process can be used on the full range of water/hydrocarbon product separators, in particular the following:

- **Oil sector**

(i) refining (similar to the demonstration project);

(ii) recovery of hydrocarbons or light solvents in the petrochemical sector;

(iii) in on/off shore production an ODS can be added to traditional plate separators that serve as the preliminary de-oiling of aqueous effluents before discharge to the surroundings;

- Edible oils industry
  Laboratory tests have shown that this technology could be used in the edible oil industry.

- Motor industry
  The technology could be applied on water/oil separators in waste water treatment plant, hold-up tanks or the buffer tanks of washing plants.

- Other industries

(i) Branches of the chemical industry using hydrocarbons and/or solvents;

(ii) paint industry;

(iii) oil removal tanks and pits;

(iv) airports, service stations and garages.

Remarks

The oleopholic drum skimmer technology has proved so successful that the project has already been replicated

some 200 times. An interesting offshoot of the demonstration programme has been the development of STOPOL, an oil spill recovery system which utilizes OSD technology.

For further information on this project, please contact: Société Nationale Elf Aquitaine, Direction de la Recherche Scientifique et Technique, 7 rue Nélaton, 75739 Paris CEDEX 15; Centre de Recherche Elf Aquitaine Solaize (CRES), BP No 22, 69360 St-Symphorien-d'Ozon; or the Commission of the European Communities, Directorate-General for Energy, Demonstration Projects, Rue de la Loi 200, B-1049 Brussels.

Tripod tower platform: a new concept for hydrocarbon production in deep waters

The techniques for hydrocarbons production in deep waters have achieved significant technological progress in the past two decades. Production from fields in water depths less than 200m has been successfully applied in severe environments.

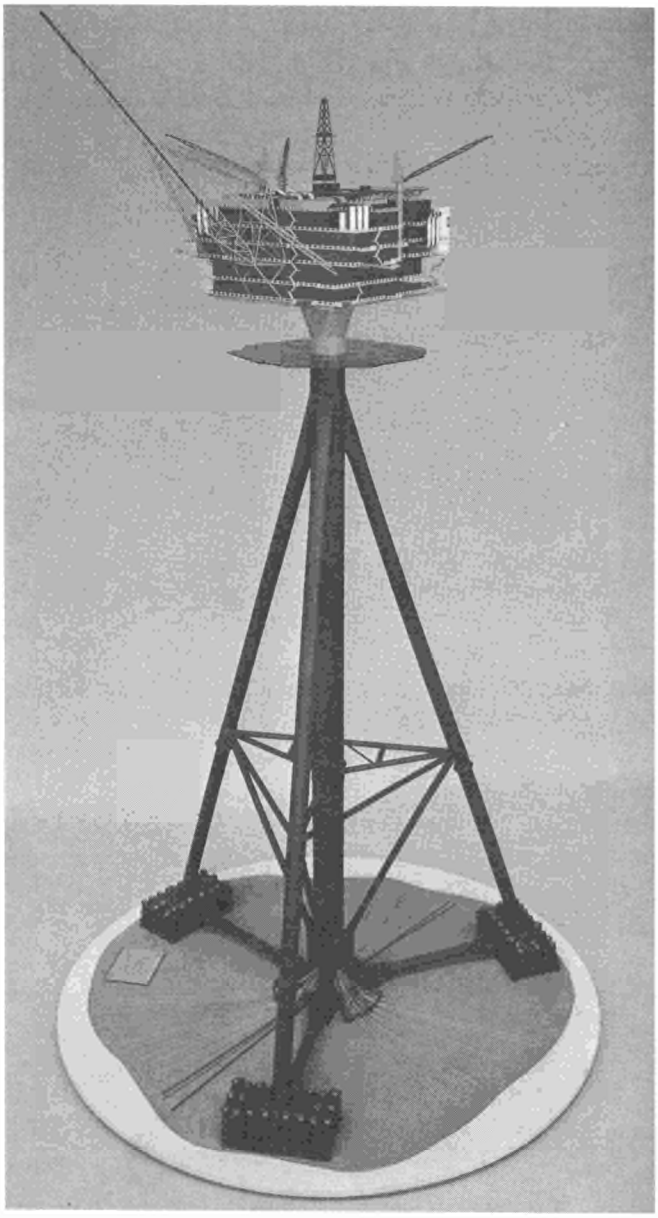
Exploration successes have shown that new important reserves, which are located in water depths beyond 300m particularly in North Sea, might be produced economically if adequate production techniques are developed.

Under the programme of support for Community projects in the oil and gas sector, the Commission has supported several projects aimed at developing new concepts for deep water production.

The 'Tripod tower platform' project

Fields located in deep waters can be exploited with purposely designed structures. Although floating production systems development presents a solution, fixed structures are still considered as an appropriate means of achieving hydrocarbons production in those areas. Nevertheless, technical solutions for platforms installed in 150 m water depths lead to prohibitively large dimensions if adopted for deep waters and extrapolation does not seem realistic.

In view of the specific application to the North Sea, the Heerema company has developed the Tripod tower platform concept for water depths beyond 300m. The purpose of the projects TH. 03.122/82 and TH. 03.139/83 was to study a variant named TPP 1115, adapted to suit the requirements of oil and gas production from the huge Troll field in the Norwegian Trench.



The technology developed

The Tripod tower platform structure is composed of a central column which supports the topsides and three inclined legs, mounted on a triangular wide base with a three points bearing system as foundation. This concept is based on the use of unstiffened tubulars and a minimum number of nodes. Tubular sections for the deep

water Tripod tower platform may be built using 200 mm thick plates.

The project results

The project has shown that the new design complies with all requirements of operation and construction and has several advantages for application in North Sea deep waters. Its flexibility makes this design possible for a range of topside facilities and associated weights. Piled foundation allows its adaption to a broad range of soil conditions and fabrication methods require the application of proven and existing technology only.

The project has highlighted that construction of the major components can be carried out simultaneously at several Norwegian yards although a suitable dry dock of approximately 400 m length and 100 m width is required during the subassemblies of column and legs. The assembly of the Tripod tower platform must be performed afloat using buoyancy forces. Feasibility of this method has been verified by means of a model test simulation. The method of the platform installation is similar to the one used for other self-floating platforms.

The studies performed by Heerema with Community support have shown that a new concept is available for deep water application in the North Sea. This has been possible by technological development which in case of application, particularly for the Troll field, will increase the safety of hydrocarbons supply to the Community.

Additional information can be obtained from: Heerema Engineering Service BV, PO Box 9321, 2300 PH Leiden, The Netherlands.

Document update

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

Energy saving

C/87/516 final Commission decision of 16 March 1987 amending the Commission Decisions of 28 July 1986, 7 November 1986 and 11 November 1986 on the granting of financial support to technological development projects in the hydrocarbons sector and to demonstration projects in the energy field

Commission of the European Communities, Energy Saving Regulations (1974-86)

Solid fuels

SEC/87/306-4 Draft Commission Decision on technical coal research

European Coal and Steel Community report on the 1986 summary of investment in the Community coal mining and steel industries.

Liquid fuels

COM/87/36 final Amendment to the proposal for a Council Directive amending Directive 75/716/EEC on the approximation of the laws of the Member States relating to the sulphur content of certain liquid fuels

Nuclear

COM/87/70 final Proposal for a Council Decision approving amendment of the statutes (articles of partnership) of the joint undertaking 'Société d'Energie nucléaire franco- belge des Ardennes' (Sena)

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