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ENERGY IN EUROPE

Energy policies and trends in the European Community

Number 2 August 1985

Commission of the European Communities □ Directorate-General for Energy

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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
EUR 10	Total of member countries of the EC
I or —	discontinuity in series
of which	the words 'of which' indicate the presence of all the subdivisions of the total
among which	the words 'among which' indicate the presence of certain subdivisions only

Is the general public in favour of a Community energy policy?

Public opinion in the European Community on energy issues in 1984

Faits et Opinions, the public opinion pollsters, have produced a detailed report, on their own responsibility, about a survey they conducted amongst 9 900 citizens in the ten Member States in October 1984 for the Commission. A similar survey was carried out in October 1982 and published in 1983.

Commission staff felt that it would be helpful if they, for their part, picked out the general findings in the report which cast most light on the Community's energy policy.

The gravity of the energy problem

Over half the Europeans interviewed considered the energy problem serious and thought that it would still be virtually the same in 10 years' time. However, their pessimism has abated slightly since two years ago. Opinions differ appreciably from one Member State to another, with the Italians the most pessimistic and the Dutch and Danish the least concerned.

Percentage of public support for joint action on energy by the Community countries (Oct. 84)

Belgique/België	78
Danmark	63
BR Deutschland	71
Ελλάδα	57
France	74
Ireland	72
Italia	78
Luxembourg	87
Nederland	87
United Kingdom	53
EUR 10	**71**

Dependence on imported energy supplies

Europe in general, and each individual Member State in particular, seems highly aware of its dependence on imported energy supplies today (and of the disparities between one Member State and another). There is a clear correlation between this awareness on the one hand and the realization of the seriousness of the problem on the other.

General policy questions

Given the seriousness of the situation and the relatively heavy dependence on imported energy supplies, two general lines of policy are open:

(a) **Advantages of joint action.** More than two out of every three Europeans favoured action by the Community on energy policy, whereas only one in five preferred separate national action. In every Member State, the majority favoured action by the Community. This advantage of the European dimension was borne out by the respondents' confidence in the security of supplies from other parts of the Community.

(b) **The need for public spending** in this field was broadly accepted. Over two thirds of the respondents accepted the principle of financial aid for energy research and energy-saving schemes. However, in reply to the specific question of cutting down energy consumption, the majority preferred recommendations rather than statutory obligations (Greece and Italy being the only exceptions).

General priorities

Almost one European in two favours measures to make Europe less dependent on **imported energy supplies.** None the less just under one in five put the cheapest possible price before the risk of becoming more dependent on foreign supplies.

Interestingly, **environmental protection** is one of the priorities of almost one European in three, and even of the majority of those questioned in Denmark, Germany, Luxembourg and the Netherlands.

Priorities for specific sectors

(a) Energy saving

Over two thirds of the respondents said that a great deal of energy was wasted. This was clearly the feeling in every Member State, albeit to differing degrees.

However, less than one European in two claimed personally to have done anything to save energy over the last few years in any of the three main areas listed (insulation, turning down the heating and driving more economically). On average, only one in four felt that they could personally make more savings in any of these three areas than they were already.

Slightly over one European in 10 voted energy saving the top policy priority to overcome the supply problems, with a quarter of the respondents placing it second. This is low considering the still untapped potential in this area and seems to contradict the feeling of those questioned that a great deal of energy is still wasted. One conclusion which can be drawn is that it is essential to keep consumers better-informed of ways of reducing wastage and of the benefits which they can expect from them.

As for the means to be employed, the majority preferred incentives to restrictions by law (except in Italy and Greece). On the other hand a very large majority (over three quarters) felt that financial help to consumers wishing to install energy-saving equipment was justified, with the replies broadly the same in each Member State.

(b) Oil

Oil has a poor image. The vast majority of the Europeans interviewed rated it the least reliable of all the sources listed, in terms of security of suply, price stability and pollution risks.

Two other findings corroborate this. Eight out of every ten people in Europe as a whole (and an even higher proportion in France, Germany and Italy) feel that oil consumption for electricity generation should be cut down substantially in order to reduce dependence on oil. Another indication is that although one in every three Europeans has an oil-fired heating system at home, half would prefer to convert to another fuel.

(c) Natural gas

One in four Europeans ranked natural gas the stablest-priced, safest form of energy. One in five also saw it as the fuel posing the lowest pollution risk. This preference for natural gas is particularly marked in Denmark, Ireland, the Netherlands and the United Kingdom. (In both the United Kingdom and Ireland, natural gas is even preferred to renewable sources as a means of combating pollution.)

(d) Solid fuels

Solid fuels also have a fairly good image, at least on price stability and security of supply. Almost one in five Europeans put them first on both these counts, giving solid fuels comparable support to natural gas, nuclear energy and renewable sources. This support is stronger still in Belgium, Ireland, Luxembourg and Germany, whereas the Netherlands and Denmark are the least enthusiastic.

On the other hand, the pollution risks are generally acknowledged, with only one European in 10 voting solid fuels the best means of combating pollution. The assessment of the risks of living close to a coal-fired power station are also significantly higher than in the 1982 survey.

The same relative preference for solid fuels comes through in the question on electricity generation, where solid fuels have a slight edge over nuclear power in terms of price stability and security of supply and are more decisively preferred from the point of view of pollution risks, compared to nuclear. There is a marked preference for solid fuels in Belgium, Denmark, Greece, Ireland and Luxembourg.

(e) Nuclear power

Nuclear power's image differs widely.

The proportion of citizens describing nuclear power stations as 'worthwhile' (43%) or saying that the risks involved were 'unacceptable' (38%) were both higher than in the 1978 and 1982 surveys. The proportion of 'don't knows' has gone down.

As mentioned earlier, nuclear power was ranked almost equal to solid fuels on price stability and security of supply for electricity generation. But only one country — France — gave nuclear power the lead on both price stability and security of supply.

There are still substantial reservations about using nuclear power. Overall, just under one in every two Europeans feels that the risks must be accepted. Opinion is generally divided, except in France and Germany, where the balance is clearly in favour of nuclear power, and in the countries with no nuclear installations, namely Denmark, Greece, Ireland and Luxembourg, where there is clearer opposition.

Almost two in three Europeans feel that nuclear power stations pose as great a hazard to local residents as explosives factories (but less than a chemical factory).

The greatest concerns seem to be the risks of storage of radioactive waste (two Europeans out of every three), followed by radioactive emissions (roughly one in two).

(f) Electricity

The respondents expected demand for electricity in their countries to continue to grow in future. This agrees remarkably with expert opinion. In addition, the public not only feels that the energy problems are serious but also expects electricity consumption to increase.

(g) Alternative sources

There is nothing surprising in the finding that one in every two Europeans in every Member State except the United Kingdom and Ireland (where natural gas is preferred) thought that 'soft' energy is the best means of combating pollution.

What is more surprising is that one European in five said that alternative sources are the stablest priced. (The proportion rose to one in three in Greece and one in four in France and Italy, though Ireland and the United Kingdom both remain very sceptical.)

Finally, the much more surprising finding is that one European in every two sees alternative energy sources as the most appropriate solution to the supply problems and energy difficulties.

* * *

The information provided by the survey is clearly of interest, but any assessment must of necessity be cautious. A copy of the full report can be obtained from the Commission (Mr Tiberi; tel. Brussels 235 22 81).

The opinions expressed (on the basis of a questionnaire) reflect the climate of opinion at a particular moment in time and are given 'raw' and without any critical judgment having being made. The Commission will subsequently have the task of evaluating the opinions to see how they can be taken into account in the proposals it makes concerning energy policy.

New Community energy objectives

Although the world energy situation is reasonably calm, at least for the time being, the ten Member States of the European Community are still working to achieve common energy objectives. What is more, those objectives are well on the way to being fulfilled. The lesson of the past, however, is that it would be fatal to assume that the future energy situation will now look after itself. We have seen how quickly a favourable energy situation can turn into a state of crisis. Sustained efforts will be needed to ensure that this does not happen again. The European Commission has therefore suggested that the Community should underline this need by adopting new energy objectives for the year 1995.[1]

The point of having common energy objectives is not just to give substance to the existence of a Community energy policy. Common objectives represent a political commitment by all member countries to continue with effective policies, and they lay down a common direction which these policies will take. The objectives have always been backed up by regular monitoring of progress. The Commission has been given this particular responsibility and carries out, most recently in 1984,[2] regular reviews of the energy situation and energy policies in each Member State.

For the last five years the ten member countries of the Community have been working on the basis of 1990 objectives, which were adopted by the Council in June 1980. These included, inter alia, commitments to:

(i) reduce the share of oil in the Community's total energy consumption to about 40%;

(ii) increase the share of coal and nuclear energy in the fuels used for electricity generation to at least 70-75%;

(iii) reduce the ratio between economic growth and growth in energy demand to less than 0.7.

The 1984 review of Member States' programmes showed that all three of these objectives were likely to be achieved by 1990. Indeed, the coal/nuclear target has already been met. More generally, these improvements illustrate the very considerable progress which has been made in the Community since the 1973/74 oil crisis. In 1984, after 11 years of economic growth, total energy consumption in the Community was 2% lower than in 1973. Oil consumption was down by 25% and net oil imports had been cut from 596 Mtoe in 1973 to 299 Mtoe in 1984. Nuclear capacity in the Community had more than tripled to 53 gigawatts (GW) at the end of last year.

But energy needs will of course continue to grow during the rest of this century. It is essential that these needs should be met efficiently and with a diversified and secure pattern of supplies. Energy is a field in which the lead times for many decisions and investments are notoriously long. The 1990 objectives are therefore starting to lose their relevance. The Community should now be looking beyond the end of this decade to ensure that the necessary decisions needed for the 1990s are taken, and taken in good time. This is the case for adopting new objectives to guide energy policies during the next 10 years.

The new objectives suggested by the Commission are designed to take account both of **horizontal** requirements, that is essential guidelines which should be followed in all energy sectors, and of **sectoral** needs. They have been derived from the Commission's own assessment of the current situation and past trends, set out at length in the 1984 review, and from its recently-published **Energy 2000** study[3] which looked at a range of possible developments over the rest of this century. The results of the latter study were summarized in the last issue of *Energy in Europe*.

On the **horizontal level,** the Commission has suggested the following seven objectives:

1. External relations:

Development of external energy relations through a coordinated Community approach.

[1] COM(85) 245 final.
[2] COM(84) 87 and 88 final.
[3] SEC(85) 324 final.

2. Internal market:

Greater integration of the Community energy market to improve supply security, reduce overall costs and enhance economic efficiency through increased competition.

3. Energy security:

Reduction of security risks through indigenous energy production, diversification of supply sources, greater system flexibility and effective contingency measures.

4. Energy pricing:

Application of the Community's energy pricing principles in all sectors of consumption.

5. The environment:

The balanced pursuit of both energy and environmental aims, particularly through the use of the best available and cost-effective control technologies and through improvements in energy efficiency.

6. Regional development:

Reinforcement of Community energy policy through appropriate measures in less favoured regions.

7. Technology and innovation:

Continued promotion of innovative energy technologies through research, development and demonstration.

The case for each of these seven basic horizontal needs is perhaps self-evident. In an inter-dependent world energy economy there will always be a need to maintain good **external relations** and encourage recognition of the common interest all nations have in ensuring trade, growth and stability. Reinforcement of the **internal market** must be an economic aim for the Community in energy as much as in other fields. No energy policy can ever be effective without paying attention both to **energy security** and to the importance of realistic **energy pricing** for the effective operation of the market. **Environmental aims** must in future be an integral part of energy decisions, and the reverse holds true as well. The same type of interaction is true in the **regional development** field, not least because the energy situation in many of the Community's poorer regions is particularly vulnerable. And, lastly, the future of the Community's energy situation will depend a great deal on the development and, above all, on the commercialisation of **new energy technologies.**

The **sectoral objectives** suggested by the Commission amount to a series of signposts towards the type of energy situation which would provide the Community with an acceptable level of security and efficiency in ten years' time. The degree of effort which will be needed to achieve these objectives will of course depend on how economic trends and energy markets develop. If these developments are favourable, the objectives may be achievable with present policies. But it is more likely, given the uncertainties and scope for fairly rapid change which characterise the energy field, that stronger policies will be needed from time to time to keep the Community on its chosen course. Changes in the price of oil relative to other fuels could be an important example of this type of change. The major significance of the proposed objectives, therefore, is that their existence would signal the need for stronger action when market trends started to diverge from the path they set.

The desirable pattern of development indicated by the proposed sectoral objectives, therefore, is one in which the growth in energy consumption would be held down by continuing gains in energy efficiency, and in which reliance on oil would continue to be restrained by expanded use of coal and other solid fuels, natural gas, nuclear power and renewable sources. On the supply side, efforts to discover and bring on stream new oil and gas fields will clearly need to be given priority, as well as the continued expansion of the nuclear programme and the restructuring of the Community's coal mining industries.

With these aims in mind, *the specific sectoral objectives* put forward by the Commission are:

1. Energy efficiency:

Continued improvement of energy efficiency in all sectors to achieve at least a further 25% reduction in the overall intensity of final energy demand by 1995.

2. Oil imports:

To maintain net oil imports at less than one-third of total energy consumption in 1995 by continued oil substitution and by promotion of exploration and production within the Community.

3. Natural gas:

To maintain and if possible increase the market share of natural gas on the basis of a secure and diversified pattern of supplies.

4. Solid fuels:

To maintain and if possible increase the present market share for solid fuels. Continued restructuring of the Community's solid fuels production industries.

5. Electricity:

Continued priority for the use of solid fuels and nuclear energy in the electricity sector to ensure that not more than 10% of electricity is generated from hydrocarbons in 1995. Approximately 40% of electricity output in 1995 to be generated from nuclear energy.

6. Renewable energies:

To increase the efforts already underway to develop and commercialise new and renewable energies with a view to tripling their displacement of conventional fuels by the end of the century, enabling them thereby to make a significant contribution to the Community's energy requirements.

These are of course Community level objectives rather than objectives which will apply individually to each member country. There are naturally major differences from one country to another in terms of energy resources, geography, demand patterns, administrative structures and policy choices. But the achievement of the common objectives will require equivalently strong efforts in each country. One important aspect of the objectives is that they will provide the basis for regular monitoring by the Commission of energy policies in the Member States.

The Commission has invited the Council to ratify the new objectives in the form of an agreed Council Resolution. Its proposals were discussed for the first time by the Energy Council on 20 June, where initial reactions at the political level were generally favourable to the idea of making a renewed commitment to sound energy policies over the longer term. The details of the Commission's proposals will now be discussed at working level and brought back to the next Energy Council in the second half of 1985. Since the objectives will apply to the expanded Community of Twelve, the proposals will also now be discussed with Spain and Portugal.

Ultimately, the adoption of new energy objectives for 1995 will be a signal to the outside world that the Community intends to keep its energy economy in order, and therefore to maintain the contribution it has been making to improve the world energy situation. Above all, the objectives and their implementation will provide the secure energy base which the Community will need to achieve its economic and social aims. The recent opinion survey discussed in another article in this issue of Energy in Europe shows that the European public has not forgotten this need and that there is wide public support in every country for taking effective action at the level of the Community itself.

Energy research and development (R&D) in the European Community

At almost 50% of the total Community R, D&D [1] volume planned for the period 1984-87 the Community goal 'Improving the management of energy resources' is the major one among the seven goals in the framework programme for the scientific and technical activities of the Community.[1]

This general energy goal comprises four broad objectives for energy research concerning **nuclear fission, fusion, renewable energies** and **rational use of energy.** A number of R, D&D programmes, carried out or managed by several Directorates-General of the Commission, work towards realization of these objectives. The major contributions come from a number of dedicated energy programmes, ranging from research to demonstration activities. An additional, smaller contribution comes from a number of other Community R,D&D programmes, dedicated to other, non-energy sectors, such as 'materials' for instance which usually contain a relatively small energy-aspect. In turn, the dedicated energy programmes frequently contribute to other objectives, such as **'protecting the environment'.**

Taking this into account, the overall resources proposed for energy R, D&D during the period 1984-87 as well as the state of implementation of this proposal by means of both dedicated programmes and contribution from other proposals, by March 1985, are shown in Table 1.

Table 1 — Goal of the framework programme 1984-87 on Community R, D&D:
Improving the management of energy resources

Objectives	Proposed for 1984-87	Status on 1. 3. 1985
1. Developing nuclear fission energy	460 [1]	410 [1]
2. Controlled thermonuclear fusion	480	591
3. Developing renewable energy sources	310	122
4. Rational use of energy	520	195
	1 770	1 318

([1]) 1982 value.

It should be noted that as a result of the guidelines adopted by the Council on 20 June 1985 on the duration and on the amounts estimated necessary for the demonstration projects, the figures concerning the status of the last two objectives in Table 1 will increase.

The energy-dedicated programmes, which account for the major share of the state of implementation of the various objectives are shown in the following Table 2 which reflects the situation of March 1985.

The R&D activities are executed either in-house by the Joint Research Centre, or in laboratories of industry, national centres or universities in the Member States on the basis of cost-shared contract research, administered by Commission departments.

Energy in Europe will devote considerable attention in the future, as it has in the past, to Community action administered by the Directorate-General for Energy to promote demonstration projects in the exploitation of alternative energy sources, the rational use of energy and the liquefaction and gasification of solid fuels.

This article simply gives a brief overview of energy R&D activity financed by the Community in the fields of fission, fusion and non-nuclear energies.[2]

1. Fission nuclear energy

Energy from nuclear fission continues to play an expanding role in meeting the Community's energy requirements. It is already used on a large scale in some countries and its use is expanding throughout the Community. At Community level this implies concomitant research efforts to help meet public concern that man and the environment should be protected against the risks of escaping radioactivity. Action by the Community has been and still is concentrated on the operating safety of nuclear power stations and of fuel cycle installations.

The main objectives of the **reactor safety** programmes are accident prevention on the one hand, and accident analysis, control and mitigation of accident consequences, on the other. Accident prevention addresses the problems

[1] Official Journal C 208, 4. 8. 1983 on the Council Resolution of 25 July 1983 on framework programmes for Community research, development and demonstration activities and a first framework programme 1984-87.

[2] For more detailed information on any of these programmes, please contact DG XII Scientific Coordination. Tel: Brussels 235 67 12 or Brussels 235 69 16.

of continuous improvements of design and fabrication quality for reactor components and systems. Thereby the operational reliability and hence safety and economy of nuclear power plants are increased. The major effort is devoted to risk and reliability assessment, and to studies on the integrity of components and systems. In the area of accident analysis, control and mitigation of accident consequences, the effort is directed to develop models and computer codes which describe the phenomena occurring during the course of an accident. Large test risks are run to produce experimental data for code verification.

The emphasis on the above two main research areas is slightly different for the two types of reactors — LWRs (light water reactors) and LMFBRs (liquid metal fast breeder reactors) — owing to their different stages of development.

The objective of the **reactor development and advanced technologies** activity is mainly to perform comparison, analysis and synthesis studies in the field of coordination research and of harmonization of safety methodologies, codes and standards — both for LWR and LMFBR systems. In the light of advanced technologies, comparison, analysis and synthesis studies are also carried out.

The **management and storage of radioactive waste** programme is oriented towards optimization of radioactive waste management with respect to safety and cost. Moreover, existing methods are improved and processes developed for treatment, conditioning and handling of radioactive wastes arising from all stages of the nuclear fuel cycle. Concerning final storage of high-level wastes and long-lived wastes, the effort aims at evaluation and demonstration of feasibility of final storage in various geo-

Table 2 — Energy

		1984	1985	1986	1987	1988	1989	1990
Nuclear fission								
Reactor safety	JRC			192/1				
Reactor development and advanced technologies [2]		0.93	1.1					
Management and storage of radioactive waste	SCA	43/10			62/12			
Radioactive waste management	JRC			49/1				
Fissile materials control and management	JRC			45/51				
Nuclear fuel and actinide research	JRC			66/1				
decomissioning of nuclear plants	SCA			12.1/3				
utilization of HFR reactor	JRC			59/1				
Fusion								
Thermonuclear fusion-JET or general programme	SCA			690/270	690/270			
Fusion technology	JRC		46.5/1	46.5/1				
Specific appropriations for projects of European significance	JRC		3					
Non-nuclear energies								
Energy (non-nuclear)	SCA				175/40			
Solar systems testing methods	JRC		22 [1]					
Habitat energy management	JRC		17 [1]					
Alternative energy sources, energy saving, substitution	PD	215				545		
Liquefaction and gasification of solid fuels	PD	50				155		
Coal research	ECSC [2]	19	19					

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

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

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

logical formations — including under ocean sediments — and evaluation of safety of the different options. As for all other Community actions, the work is carried out in a close collaboration with Member States' experts in order to obtain international consensus.

The **radioactive waste management** programme is fully complementing the previously mentioned activity. It deals with all aspects linked to the fuel cycle installations, e.g. chemical separation of actinides from medium-level waste, including cost/benefit evaluations. Furthermore, it aims at providing the necessary data base and model validation for waste disposal in continental geological formations, and at assessment of safety and feasibility of waste disposal in deep oceanic sediments.

The fissile materials control and management programme is primarily oriented to assist the Euratom Safeguards Directorate and the European nuclear plant operators in the implementation of their safeguards duties in the frame of the Euratom Treaty and the Non-Proliferation Treaty or other agreements. The programme combines the technical requirements originated from the different safeguards obligations with the reality of industrial operations and fissile materials management. Harmonization with the Member States are ensured through Esarda (European Safeguards Research and Development Association) and bilateral collaborations. The Commission-IAEA (International Atomic Energy Agency) cooperative support programme is an important channel for supporting the IAEA safeguards.

The nuclear fuels and actinide research programme includes R&D work related to improvement of LMFBR fuels — with emphasis on assessment of optimised advanced fuels, and on study of fuel and fission product behaviour under off-normal conditions. Moreover, key problems of the fuel cycle — both LWR and LMFBR — are dealt with such as safety aspects of fuel fabrication with special regard to aerosol formation, and formation of actinides in the reactor. In the field of actinide research — where the Commission laboratory plays a leading role in the Community — the main effort is on crystal chemistry and general theory of bonding in solid actinides.

The main objective of the **decommissioning of nuclear installations** programme is to develop methods which will ensure the safety and protection of man and the environment against the potential hazards involved in decommissioning operations. Accordingly, the programme aims at development of management systems for nuclear installations definitively shut-down, and for radioactive wastes produced in plant dismantling. Various decontamination, dismantling and disposal techniques are studied in the light of large-scale decommissioning operations undertaken in the Member States. Moreover, the programme aims at identification of guiding principles which could form the initial element of a Community policy in this field.

Finally, the **HFR** reactor (high flux reactor) is operated and utilized in support of the research programmes of the Commission and of the Member States, as well as for industry. These programmes cover the fields of nuclear fission energy (especially safety aspects), thermonuclear fusion, fundamental research, together with non-nuclear applications in medicine, agriculture (radioisotopes) and in industrial neutron radiography.

2. Fusion nuclear energy

Controlled thermonuclear fusion is one of the possible solutions to the problem of energy supply in the long term. The scientific and technical problems are so complex, demanding enormous efforts and very long development times, and the potential benefits are so great that the Community countries decided to work together at an early stage. Controlled thermonuclear fusion already appeared in the very first programme of the European Atomic Energy Community in 1958. The fusion programme runs for a five-year period. After three years of operation a new five-year programme ('rolling programme') is adopted, which thus overlaps with the last two years of the previous programme, thereby ensuring the programme's continuity and consistency. The essential features of the European fusion programme are that it is all-encompassing, in that it covers all the activities in all the Member States, and that it has long-term objectives (the prototype reactor) which extend well beyond each five-year programme. This approach, which has been extended to include two non-Community countries — Sweden (1976) and Switzerland (1978) — and Spain (1980) has produced major achievements — witness the entry into operation in June 1983 of the JET project (Joint European Torus), inaugurated in spring 1984 at Culham in the United Kingdom.

The strategy of the programme is to demonstrate successively:

(i) the scientific feasibility of fusion: this is the objective of JET and of the support equipment in national laboratories;

(ii) its technological feasibility: for this purpose a NET (Next European Torus) study group has been set up to plan the next step, which will be a high-technology machine;

(iii) its commercial feasibility: this will be the objective of a power and demonstration reactor (DEMO) to be built early in the 21st century.

The objectives of the programme for 1985-89, adopted by the Council on 12 March 1985 and allocated 690 million ECU, are essentially the exploitation of the JET, the commissioning of new equipment in the national laboratories and establishment of the physics and technological bases for NET.

The European fusion programme is carried out under association contracts between Euratom and the national organizations active in this field in the Member States and in Sweden and Switzerland, and the JET Joint Undertaking.

A smaller part of the JRC programme is also devoted to fusion. In its decision of 22 December 1983 adopting a research programme for 1984-87 to be carried out by the JRC, the Council allocated 46.5 million ECU to fusion technology and safety. The Commission has also proposed that the Council use the specific appropriations provided for in the JRC programme for projects of European significance (12.5 million ECU) by applying them to the construction of a tritium-handling laboratory at the Ispra establishment.

3. Non-nuclear energy

The European Community launched its first four-year non-nuclear energy R&D programme with an allocation of 59 million ECU in 1975. It gave a new dimension to the JRC's activities and to those carried out under the Commission's aegis and pursuant to the ECSC Treaty to encourage technical and economic research concerning the production and increased expansion of coal. A second programme followed in 1979, with 105 million ECU, and a third, with 175 million ECU, was recently adopted by the Council (12 March 1985).[1] In coordination with JRC activities it constitutes the research action programme for non-nuclear energy.

[1] Official Journal L 83, 25. 3. 1985.

JRC direct action

The funding allocated for JRC activities is less than that for shared-cost actions. These activities have been run for over 10 years by research workers who are Commission staff members and work at the Ispra establishment. The activities focus on a limited number of actions and have achieved significant results.

In the 1970s research on highly adaptable and clean energy carriers led to the definition and first experimental testing of a thermochemical water breakdown process for producing hydrogen, the aim being to use nuclear heat for this purpose. A variant of the same thermochemical process was then developed for desulphurizing the emission gases from thermal power stations; an invitation to tender for an industrial prototype has been issued by the Commission.

In the field of solar energy the JRC's task is to contribute to the definition and harmonization of methods and standards. One of the largest testing stations in Europe was installed in Ispra in 1977 to test photovoltaic converters and heat collectors. Solar-light simulators and equipment to determine aging, mechanical resistance, compatibility, reliability, etc. are operational and are used for qualification tests. Standardization recommendations have been published; the experience acquired has enabled the JRC to play a significant role, fulfilling its function in this field at European and international level. Another specific task of the JRC is to collect and process operational data on projects financed by the Commission.

The current programme, adopted by the Council on 22 December 1983 for the period 1984-87, allocates 22 million ECU to solar energy systems testing methods (photovoltaic systems, heat conversion) and 17 million ECU to habitat energy management (assessment of hybrid systems, passive technologies, energy auditing).

Shared-cost projects

ECSC research

Community coal research under article 55 of the ECSC Treaty can now boast a 30-year history, the most recent medium-term guidelines having been established for the period 1986-90. The purpose of the aids granted is to cover direct expenditure on research either in mining technology or in coal derivatives. Over the last five years about 90 million ECU will have been contributed for 232 projects submitted by most of the Community member

countries. A sum of 19 million ECU is entered in the ECSC budget for 1985.

Non-nuclear energy R&D
For the third non-nuclear energy R&D programme (1985-88), adopted on 12 March 1985, the estimated cost is 175 million ECU; it covers nine subprogrammes under two main heads:

Development of renewable energy sources

1. Solar energy
2. Energy from biomass
3. Wind energy
4. Geothermal energy

Rational use of energy

5. Energy conservation
6. Use of solid fuels
7. Production and use of new energy carriers
8. Optimization of the production and use of hydrocarbons
9. Analysis of energy systems and modelling.

(a) Development of renewable energy sources
The first energy R&D programme, covering solar energy, geothermal energy and the production and use of hydrogen, supported 512 projects to a total amount of 43.7 million ECU, and the second programme has assisted 722 projects at a cost of 72 million ECU. Under the third R&D programme, a total of 94.5 million ECU will be allocated for solar energy (35.5 million ECU), energy from biomass (20 million ECU), wind energy (18 million ECU) and geothermal energy (21 million ECU).

(b) Rational use of energy
Community research in energy conservation was launched with the first non-nuclear energy programme for 1975-79, under which 11.4 million ECU was earmarked to support 117 projects. The extension of the R&D programme to the period 1979-83 gave real substance to Community action in this field. The number of R&D projects rose to 165 and total aid granted was increased to 27 million ECU.

For the period 1985-88 the estimated cost of the R&D subprogramme on energy conservation is put at 26.5 million ECU.

The research on solid fuels (coal, lignite and peat, 20 million ECU), new energy carriers (10 million ECU) and hydrocarbons (15 million ECU) are new subprogrammes. In some of the sectors they cover, the first two fields supplement and amplify research under the ECSC Treaty.

The subprogramme on the production and use of hydrogen carried out from 1975 to 1983 has come to an end, but the results obtained will be of considerable value in launching the new subprogramme on new energy carriers.

Finally, part of the resources for the three non-nuclear energy R&D programmes are applied to systems analysis and energy models. Under the first two programmes, 144 projects were financed to a total amount of about 10 million ECU. The new programme is allocated 9 million ECU. Under the programme energy supply and demand models have been developed and set up in all Member States, involving research institutes and university centres. These models have also enabled the Commission departments to carry out a study on energy trends to the year 2000 entitled 'Energy 2000' (see *Energy in Europe* No 1, pages 19-24). This study is the reference scenario for the debate on the Community's new energy objectives and is the technical framework for their quantitative elements (see this issue of *Energy in Europe*, pages 8—10).

4. Administrative aspects

- To enable public and private national research institutes to participate in Community shared-cost research programmes, the Commission periodically publishes invitations to submit proposals in the *Official Journal of the European Communities*. Proposals must be sent on the appropriate forms to the Commission of the European Communities, Directorate-General for Science, Research and Development, rue de la Loi 200, 1049 Brussels, Belgium.

- For its European science and technology strategy the Commission is assisted by several advisory bodies (see box).

- The Commission has started calling in external experts to make a systematic assessment of the operation and results of certain selected programmes, including the non-nuclear energy programmes. In January 1983 the Commission presented a Community action plan for the

assessment of the results of research and development programmes of the Eureopan Community, which should be of use in the launching and periodical review of the outline programme of Community scientific and technical activities.

● Every year the Commission publishes 60 volumes containing the detailed results of contract research; so far, more than 20 000 publications have been issued. Abstracts of reports on research results are published in a monthly series and the full texts are also available on microfilm.

● No periodic invitation to submit project proposals is published in the case of the ECSC coal research programme, but applications may be made before 1 September each year for support from the following year's budget and Official Journal C 159, 24. 6. 1982 contains a communication explaining the application procedure. Guidelines for the programme are published from time to time, the most recent, covering the period 1986-90, appearing in Official Journal C 165, 4. 7. 1985.

For the management of the programme, the Commission calls on the services of the Coal Research Committee (CRC) comprising representatives of the coal producers and the associated trade unions, and the Community's principal coal research institutions, who are appointed to the CRC in a personal capacity. (Under the terms of the Treaty the Commission must also seek the advice of the ECSC Consultative Committee and obtain the assent of the Council of Ministers for its annual selection of projects. The latter represents the only intervention in the programme at national government level.) The Commission also has at its disposal a series of comittees of experts, research institutes, universities, and the coal producers whose tasks are to give technical evaluations of new research proposals and to monitor ongoing projects. A rapid dissemination of research results to the interested parties in the Community is assured through these committees, as well as through a series of round-table meetings and international symposia. Final reports on completed projects are published by the Commission and summaries of these, together with short annual reports and details of new projects, appear in the publication 'Euroabstracts, Section II'.

Community consultative bodies

1. Codest: Committee for the European Development of Science and Technology, comprising 21 leading scientists (Nobel prizewinners and scientific advisers) appointed by the Commission in their personal capacity to advise on the planning of the common R&D strategy and the implementation of activities to stimulate S/T potential in the Community. **The chairman is Professor U. Colombo (President of the ENEA).**

2. Irdac: Industrial Research and Development Advisory Committee, comprising 12 members with long experience at a very senior level in R&D work in large industrial firms and 4 members from the European organizations in this field (Unice, ECPE, Feicro, ETUC). All these members are appointed by the Commission in their personal capacity to advise in the preparation and implementation of Community policy for industrial R&D. **The chairman is Dr Beckers (Research Coordination, Shell).**

3. Crest: Scientific and Technical Research Committee, whose 22 members are top national and Community officials for science and technology policies, appointed by the governments and the Commission to advise the Commission and the Council in the preparation and implementation of Community S/T policy and the coordination of national S/T policies. **The chairman is Professor P. Fasella (Director-General of DG XII).**

4. CGC: Management and Coordination Consultative Committees, each with 23 members designated by the Member States and appointed by the Commission. There are 12 CGC for the main sectors of activity; their task is to assist the Commission in the preparation and implementation of Community R&D activities and to coordinate national R&D activities in their sectors.

Energy and the environment

Taking the environment into account in energy policy

Just as using energy affects the environment, measures to protect the environment have an impact on the cost of energy supplies and on competition between energy sources. Energy and the environment are therefore very closely connected with one another and policy in these two areas should take this interrelationship into account from the outset.

The requirement to take the environment into account in energy policy may appear self-evident, but it took rather a long time for the Community and the Member States to translate this into clear energy Community policy obligations. After the meeting of European Heads of State or Government in Paris in October 1972, when the need for a Community environment policy was acknowledged and the Commission was urged to submit an action programme on the environment, over 10 years elapsed before the Commission — in the third Community action programme on the environment adopted by the Council[1] — stated that environmental concerns should be taken into account in the planning and implementation of all other sectoral policies, including energy policy.

This does not mean, however, that in the thirteen years of existence of a Community environment policy environmental aspects have been neglected by those responsible for energy policy. Way back in March 1975 the Council of Ministers adopted a resolution on energy and the environment which called for the integration of environment policy and energy policy:

> *'The Council of the European Communities affirms that the maintenance of a sufficient level of energy production and the need to protect the environment must be reconciled with the concern for bettering our society and the quality of life, and that a fair balance should be struck between these two requirements.'*

Moreover, prior to the adoption of the third action programme on the environment numerous pieces of Community legislation had been adopted to limit the unfavourable effects of energy use on the environment, e.g. the directive on the lead content of petrol and the directive on the sulphur content of certain oil products.

On 22 May 1985 the Commission translated the obligation set out in the third action programme on the environment into Community energy policy. The new energy policy objectives for the Community submitted to the Council (COM(85) 245) state that one of the objectives of Community energy policy is the balanced pursuit of energy and environmental goals. The Community energy objectives adopted by the Council in 1974 and 1980 have over the last 10 years been the cornerstone of a consistent and coordinated energy policy in the Community. They give expression to agreement on the energy policy priorities and indicate the direction to be taken by the policies of the Member States and the Community. (See other article in present edition).

Translating environmental protection requirements into Community energy policy

If accepted by the Council, the integration of environmental requirements into Community energy policy cannot mean that environmental protection will become the only determining factor where energy policy is concerned. Nevertheless, it is an indication that environmental considerations would be taken into account in energy policy decision-making. How can environmental requirements be translated into practical energy policy?

First of all, it should be pointed out that there are energy policy objectives which have an exclusively beneficial impact on the environment. For example, it was acknowledged at international level at the multilateral environmental conference in Munich in 1984 that methods for the rational use of energy resources and for energy conservation constitute a substantial contribution to the reduction of air pollution. Action should therefore be stepped up to promote efficient energy use where this is economically possible, either by means of direct incentives, or through suitable pricing mechanisms or by using the best available and cheapest control technologies. The Commission emphasized this in the new energy policy objectives submitted by it, and called for a further improvement in energy efficiency in all sectors with a view to reducing overall energy intensity by at least 25%.

In addition, it is recongized worldwide that the use and development of improved, cheaper technologies will make a contribution towards resolving environmental protection problems. New technologies will not only be an important factor in the necessary process of restructuring the energy economy but also promote energy efficiency and hence environmental protection, and give rise

[1] Official Journal C 46 17. 2. 1983, p. 1.

to production processes which cause little or no pollution and more effective emission reductions. The continued promotion of innovative energy technologies through research, development and demonstration is therefore of particular importance and is also included in the catalogue of new energy policy goals for the Community.

Greater use of natural gas, combined with limits on nitrogen oxide emissions, the further development of safe nuclear energy generation, non-polluting coal use, greater use of alternative energy resources and the promotion of combined heat and power generation and further quality standards for fuels may make substantial contributions towards reducing emissions and further the attainment of the Community's energy policy and environment policy objectives.

There may of course be different emphasis between energy objectives and environmental objectives. In order to achieve an acceptable balance when weighing up the relevant factors, it is necessary to examine analytically the economic impacts of proposed decisions. This is particularly difficult where the environment is concerned, as it will often be hard to prove that short-term costs are justified by environmental improvements which can only be achieved in the long term. However, these difficulties are no justification for failing to make such cost-benefit analyses or to evaluate the relevant scientific evidence.

Action to reduce air pollution

Environmental problems cover the whole spectrum of activities of individuals and industries. However, where energy conversion and use are concerned, the priority is to prevent and combat air pollution. The phenomena of acid rain and forest die-back in parts of the Community have elevated action to combat air pollution to a political priority in the Community.

The impetus for recent Community initiatives in this area derived from the European Council in Stuttgart in June 1983 which emphasized the need to combat environmental pollution rapidly and vigorously at national and Community level. Special reference was made to the threat to European woodlands, and the Commission was urged to submit proposals to the Council of Ministers for achieving swift and significant progress.

The first successful move was the Council Directive of 28 June 1984 on the combating of air pollution from industrial plants which provides for the introduction of authorization procedures for the construction, operation and alteration of such plants on the basis of the best available technologies to reduce or prevent air pollution.

The Council can also, acting on a proposal from the Commission, if necessary set uniform Community emission values based on the best available control technology not entailing excessive costs.

In connection with this general framework directive, the Commission submitted to the Council in December 1983 the proposal for a Council directive on the limitation of emissions of pollutants into the air from large combustion plants which provides for the setting of compulsory Community emission limit values for sulphur dioxide, nitrogen oxides and dust for new large combustion plants whose rated thermal output exceeds 50 MW. In addition, the Member States will be required to draw up national programmes to reduce sulphur dioxide emissions by 60% and emissions of nitrogen oxides and dust by 40% by 31 December 1995. This proposal for a directive, which was slightly amended by the Commission in February at the suggestion of the European Parliament, is at present still being discussed by the Council of Ministers. Although the European Council meeting in March called for rapid progress on this proposal, it is unlikely that the discussions can be successfully concluded in the near future. The differences between the Member States are too great and fundamental. For example, some Member States are questioning the need for Community emission limit values for new large combustion plants and it has been asserted that the Commission proposal does not take sufficient account of the various national situations with regard to industrial development and emission levels. In this regard, at Helsinki on 9 July 1985 at the European Commission for Europe's executive body for the Convention of long-range transboundary air pollution 21 countries including Belgium, Denmark, France, FR of Germany, Italy, Luxembourg and the Netherlands signed a protocol to the 1979 Convention on long-range transboundary air pollution to reduce their national annual sulphur emissions or their transboundary fluxes by at least 30% as soon as possible and at the latest by 1993, using 1980 levels as the basis for calculation of the reductions.

Apart from large combustion plants, the other Community measures to reduce air pollution are focused above all on motor vehicles with internal combustion engines. On 20 and 21 March the Council of Ministers adopted a directive on the approximation of the laws of the Member States concerning the lead content of petrol which

makes it compulsory to introduce lead-free petrol in the Community by 1 October 1989. This directive is intended to ensure that the amount of lead in the air is reduced and that a suitable unleaded fuel is available so that catalytic converters can be used.

As regards reducing motor vehicle emissions, Community legislation focuses on three substances: carbon monoxide (CO), unburned hydrocarbons (HC) and nitrogen oxides (NO_x). Emission limit values for these substances have been tightened up since 1970 in four successive directives. The Council is at present discussing further amendments to Directive 70/20/EEC proposed by the Commission with the aim of tightening up the limit value for motor vehicle exhaust gases and hence reducing air pollution. Detailed emission limit values for the various motor vehicle categories were proposed by the Commission in June with a view to reducing emissions of nitrogen oxides, the most dangerous pollutants, by some 50% from 3 million tonnes to 1.5 million tonnes. The proposed limit values are as follows:

Vehicle category	Time of introduction	Emission limit values		
	(new models/new vehicles)	CO	HC + NO_x	NO_x
over 2 litres	1. 10. 1988/1. 10. 1989	25	6.5	3.5
1.4 to 2 litres	1. 10. 1991/1. 10. 1993	30	8	4
below 1.4 litres	1. 10. 1990/1. 10. 1991	45	15	6

These proposals are line with the agreement reached in the Council of Ministers on 20 March whereby the new limit values should be equivalent to the corresponding US standards and should be achievable in the 1.4 to 2 litre category by various technical means at a reasonable cost. The Environment Council which met on 27 June led to widespread agreement on these proposals except for one important category. For medium size models (1.4 to 2 litres) the NO_x limit was not retained separately but was included in a combined value: this flexibility ought to allow the development of the 'lean burn' engine.

Energy cooperation with China

The fast-growing cooperation between the European Community and China in the energy field was illustrated by the visit to the Community in June of a delegation from the People's Republic, led by Vice-President **Yang Jun** of the State Science and Technology Commission.

China is of course already a major factor in the world energy scene and will become increasingly important in terms of both energy demand and supply. At present, Chinese 'commercial' energy consumption is equivalent to about 650 million tonnes of coal a year. In addition, there is major use of renewable energy sources. China's coal production, at about 480 million tonnes a year, is more than twice as large as production in the Community and supplies over 70% of the country's commercial energy needs. Oil production is running at over 100 million tonnes a year and there is considerable activity in offshore oil and gas exploration.

The European Community's energy cooperation with China began in 1981 as a result of a visit to China during that year by Michel Carpentier, then Deputy Director-General for Energy in the Commission. During that visit, agreement was reached on an energy planning cooperation programme which included the training of Chinese officials in energy planning techniques, both in China and in Europe, and studies of industrial and rural energy demand in that country. The cooperation programme later expanded into other fields such as coal mining, electricity production and transmission, and energy conservation.

One major feature of the programme is that more than 1 500 Chinese nationals have been trained:

(i) in four EC-China energy planning and management training centers in Peking, Tianjing, Nanjing and Hangzhou, with the assistance of more than 50 European experts;

(ii) in Europe at technical and university institutes in Belgium, France, Germany, Italy, Netherlands and the United Kingdom.

The graduates of these training activities have gone on to draw up local and regional energy balances, to establish energy plans in various Chinese cities and districts and to provide energy management services for different branches of Chinese industry.

Another important cooperation activity has been the joint development of energy analysis instruments involving a team of 10 energy researchers at Tsinghua-University in Peking (Institute of Nuclear Energy Technology). INET is a member of the EC-financed international network of energy institutes in developing countries. The methods developed are now used in China for evaluating energy demand and supply and for resource assessments.

The Commission has provided funding for these activities up to the level of 50% of total costs. By end 1984 some 3 million ECU had been committed to this programme. The 1985 programme includes some 12 projects in the areas mentioned above.

The visit in June was made at the invitation of the Commission and focused both on energy and on information technology. In Brussels Mr Yang Jun and his team met with three Members of the Commission — Nicolas Mosar (Energy), Karl-Heinz Narjes (Industry and Research) and Willy De Clercq (External Relations) — as well as holding discussions with the Commission services responsible for these fields. They also met with government authorities and industries in Belgium, France, Netherlands, Denmark and Germany.

In the energy field, a joint memorandum was signed at the end of the visit recording agreement in principle on new areas for EC-China energy cooperation, specifically:

(i) The opening of an EC-China training centre on coal combustion technology at Harbin in the North of China.

(ii) The inclusion of a second Chinese energy research institute in the EC-network on energy planning in developing countries.

(iii) Cooperation in a second energy management training centre in Nanjing, to build on the results obtained in this field at the first centre in Nanjing and the centre in Hangzhou.

(iv) Cooperation in the installation of software for electric power system planning.

(v) Exchanges of staff.

(vi) Production of video-tapes on EC-China energy planning cooperation projects.

(vii) Studies of a decentralised energy system using in particular new and renewable energy sources (solar energy centre on Dachen Island, Zheijiang Province).

This visit was the second high-level mission to Europe of its type following an energy mission led by Vice-President Yang Jun in February 1982. It gave both parties the opportunity to underline the importance of cooperation between the People's Republic of China and the European Community and to express their satisfaction with the results achieved in the energy field.

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

The Community's consumption of primary energy is expected to increase by 2.6% in 1985 and 2.9% in 1986. The four main reasons for this are the expected increases in the Community's GDP (2.3% for which both years), 3—4% growth rates of industrial production, weaker energy prices (led by lower oil prices) and cold weather in the early part of 1985. The base case forecast also assumes some ECU revaluation against the dollar which, if correct will accelerate the fall in real energy prices. Following the ending of the United Kingdom mining strike in early 1985, coal consumption could by 3% higher this year than in 1984, but oil consumption is forecast to fall by 2-3% in 1985 but perhaps increase very slightly in 1986. Gas and electricity consumption should increase in both years and at similar rates, but the most telling factor in the period will be the increase in nuclear power. In 1986 nuclear should provide nearly 15% of the Community's energy needs, as against only 4% in 1980. The Community's net energy import dependence is expected to fall to 42% in 1986, as compared to 44% last year.

Highlights

(i) The Community's **energy consumption** grew by 3.6% in 1984 — the highest rate of growth since 1979. This was due to the European economies moving out of recession, particularly a pick up in the output of the energy intensive industries, and more stable (rather than rising) real energy prices. Primary energy consumption in the Community is expected to continue increasing in 1985 and 1986, but at the slower rates of 2.6% and 2.9% respectively. The driving variables for this growth in energy consumption are Community GDP (forecast to increase by 2.3% in both years) and industrial production predicted to increase by at least 1% more than GDP. Also energy prices are expected to be weaker over the forecast period. Colder weather also played a part in early 1985.

(ii) **Oil demand** increased by 2.8% in 1984 because of the increase in fuel oil consumption in the United Kingdom during the coal strike. Discounting this factor, Community oil demand would have fallen by about 1%. In 1985 oil demand could fall by 3% and possibly increase by 1% in 1986.

(iii) **Electricity demand** will be determined by expected constant electricity prices in real terms and by rising GDP. Demand is expected to increase by 4.5% in 1985 and 2.5% in 1986. Nuclear could supply 34% of the Community's electricity production in 1986.

(iv) The Community's **natural gas demand** expanded by 6% in 1984. Further increases of 3.9% and 3.0% are expected in 1985 and 1986 respectively. There is still uncertainty surrounding these projections because of the difficulty in predicting the evolution of natural gas prices in the short term. Even though some of the Community's gas suppliers have reduced their prices (by up to 10% in some cases) the competitive position of natural gas in 1985 and 1986 could still be disadvantaged by the fact that the link between its prices and those of oil products (mainly fuel oil and more recently gasoil) involves a time lag.

(v) The ending of the UK mining dispute in March 1985 has improved the short-term prospects for coal. **Solid fuel demand** fell by 5% in 1984. It is expected to increase in 1985 — but only by 3%. Overall, three important factors will tend to restrain coal consumption: the increase in nuclear capacity, rebuilding of power station stocks and potential environmental constraints.

(vi) **On the supply side** — two factors stand out. **Firstly** the surge in nuclear production — by 1986 nuclear output will be the equivalent of nearly 15% of the Community's primary energy consumption. **Secondly** that in 1985 the Community's oil production is expected to peak. Community coal production will recover in 1985 but will probably not reach the pre-strike 1983 output level. A further increase in production is expected in 1986. The Community's net energy import requirement will remain at around 400 Mtoe through the forecast period. Overall net import dependence will be 42% in 1986 (from 44% in 1984).

Comparison with previous forecasts

The table below compares the 1985 forecasts of the Community's energy consumption that have appeared in each edition of *Energy in Europe* published so far.

1985 Estimated gross inland consumption *(million toe)*

	Energy in Europe NO O (December 1984)	Energy in Europe NO 1 (April 1985)	Energy in Europe NO 2 (August 1985)
Solid fuels	205.3	201.0	204.5
Oil	426.5	421.7	415.6
Natural gas	176.8	183.6	182.3
Nuclear	117.4	116.4	120.1
Hydro	12.7	12.7	12.6
Net imports electricity	1.7	0.9	1.7
Total	940.4	936.4	936.7

In *Energy in Europe No O* it was assumed that the UK mining dispute would end on 31 December 1984 and hence solid fuel demand was forecast to be higher than in the latest estimates. Oil demand has also been 'marked down' slightly over time in part due to a more rapid backing out of fuel oil in power stations. By contrast projected 1985 natural gas consumption has edged upwards — to a large extent because of gas suppliers reducing their prices. However there is still some uncertainty regarding the natural gas outlook. Finally nuclear production is expected to be slightly higher than forecast in *Energy in Europe No 0*. Several nuclear reactors will be coming on stream earlier than expected. Overall energy demand however has remained more or less unchanged.

* * *

The remainder of this article presents the Commission's Directorate General for Energy's (DG XVII) latest Community energy forecast covering the period 1985 and 1986. The results are mainly derived from a short-term forecast model — codenamed STEM — that has been jointly developed by DG XVII and DG XII (the Directorate General for Science, Research and Development). A series of key assumptions underly all the results. Some alternative scenarios are however presented to test the sensitivity of the main results to different assumptions.

1. Forecasting assumptions

(i) **Macroeconomic climate**

The macroeconomic assumptions used for this forecast are derived from the Commission's Directorate-General for Economic and Financial Affairs (DG II).[1]

Community GDP is forecast to grow by 2.3% by both 1985 and 1986.

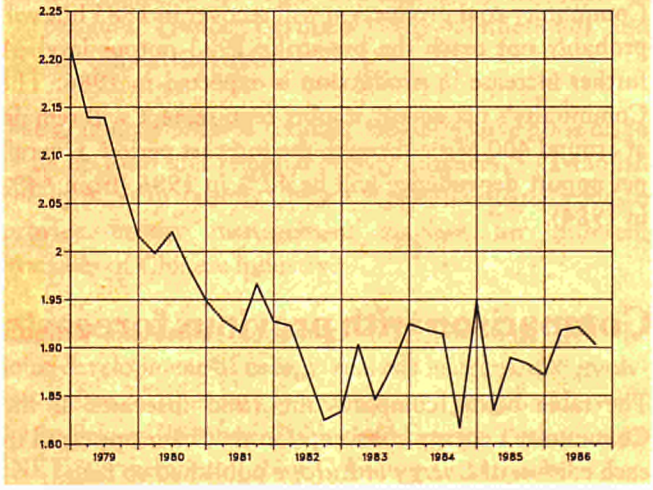
The ending of the UK mining dispute will boost the 1985 rate of economic growth. Leaving this factor aside, the underlying trend in 1986 is in fact higher than in 1985.

The expected quarter on quarter changes show low growth in Q1 1985 (+ 0.4% over previous quarter at annual rate), an acceleration in Q2 1985 to 4.8% annual rate before slowing to around 2.2% from Q3 85 to Q3 86. A pick up at the end of Q4 1986 to 2.7% is expected.

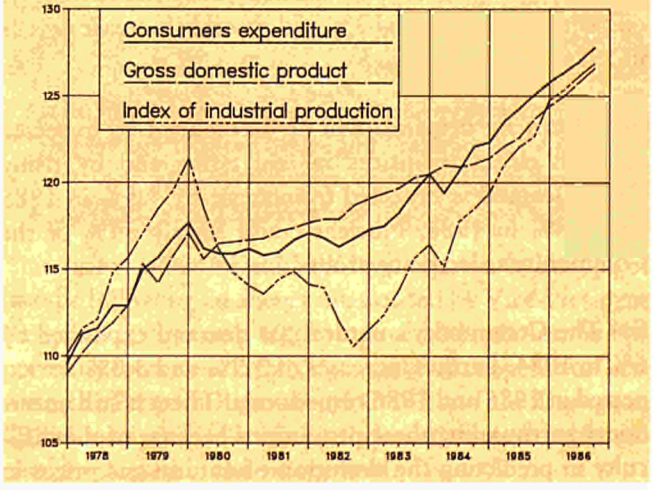
In both 1985 and 1986 the main contribution to these projected changes in Community GDP are derived from domestic demand. The following table summarizes the macroeconomic forecast:

[1] Economic forecasts 1985-86. Detailed tables May/June 1985.

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)



Community demand components — % change on preceding year

	1984	1985	1986
Private consumption	1.0	1.5	2.3
Government consumption	1.2	1.6	0.9
Gross fixed capital formation	2.3	2.2	2.9
— of which: construction	1.4	– 1.4	1.0
equipment	3.4	6.1	4.7
Change in stocks	1.5	1.7	1.7
Domestic demand	2.0	1.9	2.2
— of which: (contribution to change in GDP)	1.3	1.6	2.7
GDP	2.1	2.3	2.3

Industrial production is forecast to increase by 4% in 1985 and by 3.2% in 1986 — particularly affected by the strong increases expected in equipment investment and buoyant export demand.

The Community's inflation rate is forecast to fall from around 6% in 1984 to 5.5% in 1985 and 4.7% in 1986.

Because most imported energy is priced in US dollars, one of the most important assumptions for the forecast concerns the **ECU/USD exchange rate.** The base case assumption is that the ECU will continue to slowly revalue against the dollar so that its average value in 1986 will be equal to its average 1984 value.

(ii) **Community crude oil production**
This is forecast, exogenously, to be about 146 million toe in 1985, slightly higher than in 1984. UK North Sea oil and condensate production are expected to reach their peak levels in the first half of 1985.

(iii) **Nuclear capacity**
The recent surge of new nuclear capacity coming on stream in France, Germany and Belgium is having a significant effect on the Community's energy economy. Average capacity in 1985 (about 63 GW) will be 24% higher than in 1984. A further significant increase is expected in 1986. By the end of Q4 1986 — Community nuclear capacity could stand at 80 GW.

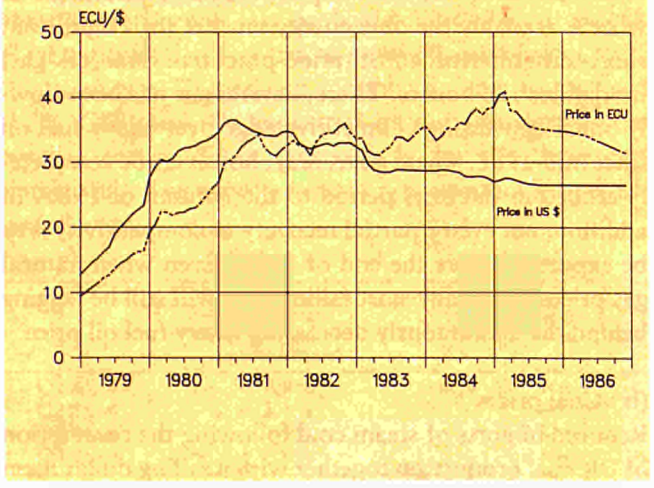
(iv) **Temperature**
Average weighted degree days in the Community were 20% higher in Q1 1985 compared to the corresponding period of 1984, thereby increasing energy consumption (mainly natural gas, electricity and domestic heating oils). For the remainder of the forecast period average degree days over the past eight years are assumed.

2. Energy prices

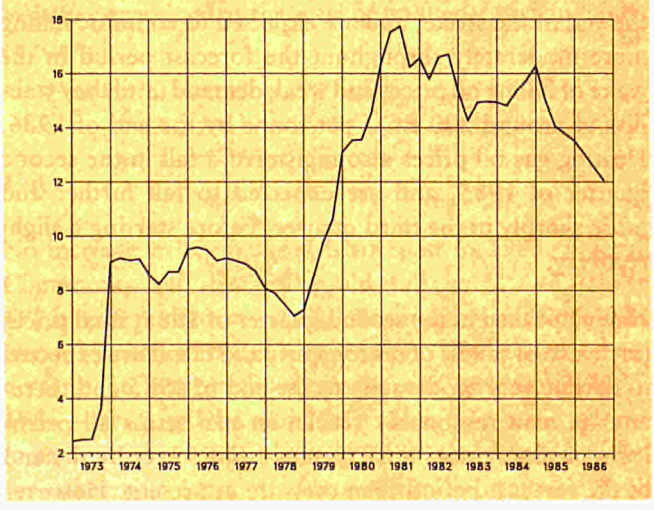
(i) **Crude oil prices**
In view of continuing market pressures, the average dollar cost of crude oil to the European Community, which has declined by more than USD 1.20 per barrel between the first quarter of 1984 and the second quarter of 1985, is assumed to slide further to around USD 26.50 by the third quarter of 1985, and to remain at that level until the end of 1986.

The continuing weakness of the world crude price is certainly not a new phenomenon but until recently it has failed to be translated into lower prices paid by the Community countries because of the rapid and prolonged

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



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



appreciation of the dollar against European currencies. In fact, measured in ECU terms, the average cost of crude to the Community reached an all time peak at just under 41 ECU per barrel in March 1985 (compared with around 31 ECU in May 1983). The recent rise in the value of the ECU has however meant that oil costs to the Community have fallen by more than 4 ECU per barrel between March and June 1985. The continued modest appreciation of the ECU incorporated in the present forecast, together with the weakness of the world crude price, is assumed to result in the Community paying, just over 34 ECU/barrel by the end of 1985 and less than 32 ECU/ barrel by the end fo 1986.

Cautious as these oil price and exchange rate assumptions may be, they do point to some striking consequences. Real (deflated) crude oil prices in ECU terms would not only register their first significant and sustained fall for the Community since the 1979-81 price 'shock', but would fall back to their end-1979 level by the end of 1986.

(ii) **Oil product prices**

The first quarter of 1985 was marked by unusual firmness of heavy fuel oil and gas oil prices which had then gained approximately 55 ECU per tonne and 60 ECU per 1 000 litres respectively over their levels of a year ago. These gains were much larger than those registered by crude oil prices and can be attributed to relative scarcity of these products at the beginning of 1985. In the case of gasoil this was due to excess demand and low stocks resulting from harsh weather conditions throughout Europe in January and February. Heavy fuel oil prices were also influenced by weather related demand but the firmness can be primarily attributed to excess demand arising from the effects of the UK coal miners strike. Already by the second quarter of 1985 heavy fuel oil prices had lost on average around 35 ECU per tonne following the end of the strike, and are expected to continue falling more moderately throughout the forecast period in the wake of falling oil prices and weak demand until they stabilise at around 200 ECU per tonne by the end of 1986. Heating gas oil prices also registered a fall in the second quarter of 1985, and are expected to fall further and more sharply in the third quarter, before starting a slight recovery.

Having peaked in the second quarter of 1985, final prices (inclusive of taxes) of motor spirit and diesel are expected to decline very moderately to the end of 1985 and thereafter remain reasonably stable. In real terms all petroleum product prices are expected to be lower by the end of the forecast period than they are at present. However their average levels in 1986 will be close to the 1984 averages, with the notable exception of heavy fuel oil which will be markedly lower.

(iii) **Natural gas prices**

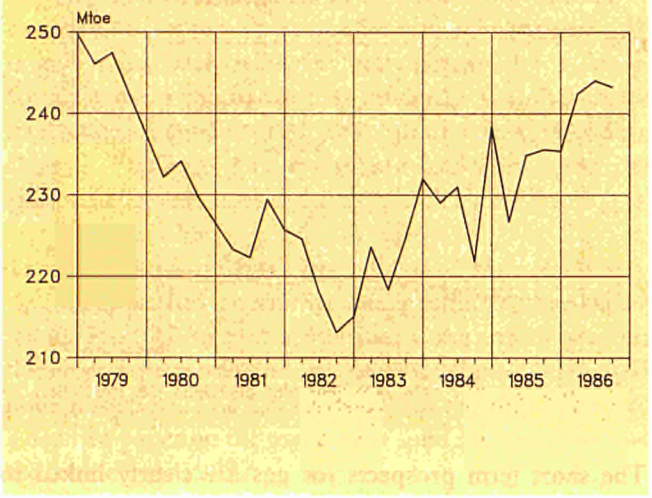
As indicated in the April issue of *Energy in Europe* average imported natural gas prices into the Community escalated throughout 1984 trailing the substantial increases in the price of heavy fuel oil. It has been becoming evident in recent months that further escalation would be inevitable under present price formulae. In anticipation of this a number of events have taken place to smooth the impact. These involved the re-negotiation of some contracts to: (a) lower the base price, (b) reduce the weigth of heavy fuel oil in the indexing formulae whilst increasing that of gas oil, (c) denomination of contracts in ECU or importing country currencies. Although these measures would have stalled or drastically moderated the imported gas price escalation in 1984, had they been applied a year earlier it is doubtful whether under present conditions they can prevent further significant increases in the rest of 1985. The ECU or local currency denomination would have trimmed increases in the context of a rising dollar but may work in reverse in the circumstances of a weakening dollar. Furthermore the increase of the weight of gas oil prices in the indexing formulae will, in the short term, increase prices since gas oil registered the biggest price increases during the first quarter of 1985. In this way the lowering of the base price is likely to provide only a temporary respite (an 8% downward adjustment was incorporated in the base case forecast) and imported natural gas prices are expected to increase strongly during the rest of the year. Thereafter the indexing formulae will start reflecting the recent petroleum product price falls and gas prices at the frontier could fall throughout 1986.

These movements in gas prices are likely to have important implications for the competitiveness of natural gas in what is arguably the only energy market with significant short-term interfuel substitution potential: dual (oil/gas) fired industrial boilers. There, natural gas has been slowly building a strong competitive edge over heavy fuel oil since mid-1982. These gains may, however, be completely eroded in the brief period to the autumn of 1985. In addition, not even a partial recovery of competitivity is to be expected before the end of 1986. Even when natural gas prices eventually start falling they will still be lagging behind the continuously decreasing heavy fuel oil price.

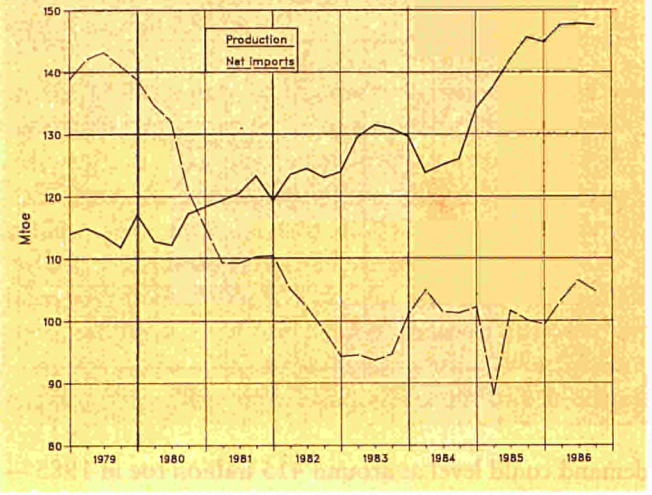
(iv) **Coal prices**

Reduced imports of steam coal following the resumption of UK coal production together with a falling dollar form

Graph 4.1 – EUR 10 : Seasonally adjusted quarterly primary energy consumption



Graph 5 – EUR 10 : Seasonally adjusted quarterly primary energy supply



the background for imported steam coal price weakness which should begin to be felt after the third quarter of 1985. As imports of hard coal are forecast to fall further in 1986, weak demand will result in a continuation of this price trend into that year.

Coking coal prices are also expected to register further losses, especially in 1986 following prolonged stagnation of demand for steel making.

Real coal prices to industry in 1986 will be lower than they have been at any time since 1979.

3. Overall energy

Overall energy demand increased by about 3.6% in 1984 and this growth in demand continued into the first quarter of 1985 when energy demand was 2.9% higher than the corresponding period of 1984. Very cold weather throughout Europe was probably the dominant factor. Energy demand is forecast to continue growing in 1985 at a slow rate. The driving variables will be the assumed 2.3% GDP and 4% industrial production growth and weaker energy prices (particularly for the 'lead' fuel namely oil). The expected quarter on quarter changes are as follows:

	Overall increase in energy demand (over same quarter of previous year)	Increase in primary energy consumption
Q1 85/4	+ 2.9%	+ 5.5 Mtoe
Q2 85/4	– 1.1%	– 2.3 Mtoe
Q3 85/4	+ 1.9%	+ 3.7 Mtoe
Q4 85/4	+ 6.0%	+ 14.7 Mtoe

The strong increase expected in Q4 85 can be explained by the unusually mild weather and the slowdown in industrial production in the same quarter of 1984.

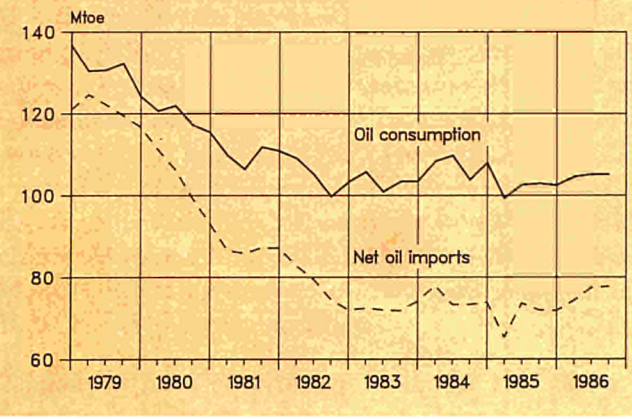
The prospects for 1986 are for a further increase in Community energy consumption. Around 2 1/2-3.0% growth is forecast. Positive economic trends and the possibility of a fall in real oil prices for the Community support this view.

The accompanying graph shows that the Community's primary energy intensity (primary energy consumption/GDP) has flattened since falling to register a trough in Q4 1982. This is not easy to explain — but the upturn in the energy intensive industries on top of the expanding nuclear contribution to primary energy consumption (which in statistical terms inflates primary energy consumption) plus the contribution of economic growth could supply the basis of an answer. These trends would be better examined at the level of final energy demand by sector.

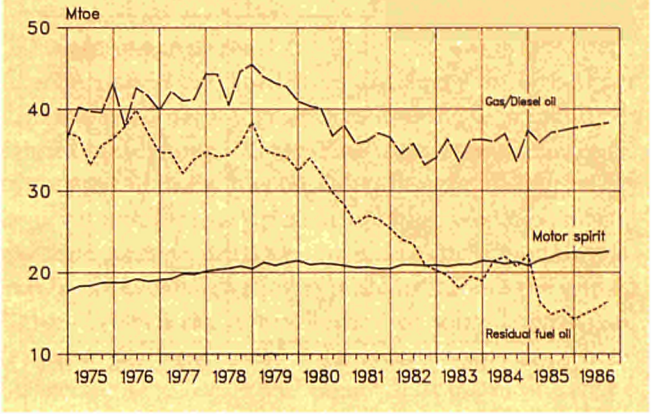
Oil

No increase in oil demand is forecast in 1985. Overall Community oil demand could fall by 2 1/2-3.0% in 1985 with perhaps a small 1% increase in 1986. The trends by product differ considerably. Whilst increases in demand are expected for mogas and gas/diesel oil in 1985 — these will be more than offset by a rapid decline in fuel oil use (15% less than in 1984) and lower demand for other petroleum products. Overall Community oil

Graph 6 – EUR 10 : Seasonally adjusted quarterly oil consumption and net oil imports



Graph 7 – EUR 10 : Seasonally adjusted oil products consumption



demand could level at around 415 million toe in 1985 — 22% lower than in 1979.

This picture is expected to be broadly similar in 1986 in spite of the large fall in real oil prices which the base case projects. The motor fuels are again expected to increase but will be offset by a further decline in fuel oil usage.

On the supply side the Community's net import requirement will reamin broadly unchanged throughout the period. Community oil production will peak in 1985 but stocks of oil may remain low in line with low demand.

Natural gas

1984 saw a strong 6% increase in Community natural gas demand. Demand in the first quarter of 1985 was 5% up on Q1 1984 and overall demand is expected to increase by 3.9% in 1985.

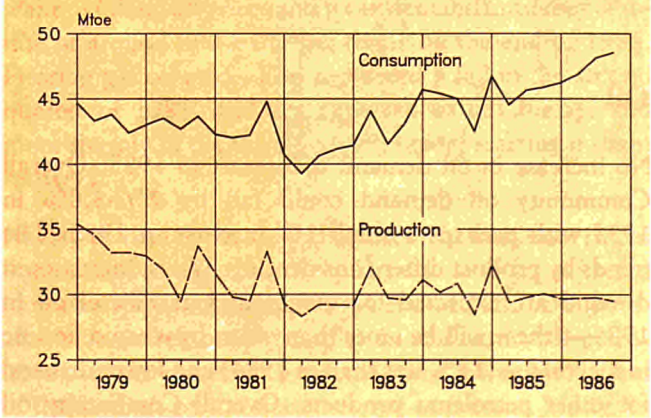
The short term prospects for gas are clearly linked to whether gas producers continue to react to the uncompetitive position of gas (see earlier). An expected slowdown in chemical output is also expected to constrain demand. In 1986 demand could increase by around 3.0%, although this projection must be regarded as rather uncertain.

Net imports of gas are expected to increase from 60 million toe in 1985 to 70 million toe in 1986.

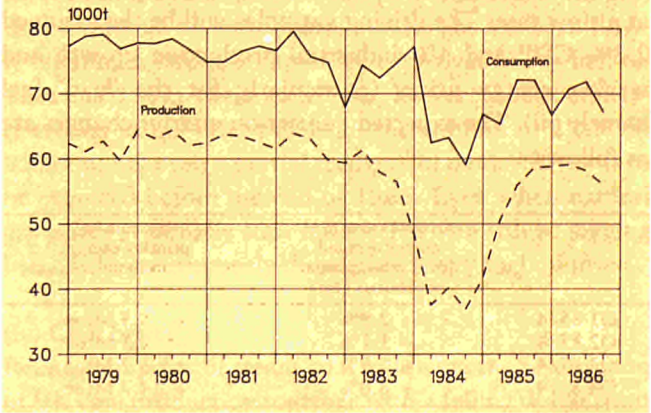
Coal

The ending of the mining dispute at the end of Q1 1985 has improved the short-term prospects for coal. Following a 5% fall in solid fuel consumption in 1984, consumption in 1985 is forecast to edge up by 3%. The reason for only a modest increase is that because of the continuing strike, hard coal consumption was 11 million

Graph 8 – EUR 10 : Seasonally adjusted natural gas supply & demand



Graph 9 – EUR 10 : Seasonally adjusted hardcoal consumption and production



tonnes lower in Q1 85 compared to Q1 84, and secondly stocks at power stations in the United Kingdom were very low at the end of March 1985 and could be expected to be substantially rebuilt before the winter months. So although hard coal deliveries will increase by 18% — consumption will only increase modestly. Graph 9 shows the speed of adjustment of Community coal production. Overall 1985 hard coal production is forecast to be 206 million tonnes.

The outlook for coke is rather 'flat' in 1985. No significant increases in Community steel production are expected in the 1985-86 forecast period. Coke consumption is therefore expected to remain at close to the 1984 level (48 million tonnes). The Commission has recently published a detailed paper on the market for solid fuels in 1984 and the outlook for 1985.[2]

Electricity

Community electricity consumption increased by 4% in 1984. Every Member State recorded increased demand, with France, Italy, Belgium, Denmark and Greece recording growth above the Community average. The strongest component of this demand growth was industrial demand for electricity which surged by 4.6% in 1984, with household demand increasing by 3.7%. Community electricity demand continued to increase in the first quarter of 1985 (helped by cold weather) — with demand up by 4.4% over the corresponding period of 1984. Demand growth in the first quarter of 1985 was particularly strong in France, Belgium und Italy. Overall electricity demand is forecast to increase by around 4.5% in 1985 — some 2% above the rate of growth of GDP, with the highest quarter on quarter growth being forecast for the last quarter of 1985.

As far as the **supply of electricity** is concerned, nuclear production is expected to maintain its strong performance. In the first quarter of 1985 alone it increased by 25% over the corresponding period of 1984. Nuclear could cover a little more than 30% of the Community's electricity production in 1985. As for the other fuels, coal burn will increase but will remain well short of its 1983 peak, whilst residual fuel oil consumption in power stations is forecast to be 30% lower than in 1984. Natural gas consumption in power stations could stay at around the 1984 level.

The prospects for 1986 are for continued electricity growth — perhaps around 2 1/2% but still above GDP growth. Nuclear production will again increase strongly. Coal consumption could increase by around 5% in power stations, displacing more fuel oil.

Alternative scenarios

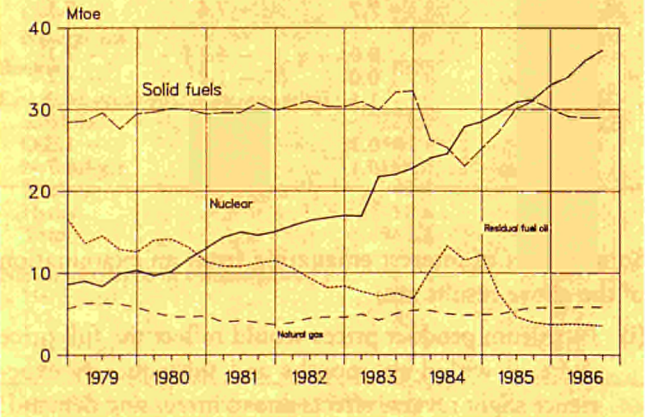
Using the model two alternative scenarios around the base forecast were carried out to test the sensitivity of energy economy variables to changes in the basic assumptions. These are as follows:

Scenario 1: The 'recession simulation'

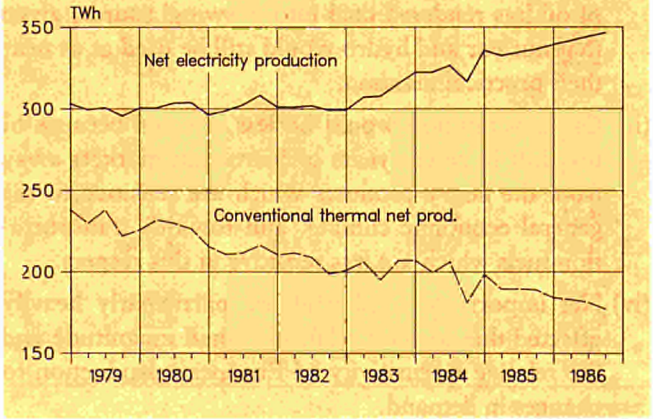
Following a drastic slowdown in world trade in 1985 the European economy is assumed to stagnate for the remainder of the year and only register 1% growth in

[2] The market for solid fuels in the Community in 1984 and the outlook for 1985. Official Journal C 177, 15. 7. 1985.

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



Graph 11 – EUR 10 : Seasonally adjusted electricity production



1986. The main results for 1986 on the basis of this simulation are as follows:

Impact of 'Recession simulation' — in % deviations from 'base case', 1986

GDP	- 2.9
Energy consumption	- 3.5
Energy intensity	- 0.5
Consumption:	
Solid fuels	- 6.2
Oil	- 2.7
Natural gas	- 5.1
Electricity	- 2.6
Deliveries of:	
Motor spirit	- 1.0
Gas oil	- 1.7
Heavy fuel oil	- 5.6
Coke	- 12.0
Production of:	
Hard coal	- 2.7
Natural gas	- 4.2
Net imports of:	
Hard coal	- 13.4
Oil	- 4.8
Natural gas	- 6.0
Prices:	
Heavy fuel oil	- 0.7
Industrial gas	- 2.1
Coking coal	- 1.6

The key points to note are the following:

(i) Energy consumption in the short-term would be disproportionately affected by the reduced GDP. In other words there would be a drop in energy intensity. This is primarily due to the exaggerated impact of a recession on some key energy consumption sectors like chemicals and iron and steel and industry in general.

(ii) Consumption of gas and solid fuels would be sharply affected in view of their role in the chemicals and iron and steel sectors respectively. In the case of solid fuels an important role is also played by the structure of power generation where the diminution of the share of oil has rendered coal into a 'swing' source, given that nuclear and hydro would still be used at or near their practical maxima.

(iii) Oil consumption would be less affected because of the shift in recent years of petroleum markets away from the heavy products which are sensitive to the general economic climate, and towards transportation fuels which are less sensitive in this respect.

(iv) Net imports of hard coal are particularly heavily affected due to their relatively small magnitude and the relative insensitivity of European production to changes in demand.

Scenario 2: 'Oil price cut simulation'

In this simulation an attempt is made to trace through time the likely effects on the European energy economy of a cut to USD 24/barrel in the world price of oil.

The interesting question is: how quickly and by how much would European energy markets respond to an immediate price cut? By implication the answer to this question (even at only a European level) would give some indication as to the suitability of price cuts as a means of influencing the present imbalance between supply and demand for fuels. The following tables summarise the results of the simulation:

Phased impact of 'USD 24/barrel from 1 July simulation' in % deviations from base case

	2nd quarter	4th quarter	6th quarter
Consumption:			
Primary energy	0.4	0.8	1.0
Oil	1.0	1.9	2.3
Coal	- 0.3	- 0.6	- 0.7
Natural gas	0.1	0.5	0.5
Electricity	0.0	0.0	0.1
Deliveries of:			
Motor spirit	0.4	0.9	0.5
Gas oil	1.2	2.1	2.6
Heavy fuel	1.3	3.1	4.4
Net import:			
Oil	2.0	3.9	4.2
Coal	- 0.8	- 1.6	- 3.8
Approximate oil import bill	- 7.6	- 5.9	- 5.6

Phased impact of 'USD 24/barrel from 1 July simulation'

	2nd quarter	4th quarter	6th quarter
Import prices:			
Crude	- 9.5	- 9.5	- 9.5
Natural gas	0.0	- 6.5	- 9.3
Steam coal	- 3.3	- 6.9	- 6.9
Coking coal	- 1.2	- 3.0	- 3.1
Consumer prices:			
Motor spirit	- 2.2	- 2.1	- 2.0
Diesel oil	- 3.3	- 3.2	- 2.9
Gas oil	- 6.7	- 6.4	- 5.2
Heavy fuel	- 7.7	- 7.6	- 7.1
Natural gas:			
Industry	0.0	- 4.2	- 7.1
Residential	0.0	- 1.8	- 4.2
Coal (ind)	- 1.5	- 4.3	- 4.2
Electricity:			
Industry	- 0.3	- 1.0	- 1.3
Residential	- 0.1	- 0.5	- 0.7

Some points of interest emanating from an examination of the above results are:

(i) Petroleum product prices would reflect the full price decrease within six months and subsequently experience slight reverse effects due to increasing demand.

(ii) All other fuel prices would be affected but more slowly, and incur a short-term loss of competitiveness. This phenomenon would be short-lived and in the crucial case of industrial natural gas the situation *vis-à-vis* heavy fuel oil would be entirely restored after 18 months.

(iii) Though oil would increase its share in total energy demand, lower energy prices in general would also result in higher consumption for other fuels (slightly lower consumption is registered only for hard coal).

(iv) Oil consumption would rise appreciably and, because of the short-term price insensitivity of European crude production, net oil imports would experience an even more marked increase.

Table 1 — Primary Energy balance for the European Community

(Mtoe)

	1980	1981	1982	1983	1984	1985 [2]	1986 [2]
Primary production							
Solid fuels	184.8	185.0	182.1	174.0	130.1	157.2	173.8
Oil	91.4	101.6	114.9	131.2	143.2	146.2	142.2
Natural gas	129.4	125.5	116.1	119.9	120.4	122.5	118.6
Nuclear	42.1	56.8	63.9	77.4	99.3	120.1	140.0
Hydro	12.6	12.8	12.6	12.5	12.2	12.6	12.8
Total	460.3	481.7	489.5	514.9	505.1	558.6	587.4
Net imports							
Hard coal	48.2	43.4	45.5	37.6	51.3	45.5	40.5
Oil	433.1	352.5	323.2	287.7	298.4	284.3	300.9
Natural gas	43.5	46.2	45.8	50.1	57.9	60.7	70.9
Electricity	1.2	1.9	1.7	1.9	1.3	1.6	1.7
Total	526.0	444.0	416.1	377.3	408.8	392.1	413.9
Change in stocks							
Hard coal/coke	11.0	8.9	9.7	2.7	- 16.5	- 1.9	11.9
Oil	15.2	- 17.3	- 11.7	- 18.0	- 5.9	- 5.9	0.9
Natural gas	3.9	6.7	3.4	4.9	2.8	0.9	1.8
Bunkers	23.0	25.1	23.4	21.5	20.5	20.9	22.7
Estimated gross inland consumption							
Solid fuels	222.0	219.5	217.9	208.8	197.9	204.5	202.4
Oil	486.4	446.3	426.4	415.4	427.0	415.6	419.5
Natural gas	169.0	164.9	158.5	165.1	175.4	182.3	187.7
Nuclear	42.1	56.8	63.9	77.4	99.3	120.1	140.0
Hydro	12.6	12.8	12.6	12.5	12.2	12.6	12.8
Total	933.2	902.2	880.9	881.1	913.1	936.7	964.0
Net imports as % of consumption [1]							
Hard Coal	21.7	19.8	20.9	18.0	25.9	22.2	20.0
Oil	85.0	74.8	71.9	65.9	66.7	65.1	68.0
Natural gas	25.7	28.0	28.9	30.3	33.0	33.3	37.8
Total	55.0	47.9	46.0	41.8	43.8	40.9	41.9

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

[2] Forecast

Table 2 — Primary energy balance for the European Community

(Mtoe)

	1984		1985				1986[2]			
	III	IV	I	II [2]	III [2]	IV [2]	I	II	III	IV
Primary production										
Solid fuels	29.6	31.7	35.1	36.8	38.5	46.8	46.9	42.2	39.7	45.0
Oil	34.7	37.7	37.9	35.0	35.5	37.9	36.9	34.5	34.9	36.0
Natural gas	19.4	32.8	44.7	24.5	18.8	34.6	41.2	24.7	18.8	33.9
Nuclear	21.7	28.9	32.3	28.1	27.3	32.4	37.4	32.1	31.8	38.7
Hydro	2.8	3.0	3.0	3.5	3.0	3.1	3.2	3.5	3.1	3.1
Total	108.3	134.2	153.0	127.8	123.0	154.7	165.5	137.0	128.2	156.6
Net imports										
Hard coal	13.5	14.1	12.6	8.2	12.1	12.6	8.9	12.5	11.3	7.8
Oil	71.0	76.2	73.7	64.7	71.2	74.8	71.4	73.7	74.9	80.9
Natural gas	11.6	15.3	16.1	14.6	12.7	17.3	19.1	16.5	14.4	20.9
Electricity	0.5	0.4	0.2	0.5	0.6	0.2	0.2	0.6	0.7	0.3
Total	96.6	106.0	102.6	88.0	96.7	104.8	99.5	103.3	101.2	109.8
Change in stocks										
Hard coal/coke	1.0	- 3.2	- 8.3	- 0.5	4.8	2.0	0.4	6.6	5.9	- 0.9
Oil	- 2.8	- 2.7	- 7.9	1.2	4.3	- 3.5	- 5.8	3.9	4.5	- 1.6
Natural gas	3.8	— 1.3	— 4.5	3.2	3.8	— 1.6	— 3.3	3.1	3.9	— 1.9
Bunkers	5.3	5.0	4.8	5.0	5.5	5.6	5.5	5.8	5.8	5.6
Estimated gross inland consumption										
Solid fuels	42.1	49.1	56.1	45.4	45.7	57.3	55.4	48.2	45.2	53.7
Oil	103.2	111.7	114.6	93.5	96.9	110.6	108.6	98.5	99.5	112.9
Natural gas	27.2	49.4	65.3	35.9	27.7	53.4	63.6	38.1	29.3	56.7
Nuclear	21.7	28.9	32.3	28.1	27.3	32.4	37.4	32.1	31.8	38.7
Hydro	2.8	3.0	3.0	3.5	3.0	3.1	3.2	3.5	3.1	3.1
Total	197.6	242.4	271.4	206.9	201.3	257.1	268.2	221.0	209.4	265.4
Net imports as % of consumption [1]										
Hard coal	32.0	28.8	22.6	18.0	26.4	21.9	16.1	26.0	25.0	14.4
Oil	65.4	65.3	61.7	65.6	69.6	64.4	62.6	70.6	71.1	68.3
Natural gas	42.7	31.0	24.6	40.7	45.8	32.3	30.0	43.3	49.1	36.9
Total	47.6	42.8	37.1	41.5	46.7	39.9	36.4	45.5	47.0	40.5

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

[2] Forecast

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

	1979	1980	1981	1982	1983	1984	1985 [3]	1986 [3]
1. Oil (Million tonnes)								
Primary production	88.6	90.6	100.7	113.9	130.1	142.0	145.0	141.0
Change in stocks [1]	17.7	15.1	- 17.2	- 11.6	- 17.9	- 5.9	- 5.8	0.9
Net imports [1]	487.3	433.0	353.0	323.7	288.4	298.9	285.0	301.5
Bunkers	27.5	24.5	26.8	25.0	23.0	21.9	22.3	24.3
Apparent consumption	530.8	484.0	444.1	424.3	413.3	424.9	413.5	417.4
Inland deliveries:								
Motor spirit	83.9	84.5	82.6	83.3	83.7	85.1	86.6	89.8
Gas/diesel oil	175.7	158.6	147.5	140.3	140.4	142.5	148.1	152.2
Heavy fuel oil	142.8	128.0	108.1	93.6	77.8	82.5	69.7	61.4
Other production	96.4	85.0	80.4	80.5	85.4	87.0	85.3	88.8
Total	498.8	456.2	418.6	397.8	387.3	397.1	389.7	392.2
Power stations:								
Consumption	58.4	53.9	44.7	40.0	31.2	41.2	29.5	14.8
Change in stocks	1.7	- 0.4	0.6	- 1.4	- 2.7	- 0.1	0.3	- 2.3
2. Natural gas (Mtoe)								
Primary production	136.8	129.4	125.5	116.1	119.9	120.4	122.5	118.6
Imports [2]	37.4	43.5	46.2	45.8	50.1	57.9	60.7	70.9
Apparent consumption	172.8	169.0	164.9	158.5	165.1	175.4	182.3	187.7
of which:								
in power stations	24.4	20.3	16.9	16.6	18.8	20.6	21.1	23.2

[1] Crude oil and Petroleum products

[2] Imports from third party countries

[3] Forecast

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

	1979	1980	1981	1982	1983	1984	1985[1]	1986[1]
1. Hard coal (Mt)								
Primary production	245.1	253.6	252.2	248.4	235.2	162.2	206.2	231.9
Change in stocks								
Collieries	- 5.6	10.7	8.9	4.2	0.5	- 8.3	- 12.4	11.0
Power plants	- 2.3	6.7	6.2	7.9	2.5	- 13.7	13.2	7.4
Net imports	58.4	74.2	66.5	70.0	57.0	78.9	71.0	62.2
Apparent consumption	311.4	310.3	303.6	306.2	289.2	263.1	276.4	275.6
Deliveries to:								
Power plants	166.4	179.2	176.5	184.0	175.8	131.9	165.6	160.3
Coking plants	87.6	88.4	85.2	80.1	69.7	69.7	74.0	71.0
All industries	22.4	22.7	24.0	24.5	25.4	24.8	27.4	28.5
Households	19.9	18.0	16.0	16.5	15.9	13.1	15.3	16.5
Total	296.3	308.4	301.7	305.2	286.8	239.6	282.4	276.2
2. Hard coke (Mt)								
Coking plants								
Production	67.6	66.3	64.2	60.2	53.5	52.8	54.8	53.8
Change in stocks	- 8.9	0.8	- 0.1	3.8	1.4	- 5.3	- 2.6	1.3
Deliveries to the iron and steel industry	58.4	54.3	52.6	46.3	41.8	48.5	48.7	48.4
3. Lignite								
Production (Mt)	158.2	157.0	162.4	159.3	158.7	162.0	163.3	168.7
Consumption in power stations (Mtoe)	25.9	26.2	27.6	26.6	27.3	27.0	28.5	29.0

[1] Forecast.

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

	1979	1980	1981	1982	1983	1984	1985[2]	1986[2]
Electrical power (TWh)								
Total generation	1 267.5	1 277.6	1 274.6	1 271.4	1 299.8	1 360.5	1 417.6	1 452.3
Total net production	1 198.8	1 208.7	1 206.1	1 202.9	1 229.1	1 286.6	1 340.2	1 371.8
of which:								
Hydroelectrical	143.9	146.1	149.1	146.1	144.8	141.5	146.2	148.8
Nuclear	127.6	149.4	201.7	226.9	275.0	352.8	426.5	497.3
Conventional thermal	927.3	913.1	855.2	830.0	809.3	792.3	767.6	725.7
Gross inland consumption	1 283.9	1 291.7	1 296.8	1 290.8	1 321.6	1 375.1	1 436.0	1 472.3
Available for internal market	1 206.5	1 213.9	1 217.4	1 212.0	1 237.9	1 287.3	1 346.5	1 380.8
Input to thermal power stations [1] (Mtoe)								
Hard coal	88.1	92.9	91.9	94.7	96.1	80.8	84.5	88.4
Lignite	25.9	26.2	27.6	26.6	27.3	27.0	28.5	29.0
Petroleum products	57.9	53.4	44.3	39.6	30.9	40.9	29.2	14.6
Natural gas	24.4	20.3	16.9	16.6	18.8	20.6	21.1	23.2
Derived gas	1.7	1.7	1.8	1.5	1.3	1.5	1.5	1.5
Total	197.4	193.7	182.2	178.2	174.0	171.7	165.8	157.0
Net Nuclear capacity (GW)	22.8	26.7	34.4	40.2	43.8	50.6	62.8	75.6

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

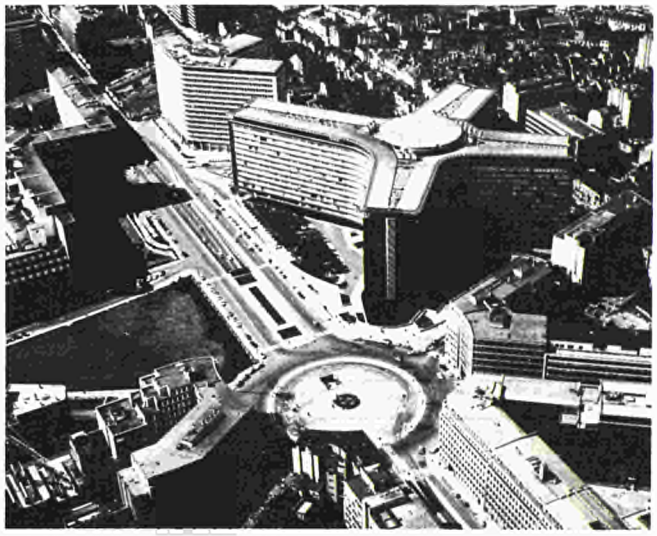
Community news

Energy policy: the roles of the Community institutions

How are energy matters handled in the European Communities and which institutions are involved? What are their specific responsibilities? What are the links between them? And how do their roles differ from those of the International Energy Agency in Paris? This short guide to the Community institutions explains.[1]

The four main institutions

The achievement of the aims of the European Communities is the responsibility of four main institutions — the European Commission, the Council of Ministers, the European Parliament and the Court of Justice. Alongside these four institutions there is also a Court of Auditors, which audits the accounts of the Community bodies and checks on financial management; and two committees, representing the various sectors of the economy (the Economic and Social Committee and the Consultative Committee of the European Coal and Steel Community), established to assist and advise the Commission in the formulation of its proposals.



The Berlaymont building in Brussels — headquarters of the European Commission

The European Commission

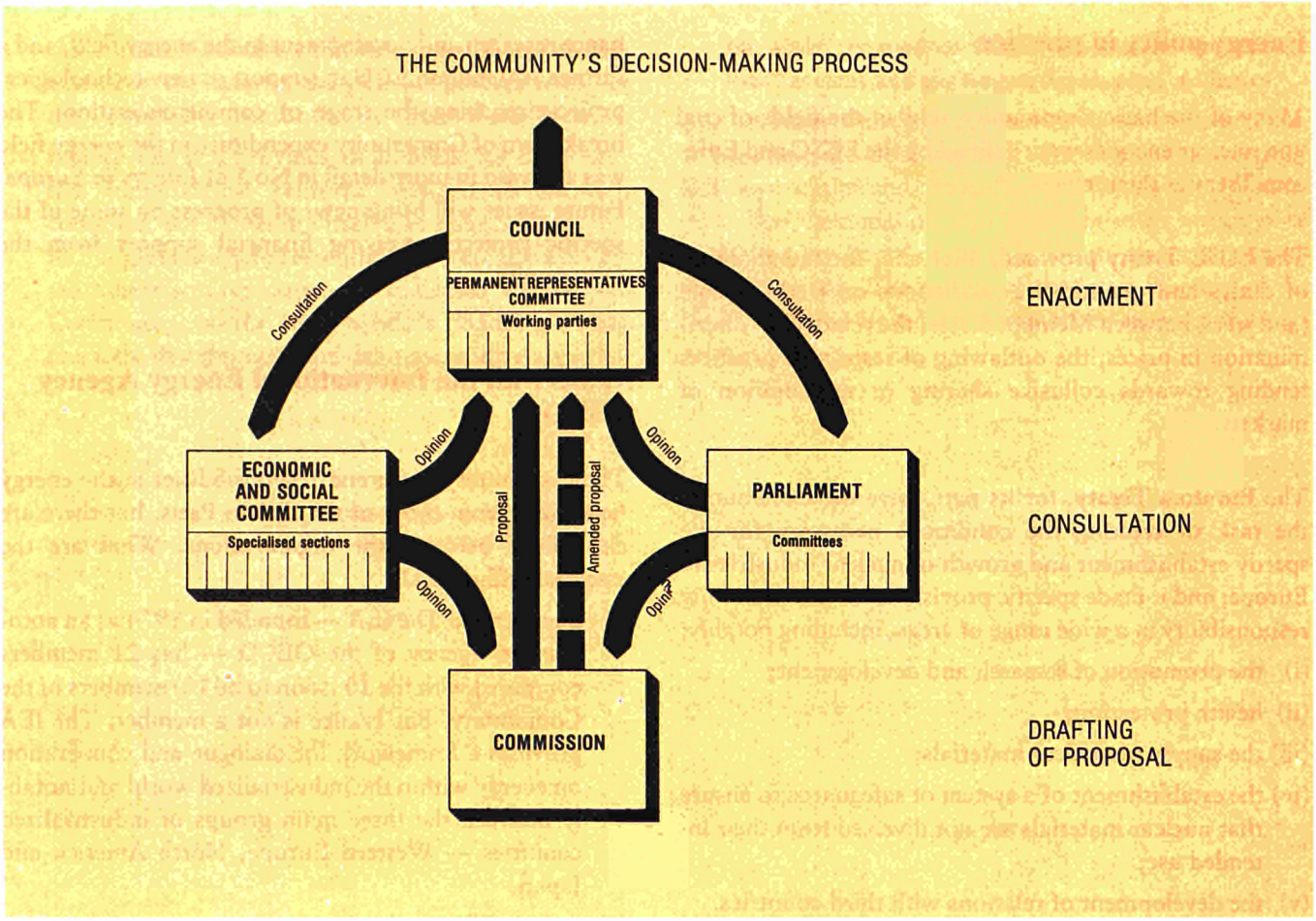
The European Commission consists of 14 Members (former senior politicians or civil servants) who are nationals of the Member States of the Community yet independent of them. The Commission is the source of proposals for Community action and only in rare cases can decisions be made in the Community without a proposal from the Commission. The Commission therefore has a permanent duty to **initiate action.** It is also the executive arm of the Community, with extensive **rule-making powers** vested in it by the three Treaties governing the Community (the Coal and Steel Community Treaty — ECSC, the Euratom Treaty and the EEC Treaty). It is responsible for ensuring that the **rules of the Treaties are respected.** More generally, it is the exponent of the **Community as against national interest.**

The Commission acts as a collegiate body but its members have specific portfolios. Nic Mosar, the Commissioner from Luxembourg, is responsible for the energy portfolio. He is assisted by a small personal and political staff (Cabinet) and by some 370 civil servants (fonctionnaires) of the Directorate-General for Energy (DG XVII) of the Commission, based in Brussels and Luxembourg. At their head is the Director-General for Energy, Christopher Audland.

The Council of Ministers

The Council, by contrast, is made up of the representatives of the governments of the 10, soon to be 12, Member States of the Community. Its membership varies with the subject under discussion. On energy matters the Council is normally composed of Ministers for Energy from each Member State. The Commission takes part in all Council meetings. The chairmanship, or Presidency, of the Council rotates between Member States on a six-monthly basis. From 1 July to 31 December 1985 Luxembourg is in the chair. The Council is supported by a secretariat of permanent official based in Brussels. Ministerial meetings are prepared by specialized groups of officials from Member States (the so-called Energy Group and High Level Energy Group) and by a Comittee of the Ambassadors (Permanent Representatives) of Member States to the Community. These meetings too have rotating chairmanship and Commission representation at staff level.

[1] A fuller description of the Community institutions is to be found in 'Working together': 'the institutions of the European Communities — 1985 edition' by Emile Noël, in the series European Documentation, available from the Office for Official Publications of the European Communities.



In simple terms, except when legal powers have already been given to the Commission in the Treaties, the Commission proposes and the Council disposes. The Council cannot itself amend Commission proposals except by unanimity. It can, however, take decisions in line with Commission proposals in many cases on majority vote only — in theory at least. In practice, however, the majority vote has been used less frequently than envisaged and decision-making is more often the result of a lengthy 'dialogue' between the Commission and the Council before a consensus is reached on the way ahead.

The European Parliament

The Treaties make the Commission answerable to the European Parliament alone. The Parliament, whose 434 members are now directly elected by universal suffrage, has to be consulted on the Commission's more important proposals under the three Treaties **before** the Council takes a decision. If Parliament censures the Commission, the latter's members must resign as a body. Parliament also has a crucial role in determining the Community's annual budget, including the bulk of expenditure on energy.

Much of the work of the Parliament is handled in specialist committees. The Energy, Technology and Research Committee covers energy matters. Its current chairman is Michel Poniatowski (F-Lib). The activities of the Parliament will be reported regularly in *Energy in Europe*.

The Court of Justice

The Court consists of 11 judges appointed for six years by agreement among the governments. Its responsibility is to rule on whether there have been breaches of the Treaties or subsequent Community legislation and on the interpretation and applicability of Community law in national circumstances. Cases can be brought by either the Commission itself (exercising its role as guardian of the Treaties), Member States, individuals or enterprises.

Energy policy in practice

Many of the basic Community aims in the fields of coal and nuclear energies were defined by the ECSC and Euratom Treaties themselves.

The ECSC Treaty provided, inter alia, for the abolition of duties and quantitative restrictions on trade in coal (and steel) between Member States; the removal of discrimination in prices; the outlawing of restrictive practices tending towards collusive sharing or exploitation of markets.

The Euratom Treaty, for its part, gave the Community the task of creating the conditions necessary for the speedy establishment and growth of nuclear industries in Europe; and it made specific provisions for a Community responsibility in a wide range of areas, including notably:

(i) the promotion of research and development;

(ii) health protection;

(iii) the supply of nuclear materials;

(iv) the establishment of a system of safeguards to ensure that nuclear materials are not diverted from their intended use;

(v) the development of relations with third countries.

The Treaty establishing the European Economic Community was much less specific in the energy field. But it has provided a legislative, political and financial framework for the development of a wide range of actions at Community level.

As far as legislation is concerned, two important Community agreements should be cited: ever since 1968 there has been Community legislation on the holding of minimum oil stocks by Member States; and since 1975 Community legislation has limited the use of oil and natural gas in power stations.

Key political agreements have been the establishment of long-term Community energy objectives; common energy pricing principles; and guidelines for action in the field of energy savings.

Expenditure on energy financed from the Community's general budget and the special budget applying to the Coal and Steel Community is also far from insignificant. In 1983, for example, some 340 million ECU were spent by the Commission, on behalf of the Community, to finance research and development in the energy field, and a further 100 million ECU in support of new technological projects reaching the stage of commercialisation. The breakdown of Community expenditure in the energy field was analysed in more detail in No 1 of *Energy in Europe*. Future issues will bring news of progress on some of the specific projects receiving financial support from the Community.

Links with the International Energy Agency (IEA)

The Community's role and responsibilities in the energy field differ from those of the IEA in Paris, but there are close links between the organizations. What are the essential differences?

(i) membership The IEA — founded in 1974 as an autonomous agency of the OECD — has 21 members compared with the 10 (soon to be 12) members of the Community. But France is not a member. The IEA provides a framework for dialogue and cooperation on energy within the industrialized world and notably between the three main groups of industrialized countries — Western Europe, North America and Japan.

(ii) responsibilities The IEA was a response initially to the first oil crisis of 1973-74 and it has a particular responsibility in consequence for oil-sharing arrangements among its Member States in a crisis. In view of this there is extensive involvement of the oil industry itself in the Agency's activities, through a series of advisory boards. The IEA has, however, widened its responsabilities over time with the development of a programme of long-term energy cooperation among its Member States, based on a series of agreed common principles of action. The Community's responsibilities are more specific than those of the IEA in some sectors (natably coal and nuclear); they are also set in the context of wider Community aims (notably, the development of the European common market and strategies for European industry and technology).

(iii) rule making The IEA takes decisions and makes recommendations to its member countries its Governing Board — composed of Energy Ministers, or, more frequently, senior energy officials from the participating countries. These are political decisions often imposing important obligations on Member States without the force of legal sanctions. Many decisions in the Community are based similarly on political

rather than legislative agreements, but there are also extensive rule-making and policing powers vested in the Community institutions by virtue of the Treaties.

(iv) finance The IEA provides an umbrella for collaborative technological ventures between its member countries. But it does not itself give financial support. Its budget is restricted essentially to staff and associated administrative costs. As indicated earlier, the Community, on the other hand, is financing energy research, development and demonstration on a sizeable scale, as well as technical assistance to energy management and planing in developing countries.

The activities of the two organizations are complementary and there are close working relationships between the IEA Secreatariat and the staff of the European Commission. The Commission also participates in meetings of the Governing Board of the IEA and its associated standing committees. The results of the latest meeting of the IEA Governing Board are summarized in a separate article below.

Energy Council, 20 June 1985

From left to right, Luxembourg's Energy Minister Mr Schlechter, Italy's Permanent Representative to the EC, His Excellency P. Calamia, the President of the Energy Council, Italy's Energy Minister Mr Altissimo, and EC Energy Commissioner Nic. Mosar during the last Energy Council in Luxembourg

The Council was held in Luxembourg under the chairmanship of the Italian Energy Minister, Signor Renato Altissimo, with Energy Commissioner Nicolas Mosar representing the Commission.

In contrast to the protracted negotiations that have taken place in the past, the Energy Council on 20 June reached a quick consensus on the important political points that needed to be resolved to allow the Community's **demonstration hydrocarbon technology** programmes to continue beyond the end of this year. The Council decided that both schemes should be extended by four years, with 90 million ECU per year allocated to demonstration projects (which embraces projects in the fields of energy conservation, renewables and solid fuels) and 35 million ECU a year for hydrocarbon technology projects. The details of the necessary regulations remain to be worked out but the Council's political orientations have been taken.

The Council devoted considerable attention to the follow-up which the Commission had undertaken since the March Energy Council on the question of increased oil product exports from the Middle East. The Commission's discussions with producing countries and with Japan and the US had confirmed its view that world markets should be able to cope with these additional supplies provided there was equitable access to all main markets. Restriction of access to the Japanese market was a cause of concern. At the Council, Energy Ministers reaffirmed the coordinated EC approach which has been put forward during the preparations for the IEA Ministerial meeting on 9 July. The essence of the Community's approach is that industrialized countries should agree to maintain or create the necessary market conditions to allow oil products to circulate freely. This position was subsequently adopted by IEA Ministers on 9 July — see relevant article on IEA Ministerial meeting.

One area though where the Council failed to make headway was on energy pricing. In September 1984 the Commission had produced a report on the application in Member States of the previously agreed energy pricing principles. This report has been under examination at working level, the aim being to try to reach a political agreement on pricing practices in gas and electricity sectors. Since negotiations at working level had been unsuccessful, a final attempt was made at the Council to achieve a solution. Regrettably, the political difficulties were not overcome. Commissioner Mosar affirmed however that in the absence of a political solution, the Commission would continue its efforts to improve pricing policies and transparency in the gas and electricity sectors through the powers in the Treaty of Rome and the pricing principles previously approved by the Council.

There was also a new Commission Communication (COM(85) 245 final) before the Council suggesting new energy objectives for the Community. This important document proposes horizontal and sectoral energy objectives for 1995. The broad lines of the Commission's initiative were welcomed by Ministers. The Commission proposals will now be examined in detail by the Energy Working Group, and will be considered again by Ministers at their next meeting.

The next Energy Council, which will be held under the Luxembourg Presidency, will probably take place in November.

IEA Ministerial meeting

This article highlights some of the points discussed at the International Energy Agency meeting in Paris on 9 July which were of particular interest to the Community.

The theme of the IEA Ministerial meeting was 'Lessons of the past and tasks for the future'. It was the first meeting

at Ministerial level since 1983 and coincided with the IEA's 10th anniversary. The meeting therefore provided an opportunity to reflect on the changes that have taken place in the energy situation since 1973 and on the measures needed to ensure that renewed energy difficulties are not encountered in the 1990s.

The issues discussed at the IEA Ministerial meeting corresponded in many ways with the work on future policies which has been going on in the Community during the past 18 months. Following its major review of Member States' energy policies in early 1984, the Commission has since published its Energy 2000 study and has now proposed new energy objectives for 1995. The present respite in energy markets has in fact allowed all concerned to look in some depth at longer term policy issues.

A common theme expressed by many Ministers at the IEA, including Energy Commissioner Mosar, was the need to maintain strong energy policies and not be misled by short-term market signals. There was a remarkable degree of consensus on the main issues that needed to be faced, which were set out in a communiqué and conclusions adopted by the Ministers.

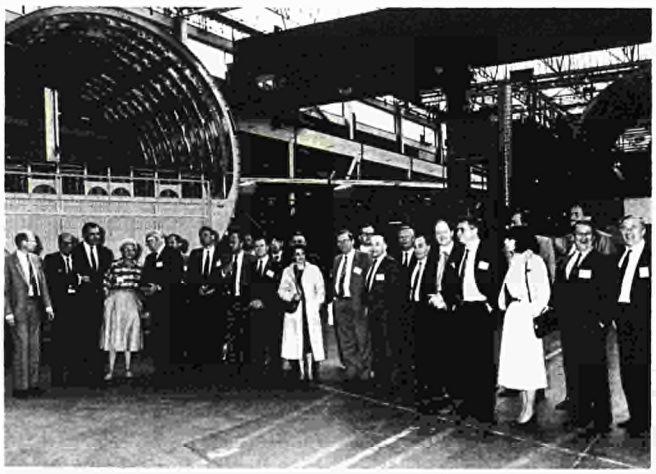
Of particular interest to the Community were the discussions on the build-up of refined oil product exports from the Middle East and North Africa. The Commission's suggested approach had been agreed at the Energy Council on 20 June (see separate article) and had been submitted to the IEA Ministerial meeting, as a possible means of coping with the problem. The basic point at issue was the risk that restrictions on oil product imports into Japan could oblige other countries or regions to take additional amounts of these products. Considerable discussion took place at the Ministerial meeting on the way in which the issue should be dealt with. Having a common position enbled the Commission, with support from Member States, to influence strongly the course of discussion. The agreements reached by IEA Ministers meets a key requirement of the Community, ie, that no country should be able to shift its burden of adjustment to others. The common approach will be to allow these refined products to flow according to normal world market patterns. This outcome is important for the Community, not only in that it conforms to the approach put forward by the Commission and EC Member States at the Ministerial meeting, but as an effective response to calls for protectionist measures. The EC will be cooperating with the IEA in monitoring of the implementation of this agreement.

The need for energy policy to take account of changing concerns is reflected in the detailed conclusions adopted by the IEA Ministers on energy and the environment. For the first time at such a forum Energy Ministers have agreed that an integrated approach should be followed to ensure a satisfactory balance between energy and environmental objectives.

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

Two important dossiers which have been in front of the committee have been the Commission's proposals on hydrocarbon technology projects and on energy demonstration projects. As far as the first is concerned, the report by Madron Seligman (ED, United Kingdom), which basically approved the proposal, was adopted by the European Parliament on 14 June.

The proposals on demonstration projects relating to alternative energy sources, energy saving, hydrocarbons substitution and liquefaction and gasification of solid fuels were the subject of a report by Giovanni Starita (PPE, Italy), which was adopted by the committee at its meeting on 15 and 16 July, with a view to being debated in the September plenary session (9 to 13 September).



Members of the European Parliament's Committee on Energy, Research and Technology

The report is very positive towards the demonstration programme. On the contents of the programme the report welcomes the Commission's proposals, encourages a

better dissemination of results and urges that, if the reimbursement clause is abolished, the Commission should only support those projects which really need financial support.

* * *

Parliament finally adopted the 1985 Budget at its June session. The Committee was reasonably satisfied with the outcome as regards Chapter 70 (Energy), except for the fate of its amendments to increase funding for Article 706 (Energy programming) and Article 709 (Studies in the energy sector), which were ultimately unsuccessful. The Committee's draftsman of opinion for the 1985 Budget was Gordon Adam (S, United Kingdom). Work has already started on the preparation of the 1986 Budget, for which the draftsman is Jacques Mallet (PPE, France).

* * *

Nuclear matters are occupying considerable attention, with three reports in this area currently, before the Committee: a report by Undine Bloch von Blottnitz (Arc, Germany) on advanced reactor systems, a report by Paul Staes (ARC, Belgium) on discontinuing the nuclear powered production of electricity and a report by Llewellyn Smith (S, United Kingdom) on a motion for a resolution tabled by Carole Tongue (S, United Kingdom) on an alleged contravention by the United Kingdom Government of the Euratom Treaty. The Bloch von Blottnitz and Smith reports have already been the subject of preliminary discussion in the committee.

* * *

European Community policy on coal has been a constant preoccupation in recent months. The Committee has been awaiting with great interest the Commission's final proposals on solid fuels policy and on a regime of national subsidies, which expires in 1985. The Committee's rapporteur is Lambert Croux (PPE, Belgium). The Commissioner, Mr Mosar, addressed the committee on this subject on 14 May.

* * *

Looking ahead, one of the most important items in the Committee's future work will be the report on the new Community energy objectives for 1995. The rapporteur is Mr Adam. The committee will be attaching great importance to a thorough examination of this matter.

Economic and Social Committee

At its plenary session at the end of May, in the presence of Mr Mosar, the Economic and Social Committee adopted its opinion (Rapporteur: Mr Querleux, France, Employers' Group) on the third illustrative nuclear programme (PINC) submitted by the Commission.

The PINC report is concerned in particular with nuclear energy production targets and all types of investment required for their attainment.

The Committee considers that the line of approach to the development of nuclear energy proposed in the PINC is logical and approves the PINC's message that the Community has a basic interest in reducing its dependence on imports of uranium by pursuing a supply strategy based, among other things, on continued prospecting and a policy for the reprocessing and temporary storage of used fuels.

The Committee also agrees that preparations should be made for the achievement of economic competitiveness by the next generation of fast breeder reactors in accordance with the programme set out in the PINC, by checking at each stage the technical and economic reliability of the reactors.

The Committee considers that the PINC does not lay sufficient emphasis on the problems that still arise (with wide variations from one country to another) in connection with the acceptance of nuclear energy by public opinion. The Committee therefore recommends that all data concerning nuclear energy should be presented to the public in a campaign dealing clearly and frankly with questions with which the public is unsufficiently familiar.

More generally, the Committee suggests that the PINC should specify more clearly the action to be embarked upon by the end of the century in the crucial areas of the reprocessing and interim storage of irradiated fuel elements and the management of radioactive waste, with the aid of an initial set of indicative deadlines to be updated by means of 'rolling plans'.

Lastly, the Committee asks the Commission to place greater emphasis on the major importance of greater Community political will in the implementation of investment programmes concerning the various aspects of nuclear energy.

* * *

The Committee's Energy Section adopted a report in July 1985 on Energy options (full title: Environmental constraints and their implications for Community energy policy) — Rapporteur: Prof. von der Decken, Germany, Various Interest Group. The report demonstrates clearly how important it is to understand the interaction between (a) the problems of energy production and utilisation and (b) environmental problems, and to take them into account in a joint energy/environment policy.

The report starts out by asserting that global energy resources are so great that even a world population which is still much on the increase, can be supplied for a long time yet. We are not facing an energy supply problem so much as a problem of organizing ourselves — and paying for — environmentally clean energy.

The section pays tribute to all the measures so far taken to reduce atmospheric pollution, pollution of sea water etc. However, the risk of ever-increasing pollution as the use of fossile fuels builds up, is becoming so great that the Community can no longer afford to have energy and environmental policies dealt with separately. This is an institutional as much as a technical matter.

Whilst acknowledging that a variety of technical, legal as well as political measures can be used, the section's report proposed that we target our energy strategy on 'zero-emission'. This calls for something of a revolution in energy production. Instead, for instance, of the vertically-integrated energy systems we are familiar with, we should go for horizontally-integrated energy production systems.

The report concludes with the hypothesis that towards 2030 liquid fuels (methanol) synthesized from solid fuels, will themselves be as important a source of energy for us as oil is today.

* * *

The Committee, in its meeting of 3 July 1985, adopted a report given by Mr Paul Flum (Federal Republic), rapporteur of the Section for Energy and Nuclear Questions, on the new demonstration regulations. The report points out the positive effects of the programme in terms of improving the energy situation in the Community, job creation, conservation of the environment and on export opportunities. It states that the demonstration project scheme should be adopted:

(i) with no cuts in the planned expenditure;

(ii) with no reduction in the planned duration of five years;

(iii) and with provisions for an extension at the appropriate time.

ECSC Consultative Committee: Main activities in the energy field

At its 249th session on 29 March 1985, the Committee debated a draft document, prepared by the Commission's services, on the solid fuel market in the Community in 1984 and the outlook for 1985. This document, which was subsequently revised to take account of the Committee's comments, has now been published (Official Journal C 177). Such consultation is carried out each year in accordance with the procedure laid down in Articles 19 and 46 of the ECSC Treaty. On this occasion, the debate covered not only the document itself but manifold aspects of coal policy, and the Committee took the opportunity of passing a resolution expressing its concern that a healthy level of domestic Community coal production should be maintained.

At the same session, the Committee approved the Commission's proposals for the 1985 ECSC coal research programme, based on Article 55 (2)(c) of the ECSC Treaty and involving 72 projects concerned with coal production and use. Proposed expenditure amounted to 23.1 million ECU, 19 million ECU being earmarked from the ECSC levy for first priority projects, while the financing of the remaining projects was left open.

Its 250th session, on 28 June 1985, saw the Committee debate the Commission documents 'Energy 2000'[1] and 'New Community energy objectives'[2] (to 1995). The Committee passed a resolution referring to these documents and calling on the Commission, among other things, to give a more prominent position in Community energy strategy to coal and other secure energy sources, and to take all appropriate steps to foster both the consumption of coal and its production within the Community.

Note: Since the last issue, the appointments have been made of Mr A. Scargill and Mr P. Heathfield as representatives of the coalworkers to the ECSC Consultative Committee.

[1] SEC(58) 324.
[2] COM(85) 245 final.

ETUC – European Trade Union Confederation

Energy work programme as adopted by the Executive Committee meeting 18 and 19 April, 1985

The ETUC is an organization which comprises 35 national confederations of trade unions in 18 countries. The member organizations have altogether more than 40 million individual members. It is the only European organization of national trade union centres and more than 80% of the trade unionists in Western Europe are organized in ETUC affiliations. The ETUC is recognized by the European Community as the sole representative of trade unions at the European level.

As far as the energy sector is concerned, no special industry committee exists. The Executive Committee of the ETUC decided in 1978 that energy matters should be dealt with by the ETUC Coordinating Committee on energy and later attempts to establish an industry committee within the energy sector was stopped by some of the larger trade union confederations within the Community. ETUC has therefore been given the mandate to represent the trade unions in Western Europe, both to safeguard sectoral interests of trade unions within energy production plans and the respective energy policies of the trade unions in general. ETUC thus claims to represent trade unions both as producers and consumers of energy.

Over recent years, the Committee has increasingly focussed its work on issues of practical importance to unions in the energy industries. It has also attempted to coordinate its work within the framework of general ETUC economic and employment policy. In particular, ETUC's work on energy questions has to be part of the campaign to restore full employment and to improve the quality of life throughout Europe.

The ETUC's general principles of energy policy are set out in the ETUC energy programme, adopted by the Executive Committee in December 1980. That energy programme provides the basis for the Coordinating Committee's work.

The issues set out in this work programme form the Committee's priorities for the coming year.

The main areas covered by the work programme are the following:

(i) energy policy and employment,
(ii) energy research and development,
(iii) acid rain,
(iv) energy efficiency,
(v) the oil refining industry.

ETUC's opinion is that trade unions should play an important part in planning, decision-making and development of energy policies at all levels and ETUC is therefore willing to contribute in this way whenever possible.

At the last ETUC Energy Coordinating Committee meeting in Brussels on February 26 and 27, 1985, a decision was made to start work on an ETUC position and policy for immediate action in the coal, nuclear power and gas industries. The Committee will do so in close cooperation with its affiliated national organisations and the industry committees.

Commissioner Mosar in Oslo

As a major and secure supplier of oil and gas to the European Community Norway has long received priority in the EC's international energy relations. Regular contracts have been maintained with Norway in this field over the past few years. Mr Nic Mosar's first official visit to a capital of a country outside the EC — since he took office in January last — therefore brought him to Oslo. Mr Mosar, accompanied by the Director-General for Energy, Mr Christopher Audland, met Mr Kåre Kristiansen, the Norwegian Minister for Energy and Mr Torbiørn Frøysnes, State Secretary for Foreign Affairs on 26 April.

Mr Kristiansen informed Mr Mosar about Norwegian production developments regarding gas and oil. Mr Kristiansen appeared optimistic about the prospects of a deal with Community gas companies on Troll. He recognised that the gas would have to be sold under competitive conditions if it was going to be contracted.

Regarding natural gas, Mr Mosar confirmed that the Community would need additional imports in the mid-1990s and expressed the hope that substantial quantities would come from Norway. He agreed on the importance of competitive conditions. Mr Mosar also informed the Norwegian Minister about the concern of some Community firms about the extent to which the market for offshore goods and services would be open to Community bidders.

Mr Frøysnes underlined the usefulness of the bilateral exchange of views on energy matters which was initiated by Mr Davignon, the former Energy Commissioner. It was Norway's intention, as far as was economically possible, to increase their contribution to the Community's supply of oil and gas, in line with the IEA policy guidelines of May 1983. Although Norway regretted that no deal had been possible with the UK on the sale of Sleipner gas, Norway would now concentrate on the sale of Troll gas to the European Continent.

Relations with South-East Asia

South-East Asia is assuming growing importance in the world energy picture. Energy demand in the region is increasing rapidly with successful industrialization, and Indonesia, Brunei and Malaysia are now important oil producing and exporting countries. There are also major natural gas reserves in the region and considerable hydropower potential. Singapore is one of the world's major oil refining centres. For both energy and foreign policy reasons the Commission favours strong relations with this area.

Officials from the European Commission's Directorate-General for Energy (DG XVII) visited South-East Asia in March/April this year. Clive Jones, Director for Energy Policy, and Hans-Eike von Scholz, who is in charge of DG XVII's energy cooperation programme, attended an international energy seminar in Thailand which was sponsored by the Commission under the DG XVII programme and organized by the Asian Institute of Technology (AIT). This occasion brought together the leading figures from an international network of 11 energy institutes which has been carrying out work for the Commission on planning methods suitable for Third World energy situations. The 11 institutes are located in Latin America, India, the Middle East, China, West Africa, Europe and Thailand itself (AIT).

As well as presenting the Commission's programme and the network's activities to an invited audience from Thailand and elsewhere, the seminar enabled the members of the network to discuss and reach agreement on their work programme for the next three years. The next phase of the work will concentrate largely on using the planning methods which have been developed to carry out planning studies in selected developing countries. As part of its own contribution to the network's activities, AIT has already drawn up energy balances for Indonesia, Malaysia, Thailand and the Philippines, as well as carrying out four studies of rural energy problems in the region.

The DG XVII representatives also held discussions during their visit with the **Thailand National Energy Administration** and reached agreement in principle on a two-year energy planning cooperation project. This joint project will concentrate on setting up a national energy data system in Thailand and on methods of forecasting energy demand. It will also include a training programme for national officials with a view to establishing an energy planning unit in NEA.

The Commission therefore intends to expand its energy relations with South-East Asia, both bilaterally and through its relations with Asean. Support has already been provided for the region in the form of scholarships for energy planning studies at AIT and reinforcement of AIT's faculty with EC-financed lecturers. The Commission has also agreed to cooperate with Escap, the UN organization for South Asia, in holding a series of energy planning seminars in the region of 1985/86. On the return journey from Thailand, Mr Jones visited both Malaysia and Singapore and held discussions with the main government agencies and energy industries in those countries.

The third Arab Energy Conference held in Algiers from 4 to 9 May

A Commission delegation headed by Commissioner Mosar attended the third Arab Energy Conference held in Algiers from 4 to 9 May. Mr Mosar gave a statement about the Community's experience with regard to energy cooperation with the developing countries.

The Commission was the only non-Arab political organization to be invited. It was also the first time that a Member of the Commission was directly involved (at the invitation of the Organization of Arab Petroleum Exporting Countries — Oapec) in this Conference which has met every three years since 1979. The fourth Conference is scheduled to be held in Baghdad in March 1988.

Mr Mosar took this opportunity of meeting several Arab Energy Ministers and the Algerian authorities.

The contacts made confirmed the Arab World's interest in international energy cooperation, in particular with the Community. It emerged from discussions with members of the Gulf Cooperation Council and Algeria that these countries are interested in a rapprochement with the Community and wish to reactivate the cooperation agreement concluded with the Community in 1976, where some of them are concerned, and to lay the foundations for more formal relations with the EEC, where others are concerned.

Eurostock

The 1985 trial phase of the European Community financed European rapid oil stock reporting system is in full swing. Currently over 80 oil companies covering over 80% of the Community's primary oil stocks are participating in the scheme. Participating companies send their end-month stock figures shortly after the end of the month to the international firm of accountants Klynveld Kraayenhof & Co (KKC) in the Netherlands who guarantee the confidentiality of the data. Thereupon the participating company data is added up and scale-up formulae applied (developed by the consultants Joe Roeber Associates) to estimate the total stock level for each Community country for four stock categories (crude, mogas, middle distillates and residual fuel oil). Shortly after, telexes are dispatched to the participating companies and Member State governments with the estimated data. Stock data is therefore available two months before national statistics or those of the International Energy Agency (IEA) are published.

Although the system has only been running since January 1985, there has been a detectable increase in overall accuracy of the estimates with a significant portion of the estimates falling within a 0-4% error tolerance range. Substantial efforts have been undertaken to clear up definitional problems in some countries and renewed attempts have been made to encourage more companies to participate.

At the end of September, a meeting will be held in Brussels to which participating companies will be invited to discuss the future of the Eurostock system from 1986 onwards.

Mr Georges Brondel retires

Mr Georges Brondel, Director for Oil and Natural Gas in the Directorate-General for Energy for the past 15 years, retired at the end of May.

His name is closely associated with all the Commission's major activities concerning petroleum, gas and energy in general over the last 25 years.

In recognition of his services, the Commission has appointed him Honorary Director-General.

With a background in engineering, law and economics, Mr Brondel was Head of the Energy Economics Division in the old EEC Commission, then Adviser in the Directorate-General for Energy and finally Director for Oil and Natural Gas; his competence was recognized well beyond the frontiers of the Community.

Mr Robert De Bauw, Head of Division in the same Directorate, has been appointed Acting Director for Oil and Natural Gas from June 1985.

Demonstration programme

Evaluation of programme

Some time ago the Commission invited a group of four independent experts[1] to evaluate the Community Energy Demonstration Programme. Their report was published by the Commission in February 1985 (COM(85) 29/2). Its generally favourable overall conclusions were presented in the last number of *Energy in Europe*.

[1] Henri Durand (Chairman), University of Paris;
Angelo Airaghi, Finmeccanica, Rome;
Hans Hertlein, DFVLR, Köln-Porz;
Morton Lange, Copenhagen, University.

This article gives a brief summary of the experts' conclusions on the particular sectors within the programme.

Energy saving in buildings
The experts recommend continuation of this programme, keeping the present severe selection criteria which avoid unnecessary duplication with national programmes.

They felt that the priorities should be:

(i) retrofitting techniques, to expand the trend which exists already for new buildings, thanks to improved standards;

(ii) the non-residential sector, which allows for more advanced technologies and can be particularly useful in training architects and engineers in modern techniques.

Energy saving in indusry
This sectoral programme is considered very successful. It needs, however, to be followed up by replication and multiplication. With that remark in mind, the programme should otherwise be vigorously pursued.

Energy saving in transport
Given that in the past only a limited number of good applications have been received in its sector, and the special features of the transport market, the experts recommended that invitations to tender should be better defined by giving more detailed information about objectives, technical priorities, etc. Since this sector is very important for overall energy consumption, efforts to make this programme more effective are fully justified.

Energy saving in energy industries
This programme is both promising (by virtue of its major potential) and disappointing (because of the difficulties attached to bringing contractors together to set up large projects). Proposals should therefore be discussed and selected on a case by case basis with greater attention to truly innovative technologies (e.g. large heat pumps, use of waste and solid fuels).

Energy saving in agriculture
The experts suggested that this rather small programme should be discontinued as such, while continuing to make agricultural projects eligible for other sectors like biomass and waste, buildings, or use of heat.

Solar energy
A limited demonstration programme should be pursued under the following conditions:

(i) sub-sectors such as passive solar and medium temperature applications should be given priority;

(ii) photovoltaic applications need more demonstrations, in Europe and in developing countries, in order to popularize their specific interest, increase industrial production and hence reduce costs;

(iii) selected active thermal applications, and their related storage should be funded under a long-term approach.

This type of continuity in the demonstration programme was felt to be necessary, supported by an active R&D programme, to create the conditions for a gradual but constant development of solar energy in Europe.

Biomass and energy from waste
Despite the limited result so far achieved and the great diversity of projects, the experts provisionally indicated the following technical priorities for the future:

(i) end-use of agricultural by-products;

(ii) advanced combustion and gasification processes;

(iii) urban and industrial treatment;

(iv) harvesting poorly exploited forests (coppices) for both energy and paper-pulp sectors.

With these technical priorities, the biomass/waste demonstration programme should be continued. In spite of the present competition with relatively cheap fossil fuel, its short-term potential in Europe is significant, its consequences for the environment are excellent and the long-term perspectives are even more promising.

Geothermal energy
The experts conclude that such a programme should undoubtedly be continued, with the following priorities:

(i) first, experimental drillings in little-known areas ('mining-risk');

(ii) second, pursuing technological innovation tests on new drilling methods and on specific hardware;

(iii) third, financing selected 'classical' operations in those countries lacking sufficient experience but offering interesting potential.

Small hydro-electric power generation
As a preliminary conclusion, the experts state that if a new call for tenders is to be launched in the next one or two years, it might be advisable to include applications such as the direct use of electrical power by industries, or the combination of optimal self-production with grid-power, rather than straightforward general purpose electricity generation.

Wind energy
This programme should be pursued, but, in the light of the experience gained through the first call for tenders, with a greater emphasis on more limited specifications — and/or applications — making use of national expertise and improved evaluation of wind energy potential in various climatic and economic conditions.

Use of solid fuels
This programme stems directly from one of the priorities in Community policy. Experience gained since 1983 should help to provide a better identification of this area. In spite of its inconveniences, coal still offers good prospects for Europe. Efforts should therefore continue to promote the use of solid fuels. Environmental concerns should also be central to this programme.

Use of heat
In the future, more attention should be paid to industrial projects (especially in the storage area), and also to management and monitoring of large heat networks.

The evaluation report is available in all Community languages (reference COM(85) 29/2) from DG XVII or the Community's press and information offices.

Council Decision on demonstration programme

At its meeting of 20 June 1985, the Energy Council agreed in principle on the continuation of the demonstration programme for another four years (1986-90), and indicated an 'amount considered necessary' of 360 million ECU for the total period. This orientation by the Council also includes the proposed adoption of a single regulation for the whole programme (ie: including liquefaction/gasification of solid fuels). The Commission will be invited to prepare, one year before the end of the programme, a report on the necessity of its continuation or the introduction of other measures. On that basis, the Commission intends to publish a new call for tenders by the end of 1985.

Energy demonstration projects workshops

Programme
As one way of encouraging the replication of successful projects carried out with aid from its energy demonstration programme, the Commission (Directorate-General for Energy) arranges, in collaboration with project participants, a series of workshops to further publicize the technology of these projects. Three of the most recent are described below. In addition, a workshop was held in June at Elf-Aquitaine's Grandpuits refinery outside Paris (Project EE/125/80/F) and centred on the various applications of the very successful oil separation system for water-oil emulsions. A further series of workshops is planned for the latter part of 1985.

Workshop on solar energy and building design (Birmingham, UK, — 11/12 April 1985)
For the second year running, an important solar energy workshop was organized by the UK Branch of the International Solar Energy Society (ISES), in cooperation with the Commission of the European Communities (CEC), on the thermal application of solar energy in building design. The workshop was held on the campus of the Birmingham University, which has for many years been at the forefront of solar energy R&D and demonstration in the UK and therefore provided an excellent venue for participants from many European countries and industries.

The list of speakers was impressive; contributions being made from amongst others, Italy, Belgium, Sweden and Germany. The discussion was particularly stimulated by the presence of many representatives from the building industry.

The majority of the presentations concerned projects supported financially by the European Community in the framework of the demonstration programme. It was encouraging to see that a number of these projects represent the sharp end of solar energy technology and it was interesting to note the influence they have on the perception by industry of the future development of solar energy.

The workshop also covered the various applications of well-known computer models in architectural thermal design and, moreover, attempted to identify the non-technical barriers to solar energy developments. The event was considered to be successful both in increasing the awareness of solar energy potential and in furthering the application of developed technologies. Proceedings have

been published and are available from ISES, International Solar Energy Society, 19 Albermarle Street, London W1X 3HA. It is hoped that a similar event will be organized in 1986.

Workshop on extraction pumps of geothermal waters (Meaux, France — 26 March 1985)

The workshop was arranged in cooperation with the project contractor, the 'Syndicat Mixte pour la Géothermie à Meaux'. Over 40 participants, representing all Community Member States, except Luxembourg, Ireland and Greece, attended.

In this town, which is very well situated over the geothermal reservoir of the Paris Basin, the most important geothermal operation in France has been realized;[1] four pairs of wells (doublets) are currently being exploited for the district heating of some 15 000 equivalent dwellings, saving 19 000 toe per year. In the production well of one of these doublets, a new concept of submerged turbo-pump unit, under a Community demonstration project contract (GE 456/83), is successfully operating. The objective of the workshop was to ensure that as many concerned entities as possible in the Community were fully informed about this important development and to exchange information on the general aspects of geothermal pumping.

The prototype geothermal extraction pump, developed by Ets Pompes Guinard, is especially suited to operate in hot and corrosive environments and is intended to replace the various not very satisfactory, traditional pumps (the electro-submersible and the vertical long shaft pump) which are in current use. The complete pumping system consists of a turbo pump in the borehole, a second surface feed pump coupled with a booster, and a static frequency convertor. The submerged pump located in the well pumping chamber is driven by the submerged turbine and therefore needs no electric cables or motors. The turbine component is driven by the surface electric pump using as a hydraulic fluid the same geothermal fluid to be pumped up for district heating. The test results have been very promising and are even somewhat better than the required specifications. The major advantages of the system are:

(i) reliability (no submerged electrical equipment, long life hydrostatic bearings);

(ii) reduced dimensions;

(iii) longer life cycle for the whole unit;

(iv) easy installation and flexible accommodation of variations in flow-rates;

(v) reduced maintenance and replacement costs.

There are many geothermal projects in Europe and elsewhere operating in difficult physical/chemical environments and thus a market for pump equipment of this type already exists.

The workshop was very successful both in interesting potential users of this pumping system and in achieving a valuable exchange of information on pumping problems.

Workshop on electricity production from blast-furnace gas (Duisburg, Germany — 14 June 1985)

European iron and steel company representatives attended a workshop at Duisburg to discuss an energy saving demonstration project undertaken by Thyssen Stahl AG with the financial aid of the European Community.

The Thyssen steelworks at Duisburg has developed and demonstrated a project consisting of the production of electricity from the expansion energy of the gas from its blast-furnaces. In a modern iron and steelworks, the air sent to the base of the blast furnace is compressed to a high pressure to improve the efficiency of the ore reduction. On exiting, the exhaust gas pressure is almost double that of the outside atmospheric pressure. To get the maximum benefit from this gas, which is partially combustible, it is necessary to operate a pressure recovery system.

Certain steelworks have already equiped the exhaust gas systems of their blast furnaces with a turbine alternator unit and produce electricity in this fashion. But until now the output was relatively modest and represented less than 10% of the potential energy recoverable from the pressure drop. The difficulties encountered in obtaining higher outputs related to the resistance of the turbine blades to corrosion from the exhaust gas, which is loaded with oxide dust and at high temperature. As a result of an efficient gas purification system and a particularly corrosion resistant turbine, Thyssen have succeeded in raising the output of this operation by more than 90%, or 30 kWh of electricity per tonne of steel produced, which in turn is equivalent to an energy saving of 7 800 toe per annum.

The results have shown that the installation is most certainly profitable as a result of the additional electricity injected into the plants network. At the workshop, the representatives of 11 major iron and steel manufacturers

[1] Indeed, the town's achievements form part of the French pavillon in the Tsukuba international exhibition.

visited the installation and were able to question the operators on all the technical and economic viability issues of the plant. The undertaking of this type of workshop indicates the Commission's concern to see that successful energy saving demonstration projects are repeated. Thyssen Stahl AG intend to equip two further blast furnaces with the same technology. The Commission estimates that if the process were utilized more widely among European steelmakers, a saving of approximately 200 000 toe per annum would be achievable in the medium term.

The companies represented at the workshop were: British Steel Corporation — Cockerill-Sambre — Hoesch — Krupp Stahl — Mannesmannröhren-Werke — Nuova Italsider — Peine Salzgitter — Sidmar — Solmer — Usinor and Voest-Alpine. The demonstration project was project EE/246/81/D and further information may be obtained from the Commission or from Thyssen Stahl AG.

Council resolution on the rational use of energy in the building sector

The Council recently demonstrated the importance it attaches to the rational use of energy in the building sector by adopting a resolution[1] on the subject.

In this resolution the Council:

(i) welcomes the Commission's initiative, designed to supplement efforts already undertaken in the Member States . . .,

(ii) reaffirms the importance of a detailed examination at Community level of definitions concerning standardized methods of measuring the thermal performance of buildings . . .,

(iii) notes the wisdom of a more detailed study of ways and means of improving thermal performance when existing buildings are renovated,

(iv) emphasizes the importance of the regulations in force . . . and, if necessary, of the introduction or reinforcement of such regulations,

(v) stresses the need to continue research/development and demonstration efforts . . .'

This resolution is the response to a Commission communication[2] which reports the following findings:

(i) the energy saving potential in the building sector is 75 million toe/year by 1995. In other words, it should be possible to reduce energy consumption in this sector by some 30% within about 10 years;

(ii) this sector is the heaviest consumer of energy, ranking before industry and transport;

(iii) although per capita consumption fell by 13.6% from 1979 to 1982, the overall energy saving potential is far from being achieved.

Much therefore remains to be done: most Member States have been making considerable efforts for some years,[3] but the results are very variable and sometimes minimal.

The need is greater than ever for coordinated action and a joint effort. Ideas, experiences and resources must be pooled, the best advantage must be taken of measures already carried out and human and especially financial resources must be applied to the best possible effect.

The guidelines for action are set out under several heads:

(i) thermal auditing of buildings,

(ii) technical improvements,

(iii) regulatory requirements,

(iv) optimum use of funds,

(v) user information and behaviour.

The Commission has already started work in three fields:

(i) examination of questions concerning notification of the energy efficiency of buildings by a certification process,

(ii) assessment of the pilot projects already carried out in some Member States for the energy rehabilitation of existing buildings after thermal auditing,

(iii) preparation of a specific 'RUE, building sector' Eurocode that will contain the technical rules for the methods of calculating the energy requirements of buildings, recommend harmonized test and monitoring standards and specifications and offer standard solutions that take account of different situations.

[1] Council resolution of 15 March 1985, Official Journal C 78, 26. 3. 1985.

[2] 'Towards a European policy for the rational use of energy in the building sector', COM(843) 614 of 13 November 1984.

[3] See 'Comparison of energy saving programmes of EC Member States', COM(84) 36 of 2 February 1984. This Commission communication describes the measures taken and points out certain gaps.

Rational use of energy in health care establishments

Health care establishments are a building subsector with highly complex installations. It is no exaggeration to say that these buildings exhibit virtually all the energy problems of the sector combined.

There are more than 15 000 health care establishments in the Community with about 2.5 million beds.

It is difficult to estimate their energy consumption accurately: depending on the country, the average ranges from 2 to 6 toe per bed occupied per year. The energy bill accordingly ranges from 1 000 to 3 000 ECU/bed/year. Total annual energy consumption runs at some 7 to 8 million toe, which means an energy bill of 3 500 million to 4 000 million ECU per year.

Energy is not a primary concern of hospital administrators: their problems are essentially the quality of care, medical staff shortages, budgets and accounts, and administration. As a result, and also because the installations and equipment are so sophisticated, there is considerable overconsumption of energy. On average, consumption could be reduced by some 20% through improved management and careful investment. An important fact to note is that, compared with other building subsectors, the payback time for investment is fairly low at about two to three years.

In other words, potential energy savings in hospitals throughout the Community is some 1.5 million toe per year.

Some Member States have launched massive hospital retrofitting programmes, with systematic thermal auditing followed by capital expenditure.

However, the Commission felt that there was a need for a guide for heads of hospital plant and maintenance departments, to alert them to the problem and inform them of the energy — and therefore financial — savings possible. Many things can be done besides physical improvements to a building and its equipment: efficient management and changes in the behaviour of all hospital staff can result in substantial savings.

The Commission has accordingly had a manual drafted on methods of identifying ways of saving energy in health care establishments.

It comprises over 200 technical data sheets covering eight fields, each data sheet showing:

(i) the type of operation (description of the improvement),

(ii) probable energy gains,

(iii) comments, and

(iv) profitability assessment of the operation.

As a test, a simulation exercise was run on four hospitals selected as representative on the criteria of size, age and type of construction. For each establishment the study identified financially profitable operations on the basis of the technical data sheets.

This methods manual is not meant to replace thermal auditing; it complements it by pointing the way to an initial investigation and assessment of possible improvements beforehand, and making sure that the improvements are maintained by sound management afterwards. Good management must become a permanent concern of hospital staff.

The methods manual for the rational use of energy in hospitals is available in French from the Commission's Directorate-General for Energy.

Commission reaffirms support for 'Energy Bus' concept to save energy in SME

The European Commission has decided to reaffirm its support for the 'Energy Bus' concept to save energy in SME by according it 1 325 000 ECU for the period 1985-87. The 'Energy Bus' approach, first introduced to the Community in 1980 after its earlier success in Canada from 1977 onwards, is geared towards redressing the difficulties that small and medium size industrial enterprises have in gaining access to information and advice on energy saving in their own plant.

The 'Energy Buses' are effectively mobile audit vehicles equipped with computers, measuring instruments, demonstration equipment and video units and staffed by a team of experienced engineers. The buses visit different plants, on average for a day at atime, and produce an analysis of the plant energy use pattern and the potential for energy savings. The results are presented to the plant managers. The recommendations made are generally

low-cost in nature with more complicated changes identified usually involving a suggestion to contact a qualified consulting firm.

By the end of 1984 about 10 500 audits had been undertaken by participating groups in Belgium, the FR of Germany, Italy, Ireland, Holland and Turkey. Of this total, almost 8 000 are now stored in a common data base of the EEC Joint Research Facility at Ispra, Italy. The potential energy savings identified vary between 10% and 20% of normal consumption in a plant per bus visit. This is equivalent to about 130 tonnes oil equivalent (toe) per audit, or 26 000 toe per bus per year. The total savings identified so far amount to not much less than one million tonnes oil equivalent.

The most recent Commission decision reflects the wide acceptance of the energy bus concept by European industry. The Commission intends to deepen the impact of the programme by (a) attracting participants of other Member States; (b) focusing more closely on a selected number of industrial sub-sectors with significant potential for savings; (c) maintaining the tempo of audits undertaken at about 1 500 per year and give partial financial support; and (d) conducting national and sectoral analyses of data gathered with the support of coordinators in the participating groups. This programme will run for two years from October 1985 to September 1987.

The programme continues to benefit from interchanges of experience with the Canadian programme under the auspices of a Memorandum of understanding between Canada and the European Communities signed in 1979. This had led to a free and full exchange of software for data accumulation, access to the respective data bases and an exchange of experience and technical improvements. In the earlier part of the Community's programme Canada also provided training for the first Community energy bus crews and a demosntration bus to visit Member States.

Further information on this programme may be obtained by writing to:
The Commission of the European Communities

Directorate-General for Energy
Energy Bus Programme
200 rue de la Loi
B - 1049 Brussels.

Electricity prices 1978-84

After a study on gas prices, the Commission has recently issued a similar publication entitled *'Electricity prices 1978-84'*, a further step towards ensuring transparency of consumer prices for energy.

This publication is the outcome of a survey made by the Statistical Office of the European Communities in collaboration with the electricity generating and distributor companies in some 30 cities or regions of the Community.

Real prices paid by each representative category of consumer are shown in a large number of tables and graphs, and the text explains how the electricity industry is organized and goes into tariff systems, taxation, price trends, and international price comparisons.

The main conclusions may be summed up as follows:

(i) there is a general rise in current prices;

(ii) prices also rose in constant terms;

(iii) small domestic consumers were relatively well protected;

(iv) nevertheless, electric central heating became more expensive;

(v) prices for industrial consumers followed diverse trends: in some cases the heaviest consumers suffered the largest price increases, in others it was the reverse;

(vi) price differences between countries remained wide, sometimes varying by as much as a factor of 2;

(vii) the heaviest tax burden fell on domestic consumers;

(viii) in most cases tax-exclusive prices rose less than prices inclusive of all taxes — in other words, taxes were increased;

(ix) price trends were strongly influenced by tariff systems (whether or not indexed);

(x) electricity prices increasingly depended on the time of supply, varying according to the season and the time of day;

(xi) the position of electricity improved relative to that of gas.

This publication is available in English, French, German and Italian and may be obtained from the sales offices listed on the inside back cover, or from:

Office for Official Publications of the European Communities,
5 rue du Commerce
L - 2985 Luxembourg

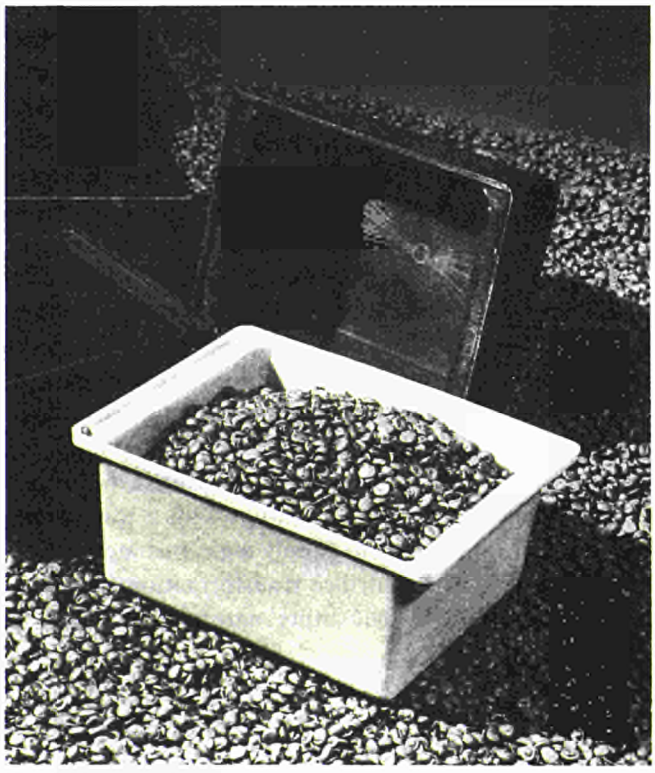
Technology focus

Energy demonstration programme: Biomass and energy from waste

Up until the end of 1984 the Commission had given support to 102 demonstration projects dealing with the use of biomass or waste (the 1985 selection is still under way). Over the last few years, the nature of the proposals has changed. In the past most interest was shown in the production and use of **biogas,** while in 1984 increasing interest was being shown in the production of gas and char through **gasification** and **pyrolysis,** and in the production and use of **refuse-derived fuels** (RDF).

There is also renewed interest in **composting,** a technique which some years ago seemed to have been fully developed and to be of such marginal interest that, on its own, it was hardly a candidate for technical innovation.

It is now apparent that composting deserves careful reappraisal. This subject has revived, partly for environmental reasons, but also because it is clear that it can be considerably improved from both the technological and economic points of view. In this respect it is worth underlining the usefulness of the composting process for treatment of the organic fraction as a means of reducing the cost of the treatment and disposal of urban waste.



The finished plastic products

Anaerobic digestion processes have been successfully applied in the industry field. Production and utilization of biogas at the farm level is still questionable unless expert maintenance/repair services are readily available.

Production of **ethanol** is receiving increasing interest in view of its utilization as an additive in fuel.

Another topic still of considerable interest is the sorting of **urban waste.** Although more plants are now using this technique in Europe and much technological progress has been made, there is still scope for projects to demonstrate integrated waste treatment methods with the aim of saving costs and energy by improving the production/collection/treatment/recycling chain.

The Intradel project

The demonstration project carried out as early as 1979 by Intradel-Liège, Belgium, under the Community programme is a good example of energy recovery from plastic waste (Project No EE/192/79).

Obtaining a 'plastic concentrate'

The most economical process for obtaining plastics of an acceptable quality is still the automatic sorting of raw refuse. After several years of industrial tests, Esdex in the Netherlands has developed an efficient process which is working satisfactorily at Zoetermeer, The Hague.

Flexible plastic sheet and film are baled after separation from a paper and plastic mix and sent to the Intradel plant. Nearly 60% of plastic waste in Belgium is dealt with in this way.

More rigid, heavier or more bulky plastic items cannot be separated out in this way.

These polymers may contain chlorine or sulphur and produce corrosive and toxic acids by combustion (by direct incineration or indirect incineration, i.e. burning a fuel derived from the light fraction of the waste).

Intradel has stepped up its selective collection of plastic bottles in the Liège municipal areas in collaboration with the Belgian firm GB-INNO-BM.

The separate collection of plastic containers at source has several advantages:

(i) the volume of waste to be collected is substantially reduced,

(ii) the derived fuel is of improved quality,

(iii) a source of good-quality plastic is obtained.

The technology used

The plastic materials, either sorted automatically or collected separately, are tipped onto a vibratory feeder from which they pass to a slow shredder consisting of two parallel shafts with discs which cut the waste into pieces a few centimetres on a side, releasing any non-plastic materials and trapping unwanted hard and bulky items.

The pre-treated waste is then fed into an air separator which removes heavy items (often contained in selective collections). The plastics are concentrated in a light fraction which after magnetic separation is fed into a rotary-blade grinder. This reduces the plastics to 100 mm granules which are then washed, centrifuged and dried.

The dry waste from rigid plastics is micronized and that from more flexible plastics is predensified.

After micronization or predensification the products are stored and then mixed with additives according to customers' specifications. The compound is fed into plasticizer-granulators which homogenize, plasticize and granulate the polymer compounds thus formed. The granules obtained are then packaged for storage and delivery to customers for processing into finished products.

Marketing

Although the granules are produced at highly competitive prices compared with new materials and industrial wastes (see table below), finding outlets for them has required a major technical and marketing effort.

(Cost prices (BFR/kg)

Year	New materials[1]			Industrial waste	Intradel Compounds
	PVC	PE	PS		
1984	37	46	54	33 to 40	25

(1) PVC = Polyvinylchloride; PE = Polyethylene; PS = Polystyrene.

The origin of the compounds caused some resistance among potential users, which was not overcome until trials were carried out to develop new products specifically designed for manufacture from these new plastics. New market opportunities were thus opened up through collaboration between industrial users and Intradel. Plastic waste now competes with other plastics of higher-grade origin and with traditional materials such as wood, paperboard, earthenware and so on.

Further information may be obtained from Intradel, Port de Herstal, Pré Wigi, B-4400 Herstal.

Solid fuel gasification

Coal gasification differs from pyrolysis, the technique of which was described in a previous issue, in that it is a process, not of distillation, but of the complete conversion of coal into gas. Earlier this century, it served not only to release gas supplies from dependence on coke production, but also to make pure synthesis gas available to the chemical industry. With the rapidly increasing supplies and steadily falling prices of petrochemical feedstocks in the 1950s and 1960s, however, the chemical industry and most district gas works changed over to the gasification of oil and naphtha, which made gas production cheaper and technically simpler: the gasification of coal lost ground and this tendency increased with the discovery of plentiful supplies of natural gas in the 1960s and 1970s. Now, however, the further development of coal gasification is being pursued both by some Member States and as an activity part-financed by the Community. Outside the Community, only the United States and Japan have significant programmes of support for this technology.

Surface gasification of solid fuels can be carried out by a variety of techniques, which mostly operate by bringing these fuels (chiefly coal, but also lignite) into contact with a mixture of air (or oxygen) and steam. The oxygen in the air or pure oxygen is used for the purpose of burning part of the fuel (20-30%) in order to maintain a good reaction temperature: at this temperature the steam reacts with the solid fuel, and synthesis gas is produced, a mixture of variable proportions of carbon monoxide and hydrogen, from which many other gaseous or liquid compounds (eg methanol) can be synthesized. It can, of course, be burned simply in order to provide heat (but with a low or medium calorific value), or to supply a gas turbine for electricity generation. Its further transformation into methane produces SNG (substitute natural gas), used as such.

The Community's demonstration programme relating to gasification and liquefaction of solid fuels began in 1978. It is a natural extension of the research which has been

conducted under Article 55 of the Coal and Steel Treaty for many years. After an initial evaluation in 1982, the programme was extended to include industrial pilot projects on a smaller scale and at less cost than that of demonstration projects proper.

Under the 1983-85 programme, grants of financial support of up to 49% of the total eligible cost of projects are made, subject to a clause whereby up to 50% of the assistance received is repayable in the event of commercial success in the case of demonstration projects (but not in the case of industrial pilot projects). Feasibility studies may also qualify for Community support if no study is known or available for similar projects.

In 1983, 1984 and 1985 invitations to submit gasification projects resulted in seven acceptances for each of these three years, with total financial support of 27.7 million ECU granted in 1983, 20.3 million ECU in 1984 and 20.4 million ECU in 1985: this brings the total for commitments since 1979 to 138.3 million ECU. The demonstration or industrial pilot projects selected cover all the main gasification techniques: fixed bed gasification, in which the gasifying agent is passed through heated coal in stasis (British Gas Corporation); fluidized bed gasification, in which the gasifying agent passes through a moving bed of smaller pieces of coal (the National Coal Board, Energy-Equipment, Labofina and Charbonnages de France) and entrained bed gasification, in which the oxygen blows through dust-like particles of coal in violent motion (Rheinbraun, Veba Oel and Krupp-Koppers). Two more specific projects are connected with the steel industry: the Klöckner molten iron bath gasification project and the feasibility study of the Centre de Recherches Industrielles de l'Université de Bruxelles of the gasification of coal in blast furnaces.

There were also two underground gasification projects of long standing, which have now combined: the French project of the 'Groupement d'étude pour la gazéification souterraine' and the Belgo-German project of the 'Institution pour le développement de la gazéification souterraine'. Underground gasification involves pumping the gasifying agent down to the coal *in situ*, the resulting gases being brought to the surface via another route. Underground gasification presents many difficulties and has not so far emerged beyond the stage of industrial pilot projects.

The solid fuel gasification projects financed by the European Community, which are at varying stages of completion, aim at providing commercially worthwhile sources of gas for the production of chemical derivatives, for power generation and for heating. The economics of solid fuels gasification are dependent, for synthesis gas, on comparisons with that produced from heavy fuel oil or natural gas and, in the case of substitute natural gas (SNG) on comparisons with natural gas itself. In view of the high levels of investment required for coal gasification plants and continuing uncertainly in the general economic outlook, it is not possible to say more at present than that the production of synthesis gas and the use of coal gasification for electricity generation seem likely to be the most promising applications. Further indications will emerge when the current demonstration and pilot projects are completed in a few years' time. Meanwhile, the programme continues within the Community's overall strategy of reducing dependence on imported oil and ensuring a broader variety of sources of energy.

Main Commission energy documents, proposals, directives in 1985

Energy policy

COM(85) 0245-02 Draft Council Resolution concerning new Community energy policy objectives for 1995 and convergence of the Member States

COM(85) 0245-01 Communication from the Commission to the Council — New Community energy objectives

COM(85) 0143 First report from the Commission to the Council and to the European Parliament on the application of Council Regulation (EEC) No 1890/84 of 26 June 1984 introducing special measures of Community interest relating to energy strategy

COM(85) 0118 Second report from the Commission to the Council and to the European Parliament on the application of Council Regulation (EEC) No 625/83 of 15 March 1983 establishing specific measures of interest relating to energy strategy (in 1983)

Solid fuels

COM(85) 0098 Memorandum concerning the implementation and execution of a coal research programme with a view to obtaining financial aid under the terms of Article 55(2) (C) of the ECSC Treaty (budgetary year 1985)

COM(85) 0061 Memorandum on the financial aids granted by the Member States to the coal industry in 1984 and on the additional financial aids granted by the Member States to the coal industry in 1983.

Nuclear

COM(85) 0294 Commission Communication to the Council: Position to be adopted concerning the expiry on 23 June 1985 of the 1961 Euratom-Brazil Agreement

Energy saving, alternative energies, electricity

COM(85) 0029-02 Proposal for a Council Regulation (EEC) on the promotion, by the granting of financial support, of pilot industrial projects and demonstration projects relating to the liquefaction and gasification of solid fuels

COM(85) 0029-01 Proposal for a Council Regulation (EEC) on the promotion, by the granting of financial support, of demonstration projects relating to the exploitation of alternative energy sources and to energy saving and the substitution of hydrocarbons

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