

# ENERGY IN EUROPE

Energy policies and trends in the European Community

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## Foreword

*On 17 June the Council of Ministers of the European Community took an important decision for the future of the energy sector in Europe and cooperation between the Community and the East European countries. It convened an International Conference to negotiate a pan-European agreement on energy, the **European Energy Charter**.*

*This major initiative, which will be negotiated throughout the second half of this year, is discussed in the first article in this edition of Energy in Europe. The next edition of Energy in Europe will cover the proceedings of this International Conference which will crystallize the efforts of the Commission's Directorate-General for Energy over the next few months.*

*Closely connected with efforts to combat the greenhouse effect, efficient use of energy is a growing concern for all European countries. The Community is aware of the economic and environmental stakes involved in controlling energy consumption, and thus improving security of supply. So, over the next few months, it will be launching **SAVE**, a new energy management programme, as a contribution towards reducing the energy intensity of the EC economy. This programme, which consists of measures concerning legislation and standards, but will also include back-up and information for economic operators, is analysed in detail in the second article of this edition.*

*This general article on **SAVE** is followed up by a summary of the initial legislative measures tabled to put the programme into action. A further article outlines the results of a pilot study based on the principle of least-cost planning, which will be widely used under **SAVE**.*

*To achieve more rational use of energy, the Community has since last year been operating the **Thermie** programme for the promotion of innovative technology which also covers renewable energy sources and fossil fuel technology. During the first year of **Thermie**, the Directorate-General for Energy has been carrying out a major operation to set up offices in all the Community Member States to coordinate Community action for the dissemination of energy technology. This **network of OPETs** (Organizations for the Promotion of Energy Technology) is harnessing the energies of the Community regions to enable efficient energy technology to make inroads into the market place. The **OPETs** network is described in the third article of this edition and is followed by results of the first round of financial support for projects submitted under the **Thermie** programme last year.*

*The three following articles concern energy resource use planning in Community regions, as well as in developing countries.*

*Turning to the sociology of nuclear energy, we set out the findings of a recent comparative bibliographical study of nuclear energy and public opinion in Europe.*

*Next comes a presentation of a new Community initiative to establish a vast trans-European gas and electricity transmission network connecting all the Community regions and the other European countries, as well as North Africa.*

*Continuing the series on the energy profile of the Member States, we describe the energy sector in Ireland.*

*Lastly, the Community News section highlights the main extracts from a keynote speech given on 10 June in Copenhagen by the Energy Commissioner, **Mr Cardoso e Cunha**, on the need for greater liberalization of the Community energy market. This speech, delivered a few days after the Energy Council of 31 May (covered in a special article) formally adopted the Energy Commissioner's first liberalization plan, signals for the first time future Commission action to bring about a single market in the energy sector.*

*This edition of Energy in Europe is the **first multilingual edition**: after a first section in English, articles from the last edition (No 16) are reprinted in Spanish, German and French.*

*30 June 1991*

# Why a European Energy Charter?

by Christian Waeterloos, DG XVII: Head of policy making unit (A1)

*The energy policy taking shape in the European Community is being influenced by two major developments: completion of the internal energy market and the dramatic course of political and economic events in the countries of Eastern Europe. The directions taken in the context of the internal energy market and the changes that may result, particularly in terms of security of supply, have been dealt with many times before and will no doubt be again. This article will therefore concentrate exclusively on another determinant of future Community energy policy: the cooperation and synergies to be developed between the Eastern and Western half of the European continent.*

## East-West cooperation in Europe

The Dublin summit of EC Heads of Government in June 1990 asked the EC Commission 'to consult the Government of the Soviet Union with a view to preparing urgently proposals covering (...) and longer term support for structural reform'.

This request can be understood in the light of the Community's desire to make a specific contribution to consolidating the changes in the East resulting from German unification, the loosening of the ties formed in the Council for Mutual Economic Assistance (CMEA) and the effects of perestroika in the USSR.

In the case of the USSR, the European Council's request underlines the Community's will to step up its efforts to promote the economic and constitutional reforms in progress through measures to support economic development and the emergence of a democratic order.

## Energy's role in this cooperation

Modernization of the Soviet economy and its transition towards a market economy can be achieved only by adjustment of prices to world levels, introduction of new technologies and acquisition of modern, efficient capital goods.

An increase in the Soviet Union's ability to earn hard currency is vital for the purchase of the capital goods and advanced technologies necessary to set its economy on the road to growth. At least 60% of the foreign exchange earned by the Soviet Union in the last few years came from energy exports, primarily oil and natural gas. This is an indication of how important the energy sector is to attainment of the set goal.

It is only logical in these circumstances that the Commission, in execution of the Dublin mandate, has sought to lay the political groundwork for an 'energy' cooperation programme between the European Community and the USSR. Two successive visits to Moscow by the EC Commissioner and his Director-General in the Autumn of 1990, and several subsequent meetings in Brussels and Moscow, enabled the priorities for such a programme to be identified. The meetings gave both sides an opportunity to define the scope of possible cooperation measures and appraise the political, technical and economic conditions necessary for their implementation.

## Eastern Europe's energy problems

The energy situation in the Soviet Union has for many years been characterized by an abundance and diversity of available resources and a high level of energy production. Targets set for the development of capital goods and, in particular, heavy industries led over the years to an energy system oriented towards continuing growth of supply to maximize production and exports. Exports played an important part both in supplying the other CMEA countries with oil and natural gas and in earning the Soviet Union hard currency.

High energy production levels and abundance of proven resources make the Soviet Union a key player in the world energy scene. By way of illustration, the Soviet Union's share in world energy production is 10% in the case of nuclear energy, 15% for coal, 20% for oil and almost 40% for natural gas. There are similar figures for proven reserves, at least as far as coal and natural gas are concerned. The Soviet Union doubled its total energy production between 1970 and 1989. Following a substantial increase between 1970 (350 million toe) and 1979 (590 million toe), crude oil production stabilized in the 1980s at a little over 600 million toe, before beginning to show a decline in 1989.

Natural gas production, on the other hand, expanded greatly during those 20 years, increasing from 200 billion m<sup>3</sup> in 1970 to some 800 billion m<sup>3</sup> in 1989. Coal production meanwhile experienced slow but irregular growth, increasing from 580 million t (t = t) in 1979 to about 660 million t (t = t) in 1989, and will probably remain stable in the next few years. Finally, the rapid growth in nuclear generated electricity between 1970 and 1987 (from 10 to 190 Twh) came to a halt after Chernobyl. Development plans for the future have been radically reviewed and work on new stations suspended in many cases.

The Soviet Union is also a major energy exporter, principally of oil and natural gas.

In 1989, the Soviet Union exported 210 million toe of crude oil and refined oil products, including almost 80 million toe to the CMEA countries and 100 million toe to OECD countries. Its exports of natural gas amounted to 100 billion m<sup>3</sup> in 1989, evenly split between Eastern and Western Europe (including 40 billion m<sup>3</sup> to the European Community).

In future, efforts to stabilize oil production together with the development of new natural gas fields in, for example, the Barents Sea or the Yamal Peninsula, should lead to a substantial increase in exports of natural gas. Soviet sources indicate additional potential for natural gas production of between 200 and 250 billion m<sup>3</sup> per annum. At least two-thirds of this additional production could be exported to the rest of Europe. To put this in perspective, it is worth remembering that the European Community at present imports over 120 billion m<sup>3</sup> per annum of its natural gas requirement.

The Soviet Union, with a population of 285 million, has an annual per capita consumption of 5 toe. This figure, which is lower than that for the US, is nevertheless considerably higher than the Community's per capita consumption of 3.5 toe.

The energy intensity of the Soviet economy<sup>1</sup> can be represented by a coefficient of 0.9, which compares with a coefficient of 0.6 for the US, 0.4 for Western Europe and 0.3 for Japan. Although these figures are only a rough estimate, they indicate the Soviet Union's relatively poor efficiency of energy processing, transport and consumption. This assessment must be qualified by the fact that the Soviet Union encompasses a whole continent and energy has to be transported over very great distances. In addition, weather conditions can be severe.

Having said that, the level of technological development and reliability of capital equipment at the various stages of the energy chain are well below those in the Western industrialized countries. Some experts estimate that Eastern energy technology is about 20 years behind the West.

This, albeit brief, summary of the Soviet energy situation gives some general pointers to the areas where serious problems persist.

On the supply side, extensive exploitation of resources leads to waste. Modernization of energy production and transport equipment is vital to the success of the economic reforms in progress. Plant safety and reliability will call for a substantial transfer of technology and know-how, appropriate training, devolution of responsibility to the operators and an improvement of their management capabilities.

At the same time, on the demand side, market mechanisms will have to be introduced and the true prices of energy established if the Soviet Union's energy system is to be made more efficient. The relaunch of the Soviet economy depends in part on stepping up its production of oil and natural gas. In addition, adequate electricity generating capacities must be installed.

Environmental concerns, frequently at local level, must be taken into account gradually. A general improvement in the efficiency of the Soviet energy system and appropriate substitution between fuels may contribute towards this end.

Development of the country's energy resources under proper economic, safe conditions and improved energy management are fundamental to any energy cooperation with the Soviet Union.

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<sup>1</sup> Calculated on the basis of the ratio between gross primary energy consumption and NMP (net material product), expressed in parities of purchasing power (GDP for industrialized countries).



A recent G 24<sup>2</sup> analysis of the energy sector Central and Eastern Europe revealed long-term structural problems, which were further exacerbated by the Gulf crisis and the collapse of CMEA agreements. Since the beginning of 1991, Soviet sales of oil and gas to the Eastern bloc countries have become increasingly unreliable, but are priced at international market rates and paid for in hard currency. Owing to the drop in oil exports from the Soviet Union, these countries will have to buy their oil products through barter agreements with Iraq, which used to supply them with part of their oil requirements. These supplies have been interrupted since August 1990, and are not likely to resume for the time being. The countries of Central and Eastern Europe therefore have a big interest in the development of a Europe-wide cooperation which could eventually secure their energy supply and improve the efficiency of their energy use.

## Possible cooperation projects

Talks between Commission officials and the authorities in the Soviet Union and other Eastern countries, as well as contacts with industry have paved the way for an initial list of cooperation projects to be drawn up. The projects take account of the vulnerability of the Eastern countries - in particular following the Gulf crisis - and future prospects in their energy markets. These projects can be grouped into two categories.

The first category is technical projects involving essentially the protection and improvement of living conditions in Europe. These projects would concentrate in particular on:

- nuclear energy and better safety standards at nuclear power stations;
- energy efficiency and transfer of appropriate technologies;
- energy management and environmental protection.

These schemes could be backed up by cooperation in the form of feasibility studies and training programmes, *ad hoc* participation in discussions on network interconnection, development of hydrocarbons, implementation of the market economy and definition of appropriate, coherent energy policies.

This package of measures could be developed under the umbrella of existing or impending bilateral agreements.

A second category of projects with a direct bearing on the economic development of the Soviet Union was specifically proposed to us by our Soviet partners. Its principal objective is exploitation of the Soviet Union's oil and gas resources, for example in the Barents Sea where the existence of one of the world's largest fields has just been confirmed. The proposed measures also concern modernization of the transport network (including coal transport), refurbishment of antiquated refining plant and the development of electricity generation and transport equipment, including interconnection to the Western grids. These are all major industrial projects, requiring investment of anything up to several tens of billions of ECU each.

The projects are essential to the equilibrium of the Soviet economy, but are also important to the maintenance of an adequate energy supply for the other countries of Central and Eastern Europe. In addition, they may in the long term help to improve the EC's security of supply by reducing our dependence on the Gulf.

These projects will require major investments and the application of technologies specific to the energy sector. But given their unquestionable viability it is only right that they should be implemented entirely by industry and financed by the methods normally used in market economies.

Of course, industry and the financial world will cooperate in this type of project only if institutional and economic reforms are carried out in the Soviet Union or consolidated in some Central and East European countries, and if the agreements concluded at international level create a climate of confidence enabling industry to operate and procure the necessary financial backing.

## The Dublin initiative

Building such a climate of confidence depends in particular on the undertakings the Soviet Union and its republics are prepared to give with regard to the operating conditions for industry. These undertakings could, for example, be written into a 'European Code of Conduct' of the type proposed by Prime Minister Lubbers at the European Council in Dublin in June 1990. The Dutch Prime Minister tabled proposals for the creation of a European energy community embracing both East and West for the development and rational use of Europe's energy resources, including the use of clean energy technologies.

<sup>2</sup> G-24: at the end of their Summit in Paris on 16 July 1989, the Heads of State or Government of the Seven asked the Commission of the European Communities 'to take the necessary initiatives in agreement with ... all interested countries' (the total today is 24) 'concerning concerted support for reform in Poland and Hungary'. This initiative was subsequently extended to the other Central and East European countries.

This new community, conceived in the spirit of the ECSC Treaty, would help to consolidate the basis for economic reform in the Soviet Union, support the development of the other Eastern countries and increase security of supply in Western Europe.

From the Commission's point of view, the Dublin initiative should help create the political consensus necessary for the development of such a community based on evident mutual interests in the energy sector, provided that it does not pose a threat to completion of the EC's internal market.

The Commission therefore set to work on a draft European Energy Charter, seeking to define the general principles of its structure, the possible content of the Charter and the procedure envisaged to bring it about.

## A European Energy Charter

The Commission's approach is based on the objective aim of promoting cooperation in the energy field throughout the whole of the European continent.

In the Commission's view an international conference of all interested parties would allow them to pin down the possible content of such cooperation and see how it could be put into practice. Apart from the initial Dutch contribution, the Commission also drew on input, both formal and informal, from the United Kingdom, Italy, Germany, and France. Its reflections culminated in a Communication on the European Energy Charter containing specific proposals on its content as requested by the European Council of Rome.

The Commission's Communication<sup>3</sup> and the accompanying preliminary draft legal text are flexible, designed to accommodate all possible situations, including political changes in the East over the coming months and the progress made by the international conference on the Charter. Under this approach, for example, the Charter could be concluded either with or without the participation of the Soviet Union. In the first case, the objective would be to exploit the complementarities in Europe between those with energy resources and those with advanced technologies and know-how, and big consumer markets. If the USSR opts to stay out the Charter would have a different, more political character. It would offer the countries of Central and Eastern Europe an appropriate framework for moving closer to the European Economic Area. Clearly, we are working on the basis of the first hypothesis.

## A tiered approach

After its signature, the Charter should provide a political framework for all East-West cooperation projects in the energy sector. However, in view of the magnitude of requirements, *ad hoc* cooperation in parallel with negotiation of the draft Charter is needed. This makes it possible to conduct concurrent, but relatively separate negotiations on the Charter proper and on the substance of cooperation measures that can subsequently be included in the specific implementing agreements.

In the event of difficulties arising to slow down negotiation of the Charter, this two-tier approach will also allow pragmatic cooperation to develop as well as the more rapid finalization of agreements which could subsequently be attached to the Charter on signature.

The Charter itself will have three tiers: the Charter proper, the specific agreements which will be linked to it and the actual projects which will be carried out by the operators concerned (industry, banks, etc.).

The European Energy Charter proper constitutes a sort of code of conduct, or solemn declaration on the guiding political, economic, energy and environmental principles which the signatories undertake to respect. By its very nature, such a declaration of intent would be non-binding. However, the value of this text would be to demonstrate for the first time a consensus on the links and interdependencies in Europe's energy sector. This code of conduct would establish the general ground rules for steps designed to respond to the challenges of security and diversification of energy supply and protection of the environment.

The Commission's draft Charter sets out three specific objectives: development of trade; cooperation, coordination and technology transfer; optimum use of energy and protection of the environment. It stresses the importance of market economy mechanisms to attain these objectives. Finally, it gives a full account of the possible Community initiatives and contributions in this field.

The second level concerns practical implementation of the principles of the Charter. This will be done through the conclusion of legally binding, multilateral international accords carrying certain legal obligations. Our draft text for the Charter contains a non-exhaustive list of priority areas in which such agreements could be concluded.

These agreements must constitute the reference or legal framework for interested parties to enable them to operate in all countries and to permit cooperation between businesses in a stable and secure environment.

<sup>3</sup> Commission Communication on a European Energy Charter - COM(91)36 final, 14 February 1991.

The third tier covers concrete steps towards cooperation between the various operators, with or without financial backing from the public sector.

It is already possible at this stage to identify several specific areas in which cooperation would be of mutual benefit. For example, the implementing agreements could cover:

- nuclear energy and improvement of the operating safety of nuclear power stations;
- coal mining and 'clean coal' transport and utilization technologies;
- efficient use of energy (rational use and energy saving);
- development of renewable energy sources;
- use of natural gas and transmission through high-pressure grids;
- modernization of power stations, interconnection of power grids and electricity transmission through high-voltage power lines;
- use and transport of oil and oil products and modernization of refineries;
- technology transfer and publicising innovation.

It is clear that cooperation in the field of nuclear energy and energy efficiency will have to be carried out by industry but financed, at least initially, with public backing. A similar approach may also be justified to stimulate technology transfer and encourage innovation. In all the other fields, however, projects to be undertaken and developed under the Charter should be selected purely on their own merits and their financing should be secured on a sound commercial basis. Any agreements and commercial contracts concluded will have to respect the rules laid down in the specific implementing agreements applying to the sector concerned.

## From the initial idea to the specific project

The proposed European Energy Charter is thus based on the Lubbers plan, retaining in particular its main ideas and the two-tier approach. The original Dutch proposal contained two main ideas with which the Commission concurs:

- the need to promote a consensus in all European countries on the central objectives of energy policy: energy saving, diversification of supplies, integration of networks, nuclear safety, environment conservation, etc.

- the importance of creating a political, legal and, if necessary, financial instrument to induce substantial transfers of capital, management ability, know-how and technology, all of which are necessary to a rational development of the medium and long-term supply and consumption of energy in Europe.

The Dutch plan, like the Commission draft, proposed a two-tier approach:

- a political initiative backing up developments and reforms undertaken in the East, particularly the Soviet Union;
- an 'energy' cooperation initiative concerning specific measures for each energy sector: safety of nuclear energy, efficiency of end-use, optimization of oil and gas exploitation, etc.

The Commission's draft, while retaining both facets, nevertheless gives more weight to the politico-economic aspect of the Charter, essentially specifying the market economy mechanisms which can be applied to the energy sector. It also contains a somewhat more balanced presentation of the sectoral activities, without placing undue emphasis on any one of them.

The spirit of the Commission's draft differs more fundamentally from the Lubbers plan with regard to the rules for future organization of the energy market in Europe. The Commission's draft would involve a gradual extension of the rules of the internal energy market to the whole of the European continent, leading to more competition and greater transparency. The aim is to avoid preferential or discriminatory access to resources through the granting of concessions or exclusive production and transport rights.

The Commission's goal in promoting its proposal is not to construct a 'fortress Europe', but on the contrary to secure complete non-discrimination between operators in the energy market throughout Europe.

Establishment of a self-sufficient energy system on the European continent would be totally contrary to this idea, as well as being unrealistic and difficult to justify under GATT rules. It would also be open to a justified attack by the Community's other priority trading partners such as, for example, the countries of the Mediterranean, or the Gulf.

This is why the Commission's draft, while aiming to mobilize intra-European synergies, also envisages the possibility of subsequently opening up the Charter or its protocols to the countries on the periphery of Europe which contribute to its energy supply.

## Choices made by the Commission

Despite the similarities between our proposal and the original plan, the Commission found in drafting its text that certain choices had to be made. These were later accepted by the Council of Ministers.

**First choice:** once it has been amended by the Council, the draft Charter will constitute the Community's initial, single contribution to the international conference. The Council has agreed that the Community should speak with a single voice.

**Second choice:** the Community takes the initiative and issues invitations to this conference, which will begin on 15 July and is expected to close towards the end of the year. The Community has recently begun taking the appropriate diplomatic steps.

**Third choice:** the European Community will sign the Charter in its own right. The Presidents of the Council and of the Commission will speak in its name at the international conference.

**Fourth choice:** a small secretariat would be responsible for administration. The Charter would be reviewed annually by a conference of the ministers or their representatives. The conference would establish an arbitration mechanism to settle any disputes regarding the implementation of the Charter and the specific agreements. The practical details of these administration procedures have still to be examined by the Council.

## Important political choices left to the Council

In addition to these choices the Commission passed on three major political issues to the Council where they were the subject of intense political debate.

The first concerns the geographical scope of the Charter. The Member States finally agreed on a Charter encompassing the whole of Europe, i.e. the European Community, the countries of Central and East European, the USSR and the EFTA countries, as well as the non-European states of the G 24 (USA, Canada, Japan, Australia, New Zealand). The geographical unity and common cultural heritage of the European continent and its economic complementarities could have suggested a more limited coverage. However, other important factors had to

be taken into account, certain non-European countries having expressed their will to be involved in the undertaking from the outset.

The second question concerned eligibility to sign the Charter. Signatory countries should in theory fall within the geographical scope of the Charter. In view of the importance of some other non-European countries to Europe's energy supply, such as the Maghreb countries or the Gulf states, these countries will be granted observer status during the negotiation. They could also claim the right to become signatories of the Charter after its conclusion. A related question concerned the participation of other international organisations dealing with energy issues. They will also be granted observer status.

Administration of the Charter and the problem of setting up a small secretariat was the third unresolved question. The Community is now proposing that this secretariat, reflecting the composition of the signatories, should be responsible for monitoring the Charter and its implementing agreements. It could, where necessary, make use of the specific competences of other organizations operating in the energy sector. The Commission is willing to take responsibility on a temporary basis for the follow-up and coordination of activities necessary to the success of the international conference. Mr Clive Jones, Deputy Director General in DG XVII, has been appointed Secretary General of the technical secretariat.

## On course towards a European Energy Charter

The negotiating conference will begin work in July 1991 and finish, if possible, by the end of the year. The former Dutch EC ambassador Mr Charles Rutten will chair the international conference.

The participating countries are now working on a specific timetable for the various procedural stages leading to signature of the Charter as well as the shareout of responsibilities between the various possible players.

As far as the involvement of non-European countries in the drafting of the Charter or its implementation is concerned, these countries should logically undertake to apply in their national territories the rules which would apply throughout the European continent.

This should help pave the way for a new framework for economic and political relations between East and West, but also between North and South, dispelling the memory of 45 years of 'cold war' and division by the Iron Curtain.

'No more war' was also the prime objective of Jean Monnet, one of the EC's founding fathers, when he proposed setting up the first European Community, the Coal and Steel Community.

The convincing results of Monnet's initiative lead us to believe in the success of this new undertaking to which the Community is wholeheartedly committed.

# Specific actions for vigorous energy efficiency (SAVE)

by Derek Fee, DG XVII: New and renewable energies, rational use of energy unit (C2)

*Unless urgent and effective measures are put into effect, the Community will fall far short of its target of a further 20% improvement in the energy intensity of final demand by 1995. This was the stark conclusion of a 1988 European Commission evaluation of energy policies in the 12 EC Member States which revealed a definite levelling-off in the energy intensity of final demand.*

*The Community aims to tackle this situation by launching a new energy efficiency programme entitled 'Specific Actions for Vigorous Energy efficiency' or SAVE.*

The failure to attain the 1995 energy efficiency objective will have serious consequences, not only for future energy supply and price considerations but will also adversely affect the competitiveness of Community industries, worsen the balance of external trade and cause increased environmental damage.

To tackle this situation the Community decided to launch a new energy efficiency programme (SAVE) which is expected to be formally adopted by the Council of Ministers next autumn. The programme will initially last five years and have as its objective the rekindling of the energy efficiency flame to create social and economic benefits.

The SAVE programme will have three major axes. The primary one will be a series of legal and administrative actions to be formulated by the Commission. The second axis will be a series of support programmes partially funded by the Community and aimed at strengthening Member States energy efficiency structures. The final element of the programme will be a comprehensive information exchange programme at Community and international level.

Both the uncertainty regarding fossil fuel supplies in the 1990's and the energy/environment interface are problems facing not only the EC but the entire world. Most observers are now of the opinion that increased energy efficiency efforts represent the only viable short-term solution for both the energy supply and environmental considerations. Because these issues are global, SAVE will endeavour to set up linkages with all interested parties to propagate the EC energy efficiency experience while at the same time learning from the successful initiatives of other countries.

Since the first oil crises of 1973, energy efficiency has been one of the principal elements of the EC's energy policy. The Community's commitment to energy efficiency has been evident in the many measures aimed at improving the rational use of energy adopted by Energy Ministers since 1974.

The success of the Member States' and the Community's energy efficiency programmes was most striking during the period 1973 to 1985 when the energy intensity of final demand, i.e. the ratio of final energy consumption to GNP, improved by more than 20%. During this period, energy efficiency efforts were, of course, assisted by the effects of high energy prices. This excellent performance (which was matched by the other members of the OECD) led the Council of Ministers to set an energy efficiency objective for 1995 of a further improvement in the energy intensity<sup>1</sup> of final demand of at least 20%<sup>2</sup>.

However, the change in energy market conditions occasioned by the oil price fall of 1985/86 and the increasing importance of the energy intensive transport and building sectors (see Figure 1) has led to an increase in overall energy consumption and a dramatic fall-off in the rational use of energy. This phenomenon was already noticeable in 1987 and caused the Commission to sound the energy efficiency 'alarm bell' with the introduction of a Communication entitled 'Towards a Continuing Policy for Energy Efficiency in the European Community'<sup>3</sup>. The Council of Ministers took note of the conclusions of this Communication and reaffirmed their commitment to the

<sup>1</sup> The Council's energy efficiency objective has been set in terms of the energy intensity of final demand which unavoidably also contains elements of structural change.

<sup>2</sup> OJ No. C241 of 25.9.1986.

<sup>3</sup> COM (87)223 final.

pursuit of the 1995 energy efficiency objective. A review of the Member States energy policies carried out by the Commission in 1988<sup>4</sup> concluded that the Member States would attain their 1995 energy objectives in all but two areas, coal and energy efficiency, and that, if present trends continued, the Community would be importing and using an extra 110 Mtoe at a cost of 13 billion ECU by 1995 unless the energy efficiency shortfall was corrected.

Figure 2 shows the trend in final energy consumption, GNP and energy intensity over the period 1973/1988. This figure shows that while energy intensity improved significantly between 1973/86, the curve had already begun to flatten even before the oil price fall of 1985/86. This phenomenon shows how consumers gradually learn to live with higher energy prices. Unless this negative trend can be reversed, the inevitable repercussions will include greater energy supply uncertainties, a less competitive industrial sector and greater risks to the environment.

Fig. 1 EC Sectoral Final Energy Consumption 1973/88a)

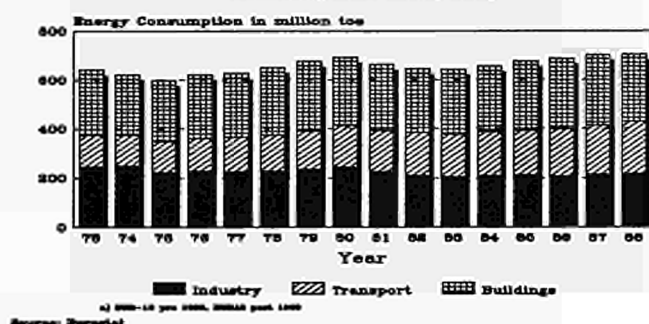
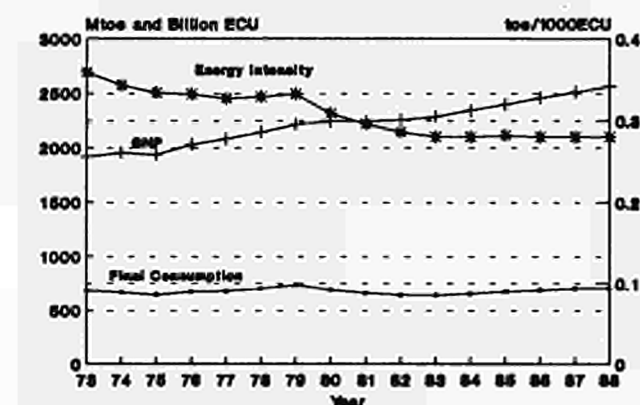
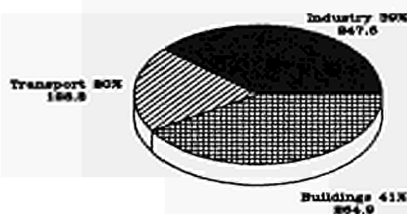


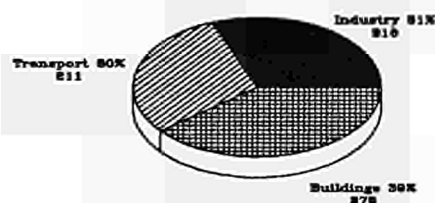
Fig. 2 Energy Consumption, GNP and Energy Intensity (1973-1988)



EC Final Energy Consumption by Sector for 1973 (in mtoe)



EC Final Energy Consumption by Sector for 1988 (in mtoe)



## The benefits of an energy efficient European Community

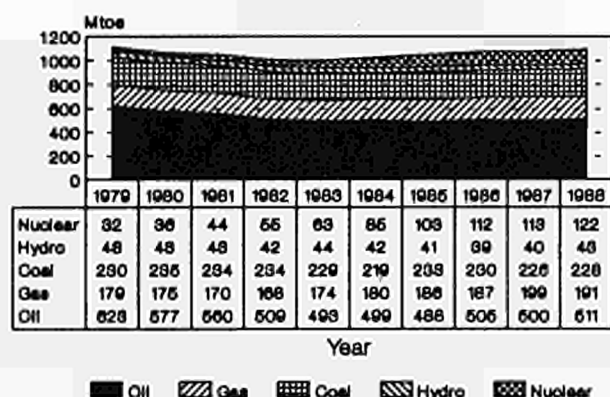
### Optimum use of finite resources

The primary objective for energy efficiency is, of course, the optimum use of finite resources. Figure 3 shows that the EC is still heavily dependent on fossil fuels and, if present trends continue, will be more so in the future.

The EC is, and will continue to be, a major importer of all three fossil fuels, i.e. oil, gas and coal. Since 65% of the world's oil reserves are located in the Middle East, future supply disruptions are a distinct possibility.

<sup>4</sup> COM (88)174 final.

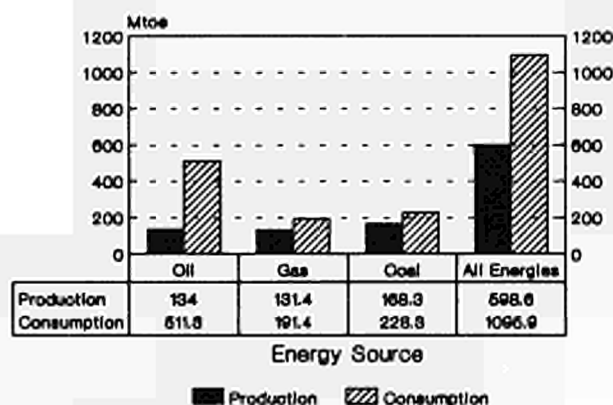
Fig. 3 EC Primary Energy Consumption by Fuel (1979-1988)



Source: BP Statistical Review

Figure 4 shows the EC fossil fuel production/consumption profile for 1988, a year in which the EC depended on imports for 45% of its energy: oil dependency was about 73%, gas dependency 31% and solid fuel dependence 27%.

Fig. 4 EC Energy Production/Consumption Profile 1988



Source: BP Statistical Review 1989

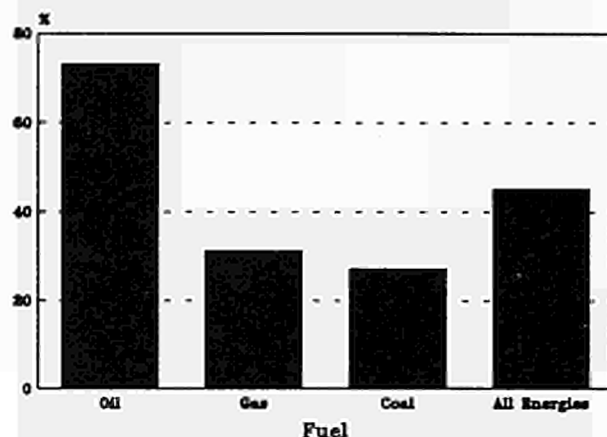
Indigenous production of all three fuels is in decline. EC oil production peaked (with North Sea production) at 142 million tonnes in 1986 and had fallen to 131 million tonnes by 1988. This can be contrasted with increasing EC oil consumption (approximately 12 million tonnes per year - see Figure 3). EC natural gas production has been falling steadily since 1977 from 141 Mtoe in that year to 119 Mtoe in 1988. Gas consumption in the EC rose consistently during the 1970's and 1980's before falling slightly in 1988 (due to mild winter conditions) (see Figure 3). EC solid fuel production has been steadily declining and fell from 196.8 Mtoe in 1983 to 168 Mtoe in 1988.

If energy intensity remains stagnant this will inevitably lead to increased imports of fossil fuels. This requirement for additional imports comes at a time when world energy consumption is rising sharply and other major energy consumers, e.g. the United States, are importing increasing amounts of their energy supplies. The substantial growth in

world oil demand will inevitably push up energy prices as supplies tighten.

After the 1973 and 1979 energy crises, the Member States and the Community adopted a series of measures to counteract energy dependence. These included energy efficiency, a greatly increased nuclear share, increasing indigenous energy production and interfuel substitution. Most of these policy options are no longer available.

Figure 4 a) Import Dependency



Under present pricing scenarios, indigenous production (with the possible exception of some renewable resources) cannot in many cases be economically increased, nuclear programmes are out of favour in many Member States, and the increasing predominance of a mono-fuel transport sector makes possibilities for interfuel substitution more limited. Therefore, only a more rational use of energy can extend the life of our finite energy resources and avoid future supply disruptions.

## Economic advantages of energy efficiency

Energy is one of the factors of industrial production and, as such, economically justifiable improvements in energy efficiency will inevitably lead to reductions in manufacturing costs with a consequent positive impact on industrial competitiveness.

A major attraction of energy efficiency initiatives is that they have a relatively short time lag before impact. Improvements are registered as soon as the energy saving projects are completed.

In general, the economic returns to the investor from energy saving are retained in the locality and do much to promote increased economic activity in often



disadvantaged areas<sup>5</sup>. This is of particular relevance to regional development within the Community. Energy costs are now a significant proportion of the outlays for the buildings and tertiary sector. Economic saving from reduced energy costs would feed directly into the local economy.

Energy efficiency programmes create a significant number of jobs at a cost which is 25-45% that of traditional energy industries. A study<sup>6</sup> carried out for the EC Commission on six energy efficiency technologies in the United Kingdom, France, Denmark and the Federal Republic of Germany concluded that an enforced demand reduction policy in the EC aimed at saving 140 Mtoe by the year 2000 (coincidentally approximates the 1995 objective) would have beneficial effects on employment creation.

The current Community initiative aimed at creating an internal market by the year 1992 calls for a redoubling of our efforts to make European industry more efficient while at the same time using the industrial engine to create societal improvements. Energy efficiency, through its contribution to resource optimization, improved allocation of funds and increases in general disposable incomes, presents a real policy option to assist the achievement of the Community's 1992 objective. The achievement of an internal market would also be enhanced through a harmonisation of energy efficiency rules and norms, by removing technical barriers to the free circulation of energy efficient goods and by correcting anomalous fiscal treatment of energy efficiency investments.

## Environmental protection

The link between energy and environment is now well established. The energy transformation sector, the transport sector and indeed the building sector are major contributors to the production of 'greenhouse gases' and other pollutants. A Commission study examining the EC energy future<sup>7</sup> has estimated that while SO<sub>2</sub> and NO<sub>x</sub> emissions will be reduced by the year 2010, CO<sub>2</sub> emissions from energy use could increase in 2010 by 26% from 2.8 to 3.5 billion tonnes. Power generation (36%) and transport (22%) will represent about 60% of total CO<sub>2</sub> emissions. The study concluded that without a significant improvement in the Community's rational use of energy, sustained high economic growth in a clean environment is unlikely.

The Commission examines the link between energy and the environment in a recent Communication to EC Energy

Ministers<sup>8</sup>. The document is unequivocal in its support of energy efficiency as the primary mechanism to limit environmental damage caused by energy use and transformation processes. It points up energy efficiency as 'the cornerstone' of our future efforts to make the supply of energy services environment-friendly.

## What potential for EC energy efficiency?

At this juncture, we must ask ourselves whether the EC's 1995 objective was too ambitious or whether it could have been attained with a more sustained commitment to energy efficiency. Perhaps the following examples will permit us to answer this question.

- a) A study carried out for the Commission<sup>9</sup> estimates that energy savings of 20-50% could be made on specific domestic appliances if the current stock was replaced by the most efficient.
- b) Twenty electricity reduction projects carried out in the industrial sector in the United Kingdom between 1987 and 1989 showed that average energy savings in industry of 20% are possible from projects with a payback period of just over one year<sup>10</sup>. Since industrial electricity consumption in the twelve Member States accounts for some 140 million toe of primary energy annually, a 20% average saving would correspond to a saving of 28 million toe of primary energy a year cutting industry's costs by some 20 billion ECU<sup>11</sup> a year with corresponding beneficial impact on the environment from reduced emissions.
- c) Current research on transport indicates that improvements in vehicles and driver behaviour can lead to savings of 20% in the road haulage sector<sup>12</sup>. If this average 20% improvement in fuel use could be attained in the EC, it would reduce consumption in road haulage by 12 million tonnes of diesel per year.
- d) A Commission study<sup>13</sup> on the application of just one technique, third party financing, on a Community-wide basis indicates that this technique alone could achieve energy savings totalling 75 million toe (based on

<sup>8</sup> COM (89)369 final.

<sup>9</sup> The Potential for Energy Saving in the Applications of Electrical Energy, Fichtner, Stuttgart, June 1988.

<sup>10</sup> Electricity Savings in Industry - the Myth and the Reality, March Consulting Group, July 1989.

<sup>11</sup> Cost expressed in final user terms, i.e. electricity costs.

<sup>12</sup> Fuel Saving in Trucks through Aerodynamic Styling - Energy Efficiency Office, September 1988.

<sup>13</sup> I. Brown, Third Party Financing Opportunities for Energy Efficiency in the European Community, Kogan Page 1986.

<sup>5</sup> Least Cost Planning Experience in the US, Karen Anderson, IEA Workshop on Conservation Programmes for Electric Utilities, Paris 21-23 September 1988.

<sup>6</sup> Employment effects of energy conservation investments in EC countries, EUR 10199EN, September 1985.

<sup>7</sup> Major Themes in Energy, *Energy in Europe* Special Issue, September 1989.

projects with minimum investment of over 60 000 ECU and maximum payback three years) in the building and industry sectors alone.

The four examples above would seem to indicate that while the Council was not over-optimistic in assessing what could be achieved given the current soft energy market, the political will to attain the objective has been somewhat lacking.

Tapping this potential will, of course, require investment. For example, it has been calculated that in order to attain the 20% saving in electricity mentioned in b) above an investment of 40 billion ECU would be required. This corresponds to a two year payback period. This figure can be contrasted with the 200 billion ECU which would be required to build generation facilities to cover a 20% increase in supply.

## Specific actions for vigorous energy efficiency (SAVE)

### What is SAVE?

The Community already has in place several initiatives which will contribute to Europe's energy future. Both the Joule<sup>14</sup> and Thermie<sup>15</sup> programmes will ensure that the energy technologies of the future are researched, developed, demonstrated and diffused as widely as possible within the Community. By providing more options, these technologies will help to improve energy supply/demand mixes and therefore the Community's energy situation.

As already mentioned, the Member States and the Community, under the pressure of the oil crises, have pursued active energy efficiency programmes since 1974. But the impact of these programmes has been tailing off since 1985 due principally to the fall in energy prices and a certain degree of complacency with regard to energy efficiency efforts.

Pricing policy can undoubtedly be a driving force towards greater energy efficiency. Some Member States, such as Denmark, follow a policy of high energy taxation to keep prices stable while many others allow energy prices to fluctuate with market conditions. The Commission is currently studying, in depth, how energy pricing strategies reflect the real societal cost of energy and how energy taxation might better represent energy efficiency and environmental considerations. Armed with the results of this study, the Commission will make concrete proposals

regarding energy pricing within the Member States, taking into account energy supply, the environment and taxation. A further element of this proposal will be to eliminate the disparity in VAT rates which discriminates against energy efficiency.

In this context and independently of the result of these reflections on the price mechanism, the Commission considers it now opportune to promote a more vigorous energy efficiency policy. The Commission has therefore conceived SAVE as a five year Community programme whose objective is to promote a more active energy efficiency policy within the EC. SAVE will act as a catalyst for improvements in energy efficiency and will be based on the wealth of experience with various energy efficiency initiatives already existing within the EC. SAVE is a complementary action to the energy efficiency programmes already being undertaken by the Member States and its implementation should be seen as a reinforcement of national, regional and local energy efficiency efforts.

The very considerable EC energy efficiency potential represents an important and relatively untapped indigenous energy reserve i.e. the so-called fifth fuel. The exploitation of this reserve would have important consequences for the future energy security of the Community. To achieve maximum energy security of supply, Member States sometimes take extraordinary measures to maintain or develop indigenous energy resources. It is logical that they should extend the same level of sacrifice to the exploitation of the energy efficiency resource. With regard to the internal market objective, measures undertaken to improve energy efficiency should be viewed with the same open-mindedness as measures aimed at preserving the security of energy supply.

The SAVE programme includes various legal and administrative measures and support for the creation or expansion of structures within the Member States which will be required to enforce the programme.

SAVE will consist of three elements:

1. A comprehensive programme of legal and administrative measures aimed at creating a more positive environment for energy saving.
2. A support programme aimed at assisting the Member States in expanding or creating an energy saving infrastructure capable of enforcing measures adopted in the legal and administrative programme.
3. An information network which will comprise measures aimed at promoting a better coordination between national and Community energy efficiency activities through the establishment of appropriate information linkages and by evaluating the impact of various measures on different sectors.

<sup>14</sup> OJ C117 p18, 11.5.1989 final.

<sup>15</sup> COM(89) 121 final, 22.3.1989.

## Legal and administrative actions

The core of the SAVE programme will be a framework of regulations to create a positive attitude towards energy efficiency and bring about a climate in which energy efficiency investments will be stepped up. Included in the programme will be:

### Buildings

- A Recommendation<sup>16</sup> and two Directives<sup>17</sup>, have been adopted concerning the performance of heat generators for space heating and hot water production in non-industrial buildings. However, these measures were limited in scope (non-industrial buildings) and were based on the concept of 'justified economic performance'. In particular they did not specify minimum performance levels for heat generators. As a consequence, requirements laid down by Member States in applying these directives vary widely which presents a major difficulty in the achievement of an internal market in these products. The Commission will now propose a directive setting **minimum performance requirements for heat generators using either gas or liquid fuels**. This directive will relate to all non-industrial uses as well as to space heating and the provision of local hot water in industrial premises. The size to be covered by the directive will be the range between 10 and 400 KW.
- The building sector (housing and tertiary uses) is a major energy consuming sector in which there is little or no consumer information. The Commission in 1987 proposed a draft directive<sup>18</sup> on building certification which was considered inappropriate by the Council because of the difficulties in implementing it at national level. However, it should be noted that building certification generally operates in the consumer's interest by enhancing market transparency and consumer choice. It further contributes directly to economic development by improving the energy efficiency and comfort of the building stock, creating new commercial opportunities in labour-intensive sectors, and reducing environmental emissions. The Commission has plans for a directive on **energy certification of buildings** which will have the same objective as the draft directive but which will be much simpler both in concept and operation thereby creating fewer implementation difficulties in Member States.

- In some Member States heating charges are not based on heat metering but on measures other than actual energy consumption (e.g. forfeiture charges based on floor area or occupancy level). This is not a true indication to the consumer of his energy use and is not consistent with responsible energy consumption decision making. The Commission has launched a study to examine this situation and will present a **directive on calculation principles for heating charges in multi-occupancy buildings based on heat metering which will better reflect actual energy consumption**.
- The applicability of third party financing (TPF) for energy efficiency investments is already well established. The public sector with its substantial building stock represents an attractive market for TPF services. However, in many Member States public accounting rules militate against the use of the TPF mechanism in the public sector. The Commission will introduce a directive requiring Member States to **remove obstacles to the use of the third party financing (TPF) mechanism for energy efficiency investments in the public sector**.
- Energy utilities within the Community have a unique position in terms of closeness to the consumer, technical capacity and access to finance. In many Member States, they enjoy a monopoly position. To improve the efficiency of energy end-use utilities will need to become active in promoting energy efficiency. The Commission will introduce a directive requiring utilities to **offer a range of energy services (including third party financing) to their clients with a view to improving the efficiency of end use**. These services should be profitable in themselves and should not be related to tariff increases.
- Two Council Recommendations<sup>19</sup> have been adopted on building insulation. Also, most of the Member States have already set minimum levels of insulation permitted in new buildings. However, since the Community does not represent a homogeneous area in terms of climate, no EC-wide insulation standards have been set so far. A comparison of existing regulations for comparable climatic conditions shows a high degree of variation between Member States. In order to rationalise this situation, the Commission has launched a study which will examine the question of insulation standards with relation to established climatic zones within the Community. It will then introduce a directive stipulating **minimum insulation levels for new buildings for each of the defined climate zones**.

<sup>16</sup> 77/112/EEC published in OJ L 295/1, 18.11.77

<sup>17</sup> 78/170/EEC published in OJ L52/32, 23.2.78 and 82/885/EEC published in OJ L378/19, 31.12.82.

<sup>18</sup> COM(87)401 final, 9.9.1987

<sup>19</sup> 76/492/EEC of 4 May 1976 published in OJ L140/11, 28.5.76 and 79/167/CECA, EEC, EURATOM of 5 February 1979 published in OJ L37/25, 13.2.79.

within the Community. These minimum requirements will be based on common economical principles.

## Industry

- **Energy audits** are a prerequisite for any energy efficiency investment and are essential in establishing the potential energy savings and the viability of the corresponding investments. This is particularly true in the case of the industry and buildings sectors but could also apply to major fuel users in the transport sector, e.g. fleet operators. Short energy audits (usually lasting one day) for small and medium industries, the service sector and multi-occupancy buildings can stimulate a range of energy efficiency improvements which can substantially reduce energy consumption. The Commission intends to introduce a directive requiring significant energy users<sup>20</sup> to carry out a **tri-annual energy audit** (such a system is already in operation in Portugal and France)<sup>21</sup>. Enterprises should also be required to report annually on the actions taken as a result of the audit. This initiative will also aim at upgrading the position of the energy manager to ensure that he/she has a sufficiently strong profile within the firm to achieve potential energy savings.

## Transport

- A recent Commission Communication to the Council<sup>22</sup> suggested that urgent action to limit CO<sub>2</sub> emissions was needed and concluded that the Council should in particular consider, before the end of 1990, measures to limit CO<sub>2</sub> emissions from vehicles, by improving their energy efficiency, as announced in Directive 89/458/EEC<sup>23</sup>. The Commission is considering a **directive indicating minimum engine energy efficiency performance**. As an alternative or in addition, the Commission will also examine the prospects for a **directive establishing a fleet consumption limit for all automotive manufacturers**. Such a system already exists in the United States and consists of setting an upper consumption limit (measured in miles per gallon) for a fleet based on the weighted average of total sales.

## General

- In many Member States energy efficiency equipment (e.g. insulation) is rated at a high or the highest level for VAT while energy consumption attracts a lower VAT rating. For example in some Member States

electricity supply is zero rated for VAT while insulation draws the highest building rating of 17%. The Commission intends to carry out a study of this point with a view to introducing a directive requiring Member States to **remove inappropriate fiscal burdens from energy efficiency investments** so that national legislation reflects a balanced treatment between energy supply and energy demand reduction investments. This directive will also assist in the process of VAT rate harmonisation implicit in the 1992 single market exercise.

- Three separate measures will be undertaken in the domestic appliance sector:
  - a) A **customer information scheme** which would permit buyers of energy-using equipment to compare more effectively the energy performance of domestic appliances produced by different manufacturers. This scheme may involve the use of a standardized EC equipment label or product information sheet for domestic appliances giving clear and comparable energy consumption information.
  - b) A substantial level of energy efficiency improvement is possible in the domestic appliance sector. The Commission will seek to conclude a **voluntary energy efficiency improvement agreement with domestic appliance manufacturers** whereby the manufacturers would commit themselves to achieving a stated level of improved energy efficiency.
  - c) There is a wide variation in energy consumption of domestic appliances currently available on the European market. Significant energy savings could be attained if only the more efficient appliances were available. The Commission will consider (during the investigation of initiative b) above) the possible introduction of a **directive setting down minimum energy efficiency requirements for domestic appliances**.

These three initiatives would require the establishment of a back-up **monitoring** effort which would review the energy efficiencies of all domestic appliances and present the global information in a form which could be easily understood by the customer and consumer advisory agencies. Monitoring activities will be carried out by appropriate organisations or independent institutions in the Member States.

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<sup>20</sup> The level is currently being considered and will perhaps have as a lower boundary 1000 toe.

<sup>21</sup> Law of 5 July 1977 'relatif aux visites et examens approfondis périodique des installations consommateurs de l'énergie thermique'.

<sup>22</sup> SEC(90)496 final.

<sup>23</sup> OJ L226 of 3.8.1989, Article 6.

## Utilities

- In 1988, the Council issued a Recommendation on auto-production<sup>24</sup> which concentrated on improving the relationship between public utilities and auto-producers of electricity. The follow-up to this Recommendation is a report on the application of the Recommendation which will be sent to the Council at the end of 1991. If the report shows that there are still in some Member States commercial and structural obstacles to the development of combined heat and power or cogeneration, the Commission will, if necessary, draw up a directive requiring Member States to remove obstacles to combined heat and power installations.

To carry out the programme detailed above, the Commission will have to undertake a series of studies on the technical aspects of the proposed regulatory and administrative actions, e.g. building codes, obstacles to cogeneration, fiscal treatment of energy efficiency and studies in the transport sector taking into account current work in the Community R & D Framework Programme. The Commission will also avail itself of the results of pilot actions to be undertaken in the support programme (see below) in formulating future proposals.

## Improving Member State energy efficiency infrastructure

The Commission recognises that the Member States will require a substantial increase in certain facets of their national energy efficiency structures if the Community's legal and administrative programme is to be successful.

Some Member States (especially those who began energy efficiency programmes in the mid 1970's) already have in place a well established national energy efficiency structure while other Member States are at an earlier stage of development. The Commission intends, under SAVE, to assist the development of national energy efficiency structure through the following steps:

### 1. Education and training at regional level

Training in energy efficiency is an important activity which is not uniformly treated throughout the Community. A level of Community support will be necessary if a satisfactory situation in the Member States is to be attained. The Community intends to back a series of education and training schemes concentrated

specifically on energy audit personnel and on all those interested in improving the rational use of energy in industry, buildings and transport, e.g. energy managers, architects, transport companies, teachers, maintenance managers of hospitals and schools and public building managers<sup>25</sup>. This activity will include the preparation of teaching materials, e.g. books, videos etc. The cost will be borne equally by the Community, the Member States and the end-users.

### 2. Sectoral pilot actions

Pilot projects will be aimed at demonstrating the potential savings in various sectors from the use of specific initiatives. Community involvement in these initiatives will ensure that the results will be available to all Member States thereby ensuring maximum replication.

a) **Least cost planning or demand side management** has been applied successfully in North America as a mechanism for creating a competitive environment between energy supply and energy demand reduction projects. The concept is currently being studied by several EC utilities and the Commission has launched two pilot studies in this area. A major element of the sectoral activities will be a programme of 10-15 'least cost planning' pilot studies. These studies would establish the viability of the least cost planning technique in the European context while giving EC utilities 'hands-on' experience with the planning mechanism. Least cost planning is only possible where the utility has an integrated production/supply function. The application of this technique on a Community wide basis could have severe implications for the completion of the internal market exercise which aims to increase competition by permitting the free flow of energy.

b) **European Network for Third Party Financing**  
The Commission will set up a European Network for Third Party Financing which will include:

- setting up an **EC network of institutions** interested in the dissemination of information related to third party financed energy efficiency investments. The Commission will examine with this network how best to ensure the maximum publicity for the third party financing technique in the EC.

- a series of **third party financing (TPF)** 'demonstrations' in the public sector. Further TPF pilot actions in each energy consuming sector (industrial, multi-family residential, commercial

<sup>24</sup> Council Recommendation 88/611 EEC published in OJ L335 of 7.12.1988.

<sup>25</sup> In its Recommendation of 25 October 1977 (OJ L 295/3 of 18.11.77) the Council invited firms to appoint energy managers and to indicate in their annual reports their energy consumption.

and public sector buildings) would demonstrate to energy users both the financial soundness of the approach, and the ability of third party financing to make energy saving investments at no initial cost to the consumer.

- c) A further action would be the application of **targeting and monitoring** in specific industries and programmes for the instigation of 'best practice' within industries.
- d) Another element of the sectoral studies programme will be the promotion of **combined heat and power** as a proven technology which can greatly assist energy efficiency. This will encompass support for CHP feasibility studies in specific circumstances (hospitals, universities, etc). No financial assistance will be provided for investment but successful experiences will be publicised as widely as possible to maximise replication. This action could lead to a future regulatory proposal.
- e) The concept of 'road pricing', i.e. charging motorists for travelling in specified city zones, should be examined for its efficacy and applicability within Member States in concertation with current R & D efforts under the Drive<sup>26</sup> programme.

3. On 5 June 1989, the EC Energy Ministers approved the Community action programme for improving the efficiency of electricity use (Pace programme)<sup>27</sup>. The objectives of the programme are:

- to influence electricity consumers in using appliances and equipment with high electrical efficiency in the most efficient manner, and
- to encourage further improvements in the efficiency of electrical appliances and equipment and of electricity based processes.

Examples of schemes to be undertaken under this programme are the promotion of energy efficient lighting and the promotion of energy efficient motors. The total electricity end use action programme is currently being implemented and it is intended that it will become an integral part of SAVE once the latter has been approved.

The Community support programmes will be proposed and operated by competent bodies within individual Member States. Support requirements will vary from one Member State to another. However, experience with energy efficiency initiatives shows that results are particularly good if undertaken at regional level. The Commission's

aim is therefore to assist Member States in the regionalisation of energy efficiency efforts by placing the management and operation of support programmes under SAVE within the competence of regional organisations as well as national bodies with regional characteristics. Some Member States already have such regionally based national bodies (IDAE in Spain, the Energy Efficiency Office in the UK, AFME in France, ENEA in Italy etc.). There are also a number of regional authorities (RhoneAlp Energie, Ente Vasco de la Energia) who, although not nationally based, could assist in the SAVE programme. The Commission intends to take advantage of the unique experience of these bodies to maximise the impact of SAVE.

## Enhancing energy efficiency information exchange

The third element of SAVE, information exchange, will allow the actions of the individual Member States to be coordinated. It is vitally important that each Member State learns from the experience of others. The information mechanism will be formalised by tying together the national energy efficiency entities operating the programme into an information network whose activities may be summarised as follows:

- a) Conferences, symposia and seminars to discuss progress on SAVE initiatives in Member States.
- b) Assistance with the creation of new publicly available energy efficiency databases (if required).
- c) A bi-monthly newsletter describing SAVE activities and advising recipients on where energy efficiency databases and other sources of information can be consulted. The preparation of promotional material e.g. brochures, videos, books etc. on energy efficiency. These promotional materials will be disseminated as widely as possible through national channels and the Euroinfo system.
- d) Since the rational use of energy (and its consequent effects on security of energy supply and the environment) are global, an important element of SAVE will be the sharing of energy efficiency experiences between the Community and other countries. For example Eastern Europe, where there is a considerable potential for energy efficiency, might benefit greatly by being associated with many of the policy initiatives included under SAVE. This argument would also hold for developing countries. On the other hand Japan, the United States and Canada have already shown themselves to be highly innovative in producing energy efficiency initiatives

<sup>26</sup> OJ L 206/1 of 13.7.88 - see also the article in English on p.80 of *Energy in Europe* N° 16 and in Spanish in this issue.

<sup>27</sup> OJ No. L157 p.32 of 9 June 1989.

and an exchange of experience between the Community and these countries would prove mutually beneficial. The budget for this item will essentially cover training exercises, study trips and exchanges of experts<sup>28</sup>.

## How is the SAVE programme funded?

SAVE will cost 35 MECU (million European Currency Units) spread over its five year life. This budget is only indicative and will depend on the annual budgetary procedure and the EC's financial perspectives. The budget for 1991 is likely to be 4 MECU with approximately 11 ECU per annum required for the following four years.

The rough breakdown between the proposed activities is as follows:

Technical and other background studies needed in the formulation of the legal measures will account for approximately 10% of the budget, the support programme will account for 66%, the information network will account for 15%, and 9% of the budget will be accredited to operational expenses.

## How will SAVE operate?

The programme will be coordinated by the Commission on the following basis:

- A steering committee of national experts will assist the Commission in examining individual Member State's requests for support with a view to maximising the Community approach to the energy circumstances of a particular Member State;
- individual Member State annual support programmes will be submitted to the Commission for review and comment by the committee of experts under the chairmanship of the Commission;
- annual support programmes will be agreed with Member States and budgets allocated;
- the Member State bodies managing SAVE support schemes will submit an annual report on activities and expenditure;

- national efforts will be reviewed annually by the committee of experts with a view to establishing priorities;
- administration of the programme may require the occasional or full-time assistance of contract staff.

The Thermie programme will develop tools to promote the dissemination of new technologies. These tools will also be used to propagate the SAVE experience.

Conversely, activities promoting SAVE should also be used for technological dissemination under Thermie.

## What results do we expect from the Save programme?

If all the measures associated with SAVE, i.e. the legal programme, the support programme and the information programme, are fully implemented, it has been estimated that a total energy saving of about 105 Mtoe would be achieved. This figure corresponds to a reduction of 12.8% of primary energy consumption of Scenario I of the 2010 study. The corresponding reduction in CO<sub>2</sub> associated with this energy saving has been estimated at 200 million tonnes which corresponds to a reduction of 8.7% on the Scenario I estimates of the 2010 study.

## Conclusion

If current energy consumption and energy efficiency trends continue, there is no prospect of the Community achieving its 1995 energy efficiency objective of an improvement of 20% at least in the efficiency of final demand.

Failure to meet this objective will have grave consequences for energy supply, the environment and European competitiveness. The additional energy consumption (approximately 110 Mtoe) will cost the Community around 13 billion ECU (1988 money) which corresponds to 5% of annual capital investment in the Community<sup>29</sup>.

The damage caused to the environment by energy has focussed the attention of the public and the political establishment in the Member States on this sector. An active energy efficiency programme is universally recognised as a major element in abating the environmental damage caused by the energy sector.

<sup>28</sup> Third country experts, particularly from Eastern Europe or developing countries could be admitted to local training initiatives or may be the object of specially tailored training.

<sup>29</sup> op cit 3.

The efficient use of energy is a global issue which requires the highest level of cooperation between all energy using countries. The Community's efforts in improving energy efficiency will only attain their full potential if there is a high degree of cooperation between the EC and the global community. It is vitally important that successful energy efficiency initiatives should be researched and propagated as widely as possible in order to ensure the maximum protection for the environment and to optimise the use of our finite energy resources.

The case for the pursuit of a vigorous energy efficiency policy would appear to be overwhelming. However, while many Member States express their support for energy efficiency, they have been quietly dismantling their energy efficiency programmes and their national promotional organisations.

In order to redress this situation, the Commission is proposing the creation of a Community programme for specific actions for vigorous energy efficiency (SAVE) with a budget of 35 MECU during its five year life. This programme will attempt to reverse the current trend in complacency towards energy efficiency and re-invigorate national efforts through Community initiatives.

The SAVE programme is particularly important for social and regional development. Energy costs place an immense burden on both the state and the consumer within the EC. A vigorous energy efficiency programme, administered largely on a regional basis, would contribute, through reducing society and consumer costs, to the aims of social cohesion and regional development embodied in the Single European Act.



# First energy efficiency Directives under SAVE programme

- efficiency requirements for boilers
- a labelling scheme for household appliances
- energy certification of buildings
- heat metering in multi-occupancy buildings

by Mathew Kestner, DG XVII: New and renewable energies, rational use of energy unit (C2)

*These four Directives are the first to be proposed by the Commission under the SAVE programme. Two are harmonization Directives under the scope of Article 100A of the Treaty of Rome, the single market article. The other two come under the scope of Article 235. Three of them concern space and water heating, the other household appliances (white goods).*

*The proposed boilers Directive sets minimum efficiency standards, of 86% to 89% for the principal types of gas and oil fired boilers. At present efficiency requirements vary considerably from one Member State to another. If no Community action were taken less efficient boilers approved in a Member State with lower standards would be able to circulate freely throughout the Community, after the establishment of the single market in 1992. This could lead to a drop in the average efficiency of boilers and so of hot water and heating systems. This Directive will allow the Community to create a single market in boilers and ensure that efficiency standards are increased, resulting in a marked reduction in energy consumption, air pollution and CO<sub>2</sub> production.*

*The proposed energy labelling Directive will also cut energy consumption by promoting increased awareness of the energy consumption of household appliances, while avoiding the creation of any barriers to trade. It will encourage consumers to buy more energy-efficient appliances, which cost less to run and cause less pollution. Information on energy efficiency will be provided by a uniform Community energy label on appliances displayed to the consuming public, and a more detailed standard fiche which will be available in product brochures. This uniform scheme will replace existing and proposed national schemes, so encouraging the creation of a single market.*

*Like the 'boilers' Directive the 'energy certification' Directive relates to heating buildings. It will encourage the measurement of the 'standardized' energy consumption of a building, and provide hints on how to reduce this. This will both directly encourage owners to make energy saving investments that will save them money, and allow the energy running cost of a building to be reflected in the price or rent paid. This latter will encourage owners to invest in energy efficiency, even where they do not pay the heating bills.*

*The 'heat metering' Directive relates to blocks of flats, and other multi-occupancy buildings where heating and/or hot water is supplied to all from a common source. It will require heating bills to be divided between the occupiers on the basis of their measured consumption, and not, as often occurs now, on some other basis such as the floor area of the flat. This will give them an incentive to save energy, which at present is often lacking.*

## Introduction

Energy intensity in the Community, i.e. the ratio of final energy consumption to gross domestic product, improved by 20% between 1973 and 1982. In 1986 the Community adopted a target of a further 20% improvement of energy efficiency by 1995, and in October last year it agreed to stabilize CO<sub>2</sub> emission levels at 1990 levels by the year 2000, as described in the article on the SAVE programme in this issue. Achievement of these targets will require a number of specific measures to reduce Community energy demand. This article describes the first four proposals under the SAVE programme dealing with boilers, household appliances, energy certification and heat metering in buildings. From the point of view of energy consumption all three fall within the building sector (residential and commercial). This sector accounts for 41% of final Community energy consumption, some 289 million toe in 1987. It is an expanding sector with forecasts for 1995 reaching 310 or perhaps even 340 million toe.

## Boilers

Although there has been an improvement in energy efficiency in this sector, it has come mainly from changing behaviour, with individuals seeking to save energy. Recent studies indicate that these behavioural changes may have been reversed, and cannot be relied on for long term improvements in energy efficiency without the introduction of structural measures to reinforce energy saving behaviour.

A 1978 Directive (78/170/EEC) on 'the performance of heat generators for space heating and the production of hot water....' already exists. It was strengthened in 1982 (82/885/EEC). Under the 1978 Directive, Member States had to ensure that equipment would be subject to inspection when manufactured and would comply with minimum performance levels. The 1982 Directive laid down that these performance levels had to be 'economically justifiable' and extended the scope of the inspection to include installation.

The term 'economically justifiable' has been subject to extremely varied interpretation by Member States and transposition of the Directive into national law has resulted in differing requirements, as can be seen from graphs 1 and 2.

With the completion of the internal market, less efficient equipment could gain access to markets that are currently closed by measures laying down minimum performance

levels. This would result in a drop in energy efficiency levels in the Community.

This implies a need to introduce Community legislation laying down quantified minimum performance levels to be achieved by new hot water boilers placed on the market after 1 January 1993. However, boilers complying with national rules in force in their territory at the end of 1992 can be placed on the market, and put into service up until the end of 1995.

The boilers Directive covers most oil and gas fired boilers used to heat buildings, which account for 65% of oil and gas used in buildings. It excludes the smallest (under 10 kW) and the largest (over 400 kW), and a number of less common types of boilers that could not be included without first solving numerous technical problems.

## Minimum performance levels to be met

The useful efficiency of a boiler is expressed as the amount of heat transferred to the water as a percentage of the energy value of the fuel used in the boiler. For the purpose of this Directive this includes the energy used in pilot lights, but excludes electricity consumption for circulating pumps etc.

Technically the higher the output of the boiler the easier it is to obtain a given level of efficiency. Accordingly, when running the boiler at an average temperature of 70° C, the proposed Directive will require a minimum efficiency, which rises on a logarithmic scale, of:

- 86% for boilers of 10 kW
- 87% for boilers of 31.6 kW
- 88% for boilers of 100 kW
- 89% for boilers of 316 kW

For reasons of operational safety, small gas boilers (up to 31.6 kW) fitted with natural draught burners will be allowed with slightly lower efficiency levels.

Any heating system is designed to provide sufficient heat for even the coldest days. They thus operate for most of the time at a reduced load. This makes it important to maintain good performance levels at part load. In order to ensure this is achieved the Directive will require the following efficiency when the boiler is run at 30% load and an average water temperature of at least 50° C:

- 83% for a rated output of 10 kW
- 84.5% for a rated output of 31.6 kW
- 86% for a rated output of 100 kW
- 87.5% for a rated output of 316 kW

These figures are high but realistic. Requirements higher than these are already the subject of voluntary labels attributed to more than 100 boiler units from a number of Community and EFTA countries.

## Quality label

To encourage consumers to buy the more efficient boilers, the Directive provides for a star rating scheme, with boilers being given one star for every two percentage points they exceed the relevant minimum requirements at both full and partial loads.

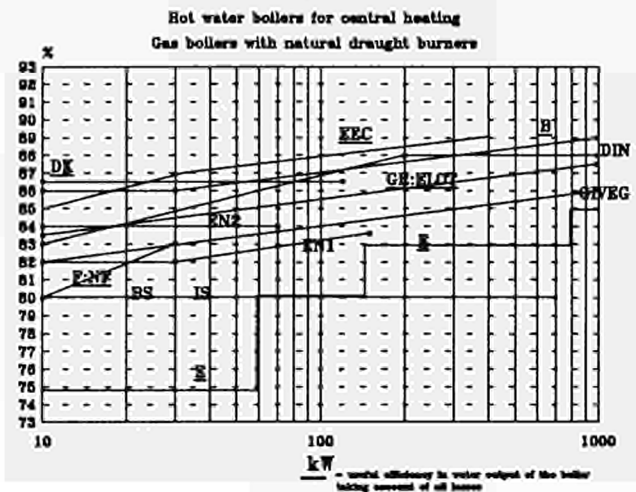
## Effect of the Directive

As central heating boilers last for 15 to 20 years, the Directive will take some time to take full effect. A study carried out by the Commission<sup>1</sup> estimated the reduction in oil and gas consumption that will result from this Directive, when the stock of boilers have been replaced after 15 or 20 years. This was put at 7.2% of the demand for these appliances. This represents about 1% of primary Community energy consumption, or 2.5% of final energy consumption in the building sector. By 2010<sup>2</sup>, when the Directive will be fully effective this will imply a primary energy saving of perhaps 11.2 mtoe a year.

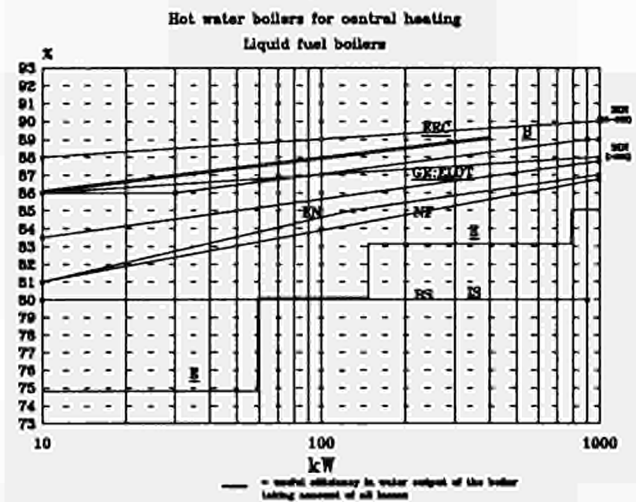
Lower consumption of energy will automatically mean lower CO<sub>2</sub> emissions. Thus the 11.2 mtoe reduction in energy demand in 2010 would imply a reduction of 26 million tonnes of CO<sub>2</sub> emissions in 2010.

The lower energy consumption will result in savings to users in the form of lower gas or oil bills. Given the volatility of oil prices it is not possible to estimate this saving with any accuracy, but at current prices it would be of the order of 1.500 million ECU per year. Against this must be set any increased cost of producing more efficient boilers. On the basis of modern manufacturing techniques this does not appear likely to be appreciable. It will in any case be many times smaller than the resulting cost savings.

Graph 1



Graph 2



The initials underlined indicate obligatory national standards; those not underlined, reference standards.

## Household appliances

The second Directive proposed by the Commission under the SAVE programme relates to household appliances such as refrigerators, washing machines etc. It seeks to persuade consumers to buy more energy efficient appliances by means of a comparative label and a more detailed fiche.

Like the boilers Directive it builds on a number of previous measures, both Community and national. In 1979 the Council passed a Directive (EEC N° 79/530) intended to introduce a Community-wide energy labelling scheme for most of the appliances to be covered by this Directive. Although the Commission brought forward proposals covering a number of appliances, differences over technical measurement standards meant that only that on electric ovens was approved (Directive EEC N° 79/531). This meant that interest in the scheme, and so its impact,

<sup>1</sup> BAT Report 01/89 'Effects of improved heat generator performance on the consumption of liquid and gaseous fuels'.

<sup>2</sup> Commission study: 'Major themes in energy', scenario 1.

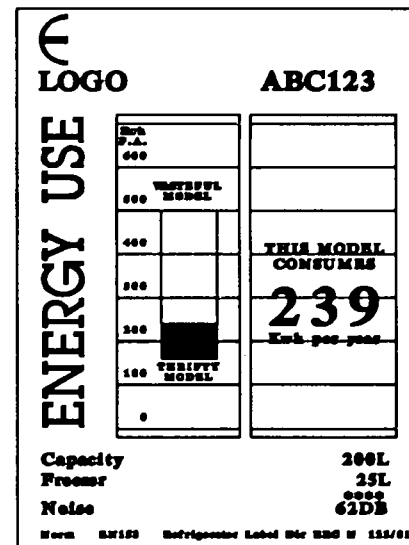
was low. Following this, a number of Member States took their own initiatives. Germany, for example, set up a voluntary scheme. This brought in labels, initially based on those in the previous Commission proposals as well as product information. France, on the other hand, introduced its own compulsory labels. More recently interest in energy labelling has been revived and a number of Member States including the Netherlands and the UK have been working on their own schemes, as has Denmark together with the other Nordic countries. The Commission was concerned that a variety of national schemes would create barriers to trade and cause confusion among consumers. Moreover some of the technical problems that caused difficulties in the past had been overcome. For all these reasons it decided to propose a harmonized Community labelling scheme.

### Labelling scheme

The purpose of the scheme is to inform potential purchasers of the energy consumption of the various appliances on offer, so they can take account of this and the resultant running costs, in deciding which appliances to buy. Various surveys have shown that the energy consumption of domestic appliances varies widely, and that at current levels of efficiency, there is no particular relationship between energy efficiency and price or performance. Thus if potential purchasers were aware of, and understood, the differences between appliances, they would tend to buy appliances which were more energy efficient, cost less to run, and caused less environmental damage. This would, through the normal competitive process, put considerable pressure on manufacturers to increase their efforts to produce more efficient appliances. At present few customers receive this information, so as a result most show no preference for energy-efficient appliances, and the market fails to encourage their manufacture. More information on the energy consumption of their appliances may also make consumers better aware of how energy consumption depends on the way they use them. This may indirectly lead to further reductions in energy consumption.

The current Commission proposal will remedy this lack of consumer information in two ways - a simple comparative label, and a more detailed information fiche. The principal element of the label will probably be a bar on which the relative energy efficiency of the appliance will be compared with an 'efficient', an 'inefficient' and an 'average' model. This will be supplemented by a very limited range of basic information, such as the energy and water consumption on a standard cycle, the noise level and perhaps a capacity figure. Figure 1 gives an idea of a possible label, based on a Dutch design, though the exact design has not yet been decided.

Figure 1



The Directive will require the label to be prominent whenever an appliance is displayed, thus it will be on view not only when an appliance is on sale in a shop, but also if it is displayed in a manufacturers showroom, or at a trade fair, etc.

The fiche will provide further detailed information. So for a washing machine this may include the consumption of energy and water for various wash cycles, plus information on the capacity. It may also give indications of annual consumption for various typical usage patterns. The Directive will require manufacturers to supply the fiche as part of any product brochures, or other literature they supply. The information fiches will also provide standardized information for groups, such as consumer organizations, retailers etc., who want to produce tables, comparing the energy efficiency of the appliances on the market. A number of Member States already produce such comparisons, and others are keen to encourage them.

The reason for having two ways of providing the information is to cater for a variety of approaches to buying household appliances. Some customers, particularly those replacing worn-out appliances, will make a rapid choice without analyzing in any detail the relative technical merits of the competing appliances. The only hope of influencing this type of consumer is to present them with a simple, eye catching label that will allow a rapid and clear comparison of the relative efficiency of the appliances on offer. Other customers will take longer to make their choice taking time to compare the relative merits of each appliance and relate this to their personal requirements. The fiche is intended to help the latter type of customer, who will also be interested in any comparative tables.

## Impact of labelling scheme

It is difficult to assess the likely impact of this labelling and information scheme on the energy efficiency of appliances. However the benefits clearly outweigh the costs. Taking refrigerators as an example, the average lifetime savings from the purchase of a more energy-efficient machine could be over 100 ECU. Allowing for the fact that many purchasers will simply ignore the energy information, the average saving per appliance sold could be of the order of 25-50 ECU. This compares with the cost of the labelling scheme, printing of labels, testing appliances, etc., that is estimated at well under 1 ECU per appliance sold!

More than a quarter of the over 200 Twh/year of electricity and of the smaller amounts of other forms of energy, consumed by appliances covered by this Directive could probably be saved in ways that would actually save money, i.e. where the extra capital costs would be paid for by the energy savings. Clearly this potential saving will not be achieved by labelling alone. Experience in the US indicates that labelling and information schemes work best when combined with other measures, such as minimum efficiency standards (which may be either voluntary or compulsory) or fiscal measures.

This is why the SAVE programme provides for the introduction of either voluntary or compulsory minimum efficiency standards and preliminary discussions with manufacturers have already started. Taken together, the measures relating to household appliances should result in savings of primary energy consumption of around 12 mtoe by the year 2010. This would imply a reduction in CO<sub>2</sub> emission of about 25 million tonnes in 2010.

## Energy certification of buildings

This third SAVE Directive, soon to be proposed by the Commission aims, like the appliance labelling directive, to offset the failure of the market in energy efficiency improvement by providing consumers with information about the energy efficiency of their potential purchases. In this case the purchases concerned are buildings. It seeks to promote investment in improved energy efficiency of buildings by encouraging the production of an 'energy certificate' when buildings are sold, or at other appropriate times.

Like the boilers and household appliance labelling proposals, this draft Directive builds on previous experience both at Community and national levels. To date only one Member State, Denmark, has compulsory certification. Several others have voluntary schemes with a

variety of State support. For example, France allows the cost of doing the surveys to be partially set off against income tax. The UK even has two rival national schemes! A previous Commission proposal called for a full 'energy audit' whenever an 'old' building was sold or let. This was not considered appropriate by the Member States which felt that the cost of preparing a detailed analysis of the costs and benefits of a large number of energy saving options would often be wasted if the options were not appropriate to the new owner of a building.

## The energy certification Directive

The current proposal calls on Member States to encourage the energy certification and the efficiency diagnosis of buildings. Member States are allowed a number of choices as to how they will encourage this certification. For privately owned buildings they may choose one of three options:

- require the certification of all buildings offered for sale, and after a transitional period of five years all buildings offered for rent;
- pay for at least half the cost of carrying out energy certification and efficiency diagnosis. Subsidised certificates and diagnoses must then be shown to potential purchasers or tenants;
- they may take any other measures, provided that these result in an annual number of certifications that is at least equal to half the number of property transactions.

They must also ensure that each year at least 5% of publicly owned buildings receive an energy certificate. In doing this priority must be given to public sector housing, all of which must be certified within 10 years.

While the exact form of the energy certificate is left to Member States to choose, it must consist of three elements:

- some simple indication of the overall performance of the building, which allows the general public to compare its performance with some general scale. This might consist of a star rating system, or a comparison of the energy use in the building with current building standards;
- some more technical 'intermediate' parameters which will allow building professionals to calculate the benefits of any proposed improvements;
- basic indications of how the building might be improved.

Under the Directive, 'energy diagnoses' may also include far more detailed information on possible improvements, their cost and benefits. They must be carried out by appropriately qualified energy experts.

## Impact of the certification Directive

The Directive can be expected to increase energy efficiency investments in two ways. First, those who receive a certificate can see that certain efficiency investments offer a good return, and so may make them. Second, by providing a reliable guide to the cost of heating a building, it will allow prospective purchasers and tenants to take this into account on their offers. This will provide an incentive to invest in energy saving to those, such as landlords, who do not pay heating bills.

The average building owner will find energy certification a profitable investment. For an average sized house the certificate may cost about 150 ECU. Something over half of new building owners will spend on average 350 ECU on energy saving measures. This will result in a saving of 10-15% of their heating bills. This should result in an overall saving of about 5 mtoe a year by 2010 which would imply a reduction in CO<sub>2</sub> emissions of about 15 million tonnes a year.

## Heat metering in multi-occupancy buildings

This fourth SAVE Directive relates to the division of heating and hot water charges between occupiers of blocks of flats or other multi-occupancy buildings. It will ensure that payments are related to individual use when a number of users are supplied with heating and hot water from a common source.

As with the other measures, this Directive builds on a number of existing Community and national initiatives. Council Recommendations in 1976 and 1977, and Resolutions in 1980 and 1985, sought to encourage the development of individual heat metering systems. Two Member States, France and Germany, have already made metering compulsory, while Spain has taken some preparatory measures.

## Heat metering Directive

The proposal deals with 'multi-occupancy' buildings, where heating, hot water or air conditioning is supplied from a collective source. Thus it deals with not only blocks

of flats, but also office blocks, shopping centres and the like. Under the proposal, each units' use of the relevant services is to be measured, either by the direct use of meters, or in the case of heating and air conditioning, which would otherwise require expensive integrating meters, by indirect means. The results of this metering must then be used to apportion between 50% and 70% of the costs involved.

Buildings where the cost of metering would be too expensive (over 15% of the annual heating bill) or where individual adjustment of the heating or cooling is impossible, are excluded.

## Impact of heat metering Directive

Of the roughly 60 million flats in the Community, about three quarters are heated collectively. If those flats in warmer areas where the cost of metering would exceed the savings are excluded, this leaves something like 35 million flats consuming around 27.5 mtoe a year. Experience from existing flats where metering has been introduced suggests that it leads to savings of 15-20%. If one excludes flats which are already metered, this implies that metering of flats will result in savings of around 2 mtoe a year. This would imply savings in CO<sub>2</sub> emissions of about 11 million tonnes a year by 2010.

## Further SAVE Directives

In addition to the four Directives already under way, the Commission intends to put forward two further SAVE Directives by the end of this year on 'third party financing' and 'energy audits/energy managers'. It is estimated that these Directives should result in primary energy savings of about 36 mtoe a year by 2010, which could reduce CO<sub>2</sub> emissions by as much as 64 million tonnes a year. A brief description of these Directives is included in the SAVE article in this edition.

## Conclusions

The four Directives described in detail in this article relate to some of the most important areas in which the Community can save energy. Taken together they should result in primary energy savings of about 30 mtoe a year by 2010 or about 2% of Community energy consumption under scenario 1 estimates in the 2010 study. If this is added to the savings flowing from the other four SAVE measures which the Commission intends to propose by the

end of the year, a total of 60-70 mtoe a year could eventually be saved. These projections show that, with a series of relatively painless measures, it is possible to

achieve a significant contribution to the reduction of costs, pollution, and greenhouse gas emissions resulting from energy use.

# Least-cost planning for Schleswig-Holstein

by Andreas Jahn, InnoTec Systemanalyse Berlin and Holger Krawinkel, Ministry of Health, Social Affairs and Energy of the Land of Schleswig-Holstein

*Energy experts met to discuss the first experiences with European least-cost planning projects in Kiel on 4 March 1991. The participants, mainly from Northern Europe, reviewed the interim results of a least-cost planning project co-financed by the EC Commission in the German Land of Schleswig-Holstein. They concluded that there are no longer any substantial reservations about making greater use of the least-cost planning instrument - already in use for many years in the USA - in pilot projects in Europe. The need for demand-oriented measures in the energy sector is equally apparent in both continents. The main results are set out below.*

Least-cost planning is the integrated planning of electric power generation and use with the aim of minimising the social costs of producing useful energy (see Fig. 1). Least-cost planning aids the efforts of energy supervisory bodies to provide reliable low-cost energy service packages for both supply and demand-oriented measures on the market.

Evaluation of case studies of least-cost planning in the USA shows it has resulted in an overall reduction of energy costs for most consumer groups, a reduced requirement for additional building capacity in power stations, redirection of the saved energy costs to other areas of the regional economy and limitation or reduction of the emissions caused by energy conversion. The US experiences are in line with the aims of the Land Government of Schleswig-Holstein.

To carry out least-cost planning in Schleswig-Holstein, a user-friendly computer model has been developed which processes all the required data. The measures with their technical savings potentials (in GWh/a) and their specific savings costs (in DM/saved kWh) are input into this computer model. After the measures have been graded according to their individual economic efficiency and compared with the corresponding tariffs, the minimum overall power supply costs for Schleswig-Holstein are calculated. In addition, external effects in the form of environmental damage and a surcharge for exploiting non-renewable energy sources are taken into account.

By technical measures in the households sector (see Fig. 2) savings of 32% of present consumption, or 1.252 GWh/a, can be economically justified. Energy-saving measures in

the case of household appliances which have particularly low specific energy-saving costs include washing machines (0.015 DM/kWh), dishwashers (0.018 DM/kWh) and fridge-freezers (0.038 DM/kWh). The largest technical and economic energy-saving potentials are in freezers (243 GWh/a), refrigerators (206 GWh/a) and night storage heaters (169 GWh/a).

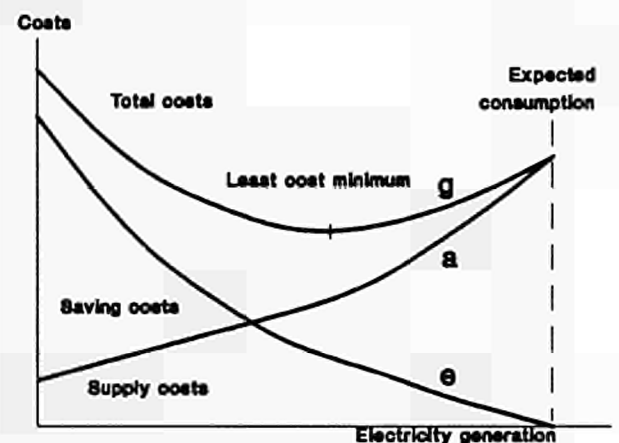


Fig. 1: The least-cost planning principle

Economic measures in the case of small consumers and industry save considerably less than in the households sector, but nevertheless produce additional savings of 702 GWh/a and 586 GWh/a respectively, or 21% and 18% of present consumption in each case. In the small consumers sector there is above all a fairly large economic savings potential in business (562 GWh/a). Since the electricity costs of 0.222 DM/kWh in the small consumers sector are similar to those for households, energy-saving



measures are usually economically desirable. In industry, the largest economic savings potential is in the chemical industry (55 GWh/a). Related to individual technologies, the economic savings potential lies mainly in new engines (97 GWh/a) and efficient lighting (73 GWh/a). The specific energy-saving costs are as high as those in other sectors, but profitability thresholds are very high with payback periods of less than three years.

### Energy saving measures

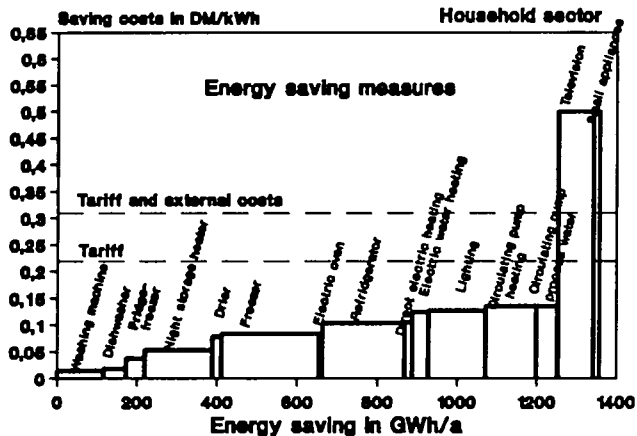


Fig. 2: Technical measures for energy-saving in the household sector in Schleswig-Holstein compared with tariffs and external costs

With these measures, a total of 2 540 GWh/a can be saved in Schleswig-Holstein, corresponding to a value of 483 million DM/a for the consumer. The costs for carrying out the measures are about DM 1 610 million nonrecurring or by the annuity method they amount to 180 million DM/a for 7% real interest and an average technical lifetime of 15 years. This means a profit to the national economy of 303 million DM/a. With Schleswig-Holstein's expected power consumption of 12 700 GWh/a for 1995, the economic saving potential shown here is around 20% of the Land's future electricity demand. The technical savings potential is even substantially higher and its achievement using the DM 303 million saved annually would involve no increase in the present total investment on energy-saving measures (see Fig. 3).

The reason why the American supply industry adopted least-cost planning was that the high costs of additional buildings were straining the financial limits of the power supply firms. The costs for each kilowatt-hour generated by additional building were considerably higher than the revenue expected from sales. Future supply meanwhile, was assured with relatively little expenditure for the supply industry on the co-financing of electricity-saving measures.

In Schleswig-Holstein, on the other hand, with least-cost planning a small energy saving of 10 648 GWh/a can be made compared with present electricity consumption for 1989. In the short term, however, on account of the low

variability of the cost situation in the power supply firms this saving in electricity will lead only to relatively small fuel cost savings of about 0.04 to 0.08 DM/kWh. So, for purely business considerations, the supply industry can have only a limited interest in achieving energy savings. Only if relatively high capital investments for replacements could be made unnecessary by achieving low current consumption would a reduction of power consumption be of commercial interest to the supply industry.

Least-cost planning is compatible with the energy supervision and competition laws (Power Industry Law, Law Against Restraints of Competition) of Schleswig-Holstein. It honours in particular the principle of fairness and the public interest principle of the Power Industry Law. Fairness is taken into account in relation to useful energy and the public interest by way of the external costs. Only if the size of possible energy-saving costs borne by the power supply firms were to lead to a considerable increase in charges would any objections supported by energy and competition law arise against passing on the energy saving costs to the final consumer. These objections in turn would have to be weighed against the obligation to maintain the natural foundations of the Land Constitution of Schleswig-Holstein. Finally it is recommended to gradually institutionalise least-cost planning as part of energy supervision. The power supply firms can then add the costs of energy-saving measures on to tariffs.

One saving potential that can be realised is in the technical and economic potential (in GWh/a) and the market penetration (in %). There are various instruments available for improving market penetration. The technical measures can be put into effect only by a combination of informal, financial, organisational and standardising instruments.

Depending on the type of measures in question, general improvement of the information supplied to consumers, financial assistance for purchasing energy-saving appliances and more stringent standards and laws are identified as effective implementing instruments for the households sector. In the small consumers sector the public authorities themselves are able to reduce future energy costs below economic criteria even by their own investments in energy-saving technologies.

In industry, where energy-saving investments often come to grief on high profitability thresholds, apart from consultation it is above all organisational instruments like energy agencies and indemnity bonds that are appropriate and necessary for implementing the measures. Owing to the easier market access to customers, those power supply firms that can broaden their scope to function as electricity service companies will have a special strategic importance in the implementation of the measures.

Owing to the situation prevailing in the Land of Schleswig-Holstein, least-cost planning there will not - contrary to

American experience - be the exclusive preserve of the power supply firms but will also be carried out by other actors. The main actors in implementing the results of least-cost planning differ from one sector to another, the reason for this being the lack of positive interest so far shown by the supply industry in lower energy consumption.

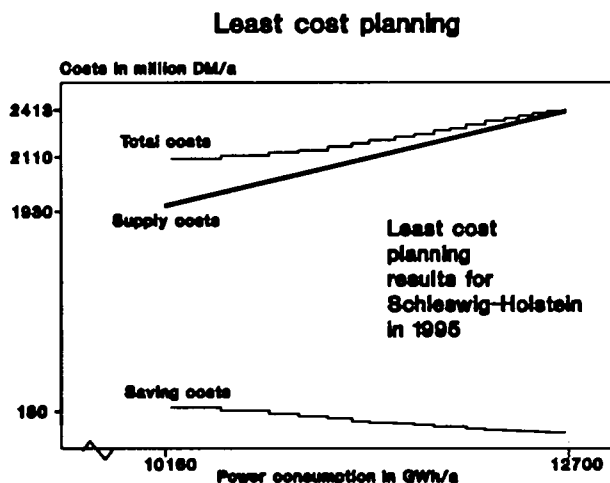


Fig. 3: Least-cost planning result for all measures in all sectors in Schleswig-Holstein up to 1995

In the industry and private services sectors, for example, the users themselves, energy agencies and energy consultants will assume a significant role as actors. In the least-cost planning context the power supply firms will then specialize in the use of combined heat and power

systems in these sectors and in providing information and financial support for energy-saving measures in the household sector. In this sector, too, the manufacturers and producers of electrically-operated series appliances will be important actors in quickly and effectively reaching the energy-saving objective. Only when the German electricity supply firms themselves see a new market opportunity in the area of electricity demand (like in the USA) will they also become an important actor in least-cost planning. Otherwise this economically interesting task will no doubt be taken over by other operators on the market.

It is certainly possible to apply American experience with least-cost planning to European conditions. Structural differences between the regions call for differences of emphasis in least-cost planning, but the basic idea is right and necessary for the conversion of electricity supply firms into energy service companies in accordance with regional energy saving objectives. It does, however, require considerable experience on the part of energy supervisory bodies to carry out energy-saving programmes based on least-cost planning and to assess the effects of the individual implementing instruments. The prerequisite for what will ultimately be widespread application of least-cost planning within the European Community is a methods and data manual compiled from American and European experience together with a user-friendly computer model. With these, it will be possible to gain additional experience in other regions so that the rapid implementation of economic energy-saving measures in the market is considerably improved.

# OPETs: organisations for the promotion of energy technology

by Michael Gowen, DG XVII: Energy technology; strategy, dissemination, evaluation unit (D1)

*Over the past 15 years the European Community has spent a billion and a half ECUs in supporting the demonstration and implementation of innovative energy technologies. Many new technologies have come into being as a result of this support, but it has become increasingly apparent that efforts to demonstrate new energy technologies are not in themselves adequate unless accompanied by positive steps to promote these technologies. In short, experience shows that new and more efficient energy technologies do not automatically penetrate the market, and that particular difficulties can be encountered in getting them to cross national boundaries.*

This is one of the reasons why in June 1990 the Community adopted the new **Thermie programme** for the promotion of European energy technologies<sup>1</sup>. An important part of Thermie is its **associated measures for the promotion of innovative energy technologies**<sup>2</sup>, both those which have arisen from Community programmes and those developed by other means, either through national government programmes or commercially without any public support.

The associated measures cover the following areas:

- evaluation of the market potential for energy technology
- project monitoring and evaluation
- dissemination of information on energy technology promotion and results of projects (by means, for example, of databases, seminars, conferences, exhibitions, documentary material, videos)
- collaborative assistance from appropriate national regional or local organisations
- industrial cooperation with non-Community countries.

Obviously the Commission could not carry out a comprehensive programme of associated measures entirely

on its own. Furthermore, the EC's principle of subsidiarity dictates that activities should be carried out at the appropriate level (Community, national, regional or local). Therefore, in July 1990 the Commission published an open call for tender in the Official Journal, inviting responses from organisations capable of assisting with promotional activities. On the basis of the replies received, 33 organisations have been selected and designated as **Organisations for the Promotion of Energy Technology (OPETs)**; two further OPETs were subsequently designated in the territory of the former German Democratic Republic (*see list overleaf*).

This network of OPETs embraces a wide variety of organisations from every country in the Community (except Luxembourg, from which no reply to the call for tender was received), and gives the Commission access to over 2,000 experts in energy and related fields - a complete list of them is set out below. Most of the OPETs were already active in technology promotion within their own spheres, and their designation as OPETs allows them to add a European dimension to their activities.

Seventeen of the OPETs are publicly funded bodies and 18 are from the private sector. 12 are operating as OPETs on a national level, 14 at regional level, and nine throughout the whole Community (in relation to particular sectors).

Their areas of responsibility cover the four fields of application defined in the Thermie programme:

<sup>1</sup> The Regulation governing Thermie is Council Regulation (EEC) No 2008/90, OJ L185 of 17.7.90. See also the article on p.87 of 'Energy in Europe' No 16 for a description of the Thermie programme (and in French at the end of this issue).

<sup>2</sup> Article 5 and Annex V of the Thermie Regulation.

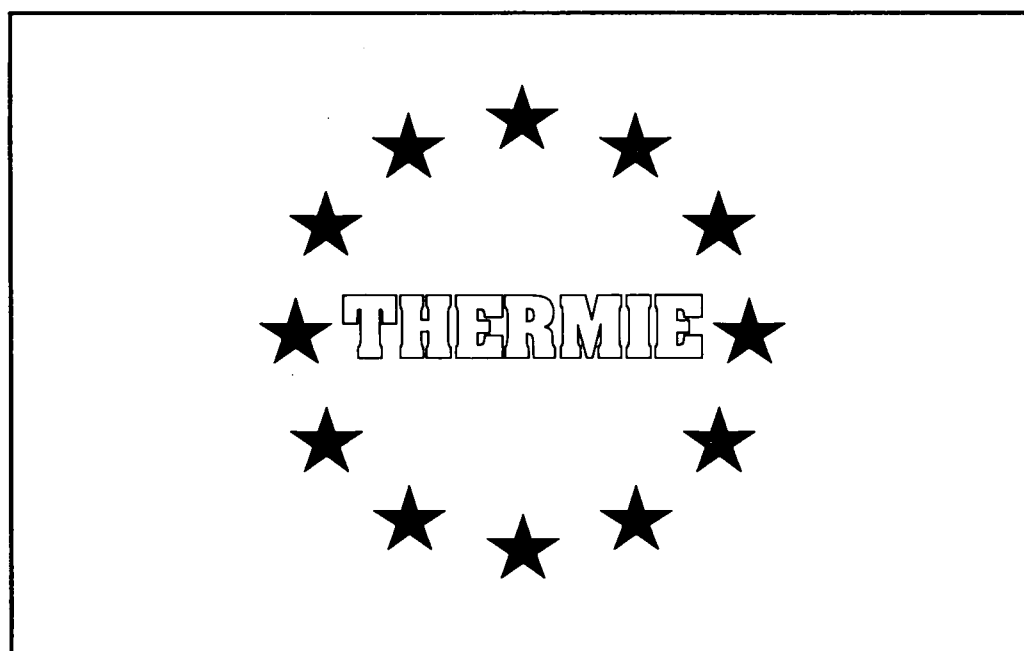
- 33 have responsibilities in relation to the rational use of energy
- 30 are working with renewable energy sources
- 12 are involved with solid fuels
- seven are working in the rather more specialised hydrocarbons sector.

The EC regulation governing the Thermie programme specifies that 10-15% of its budget will fund associated measures. Thus, around 20 million ECU will be available for promotion under the 1991 Thermie budget, and a substantial proportion of this will be disbursed through the OPET network.

Initial contracts have been signed with the OPETs, under which they made available about 500 man-months of expertise during the first six months of 1991. After this they will work on the basis of annual work programmes agreed with the Commission, which will take into account the evolution of the energy technology promotion programme. Steps have been taken to ensure that the activities are properly coordinated, and meetings of all the

OPETs will be held twice a year in Brussels, to assess progress and to plan future strategy. The aim is not to create a 'bicycle wheel' type of network, with the Commission at the hub and all links going out from it. Rather, as the programme develops, it is anticipated that stronger and stronger links will be forged between the OPETs themselves and that a genuine, effective, mutually supportive network will be established.

Now that the Community network of OPETs is operational, the task is in hand of extending the range of OPET activities outside the Community. This extension fulfils the requirement of the Thermie regulation for industrial cooperation with third countries. Wherever possible, the expertise of the Community OPETs will be used, in collaboration with appropriate organisations in non-EC countries, but in some situations the creation of a new body will be necessary. Initial target areas for this activity are Japan, USA, Central/Eastern Europe, Scandinavia and Southern Europe. It is hoped that technology promotion activities will have been launched in around 10 of these countries by the end of 1991.



## Organisations for the promotion of energy technology

Energium 2000  
Brussels, Belgium

Institut Wallon  
Namur, Belgium

TOP E European Economic Interest Group  
Brussels, Belgium

Vlaamse Vereniging voor Energie- en Milieutechnologie (ENERGIK)  
Antwerpen, Belgium

Danish Energy Centre (Energistyrelsen)  
Kobenhavn, Denmark

Consortium EAB/TUB/ERIL  
Berlin, Germany

Fachinformationszentrum  
Karlsruhe, Germany

GOPA Consultants  
Bad Homburg, Germany

ICEU  
Leipzig, Germany

Land Brandenburg, Ministerium für Wirtschaft, Mittelstand und Technologie Abteilung Energiepolitik und Bergwesen, Potsdam, Germany

TÜV Rheinland  
Köln, Germany

Zweckverband regionale Entwicklung und Energie (Zr-E)  
Regensburg, Germany

Centre for Renewable Energy Sources (CRES)  
Koropi, Greece

LDK Consultants  
Athens, Greece

Asociacion Gestora para la Investigacion y Desarrollo Tecnológico del Carbon (OCICARBON)  
Madrid, Spain

Ente Vasco de la Energia (EVE)  
Bilbao, Spain

Generalitat de Catalunya - Departamento de Industria y Energia  
Barcelona, Spain

Instituto Para la Diversificacion y Ahorro de la Energia (IDAE)  
Madrid, Spain

Instituto per la Promoció d'Energies Alternatives i Estalvi Energètic (IPEAE)  
Valencia, Spain

Agence Française pour la Maîtrise de l'Energie (AFME)  
Paris, France

Agence Poitou Charentes Energie  
Poitiers, France

ARE Nord-Pas de Calais  
Lille, France

EUROPLAN Consultants  
Valbonne, France

Rhonealpennergie  
Lyon, France

EOLAS - The Irish Science and Technology Agency  
Dublin, Ireland

University College of Dublin Energy Research Group  
Dublin, Ireland

Agenzia per lo Sviluppo Tecnologico dell'Emilia-Romagna (ASTER)  
Bologna, Italy

Federazione delle Associazioni Scientifiche e Tecniche (FAST)  
Milano, Italy

Istituto Cooperativo per l'Innovazione (ICIE)  
Roma, Italy

NOVEM - The Netherlands Agency for Energy and the Environment  
Sittard, Netherlands

Consortium CCE/CEEETA/CBE  
Amadora, Portugal

Building Research Establishment (BRECSU)  
Watford, England

Energy Technology Support Unit (ETSU)  
Harwell, England

Petroleum Science and Technology Institute  
Edinburgh, Scotland

Technology Training Partnership (Scotland)  
Glasgow, Scotland

# First round of financial support for Thermie projects

by Michael Gowen, DG XVII: Energy technology; strategy, dissemination, evaluation unit

The first round of financial support for projects submitted under the European Community's Thermie programme for the promotion of energy technologies<sup>1</sup> has now been announced. Projects from the following areas have been selected for awards under the 1990 Thermie budget.

	No of projects	Financial support (MECU)	% of total
<b>Rational use of energy</b>	39	18.7	41.6%
Buildings	11	2.7	6.0%
Industry	26	15.0	33.4%
Transport	2	1.0	2.2%
<b>Renewable energy sources</b>	27	6.6	14.7%
Solar energy	19	3.6	8.0%
Biomass & waste	5	2.4	5.4%
Wind energy	3	0.6	1.3%
<b>Solid fuels</b>	3	9.6	21.4%
<b>Hydrocarbons</b>	16	10.0	22.3%
<b>Total</b>	85	44.9	100%

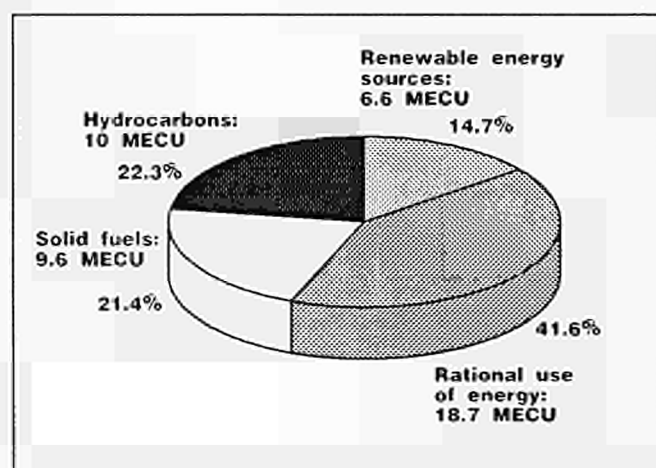
Financial support from the Community is offered to projects up to a maximum level of 40% for innovatory projects, which implement new energy technologies for the first time. A maximum of 35% funding is available for dissemination projects, promoting new technologies which have already been applied once but which have not yet penetrated the market. In this first round of awards, funding has been offered to 63 innovatory and 22 dissemination projects.

Thermie is a new five-year programme, designed to run from 1990-94. The budget for this, its first year of operation was substantially smaller than is anticipated for future years, and so the call for proposals upon which this

decision is based was somewhat limited and the number of proposals received was much fewer than will be the case in future years. It is this which explains the division of the support between the various sectors: a limited number of suitable proposals was received for some sectors (particularly the renewable energy sources), and these percentages should not in any way be seen as representative of the Commission's future priorities for Thermie.

A second call for proposals, with regard to the 1991 Thermie budget (125 million ECU), closed on 7 January 1991. The 518 proposals received in response to this are now being evaluated. An additional special allocation of 10 million ECU has been made available from the Community's 1991 budget for projects in the former East Germany, and arrangements are being made in relation to this.

Finally, a third call for proposals is being launched in July 1991, in relation to the 1992 Thermie budget. The Commission wants proposals to be submitted by 31 October 1991<sup>2</sup>.



Distribution of financial support for 1991 Thermie projects

<sup>1</sup> See Regulation (EEC) No 2008/90, OJ L185 of 17.7.90 and the article on p.87 of 'Energy in Europe' No 16 and in French at the end of this issue).

<sup>2</sup> Details of this may be obtained by making a written request to : Commission of the European Communities, DG XVII - Thermie, 200 rue de la Loi, B-1049 Bruxelles. Fax : +32.2.235.01.50.

# Regional and urban energy planning in the EC

## EC moves to promote studies

DG XVII: Task Force on Community integration; accompanying measures unit (TF2)

*Upheavals in the energy markets of the 1970s and their negative consequences on economic development made numerous countries and regions of the Community aware of the need to restructure their energy consumption.*

*However, this desire to implement new energy policies quickly ran into major obstacles: a shortage of sufficiently detailed and reliable information on demand and energy conservation, a lack of methods and tools for analyzing and forecasting future development, insufficient contacts at technical level and a general absence of confidence among all parties involved.*

*The need for Community action on energy planning has become obvious, as has the importance of exchanging regional experiences at Community level. For this reason the Community has co-financed studies carried out at regional and local levels since 1982.*

### Objectives

The field of regional or local energy planning can be defined as follows: the systematic collection, assessment and use of socio-economic and technological data in energy and energy-related areas, carried out at sub-national level. The intention is to prepare action plans, whilst taking account of the directions of energy policy.

The main goal has been to improve the management of demand by promoting energy efficiency and more extensive use of locally available resources.

This objective can be reached:

- by promoting and organizing the exchange of experience between regional and local authorities, official institutions and bodies and experts involved in energy programming;
- by promoting new studies throughout the Community in a more systematic manner.

### Framework

Regional energy planning must fit into a framework coherent with the general objectives of Community policy. In particular, it must contribute to the achievement of the Community's energy policy in the areas of rational energy use and the exploitation of new and renewable local sources.

Finally, regional energy planning provides energy policy with a socio-economic dimension, an element which is implicitly included in the Community's energy objectives established for 1995. This facilitates evaluation of the extent to which energy is a determining factor in the overall development of a region.

The emphasis placed on the socio-economic dimension responds to another key objective of the Single European Act; the strengthening of economic and social cohesion and EC integration.

The Community's activity in the area of regional energy planning is thus fully justified in the light of the challenge of the internal market, while integrating perfectly into accompanying policies aimed at narrowing socio-economic gaps between Community regions.

## Scope of the action

The 'regions' which come under the scope of the present Community scheme are estimated to cover:

- more than 20% of the Community's population
- about 25% of its surface
- and 25% of its total energy consumption.

Since 1989, particular attention has been paid to the problems of the interaction between energy and the environment at urban level.

The contents relate principally to the analysis and forecasting of needs, energy supply and demand, the problems of energy management and substitution, the assessment of potential sources of renewable energy and the interaction between energy and the environment.

## Procedures

Specific procedures calling for energy planning proposals are published in the EC's Official Journal. Publication, which is generally at the beginning of the year, lays down the points required for a proposal to be accepted, namely:

- The general objectives of planning, as described above, are underlined along with potential changes and developments. For example, in addition to energy management the accent is now being placed on the environmental effects of energy consumption.
- Secondly, the areas covered and the respective priorities are clearly indicated. To date, for example, three types of study project have been accepted: regional energy plans (priority given to frontier, outlying and insular regions, or economically backward regions which have not yet undertaken an exercise of this kind); energy planning for towns and cities with populations of more than 100,000 (priority given to waste management and the conversion of waste into energy, transport problems and heating networks, especially where towns from different Member States are involved in the same projects); and, finally, feasibility studies following on from planning studies (priority given to processes and solutions which are innovative and daring, serve as examples for future studies and are easily copied).
- Finally, several chapters are devoted to financial, legal and practical information. This covers financial backing from the Commission: maximum of 40% with a ceiling

of 100,000 ECU (which means that between 30 and 40 projects can be supported each year). Conditions of eligibility are also covered and these have recently developed in favour of public bodies, which are now the only parties that can be the prime proposers and contractors.

Rights and contractual obligations of the future beneficiaries of Commission support are also set out including monitoring arrangements in the form of interim and final reports (as laid down in the recommendations of a guide drawn up to this effect), along with control of expenditure and commitment to disseminate the results.

Methods of appraising proposals have been harmonized according to a specific procedure, the proposal generally being open for a period of three months.

Appraisal takes about six months after closure of the invitation to submit proposals.

## Publicising planning benefits

Disseminating information on planning takes the shape of seminars, workshops, publications and similar activities. These make it possible to transfer know-how on energy analysis and forecasting. In addition, they promote exchanges of experience and cooperation between institutions, experts and other players on the energy planning scene.

It is with this goal in mind that the EC Commission's Energy DG is publishing an initial series of 30 regional data sheets called 'map brochures' because of their cartographic nature. These data sheets summarise the salient elements of representative studies co-financed by the Community during recent years (see list below).

### List of data sheets on regional experiences of energy programming:

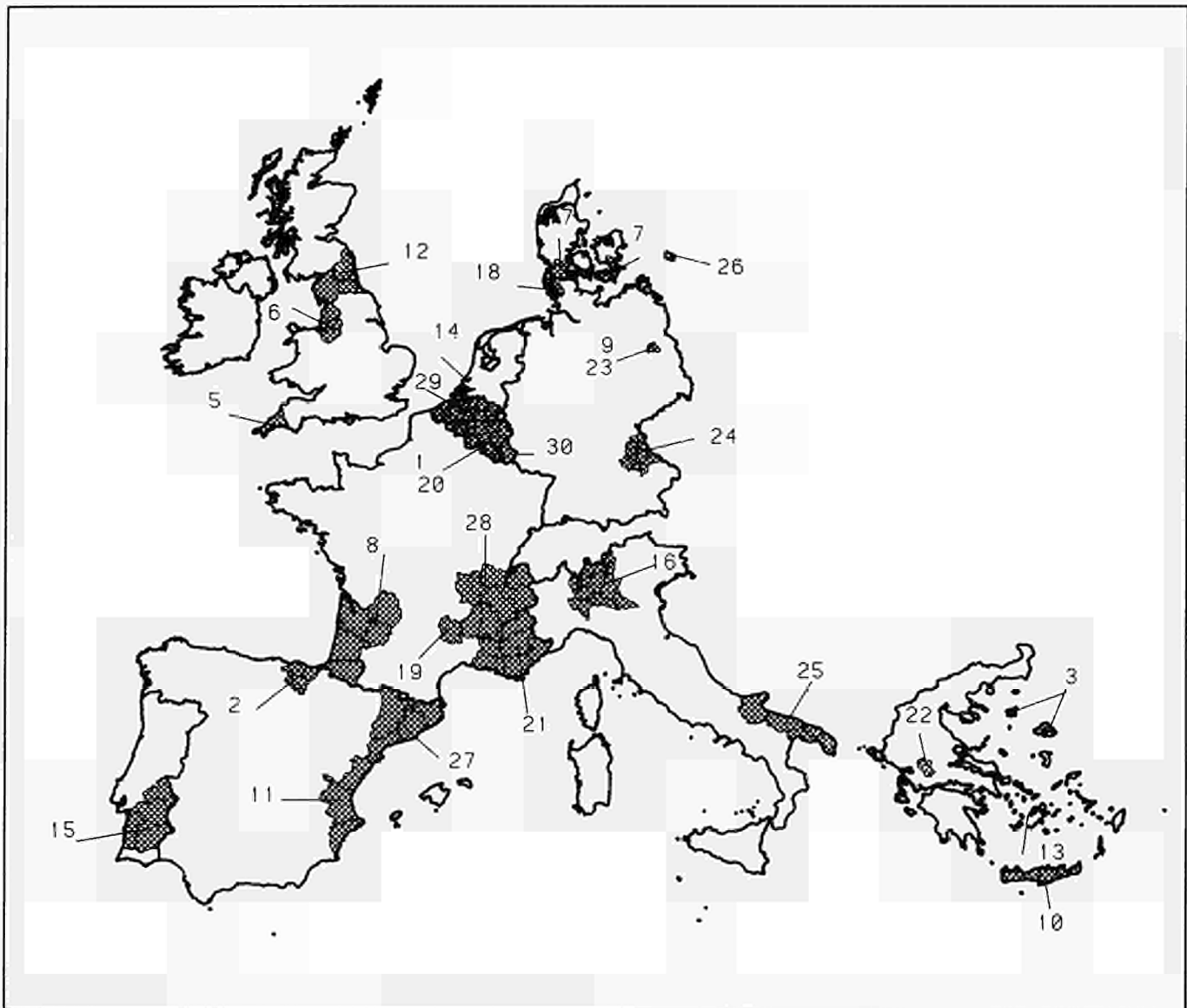
- Data sheet 1: Wallonia (B)
- Data sheet 2: Basque country (E)
- Data sheet 3: Lesbos (GR)
- Data sheet 4: Madeira (P)
- Data sheet 5: Cornwall (UK)
- Data sheet 6: North West England (UK)
- Data sheet 7: Storstrøm (DK)
- Data sheet 8: Aquitaine (F)
- Data sheet 9: Berlin (D)
- Data sheet 10: Crete (GR)
- Data sheet 11: Valencia (E)
- Data sheet 12: North East England (UK)



- Data sheet 13: Cyclades (GR)
- Data sheet 14: Westland (NL)
- Data sheet 15: Alentejo (P)
- Data sheet 16: Lombardy (I)
- Data sheet 17: Southern Jutland (DK)
- Data sheet 18: Nordfriesland (D)
- Data sheet 19: Lozère (F)
- Data sheet 20: Wallonia (B)
- Data sheet 21: Provence-Alpes-Côte d'Azur (F)
- Data sheet 22: Eurytania (GR)
- Data sheet 23: Berlin (D)
- Data sheet 24: Northern Oberpfalz (D)
- Data sheet 25: Apulia (I)
- Data sheet 26: Bornholm (DK)
- Data sheet 27: Catalonia (E)
- Data sheet 28: Rhône-Alpes (F)
- Data sheet 29: Flanders (B)
- Data sheet 30: Luxembourg (L)

For additional information please contact:

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# EC-Mexico energy cooperation

by Miriam Delchanty, DG XVII: International energy cooperation programme unit (A3)

*Since the late 1970's the EC has been supporting a programme aimed at improving the long-term world energy situation by helping major developing countries to make effective energy decisions. The Federal Republic of Mexico, the third largest country in Latin America, with an estimated population of 86 million in 1989, is an obvious partner for such cooperation. A feature of the programme is the extent of cooperation with national administrations. Cooperation with Mexico's government, which began in 1985, is no exception to this rule. The programme works closely with the Mexican Ministry for Energy and Mines and the Federal Ministry and was instrumental in setting up the National Energy Conservation Commission in Mexico (CONAE). This body serves as a focus for the implementation of a major element of Mexican national energy policy i.e. the promotion of energy efficiency in all sectors of the economy.*

*This article presents the main elements of Mexico's energy policy and shows the ways in which the European Community has been of practical assistance in its formulation and implementation.*

For over three decades, the energy sector has been one of the mainstays of Mexico's economic growth. The country's reserves of hydrocarbons currently rank eighth in the world, while its oil production ranks sixth, and its installed power production capacity is among the twenty largest in the world.

The present Government, engaged in the process of modernizing the country, considers energy infrastructure and the proper use of scarce resources of vital importance to the energy sector. Its energy strategy is set out in the National Development Plan 1989-1994, which calls for three major National Agreements: an Agreement on the Broadening of Democratic Life; an Agreement on Economic Recovery and Price Stability; and an Agreement on the Productive Improvement of the Standard of Living.

The agreements also provide the framework for the National Programme of Energy Modernization 1990-1994. The Programme provides forecast scenarios up to the 1994 expiry date which will be adjusted in line with general economic trends, in particular with trends in the energy sector. It also sets out estimates of energy supply and demand up to 2010, when it will be possible to assess the impact of the policies and projects being implemented by the current administration.

The Programme sets the following objectives for the energy sector: guaranteed self-sufficiency, closer links between the energy sector and the economy, society and the environment, and consolidation of a more modern and better integrated energy sector.

The Programme's strategy is to combine the structural upgrading of the sector with an increase in production capacity. Faced with an ever-increasing demand for energy from a growing economy and a population eager to raise its standard of living, the energy sector must not simply expand; it must also become more efficient and productive and more rational in its use of resources.

The Programme proposes five priorities: productivity; energy savings and efficient use of energy; funding for development and increased supply; diversification of sources; and effective participation in the international market. These guidelines form the basis of the national energy policy and, if properly applied, should produce the modern energy sector which is vital for the country.

## The present energy situation

The energy sector has played a leading role in bringing about the changes that characterize Mexico's recent history, and in the country's relations with the rest of the world. The strategic importance of that sector in the national economy is obvious:

- it provides the energy needed to maintain and increase production and to raise living standards. As a consumer of goods and services, and through its knock-on effect, it encourages the development of many other industries;

- it accounts for just over 4% of the GDP (1988) and provides direct employment for over 300 000 people;
- it attracted almost 35% of all public sector investment in 1988 (40.6% in 1982).

Over the last 25 years the rate of change in the energy sector particularly, between 1976 and 1982, has at times been faster than that observed in the national economy generally. Production of primary energy has grown fivefold in the last quarter of a century, while national consumption has risen by a factor of only 3.5 over the same period.

Since 1983, the energy sector strategy has been aimed essentially at qualitative change and achievement of a more efficient and better integrated energy industry.

At present, Mexico's energy sector has a solid enough basis to ensure that it will be capable of backing up the modernization strategy in the years to come.

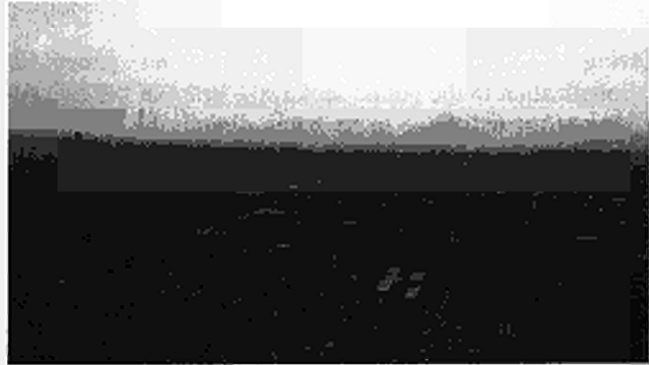
## Current problems

Although in recent years the energy sector has declined to some extent in relation to the economy as a whole, its importance has grown in crucial economic areas: foreign currency earnings and, in particular, public finances. Priorities based on financial estimates were therefore established as the nucleus of a policy for development of the sector, which has since been progressing in fits and starts.

In the domestic energy market, demand is still closely related to the behaviour of the economy as a whole. Between 1970 and 1982, a dynamic economy in which prices were slow to rise resulted in an average annual growth in energy consumption of 8%, reaching double figures in some years. The trend altered in 1983, and in 1988 consumption was barely 1.9% above its 1982 level.

Efforts made to promote energy savings and efficient use of energy did not form part of a comprehensive, large-scale programme, so that any measures taken had a limited effect. In Mexico, the ratio of growth in energy consumption to growth in GDP is high (1.5), the corresponding figure in other countries being around 0.5.

If Mexico is to resume a course of sustained economic growth and continue to industrialize, decisive steps must be taken to rationalize demand, with emphasis laid on the efficient use of energy. There is major potential for saving energy in the industrial and transport sectors, particularly in the energy sector itself, and it costs less to save energy than to produce it.



*Mexico city where air quality is improving through, inter alia, energy conservation measures.*

Mexico's energy resources consist primarily of hydrocarbons, which now account for 90% of primary energy production and around 85% of gross domestic supply. Even though this percentage has fallen (92% and 86% in 1982), there is still an excessive dependence on hydrocarbons.

Efforts to diversify energy sources have been focused on electricity. Between 1983 and 1988, installed operating capacity rose by 5 564 MW, 47% of which is generated by power stations fuelled by alternative sources. This shows that the relative contribution of such stations to operating capacity rose from 38% in 1982 to 40% in 1988. These efforts are not yet reflected in generation figures, the contribution of hydrocarbons in that regard having risen from 65.5% to 67.2% over the same period.

The financial situations of the bodies involved in the sector vary widely. PEMEX (the state oil company) has succeeded in maintaining a surplus and has boosted the treasury while the electricity sector continues to show a deficit, despite improving its financial situation in recent years.

## Some features of the policy for modernization of the energy sector

In keeping with the National Programme of Energy Modernization and its priorities (productivity; energy saving and efficient use of energy; financing to assist development and increase supply; diversification of

sources; participation in the international market), greatest emphasis will be laid on energy saving and the efficient use of energy, involving a combined effort by society as a whole. Mexico's overall energy-saving potential is put at over 300 000 barrels a day of crude oil equivalent. A practical policy with realistic goals is necessary, and action should be taken as a matter of priority in the industrial and transport sectors and in the energy sector itself.

Owing to a relative lack of funds and plans for rationalization in the public sector, the brunt of the energy-saving effort will have to be borne directly by consumers themselves. Public companies will be at the forefront of the campaign. The main incentive will be economic, but it is vital to create broad social awareness of the importance and impact of energy saving.

According to the Federal Government instruments and measures will have to be employed which, combined with unremitting application of a realistic policy on prices and tariffs, can change habits and encourage more rational use of energy.

A significant step in the formulation of this policy was the setting-up, under the Presidential Agreement of 26 September 1989, and with the support of the EC, of the National Energy Conservation Commission (CONAE). The Commission offers technical advice on energy saving and efficient use of energy to the various bodies of the Federal public administration, to state and local government and to individuals. It is a forum for concerted social action and is of immense value in encouraging the participation of all sectors of society in the national campaign.

Specific account will be taken of energy-saving objectives in the policy on energy prices and tariffs. The price of every product will include production and distribution costs and will prevent any losses in real terms.

Energy saving should not be considered as a passing whim, but as a permanent objective capable of changing consumer habits and developing a new tradition of saving and efficient use. All achievements along these lines will help to step up national productivity, make the economy more competitive internationally and raise the living standards of the Mexican people.

## EC-CONAE agreement

The SEMIP-EC Cooperation Programme was initiated on 18 September 1989. Present then were the senior officials who, working with the National Energy Conservation Commission (CONAE), would later plan in detail the activities of the experts in the various disciplines to be seconded on a short-term basis.

The Agreement between the Ministry for Energy, Mines and Federal Industry (Secretaría de Energía, Minas e Industria Paraestatal - SEMIP) and the EC Commission selects and promotes projects which will save energy in energy-intensive sectors (industry, transport).

The Agreement as a whole is focused on the various stages at which action can be taken to save energy and use it efficiently: planning, preparation of standards and regulations, activities targeted at users, energy audits, training and technological exchange.

Work so far on energy saving under the Agreement has produced highly satisfactory results, since industry can now make substantial savings in running its equipment.

Contributions from technical experts assigned to the Mexican project by the EC have been of great value, ranging from the structuring of the National Energy Saving Commission to the performance of energy audits, chiefly in the small business and transport sectors.

Of the aspects accorded priority status during the first year of cooperation with the EC, the following are particularly important:

- advice from senior experts;
- energy audits for SMEs;
- energy audits in the transport sector;
- the study on financial schemes for energy efficiency in Mexico.

Senior experts gave advice on the objectives, strategies and measures to be adopted by the Energy Saving Centre (Centro de Conservación de Energía) and identified those currently proving effective in energy saving which they felt to be most applicable in Mexico.

They also gave advice on how to organize the Energy Saving Centre. The structure of the CONAE was based on their proposals, taking account of Mexico's need for a lightweight but efficient structure to promote energy saving together with assessment of measures to ensure energy is used efficiently in the public and private sectors.

The public sector is currently implementing the CFE (Federal Electricity Commission) and PEMEX (the state oil company) energy saving programmes, concentrating on the priorities fixed by CONAE, which will also be monitoring the steps taken and assessing their effectiveness every three months.

Another important aspect is energy saving in industry, especially in small and medium-sized undertakings, where advice is felt to be most needed in conjunction with support from CONAE. With the assistance of the EC, 21

energy audits were carried out in the textile, furniture, chemical, steel and metallurgical industries.

These surveys found that Mexico's industrial sector should initially be allowed to benefit from immediate low-level, short-term investment. It is important to note that five companies have already taken steps to make themselves more energy-efficient through investment and that all other companies will also be upgrading their efficiency with the aid and support of CONAE. It is encouraging to note such enthusiasm for energy saving in the industrial sector now that European experts, under the Cooperation Agreement, are providing the in-depth assistance which was beyond the capacity of CONAE alone.

## Energy and transport

The Mexican transport sector now represents the most significant final consumer of energy and is entirely dependent on hydrocarbons. In 1989, this sector consumed more than 520 000 barrels per day or 37% of national demand showing an increase of 9% over the preceding year.

Some years ago, it was considered that a reduction in this growth posed impossible challenges. For this reason initial efforts to conserve energy were directed at other sectors, particularly industry. However, it was demonstrated that potential for savings existed in the transport sector and that it was time to get specific voluntary programmes underway.

Mexico is amongst those countries showing strong growth and where the transport sector makes a significant contribution to development. Transport was not originally included in the cooperation programme between Mexico and the EC which was launched in 1985. However, cooperation in the transport area began the following year. The first effort was directed at Mexico city with a preliminary evaluation of actual consumption in this metropolis which faces increasing environmental difficulties.

Once the initial phase of the programme was accomplished, it was decided that the priority should be to organise concrete activities. EC experts and the Mexican authorities together agreed on the feasibility of launching energy saving projects in the transport sector.

Nowadays, despite Mexico's status as an oil producing country, the continuation of such programmes has become a priority as they emphasise environmental and security considerations.

EC support has permitted the consolidation of activities in cooperation with the most significant consumers.

The following activities deserve special mention:

- interurban personal transport;
- public transport of goods in the metropolitan area of Mexico;
- public and private transport of goods at regional, national and export level;
- public transport fleets (oil, electricity).

One of the consequences of programmes within large and medium energy consuming companies is the 'ripple' effect which extends to private users who, in Mexico as in many other countries, are the biggest energy consumers.



*The underground system in Mexico city which contributes to improving the efficiency of the transport sector.*

Appropriate recommendations have also been made on a national scale. Studies carried out by Mexican and EC experts identified certain legislative, financial and fiscal obstacles impeding the implementation of reforms or radical modifications. In other cases, local habits proved the greatest source of resistance. Difficulties with access to credit, high transport tariffs, the setting of energy prices below reference levels (international prices), the absence of fiscal advantages for modernisation (accelerated amortisation, exemption from laws and taxes) are examples which have been highlighted and which the relevant authorities have begun to modify, if not remove altogether.

Training and activities aimed at changing behaviour show the most promise. The change in behaviour of drivers is the most typical example and the potential in this area is the most significant, not only in the energy area, but equally in associated areas (environment and security).

With the EC's backing, the concept of using energy more efficiently in the transport sector has now been fully developed in Mexico. Other countries must follow this

pattern to reduce consumption in a sector whose potential for growth is closely linked to economic development. This is all the more important because the transport sector in numerous developing or semi-industrialised countries has become a significant consumer of final energy.

## Conclusion

Priority in the second year of cooperation with the EC (1990-1991) is being given to energy audits in the SME and transport sectors. However, the need has been recognized for trained Mexican technicians who, after

receiving special training in auditing methods and with the help of EC experts, will subsequently instruct other technicians and in this way spread the concept of energy saving to other sectors.

Once CFE, PEMEX, industrial and transport associations, universities and CONAE have their own experts, the continued application of energy efficiency measures can be assured. Effective demonstration projects triggering further advances in energy saving and the efficient use of energy can also be guaranteed. It is also desirable that European expertise be transferred to Mexico and other developing countries. The European Commission, through its Energy Technology Transfer, is facilitating this aim.

# EC-India Energy Management Centre

by Miriam Delehanty, DG XVII: International energy cooperation programme unit (A3)

*India, the second most populated country in the world (after China), and with an ever-increasing population growth, faces the challenge of finding new commercial forms of energy. Sound energy management practices in all sectors would help to manage energy demand thereby strengthening the economy and helping to improve the standard of living of its people.*

*The EC-India Energy Management Centre, which was inaugurated in April 1989, responds to this need. The Centre was established with the cooperation of the European Community (EC). The centre's headquarters are now in New Delhi with a training centre in Nagpur. It is an autonomous society under the Department of Power, Ministry of Energy, of the Government of India.*

*Although there is no shortage in India of institutions active in the field of energy management, their efforts have so far been effective within the ambit of their individual charters and the constraints of their resources. Consequently, there is fragmentation of effort, and lack of coordination of the various initiatives which are underway.*

*The main difficulty is the lack of an overall strategic vision, supported by quantitative analysis, of what needs to be done to improve energy efficiency in the economy as a whole. The Energy Management Centre was set up to meet this need by promoting research and training in energy policy and management for the entire country. A further important role for the Centre is to serve as a focal point for cooperation in energy matters between India and the European Community.*

## Exchange of research and training experience

Under the bilateral arrangement between India and the EC, the Centre has five major tasks:

- organising exchange of research results on energy policy and energy management, planning techniques, energy statistics and forecasting, etc.;
- supporting energy management activities in India and arranging joint India/EC energy management study programmes;
- training energy managers and experts in India;
- organising exchange of energy experts between India and the EC; and
- assisting in the organisation of short-term training programmes in and visits to European institutes and industries.



*The EC Advisor to the EC-India Centre at inauguration of the 'Training of Trainers' programme, 1990*

The Centre is responsible for encouraging and attracting competent people from within the country as well as from abroad to participate in its activities. It facilitates mobility of staff between other organisations and the Centre to ensure rapid development of efficient manpower in the energy field.

The Centre has established special procedures to facilitate smooth functioning of its programmes and activities including matters relating to personnel, finance, administration, purchase, travel, etc. Professional consultants and technical advisers are engaged when necessary and specific tasks subcontracted to other organisations to meet the objectives of the society.

## Work programme

Projects undertaken by the Centre since its inauguration are as follows:

- education and training at senior level;
- training of energy managers and auditors;
- publication and publicity;
- comparative energy audits of two large power plants;
- energy audit of large cement plants;
- load management in high tension (HT) industries by time-shifting of certain loads;
- energy conservation study in the agricultural sector, by means of an energy audit of a government farm;
- promotion of efficient household energy appliances;
- integrated energy pricing;
- industrial data base development;
- comparative analysis of two thermal power stations from a behavioural perspective; and
- inventory of energy management work being done in India.

The Centre has also been entrusted with implementing the EC-India Energy Bus Programme.

Three energy buses, or Energy Auditing Units, built in India to EC recognised specifications, are equipped with modern energy monitoring and computing equipment. They will carry out energy surveys and audits in key industrial regions.

Each vehicle is operated on a commercial basis by specially selected teams from the leading agencies, appointed by the Government of India - the National Productivity Council in the Kanpur/Delhi area, Tata Energy Research Institute in Bangalore/Madras and Mahratta Chamber of Commerce in Pune/Bombay.

While still in the early stages, initial response from Indian energy users has been very encouraging. The Government of India, through the EC-India Energy Management Centre, is already planning a further 15 Energy Bus

Schemes based on the EC model. The Directorate General for Energy - DG XVII - sees this project as a major part of its contribution to promotion of energy conservation in India through enabling transfer of the best in European energy conservation technology and experience.



*EC-India energy bus vehicle*

In addition, the Centre has been entrusted with some assignments by the Department of Power, including a project profile for an Industrial Energy Efficiency Project to be funded by the World Bank; a project on energy audits funded by the United Nations Development Programme (UNDP); and work on a regional energy conservation working group under the Regional Energy Development Plan/Economic and Social Commission for Asia and Pacific (REDP/ESCAP).

A recent initiative in the field of energy conservation in India was the adopting of 14 December 1990 as Energy Conservation Day. The Centre played an important role in this event. The EC Energy Buses were launched on the same day, thus highlighting this effective medium for promotion of energy conservation.

## Innovative approach to energy management

The Centre aims to develop innovative methodologies in energy management techniques, particularly the software aspects, in order to increase the competence of energy professionals. Along with improving the energy information system and data base, the Centre will train energy managers and experts in the country. It will organise the exchange of research findings on energy policy, management, planning techniques, statistical assessments, forecasting, etc. among institutes organisations and industries within the country as well as between Indian and European professionals.



The Centre intends to play a significant role in the evolution and implementation of programmes that would strengthen energy management in the country. It promotes innovative management practices and systems in the energy sector and organises exchanges of experts between India and the EC and between India and other countries in the Asia-Pacific region. In addition, the Centre will establish or assist in setting up sub-centres across the country to utilise local talent and implement its programmes.

The Centre may receive grants, gifts, loans, subscriptions and donations from within the country and/or abroad including UN agencies, subject to the prevailing laws. It also has the power to invest and deal with all funds raised and to vary, alter or transfer such investments whenever necessary.

## Organisation of the Centre

The Energy Management Centre is a Society under Indian law: an independent and autonomous authority, with responsibility and flexibility for dynamic operation. A Governing Council made up of representatives of the Indian Government while a representative nominated by the Commission of the European Communities advises the Centre in the formulation of general policy. The Council also monitors the implementation and administration of the Centre and approves its work programme and annual budget proposal.

The Centre is headed by a Director, appointed by the Government. He is responsible for the operation and management of the Centre in keeping with the policies and guidelines established by the Governing Council. The European Community Senior Adviser, who took up his duties in March 1990, advises the Director in the management, planning and implementation of the programme of activities with particular responsibility for European Community matters and the transfer of European experience.

## Budget and funding

The Centre is financed by the Government of India and the EC. The Government's contribution is in the form of new office facilities, training courses and seminars, salaries for Indian staff, office expenses and expenditure on related activities. The EC support meanwhile, covers equipment and library material involving foreign exchange, salaries for European professional staff including costs of visiting European Community lecturers, training programmes and visits to Europe, etc.

## Conclusion

The Centre has now been in operation for two years and during this time has been very successful, becoming the focal point of national energy management and conservation policy. The fact that the Indian Government (the Department of Power) has entrusted it with implementation of certain technical projects bears witness to this fact.

The success of the Centre is also due to the enthusiasm of the Indian authorities who have supported it since its inauguration.

This positive experience of the Indian Centre provides encouragement for the creation of further EC Energy Centres in other parts of the world. Consideration is therefore at present being given to whether the political and economic developments in Eastern and Central European countries, and in particular their serious energy problems, could be addressed by setting up EC Energy Centres.

Given the rather different nature of the energy situation in Eastern and Central Europe compared with India, it could, however, prove necessary to adapt the concept of the Centre to the specific needs of this region. Such a task would no doubt be facilitated by the valuable experience which has been gained during the successful first two years of the EC-India Energy Management Centre.

# Nuclear energy and public opinion in Europe: a review of the sociological aspects of the nuclear option

by Georges Kontogeorgis, Rector of Pantion University, Athens<sup>1</sup>

*The study, carried out in 1990, reviews various sociological factors which have influenced the development and siting of nuclear facilities in the Community. It is in the form of a bibliographical review which brings to the fore major factors and communication strategies and is supplemented by case studies, some of them comparative.*

## Major factors

### Environmental awareness

Awareness of environmental issues appears to be higher in highly industrialized countries, varying substantially from one country to another for no obvious cultural reason. However, the countries in which public opinion is most fearful of nuclear accidents are those with the fewest nuclear power stations.

Opinions changed little between 1986 (just after the Chernobyl accident) and 1989.

The differences observed cannot be explained on a purely national basis.

### Psychological factors

The ambiguous relationship between civil and military uses of nuclear power is an important factor, especially since mysterious power is derived from a very small quantity of matter in both cases. Explanations to the public have not dispelled the fear of an explosion at a power station (particularly after Chernobyl).

### Demographic and socio-cultural factors

Within the Community, women as a social group are more hostile to nuclear power than men, probably owing to their less extensive technical knowledge and the uncertain risks linked with pregnancy. This hostility is found in socio-professional groups in which women predominate.

Young people are less favourably disposed towards nuclear power than older generations. The former are used to an affluent society and do not share the more materialistic concerns of their elders; the generation gap may also play a role.

A higher level of education, particularly scientific education, makes nuclear power easier to accept. A high level of social integration and greater exposure to the media also raise the level of nuclear power's acceptability; the same is true of interest in politics.

Attitudes to nuclear power become increasingly negative as the political spectrum is crossed from right to left. This remains true of political parties, although it is difficult to compare parties from different countries.

However, the correlation between religious affiliations - which to some extent reflect political affiliations - and hostility to nuclear power is less rigid, tending to increase across the following spectrum:

Catholic (practising, non-practising), Protestant, no religion.

To sum up, a feeling of social exclusion and environmental concerns are two key factors in opposition to nuclear power.

### Institutional context

The degree of openness of political systems is a major factor in determining public opinion. It can be understood as the facility with which opponents are able to mobilize the legal system, the media, members of parliament, etc., against nuclear power.

The capacity of the promoter (State or other) to implement projects is equally important. These two factors can be

<sup>1</sup> This summary was prepared by the nuclear energy unit (C3) of DG XVII.

combined. There is a significant difference between patterns of behaviour at local and national levels.

## Secondary factors

We have seen that a higher level of information increases the acceptability of nuclear power; information campaigns in schools are well received and facilitate acceptance of nuclear power.

Irrespective of socio-professional category, opinion leaders play an important role through their influence and means of exerting pressure.

Politicians are not always credible, and their tenure of office is often much shorter than the life expectancy of nuclear facilities. Local politicians, who are frequently opposed to nuclear power, cannot prevent the siting of a power station which is often supported by regional politicians (France).

Journalists in search of good stories have a preference for reporting accidents, and are generally less favourably disposed towards nuclear power than scientists.

Doctors, who tend to adopt a more positive attitude, seek information on radiation protection and the effects of radiation on the human body which they can then disseminate.

Communication strategies can be developed - as in France - by the Government or the electricity utility.

The French authorities, whose political will has remained undiminished since 1945, have been responsible for organizing the industrial protagonists - builders and manufacturers (construction site, turbine, fuel cycle), power station operators and R&D bodies - and the administration.

From the outset, nuclear programmes have been planned within the context of town and country planning (development of the local industrial and social fabric).

Public information has been improved at both local and national levels (Minitel Magnuc bank, specific review by Ministry for Industry, scale of accident severity, Parliamentary Office for the evaluation of scientific and technological options).

The French electricity company, EDF has taken steps to inform the general public, the local population and local politicians. Since 1986 (Chernobyl and energy self-sufficiency), such measures have been intensified (information centres, schools, guided visits, etc.). Carefully

presented information was sent to members of the medical profession, much consulted by their patients, and to EDF staff (120 000 people). Information is now provided on a more systematic and transparent basis.

At international level, the EC Commission has stepped up its activities. Mutual information networks have been developed (IAEA, WANO, etc.).

The economic factor inevitably involves a cost/benefit analysis. At national level, nuclear power increases energy self-sufficiency, supports a highly developed industrial fabric and reduces spending on oil. At local level, a construction site invigorates the region's industry, as does operation of the completed power station. The local taxes paid by the operators increase their acceptability.

In Germany and Spain, however, nuclear power is perceived to be a competitor with nationally mined coal.

In the United Kingdom, an investment pay-back period of 10 years has slowed down the nuclear industry.

Two French case studies illustrate the diversity of situations.

Flamanville is in a rural area near the reprocessing centre at La Hague and the nuclear submarine base at Cherbourg. The region's willingness to accept the power station was largely influenced by its invigorating effect on the area immediately surrounding the site.

In the second case Le Carnet was chosen to replace the Pellerin site, which faced overwhelming opposition, and succeeded in winning the support of the local politicians.

Viewpoints on the role of the State; whether or not it should be strong, centralized, etc. are usefully illustrated by the above examples.

## Comparison survey of France, Italy and Spain

### Energy and political aspects

In France, successive governments have continuously supported the nuclear industry. In 1989, nuclear power accounted for 75% of electricity generation.

In Italy, the first nuclear power programme was already under way before 1973. However, nuclear power had to be abandoned following a referendum (1987) and a parliamentary resolution (1990).

In Spain, the ambitious nuclear power plan established in 1977 was stopped by a moratorium in 1982. The Government now appears ready to review it. In 1989 nuclear power accounted for more than 38% of electricity generation.

### **Public opinion**

Positive attitudes based on cost, energy self-sufficiency and clean energy are less frequent in Italy than in France and still more rare in Spain. The French are moderately well disposed towards nuclear power, the Italians unmindful of their energy supply and the Spanish undecided.

## **Conclusions and recommendations**

Serious consideration must be given to three major developments: the opening up of Eastern Europe, the desire for increased democracy and rising concern about the environment.

In the case of Eastern Europe, the reduced international tension will lessen any influence that the ambiguous relationship between civil and military nuclear installations may have; moreover, awareness of the extent of environmental damage (in the East) can only strengthen concern for the environment.

With regard to the desire for a more democratic approach, the public is demanding greater transparency from industry and government, both of which are already developing expertise in fields not directly involved in the process of electricity generation.

Interest in the state of the environment is growing steadily, and would be doing so even if the impact of the Chernobyl accident could be neglected.

Public concern will in future continue to focus on the safety of nuclear installations (i.e. no accidents) and the long-term management of nuclear waste (i.e. no leaks).

Continual implementation of nuclear power programmes must be accompanied by debate involving all parties, an element that appears to have been absent in the past.

# Trans-European networks:

## The European Commission is proposing to Member States priority measures in transport, energy, telecommunications and vocational training

by M. De Coninck, DG XVII: Task force on Community integration, accompanying measures unit

*For the general public, business, industry and the public authorities, an essential aspect of the completion of the internal market by the end of 1992 is the establishment and interconnection of genuine trans-European networks in four sectors: transport, energy, telecommunications and vocational training. These sectors were singled out for their potential impact on the integration of Europe's economy.*

*The Commission's main concern is to provide the 'missing links' in the various sectors. This involves not only reducing the isolation of the regions on the edges of the Community but also extending the networks beyond the existing geographical territory of the Member States to the EFTA countries, the countries of Central and Eastern Europe and those of the Mediterranean basin.*

### An original approach

There was no *a priori* reason why these four sectors of the economy should be grouped together in a common approach, orchestrated by the Commission.

Indeed transport, energy, telecommunications and vocational training are the responsibility of separate authorities and services which are not accustomed to working together, either within the Community institutions or in the Member States.

However, the benefits of a frontier-free area depend as much on a favourable legislative environment as on the existence of trans-European infrastructures and services designed to ensure the free movement of persons, goods, services and capital.

The need for overall Community action in this field was stressed by the heads of State and Government at the European Council in Strasbourg on 8 and 9 December 1989:

'Special priority should be given to the development and interconnection of trans-European networks, notably in the area of air traffic control, the linking of the main Community conurbations by broadband telecom-

munications networks, the most efficient surface communications links and energy distribution.

The European Council asks the Commission to propose the appropriate measures, taking into account the possibility of extending such action to the whole of the Community, paying particular attention to situations arising at the Community's limits in the context of economic and social cohesion'.

Preparatory work carried out in 1989 soon resulted in a Communication adopted by the Commission on 18 December 1989<sup>1</sup> leading to a Resolution on 22 January 1990<sup>2</sup>. In this document the Council called on the Commission to present, by the end of 1990, a work programme and proposals for suitable measures for all these fields.

One of the merits of this approach lies in the opening up of wide-ranging cooperation between national and Community authorities and the business circles affected by the four reference sectors. This generates its own dynamic and greater awareness of the advantages of a coordinated approach at Community level.

<sup>1</sup> COM(89) 643 final.

<sup>2</sup> OJ No C 27, 6.2.1990.

The Council is due to adopt a position soon on the work programme adopted on 10 December 1990<sup>3</sup> by the Commission, and on a proposal for a Resolution laying down general policy, priority sectors and the framework for Community financial support.

## Eliminating the obstacles to trans-European networks

The deficiencies visible at present in trans-European networks arise from a combination of obstacles. Without vigorous, concerted political action, there is no reason to suppose that these obstacles - affecting to differing extents the four sectors in question will simply disappear.

First, a solution has to be found to the **problems of transboundary interoperability** resulting from fragmentation of the networks and their mode of operation which are based on national models. In the energy sector this means non-existent or inadequate international links most of which are in the process of being rectified in the long term.

At present some Member States are not interconnected with the rest of the Community and are thus unable to take full advantage of the potential benefits of the single market. Greece and Ireland do not have electricity links with their European partners. In the natural gas sector, where the market is recent, major projects are under consideration or being implemented for establishing networks in Greece and Portugal, and for establishing interconnections between Spain and France, Ireland and the United Kingdom.

The absence of any gas link between the United Kingdom and the continent of Europe represents a very obvious gap in the European network, but there appear to be no immediate plans to establish such a link.

On the operational level, better coordination of network operation and greater homogeneity of management techniques will enhance reliability and security of supply and make existing infrastructures more viable.

The **legal environment** can also be a source of obstacles to the development of trans-European networks. The existence of national rules affecting the free movement of products, freedom of establishment and freedom of provision of services in the Community was highlighted in the Commission's White Paper on the internal energy market<sup>4</sup>. The Commission has undertaken progressive

liberalization of the sector by measures favouring the transit of electricity<sup>5</sup> and natural gas<sup>6</sup> on major networks.

Other national rules impede trans-European networks and reflect the wide variety of legal situations and authorization procedures facing major interconnection projects. Resulting delays or blockages sometimes jeopardize the completion of work or lead to alternative solutions whose financial viability is questionable. The Commission plans to hold general discussions on harmonization and simplification of Member States' rules and procedures applying to the completion of network infrastructure projects. The aim here will be to cut the costs which may be incurred at present and deal more effectively with restrictions imposed for reasons of environmental protection.

**The lack of a broad focus** at European level concerning requirements for network infrastructure constitutes an obstacle to the integration of the internal market, as has been stressed repeatedly by the Commission.

Even now infrastructure continues to be designed and implemented on the basis of information which only partially incorporates the European dimension. Business circles consulted during preparatory work were unanimous in voicing regret at the lack of a broad European focus in infrastructure requirements, especially in transport. Taking the internal market into account also necessitates redefinition of frameworks in which infrastructures are designed at the appropriate level of decision.

Choices are based both on the availability of better, more powerful statistical instruments and on the need to set up a coherent European reference for decision makers in both the public and private sectors<sup>7</sup>.

## Fuller integration of the Community dimension

To speed up the emergence of trans-European networks, the Commission is therefore proposing a set of **general steps**, applicable to the four sectors concerned, **pilot projects** chosen according to their contribution to the working of the internal market and the strengthening of economic and social cohesion, and **financial measures**.

The action programme, awaiting approval by EC Energy Ministers, should enable four elements essential for integrating the European dimension into the design,

<sup>3</sup> COM(90) 585 final.

<sup>4</sup> COM(88) 238 final.

<sup>5</sup> Council Directive of 29 October 1990 (OJ No L 313, 13.11.1990).

<sup>6</sup> Council Directive (EEC 91/296) OJ No L 147 of 12.6.91.

<sup>7</sup> COM(90) 544 final of 16 November 1990 'Europe 2000: outlook for the development of the Community's territory'.

implementation and operation of major networks to be singled out:

- the drawing up at regular intervals of **master plans** for trans-European networks for transport, energy and telecommunications. This should be backed up by feasibility studies carried out on the joint initiative of the States concerned and the Commission;
- **the rapid adoption of laws** needed for the emergence of trans-European networks. All these measures are designed to create a legal framework for promoting the provision of services, the setting up of firms and the free movement of products; essential conditions for the establishment and functioning of trans-European networks.

In the energy sector measures are needed to ensure the efficient implementation of directives on the transit of electricity and natural gas, possible access for third parties to the networks, studies and proposals on removing administrative and legal obstacles to the establishment of interconnections, the opening up of cooperation procedures on maximum efficiency in network operation, etc.;

- the drawing up of an **annual programme of European standardization** to achieve network interoperability and prevent the appearance of divergent national standards. In the energy sector, where gas and electricity networks are already largely coordinated, the standardization programme could aim to improve operating equipment standards and the quality of products and services provided;
- the granting of a **Declaration of European interest** would promote network projects or programmes and the mobilization of potential investments. The advantages of such a declaration could be to limit the political risk entailed by any major infrastructure project, ease access to financing without necessarily calling on a contribution from the Community and assure investors of the coordination and cooperation of the authorities. An initial step in this direction was the 'Declaration of European interest' in the transport infrastructure action programme, adopted by the Council on 20 November 1990.

In the energy sector, the Commission is giving priority to projects for gas and electricity interconnection networks in view of their dominant role in the process of integration of the economy of Europe. Since the definition of specific projects and their economic viability are clearly a priority for the economic players concerned, a number of projects under consideration or now being implemented show a clear interest for the Community as a whole. This is because they either aim to extend the existing network to other Community countries, or they help to enhance

security of supply and the most efficient use of production capacities.

At present, the provisional list of projects, subject to addition, is as follows:

## Electricity interconnections

- Establishment of new links:  
Ireland-United Kingdom (1995)  
Greece-Italy (1993)
- Upgrading existing interconnections (1991-95):  
France-Spain and Portugal  
France-Germany, Belgium, Italy and Switzerland  
Italy-Austria and Switzerland  
Germany-Denmark, the Netherlands and Austria
- Upgrading internal networks (1991-95):  
Germany, Belgium, France and the Netherlands.

## Gas interconnections

- Introduction of natural gas in Greece (1993) and Portugal (1994)
- Interconnection Ireland-United Kingdom (1993)
- Interconnection France-Spain (1993) and Portugal (1995)
- 'Midal' project between Emden and Ludwigshafen (Germany) and 'Zeepipe' project (Belgium) designed to open up new outlets for gas from Norway (1991-93)
- Three projects in Germany to link up the new Länder (1991-93)
- Interconnections Germany-Belgium, Germany-Denmark
- Denmark-Norway ('Scanpipe') and United Kingdom-Continent
- Interconnection mainland Italy-Corsica-Sardinia (1993)
- Upgrading of 'Transmed' gas pipeline (Tunisia-Italy)
- Interconnection Morocco-Spain (1995).

## Increasing financial assistance from the Community

Trans-European networks are closely bound up with specific market requirements. Projects of Community interest must be viable and draw to a large extent on private funding.

However, viability must not just be interpreted in a narrow financial sense. Other more general considerations must also be taken into account, such as reducing the isolation of regions, achieving overall economic and social cohesion and security of energy supply in particular. This will be all the more possible if the project is examined in its overall Community context.

Private funding cannot, however, cover all cases and public assistance is therefore necessary, especially when projects are not sufficiently financially viable even where socio-economic viability is established.

The Community, for its part, is already making a financial contribution, in the form of grants and loans, to help implement trans-European projects, even if the primary objective is geared to regional development.

By way of example, the **European Regional Development Fund (ERDF)** will be allocating for 1988-93 about 2 billion ECUs for energy infrastructures in less developed regions.

This amount includes 300 million ECUs from the **REGEN**<sup>8</sup> initiative for gas and electricity transit networks.

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<sup>8</sup> OJ No C 326, 28.12.1990.

The **European Investment Bank**, meanwhile, earmarked loans to transport and energy transit and distribution infrastructures to the tune of 950 million ECUs in 1989 (3.9 billion for 1985-89).

**European Coal and Steel Community (ECSC)** loans may also be used to finance infrastructures using Community steel, such as the Atlantic TGV or the Greek gas network.

Apart from allocations from the structural Funds (mainly ERDF), the Community budget does not provide any other possibility for the establishment of trans-European energy networks.

This restriction applies to two-thirds of Community territory where it would appear that the Commission should conduct feasibility studies on projects of European interest, give financial backing to operations which will be viable only in the long term, or participate in the form of indirect aid in the projects themselves.

These new budgetary possibilities are not foreseeable in the near future, however, because of internal EC budgetary agreements which limit Community expenditure. But a new financial outlook for the post-1992 period could provide the opportunity for emphasizing in the Community budget the priority status attached by the political authorities to the completion of the trans-European networks.



# Ireland

by Miriam Delehanty, DG XVII: International energy cooperation programme (A3)

*At the time of the first oil crisis (1973-74), Ireland was largely dependent on imported petroleum for all its primary energy requirements. With the discovery of natural gas in 1971 and its production in 1978, this situation has been dramatically changed. Imported petroleum now accounts for less than half of total primary energy requirements.*

*Ireland's energy policy is directed at reducing the country's dependence on imported oil and at improving energy efficiency in all sectors. The Department of Energy is responsible for energy planning and government-owned ('semi-State') companies are largely responsible for implementation of energy policies. Environmental issues are of major concern and are integrated into energy policies.*

## Economic situation and prospects

Ireland has a surface area of 70 284 km<sup>2</sup> and its population in 1986 was 3.5 million. Its population density is 50 inhabitants/km<sup>2</sup> which is the lowest in the Community.

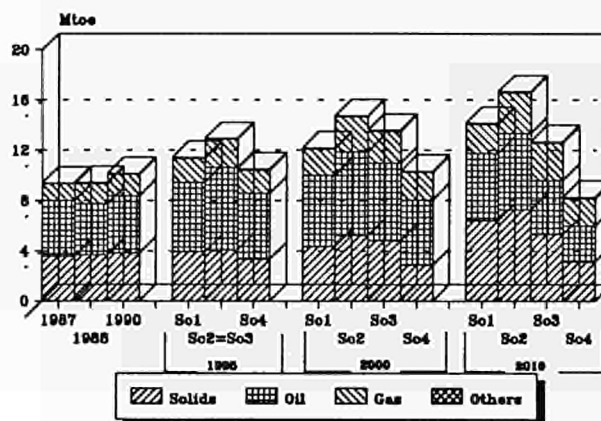
Following a sustained period of accelerated growth (average of 4.5% per annum between 1987 and 1990), activity in the Irish economy is likely to slow to about 2.25% this year. The decline in economic performance relates primarily to the slowdown in external demand. Domestic demand will remain relatively strong, supported by steady growth in private consumption and investment. Falling demand in principal markets (particularly the UK) should constrain export growth to moderate levels. Import volumes will expand in line with domestic demand, implying no further increase in the large trade surplus.

Ireland is now a member of the 'club' of low inflation countries. In the last quarter of 1990, the Irish annual inflation rate fell below that of Germany and was about 3.5% for the year as a whole. Low inflation and further income tax relief will underpin the moderate wage increases agreed for 1991 under the new Programme for Economic and Social Progress. Wage moderation will, in turn, help to support investment profitability.

Employment growth accelerated to about 2% last year having remained well below the Community average throughout the 1980s. Nevertheless, unemployment began to fall in mid-1987, reflecting high levels of net outward

migration; however, economic weakness in the US and the UK (the main destinations of Irish emigrants) is discouraging emigration and un-employment has begun to rise again.

IRELAND Primary Energy Demand by Fuel



Source: EC Energy for a New Century: The European Perspective, Conference held in Brussels, May 1990

A remarkable feature of Ireland's recent economic recovery is that it has coincided with a major fiscal consolidation. Since 1986, net borrowing by general government has fallen by about 10% of GDP and the spiralling trend in the public debt/GDP ratio has been reversed. Underlying this adjustment has been a very substantial reduction in the public sector share of output which has been sufficient to facilitate limited tax reductions in conjunction with the reduction in borrowing. As the economy slows, the pace of adjustment is moderating but the fiscal stance is likely to remain restrictive in the medium term.

## Energy policy

The principal objectives of Ireland's energy policy are security of energy supplies by way of reduced dependence on oil through the use of a good mix of fuels including natural gas, compliance with high environmental standards, (recognising that energy plays a significant part in achieving such standards) promotion and development of indigenous energy resources and increased efficiency in the use of energy. It is Government policy to forego the nuclear option because of unacceptable risks to public health and safety.

### Ireland's estimated primary energy consumption

1990

	000's toe	Percentages
Peat	1439	14.36%
Coal	2243	22.37%
Oil	4759	47.47%
Gas	1502	14.98%
Hydro	82	0.82%
Total	10025	100%

Source: Department of Energy, Dublin

Energy policy is directed by the Department of Energy but involves other Government Departments. For example, the Department of Energy and the Department of the Environment work closely together to integrate environmental and energy policy considerations. Government owned agencies play an important role in the energy sector. One company, the Electricity Supply Board (ESB), generates most and distributes all of the nation's electricity. EOLAS, the Irish Science and Technology Institute, coordinates energy research and development and provides technical and scientific advice to Government. In 1990, almost one third of Ireland's primary energy needs was supplied from indigenous energy resources but there is still considerable reliance on energy imports. However the situation has greatly improved since 1979 when Ireland was dependent on imported petroleum for 70% of its total primary energy supply (TPES). Since then, due to production of natural gas and peat and increased imports of coal, imports of and dependence on petroleum has been reduced to 42% of TPES.

## Natural gas

Ireland has only one producing natural gas field, the Kinsale Head Field, situated 50 kilometres offshore from Cork harbour. It was discovered by Marathon Petroleum Ireland Ltd. in 1971 and went into production in 1978. All the gas is sold to Bord Gais Eireann, (BGE) the Irish Gas Board, the State-owned natural gas transmission and distribution company. Production in 1990 was about 2 billion cubic metres. At present consumption levels, the field is expected to last into the next decade.

Under an agreement with the Minister for Energy in 1988, Marathon is now carrying out further exploration in the Celtic Sea. Its first well, drilled in March 1989 and located close to the Kinsale Head Field, discovered a small gas field. Production from the Ballycotton field, as it is now called, is expected in late 1991. Estimated reserves by Marathon are in the order of 2 billion cubic metres. The field will be developed by means of a sub-sea system which will pipe gas to the Kinsale platforms. This represents the first sub-system in Ireland and may prove to be a model for small fields in the future.

Government policy is to continue exploration for gas offshore. BGE has been successful in extending the national gas grid and increasing consumption in premium markets. However the likelihood is that any additional deposits may not be sufficient to meet demand in the next century. Consequently, negotiations are at an advanced stage between the Irish and British authorities in order to build a gas interconnection. Such an interconnection could, of course, be equally used for exports in the event of a surplus to domestic requirements. Sub-sea surveys of possible routes have already been carried out and with the assistance of aid under the EC REGEN initiative an interconnecting gas grid could be in place by winter of 1993-94. This development is in line with Government policy to improve security of supply and with Community policy to achieve an internal energy market.

## Peat

Bord na Mona, (the Irish Peat Board), was established as a State body to develop the country's peat reserves. It produces milled peat and machine turf, for use in the ESB's peat burning stations, and machine turf and briquettes for general industrial and domestic use. It also produces horticultural peat products for a worldwide market.



*Peat harvesting on Bord na Mona bog, Ireland*

Production in 1990 was 4.5 million tonnes of fuel peat, three quarters of which was sold to the ESB for its power stations and the bulk of the remainder compressed into briquettes for the domestic market.

Bord na Mona has achieved substantial progress recently in improving its overall economic position. Its long term policy is to continue to make peat more competitive and contribute an energy input of 15% of total energy demand.

## Coal

Production of coal in Ireland ceased in 1990 with the closure of Arigna coal mine. The adjacent 15 MW power plant is expected to close when coal stocks are used up. Coal for the coal-fired plants at Moneypoint, County Clare is imported and consumption in 1990 was 1.9 tonnes (estimated) a slight decrease on 1989.



*Moneypoint coal-fired station, Co. Clare, Ireland*

The sale and distribution of bituminous coal has been banned in Dublin city, built up areas of the county and adjacent areas, by legislation effective from 1 September 1990 for environmental reasons. However, coal remains an important fuel for residential heating with over eight hundred thousand tonnes consumed in 1990. In the

industrial area over half a million tonnes were consumed. The commercial sector accounted for only 0.3% of coal consumption.

## Renewable energies

Policy in this area is to encourage and promote development of renewable energies where it can be demonstrated that it is technically and financially feasible to do so.

### Hydro

Most of the potential for hydro has already been harnessed. The ESB has 512 megawatts (MW) hydro-capacity of which 292 MW is pumped storage. An additional 4 MW is supplied by private contractors. A survey of potential small hydro resources carried out in 1985 showed that, for sites capable of producing more than 10 kW, a total technical capacity of 38 MW existed of which over 4 kW was in operation at the time of publication. Much of the remaining potential is associated with technically difficult sites and their development will depend on changing economic and environmental conditions.

### Wind

In the mid-1980's a windpower demonstration programme was undertaken involving several small turbines located on the southern and western coasts. The results were mixed but the experience provided useful information on the use of wind turbines in the Irish context. In 1989, a study of sites suitable for windfarm development was completed. More recently, proposals were invited from interested parties for the construction and operation of Ireland's first windfarm. This project will be carried out with the assistance of the Community. Contracts are to be placed shortly involving use of 'state of the art' technology by a Danish turbine manufacturer.

While research and demonstrations have taken place on other renewables (solar, wave, biomass, etc.), the potential for commercial development of these energy forms is less certain than in the case of hydro and wind energy. While certain systems are now beginning to be adopted on a limited commercial scale, Government and the private sector monitor developments in this area and participate in technical developments through programmes such as the Community demonstration programme.

## Oil

Over 100 exploration wells have been drilled to date in the Irish offshore but while there is evidence of the presence of oil, no deposits large enough to support commercial development have yet been found. However a recent development has taken place in that an Irish operator intends to carry out a feasibility study regarding commercial development of the Helvic field, located in the Celtic sea. Any proposals for development will be subject to the Minister's approval.

Government policy is to maintain and increase if possible the level of exploration in recent years. The success of this policy depends very much on the economics of oil exploration and development which, in the Irish context, depends, inter alia, on the current price of oil, advances in deepwater technology and depletion of other reserves (e.g. in the rest of Europe). Interconnection with the UK will have some implications, both positive and negative, for exploration.

Ireland is entirely dependent on imports to meet its oil requirements. 65% of its refined oil requirements are imported, the rest is supplied by the country's single refinery at Whitegate in Co. Cork which is operated by the Irish National Petroleum Corporation. Under a Government Order, requiring importers to purchase 35% of their gasoline and gas oil from Whitegate, the State, in the interests of security of supply, can maintain its indigenous refining capability and ensure that a portion of its oil imports are in the form of crude oil. Such need to ensure security of supply has been deemed valid by the EC Court of Justice. Partners are being sought to upgrade the refinery and improve its commercial position.

There has been a marked decrease in primary oil consumption in Ireland from 74% in 1973 to 47% in 1990. This is mainly due to the increased use of coal and natural gas in the power generating sector.

Five multinational oil companies supply around 70% of the country's oil products. The market for automotive diesel fuel and gasoline is regulated by the government in order to avoid any possible abuse of power by the multinational oil companies.

At the moment Ireland has a satisfactory level of oil stocks, (held at Whiddy and other locations), amounting to approximately 107 consumption days.

## Electricity

The Electricity Supply Board is responsible for generation and distribution of Ireland's electricity. Effective generating capacity in 1990 was 3.932 MW. Ireland has no interchange of electricity with another country. The energy sources of units generated in 1990 were as follows:

Coal	42%
Natural gas	27%
Peat	16%
Oil	10%
Hydro	5%
Total	100%

The Board is examining various longterm supply options as demand grows and as some plant reaches the end of its useful life. Options being considered are the re-commissioning of some moth-balled power plants and the construction of new gas-fired plants. This possibility will be examined in the light of progress of interconnection with the UK gas network. The possibility of an electricity interconnector with the UK is also being examined jointly by the ESB and the National Grid Company in the UK (which is responsible for transmission of electricity within the UK and interconnection with grids outside UK). In addition the development of technology to minimize the environmental effects of coal will be monitored. The Board is also committed to reducing growth in peak demand for electricity e.g. by offering attractive night rates. Promotion of industrial combined heat and power plants (CHP) will also be pursued by the Board.

The Board will comply with EC and internationally agreed limits on emissions of SO<sub>2</sub> and NO<sub>x</sub> from power plants.

## Energy efficiency

The Irish Government is committed to improving energy efficiency which not only reduces the level of harmful emissions in the air but also reduces the dependence on outside energy sources as well as improving the competitiveness of the Irish economy.

A large part of the Department's energy efficiency programme is implemented on its behalf by EOLAS. This includes the provision of information brochures on energy efficiency, publicity campaigns, seminars and workshops. Regional Energy Officers offer on the spot advice to industry and other sectors on energy-related matters. I

addition, grants are available from the Department of Energy for the carrying out of fuel efficiency surveys in certain sectors. A major project was undertaken last year to investigate the potential of using groundwater in conjunction with heat pumps, in Dublin city. A further project to be carried out in 1991 involves an investigation of the potential for energy savings in two hospitals by installing energy management systems.

## Energy and the environment

The Environment Action Programme launched by the Government in January 1990, sets out the environmental policies for the 1990's. This policy takes account of the concept of sustainable development, as advocated in the Brundtland report, the need for precautionary measures to

protect the environment and calls for environmental considerations to be integrated into all policy measures.

From February 1990 all major developments require an Environmental Impact Assessment as part of the planning approval process. In September 1990, the problem of urban smog was addressed with a ban on the sale of bituminous coal in the Dublin area which had the effect of greatly improving air quality. Progress should be maintained as conversions of heating systems to environmentally friendly fuels, such as natural gas, continue.

Ireland has signed the Sofia Protocol on the control of NO<sub>x</sub> emissions and is, at present, preparing to accede to the Helsinki Protocol on SO<sub>2</sub> emissions. Ireland is also party to the agreement of EC Energy and Environment Ministers (October 1990) to stabilise Community CO<sub>2</sub> emissions at 1990 levels by the year 2000.

# Energy Council of 31 May

## Main achievements

Directive on natural gas transit adopted; consensus reached on SAVE programme; further examination of the oil-crisis proposals; favourable reaction to the European Energy Charter

*Community Energy Ministers formally adopted a Directive on natural gas transit at their May meeting. Following on from adoption last year of Directives on gas and electricity price transparency and on electricity transit, this marks the completion of stage one in the liberalization of the Community energy market, a process set in motion two years ago on the initiative of Energy Commissioner, António Cardoso e Cunha, who represented the Commission at the Energy Council.*

*A broad measure of agreement was also reached on the SAVE programme which should be formally adopted as soon as the financial aspects have been finalized.*

*The Ministers then turned their attention to the Commission's proposals to reinforce the Community's contingency arrangements for dealing with oil supply crises. They agreed on the need for such arrangements at Community level and decided that procedures put in place twenty years ago should be updated. They called on the Commission to re-examine its proposals, which will then be discussed further within the Council.*

*Ministers ended their meeting with a debate on the European Energy Charter. Three weeks later, Foreign Affairs Ministers agreed that the International Conference to negotiate the Charter should be launched on 15 July.*

## Transit of natural gas through grids

Having concluded the cooperation procedure with the European Parliament, the Council adopted by qualified majority a Directive on the transit of natural gas through grids.

The Directive, which Member States must comply with by 1 January 1992, is designed to help achieve a more integrated European energy market by removing obstacles to increased natural gas transfers between transmission grids.

The Directive is a logical extension of a Directive adopted in October 1990 on the transit of electricity through grids and its content may be summarized as follows:

Member States are required to take steps to facilitate the transit through their territory of natural gas between high-pressure grids. Transit is defined in this case as any natural gas transmission operation meeting the following conditions:

- (a) transmission is carried out by the entity or entities responsible in each Member State for high-pressure natural gas grids, with the exception of distribution grids, in a Member State's territory which contribute to the efficient operation of European high-pressure interconnections;
- (b) the grid of origin or final destination is situated in the Community;
- (c) transmission involves the crossing of at least one intra-Community frontier.

The Directive contains a list of the gas transmission grids involved and of the bodies responsible for them in the Member States. The list will be updated by the

Commission, after consultation with the Member State concerned, whenever necessary.

Contracts involving transit of natural gas between grids will be negotiated between the companies responsible for those grids and for the quality of service provided and, where appropriate, with the entities responsible in the Member States for importing and exporting natural gas.

Conditions of transit will, in accordance with EC law be non-discriminatory and fair for all parties concerned. They will exclude unjustified restrictions and will not endanger security of supply or quality of service, taking full account

A blueprint of SAVE was presented by Commissioner Cardoso e Cunha at the previous Energy Council on 29 October 1990. Its primary purpose is to contribute to improved use of energy, with a view to reducing by 1995 energy use per unit of GNP by 20%.

The programme provides for Community funding ranging from 30 to 100% of the cost of projects under four categories:

- technical evaluations for assessing data needed for defining technical standards or specifications;
- measures to support Member States' initiatives for categories:
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He also noted requests on the part of several delegations for the Commission to re-examine its proposals on this matter.

Ministers referred the question back to the Permanent Representatives Committee so that it could be discussed at a future Council meeting.

## European energy charter

The Ministers reacted very favourably to the broad thrust of a Commission Communication on a proposed European energy charter.

In particular they focused on the wording of the draft charter which will serve as a basis for the EC's position at the forthcoming International Negotiating Conference on the charter.

EC foreign Affairs Ministers, who met in Luxembourg on 17 June agreed to launch the Conference on 15 July, and negotiations are expected to continue right up to the end of the year.

A separate article in this edition of *Energy in Europe* outlines this major proposal.



# Community news

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## Energy Commissioner seeks greater competition in energy sector

*Energy in Europe* reprints below extracts of a keynote speech given by EC Energy Commissioner António Cardoso e Cunha on 10 June 1991.

The speech, delivered to a conference of the International Union of Energy Producers and Distributors (UNIPED) is a significant one in so far as it argues for greater competition in the energy sector. It is particularly noteworthy as it was made shortly after the completion of work by the EC's consultative committees on access for third countries to gas and electricity networks (see next article in *Community news*) as well as the adoption by Energy ministers of a Directive on natural gas transit.

(...) 'The European Community has firmly and irrevocably accepted the development of the single market and the internal energy market. Moves towards the achievement of these aims have already been made and will affect all sectors of activity including industry, transport and, not least, the electricity supply sector. These are fundamental political decisions and the question that the European Commission has to answer is not whether to go forward, but how to do it. This movement, whatever its ultimate time scale, is irreversible. This climate change of perceptions and attitudes, is already upon us, whether we like it, or not.

The evolution of European society is such that our citizens, agents of the largest world market, supporters of the tradition that considers Europe as the nest of western civilization, cannot accept any longer being frequently delayed in airport departures because 'slots' have been reserved for the national airline, which, quite often, is not using them! This is why the EC Commission is active in liberalising air transport.

### Citizens of Europe

- cannot accept that road transport is becoming impossible, even if they know that 30% of traffic is made up of empty return trucks! This is why the EC Commission wants to rationalise road transport;
- cannot accept the limitation to gas and electricity transit through networks which have technical capacity of transport but are linked to exclusivity contracts; this is why we are insisting on some kind of freedom of access;
- cannot accept rail gauges which are not uniform across the continent;

- cannot accept that even simple actions like the use of an electric razor can become impossible by lack of standardization of domestic power sockets.

### Citizens of Europe

- cannot accept that mobile telephones become useless as soon as a national border line is crossed, despite the fact that this border is disappearing;
- cannot accept different international dialling codes, different speed limits, and, progressively, different currency units, even different external policy, security and defence concepts!

We must, all of us, recognize that fundamental political change is under way. The force of integration is far bigger than the forces of stability. True leaders of society are not those who, in a very competent way, take care of the business of every day. With great respect, those are accountants and notaries.

Leaders are those who can complement visibility with *vision*, those who have the capacity of seeing what is not yet visible.

This is why, in my opinion, reasons advanced by those who want to maintain the *status quo* do not correspond to the true picture.

It is, in my judgement, unacceptable to leave the control of commercial practices of electricity producers, transports and distributors to national authorities, because, more often than not, governments are major shareholders and - even worse - complacent shareholders!

It is not reasonable for the electricity industry to complain about prohibition on access to cheaper raw materials, or various environmental, fiscal and financial conditions, and not conclude that the best way to end those constraints is to open the markets and liberalize the networks!

It is very much doubtful that free access to networks will freeze investment, when we see (*certainly in a preliminary step*) that the largest investments of the sector today, are located in the only market that is being, in a considerable way, liberalized!

There is a social and political movement towards liberalization of the last closed sectors of the economy that overcome our individual wills and are being imposed all over the world. What we are doing here in Europe is not an isolated move, countries as far away as New Zealand, for instance, are following exactly the same track.

However, it would not be honest to hide the fact that, in the Community electricity supply sector, important progress has been made. An improved system of consumer price transparency has already been established and we are convinced that transparency of prices must be extended to all areas of the market which are not fully competitive. As far as *transparency of costs is concerned* everything depends on the degree of competition. A competitive system does not need a system of transparency of costs. This is entirely consistent with the concept of a market in which the participants have choice, the choice of remaining in a regulated environment or making binding, bilateral, arrangements.

Rules have been set for the transit of electricity across grid systems and national frontiers. Here again the accent is on choice, subject only to reasonable technical and economic constraints. The active cooperation of the supply industry, after some initial hesitations, is an encouraging sign of changing attitudes.

The question of third party access to grid systems has been discussed at length and with some animation in two EC consultative committees. Whilst, not unexpectedly, differing viewpoints were put forward, a number of elements are clear. It is certainly possible to devise a system of third party access, at least as a right, even if not yet as an obligation, whilst preserving the integrity and security of the supply system. Such a system, operated on the basis of the choice of consumers and producers, can be an incentive to improved economy and efficiency but requires modifications to the operational structure of the market to accommodate special cases, for example automobile producers. Furthermore, if I want to keep an indisputable profile of equity, I must accept that all this philosophy involves an element of risk.

In an open market, risk is a normal condition of life for investors and we should not shrink from the acceptance of balanced risks for everyone. It is the task of the participants to decide the level of risk that is acceptable to them and weigh advantages, for example of increased security of supply, against increased costs.

New thinking is required, to separate the absolute from the unnecessary and to question the concepts which have led to the present operational structure of the industry and the notion of the obligation to supply.

In the European '*électricité sans frontières*', there is no place for any national or even intellectual frontiers. The status quo is not sacrosanct; what is needed is a positive attitude to change. Having said that, the Commission, for its part, will take a pragmatic approach in formulating new proposals affecting the electricity supply sector. We must recognise those aspects of the sector which work well, assist the aims of the internal market and be careful not to throw out the baby with the bath water!

What I can say about the way in which the Commission is approaching the formulation of new proposals is that we are not afraid of the word or concept 'competition' and we are suspicious of the words or concepts 'monopoly', 'exclusive rights', 'vertical contracts' and 'exclusivity clauses'. We are seeking a harmonised Community situation which favours the economic optimisation of supply in the interests of the consumers. We are pleased to note that, in many Community countries, there is already evidence of new thinking on the operational structure of your industry and on relationships with its customers. I am sure that the presentations and debates at this conference will provide further food for thought and reflection.

The Commission's declared intention to remove monopolies which are in conflict with the development of the internal market is, of course, well known. An excellent example of changing approaches brought about by this policy is the Commission's intention to remove monopolies for the import and export of electricity. A number of Member States were identified as having such legal monopolies. It is very helpful to see that already one Member State, Portugal, has decided to revise its legislation and remove obstacles to Community principles. It will now be possible to exclude Portugal from legal proceedings initiated by the Commission. Indeed, Portugal has gone further by introducing changes in the structure of its electricity supply industry which contribute to the creation of a more open market and the more rational division of responsibilities and functions. You can understand how this move is particularly important for me.'

(...) 'The integrated, high voltage grid system of the Community countries is, of course, inextricably linked with the systems of non-Community countries. We will be endeavouring to obtain rights of transit comparable with those in the new transit Directive in these inter-linked countries in order to maximise the practical utility of transit opportunities in the interests of the Community. Steps in this direction have already been taken with the EFTA countries and with Yugoslavia and this approach will be taken with the eastern European countries in due course. We believe that this approach will contribute both to increased electricity exchanges and to further optimisation of the systems. But I know it will not be easy!

In order to ensure an optimum level of electricity exchanges, and adequate infrastructure is essential. The Council of Ministers has recognised this, with the allocation of some of the Community's structural funds to the development of infrastructure. We are now building on the acceptance of this principle by proposing measures to identify key interconnection projects and to support feasibility and other related studies, as well as possibly labelling them of special Community interest.

The integrated grid system in the Community is the product of technology, management and operation skills. Advanced as these are, the full economic and security benefits to be obtained from an increasingly large network can only be obtained by the use of even more advanced technology and the further development of skills. It is up to industry to respond and it has the capacity to respond.

For our part we will be cautious in the move for more competition not to endanger the high quality of the present service, by accepting the introduction of safety nets wherever needed to avoid instability of the networks.'

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## Internal energy market

### Conclusions of the consultative committees on third-party access to the electricity and gas grids

The consultative committees on third-party access to the electricity and gas grids in the Community have completed their work. Their reports have been published by the Commission, which chaired these committees and will take their conclusions into account in its work of completing the internal energy market.

The Commission explicitly mentioned its plan to set up these committees - two made up of representatives of the Member States, the other two grouping representatives of the electricity or gas companies and of consumers - in communications to the Council with proposals for directives on the transit of electricity and natural gas (COM(89)336 and 334). Both these Directives have now been adopted by the Council.

Consultations were needed to discuss in greater depth not only transit but also how to build the large Europe-wide market in electricity and gas by 1992, to step up competition and to give consumers a wider choice.

The committees were asked to identify the main technical, economic and administrative considerations. Whenever necessary, they also tried to clarify the points on which there was agreement or disagreement.

This analysis and clarification has been successfully completed. Members of the committees played an active part in the indepth discussions to share their expertise and compare their views on this important, complex topic.

Mr António Cardoso e Cunha, EC Energy Commissioner, thanked the committees for their work. 'The reports make an essential contribution to the debate on greater competition in the energy sector and provide a basis for

formulating the broad lines of policy on the European gas and electricity market' he said.

Copies of the consultative committees reports are available free of charge on request from the Editor, *Energy in Europe*, DG XVII, Commission of the European Communities, 200 rue de la Loi, B-1049 Brussels (fax: 235.0150).

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## Energy Commissioner attends IEA Ministerial

Commissioner António Cardoso e Cunha represented the EC Commission at the International Energy Agency (IEA) Ministerial held in Paris on 3 June. The meeting brought together Energy Ministers from IEA member countries to define the broad lines of the organisation's work over the next couple of years. In his statement to the meeting, the Commissioner welcomed the forthcoming accession of France and Finland to the IEA, and stressed the increased strength and effectiveness this will bring. He also noted that with all Community states now IEA members, the Commission intends to seek a more formal role for representing the Community within the IEA.

With respect to the main energy policy issues discussed, the Commissioner stressed the central role of the Community and the Commission in cooperation with Eastern Europe and the USSR. He noted the wide range of cooperation activities, reflecting the general economic and social areas of competence of the European Community, and their political importance as a concrete way of integrating East and West Europe. 'They have the objective of furthering prosperity and stability across the continent, to the benefit of Europe, but also of the world'.

It is in this broad context of cooperation activities that the European Energy Charter should be seen he said. But the Charter is also based on certain specific complementarities: the complementarity of resources, technology and markets; the possibilities for further physical interconnections for gas and electricity networks; the possibilities for energy trade and cooperation; and the common concern with environmental issues, energy saving and security of supply. Despite its central European character however, the Commissioner said that the Charter, which is to set down the ground rules for cooperation and help establish a climate of confidence, would be non-discriminatory: 'The job to be done is so massive and pressing that all those who have a contribution to make must cooperate in the tasks which lie ahead'.

Turning to another major item for discussion, the Commissioner noted that although the Community had agreed CO<sub>2</sub> stabilisation targets by the end of the century

in order to help combat the greenhouse effect, current plans to reduce CO<sub>2</sub> emissions are not sufficient to meet this objective. 'Further action is therefore needed and in our view no option can be ruled out until it has been fully examined. One such option is the use of additional fiscal instruments'. The Commissioner went on to say that such action would also help avoid the tightening of energy markets in general and the detrimental effect this has on the developing world in particular.

Notwithstanding the possible use of such instruments, the Commissioner confirmed his full support for the maximum use of market forces in the energy sector and endorsed references to this in the communiqué issued by the IEA Ministers. Concluding his remarks, the Commissioner noted the global nature of the challenges facing the energy world and the full and active part the Community intends to play in meeting these challenges.

## Progress on Europe-Maghreb gas link

Plans to build a gas pipeline between the Maghreb countries and Europe were submitted on 28 May 1991 to the EC Commissioners for Energy and for Mediterranean Policy, Messrs Cardoso e Cunha and Matutes respectively.

The Algerian Minister for Industry and Mining and current Chairman of OPEC, Mr Sadek Boussena, the Moroccan Minister for Energy and Mining, Mr Driss Alaloui, and the Spanish Minister for Industry presented the plan which was agreed by their three governments in Madrid on 30 April. The plan is to supply Western Europe with natural gas from Algeria, across the Straits of Gibraltar.

By the end of 1995 this pipeline will supply Spain with natural gas. All three countries have also committed themselves to taking the measures necessary for the pipeline to supply other European countries with natural gas from Algeria. The plan has been submitted to the Community in a bid to gain its support for this scheme of major importance to its energy supply policy. Cooperation between these three countries in the energy field will strengthen their economic ties and consolidate cooperation between them and also between the rest of the Maghreb countries and the EC.

The pipeline will run from the Saharan gas fields in Algeria to Seville. The total investment required will be \$ US 1 300 million. The pipeline will be capable of carrying up to 10 000 million m<sup>3</sup> of gas every year. In the second phase, when other European countries are also connected and drawing off considerable supplies of gas, this capacity will be doubled to 20 000 million m<sup>3</sup>.

The project will pave the way for greater integration in the energy field between the individual Maghreb countries and between the Maghreb countries and Europe. It will allow Algeria to increase its gas exports substantially; will generate transit fees and provide a new source of energy for Morocco.

From the point of view of Europe, the plan marks a significant step forward in the policy to maintain a balance between energy supplies to the North and South of Europe, to match the parallel efforts being made for the East and West.

## 23rd Offshore Technology Conference - Houston, Texas, 6-9 May 1991

1,300 exhibitors from 20 different countries, packed into the Astrodome, next door to the famous Astrodome - some brave exhibitors even enduring the Texan heat and humidity outside the hall. 40,000 visitors from all over the world, with long queues waiting to register throughout most of the day - a large number from Texas, of course, the centre of the American oil industry; but just about every oil-producing country in the world (and some others as well) represented. This is the Offshore Technology Conference, the single most important worldwide event for the oil and gas industry each year, held in Houston for the 23rd time this year for four days between 6-9 May.

For the very first time the European Community was represented at the Conference, with a stand organized by the Directorate-General for Energy of the Commission, in the framework of its Thermie programme for the promotion of European energy technologies. Over the course of the four days several thousand people visited the stand, asking questions or taking some of the literature available.



Stand organized by the Directorate-General for Energy

Five companies who have received financial backing from the Community to develop new technologies participated on the stand, with working models to show the successful results of their projects, and to make contacts with businesses which might implement these new technologies. In this way the benefit from the Community's financial support is maximised, through widespread application of these technologies. Frequently the representatives from these companies were spotted deep in conversation with interested enquirers, thus testifying to the success of their collaboration with the Community.

Around 3 tonnes of literature was shipped to Houston, and very little of it had to be brought back to Brussels. Particularly popular were the booklets describing Community policies in areas such as energy, environment, central and eastern Europe, taxation and social policy. Those visiting the stand were concerned not only to discuss technical hydrocarbons matters, but also to ask about matters of energy policy and wider developments within the Community ('Is this 1992 business really going to go ahead?' was a favourite question).

The Community's participation in the 23rd Offshore Technology Conference can be judged a great success, in terms of increasing awareness of the achievements of its technology programmes, ensuring that they have a greater impact, and increasing awareness of developments in the Community in energy and other fields. Based on this experience, Community participation at OTC could become an annual event, justified under the Thermie programme's measure's to promote European energy technologies.

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## EC/USA high level energy talks, Washington, 2 May 1991

Director-General C.S. Maniopoulos led the Commission delegation in these annual talks with the US Administration (Departments of Energy and State).

Energy is currently high on the political agenda and items for discussion included the European Energy Charter, energy security and the Persian Gulf, energy policy on both sides of the Atlantic including the US National Energy Strategy, energy cooperation with east European countries and the USSR, the International Energy Agency (IEA) Ministerial on 3 June and global warming.

The US side said they were satisfied with the Commission's draft European Energy Charter and urged full US participation.

The Commission side noted the growing divergence between the US on the one hand and the EC and Japan on

the other over energy pricing and taxation. The US National Energy Strategy concentrates more on energy supply than action on energy conservation.

The talks were conducted in a frank and open manner with the Americans paying close attention to the Community position.

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## 11th annual meeting of COPED, Dakar, Senegal, 21-26 April 1991

The Co-operative Programme on Energy and Development (COPED), a network of EC supported energy policy and research institutes located both in Europe and developing countries recently held its eleventh annual meeting in the Senegalese capital Dakar. COPED member institutes are:

- Arab Centre for Energy Studies, Kuwait;
- Asian Institute of Technology, Bangkok;
- COPPE-AIE Energy Department of the University of Rio de Janeiro;
- ENDA , Dakar;
- IDEE of the Bariloche Foundation in San Carlos de Bariloche, Argentina;
- IEPE , Grenoble University, France;
- IIE , Cuernavaca, Mexico;
- INET , Tsinghua University, Beijing;
- SPRU , University of Sussex, Brighton, UK;
- TERI, New Delhi, India.

The meeting reviewed the organisation's activities over the preceding year and outlined appropriate research topics for 1991/92. The results of a common core study undertaken by the member institutes in 1990/1991 on the subject of the electricity systems in developing countries were presented. It was also agreed that next year's core study will focus on the regulatory, institutional structure and the performance of the electricity sector in developing countries. A special feature of this year's meeting was the participation, as observers, of representatives of two East European energy institutes.

The EC has given 0.7 MECU in aid to the COPED network over the past 12 months.

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## **Visit of Commissioner Cardoso e Cunha to China, 9-12 April 1991**

After a visit to Japan where he addressed the Japanese Atomic Industrial Forum, Commissioner António Cardoso e Cunha visited the People's Republic of China from 9 to 12 April 1991, accompanied by Mr Clive Jones, Deputy Director-General for Energy.

The Commissioner had talks with the Vice Mayor of Shanghai, the State Councillor and Chairman of the State Science and Technology Commission, representatives of the Ministry of Energy, the State Planning Commission and the National Nuclear Safety Centre.

Mr Cardoso e Cunha reviewed EC-China cooperation in the energy area and saw on-the-spot results of EC activities in China. These include training in energy management through the five EC-China energy management centres; technical support in electricity dispatching; training in nuclear safety (in anticipation of the completion of China's first nuclear plant) and research at several academic institutions.

And he signed an agreement providing Community support to China in the energy field for 1991. The agreement covers: energy policy and energy conservation, training, nuclear safety, electricity and natural gas and energy technology transfer.

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## **China-India Workshop, Jaipur, India, 11-12 April 1991**

A two-day workshop to discuss the findings of the EC sponsored study on the comparative energy situations of China and India recently took place in India.

Participants included researchers from Tsinghua University (China) and the Tata Energy Research Institute (India) and Government officials and policymakers from both countries.

The energy supply and demand situations of the two countries were discussed in relation to the overall economic picture.

Both similarities and differences between the energy supply/demand situations were revealed. However, it was generally felt that in keeping with the overall objectives (that of improving the quality of life of their peoples), the

basic thrust of energy sector developments need to be along the same lines in both countries.

The expansion of conventional, commercial energy forms like coal, oil and electricity was picked out as a major goal in both countries. One of the ways to achieve it was the rationalisation of energy prices, decided the workshop. The generally low level of energy prices in both countries provided neither adequate resources for supply enhancement, nor adequate incentives for conservation. In addition, the need for minimising technological, financial and institutional barriers towards improving efficiency of energy utilisation and demand management were also discussed.

The need to establish close links between research and development (R&D) institutions and industry was also highlighted.

In view of the areas of common concern it was agreed to strive to maintain the dialogue between academics and policymakers of both countries.

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## **Mannheim symposium - 'Energy and the urban environment'**

The experience of twelve European towns and cities with energy management was the focus of a recent symposium entitled 'Energy and the urban environment', held in Mannheim, Germany, on 7 and 8 February 1991. Some 200 participants also learned of the decision to set up a European network of towns and cities to promote energy and environment management ('European Network of Energy and Environmentally Conscious Cities'). The aim of this DG XVII initiative is to create a forum for the exchange of experience and know-how in fields where towns and cities can influence local policy on energy and the environment.

The symposium was however devoted chiefly to promoting awareness among municipal authorities to encourage them to broaden their horizons and intensify their energy management measures, particularly in the context of the internal energy market now in preparation.

In this connection, we welcomed the acknowledgment by the German political authorities that towns and cities can exercise a very important influence on energy-saving and environmental policy, an essential factor underlying security of supply. Their statements gave grounds for assuming that energy policy in Germany now takes account, perhaps more so than in the past, of the need to deal efficiently with the demand for energy.

Mr C.S. Maniatopoulos, Director-General for Energy at the EC Commission explained the principles behind the Community's energy policy and, *inter alia*, outlined the reasons for organized cooperation with the Eastern European countries since three representatives of towns in the Soviet Union were attending the symposium.

There was an exchange of views between many of the municipal representatives and others taking part. Mr Gordon Adam, Member of the European Parliament, fully supported the Commission's initiative and asked the mayors present to participate fully. He promised that the European Parliament would support the Commission's efforts to deal with energy demand and protect the urban environment.

In short, the symposium, held in cooperation with the city of Mannheim as one of the activities of the Accompanying Measures Unit of DG XVII's Community Integration Task Force, was highly successful in presenting to a broad audience the work under way in a field of capital importance to the daily life of millions of people in Europe's towns and cities.

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## Seminar 'The future of energy in Spain and Europe', Madrid, 22 and 23 January 1991

Mr Constantinos Maniatopoulos, Director-General for Energy, attended the seminar on 'The future of energy in Spain and Europe' in Madrid on 22 and 23 January 1991 which was organized jointly by the Spanish Mining, Energy and Oil Clubs. This event attracted some 160 participants, and was as successful as the preceding seminar in January 1988.

The conference on the major challenges facing European energy policy took place against the background of the outbreak of hostilities in the Gulf, when the question of security of oil supplies was uppermost in people's minds.

The Director-General dealt in succession with security of supply, the environment, the internal energy market, in particular the oil market, and, finally, external energy policy.

With regard to the Gulf crisis, Mr Maniatopoulos stressed the need both to continue working towards completion of the internal market in the energy sector and to reinforce the Commission's powers of initiative, as had already been done in connection with the oil crisis mechanism and management of strategic stocks.

The Director-General then concentrated on the consequences of events in the Gulf, which had disrupted the oil market particularly in relation to consumer prices in the run-up to the war albeit mainly for psychological reasons. This disruption had harmed the economies of the EC, the developing countries and Eastern Europe.

In view of the disparate pricing policies of the Member States, the Commission's departments had embarked on an analysis of the various price mechanisms and the prospects for a common initiative, and were studying the possibility of speeding up harmonization of fiscal policies. What was really at stake, he said, was the Community's ability to adopt measures to safeguard security of oil supplies and the political will to protect itself against fluctuations in oil prices, given that the present legal arsenal created by the directives of 1967, 1973 and 1977 had proved to be no longer adequate in the current context of integration of the Community energy market.

On the subject of external energy policy, Mr Maniatopoulos stressed the need, firstly, to intensify the dialogue between producers and consumers, above all through existing links between the Commission, OPEC and the OAPEC in order to make prices and the development of the oil market more predictable and, secondly, for cooperation with the countries of Eastern Europe. Referring to the launch by Commission President Jacques Delors of the idea of a European Energy Charter at the CSCE Summit in November 1990 and later at the European Council in Rome on 14 December 1990, he stressed the significance of this originally Dutch initiative. It would help create a climate of confidence favourable to the optimum use of resources and their export to consumer countries in both East and West. This would in turn contribute to diversification of supply sources, the reduction of imbalances in the international community and scope for tackling environmental problems he said.

Mr Maniatopoulos ended with a review of the evolving geopolitical situation between East and West in Europe and in the Middle East, the Gulf war, the upheavals in the Soviet system and the resulting risks of serious imbalance. He concluded that the only hope for progress, development and peace lies with the European Community, which is a major economic power with political responsibilities and constitutes a coherent entity in terms of its internal and external interests.

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## **ASEAN-EC Energy Management Training and Research Centre (AEEMTRC)**

In the context of activities of the AEEMTRC training courses for 1991 took place at centres in Malaysia, Indonesia, Thailand and the Philippines at the beginning of this year. Topics included energy management practices, ventilation and air conditioning, electricity use and cogeneration. The courses were given by European experts. The efforts of the local organizers: University of Technology, Johor, Malaysia; PT Koneba, Indonesia; the National Energy Administration, Thailand; and the Office of Energy Affairs, Philippines, greatly contributed to the success of the project.

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## **Thermie - busy autumn programme**

A number of major seminars under the Thermie programme will be held during this coming autumn. These events, organized for the Community through the OPET network (Organisations for the Promotion of Energy Technology), represent important activities in stimulating interest and increasing awareness in energy technology on a Community-wide basis.

The autumn programme includes seminars in Greece, Italy, Spain and Germany. These are as follows:

### **New technologies for the use of renewable energy sources in water desalination - 26-28 September 1991, Athens**

The programme consists of a two-day seminar and a site visit. Subject areas to be covered include:

- Europe's desalination and water needs;
- technology currently available;
- legislative, planning and financial aspects;
- manufacturers' and users' experience;
- planning and market development.

The site visit will be to a desalination plant on the island of Mykonos.

Simultaneous interpretation will be provided in English, French and Greek.

### **New technologies for the rational use of energy in the textile industry in Europe - 16-18 October 1991, Milan**

The programme consists of a two-day seminar and a site visit. Subject areas to be covered include:

- the state of the textile industry in the EC;
- energy use in textile production;
- new energy saving technologies for the industry;
- manufacturers' and users' experience.

The site visit will be to a number of local textile companies.

Simultaneous interpretation will be provided in English, French and Italian.

### **New technologies for the use of solar energy in the hotels sector - 13-16 November 1991, Palma de Mallorca**

The programme consists of a three-day seminar (mornings only) with a technical visit. Subject areas which will be covered include:

- current state of thermal and photovoltaic technology;
- manufacturers' and users' experience;
- economic and financial aspects;
- the market situation.

Simultaneous interpretation will be provided in English, French and Spanish.

### **Efficiency in the industrial combustion of coal - 16-17 December 1991, Berlin**

The programme involves a two-day seminar with a site visit to Bewag 100 MW CFBC-power plant. Subject areas to be covered include:

- current technologies for coal combustion in industry and power plants;
- an overview of the situation in the Community and Eastern European countries;
- the market and technology transfer between the Community and third countries.

This event has particular relevance for Eastern Europe and special efforts will be made to encourage attendance of delegates from these countries.

Simultaneous interpretation will be provided in English, French and German.

Further details of these and all other forthcoming Thermie events can be obtained from:

Michel Valdelièvre  
OPET-CS  
18 Av R Vandendriessche  
B-1150 Brussels  
Tel: +32-2-771-5370

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# Document update

## Main Commission energy documents, proposals, directives

COM(91)36 final Communication from the Commission on European Energy Charter

COM(91)53 final Energy planning in the European Community (at regional level) - Communication from the Commission

SEC(91)1199 Community grants and loans to the energy sector in 1989

Reports of the Consultative Committees on Third Party Access to Electricity Networks - May 1991

Reports of the Consultative Committees on Third Party Access to Natural Gas Networks - May 1991

## New energy publications

Energy in the European Community - European Documentation. Office for Official Publications of the European Communities. Luxembourg - ISBN 92-826-1737-8

Collection of legislation and acts relating to energy - Office for Official Publications of the European Communities. Luxembourg - ISBN 92-826-2702-0

Proceedings of Symposium on Energy Issues in EC Islands, Crete, Greece 11-13 November 1990

Proceedings of Symposium on Energy and the Urban Environment, Mannheim, Germany 7-8 February 1991

Inventory of features of the electricity supply sector in the European Community, EN, FR

Le diagnostic du système énergétique dans les pays en développement. Programme de coopération sur l'énergie et le développement (COPED) Rapport EUR 13068 Fr

Thermie - Promotion of Energy Technologies for Europe, Information Activities - CEC, Directorate-General for Energy, rue de la Loi 200, 1049 Brussels

## Promotion of energy technologies for Europe - Flag Brochures

Thermie Promotion of European Energy Technologies, available in all languages.

122 Compact gas treatment process, IFPEXOL. A gas treatment process for hydrate protection, dew point control, dehydration, and acid gas removal - Institut Français du Pétrole (IFP)

123 Subsea maintenance system, IISSPE - Integrated intervention systems for subsea production equipment - Subsea Intervention Systems Ltd (SISL)

124 Unmanned offshore production platform PLATINE - G.E.R.T.H.

125 Manipulator for diver-less intervention (MDI) - A new way for connecting flexible pipes and achieving multipurpose diver-less subsea jobs - Institut Français du Pétrole and Coflexip

126 A manned submersible for offshore maintenance - Thyssen Nordseewerke GmbH

127 Three-phase separator (improvement and test of a compact separator on an offshore platform) - Bertin & Cie

128 Hyperbaric welding THOR-2 (to develop, build and test a fully integrated pipe preparation and welding system) - COMEX

129 Deep water pile driving system (Fabrication and test of a pile driving system for 1000m water depth) - MENCK GmbH

130 Techniques for decommissioning - COMEX, Advanced Mechanics and Engineering Ltd (AME) Tecnomare SPA

131 Cooling of industrial processes using aquifers - NOVEM BV

## Map brochures

Regional and urban energy planning in the European Community. Community action to promote studies.

- Sheet 1 Wallonia (B)  
2 Basque country (E)  
3 Lesbos (GR)  
4 Madeira (P)  
5 Cornwall (UK)  
6 North West England (UK)  
7 Storstrom (DK)  
8 Aquitaine (F)  
9 Berlin (D)  
10 Crète (GR)  
11 Valencia (E)  
12 North East England (UK)  
13 Cyclades (GR)

- 14 Westland (NL)
- 15 Alentejo (P)
- 16 Lombardy (I)
- 17 Southern Jutland (DK)
- 18 Nordfriesland (D)
- 19 Lozère (F)
- 20 Wallonia (B)
- 21 Provence-Alpes-Côte d'Azur (F)
- 22 Eurytania (GR)
- 23 Berlin (D)
- 24 Northern Oberpfalz (D)
- 25 Apulia (I)
- 26 Bornholm (DK)
- 27 Catalonia (E)
- 28 Rhône-Alpes (F)
- 29 Flanders (B)
- 30 Luxembourg (L)

### **Eurostat**

#### **Rapid reports - Energy and Industry**

- 1991-1 The Community coal industry in 1990
- 1991-2 Electricity statistics
- 1991-3 Evolution of inland deliveries of unleaded motor spirit from 1987 to 1990
- 1991-4 Inland deliveries of petroleum products in 1990

- 1991-5 Statistical aspects of the natural gas economy in 1990
- 1991-6 Hard coal - Imports of Eur 12
- 1991-7 Inland deliveries of hard coal and coke in 1990
- 1991-8 Statistical aspects of the oil economy in 1990
- 1991-9 Statistical aspects of the energy economy in 1990
- 1991-10 Hard coal mines
- 1991-11 Industrial trends

International comparisons of energy data 1988, Eur-12 - USA - Japan. Office for Official Publications of the European Communities - Luxembourg

Energy balance sheets - 1988-1989. Office for Official Publications of the European Communities - Luxembourg

#### Energy Monthly statistics

- 1991 - 1
- 1991 - 2
- 1991 - 3
- 1991 - 4
- 1991 - 5
- 1991 - 6

Office for Official Publications of the European Communities - Luxembourg

Energy - Monthly statistics - Glossarium 1991

Office for Official Publications of the European Communities - Luxembourg

# Seguridad de abastecimiento

DG XVII: Concepción de la política (A 1)

*«La seguridad del abastecimiento energético, el mercado interior de la energía y la política energética» es el título de un documento de trabajo respaldado por la Comisión europea el 4 de julio de 1990.*

*Presentado en primer lugar por el comisario de Energía, Sr. Cardoso e Cunha, el documento aportó a los ministros de Energía de la CEE una base y unas indicaciones para lo que se consideraba un debate preliminar muy oportuno en la reunión informal celebrada en Roma el 16 de julio.*

Los dos principales riesgos que plantea la seguridad de abastecimiento son un **alto nivel de dependencia de fuentes externas y la preponderancia de una sola fuente** en el balance energético global.

En 1989 la dependencia externa de la Comunidad ascendió a cerca del 49 % (57 % en 1979 y 45 % en 1985), siendo el petróleo la principal fuente de abastecimiento con el 46 % de cobertura de las necesidades energéticas de la Comunidad y dos tercios de las importaciones a la Comunidad procedentes de los países de la OPEP. La producción real de la OPEP en 1989 llegaba a cerca del 85 % de su capacidad, cifra que se explica por la situación creada durante la segunda crisis del petróleo de 1979. El total de las importaciones de petróleo representa cerca del 36 % de la demanda. Incontestablemente los recientes acontecimientos del Golfo han hecho aumentar la preocupación por el suministro.

En el futuro se producirá probablemente un desarrollo de la industria del gas, sobre todo por el hecho de que la URSS posee el 38 % de las reservas de gas natural del mundo; los planes de construir un oleoducto que conectara Marruecos y Argelia a la red CE atravesando España desempeñarán también un papel importante en este sentido.

El documento de debate de la Comisión empieza definiendo la seguridad de suministro como la capacidad de garantizar la cobertura de las necesidades de energía, mediante los recursos propios adecuados producidos en condiciones económicas aceptables o mantenidos como reservas estratégicas y recurriendo a fuentes externas accesibles y estables complementadas con reservas estratégicas, si procede.

Por una parte, **la consecución del mercado interior de la energía** contribuirá positivamente a la seguridad de suministro en la Comunidad. Como se declaraba en el docu-

mento de trabajo del mercado interior de la energía, «un mercado energético más integrado es un factor adicional importante para la seguridad de suministro para todos los Estados miembros. Con una mayor interconexión de equipos sería posible aumentar la solidaridad entre los Estados miembros y la flexibilidad de la industria. Consecuentemente, habría una mayor disponibilidad de recursos de emergencia en el supuesto de producirse una crisis y se proporcionarían mayores posibilidades comerciales».

Por otra parte, todos los Estados miembros han aplicado **medidas nacionales de apoyo**, o medidas fiscales y administrativas de efecto equivalente a las restricciones cuantitativas para proteger el suministro de energía. Entre ellas se encuentran las ayudas estatales, los acuerdos de suministro a largo plazo, las cuotas de importación, el establecimiento de cupos de mercado, normas de contabilidad y formación de precios.

Las medidas nacionales deberán integrar un marco común para evitar conflictos con los intereses generales de la Comunidad. Puede que sea necesario adoptar medidas complementarias que garanticen un nivel estratégico de seguridad pero éstas habrán de adoptarse y coordinarse con carácter comunitario. Lo que necesitamos realmente es un enfoque comunitario que establezca un equilibrio entre las ventajas derivadas de la seguridad de suministro y los efectos negativos de medidas adoptadas sobre la competencia y el comercio intercomunitario.

El documento de trabajo pretende articular, con la perspectiva del mercado interior de la energía, una **transición del control nacional a la seguridad a escala comunitaria**, política que deberá desarrollarse en etapas sucesivas en estrecha conjunción con la evolución del mercado interior de la energía.

La **primera etapa** implica hacer uso de los instrumentos legales de los que dispone la Comunidad actualmente para

incorporar los distintos sistemas nacionales en un marco común. Con este objetivo, la Comisión preparará un marco global para la ayuda nacional, y analizará la compatibilidad con la legislación comunitaria de cualquier otra medida complementaria adoptada para proteger los suministros. En los próximos años la Comunidad preparará, con la cooperación de los Estados miembros, un estudio para completar la información acerca de las medidas relativas al suministro.

Si tomamos el ejemplo de la electricidad, la Comisión quiere asegurarse, en esta fase, de que la cuota del mercado de electricidad reservado al suministro nacional que resulta de los acuerdos de ayuda a largo plazo no supere los niveles actuales. Posteriormente, definirá un nivel má-

ximo de protección del sector de la electricidad en toda la Comunidad hasta el año 2000. Esta cuota irá reduciéndose gradualmente.

**El objetivo de la segunda fase** será organizar la seguridad de suministro en la Comunidad, aprovechando al máximo la relación de interdependencia y complementariedad que existe dentro de la Comunidad.

En conclusión, hay que resaltar que el documento de la Comisión supondrá un paso importante en la construcción de la política energética común. Ésta es la razón por la que la DG XVII espera recibir comentarios sobre las ideas presentadas en el documento, tanto de los Estados miembros, como de la industria de la energía.

# REGEN: Una iniciativa de política regional para crear redes de energía

DG XVII: Task Force sobre integración comunitaria: medidas complementarias (TF 2)

*El 2 de mayo de 1990, la Comisión acordó lanzar una iniciativa para crear redes de trasvase de energía en las regiones menos desarrolladas de la Comunidad. Dicha iniciativa, denominada REGEN (energía regional), recibirá una asignación de 300 millones de ecus entre 1990 y 1993.*

*La creación de redes eficaces para el transporte de energía, especialmente gas y electricidad, y el refuerzo de las ya existentes contribuirán de manera importante al desarrollo del potencial económico de las regiones que representan el objetivo 1 y a la consecución del mercado interior de la energía. Además de ello, la iniciativa REGEN responde a la petición del Consejo Europeo de Estrasburgo de dar prioridad a las infraestructuras transeuropeas para reforzar la cohesión social y económica entre los doce Estados miembros.*

## El papel desempeñado por las iniciativas comunitarias

Entre las actividades financiadas por los fondos estructurales comunitarios, la Comisión europea puede lanzar «iniciativas comunitarias»<sup>1</sup> destinadas a:

- contribuir a la solución de graves problemas directamente relacionados con la aplicación de otras políticas comunitarias (por ejemplo, la energía);
- fomentar la aplicación de políticas comunitarias a escala regional;
- ayudar a resolver problemas comunes a determinadas categorías de regiones.

Los marcos de ayuda comunitaria, ya acordados, se basan en planes de desarrollo regional, mientras que las iniciativas comunitarias son programas transnacionales creados por la propia iniciativa de la Comisión.

Entre 1989 y 1993, se dispone de un total de 60300 millones de ecus (precios de 1989) para los fondos estructura-

les,<sup>2</sup> 5500 millones de los cuales han sido asignados a las iniciativas comunitarias. Además, puede accederse a préstamos (BEI y CECA).

Debido a la cantidad relativamente pequeña de dinero, en parte, las iniciativas comunitarias se han centrado en proyectos con grandes repercusiones en el desarrollo de las regiones desfavorecidas de la Comunidad, incluidas las regiones menos desarrolladas del objetivo 1.<sup>3</sup>

## Las repercusiones de REGEN

Las regiones atrasadas y/o periféricas tienen la particular desventaja de no estar integradas en las redes comunitarias de transferencia del gas natural y la electricidad. REGEN se ocupa de este problema, acelerando el proceso de integración y reforzando la interconexión entre las redes comunitarias.

Los proyectos sobre redes energéticas han sido considerados prioritarios por los Estados miembros, pero son también de gran interés para la Comunidad. Las inversiones en este terreno son cruciales para la competitividad futura de la industria en algunas de las regiones desfavorecidas

<sup>1</sup> La base jurídica de las iniciativas comunitarias queda registrada en el artículo 11 del reglamento (CEE) nº 4253/88. En cuanto al Fondo Europeo de Desarrollo Regional (FEDER), véase el apartado 2 del artículo 3 del reglamento (CEE) nº 4254/88.

<sup>2</sup> Fondo Europeo de Desarrollo Regional, Fondo Social Europeo y Fondo Europeo de Orientación y de Garantía Agraria.

<sup>3</sup> Grecia, Portugal, Irlanda y parte de Italia, España, Francia (territorios de ultramar y Córcega) y Reino Unido (Irlanda del Norte).

de la Comunidad y constituirán, en sí, una gran contribución a la consecución de la cohesión económica y social.

Igualmente, posibilitarán la sustitución de los hidrocarburos y combustibles sólidos por fuentes de energías limpias, contribuyendo de esta manera a la mejora de las condiciones ambientales. Por último, estas inversiones contribuirán a la realización del mercado interior de la energía y, a medio plazo, mejorarán la seguridad de suministro energético y el funcionamiento de la red de energía de toda la Comunidad.

## Contenido de REGEN

La diferencia que presenta la iniciativa propuesta con respecto a otras iniciativas comunitarias estriba en que ya se conocen los principales elementos de los proyectos. Las inversiones en los sistemas de transmisión de energía se planifican realmente a largo plazo, por lo que la ayuda comunitaria a través del actual FEDER puede aplicarse únicamente a proyectos que hayan alcanzado la suficiente madurez como para ser emprendidos antes de que termine 1993, plazo límite para los compromisos presupuestarios acordados.

Otra característica de REGEN es que un número reducido de grandes proyectos se concentran en las regiones del objetivo 1, dado que la Comisión dispone de fondos limitados (300 millones de ecus).

Podrán ser seleccionados proyectos directamente relacionados con redes de gas natural y, en menor grado, redes de electricidad en regiones atrasadas que tienen estructuras insuficientes e inadecuadas.

Se concederá ayuda comunitaria a los siguientes proyectos conforme al grado de avance y el coste estimado asignado antes de 1993:

- a) creación de instalaciones de recepción y redes de transmisión para la introducción del gas natural en algunas regiones de Portugal y Grecia;
- b) un interconector para transmisión del gas que una las redes de Irlanda y el Reino Unido;
- c) la inclusión de Córcega en una posible futura interconexión entre las redes de transmisión de gas de la península de Italia y una red de transmisión que se construirá en la isla de Cerdeña;

- d) la creación de enlaces entre los sistemas de transmisión de gas en España y los planificados en Portugal;
- e) la interconexión entre las redes de distribución de electricidad en Italia y las de Grecia.

En dichos proyectos, la contribución de la Comunidad partirá de los trabajos que probablemente se realizarán en el período 1990-1993, y de una valoración de los planes financieros para garantizar el equilibrio adecuado entre las ayudas y los préstamos. De los análisis coste/beneficios de los proyectos propuestos se derivarán datos económicos y técnicos, el período de amortización de la inversión previsto y otras ventajas, como el efecto sobre la política regional de precios, la mejora de la seguridad de los suministros energéticos y las repercusiones de los proyectos sobre el medio ambiente.

## Ejecución de REGEN

La Comisión adoptó una decisión final respecto de REGEN el 12 de diciembre de 1990, tras recibir un dictamen favorable del Parlamento Europeo, el Comité Económico y Social y el comité regional correspondiente.

La Comisión insta a los Estados miembros a crear, a la mayor brevedad posible, programas operativos siguiendo las directrices mencionadas en la iniciativa REGEN y publicadas en el Diario Oficial (DO C 326 de 28.12.1990).

## Conclusión

En conclusión, es de destacar que la iniciativa REGEN traspasa la impresión inicial de mera cofinanciación de una serie de proyectos de transmisión de gas natural y electricidad en las regiones desfavorecidas de la Comunidad Europea. Contribuirá en gran manera a consolidar la cohesión económica y social, objetivo básico del programa.

Se ha de considerar la iniciativa REGEN como parte de un enfoque integrado comunitario hacia la creación de redes transeuropeas en el sector de la energía. En este documento se han aportado consideraciones generales basadas en los principios de creación de sociedades y de subsidiariedad sobre cómo mejorar el papel que desempeñan las infraestructuras energéticas en la creación del mercado interior de la CEE.

# Planificación energética en la Comunidad Europea (a escala regional): actividades en 1990

DG XVII: Task Force sobre integración comunitaria: medidas complementarias (TF 2)

*El propósito de la planificación energética a escala regional o local dentro de la Comunidad es fomentar la eficiencia energética y el uso económico de fuentes de energía nuevas y renovables, compatibles con la protección del medio ambiente. La mejor manera de alcanzar este objetivo es mejorar la información sobre la oferta y la demanda de energía mediante, por ejemplo, la determinación del caudal de energía, elaboración de planes, y análisis y valoraciones de la oferta y la demanda de energía. Estas actividades son acordes con la aspiración comunitaria de superar las diferencias económicas existentes entre las regiones de la CEE.*

*En la realización del actual programa, la invitación cursada por la Comisión (DG XVII: Energía), en marzo de 1990, para presentar propuestas (DO 1990, C 77, p. 4) tuvo una gran acogida por parte de los sectores interesados, recibándose más de 100 propuestas dentro de plazo (31 de mayo de 1990). A continuación se resumen las áreas cubiertas, las condiciones de participación y los resultados obtenidos.*

## Áreas

1. Estudios de planificación regional de la energía, que podrían mejorar la situación de la oferta energética mediante un uso más racional de los recursos tanto en la producción como en el consumo, sin olvidar los aspectos medioambientales al mismo tiempo. Tendrán prioridad las propuestas de regiones en las que no se ha desarrollado debidamente la planificación energética: regiones en declive económico, regiones comunitarias alejadas y aisladas, y regiones fronterizas de distintos Estados miembros.
2. Estudios de viabilidad de proyectos dirigidos a fomentar un uso más efectivo de la energía, el aprovechamiento de los recursos locales o la introducción de métodos de producción y utilización no nocivos para el medio ambiente. Se dará prioridad a las propuestas en las que participen regiones de distintos países y regiones subdesarrolladas.
3. Análisis de medidas para garantizar una gestión mejor de la energía en el entorno urbano. Tendrán prioridad las propuestas de ciudades a las que afecten particularmente los problemas derivados del uso de la energía en zonas urbanas.

## Condiciones para la participación

Las propuestas:

- a) tienen que estar relacionadas con algunos de los campos mencionados anteriormente;
- b) deberán realizarse dentro del territorio de la Comunidad;
- c) tendrán que aportar un plan detallado de financiación;
- d) tendrán que indicar qué recursos se utilizarán para difundir la información y los resultados obtenidos;
- e) serán presentadas por organismos u organizaciones regionales, o en su nombre;
- f) respecto del punto 3 sobre las áreas, deben ser presentadas por una ciudad, un organismo de gestión en energía urbana o una empresa de transporte público, y las ciudades que se presenten han de tener un mínimo de 100 000 habitantes.

## Resultados obtenidos

Tras una evaluación exhaustiva de las propuestas recibidas, y siguiendo criterios objetivos preestablecidos, veintiséis proyectos fueron finalmente seleccionados para recibir ayuda comunitaria (cofinanciación de un máximo del 40 % del coste total, o 150 000 ecus) por un total de aproximadamente 2 millones de ecus. De ellos, seis están relacionados con la planificación regional de la energía, nueve con estudios de viabilidad y once con planificación energética a escala urbana. Varias propuestas más integran una lista de espera para recibir ayuda, condicionada a la disponibilidad de fondos comunitarios antes de finales de este año.

Está preparándose una convocatoria de nuevas propuestas que se espera publicar en el Diario Oficial de las CE antes de finales del presente año.

La DG XVII de la CCE, asimismo, está organizando una amplia difusión de los resultados de los estudios más representativos y conseguidos, por ejemplo mediante la publicación de resúmenes que adoptan la forma de «folletos cartográficos».

La DG XVII organizó un simposio en Creta, Grecia (del 11 al 13 de noviembre de 1990), sobre el tema «Problemas

energéticos en las islas de la CE», que contó con el apoyo de las autoridades regionales de Creta. El número de participantes superó los doscientos, que representaban a las autoridades locales o regionales de distintas islas comunitarias, así como una serie de expertos. Las actas del congreso serán publicadas y difundidas en su momento.

La CCE y las autoridades soviéticas están estudiando las posibilidades de cooperación con la URSS en el campo de la eficiencia energética y la mejora ambiental a través de la planificación energética, particularmente a escala urbana y regional.

La DG XVII ha organizado un simposio para los días 7 y 8 de febrero de 1991 en Mannheim en el que se presentarán doce proyectos modelo en el ámbito de la gestión de la energía urbana, uno de cada Estado miembro de la CEE, y la presentación adoptará diversas formas, incluida la del folleto informativo. Además, se presentará la propuesta de crear una red europea de ciudades sensibles al tema energía-contaminación para intercambiar datos y experiencias.

En esta manifestación participarán representantes de muchas ciudades europeas, autoridades nacionales y regionales, representantes de empresas dedicadas a la gestión y producción de energía, asociaciones profesionales y autoridades locales, así como expertos interesados en el tema.



# Centro común ANASE-CEE para la investigación y la formación en gestión de la energía (AEEMTRC)

por el profesor Wahjudi Wisaksono, director de AEEMTRC

*El origen del AEEMTRC se remonta a la visita que realizó el anterior comisario de la CEE para Asuntos Exteriores, Sr. Claude Cheysson, a la Asociación de Naciones de Asia del Sudeste (ANASE) en 1985. En el transcurso de esta visita, se sugirió iniciar la cooperación entre la ANASE y la CEE en un programa conjunto sobre energía. En la reunión conjunta ANASE-ministros de la CEE sobre asuntos económicos celebrada en Bangkok, en octubre de 1985, la CEE propuso la idea de crear un centro.*

*Después se procedió a debatir de manera intensa en el seno de la ANASE las ventajas de la cooperación en forma de red como ya era práctica de dicha institución, y se llegó al acuerdo de crear una institución conjunta (una institución del tipo ANASE en cooperación con la CEE), para lo que se aceptó la oferta de Indonesia de albergar el centro en Yakarta. Las negociaciones entre la ANASE y la CEE fueron dilatadas, pero el largo proceso contribuyó a crear una mejor visión conjunta del papel y la función del centro y a hacer converger algunas de las divergentes expectativas y objetivos de ambas partes.*

*El AEEMTRC fue inaugurado de manera oficial el 8 de noviembre de 1988 por el Sr. Ginanjar Kartasasmita, ministro de Minas y Energía de Indonesia, en presencia del embajador de España (España ostentaba en ese momento la presidencia del Consejo de Ministros de las Comunidades Europeas), el jefe de la representación de la CEE en Yakarta, varios embajadores europeos y altos funcionarios de la ANASE para la cooperación energética (SOEC).*

En la reunión mantenida en Manila, el 15 de diciembre de 1987, los jefes de Gobierno de la ANASE introdujeron en su comunicado final la siguiente declaración de intención: «la ANASE fomentará la cooperación en el campo de la energía, en campos como la planificación energética, el intercambio de información, la transferencia de tecnología, la investigación y el desarrollo, la formación del personal, la conservación y eficiencia, y la prospección, producción y suministro de recursos energéticos». Ahora es posible alcanzar este objetivo a través del AEEMTRC.

La CEE aporta la financiación para llevar a cabo parte del programa del AEEMTRC y lo garantiza durante un período de tres años. También proporciona un asesor trasladado a la zona y algunos consultores por breves períodos de tiempo. El Gobierno de Indonesia ha tenido la deferencia de facilitar un conjunto de oficinas en los locales del Centro para la investigación y el desarrollo en tecnología del petróleo y gas (Lemigas) sito en Yakarta, así como un soporte administrativo y financiero.

Los Estados miembros de la ANASE contribuyen al

AEEMTRC proporcionando instalaciones y sufragando el coste local de seminarios, nombrando personal y aportando orientaciones y críticas realizadas por expertos para el desarrollo de los estudios. Hasta la fecha, el Ministerio de Energía de Malasia ha organizado seminarios sobre energía y medio ambiente en Kuala Lumpur, en julio de 1989. La Oficina de Energía de Filipinas organizó un seminario sobre planificación energética urbana en mayo de 1990, y los Estados miembros han respondido a las peticiones para enviar conferenciantes, aportar datos, y otras contribuciones necesarias.

El AEEMTRC informa de la evolución a un comité de gestión compuesto por miembros nombrados por los altos funcionarios de la ANASE mencionados anteriormente y por la Comisión de las Comunidades Europeas. Los objetivos del AEEMTRC convenidos por la ANASE y la CEE son:

- reforzar la cooperación entre los países de la ANASE y las Comunidades Europeas en el campo de la energía;

- contribuir al diálogo ANASE-CEE sobre temas de energía de interés para ambas partes;
- orientar las actividades conjuntas relativas a la energía.

Además de ello, AEEMTRC se ha erigido en el organismo permanente de investigación y análisis en temas relacionados con la energía para los altos funcionarios para la cooperación en energía de la ANASE. Si esta función continúa a largo plazo, y si el AEEMTRC la desempeña acertadamente, esto representará un cambio ligero, pero importante, en la actuación de la ANASE.

## Actividades

Regularmente vienen organizándose seminarios de formación sobre temas relacionados con el programa de investigación, bien para transmitir los resultados de ésta, para definir temas de investigación en campos nuevos, o para iniciar programas de investigación. Los tres primeros seminarios iban dirigidos a un nivel relativamente elevado; el primero se celebró en Yakarta en julio de 1987 antes de inaugurarse oficialmente el AEEMTRC y se centró en el tema de la gestión industrial de la energía. Tenía por objetivo la transferencia de tecnologías de conservación de la energía y de metodologías para formular y aplicar políticas de conservación energética, pero también para contribuir a definir áreas de investigación para futuras actividades del AEEMTRC.

El segundo seminario de formación, dedicado al análisis y a la toma de decisiones sobre sistemas de energía, tuvo lugar en Yakarta en noviembre de 1988, tras ser inaugurado el centro. Dicho seminario tenía como objetivo revisar las metodologías y la experiencia adquirida en el análisis de sistemas de energía, particularmente las limitaciones y dificultades, y aportar conocimientos prácticos sobre varios programas ya existentes.

El tercer seminario, que tuvo lugar en Kuala Lumpur en julio de 1989, fue el primero celebrado fuera de Yakarta. Se centró en el tema de la energía y el medio ambiente y tenía por objetivo analizar las interacciones de las políticas en dichos campos y contribuir a estudiar prioridades y dificultades de aplicación.

Un seminario similar sobre planificación de la energía urbana tuvo lugar en Baguio City (Filipinas) en mayo de 1990 y otro sobre análisis de la demanda de electricidad se celebró en septiembre en Bangkok.

## Investigación

El AEEMTRC desempeña sus funciones también en el campo de la investigación de dos maneras diferentes: realizando investigación propia y, al mismo tiempo, sirviendo para centrar y canalizar la actuación de la ANASE en actividades de investigación conjunta con terceras partes fuera de las instituciones de la ANASE.

## Investigación con equipos propios

### Datos e información

Es esencial contar con un conjunto fiable de datos estadísticos para entender cualquier investigación en planificación energética, por ello la primera prioridad de AEEMTRC ha sido reunir datos sobre todos los aspectos que presentan el suministro y el uso de energía en la ANASE. A instancias de los altos funcionarios (1988), AEEMTRC diseñó un formato de informe y obtuvo el acuerdo de los Estados miembros para proporcionar la información solicitada. AEEMTRC ha recibido la mayor parte de los datos y, con esta información, preparará estudios reguladores de la situación energética en la ANASE.

### ANASE 2010

Un proyecto importante del AEEMTRC lo constituye la preparación de un estudio actualizado regularmente sobre la oferta y la demanda a largo plazo destinado a la ANASE. Con el nombre de ANASE 2010, dicho estudio constituye un primer intento de facilitar una idea de las futuras necesidades y posibilidades que existen a escala de la ANASE. Uno de los principales objetivos del estudio es determinar las oportunidades que existen para la colaboración. La idea de la ANASE 2010 surgió en una reunión de planificación de proyectos específicos que tuvo lugar en febrero de 1990.

### Planificación de la energía urbana

No es necesario subrayar los problemas que plantean las grandes ciudades de Asia de infraestructuras saturadas. El AEEMTRC está estudiando posibles medios de miti-

gar dichos problemas, al menos en los sectores relacionados con la energía. El proyecto se inició en un seminario en mayo de 1990 y está gestionándose con la ciudad de Baguio en Filipinas la realización del primer estudio sobre planificación energética y urbana. La razón de la elección es su tamaño relativamente pequeño, aunque la mayoría de sus problemas son los de las grandes ciudades. Cuenta también con relativamente buenos datos. Tras finalizar el estudio realizado en Baguio, el AEEMTRC dedicará sus trabajos a Chiang Mai, Tailandia, para analizar los problemas de una gran conurbación y, por último, se centrará en una gran ciudad de Indonesia.

### **Análisis de la demanda de electricidad**

El tercer proyecto importante se centra en un análisis de la demanda de electricidad y, en particular, el papel que desempeñan los precios. Este tema es de gran importancia para la ANASE, ya que el índice de crecimiento que presenta actualmente la demanda de electricidad, de continuar, provocaría la paralización de las necesidades de capital, por lo que es de vital importancia comprender los factores que determinan la demanda de energía. Ya se han realizado los primeros contactos entre instituciones para la realización de este proyecto. Se han obtenido los datos y en septiembre de 1990 se inició el proyecto.

### **Programa (plan) de intervención para la cooperación en energía**

En la reunión de altos funcionarios de la ANASE y en la reunión ministerial celebrada en Kuala Lumpur en junio de 1989, se pidió al AEEMTRC que preparara un programa de acción para la cooperación energética, que va en la línea de la declaración de Manila de los jefes de Gobierno sobre el fortalecimiento de la ANASE. El AEEMTRC ha realizado una primera indagación entre los miembros de la ANASE sobre las áreas específicas de cooperación, que fueron definidas más detalladamente y desarrolladas en conversaciones posteriores con los altos funcionarios. Esta iniciativa tiene gran importancia para la ANASE, pero también para el AEEMTRC, ya que demuestra la voluntad de la primera de utilizar el centro para su propósito original.

## **Actividades realizadas con terceras partes**

Como ya se ha dicho anteriormente, el AEEMTRC cubre una importante función actuando con otras instituciones no pertenecientes a la ANASE sobre temas de importancia para la asociación. Los funcionarios de la ANASE reciben orientaciones y comentarios, pudiendo así ampliar el ámbito de su trabajo y abriendo la posibilidad de aportaciones de expertos que serían, de otra manera, difíciles de movilizar.

Actualmente el AEEMTRC tiene dos proyectos de esa índole. Uno de ellos consiste en colaborar con el Instituto Asiático de Tecnología en un proyecto para difundir la tecnología de conservación de la energía. Si dicho proyecto da buenos resultados, puede que se produzcan otros de demostración en este campo, que no se conocían en la región.

## **Conclusión**

El segundo proyecto es el estudio de viabilidad de un gasoducto de gas natural que abarque todos los países asiáticos y las diversas consecuencias que podrían derivarse para los países y la región. En este caso el AEEMTRC trabaja con un consorcio de compañías europeas que se unen para financiar y marcar las directrices del estudio de viabilidad. Promete ser un trabajo muy interesante, aunque faltan por precisar muchos de los detalles. El AEEMTRC no ha progresado tan rápidamente como se pensaba en principio, ya que hay que admitir que al iniciar una empresa conjunta entre dos asociaciones regionales tienen que surgir demoras y dificultades, que ahora parecen haberse superado con éxito. El AEEMTRC tiene una base jurídica acordada con la ANASE y con la CE, así como una sólida financiación para esta primera fase y un programa de trabajo al que se ha llegado por acuerdo entre la junta de altos funcionarios de la ANASE y el comité gestor del AEEMTRC para el proyecto.

El AEEMTRC ha contado con una excelente cooperación por parte de los países miembros de la ANASE en la dotación de personal, datos, organización de seminarios y otros muchos y estimulantes detalles de ayuda. A pesar de las demoras, concluirán los proyectos originales de investigación en el tiempo previsto. Además del contenido original del programa de investigación, se han añadido el programa de acción para la cooperación en energía de los



altos funcionarios y dos nuevos proyectos, que no son de gran importancia pero que revelan las diferentes posibilidades al alcance del AEEMTRC.

La creación de un centro de esta índole representa un cambio distintivo en el carácter institucional de la ANASE, ya que es la primera vez que un organismo representativo en cuanto a la toma de decisiones de la ANASE (es decir, la junta de altos funcionarios y ministros) cuentan con un órgano permanente de análisis e investigación. Generalmente, la ayuda prestada a las reuniones de la ANASE consiste en funciones de secretaría y la ANASE no cuenta, de modo permanente, con acceso a los servicios técnicos y analíticos.

La existencia del AEEMTRC supone una innovación que los altos funcionarios se han apresurado a utilizar. Por el momento, la solicitud de un formato común de comunicación de datos y de creación de un programa de acción ANASE para la cooperación en energía indican de manera clara el papel que desempeña el AEEMTRC en el fortalecimiento de la cooperación dentro de la ANASE. Del

programa que acabamos de mencionar, se obtendrá una base sistemática para el intercambio de los resultados de investigación sobre gestión de la política energética, y también técnicas de planificación, estadística sobre energía, previsión, programas conjuntos en la ANASE y localización de sectores para programas de cooperación.

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*Cuarto seminario del Centro común ANASE-CE para la investigación y la formación en gestión de la energía sobre integración de la planificación energética en los centros urbanos, Baguio, Filipinas, mayo de 1990*

De izquierda a derecha:

*Sr. De la Paz, director de la Oficina de asuntos energéticos, Manila*  
*Excmo. Sr. J.R. Bugnosen, alcalde de Baguio City*  
*Profesor W. Wisaksono, director, AEEMTRC*

# PACE:<sup>1</sup> programa comunitario para el uso eficiente de la electricidad

por R.H. Greenwood, DG XVII: Electricidad (C 1)

*El consumo de electricidad sigue aumentando inexorablemente, a pesar de existir límites al aprovisionamiento de nuevas capacidades de producción. Por otra parte, el Consejo acordó, el 29 de octubre, estabilizar las emisiones de CO<sub>2</sub> en la Comunidad antes de que finalice el siglo. ¿Qué puede hacerse? PACE, programa comunitario para utilizar la electricidad del modo más rentable, supone una importante aportación para solucionar este problema.*

La producción de electricidad representa aproximadamente un tercio del consumo primario total de energía en la Comunidad. La razón por la que la proporción es tan importante se debe, en parte, a que la electricidad es una forma derivada de energía, mientras que la mayoría de los otros combustibles son consumidos para producir calor y después generar electricidad. Además, por razones termodinámicas, es difícil convertir más de una parte de la energía consumida en electricidad. Por término medio, únicamente el 35 % de la producción de energía primaria es convertida en electricidad en las centrales eléctricas, a pesar de que mejora constantemente la técnica de conversión. Por otra parte, determinadas fuentes de energía, como la hidroeléctrica y nuclear, pueden ser explotadas únicamente a través de la electricidad.

Se dice a veces, y con razón, que la electricidad constituye el vértice del abastecimiento energético, ya que puede convertir cualquier fuente de energía en una forma utilizable en todo tipo de aplicaciones. Entre estas aplicaciones se encuentra, por ejemplo, la activación de motores, utilizados en cualquier sector de la industria y en prácticamente todos los electrodomésticos de los hogares. La electricidad es también esencial para todas las comunicaciones modernas y equipos informáticos, cadenas de alta fidelidad, televisión y otros artículos electrónicos para usos de diversión en casa. La electricidad puede convertirse en calor inmediatamente de manera controlada, por lo que se adecua a aplicaciones de calefacción industrial y de calentamiento de espacios y agua en locales comerciales y viviendas. Prácticamente todos los edificios y vías públicas disponen de alumbrado público, y otro uso singular de la electricidad lo constituye la electrólisis, muy utilizada en la industria química.

La gran diversidad de usos que registra la electricidad, sobre todo en una economía desarrollada, indica que es la forma de energía con un mayor índice de demanda. Así, mientras que el uso de energía en la Comunidad se ha mantenido o ha aumentado muy lentamente en la última década, el consumo de electricidad ha seguido creciendo 3 % aproximadamente o más al año, y se prevé que continúe haciéndolo a un ritmo anual del 2 %, aproximadamente. Este índice de crecimiento abarca, además, un amplio abanico de usos de electricidad ya existentes y, en consecuencia, una capacidad de producción muy grande. Actualmente, la capacidad total de producción comunitaria alcanza los 450 000 millones de vatios. Si el crecimiento de la demanda sigue al ritmo del 2 % por año, en unos ocho años será necesaria una nueva capacidad (es decir, sin contar las inversiones en sustitución) que alcance cerca de 75 000 millones de vatios, aproximadamente el total de la capacidad de producción del Reino Unido.

Algunos Estados miembros están ya encontrando dificultades para construir nuevas centrales eléctricas, generalmente en cuanto a la obtención de aprobación de planes. De todas maneras, es difícil imaginar cómo va a poder cubrirse esta nueva demanda, sobre todo si tenemos en cuenta que prácticamente todos los combustibles presentan algún problema. El carbón, uno de los principales combustibles utilizados actualmente para la producción de electricidad, produce la mayor emisión de CO<sub>2</sub> por unidad de electricidad producida. Además, un aumento importante de su uso podría tener grandes efectos en el mercado del carbón y sobre todo en los precios, al tiempo que requeriría infraestructuras de transporte. Por cuestiones políticas no se utiliza la energía nuclear en varios Estados miembros, y aunque el gas natural abunda en la actualidad, un aumento importante y sostenido de su uso para la producción de electricidad podría a la larga producir una demanda excesiva y elevar los precios. En cualquier caso, todos los combustibles fósiles son limitados, y todos ellos añaden CO<sub>2</sub> a la atmósfera (aunque las emisiones de CO<sub>2</sub>

<sup>1</sup> Acrónimo francés.

por kWh del gas natural son aproximadamente la mitad de las del carbón). No obstante, el Consejo (Energía y Medio ambiente) de 19 de octubre acordó estabilizar las emisiones de CO<sub>2</sub> en los niveles de 1990 para el año 2000 (o para el año 2005 para una serie de Estados miembros).

Las energías renovables no producen emisiones de gas a la atmósfera y son inagotables, pero de entre ellas únicamente la energía hidroeléctrica puede suponer una contribución importante al abastecimiento, ya que actualmente cubre cerca de un octavo de la demanda total de electricidad. Hay que tener en cuenta también que el potencial de capacidad hidroeléctrica que podría desarrollarse en la Comunidad es relativamente limitado. El resto de las energías renovables suponen, incluso con mayores avances tecnológicos y un programa concertado de ayuda en toda la Comunidad (aspectos ambos en los que la Comisión es muy activa) una contribución potencial que podría cubrir únicamente una mínima parte de las nuevas necesidades.

Es evidente que hay que tomar medidas para detener el crecimiento de la demanda de electricidad por varias razones: la existencia del efecto invernadero y la necesidad de limitar las emisiones de CO<sub>2</sub> a la atmósfera (la producción de electricidad en la Comunidad representa actualmente cerca del 30 % de las emisiones de CO<sub>2</sub> producidas por el hombre), el coste y la dificultad de cubrir las nuevas necesidades y las repercusiones que tendría la mayor demanda de combustibles primarios en los distintos mercados energéticos. Mejorar el rendimiento en la producción de electricidad desempeña un papel en este sentido, y las mejoras tecnológicas, introducidas particularmente a través de las nuevas centrales, intensifican, de manera lenta pero continua, la capacidad de conversión. Pero ya que la sociedad seguirá procurándose las ventajas que le aportan los electrodomésticos y los equipos eléctricos, debe intervenir fundamentalmente para mejorar la eficiencia del uso final de la electricidad.

Una amplia gama de estudios y de investigaciones ha demostrado que hay muchas posibilidades de mejorar este aspecto, y que las medidas necesarias para lograr estas mejoras son generalmente de tipo económico. De cara al consumidor, por ejemplo, esto supondría que el mayor coste de un frigorífico más rentable desde el punto de vista energético queda amortizado con creces con el ahorro que se produce en el consumo de electricidad en dos años. Y lo mismo puede decirse del consumidor industrial, para el que los nuevos métodos de calentamiento por inducción en los procesos industriales pueden resultar a veces más económicos que los métodos tradicionales, tanto eléctricos como a base de otros combustibles.

Las decisiones de esta índole reflejan, realmente, el hecho de que existen medidas para ahorrar kilovatios, medidas que son menos costosas que la construcción de nueva capacidad o la producción de más kilovatios/hora para el consumo. Además, el argumento a favor de las medidas de ahorro adquiere mayor fuerza cuando se recuerda que los precios de la electricidad no incluyen los costes externos, por ejemplo de las emisiones atmosféricas que lleva consigo la producción de electricidad. Así y todo, las medidas adoptadas para mejorar la eficiencia energética en general, y el uso final de la electricidad en particular, son mucho más escasas de lo que la economía justifica y esto se debe en parte a la dispersión que se produce en la toma de decisión, ya que, normalmente, ninguna entidad se encarga por sí misma de comparar y llevar a cabo medidas relacionadas con el aprovisionamiento de nuevas energías o con medidas de ahorro como alternativa. Por el contrario, y comprensiblemente, los tres protagonistas principales tienden a concentrarse en sus responsabilidades primarias: el proveedor de electricidad garantizando que haya suficiente capacidad para cubrir la demanda, el consumidor, sobre todo el consumidor doméstico, adquiriendo equipos que satisfagan una serie de criterios, de los cuales la eficiencia energética representa sólo uno, y el fabricante haciendo todo lo posible para satisfacer los distintos deseos del cliente, generalmente dentro de un mercado muy competitivo.

Volviendo al ejemplo del frigorífico, la investigación ha demostrado que el rendimiento eléctrico de los nuevos modelos actualmente existentes en el mercado varía en un factor dos o más, siendo los aparatos más rentables perfectamente satisfactorios en todos los aspectos y muy poco diferentes en cuanto al precio. No obstante, los consumidores dejan de lado generalmente el aspecto de la eficiencia energética, y siguen vendiéndose los menos rentables, a pesar de ser a menudo sencillo, técnicamente, mejorar su rentabilidad. En este estado de cosas, existe la urgente necesidad de actuar para aumentar la eficiencia del uso final de la electricidad, ya que ni siquiera se han utilizado totalmente las posibilidades económicas de mejora. Dicho en pocas palabras, los incentivos normales del mercado no funcionan.

Ante estas consideraciones, el Consejo de 5 de junio de 1989 adoptó una decisión por la que se creaba un programa comunitario para mejorar la eficiencia del uso final de la electricidad.<sup>2</sup> Esta decisión estipula el nombramiento de un organismo en cada Estado miembro para coordinar la aplicación de medidas sobre la eficiencia de la electricidad en cada país, y adjudica a la Comisión el papel de

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<sup>2</sup> 89/364/CEE de 5 de junio de 1989 (DO L 157 de 9.6.1989, p. 32).

coordinar estas medidas en la Comunidad, así como de emprender acciones propias cuando proceda. La decisión establece un comité consultivo ante la Comisión, que lo preside, constituido por representantes de los Estados miembros. La Comisión se encarga también de coordinar e informar del programa a las instituciones comunitarias, y puede hacer propuestas al Consejo sobre cualquier otra medida necesaria para conseguir los objetivos del programa.

Tras ser adoptada por el Consejo la decisión de crear el programa, la tarea inicial de la Comisión consistió en formular una estrategia para llevarlo a cabo, lo cual se hizo después de consultar al comité asesor y a representantes de las principales partes interesadas, incluidos los fabricantes de equipos y aparatos eléctricos, la industria de suministros de electricidad y las organizaciones de consumidores. Los principios que guiaron a la Comisión fueron: concentrar su trabajo en medidas efectivas, particularmente desde el punto de vista del coste; seleccionar planes relativamente rápidos; aprovechar en la medida de lo posible el trabajo realizado y la experiencia anterior, y, por último, mantener la coherencia respecto a la actuación en otros campos. Por ejemplo, en el primer epígrafe del programa no figuran los incentivos al uso eficaz de la electricidad mediante instrumentos fiscales, ya que están analizándose posibles cambios a escala comunitaria dentro de un contexto mucho más amplio, proceso que se prevé largo.

La Comisión debe también aprovechar las actividades y la experiencia con la que cuentan los Estados miembros, por lo cual uno de sus primeros pasos consistió en investigar las actividades realizadas en los diferentes países, así como las opiniones de los Estados miembros sobre posibles áreas de cooperación a escala comunitaria. Esta actividad se realizó mediante la celebración de reuniones del comité consultivo y el envío de un cuestionario a cada uno de los representantes nacionales que formaban parte de él. Los resultados de esta investigación evidencian una gran variedad de actividades en los Estados miembros, por lo que una de las tareas principales que debe realizar la Comisión en ejecución del programa será fomentar el intercambio y la coordinación de este tipo de datos y experiencias.

El cuarto principio, es decir, la coherencia con otras actividades, es muy importante. Ha sido intensa la coordinación con otros programas relacionados, de los que la Dirección General de Energía es responsable, y en particular con el programa de demostración de tecnología energética y su sucesor Thermie, con la nueva propuesta SAVE (véanse otros artículos de este mismo número). Efectivamente, la propuesta SAVE para un nuevo pro-

grama general de eficiencia energética incorpora la mayoría de las iniciativas que están realizándose actualmente con PACE, aunque las obligaciones que competen a la Comisión con arreglo a la decisión PACE de junio de 1989 deben ser respetadas hasta que sean reemplazadas. Se han establecido contactos con otras direcciones generales dentro de la Comisión cuando ha procedido, y especialmente con otras direcciones generales encargadas de normas (por ejemplo, para electrodomésticos), de medio ambiente y de investigación y desarrollo.

La estrategia de ejecución desarrollada por la Comisión divide las actividades en seis grandes áreas, llamadas «áreas de acción». Una de ellas constituye la función central de la Comisión de facilitar el intercambio de información y experiencias entre los Estados miembros, en la que se incluye también la posible cooperación en actividades futuras, como estudios, bases de datos, seminarios, conferencias y otras actividades de información. Una segunda área de acción se refiere a la electricidad para usos domésticos, en la que se proyecta alentar la orientación a los consumidores domésticos sobre la eficiencia en el uso de la electricidad, por ejemplo, mediante folletos, información adjunta a las facturas de electricidad y publicaciones de las asociaciones de consumidores. Debemos aprovechar los conocimientos técnicos y la experiencia que existe en algunos Estados miembros en beneficio de otros que aún no han explotado dichas técnicas.

Otra área de acción referida al sector doméstico, aunque independiente de él por sus especiales características, es la del etiquetado y las normas sobre rendimiento de los aparatos electrodomésticos. El consumo doméstico de electricidad representa aproximadamente el 30% de la demanda total en la Comunidad y cerca de dos tercios de ese cifra parecen corresponder a los aparatos electrodomésticos. Además, como ya se ha indicado anteriormente, y aunque algunos fabricantes han mejorado mucho en el terreno de la eficiencia, el mercado sigue ofreciendo aparatos de bajo rendimiento. Para contribuir a solucionar esto, la Comisión está reconsiderando la cuestión del etiquetado y de las normas mínimas de rendimiento de los electrodomésticos y recientemente organizó un seminario sobre este tema con más de 100 participantes, incluidos los representantes de los sectores principales, para debatir ampliamente los problemas y las oportunidades de solucionarlos. En dicho seminario fue reconocida la necesidad de continuar actuando en esta área, aunque los fabricantes aducían con insistencia que ello debería realizarse de forma voluntaria, más que obligatoria.

Dada la necesidad común de centrarse en las instancias fundamentales de toma de decisión y por sus característi-

cas más específicas, se ha procedido a agrupar las actividades para fomentar la eficiencia en el uso final de la electricidad en los sectores industriales y comerciales (incluidos los edificios públicos). Las medidas para aumentar la sensibilización y comunicar información son elementos esenciales de la estrategia, recurriendo al uso de folletos, seminarios, conferencias y otras actividades similares. El uso industrial de la electricidad es extremadamente diverso, y es importante dar la información adecuada a la gente que la necesita. En el sector comercial, por otra parte, las técnicas son más limitadas e incluyen climatización y calefacción de lugares de trabajo, alumbrado y equipamiento de oficinas. Otra idea dentro de esta área de acción es fomentar el conocimiento de temas relacionados con la energía en el comercio y en la industria, utilizando los balances energéticos (incluida la electricidad) cuando sea oportuno.

Uno de los resultados positivos que se derivarán del programa será el de aplazar la necesidad de nuevas centrales de producción, objetivo que también será consecuencia de un uso más regular de la electricidad con el paso del tiempo. Exceptuando algunas instalaciones de almacenamiento de bombeo, la electricidad no puede almacenarse en grandes cantidades, por lo que la capacidad de producción debe ser la justa para cubrir la demanda en las horas de carga máxima. El resto del tiempo, no obstante, esta central no se utiliza, lo que supone escasa utilización de los recursos económicos. Si puede alternarse la demanda de esos períodos de carga máxima a otros, mejora claramente la utilización. Si bien existen algunos países que han alcanzado unas curvas de demanda bastante niveladas, mediante el uso de tarifas especiales y mecanismos de gestión de la carga, es necesario que otros avancen en ese sentido. Además, el nivel general de precios de la electricidad repercutirá en la demanda (aunque parece que la repercusión será menor en el sector doméstico). Por estas

razones, la Comisión está especialmente interesada en conocer técnicas y posibilidades de «gestión de la carga», incluido el uso de tarifas de electricidad, para que se utilicen en toda la Comunidad cuando sea posible.

El último campo de acción consiste en sondear las posibilidades de que la industria de suministro de electricidad elabore, en consultas con la Comisión, algún tipo de declaración o código de conducta sobre la eficiencia en el uso final de la electricidad. En estos momentos ello está sometido a consideración por parte de Eurelectric (la organización que representa a la industria de suministro eléctrico de la Comunidad), y se espera ultimar la declaración y adoptarla en breve. En pocas palabras, constituiría una garantía que la industria fomentara la eficiencia en el uso final de la electricidad, informando y asesorando a los consumidores, realizando investigación y desarrollo, y utilizando otro tipo de actividades. Esta idea se inspiró en la nueva legislación del Reino Unido para la industria del suministro eléctrico, aunque conviene recordar que Eurelectric, por contraste, la ha adoptado de manera voluntaria.

Con los párrafos anteriores se ha pretendido describir las actividades llevadas a cabo por el programa comunitario para mejorar la eficiencia del uso final de la electricidad. Se trata realmente de un programa comunitario, en el que cada Estado miembro emprende las actividades, incluso algunas que no han sido propuestas para toda la Comunidad, que mejor se adecuan a sus circunstancias particulares. La función de la Comisión es estimular, fomentar el intercambio de información, persuadir y proponer legislación, si fuera necesario. Pero, en última instancia, el éxito o fracaso del programa depende de los esfuerzos y la cooperación de todos los integrantes del mercado de la electricidad en la Comunidad. Y ya que en él entran los consumidores de electricidad, eso quiere decir ¡todos y cada uno de nosotros!



# El uso del gas natural en las centrales eléctricas

DG XVII: Electricidad (C 1)

*El 29 de octubre de 1990, el Consejo (Energía) dio su conformidad, por unanimidad, a la propuesta<sup>1</sup> de la Comisión de derogar la directiva 75/404/CEE del Consejo<sup>2</sup> que se refiere a la limitación del uso del gas natural en centrales eléctricas y que data de febrero de 1975. Aunque no se pudo adoptar formalmente la propuesta en el mencionado Consejo, por faltar el dictamen del Parlamento Europeo sobre la propuesta, es probable que cuando se publique este número de **La energía en Europa**, la directiva 75/404/CEE del Consejo no forme ya parte de la legislación comunitaria.*

La actual directiva fue adoptada poco después de la primera crisis del petróleo, momento en el que se consideró que el gas natural era una fuente valiosa de energía primaria, pero limitada, y debía reservarse para aplicaciones especiales. Actualmente sabemos que las reservas de gas natural son mucho mayores de lo que se pensaba en 1975 y, por lo tanto, la razón subyacente a la adopción de la directiva ha perdido validez.

En la directiva se exige que la construcción de centrales eléctricas que utilicen gas natural y los contratos para el suministro de gas natural a dichas centrales se sometan a la autorización de los Gobiernos de los Estados miembros, pero específicamente permite el uso de gas natural por razones de protección ambiental y de índole económica. Dada la importancia que se da actualmente a la protección del medio ambiente (y las emisiones de SO<sub>2</sub>, NO<sub>x</sub> y CO<sub>2</sub> pueden ser menores utilizando gas natural que con combustibles sólidos) y las ventajas económicas de las

centrales eléctricas de gas, debido a los cambios tecnológicos, puede comprenderse claramente por qué la aplicación de la directiva ha sido menos restrictiva de lo que se pensó en 1975. Es también comprensible que, ante estas ventajas, los productores de electricidad utilicen cada vez más el gas natural para este tipo de producción. Probablemente el gas natural desempeñará un mayor papel en la producción de electricidad en el futuro, por lo que la directiva parece a muchos inadecuada y en discordancia con la evolución política actual. La seguridad del suministro de energía primaria, incluido el de gas natural, seguirá siendo, no obstante, un elemento clave de la estrategia energética.

La Comisión ha dejado claro que, de producirse la necesidad de controlar el uso de gas natural en las centrales eléctricas en el futuro, no dudará en proponer medidas comunitarias adecuadas.

<sup>1</sup> Publicada en el DO C 203 de 14.8.1990, p. 19.

<sup>2</sup> Publicada en el DO L 178 de 9.7.1975, p. 24.

# El mercado de combustibles sólidos en la Comunidad Perspectivas para 1991

DG XVII: Combustibles sólidos (B 1)

*En este resumen se analizan las previsiones para 1990 y 1991 que han preparado los Estados miembros y remitido a la Comisión en noviembre de 1990. El propósito del mismo es proporcionar al Comité consultivo CECA y otros círculos interesados la información más actual sobre la evolución del mercado de los combustibles en la Comunidad.*

*El informe general de la Comisión de 16 de abril de 1990<sup>1</sup> sobre el mercado de los combustibles sólidos en la Comunidad de 1989 y sus perspectivas para 1990 y el documento en el que se revisa el informe de mercado ofrecen un análisis de mercado más detallado.*

*En la primera mitad de 1991 se redactará un nuevo informe sobre el mercado de los combustibles sólidos en la Comunidad en 1990 y las perspectivas para 1991.*

En lo que se refiere al crecimiento económico en 1990, se han revisado los cálculos con una ligera tendencia descendente, ya que probablemente el índice de crecimiento del PIB no superará el 2,9 %, frente al cálculo original del 3 %. En 1991 el crecimiento económico será del orden del 2,2 %.

Los distintos grados que presentan los planes de reestructuración, racionalización y modernización siguen afectando a la producción comunitaria de carbón. En Francia, se ha reducido muy rápidamente la actividad de la cuenca del

supuso un 2,2 % en los primeros 10 meses de 1990. Si se extrapola esta cifra a todo el año, puede que la reducción alcance el 2,5 %. Un dato sorprendente es que este descenso es atribuible, fundamentalmente, a la República Federal de Alemania, en la que la producción entre enero y septiembre de 1990 descendió un 7,3 % con respecto al mismo período del año anterior. Pero ello no se debe totalmente al consumo nacional de acero en Alemania, sino más bien a un aumento en las importaciones seguido de un descenso en las exportaciones y una fuerte eliminación de reservas por parte de los consumidores.

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estabilizarse en este sentido para 1991, sobre todo por el hecho de que Francia y España esperan que sólo sus entregas de carbón en 1991 al sector eléctrico bajen 4,5 millones de toneladas con respecto a 1990, al haberse intensificado las reservas de emergencia en las centrales eléctricas francesas en 1990 y esperarse que vuelva la producción de energía hidroeléctrica a los niveles normales en ambos países el próximo año.

Las entregas a otros sectores (industria siderúrgica, otras industrias, calefacción para viviendas e industrias varias) sufrieron un descenso global en 1990 de 1,9 millones de toneladas (-4,2 %) con respecto al año anterior. El aumento de entregas de carbón a la industria siderúrgica, que supera el 24,1 % en 1,1 millones de toneladas, contrasta con el descenso en los otros subsectores, especialmente en la categoría de «otras industrias», que tuvieron un consumo, exceptuando la necesidad de producción de electricidad, de 21,8 millones de toneladas en 1990, en contraste con los 22,7 millones de toneladas de 1989, una disminución de 0,9 millones de toneladas. Esto se sintió fundamentalmente en el sector doméstico y en el sector de industrias varias (estrechamente ligado a aquél), en el que las entregas disminuyeron en 2,2 millones de toneladas (-12 %) en relación con 1989.

Las previsiones para 1991 apuntan a un aumento en las entregas a la industria siderúrgica (+0,5 millones de toneladas) y a otras industrias (+0,3 millones de toneladas), previsión que probablemente se corroborará si el coque de petróleo (utilizado fundamentalmente en cimentación) experimenta la misma oscilación de precios que otros productos derivados del petróleo. Por otra parte, se prevé otra baja de 0,8 millones de toneladas (-5,1 %) en los sectores de calefacción para viviendas y varios.

La cifra final de producción de coque en 1990 será 50,7 millones de toneladas, 0,6 millones de toneladas por debajo de lo previsto en julio pasado, en comparación con los 52,8 millones de 1989. Las entregas a la siderurgia serán de 46,4 millones de toneladas (un descenso del 3,5 %), mientras que en 1989 fueron 48,1 millones de toneladas. Otras entregas de coque en la Comunidad, 5 millones de toneladas, suponen un 21,9 % de descenso con respecto al año anterior, mientras que las exportaciones bajaron un 68 %, de 2,5 millones de toneladas en 1989 a 0,8 millones de toneladas en 1990. Se espera una disminución mayor en 1991, tanto en producción (-1,9 millones de toneladas, es decir, -3,7 %) como en las entregas a la siderurgia (-1,3 millones de toneladas, o sea, el -2,8 %), otros consumidores de la Comunidad (un descenso de 0,1 millones de toneladas, o el 2 %) y a la exportación (-0,2 millones de toneladas, o el -25 %).

Los recursos comunitarios de lignito y turba se el redujeron ligeramente en 1990 (-1,5 millones de toneladas, o el -0,8 %) con respecto al año anterior, pero se espera, en 1991, que aumenten de nuevo en 5,6 millones de toneladas (+2,9 %).

Se espera que el total de entregas acuse la siguiente tendencia: +2,2 millones de toneladas (+1,2 %) en 1990 se convertirán en +5,2 millones de toneladas (+2,7 %) en 1991. Esa tendencia al alza en 1991 es atribuible fundamentalmente a Grecia. Las cifras ilustradas anteriormente no recogen la producción ni las entregas de los nuevos Länder que han surgido de la unificación alemana a finales de 1990.

En 1990 las cifras de la antigua República Democrática Alemana son:

	millones de toneladas
Producción	243,7
Entregas	243,7
Centrales eléctricas	95,5
Plantas de briquetas	98,7
Otros	49,6

El comercio intracomunitario de la hulla y el coque enmascara la tendencia descendente de la producción, porque los precios que pueden conseguir los productores para sus exportaciones se alinean con los precios del suministro procedente de terceros países y, por lo tanto, no son ventajosos. La hulla ha sufrido un descenso de 8,8 millones de toneladas en 1989 a 8,5 millones de toneladas en 1990 y 7,5 millones de toneladas en 1991 y, en cuanto al coque, la disminución ha sido de 4,1 millones de toneladas en 1989 a 3,6 millones de toneladas en 1990 y se espera mantener el mismo nivel en 1991.

Las importaciones de hulla de terceros países experimentarán un alza en 1990, traspasando la cuota de 110 millones de toneladas; de hecho se espera que alcancen los 112,6 millones de toneladas este año. La mayoría de los Estados miembros aumentaron sus exportaciones en 1990, sobre todo la República Federal de Alemania (+3,1 millones de toneladas), el Reino Unido (+3 millones de toneladas), los Países Bajos (+1,4 millones de toneladas) y Bélgica (+1,3 millones de toneladas), haciendo mención únicamente de aquellos países cuyas importaciones aumentaron más de 1 millón de toneladas a lo largo del año. Únicamente Dinamarca (-1,2 millones de toneladas) y España (-0,7 millones de toneladas) registraron la tendencia opuesta.

En 1991, se espera que la situación permanezca igual en el conjunto de la Comunidad, con importaciones del orden de 111,8 millones de toneladas (- 0,7 %), pero se producirán claras variaciones de unos países a otros; así, mientras que el Reino Unido (+ 3 millones de toneladas), Dinamarca (+ 1,2 millones de toneladas) y Alemania (+ 1,1 millones de toneladas) aumentarán sus compras en el exterior, Francia (- 4,2 millones de toneladas) y Espa-

ña (- 1,4 millones de toneladas) reducirán las suyas.

Estados Unidos sigue siendo el principal proveedor de la Comunidad, seguido por Sudáfrica, Australia, Colombia y Polonia. Estos cinco países suministraron el 87,5 % del total de las importaciones comunitarias en 1990. En 1991, parece probable que Estados Unidos, Australia y Colombia pierdan parte de su cuota de mercado en favor de Po-

	<i>(millones de toneladas)</i>			
	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1990/1989</b>
	<b>Real</b>	<b>Provisional</b>	<b>Previsión</b>	<b>%</b>
<i>revisado 30.3.1990</i>				
<b>Carbón</b>				
<b>Recursos</b>				
- producción	214,7	208,0	200,0	- 3,8
- recuperación	4,5	4,1	3,8	- 7,3
- importaciones de terceros países	96,7	103,6	113,1	+ 9,2
<b>TOTAL</b>	<b>314,9</b>	<b>315,7</b>	<b>316,9</b>	<b>+ 0,4</b>
<b>Entregas</b>				
- a coquerías	71,5	68,3	68,9	+ 0,9
- a centrales eléctricas	195,9	199,1	200,4	+ 0,7
- a otros	48,3	45,2	45,5	+ 0,7
- exportaciones a terceros países	1,6	1,4	1,3	- 7,1
<b>TOTAL</b>	<b>317,3</b>	<b>314,0</b>	<b>316,1</b>	<b>+ 0,7</b>
<b>Lignito y turba</b>				
<b>Recursos</b>				
- producción e importaciones	181,5	194,4	191,4	- 1,5
<b>Entregas</b>				
- a plantas de briquetas	14,5	16,4	17,2	+ 4,9
- a centrales eléctricas	163,8	171,8	169,7	- 1,2
- a otros (incluidas las exportaciones a terceros países)	4,4	3,8	4,0	+ 5,3
<b>TOTAL</b>	<b>182,7</b>	<b>192,0</b>	<b>190,9</b>	<b>- 0,6</b>
<b>Coque</b>				
<b>Recursos</b>				
- producción	52,9	51,7	52,0	+ 0,6
- importaciones de terceros países	1,5	1,3	1,1	- 15,4
<b>TOTAL</b>	<b>54,4</b>	<b>53,0</b>	<b>53,1</b>	<b>+ 0,2</b>
<b>Entregas</b>				
- a la siderurgia	47,1	48,5	47,1	- 2,9
- a otros dentro de la Comunidad	5,9	5,8	5,3	- 8,6
- exportaciones a terceros países	1,8	2,2	0,7	- 68,2
<b>TOTAL</b>	<b>54,8</b>	<b>56,5</b>	<b>53,1</b>	<b>- 6,0</b>

lonia y, en menor grado, de otros países como Indonesia o Venezuela. Las entregas efectuadas por China seguirán por debajo de los niveles esperados hace unos años, bajando de 2,4 millones de toneladas en 1990 a 1,8 millones de toneladas en 1991.

Los precios del carbón importado aumentaron a comienzos de año, pero parecen haberse estabilizado actualmente, e incluso se han producido recientemente signos de una ligera erosión de los precios al contado en las entregas de carbón de vapor.

El precio indicativo del carbón de coque en el tercer trimestre de 1990 era de 59,40 USD, frente a 57,10 en el mismo trimestre del año pasado, y el precio medio ponderado del carbón de vapor (de cualquier origen y mediante cualquier tipo de contrato) importado a la Comunidad en el segundo trimestre de 1990 era de 53,45/tec, frente a 49,91 tec en el mismo período de 1989. La depreciación de cerca del 20 % que ha sufrido el dolar a lo largo de 1990 rebaja,

naturalmente, en mucho el precio del carbón importado en moneda nacional, independientemente del aumento de los precios en dólares de EE UU.

Las previsiones actuales indican que las tendencias registradas los últimos años, es decir, un descenso constante de la producción, un aumento de las importaciones para compensar los recursos totales y una clara estabilización de las entregas, sufrirán pocos cambios. Por el momento no parece probable que la crisis del Golfo produzca cambios apreciables en estas tendencias, dadas las escasas posibilidades de sustituir por carbón los productos derivados del petróleo.

Puede solicitarse el informe en  
versión completa escribiendo a:  
Dirección General de la Energía (DG XVII B)  
Rue de la Loi 200  
B-1049 Bruselas

# Der Treibhauseffekt

Annahme eines CO<sub>2</sub>-Zieles für die Gemeinschaft auf der gemeinsamen Tagung des Rates für Energie und Umwelt von P. Faross, GD XVII: Direktion Energiepolitik (A1)

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Am 29. Oktober fand erstmals eine gemeinsame Tagung der EG-Minister für Energie und Umwelt statt, um die Haltung der Gemeinschaft auf der Zweiten Weltklimakonferenz in Genf (6. – 7. November 1990) festzulegen. Nach langen, heftigen Debatten einigte man sich auf ein Ziel für die Stabilisierung der CO<sub>2</sub>-Emissionen in der gesamten Gemeinschaft:

„Die Mitgliedstaaten der Europäischen Gemeinschaft und andere Industrieländer sollten unverzüglich Maßnahmen zur Stabilisierung oder Senkung ihrer Emissionen von CO<sub>2</sub> und anderen Treibhausgasen ergreifen. Die Stabilisierung der CO<sub>2</sub>-Emissionen auf dem Niveau von 1990 sollte im allgemeinen bis zum Jahre 2000 erreicht sein; der Rat nimmt jedoch zur Kenntnis, daß sich einige Mitgliedstaaten aufgrund ihrer Programme nicht auf dieses Ziel festlegen können. Länder mit einem bisher relativ niedrigen Energieverbrauch, der jedoch entsprechend der Entwicklung dieser Länder zunehmen dürfte, müssen Ziele oder Strategien festlegen, die mit dieser Entwicklung in Einklang stehen, jedoch eine effizientere Energienutzung bei ihren wirtschaftlichen Tätigkeiten anstreben.“

Die Europäische Gemeinschaft und ihre Mitgliedstaaten gehen davon aus, daß andere führende Länder Verpflichtungen entsprechend den vorstehenden Leitlinien eingehen, und sind in Anbetracht der Tatsache, daß einige Mitgliedstaaten unterschiedliche Zieltermine für die Stabilisierung oder Senkung der Emissionen festgelegt haben, bereit, Maßnahmen zu treffen, um die Stabilisierung der CO<sub>2</sub>-Gesamtemissionen auf dem Niveau von 1990 bis zum Jahre 2000 im Gebiet der Gemeinschaft zu erreichen. Mitgliedstaaten mit relativ niedrigem Energieverbrauch und daher niedrigen, auf einer Pro-Kopf- oder anderen geeigneten Grundlage gemessenen Emissionen sind berechtigt, CO<sub>2</sub>-Ziele und/oder -Strategien zu verfolgen, die ihrer wirtschaftlichen und gesellschaftlichen Entwicklung entsprechen; sie streben jedoch eine effizientere Energienutzung bei ihren Wirtschaftstätigkeiten an.“

Auf der Zweiten Weltklimakonferenz, der letzten größeren internationalen Konferenz vor der offiziellen Aufnahme von Verhandlungen über eine Vereinbarung zum Schutz des Weltklimas, schlossen sich andere Teilnehmer, darunter vor allem EFTA-Länder, dem Standpunkt der Gemeinschaft an. In einer von den 137 Teilnehmerstaaten vereinbarten Erklärung wurde die Notwen-

digkeit unterstrichen, die nicht unter das Übereinkommen von Montreal fallenden Treibhausgasemissionen zu stabilisieren, obgleich sich die Vereinigten Staaten weiterhin jeglicher bindenden Zusage hinsichtlich der Begrenzung der Emissionen von Treibhausgasen enthielten.

Zur Erreichung dieses Ergebnisses trugen auch wissenschaftliche Beweise für eine Erwärmung der Erdoberfläche bei, die von der Zwischenstaatlichen Gruppe für Klimaänderungen (IPCC) aufgestellt worden waren.

„Der Treibhauseffekt ist eine Tatsache: Infrarotstrahlung absorbierende Gase in der Atmosphäre machen die Erdoberfläche bereits jetzt wärmer, als es sonst der Fall wäre“, schloß die Arbeitsgruppe 1 der IPCC, die größte Gruppe von Wissenschaftlern, die sich jemals mit der globalen Erwärmung befaßt hat.

Die zweite wichtige Feststellung der Arbeitsgruppe 3 der IPCC geht dahin, daß für die Emissionen von Treibhausgasen eine raschere Zunahme prognostiziert wird, als man ursprünglich angenommen hat. In einem als Referenz dienenden Szenario, das sich auf Daten der Teilnehmerländer und der Gemeinschaft stützt, wird nachgewiesen, daß die CO<sub>2</sub>-Emissionen (Basis 1985) bis zum Jahre 2025 etwa 2,5mal stärker zunehmen werden, wenn keine weltweiten Maßnahmen ergriffen werden.

Bei den Emissionen anderer Treibhausgase werden gleichfalls erhebliche Anstiege erwartet. Bei den Daten für Methan, Stickoxide und FCKW besteht allerdings nach wie vor Unsicherheit. Die Untersuchungen über die gegenwärtigen und künftigen Emissionen dieser Treibhausgase müssen fortgesetzt werden.

Nach den Prognosen werden die derzeitigen Zunahmen der Treibhausgasemissionen die globale Durchschnittstemperatur bis zum Jahr 2020 um 1,8 °C ansteigen lassen, wobei die Spanne vermutlich von 1,3 bis 2,5 °C reichen wird. Bis zum Jahr 2070 wird die Spannweite der Temperaturanstiege zwischen 2,4 und 5,1 °C liegen, wobei die beste Schätzung der IPCC auf 3,5 °C lautet. Diese rasche Klimaänderung könnte verheerende Folgen haben, wie einen Anstieg der Meeresspiegel, eine Zunahme der Stürme, der Niederschläge und sonstiger extremer Wetterlagen.

Die Nahrungsmittelerzeugung wird beeinträchtigt sein, bei den größeren Waldgebieten könnte es zu einer we-

**CO<sub>2</sub>-Emissionen im Referenzszenario**

(Mrd t Kohlenstoff)

	1985	2000	2010	2025
Gesamte Welt	5,15	7,30	9,08	12,43
Industrieländer	3,83	4,95	5,70	6,95
Nordamerika	1,34	1,71	1,92	2,37
Westeuropa	0,85	0,98	1,06	1,19
(EUR 12)	0,70	0,82	0,86	./.)
OECD-Pazifik	0,31	0,48	0,55	0,62
Europäische Planwirtschaftsländer	1,33	1,78	2,17	2,77
Entwicklungsländer	1,33	2,35	3,38	5,48

sentlichen Verlagerung kommen und die natürlichen terrestrischen Ökosysteme könnten stärker in Anspruch genommen werden, als es ihre Regeneration zuläßt. Die Auswirkungen werden für menschliche Siedlungen in Küstengebieten am stärksten sein. In letzter Konsequenz könnte dies zu Umsiedlungen führen.

**Gibt es einen Ausweg?**

Der dominierende Faktor der Klimaänderung ist die Konzentration von Treibhausgasen in der Atmosphäre, die in einer Schicht mit einer Höhe von 36 km festzustellen ist. Wegen der langen Lebensdauer dieser Gase gibt es eine erhebliche zeitliche Verschiebung zwischen Änderungen der Treibhausgasemissionen und den daraus folgenden Änderungen der Konzentrationen. Schon die bloße Erhaltung des derzeitigen Status quo wird enorme, weltweite Anstrengungen erfordern. Die IPCC hat erklärt, daß die folgende Verringerung der anthropogenen Treibhausgasemissionen notwendig ist, wenn man die Konzentration in der Atmosphäre stabilisieren will:

Kohlendioxid	60 – 80 %
Methan	15 – 20 %
Stickoxide	70 – 80 %
CFC 11	70 – 75 %
CFC 12	75 – 85 %

Während eines Workshops über Zielwerte für Treibhausgasemissionen, das vom 11. bis 13. Juni 1990 in London stattfand, wurde ein Szenario für eine Rate der globalen Erwärmung von etwas mehr als 0,1 °C/Jahrzehnt vorgestellt. Nach diesem Szenario würden sich die atmosphärischen Konzentrationen in CO<sub>2</sub>-Äquivalent bis zum Jahr 2090 verdoppeln und dann auf diesem Niveau halten. Die CO<sub>2</sub>-Emissionen fossiler Brennstoffe müßten nach folgender Zeittafel verringert werden:

	OECD	außer OECD
2000	0-5 %	+ 25 %
2025	-25/25 %	+ 65 %
2050	-20/25 %	+ 100 %
2075	-50 %	+ 50 %
2100	-70 %	+ 15 %

1990 = 100

Ein solches Szenario würde die unterschiedlichen Verhältnisse und Bedürfnisse der Industrie- und der Entwicklungsländer in Rechnung stellen. Doch selbst wenn die CO<sub>2</sub>-Emissionen pro Kopf (Basis 1985) in den Industrieländern um 50 % gesenkt und in den Entwicklungsländern um ebenfalls 50 % steigen würden, lägen die Emissionen pro Kopf in den Industrieländern immer noch erheblich höher.

## Der Beitrag der Gemeinschaft

Derzeit entfallen auf die Gemeinschaft etwa 13 % der weltweiten CO<sub>2</sub>-Emissionen; dieser Anteil soll sich bis 2000 um 11 % und bis 2010 um 9,5 % verringern. Die jeweiligen Anteile belaufen sich gegenwärtig auf 23 % für die USA, 19 % für die UdSSR, 10 % für China, 5 % für Japan usw. Andere Treibhausgase, wie Methan und Stickoxide, tragen auch in nennenswertem Maße zur globalen Erwärmung bei, doch fehlen hier noch verlässliche Statistiken.

Es liegt auf der Hand, daß die Gemeinschaft allein das globale Problem nicht lösen kann. Selbst wenn alle OECD-Länder ihre CO<sub>2</sub>-Emissionen verringerten, könnten diese Verbesserungen in einigen Jahrzehnten durch den zunehmenden Energieeinsatz der Entwicklungsländer wieder aufgehoben werden.

Daher bedarf es einer weltweiten Reaktion auf breiter multinationaler Ebene.

Eine Kooperation unter Einsatz nationaler Maßnahmen sollte jedoch nicht hinausgeschoben werden, und die Entwicklungsländer brauchen die finanzielle Unterstützung und den Transfer von Technologie durch die Industrieländer.

## Was kann die Gemeinschaft tun?

Der Europäische Rat von Dublin hat die Bedeutung und Dringlichkeit des Problems herausgestrichen und die Kommission aufgefordert, eine führende Rolle bei den internationalen Bestrebungen zur Begrenzung der globalen Erwärmung zu übernehmen. Die Gemeinschaft hat diese Forderung aufgegriffen, indem sie am 29. Oktober das vorerwähnte Ziel der CO<sub>2</sub>-Stabilisierung beschloß. Diese Vereinbarung sollte als ein erster Schritt zur Aufstellung einer langfristigen Strategie für die Verringerung der Emissionen von Treibhausgasen auf ein annehmbares Niveau angesehen werden.

Die Stabilisierung dieser Emissionen ist nur ein erster Schritt in einer auf lange Sicht angelegten Strategie der Verringerung. Eine bloße Stabilisierung der Emissionen würde verlorene Mühe, Zeit und Geld bedeuten.

Die erste Aufgabe der Kommission besteht darin, eine kohärente Strategie zu entwickeln, mit der sich die Stabilisierung des CO<sub>2</sub>-Ausstoßes bis zum Jahr 2000 erreichen läßt. Bei dieser Strategie wird man die verschiedenen Möglichkeiten und Sachzwänge ebenso wie das Emissionsniveau in den einzelnen Mitgliedstaaten berücksichtigen müssen.

### Pro-Kopf-Emissionen von CO<sub>2</sub> aus fossilen Brennstoffen

(t Kohlenstoff pro Kopf)

P	0,8
E	1,3
GR	1,6
I	1,8
F	1,8
IRL	2,3
EUR 12	2,6
UK	2,8
B	2,9
NL	3,0
DK	3,3
D	3,3
L	6,5

Die Hauptlast bei der Erreichung des Ziels der CO<sub>2</sub>-Stabilisierung wird der Energiesektor der Gemeinschaft tragen.

## Veränderungen in der Energiepolitik

Praktisch alle CO<sub>2</sub>-Emissionen der Gemeinschaft gehen auf die Verfeuerung fossiler Brennstoffe zurück. Die Exploration von Kohlenwasserstoffen und Erdgasleckagen



sind die Hauptquellen der Emission von Methan in die Atmosphäre. Unsere jüngsten Feststellungen zur Energie im Jahr 2010 zeigen – bei Zugrundelegung des konservativen Szenarios –, daß die CO<sub>2</sub>-Emissionen (in t Kohlenstoff) bis 2010 von 753 Mio t 1990 auf 856 Mio t (= +13 %) steigen werden, wenn keine Schritte unternommen werden.

#### EUR-12-Daten

##### Hauptquellen von CO<sub>2</sub>-Emissionen:

Stromerzeugung	31 %
Verkehr	24 %
Haushalte/tertiärer Sektor	22 %
Industrie	19 %
Sonstige	4 %

##### Emissionen nach Kategorien von Brennstoffen:

Öl	49,5 %
Feste Brennstoffe	31,0 %
Gas	19,5 %

Mittel und Wege zur Verringerung der CO<sub>2</sub>-Emissionen werden im einzelnen in der Mitteilung der Kommission über Energie und Umwelt (KOM[89] 369) beschrieben. Folgende Optionen scheinen sich anzubieten:

- Verbesserung des Wirkungsgrades bei Energieversorgung und -umwandlung sowie beim Endverbrauch;
- Substitution von Brennstoffen durch Energiequellen, bei denen weniger oder gar keine Treibhausgase entstehen;
- Verringerung der Treibhausgasemissionen durch Beseitigung, Rückführung in den Kreislauf oder Fixierung;
- Veränderungen im Energiemanagement, im Verhalten und in den Strukturen.

Vereinbarungsgemäß sollen die Maßnahmen in einem ersten Schritt aus anderen Gründen als der Klimaänderung von Vorteil und als solche gerechtfertigt sein. Darunter fallen marktorientierte Demonstrationsprogramme für effizientere und sauberere Energietechnologien, wie Thermie und das neue Programm der Gemeinschaft für Energieeinsparungen, SAVE.

In einem zweiten Schritt müssen die Anpassungsstrategien mit den Politiken zur Verringerung der Emissionen verglichen werden, um die brauchbarsten und kostengünstigsten Lösungen zu ermitteln. Nach unserem derzeitigen Wissensstand wird die Anpassung allein (die Anpassung der Gesellschaft an die jeweils eintretenden Änderungen) im Lichte der tiefgreifenden Änderungen im Haushalt des Klimas und der Natur keine annehmbare Option darstellen.

Eine Strategie, die eine mögliche Antwort liefern könnte, wurde mit dem Szenario 4 im Rahmen von „Energie für ein neues Jahrhundert“ veranschaulicht, in dem in Frage kommende kohärente Entwicklungen der Zukunft der Gemeinschaft auf dem Energiesektor bis zum Jahr 2010 aufgezeigt wurden. Nach diesem Szenario würden die CO<sub>2</sub>-Emissionen im Jahr 2010 um 25 % niedriger sein als heute: Dieses Szenario bedeutet aber:

- langsames Wirtschaftswachstum;
- eine rasche Verbreitung von Techniken mit höherem Wirkungsgrad für den Endverbrauch und die Erzeugung;
- höhere Endverbrauchspreise mit Beginn der 90er Jahre: Das Szenario 4 bedingt eine Steigerung des Preisniveaus um 100 % für Kohle, 44 % für Öl und 30 % für Gas;
- strengere Umweltziele.

Bei einer Analyse zeigt sich, daß eine leistungsfähige Strategie die Wirkungen von Nachfragesteuerung, Brennstoffsubstitution und höheren Preisen miteinander kombinieren muß. Die Verringerung der CO<sub>2</sub>-Emissionen würde ohne steuerliche Maßnahmen bescheidener ausfallen. Jeglicher steuerliche Eingriff muß aber darauf gerichtet sein, die langfristige Sicherheit der Energieversorgung der Gemeinschaft zu unterstützen. Eine allgemeine Steuer (auf Kilowattstundenbasis) könnte ein geeignetes Mittel sein, die CO<sub>2</sub>-Emissionen zu begrenzen und gleichzeitig die Sicherheit der Energieversorgung zu gewährleisten.

Andere, sehr wichtige Fragen bedürfen der Antwort:

- Wäre es wirksamer, Verringerungen der CO<sub>2</sub>-Emissionen außerhalb der Gemeinschaft, insbesondere in Ländern Mittel- und Osteuropas, zu finanzieren?
- Inwieweit sollten wir den Transfer von Finanzmitteln und Technologie in Entwicklungsländer fördern, um

mit dem erwarteten starken Wachstum der Weltbevölkerung Schritt zu halten?

- Wie können wir am besten eine Strategie entwickeln, welche eine Verringerung der Treibhausgasemissionen, die Wiederaufforstung und den Schutz der Wälder mit der Anpassung kombiniert?

Die Gemeinschaft muß eine Leitfunktion übernehmen. Es gibt keinen großen politischen Partner, der bereit ist, unverzüglich zu handeln.

Auf der Konferenz „Energie für das nächste Jahrhundert“ hat das Kommissionsmitglied Cardoso e Cunha eine eindeutige politische Parole für den Energiesektor ausgegeben:

„Wir müssen handeln, wir müssen rasch handeln, wir müssen gemeinsam handeln.“

# CO<sub>2</sub>-Ziele und Lastenausgleich

GD XVII: Direktion Energiepolitik, Abteilung Analysen und Vorausschätzungen (A2)  
Kevin Leydon, José Carvalho Neto, Manfred Decker

*Der Rat der Energie- und Umweltminister kam auf seiner Tagung am 29. Oktober überein, „Maßnahmen zu treffen, um die Stabilisierung der CO<sub>2</sub>-Gesamtemissionen auf dem Niveau von 1990 bis zum Jahr 2000 im Gebiet der Gemeinschaft zu erreichen“. Mit diesem Ziel ist eine gewisse Flexibilität verbunden, die Mitgliedstaaten mit einem bisher relativ niedrigen Energieverbrauch, der jedoch entsprechend der Entwicklung dieser Länder zunehmen dürfte, dazu berechtigt, Ziele und Strategien festzulegen, die mit dieser Entwicklung in Einklang stehen, wobei sie jedoch eine effizientere Energienutzung bei ihren wirtschaftlichen Tätigkeiten anstreben müssen.*

*Der Rat nahm die Absicht der Kommission zur Kenntnis, bis Ende 1990 auf der Grundlage einer gerechten Lastenteilung und unter Berücksichtigung sowohl der Möglichkeiten und Sachzwänge hinsichtlich der CO<sub>2</sub>-Senkung als auch der gegenwärtigen Emissionslage in den Mitgliedstaaten geeignete Optionen und Maßnahmen vorzuschlagen, die eine koordinierte Teilnahme der Mitgliedstaaten erleichtern.*

*Der vorliegende Artikel befaßt sich mit der Erreichung dieses politischen Ziels, indem er die „Möglichkeiten und Sachzwänge hinsichtlich der CO<sub>2</sub>-Senkung“ herausarbeitet. Er ergänzt damit andere Untersuchungen der Kommission in folgenden Veröffentlichungen:*

- Energie für das nächste Jahrhundert: Europäische Perspektive (GD XVIII, Mai 1990);*
- The Economics of Policies to Stabilize or Reduce Greenhouse Gas Emissions: the Case of CO<sub>2</sub> (GD II, Oktober 1990);*
- CO<sub>2</sub> Study – Crash Programme: Cost-effectiveness analysis of CO<sub>2</sub> reduction options (GD XII, Oktober 1990).*

*Der Artikel stellt die jüngsten Erfahrungen auf dem Gebiet der Stabilisierung der CO<sub>2</sub>-Emissionen in der Gemeinschaft in den Mittelpunkt und bringt so die wichtigsten Triebkräfte ins Bild, von denen das Ergebnis im folgenden Jahrzehnt wahrscheinlich abhängen wird. Er sucht herauszufinden, wie die Anstrengungen zur Erreichung einer Stabilisierung in der Gemeinschaft in gerechter Weise unter den Mitgliedstaaten verteilt werden können, welche Sektoren (Stromerzeugung und Verkehr) die größten Möglichkeiten bieten und zugleich die größten Herausforderungen darstellen und in welchen politischen Bereichen (Brennstoffaustausch und Effizienz) das nutzbare Potential vermutlich am größten ist. Schließlich wird die auf dem Stromerzeugungsektor an die Gemeinschaft gestellte Herausforderung in Anbetracht der Bedeutung eines weltweiten Ansatzes für das Problem der Senkung des CO<sub>2</sub>-Ausstoßes in einem globalen Zusammenhang betrachtet.*

*Es ist jetzt entscheidend, daß ein glaubwürdiges Programm entwickelt wird, bei dem das Potential eines jeden Mitgliedstaates (Subsidiaritätsprinzip) unter Koordinierung mit geeigneten Politiken der Gemeinschaft eingesetzt wird, um die Absicht des Rates zu verwirklichen, die CO<sub>2</sub>-Emissionen bis zum Jahr 2000 auf dem Niveau von 1990 zu stabilisieren.*

## Zusammenfassung

Wir stellen die Frage, wie die Verhältnisse wären, wenn die Gemeinschaft 1980 das Ziel einer Stabilisierung der CO<sub>2</sub>-Emissionen bis zum Jahre 1990 aufgestellt hätte, und konnten dabei eine Reihe ausschlaggebender Triebkräfte ermitteln, die zur Erreichung eines solchen Ziels geführt hätten (die CO<sub>2</sub>-Emissionen betragen 1980 2,8 Mrd t Kohlenstoff und verringerten sich bis 1988 auf 2,6 Mrd t); die treibenden Kräfte waren:

- Wirtschaftswachstum, mit einer Rezession am Anfang, gefolgt von einer Erholung und einer Beschleunigung am Ende des Zeitraums;
- hohe Ölpreise in der ersten Hälfte des Jahrzehnts;
- Brennstoffumstellung mit einer wachsenden Zunahme von Strom, gleichbleibendem oder rückläufigem Verbrauch von Kohle, Rückgang bei Öl, Zunahme bei Gas und einem beträchtlichen Zuwachs an Kernenergie;
- erhöhte Energieeffizienz mit hohen Zugewinnen in den ersten Jahren der Periode, danach erneutes Einpendeln auf den langfristigen Trend von 1 %/Jahr;
- wärmeres Wetter am Anfang und am Ende des Jahrzehnts.

Stützt man sich auf dieses Ergebnis und betrachtet das kommende Jahrzehnt, so erhält man einen Eindruck von den Möglichkeiten und Sachzwängen, die für die Erreichung eines ähnlichen Ergebnisses bis zum Jahr 2000 maßgeblich wären:

- Für das kommende Jahrzehnt ist bei Ausbleiben spezifischer politischer Maßnahmen mit einer Zunahme der CO<sub>2</sub>-Emissionen um 10 % (in einer Welt entsprechend Szenario 1) <sup>(1)</sup>, aber um mehr als 20 % im Falle eines höheren BIP und einer geringeren als der erwarteten Energieeffizienz zu rechnen.
- Während die Emissionssenkungen als solche im Mittel keine unüberwindlichen Schwierigkeiten bei der Aufstellung von Stabilisierungszielen (im Szenario 1) aufzuwerfen scheinen, sind bei genauerer Untersuchung zwei Schlüsselbereiche zu erkennen, von denen die Erreichbarkeit eines solchen Zieles abhängen könnte: die Erzeugung und Nutzung von Strom und der Verkehrssektor.

<sup>(1)</sup> Szenario 1 in „Energie für das nächste Jahrhundert: Europäische Perspektive“ in *Energie in Europa*, Sondernummer, Juli 1990.

- Es handelt sich bei ihnen um Wachstumssektoren, die vor allem im Endverbrauch stark dezentralisiert sind und auf denen das „Niveau“ der Nachfrage durch Einzelentscheidungen von Millionen von Individuen bestimmt wird. „Ingenieurtechnische“ Verbesserungen werden zwar helfen, doch der Schlüssel für das Endergebnis bei der Senkung der CO<sub>2</sub>-Emissionen liegt in der Veränderung des „Verbraucherverhaltens“.
- Angesichts des Investitionsprofils der Elektrizitätswirtschaft eröffnen die 90er Jahre eine wichtige „Gelegenheit für die Zukunftsplanung“, nämlich Art und Umfang der benötigten neuen Kapazität zu beeinflussen.

Nachdem wir die Stromerzeugung und den Verkehr als die für das erzielte Ergebnis kritischen Sektoren identifiziert haben, zeigen sich die Brennstoffumstellung und Effizienzverbesserungen als die ausschlaggebenden Bereiche der Politik.

- Auf der Angebotsseite des Elektrizitätssektors müßte in den 90er Jahren das Gas generell die führende Rolle übernehmen, indem es an die Stelle der Kernkraft tritt und die Kohle verdrängt.
- Auf der Nachfrageseite würde in Ergänzung zu den Maßnahmen auf der Angebotsseite die Erreichung der Stabilisierung bedeuten, daß sich die Intensität bei Elektrizität um etwa 1,4 % jährlich verringert, anstatt nach dem „konservativen“ Szenario um 0,5 % jährlich zuzunehmen.
- Für den Verkehrssektor bestehen im kommenden Jahrzehnt wenig Aussichten für eine Brennstoffumstellung, womit sich die Energieeffizienz und Veränderungen im Verbraucherverhalten als die Mittel für eine wie auch immer ausfallende Verringerung der CO<sub>2</sub>-Emissionen erweisen.

Angesichts der Bedeutung der globalen Dimension berichtet der vorliegende Artikel über wahrscheinliche Trends und politische Möglichkeiten einer Verringerung der weltweiten CO<sub>2</sub>-Emissionen in Verbindung mit dem Brennstoffeinsatz bei der Stromerzeugung, im Verkehrssektor, in der Industrie und bei allen anderen wirtschaftlichen und gesellschaftlichen Tätigkeiten. In dem Bericht der GD XVII (Energie für das nächste Jahrhundert: Europäische Perspektive) wird die weltweite Lage unter Zugrundelegung des „konventionellen“ Szenarios für diese und andere Sektoren untersucht. Darüber hinaus befaßt sich ein Bericht, der unter der Schirmherrschaft der Internationalen Atomenergie-Agentur für die Konferenz über Energie und Umwelt im Mai 1991 in Helsinki vorbereitet

wurde, mit Elektrizitätsnachfrage und -erzeugung und den damit verbundenen CO<sub>2</sub>-Emissionen auf einer globalen Basis.

Schließlich untersucht der Artikel, wie sich die zur Erreichung eines Stabilisierungsziels der Gemeinschaft erforderlichen Anstrengungen in gerechter Weise auf die Mitgliedstaaten aufteilen lassen. Es wurden eine Reihe dafür in Frage kommender Indikatoren bewertet und solche Schlüsselfragen herausgearbeitet, die gelöst werden müssen, um zu der politischen Übereinkunft beizutragen, die für die Wahl des zu beschließenden Lastenausgleichs notwendig ist.

## Die 80er Jahre

Frage:

Falls die Gemeinschaft ein CO<sub>2</sub>-Stabilisierungsziel für die 80er Jahre (auf der Basis von 1980) beschlossen hätte – wäre ihm Erfolg beschieden gewesen und welches wären die treibenden Kräfte gewesen, die einen solchen Erfolg ermöglicht hätten?

Die CO<sub>2</sub>-Emissionen der Gemeinschaft beliefen sich 1980 auf 2,8 Mrd t CO<sub>2</sub>. Bis 1988 (dem letzten Jahr, für das vollständige Statistiken vorliegen) ging der CO<sub>2</sub>-Ausstoß auf 2,6 Mrd t CO<sub>2</sub> zurück (s. Abb. 1).

## Feste Brennstoffe

Die wichtigsten treibenden Kräfte dieser Entwicklung waren:

- das Niveau des Wirtschaftswachstums, mit einer Rezession am Anfang des Zeitraums, gefolgt von einem stetigen Wachstum Mitte der 80er Jahre, das sich in den letzten Jahren beschleunigte (s. Abb. 2);
- das Niveau der Ölpreise, die am Anfang des Zeitraums bei 50 USD/bbl in Preisen von 1990 lagen, bis zum Preiseinbruch 1986 rückläufig waren und danach auf etwa 18 USD/bbl stiegen (s. Abb. 3);
- der Grad der Brennstoffumstellung unter verstärktem Vordringen der Elektrizität; Kohlenachfrage gleichbleibend oder rückläufig; Ölverbrauch rückläufig; gesteigerter Gaseinsatz; beträchtliche Zunahme der Stromerzeugung aus Kernkraft (s. Abb. 4);

- die Steigerung der Energieeffizienz, die in den ersten Jahren des Zeitraums am stärksten war und dann wieder in den langfristigen Trend von ca. 1 %/Jahr zurückfiel (s. Abb. 5);
- die Witterungsverhältnisse, gemessen in Gradtagen; das Wetter war am Anfang und am Ende des Zeitraums wärmer als im Durchschnitt, während die Temperaturen in der Zeit von 1984 bis 1987 unter dem Mittel lagen (s. Abb. 6).

Die folgende Analyse befaßt sich mit den Einzelheiten der Energienutzung und der CO<sub>2</sub>-Emissionen von

- Stromerzeugung;
- Industrie;
- Haushalten/tertiärem Sektor;
- Verkehr.

### Stromerzeugung

Abbildung 7 zeigt die Entwicklung der in Wärmekraftwerken eingesetzten verschiedenen Brennstoffe und der entsprechenden CO<sub>2</sub>-Emissionen. Es ergeben sich die folgenden beiden Hauptschlußfolgerungen:

- Die CO<sub>2</sub>-Emissionen gingen in ihrer Gesamtheit von 1980 bis 1988 um 12 % zurück, was im wesentlichen einer Brennstoffumstellung zuzuschreiben war; der Einsatz fossiler Brennstoffe verringerte sich um ca. 15 %; die Verwendung von Öl für die Stromerzeugung wurde erheblich eingeschränkt.
- Die Veränderungen bei den Brennstoffquellen und die Verringerung der CO<sub>2</sub>-Emissionen waren der beträchtlichen Steigerung der Stromerzeugung aus Kernkraft zuzuschreiben, die von 44 Mio t RöE auf 147 Mio t RöE zunahm (von 36 GW auf 101 GW).

### Industrie

Abbildung 8 zeigt die Entwicklung des Energieverbrauchs nach Brennstoffarten in der Industrie und die entsprechenden CO<sub>2</sub>-Emissionen, die von 1980 bis 1983 fielen und sich danach stabilisierten. Diese Entwicklung war hauptsächlich folgenden Umständen zuzuschreiben:

- Die Energienachfrage sank bis 1983, dann folgte eine nur mäßige Steigerung bis 1988.

- Bis 1983 kam es zu einer gewissen Umstellung von Öl auf Strom und Gas.
- Der Anteil der Elektrizität nahm gegen Ende des Zeitraums erneut zu.
- Die Nachfrage nach festen Brennstoffen hat nur geringfügig zugenommen.

#### Haushalte und tertiärer Sektor

Abbildung 9 zeigt die Entwicklung des Energieverbrauchs nach Brennstoffarten in den Haushalten und im tertiären Sektor sowie die jeweiligen CO<sub>2</sub>-Emissionen.

Die CO<sub>2</sub>-Emissionen nahmen in ihrer Gesamtheit von 1980 bis 1984 ab, bis 1986 zu und fielen dann erneut bis 1988.

Diese Entwicklung war hauptsächlich folgenden Umständen zuzuschreiben:

- Die Energienachfrage ging bis 1984 zwar nicht nennenswert zurück, doch erfolgte eine weitgehende Umstellung von den festen Brennstoffen und Öl auf Gas und Strom.
- Von 1984 bis 1986 kam es zu einer Aufwärtsbewegung bei Öl und Gas.
- Der Einsatz von Öl und Gas ging nach 1986 trotz niedrigerer Öl- und Gaspreise zurück, weil der Verbrauch fossiler Brennstoffe wegen milder Witterung unter dem Normalniveau verblieb.

#### Verkehr

Abbildung 10 zeigt die Entwicklung des Energieverbrauchs im Verkehrssektor und die entsprechenden CO<sub>2</sub>-Emissionen. Die gesamten CO<sub>2</sub>-Emissionen nahmen während des ganzen Zeitraums infolge wachsender Nachfrage stetig zu (von 517 Mio t auf 640 Mio t). Nach 1986 stieg die Nachfrage wegen hoher Einkommen und relativ niedriger Ölpreise rasch an.

## Die 90er Jahre

Frage:

Betrachtet man die kommenden 10 bis 15 Jahre: Welches sind die Aussichten, eine Stabilisierung auf dem Niveau von 1990 zu erreichen? Wie wirkt sich dies auf jeden Sektor aus, und welche Bedingungen müssen auf diesen Sektoren erfüllt werden, wenn das Ziel erreicht werden soll?

Je nach dem Verlauf der wirtschaftlichen Entwicklung, dem Erfolg des Binnenmarktes und den Welthandelsbedingungen könnten die CO<sub>2</sub> Emissionen von 1988 bis 2010 um einen Wert zwischen 21 % und 33 % ansteigen (die entsprechenden Schätzungen für die Zeit von 1990 bis 2000 liegen zwischen 12 % und 23 %).

Nach Energiesektoren und in einer dem „konservativen“ Szenario entsprechenden Welt wären die Brennstoffe für die Stromerzeugung und den Verkehr die hauptsächlichsten Antriebssektoren, die wahrscheinlich ihren CO<sub>2</sub>-Ausstoß in der Zeit von 1988 bis 2000 um 56 % bis 58 % bzw. um 15 % bis 40 % erhöhen würden.

Abbildung 11 zeigt, wie sich Energienachfrage und CO<sub>2</sub>-Emissionen auf dem Sektor der Stromerzeugung bei einer Zukunftsbetrachtung nach dem „konservativen“ Szenario entwickeln könnten. Aufgrund dieses Szenarios ergeben sich folgende Hauptschlußfolgerungen:

- Die gesamten CO<sub>2</sub>-Emissionen scheinen für die Zeit von 1988 bis 2000 auf einen Anstieg um etwa 38 % zuzusteuern, und zwar aus folgenden Gründen: die Stromnachfrage ist 1990 höher als erwartet (also bereits im Ausgangspunkt steigende Tendenz); die Elektrizität nimmt an Attraktivität zu (Substitution von Öl, Kohle und selbst teilweise Gas im Endverbrauch, worin sich das Wachstum der technologisch orientierten Industrien widerspiegelt); zwischen 1980 und 1988 gingen 65 GW Nuklearkapazität ans Netz, während für die 90er Jahre Aussichten auf 11 GW zusätzlicher Kapazität bestehen (3 GW weniger als vor ein bis zwei Jahren angenommen); schließlich wird mit einer Zunahme bei Kohle gerechnet (um etwa 39 Mio t RÖE in den 90er Jahren).
- Es gibt weniger Optionen für eine Brennstoffumstellung in den 90er Jahren: das Gas muß die Führungsrolle übernehmen, die Kernenergie ersetzen und die Kohle verdrängen, während Öl eine wenig verlockende Option bleibt.

Abbildung 12 zeigt, wie sich Energienachfrage und CO<sub>2</sub>-Emissionen bei einer Betrachtung der Zukunft nach einem „konservativen“ Szenario entwickeln können. Aufgrund dieses Szenarios ergeben sich folgende Haupt-schlußfolgerungen:

- Die für den Zeitraum von 1980 bis 1988 aufgezeichneten Trends scheinen auf einen fortgesetzten Anstieg zuzusteuern (möglicherweise um 15 % bis 40 % im Zeitraum 1988 bis 2000, nach 2000 wäre mit einer gewissen Abflachung der Anstiegskurve zu rechnen); bei dieser Prognose wurde bereits eine Effizienzverbesserung des Fahrzeugbestands um ca. 9 % angenommen (Verbesserungen zwischen 14 und 17 % bei Neuwagen), doch werden alle solche Verbesserungen mehr als aufgehoben durch die steigende Nachfrage infolge der wachsenden Zahl und der zunehmenden Größe der Fahrzeuge.
- Will man diese Trends in den Griff bekommen, so setzt dies folgendes voraus: die Zusammenarbeit der Autohersteller bei der Entwicklung und Vermarktung von Kraftfahrzeugen mit einem erheblich niedrigeren spezifischen Energiebedarf; die Verbesserung der Kraftstoffigenschaften sowie zusätzlich die Suche nach Ersatzkraftstoffen mit einem geringeren CO<sub>2</sub>-Gehalt; die Durchführung von Plänen für das Verkehrsmanagement und von Urbanisierungsmaßnahmen seitens der Stadtverwaltungen; die Entwicklung einer Verkehrstarifpolitik.

Die Aussichten für eine Stabilisierung auf dem Industrie- und auf anderen Sektoren (Haushalte/tertiärer Sektor) sind zwar von Bedeutung, stellen aber geringere Herausforderungen (s. Abb. 13 und 14) dar.

Die für die Vergangenheit festgestellten treibenden Kräfte werden auch in der Zukunft zum Tragen kommen, wie Wirtschaftswachstum, Ölpreise, Brennstoffumstellung, Effizienz und Witterung. Einige lassen sich jedoch nicht voraussagen, wie z. B. das Wetter oder auch die Ölpreise; das Wirtschaftswachstum wird von Kräften bestimmt werden, die außerhalb von Energie und Umwelt liegen. Damit bleiben zwei Bereiche für politische Überlegungen: Brennstoffumstellung und Effizienz.

## Brennstoffumstellung

- Der allgemeine Trend geht in Richtung eines verstärkten Vordringens der Elektrizität auf den Endverbrauchsmärkten, wobei der Einsatz von Kohle zurückgeht (ausgenommen zur Stromerzeugung) und Gas so-

wohl auf den Endverbrauchsmärkten als auch auf dem Stromerzeugungssektor zugewinnt. Die Bedeutung des Verkehrssektors für Öl wird zunehmen.

- Im Bereich der Stromerzeugung wird der Beitrag zusätzlicher Nuklearkapazität zur Deckung steigender Nachfrage während des Jahrzehnts weniger bedeutend sein als im vergangenen Zeitraum.
- Kohle wird wegen des CO<sub>2</sub>-Gehalts nicht attraktiv sein. Im Rahmen der früheren politischen Positionen war die Kohle der natürliche Ersatz, wenn die Kernenergie hinter den Erwartungen zurückblieb.
- Nachdem Öl (unter dem Gesichtspunkt der Versorgungssicherheit) weiterhin ein „flüchtiger“ Brennstoff bleibt, fällt die Last des „Ausweichbrennstoffs“ auf das Gas.
- Die Gasmengen, die erforderlich sein werden, um nicht nur einem massiven Wachstum der Stromnachfrage zu begegnen, sondern um Gas auch als „Ausweichbrennstoff“ einzusetzen, werden beträchtlich sein; dieser Gesichtspunkt wird in Abschnitt 3 näher untersucht.

## Effizienzgewinne

Will man die Energienachfrage besser beherrschen, indem man die Menge der für eine bestimmte Dienstleistung benötigten Energie verringert, so bedarf es erheblicher Umsicht in der Suche nach Mitteln und Wegen, um sowohl die Erzeugung als auch die Nutzung von Energie zu verbessern.

Die Analyse bestehender Szenarios geht von beträchtlichen Effizienzgewinnen aus; die folgende sektorale Analyse sieht bereits eine Verringerung der Energieintensität um 1,3 % jährlich vor; will man aber die Lücke zwischen diesen Erwartungen und dem Niveau schließen, das für die Stabilisierung erforderlich ist, so kommt man hierfür zu einer Rate von insgesamt 2,4 bis 5,8 % jährlich.

Besondere Aufmerksamkeit ist der Stromerzeugung, dem Endverbrauch von Elektrizität und dem Verkehrssektor zu widmen.

## Schlußfolgerungen

Die durchschnittliche Höhe von Emissionsenkungen scheint zwar als solche keine unüberwindlichen Schwie-

rigkeiten bei der Festsetzung von Stabilisierungszielen aufzuwerfen, doch stößt man bei genauerer Analyse auf zwei Schlüsselbereiche, von denen die Erreichbarkeit eines solchen Zieles abhängen könnte: die Erzeugung und die Nutzung von Elektrizität sowie der Verkehrssektor.

Es handelt sich hierbei um Wachstumssektoren, die vor allem im Endverbrauch extrem dezentralisiert sind und auf denen die Höhe der „Nachfrage“ durch Einzelentscheidungen von Millionen Menschen bestimmt wird. „Ingenieurtechnische“ Verbesserungen werden zwar hilfreich sein, doch der Schlüssel zum Erfolg bei der Senkung der CO<sub>2</sub>-Emissionen liegt letztlich in der Veränderung des „Verbraucherverhaltens“. Welche Herausforderung es bedeutet, die „Nachfragespirale“ in den Griff zu bekommen, ist aus Abbildung 15 gut ersichtlich.

## Vorrangige Sektoren

Frage:

Elektrizität und Verkehr sind als die kritischen Sektoren identifiziert worden, von denen der Erfolg abhängt. Brennstoffumstellung und Effizienzverbesserungen erweisen sich als die ausschlaggebenden politischen Bereiche. Welcher „Katalog“ politischer Instrumente ist erforderlich, um die Erreichung dieser Ziele zu fördern?

## Stromerzeugung

Die Größenordnung der Stabilisierungsaufgabe wird im folgenden an Beispielen veranschaulicht; es werden drei Beispiele angeboten: Stabilisierung durch Brennstoffumstellung (Abb. 16), Effizienz beim Endverbrauch (Abb. 17) und eine Verbindung beider Möglichkeiten (Abb. 18). Es handelt sich hier nicht um „Prognosen“; diese Beispiele sollen nur eine Vorstellung von den notwendigen Anstrengungen geben.

## Brennstoffumstellung allein

Will man die Stabilisierung der CO<sub>2</sub>-Emissionen bis zum Jahr 2000 lediglich auf dem Weg über die Brennstoffumstellung erreichen, so erfordert dies folgendes:

- Gas 88 GW zusätzlicher Kapazität (5 GW in Szenario 1 nachgewiesen) bzw. 104 Mio t

RöE über die (bereits vorgesehenen) 114 Mio t RöE Nettoeinfuhren hinaus;

- Kohle Verzicht auf 29 GW neuer Kapazität und Stilllegung von 37 GW bestehender Kapazität;
- Kernenergie 11 GW zusätzlicher Nettokapazität in den 90er Jahren.

Strukturelle Veränderungen dieser Größenordnung in einer so kurzen Zeitspanne sind unwahrscheinlich.

## Effizienzgewinne beim Endverbrauch

Jüngste Untersuchungen der Dienststellen<sup>(2)</sup> der Kommission legen nahe, daß es unter dem Gesichtspunkt der technischen Machbarkeit noch ein beachtliches Reservoir an „ingenieurtechnischen“ Möglichkeiten gibt. Auf diesem Gebiet bleibt noch vieles zu tun, das sich auf der Ebene der Gemeinschaft wie auch der Mitgliedstaaten als wirtschaftlich erweisen könnte.

Der Schlüssel für die Nutzung dieses Potentials liegt in der Durchsetzung auf dem Markt, d. h. in der Veränderung des Verbraucherverhaltens.

Die Stabilisierung der CO<sub>2</sub>-Emissionen bis 2000 allein durch Effizienzgewinne beim Endverbrauch erfordert eine Senkung der Energieintensität bei Strom um 2,6 % jährlich, anstatt – wie in den 80er Jahren – eine Steigerung um 0,5% jährlich.

## Brennstoffumstellung und Energieeffizienz beim Endverbrauch

Will man die Stabilisierung der CO<sub>2</sub>-Emissionen bis 2000 durch eine Verbindung von Brennstoffumstellung und Effizienzgewinnen beim Endverbrauch erreichen, so erfordert dies beispielsweise folgendes:

- Gas 77 GW zusätzlicher Kapazität (5 GW in Szenario 1 ausgewiesen) bzw. 78 Mio t RöE zusätzlich zu den (bereits vorgesehenen) 114 Mio t Nettoeinfuhren;

<sup>(2)</sup> GD XVII: Kosten-Nutzen-Analyse der Optionen für die Verringerung des CO<sub>2</sub>-Ausstoßes, Oktober 1990; GD XVII: Szenarios 3 und 4 im Bericht „Major Themes in Energy – Revisited“, Mai 1990.



- Kohle Verzicht auf 29 GW Kapazität sowie Stilllegung von 37 GW vorhandener Kapazität;
- Kernenergie 11 GW zusätzlicher Nettokapazität in den 90er Jahren;
- Verringerung der Energieintensität bei Strom um 1,4 % jährlich, anstatt einer Zunahme um 0,5 % wie in den 80er Jahren.

und der Kernenergie – im letzten Fall, um die Akzeptanz dieser Energieart in der Öffentlichkeit zu verbessern.

Es gibt auch noch andere Mittel und Wege, um bei der Lösung dieses Problems zu helfen:

- Ausweitung des Stromhandels (Binnenmarkt);
- besseres Management des Lastfaktors sowohl auf der Angebots- als auch auf der Verbrauchsseite;
- verstärkte Nutzung von Wärme-Kraftkopplung;
- gesteigerte Effizienz der Versorgungstechnologien.

## Anmerkungen

Es zeigt sich, daß Gas der „Ausweichbrennstoff“ ist, der einen geringeren nuklearen Beitrag kompensiert und die Kohle als Hauptalternative zur Deckung steigenden Bedarfs ersetzt. Ein ziemliches Problem stellen aber die Mengen Gas dar, die benötigt werden und mit denen nach vernünftigen Gesichtspunkten in den 90er Jahren auf dem Markt gerechnet werden kann.

Wenn man diese zusätzlichen Gasmengen aufzutreiben sucht, sollte dies die Gemeinschaft weder einer größeren Verletzlichkeit in der Frage der Versorgungssicherheit noch beträchtlich höheren Preisen aussetzen.

Damit man diesen Herausforderungen begegnen kann, bedarf es der Inkraftsetzung des Energiebinnenmarktes für Gas.

Die Kohle wird in der absehbaren Zukunft eine der Hauptquellen der Stromerzeugung bleiben; weder durch die Gassubstitution noch durch größere Effizienz beim Endverbrauch wird es möglich sein, größere Kohlemengen zu verdrängen; fortgesetzte FuE-Anstrengungen sind erforderlich, um sowohl die Effizienz der Kohleverfeuerung als auch die Art ihres Einsatzes zu verbessern (Verflüssigung bzw. Vergasung).

Neue und erneuerbare Energiequellen werden auch weiterhin einen Beitrag zur Stromerzeugung ohne CO<sub>2</sub>-Ausstoß leisten, aber es ist unwahrscheinlich, daß bis zum Jahr 2000 diese Energiequellen in den notwendigen zusätzlichen Mengen verfügbar sein werden, als daß sich die weiter oben dargelegte Argumentation grundlegend ändern würde.

Durch Gas wird man zwar etwas Zeit zum Atemholen gewinnen können, aber die längerfristigen Lösungen erfordern beträchtliche FuE-Anstrengungen auf dem Gebiet der Kohle, der neuen und erneuerbaren Energiequellen

Investitionen in der Elektrizitätswirtschaft – Kapazitäten und Kapital

– Abbildung 19 veranschaulicht die mögliche Höhe der Investitionen zur Stromerzeugung, die in den späten 90er Jahren, vor allem aber im ersten Jahrzehnt des nächsten Jahrhunderts erforderlich sein werden; wählt man einen konservativen Ansatz, so könnte sich ein Bedarf von etwa 190 GW mit Kosten in der Größenordnung von 240 Mrd ECU für die Zeit zwischen 2000 und 2010 ergeben; die Möglichkeit größerer Einsparungen bei den erforderlichen Mengen sowie durch die Anteile der einzelnen Brennstoffe an der Stromerzeugung mit entsprechenden Auswirkungen auf die CO<sub>2</sub>-Emissionen ist gegeben.

– Diese wichtige „Gelegenheit für die Zukunftsplanung“, d. h. die Einigung zwischen Mitgliedstaaten und Elektrizitätswirtschaft über die künftigen politischen Optionen, bietet sich jetzt, bevor diese Entscheidungen getroffen werden; dies ist ein kritischer Bereich für Überlegungen zur Entwicklung von Optionen für die Erreichung des Stabilisierungsziels.

## Verkehr

Für diesen Sektor gibt es keine nennenswerten Möglichkeiten der Brennstoffumstellung in der Zeit bis 2000.

Effizienzgewinne bieten den einzigen Weg zur Verringerung der Nachfrage und damit der CO<sub>2</sub>-Emissionen. Diese hängen jedoch ab von der

– Zusammenarbeit der Autohersteller bei der Entwicklung und Vermarktung von Fahrzeugen mit einem weit niedrigeren spezifischen Energiebedarf;

- Verbesserung der Kraftstoffeigenschaften, zusätzlich zur Suche nach Ersatzkraftstoffen mit geringerem CO<sub>2</sub>-Gehalt;
- Durchführung von Plänen für das Verkehrsmanagement und von Urbanisierungsmaßnahmen seitens der Stadtverwaltungen;
- Entwicklung einer Verkehrstarifpolitik.

Wenn der Verkehrssektor seinen Beitrag zum Gesamtziel leisten soll, dann muß die nach dem konservativen Standpunkt errechnete Menge des CO<sub>2</sub>-Ausstoßes durch eine Stabilisierungsstrategie, die sowohl aggressive Verbesserungen der Kraftstoffleistung als auch beträchtliche Veränderungen des Verhaltens einschließt, in ihr Gegenteil verkehrt werden.

Die Abbildung 20 gibt eine Vorstellung von der Größenordnung des Problems, das der Versuch einer Stabilisierung der CO<sub>2</sub>-Emissionen von privaten Kraftfahrzeugen aufwirft.

## Schlußbemerkung

Dieser Abschnitt hat die Brennstoffumstellung und das Effizienzpotential in den Mittelpunkt gestellt. Will man dieses Potential verwirklichen, so bedarf es dazu möglicherweise zusätzlicher politischer Initiativen, von denen einige gegenwärtig untersucht werden bzw. zur Diskussion stehen, wie SAVE, wirtschaftspolitische Instrumente.

## Die Stromerzeugung in der Gemeinschaft und die weltweiten Trends

Die Minister haben in ihren Schlußfolgerungen den weltweiten Charakter der Herausforderung unterstrichen, die der globale Temperaturanstieg darstellt, und sind davon ausgegangen, daß andere führende Länder ähnliche Verpflichtungen eingehen würden. Betrachtet man die weltweiten Trends von Stromversorgung und -nachfrage, so scheint sich folgende Lage abzuzeichnen:

- Entwicklungsbedarf und Umweltentlastungen müssen miteinander in Einklang gebracht werden:

Die weltweite Nachfrage nach elektrischen Dienstleistungen wird weiterhin steigen, wobei sie nur den Sachzwängen des Wirtschaftswachstums unterworfen sein wird; angesichts dieser Nachfrage kann die Elektrizitätswirtschaft der striktesten Zielsetzung einer globalen Verringerung der Auswirkungen nicht gerecht werden, ohne daß elektrische Dienstleistungen (in den Industrieländern) eingeschränkt und (den Entwicklungsländern) vorenthalten werden; einer etwas weniger strikten Zielsetzung einer globalen Verringerung der Auswirkungen kann die Elektrizitätswirtschaft ohne nennenswerte Einschränkung der elektrischen Dienstleistungen nachkommen, jedoch nur bei massiven politischen Eingriffen; wesentliche Fortschritte bei der Verringerung der Auswirkungen erfordern eine unausgesetzte Beobachtung der auf dem Sektor der Stromerzeugung erforderlichen Kapitalinvestitionen und institutionellen Entwicklungen.

- Die Möglichkeiten und die Grenzen alternativer Wege:

Jegliche Bewertung alternativer Wege für die Entwicklung des Elektrizitätssektors ist mit Unsicherheit behaftet und durch die Vielfalt von Faktoren belastet.

Effizienzverbesserungen im gesamten Stromversorgungssystem, von der Erzeugung bis zum Endverbrauch, bieten weitreichende Möglichkeiten zur Verringerung der Umweltschädigung und sollten mit Nachdruck betrieben werden; mit Effizienzverbesserungen allein läßt sich aber das gesamte Potential der Verringerung der Auswirkungen nicht nutzen.

Die Alternativen zur Kohle, die sich auf der Versorgungsseite anbieten, sollten gleichfalls hervorgehoben werden, wann immer sie zum Wirtschaftswachstum ebenso wie zur Beherrschung der Umweltprobleme beitragen können; die Kohle wird in vielen Ländern einen mächtigen Wettbewerbsfaktor gegenüber den alternativen Energiequellen bilden.

Erdgas wird bei der Verringerung der Auswirkungen eine wichtige Rolle spielen, vor allem in Europa und Nordamerika, doch ist ungewiß, in welcher Größenordnung es verfügbar sein wird.

Es ist unwahrscheinlich, daß die Wasserkraft weltweit eine erheblich größere Rolle übernehmen könnte, zum Teil, weil ihre Nutzung in großem Maßstab Umweltprobleme eigener Art aufwirft.

Energie aus Biomasse bietet die besten Aussichten auf angenehme Überraschungen; andere erneuerbare Energiequellen nehmen in ihrer Nutzung in beeindruckender Weise zu, aber es ist unwahrscheinlich, daß sie in wirt-

schaftlicher Hinsicht wettbewerbsfähig sein können, wenn es darum geht, einen großen Teil des weltweiten Strombedarfs zu decken.

Die Kernenergie hat die Möglichkeit, einen wesentlichen Beitrag zur Verringerung der CO<sub>2</sub>-Emissionen zu leisten, doch steht ihre Akzeptanz durch die Gesellschaft nach wie vor in Frage.

– Verschiedene regionale Rollen und Realitäten <sup>(3)</sup>:

Geeignete und wirksame Strategien zur Verringerung der Auswirkungen werden für einzelne Länder, Regionen und Standorte spezifisch sein; die OECD sollte die Führung bei der Propagierung alternativer Strategien übernehmen; die Sowjetunion und Osteuropa stehen vor großen Unsicherheitsfaktoren hinsichtlich der beim Wirtschaftswachstum und den institutionellen Veränderungen einzuschlagenden Wege, doch verfügen sie über ein erhebliches Potential, mit dem sie zur Verringerung der Auswirkungen beitragen können, sofern finanzielle und sonstige Mittel verfügbar sind.

Die Entwicklungsländer unterscheiden sich hinsichtlich ihrer Bedürfnisse und Optionen grundlegend von den Ländern mit höherem Pro-Kopf-Einkommen; einige Entwicklungsländer, die eine Schlüsselrolle spielen, werden die von ihnen verursachten CO<sub>2</sub>-Emissionen und sonstigen Umweltbelastungen steigern müssen, um ihre wirtschaftliche und soziale Entwicklung voranzutreiben; es wird einer wirkungsvollen internationalen Zusammenarbeit bedürfen, will man die Möglichkeiten einer Verringerung der Auswirkungen nutzen.

Abbildung 21 veranschaulicht diese Trends für mehrere Regionen der Welt: OECD, Sowjetunion und Osteuropa sowie Entwicklungsländer (einschließlich Chinas).

<sup>(3)</sup> Letzte Ergebnisse des Berichts einer Sachverständigengruppe an das „Senior Expert Symposium on Electricity and Environment“, das vom 13. bis 17. Mai 1991 in Helsinki stattfinden soll und von folgenden Organisationen gemeinsam ausgerichtet wird: KEG, RGW, ECE, IEA, IAEA, IIASA, OECD/NEA, UNEP, Weltbank, WHO und WOM.

## Lastenausgleich

Nachdem die Stabilisierungsziele der Gemeinschaft festgesetzt sind, erhebt sich die Frage, wie die zu ihrer Erreichung erforderlichen Anstrengungen verteilt werden sollen.

Dies ist eine in doppelter Hinsicht komplexe Aufgabe, und zwar sowohl in bezug auf die Grundsätze, auf deren Basis der Lastenausgleich vereinbart würde, als auch auf die Kriterien für einen annehmbaren Aufteilungsmechanismus.

Die fraglichen Grundsätze könnten Entscheidungen in folgenden Punkten umfassen:

- Frage des Ansatzes: von unten nach oben oder von oben nach unten;
- soziale Gerechtigkeit, vergleichbare Anstrengungen;
- Subsidiaritätsprinzip;
- Überwachungsverfahren.

Eine Kombination der folgenden Kriterien käme in Frage:

- wirtschaftlicher Wohlstand (BIP);
- Bevölkerung;
- Struktur und Niveau des Energieverbrauchs (als Ausdruck unterschiedlicher industrieller und wirtschaftlicher Strukturen);
- Klimaunterschiede;
- Landfläche (natürliche Senken);
- Kombinationen der obigen Kriterien unter Bezugnahme auf die Höhe der CO<sub>2</sub>-Emissionen.

Die hier unterliegende Absicht ist die Eröffnung der Debatte über den Lastenausgleich. Es wird zahlreicher, tiefer gehender Überlegungen und Analysen bedürfen, ehe die politische Diskussion Fortschritte machen wird. Aller Wahrscheinlichkeit nach wird sich die endgültige Struktur des Lastenausgleichs erst nach umfangreichen politischen Erörterungen erkennen lassen. Bevor dies geschieht, sollen die folgenden Erläuterungen einige der technischen Erwägungen herausstellen, auf die sich diese Debatten gründen werden.

## Soziale Gerechtigkeit und vergleichbare Anstrengungen

Soll das Stabilisierungsziel in Anbetracht der Unterschiede zwischen den Mitgliedstaaten bedeuten, daß jeder Mitgliedstaat für die Stabilisierung seiner eigenen CO<sub>2</sub>-Emissionen sorgen muß? Oder würde das Ziel des sozialen und wirtschaftlichen Zusammenhalts von einigen Mitgliedstaaten größere Anstrengungen erfordern, während andere ihre wirtschaftliche Basis ausbauen müßten, was einen Anstieg des Emissionsniveaus zur Folge hätte? Dieser Begriff der sozialen Gerechtigkeit beinhaltet aber das Problem der „vergleichbaren Anstrengungen“ – was wird von denjenigen Mitgliedstaaten verlangt, denen die Möglichkeit der Steigerung ihrer Emissionen eingeräumt wird?

## Klimaunterschiede

Man könnte argumentieren, daß es der Bevölkerung in Mitgliedstaaten mit kälterem Klima gestattet sein müßte, über genügend Raumheizung zu verfügen, um gleiche Bedingungen zu haben, wie die Menschen in den wärmeren Mitgliedstaaten. Dies würde zu gewissen Temperaturanpassungen der anfänglichen CO<sub>2</sub>-Zahlen führen.

## Handel

Wie soll der Handel mit Energieerzeugnissen behandelt werden? Wird z. B. Strom von einem Mitgliedstaat in einen anderen ausgeführt, so entlastet dies die Emissionen im „einführenden“ Land. Entsteht bei der Erzeugung CO<sub>2</sub>, soll dann das einführende Land mit den bei der betreffenden Erzeugung anfallenden Mengen belastet werden? Ist die Ausfuhr frei von CO<sub>2</sub> (z. B. Kernenergie oder Energie aus Wasserkraft), soll dies auf dem Konto des ausführenden Mitgliedstaates als „Guthaben“ verbucht werden, das mit seinen gesamten CO<sub>2</sub>-Emissionen verrechnet würde?

Ein weiterer Gesichtspunkt des Problems „Handel“ ist die Bewertung des Handels der Mitgliedstaaten mit Waren, bei denen viel Energie umgesetzt wird (z. B. Stahl im Falle Luxemburgs).

## Methodik

Ferner muß entschieden werden, auf welche Weise die gewählten Kriterien angewendet werden sollen. Grundsätzlich gibt es zwei unterschiedliche Ansätze. Die Kriterien könnten unmittelbar auf die CO<sub>2</sub>-Emissionen des Basisjahres angewendet werden, d. h. des Jahres, auf dessen Niveau die CO<sub>2</sub>-Emissionen stabilisiert werden sollen, oder aber auf die Emissionen im Zieljahr, d. h. dem Jahr, in dem die Stabilisierung erreicht sein soll.

Der zweite Ansatz erfordert eine Prognose, womit sich gleich die Frage stellt: welche Prognose und kann irgendetwas an eine Prognose gebunden werden?

	(a) CO <sub>2</sub> BIP	(b) CO <sub>2</sub> CAP <sup>(1)</sup>	(c) CO <sub>2</sub> TPER <sup>(2)</sup>	(d) CO <sub>2</sub> TFC <sup>(3)</sup>	(e) CO <sub>2</sub> km <sup>2</sup> <sup>(4)</sup>	(f) CO <sub>2</sub> GDP/CAP <sup>(5)</sup>	
<b>Einstufung</b>							
1		L	L	L	GR	L	UK
2		GR	DK	GR	IRL	NL	D
3		IRL	B	DK	DK	B	I
4		UK	D	IRL	UK	D	E
5		P	UK	UK	L	UK	F
6		NL	NL	I	D	DK	F
7		B	IRL	P	P	I	NL
8		DK	I	D	E	F	P
9		D	F	E	I	GR	B
10		E	GR	B	B	IRL	IRL
11		I	E	NL	NL	P	DK
12		F	P	F	F	E	L

Legende:

- (1) CAP: pro Kopf.
- (2) TPER: gesamter Primärenergieverbrauch.
- (3) TFC: gesamter Endenergieverbrauch.
- (4) km<sup>2</sup>: Quadratkilometer Fläche.
- (5) GDP/CAP: Pro-Kopf-Einkommen.

Auf welche Art man den Mechanismus für den Lastenausgleich auch schließlich festlegt – sämtliche Ansätze würden auf die eine oder andere Art von der jeweiligen Einstufung der Mitgliedstaaten nach Maßgabe verschiedener Kriterien ausgehen. Diese sechs Variablen sind: a) CO<sub>2</sub> je Einheit des BIP; b) CO<sub>2</sub> pro Kopf (CAP); c) CO<sub>2</sub> je Einheit des gesamten Primärenergieverbrauchs (TPER); d) CO<sub>2</sub> je Einheit des gesamten Endenergieverbrauchs (TFC); e) CO<sub>2</sub> je Quadratkilometer Fläche (km<sup>2</sup>); f) CO<sub>2</sub> bezogen auf das Pro-Kopf-Einkommen (GDP/CAP).

## Beispiele für verschiedene Indikatoren

Die Botschaft ist also eine jeweils andere, je nachdem welche Indikatoren man verwendet. Die Wahl dieser Indikatoren ließe sich zwar durch Erwägungen in Verbindung mit dem CO<sub>2</sub>-Problem begründen – beispielsweise könnten Länder mit größerer Fläche mehr Senken zur Verfügung stellen, was ihnen gutgeschrieben werden könnte –, doch haben die Wechselbeziehungen zwischen diesen Parametern zur Folge, daß die Verwendung des einen Indikators anstelle des anderen für bestimmte Gruppen von Mitgliedstaaten zu Vor- bzw. Nachteilen führt.

Setzt man den Energieverbrauch anstelle des BIP oder der Bevölkerung als gemeinsamen Nenner für die Berechnung des CO<sub>2</sub>-Indikators ein, so bringt dies für weniger energieeffiziente Länder einen gewissen Vorteil mit sich.

Ein anderes Beispiel: Für weniger dicht besiedelte Mitgliedstaaten ergibt sich ein relativer Vorteil, wenn das CO<sub>2</sub> in Beziehung zur Fläche anstelle der Bevölkerung gesetzt wird. In Abbildung 22 erkennt man die jeweiligen Vor- und Nachteile der Benutzung verschiedener Indikatoren.

## Schlußbemerkung

Die Auffindung des „richtigen Indikators“, aufgrund dessen die CO<sub>2</sub>-Emissionen in der „richtigen Art und Weise“ gemessen werden, und die Entscheidungen über die zu empfehlenden Verfahren erfordern weitere Überlegungen, darunter auch zu einigen allgemeineren Themen, wie „Vollendung des Binnenmarktes“ und Fortsetzung der „Politik des Zusammenhalts“ innerhalb der Gemeinschaft.

# Energie in Mittel- und Osteuropa

GD XVII: Direktion Energiepolitik (A1)

*Seit Oktober 1990 sind die Energieprobleme zu einem neuen Betätigungsfeld für die Hilfe geworden, die die Gruppe von 24 westlichen Ländern (G 24) der Region leistet.*

## Energie – eine neue Priorität für die G 24

Die Probleme sind zwar von Land zu Land verschieden, doch leiden die meisten Länder unter folgenden Sachzwängen:

- Sie sind in hohem Maße abhängig von einer einzigen Energiequelle. Dies gilt für alle Länder der Region, aber in Polen und der Tschechoslowakei ist die Abhängigkeit von Kohle besonders stark. Die meisten von ihnen hängen ferner von der Sowjetunion als einzigem Lieferanten von Öl, Erdgas oder Strom ab.
- Die Öleinfuhren aus anderen Ländern als der Sowjetunion müssen erhöht werden, weil es schwierig ist, die Lieferungen aus der Sowjetunion im bisherigen Umfang aufrechtzuerhalten.
- Die Energienutzung ist ineffizient infolge des schlechten Managements überholter und nach planwirtschaftlichen Gesichtspunkten errichteter Industrien, von denen viele energieintensiv sind.
- Die Umwelt- und Sicherheitsrisiken in Verbindung mit Energieerzeugung und -verbrauch sind hoch, vor allem in der Nuklearindustrie.
- Die Preisfestsetzung erfolgt nach planwirtschaftlichen Gesichtspunkten, d. h., sie steht in keiner Beziehung zur Realität des Marktes.
- Seit 1991 müssen alle Energieeinfuhren aus der Sowjetunion mit harter Währung bezahlt werden.
- Der Zugang zu neuen Technologien ist außerordentlich begrenzt.

Durch die Golfkrise und den Zusammenbruch des RGW-Handelssystems haben sich diese Probleme verschärft, und die derzeitige Wirtschaftsrezession hat Befürchtungen aufkommen lassen, daß die in diesen Ländern ein-

geleiteten politischen und wirtschaftlichen Reformen gefährdet sein könnten.

Aufgrund des G-24-Beschlusses, die Energie zu einem vorrangigen Sektor der Hilfeleistung zu machen, hat die EG-Kommission als Koordinator der G-24-Hilfe in Zusammenarbeit mit anderen internationalen Körperschaften eine Liste der Erfordernisse aufgestellt, die Vorrang haben müssen.

Auf ihrer ersten Tagung am 21. Dezember 1990 hat sich die für diesen Zweck eingesetzte Arbeitsgruppe der G 24 unter dem Vorsitz des Generaldirektors für Energie der EG-Kommission mit folgenden Fragen befaßt:

- Soforthilfe für Mittel- und Osteuropa während der Wintermonate;
- Zusammenarbeit auf dem Energiesektor auf mittlere und lange Sicht;
- Koordinierung der G-24-Hilfe auf dem Energiesektor.

## Das Hilfsprogramm der EG-Kommission für die Energieplanung

Zur Verbesserung der Energieplanung in Mittel- und Osteuropa stehen 1,4 Mio ECU zur Verfügung.

Aus dem Programm wurde bereits eine Untersuchung der Möglichkeit der Fremdfinanzierung in Ungarn finanziert; außerdem wurden Erhebungen über die Energienutzung in der ungarischen Nahrungsmittelindustrie und über Fragen des Energiemanagements in der Stadt Miskolc eingeleitet.

In Polen wird die EG eine Reihe von Studien finanzieren, welche die Umstrukturierung des Ölsektors betreffen:

Projekte zur Verbesserung des Energiemanagements in einer Reihe von Städten wurden in Angriff genommen.

In der Tschechoslowakei wird Hilfe zur Verbesserung der Energieeffizienz in der Bauwirtschaft bereitgestellt, während andere Projekte, einschließlich eines Energiesparprogramms und eines Ausbildungslehrgangs, geplant sind.

In Jugoslawien hat sich das Programm an der Organisation eines Seminars über Energiemanagement beteiligt.

## PHARE

Das Programm der Gemeinschaft über wirtschaftliche Unterstützung für Mittel- und Osteuropa (PHARE), das ursprünglich Polen und Ungarn gegolten hatte, wurde vor kurzem auf Bulgarien, Rumänien, die Tschechoslowakei, Jugoslawien und das Gebiet der früheren DDR ausgedehnt (Verordnung [EWG] Nr. 2698/90 des Rates, ABl. L 257 vom 21.9.1990).

Die frühere DDR hat seit dem Zeitpunkt der deutschen Vereinigung am 3. Oktober 1990 nun auch uneingeschränkt Zugang zu den bekannten Finanzierungsinstrumenten der Gemeinschaft (Strukturfonds, EIB-Darlehen usw.).

Den Energieproblemen wird in den bereits 1990 genehmigten Umweltprojekten von PHARE für Polen, Ungarn und die frühere DDR sowie in den für die Tschechoslowakei geplanten Vorhaben beträchtlicher Raum gegeben. Ungefähr ein Viertel der 100 Mio ECU, die für Umweltprojekte im Rahmen von PHARE vorgemerkt sind, gelten speziell Energieproblemen. An den Entwürfen von Projekten für 1991 wird bereits gearbeitet.

Eine kohärente Energiestrategie wird als wesentlicher Bestandteil jeglichen künftigen Hilfsprogramms für Mittel- und Osteuropa angesehen. Will man dies erreichen, so ist eine Koordinierung der Hilfe unerlässlich, vor allem, wenn es sich um eine Vielzahl von Geberorganisationen handelt (z. B. EIB, Weltbank, IWF, EBWE und IEA), und die EG-Kommission ist sich der Bedeutung ihrer Rolle als Garant für diese Koordinierung voll bewußt.

# Das Programm PHARE und die Europäische Gemeinschaft

Serge Christiane, Verwaltungsrat bei der Generaldirektion I: Auswärtige Beziehungen, operationeller Dienst „PHARE“,  
Kommission der Europäischen Gemeinschaften

*Die Demokratisierung der osteuropäischen Länder sowie das Abbröckeln der sowjetischen Vormachtstellung in den ehemaligen Bruderländern sind für den europäischen Kontinent ein bedeutendes historisches Ereignis.*

*Der Vorreiter Polen sowie Ungarn, die Tschechoslowakei, die Deutsche Demokratische Republik (DDR), Bulgarien, Rumänien und Jugoslawien, Länder, die 40 Jahre lang unter einem kommunistischen Regime gelebt haben, sehen sich von heute auf morgen erheblichen Problemen bei der Umstrukturierung ihrer Wirtschaft gegenüber.*

*Angesichts der immer größer werdenden Probleme, die im Juni 1989 insbesondere in Polen zutage traten, konnte sich vor allem die Europäische Gemeinschaft nicht gleichgültig verhalten. Auf dem Pariser Wirtschaftsgipfel im Juli 1989, an dem die sieben größten Industrieländer teilnahmen, wurde der Kommission der Europäischen Gemeinschaften (KEG) die Koordinierung der Hilfsmaßnahmen aller Industriestaaten (EWG und OECD) übertragen, die die osteuropäischen Länder auf ihrem Weg in die Demokratie begleiten sollen.*

## Die G 24 und das Programm PHARE

Bis Juni 1990 beschränkte sich die Unterstützung der G 24 (Gruppe der 24 hilfeleistenden Länder) auf Polen und Ungarn. Die KEG hat deshalb eine Task Force PHARE eingesetzt (Aktionsplan für die wirtschaftliche Umstrukturierung in Polen und Ungarn), die die Arbeit der G 24 koordiniert.

Außerdem wurden der KEG Mittel in Höhe von 300 Mio ECU zur Verfügung gestellt, um die Entwicklungs- und Privatisierungsvorhaben in vier vorrangigen Bereichen zu unterstützen: Landwirtschaft, Umwelt, berufliche Bildung und Industrie/gemeinsame Unternehmen.

Zur Durchführung dieser bedeutenden Hilfsmaßnahmen, denen eine Katalysatorwirkung für die Unterstützung der G 24 zukommen wird, hat die KEG einen operationellen Dienst „PHARE“ in der Generaldirektion Auswärtige Beziehungen eingerichtet.

Dieser Dienst hat eine schwierige Aufgabe zu bewältigen. Trotz der sofortigen Nahrungsmittelhilfe, die die G 24 für

Polen bereitgestellt hat, befindet sich dieses Land in einer äußerst schwierigen wirtschaftlichen Situation, die seine Entwicklung zur Demokratie gefährden könnte.

## Gewährleistung eines ausgewogenen Wachstums

Mit den verfügbaren Mitteln soll versucht werden, die dringlichsten Probleme zu bewältigen, indem zunächst die notwendigen Grundlagen geschaffen werden, die Polen und Ungarn trotz der schwierigen Situation ihrer öffentlichen Finanzen die Gewähr für ein ausgewogenes Wirtschaftswachstum bieten.

Die Auslandsverschuldung Polens (40 Mrd USD) und Ungarns (20 Mrd USD) nimmt weiter zu. Eine finanzielle Unterstützung von außen und Maßnahmen zur Förderung von Investitionen erscheinen deshalb dringend geboten, auch wenn die Wirkungen dieser Maßnahmen nicht sofort spürbar sind und sich erst mittelfristig bemerkbar machen.

Der Erfolg des Programms PHARE wird zum großen Teil davon abhängen, wie stark der Wille dieser beiden



Länder und ihrer Wirtschaft ist, die Situation in den Griff zu bekommen.

## Die Ergebnisse des Programms PHARE

In den ersten sechs Monaten konnten eine Reihe von Vorhaben in jedem der beiden Länder festgelegt und beschlossen werden. Für diese erste Aktion wurde nahezu die gesamte Summe der verfügbaren Mittel (300 Mio ECU) gebunden. Es handelt sich um folgende Vorhaben:

### A Polen und Ungarn

- 1 Zusammenarbeit im Bereich der Wirtschaftswissenschaften (1,5 Mio ECU)
- 2 Durchführung des europaweiten Programms für Mobilität im Hochschulbereich - Tempus (20 Mio ECU)

### B Polen

- 1 Sektorales Programm für die Einfuhr von Pflanzenschutzmitteln (50 Mio ECU)
- 2 Programm zum Schutz der Umwelt (22 Mio ECU)
- 3 Grundlegendes technisches Hilfsprogramm für die Privatisierungsstelle (9 Mio ECU)
- 4 Sektorales Programm für die Einfuhr von Futtermitteln und Futterzusatzstoffen (20 Mio ECU)
- 5 Sektorales Programm für die Einfuhr und technische Hilfe für kleine und mittlere Unternehmen (25 Mio ECU)
- 6 Eröffnung von Kreditlinien für die Einfuhr von Geräten für die Agrar- und Ernährungswirtschaft (30 Mio ECU)

### C Ungarn

- 1 Programm zum Schutz der Umwelt (25 Mio ECU)
- 2 Beteiligung der Gemeinschaft am Regionalzentrum für Umweltschutz in Budapest (2 Mio ECU)

- 3 Programm zur Entwicklung der privaten Landwirtschaft (20 Mio ECU)
- 4 Technisches Hilfsprogramm für die Modernisierung des Finanzsystems (5 Mio ECU)
- 5 Grundlegendes technisches Hilfsprogramm für die Privatisierungsstelle (5 Mio ECU)
- 6 Programm zur Unterstützung kleiner und mittlerer Unternehmen (KMU) (21 Mio ECU)
- 7 Sektorales Programm zur Modernisierung der Infrastrukturen im Forschungsbereich (3 Mio ECU)

Alle Vorhaben betreffen die Finanzierung technischer Hilfsprogramme sowie der Einfuhr oder des Kaufs von Material jeder Art.

Diese Projekte werden zum größten Teil in den Empfängerländern durchgeführt, die unter Kontrolle der Kommission oder der neu eingerichteten Delegationen in den beiden Ländern Ausschreibungen veröffentlichen und Verträge abschließen. So hat die Kommission beispielsweise für die beiden Umweltschutzprogramme in jedem der beiden Länder ein „Projektmanagement-Team“ eingerichtet, in dem Sachverständige aus der Europäischen Gemeinschaft ihre polnischen und ungarischen Kollegen bei der Durchführung der Programme unterstützen.

Die Vorhaben, über die zur Zeit verhandelt wird, betreffen hauptsächlich die Reform des Außenhandels, die berufliche Bildung, die industrielle Umstrukturierung und verschiedene kleinere Aktionen im sozialen Bereich.

## Und andere Länder?

Am 4. Juli 1990 haben die Minister der G 24 auf ihrer Sitzung beschlossen, das Programm PHARE auf andere mittel- und osteuropäische Länder (Bulgarien, DDR <sup>(1)</sup>, Tschechoslowakei und Jugoslawien), mit Ausnahme von Rumänien auszudehnen. Für Rumänien wird erst dann eine Entscheidung gefällt, wenn sich die Anzeichen der Demokratisierung verstärken.

<sup>(1)</sup> Bis zum 3. Oktober 1990, Tag der deutschen Einigung.

Zusätzliche Haushaltsmittel in Höhe von 200 Mio ECU werden durch die Gemeinschaft freigegeben, um in diesen Ländern schnelle Hilfe leisten zu können. Aus der Liste der Prioritäten dieser Länder ist bereits eine Auswahl getroffen worden. Man kann deshalb damit rechnen, daß alle für diese Länder eingesetzten Mittel bis Ende des Jahres in Vorhaben gebunden sein werden, die die Umwelt, die berufliche Bildung und die Reform der Finanzdienste und -systeme betreffen.

Was wird in den nächsten Jahren geschehen? Die Kommission beabsichtigt zur Zeit, Mittel in Höhe von 850 Mio ECU für 1991 und 1 Mrd ECU für 1992 bereitzustellen. Die Prioritäten für die nächsten Jahre sind noch festzulegen. Sie dürften sich jedoch nicht sehr stark von den 1990 festgelegten Prioritäten unterscheiden. Die Bereiche Energie und Verkehrswesen werden wahrscheinlich hinzukommen.

## Weitere Maßnahmen

Außer durch das Programm PHARE haben die Gemeinschaft und die übrigen Geberländer auf die sozialen und wirtschaftlichen Probleme der mittel- und osteuropäischen Länder auf verschiedenen Ebenen reagiert:

- 1 Mit Außenhandelskonzessionen wurde den Ländern die Möglichkeit geboten, ihre Ausfuhren in die Gemeinschaft zu steigern.
- 2 Eine technische Hilfe für die berufliche Bildung wird ins Leben gerufen.
- 3 Wichtige Finanzierungsfazilitäten wurden eingeräumt, die sich mittelfristig auswirken werden.

### 1 Außenhandelskonzessionen

Eine Reihe von Maßnahmen wurden verabschiedet, damit die Länder Mittel- und Osteuropas einen besseren Zugang zu den Märkten der Gemeinschaft haben. Ziel ist, ihre Exportkapazitäten zu erhöhen und so dazu beizutragen, daß sie leichter in den Besitz von harter Währung kommen, mit der sie ihre Zahlungsbilanzschwierigkeiten bewältigen können.

Kommerzielle Maßnahmen sind vor allem:

- Beseitigung der noch bestehenden spezifischen mengenmäßigen Beschränkungen;

- Aufhebung aller anderen mengenmäßigen Beschränkungen, die von den Mitgliedstaaten angewandt werden, für ein Jahr;
- Ausdehnung des allgemeinen Präferenzsystems (APS) auf diese Länder;
- Verpflichtung zu prüfen, inwieweit die Möglichkeiten der Einfuhr in die Gemeinschaft von Erzeugnissen aus dem Textil- und Bekleidungssektor verbessert werden können;
- Grundsatzentscheidung, mit diesen Ländern Abkommen im Bereich des EGKS-Vertrags auszuhandeln, um die wenigen mengenmäßigen Beschränkungen, die in den einzelnen Ländern für die Einfuhr noch bestehen, zu beseitigen.

Die 1990 getroffenen Maßnahmen sollten den Ländern die Möglichkeit bieten, ihrem Wunsch entsprechend die Handelsbeziehungen mit dem Westen auszubauen.

Neben diesen Vereinbarungen werden zur Zeit Assoziierungsabkommen zwischen diesen Ländern und der Europäischen Gemeinschaft geprüft. Der Rahmen der heutigen normalen Zusammenarbeit würde damit überschritten. Das bedeutet, daß längerfristige und engere Beziehungen zur Teilnahme an der europäischen Wirtschaft und am europäischen Leben hergestellt werden.

### 2 Berufliche Bildung

Im Dezember 1989 wurde auf dem Straßburger Gipfel folgende Entscheidung getroffen:

- die Einrichtung einer Europäischen Stiftung für die Berufsbildung, die für alle osteuropäischen Länder offen sein soll. Sie könnte als Zentrum für den Austausch und für die technische Dokumentation sowie als Ausgangspunkt für die Koordinierung verschiedener Bildungstätigkeiten dienen;
- die Durchführung von Bildungsprogrammen in der Art der in der Gemeinschaft bestehenden Programme wie Erasmus, Comett, Lingua usw.

Die Einrichtung der Europäischen Stiftung für die Berufsbildung kann zur Zeit nicht erfolgen, da die Entscheidung über den Sitz noch aussteht. Es ist jedoch damit zu rechnen, daß dieses Problem in Kürze zum Nutzen der mittel- und osteuropäischen Länder gelöst wird.

### 3 Finanzierungsfazilitäten

Ebenfalls im Dezember 1989 hat der Europäische Rat in Straßburg beschlossen, die Europäische Bank für Wiederaufbau und Entwicklung (EBWE) zu gründen.

Diese Bank soll den Übergang von der Planwirtschaft zur Marktwirtschaft erleichtern, die Finanzierung von Investitionsvorhaben ermöglichen und die strukturellen Anpassungen beschleunigen. Die Beteiligung am Kapital und an der Leitung der Bank steht osteuropäischen Ländern offen. Die Bank soll ihren Sitz in London haben und wird ihre Arbeit im März 1991 aufnehmen.

Ferner hat die Gemeinschaft Ungarn eine mittelfristige finanzielle Unterstützung bewilligt, damit dieses Land seine Zahlungsbilanzschwierigkeiten überwinden kann. Die Gemeinschaft hat hierfür 1 Mrd ECU auf den internationalen Märkten aufgenommen.

Für Polen hat die G 24 einen Fonds zur Stabilisierung des Zloty in Höhe von 1 Mrd USD eingerichtet. Mit diesem aus Beihilfen und Darlehen bestehenden Fonds sollen Devisenreserven geschaffen werden, um die Inflation zu bekämpfen und die Konvertierbarkeit der Währung zu erleichtern.

Außerdem wurde Polen und Ungarn die Möglichkeit eingeräumt, Darlehen bei der Europäischen Investitionsbank (EIB) aufzunehmen, die in Höhe von 1 Mrd ECU mit einer Laufzeit von drei Jahren zu den üblichen Bankbedingungen gewährt werden sollen. Diese Darlehen sind insbesondere für die Finanzierung von Investitionsvorhaben bestimmt, für die ein Devisenanteil erforderlich ist, z. B. für die Gründung von gemischten Unternehmen. Andere vorrangige Bereiche kommen für Finanzierungen durch die EIB in Frage: Energie, Telekommunikation und Verkehrswesen.

### Energie und PHARE

Auch wenn die Energie in spezifischen Vorhaben des Programms PHARE – mit Ausnahme der Vorhaben zur Verbesserung der Umwelt – noch nicht enthalten ist, scheint es doch, daß die Empfängerländer der PHARE-Hilfe immer deutlicher erkennen, welchen Nutzen sie aus einer effizienten und sparsamen Energiepolitik ziehen können.

Zum einen sind ihre Kern- und Wärmekraftwerke sowie deren technologische Verfahren häufig veraltet, so daß ihre Funktionsweise zu wünschen übrig läßt.

Die durch die Stromerzeugung verursachte Verschmutzung ist enorm: Die Schwefelemissionen Polens und der Tschechoslowakei z. B. entsprechen den gesamten Schwefelemissionen Westdeutschlands, Frankreichs und der Beneluxstaaten, obgleich diese Länder stärker industrialisiert sind als Polen und die Tschechoslowakei.

Zum anderen müssen die mittel- und osteuropäischen Länder ihr Öl an die Sowjetunion nunmehr in harter Währung und nicht mehr in Rubel bezahlen. Für die Zahlungs- und Devisenbilanz dieser Länder ist das ein großes Problem.

In der Planwirtschaft des Rates für gegenseitige Wirtschaftshilfe (RGW) bezahlten die ehemaligen sozialistischen Länder für das Barrel Rohöl an die Sowjetunion 7 USD. Im Rahmen des neuen Systems würde das Barrel zu 20 USD 80 % der Devisenreserven Bulgariens verschlingen, bei 30 USD für das Barrel wären es schon 100 %. Die entsprechenden Zahlen liegen bei 60 und 90 % für die Tschechoslowakei, bei 14 und 21 % für Ungarn und 22 und 23 % für Polen.

Ferner bringt der Konflikt zwischen Irak und Kuwait und sein ungewisser Ausgang einige dieser Länder in eine schwierige Lage. Die mit Irak abgeschlossenen Verträge über Öllieferungen im Austausch gegen bestimmte Waren sind nun gefährdet. Das internationale Embargo gegen Irak bedeutet folglich das Ende der Öllieferungen. Allerdings wurden die meisten Waren, die hierfür bestimmt sind, bereits geliefert. Für Polen beläuft sich diese Einbuße auf etwa 150 Mio USD für das Jahr 1990.

Schließlich ist anzuführen, daß jeder Bewohner der mittel- und osteuropäischen Länder einschließlich der Sowjetunion im Durchschnitt 4,8 t RÖE verbraucht. In den westlichen Ländern liegt der Verbrauch bei 3,4 t RÖE.

Die Situation ist somit dramatisch. Sie nicht ernstzunehmen, könnte verheerende Folgen für unsere Umwelt und für die laufenden demokratischen Reformen nach sich ziehen. Nach Meinung der Sachverständigen würde das bedeuten, daß der Lebensstandard in diesen Ländern doppelt so schnell sinken würde – nicht um 10 bis 15 % in den nächsten drei Jahren, sondern um 20 bis 30 %. Um schnell Abhilfe zu schaffen, könnten die Länder eine Möglichkeit darin sehen, ihre gefährlichen Kernkraftwerke weiterzubetreiben und auch weiterhin Braunkohle zu verbrennen. Sie würden damit unmittelbar auf eine ökologische und menschliche Katastrophe zusteuern.

Sollten die verschiedenen Länder, in denen das Programm PHARE durchgeführt wird, 1991 um weitere

finanzielle Mittel für die Fortsetzung der verschiedenen Umweltschutzvorhaben ersuchen, so werden die neuen wirtschaftlichen und politischen Gegebenheiten vermutlich dazu führen, daß neue Prioritäten und Projekte im Bereich der Energie festgelegt werden. Im Rahmen des Programms PHARE der Gemeinschaft und zusammen mit der EIB und der EBWE wird man sich 1991 dieser Vorhaben annehmen müssen. Die Kommission hat diese

Fragen bereits intern erörtert, und die Diskussionen mit den verschiedenen Empfängerländern werden wahrscheinlich im Spätjahr 1990 aufgenommen.

Es muß jedoch festgestellt werden, daß alle bereits finanzierten Umweltprojekte zum großen Teil die Durchführung von Energiesparmaßnahmen betreffen.

# Demonstrations- und industrielle Pilotprojekte auf dem Gebiet der Energie: die Kohledruckvergasung nach dem Prenflo-Verfahren

GD XVII: Direktion Energietechnologie, Abteilung Programmverwaltung (D2)

## Projekt Nr. LG 354/87 DE

Mit finanzieller Unterstützung durch die Kommission der Europäischen Gemeinschaften (Verträge Nr. LG 018/83, LG 270/85, LG 354/87 DE) und den Minister für Forschung und Technologie der Bundesrepublik Deutschland hat Krupp Koppers eine Kohledruckvergasungsanlage nach dem Prenflo-Verfahren mit einer Kapazität von 48 t Kohlenstaub pro Tag im Saarland errichtet. Mit der erfolgreichen Vergasung von Brennstoffen unterschiedlicher Herkunft in über 8000 Betriebsstunden wurde nachgewiesen, daß das Prenflo-Verfahren umweltfreundlich, effizient, betriebssicher und wirtschaftlich attraktiv ist.

### I. Einführung

Das Prenflo-Verfahren zur Hochtemperatur-Druckvergasung von trockenem Kohlenstaub mit Sauerstoff erzeugt ein einfach zusammengesetztes Rohgas mit den Hauptkomponenten Kohlenmonoxid und Wasserstoff. Das Rohgas wird mit konventioneller Gasbehandlungstechnik zu Synthesegas, Wasserstoff, Reduktionsgas oder das für die Kohleverstromung im Gas-/Dampfturbinenkraftwerk erforderliche, maschinensaubere Heizgas aufgearbeitet.

Krupp Koppers hat das Prenflo-Verfahren zur Kohlevergasung unter Druck auf der Grundlage des kommerziell etablierten Koppers-Totzek-Verfahrens (Niederdruckvergasung) entwickelt.

Das Prenflo-Entwicklungsprogramm (Abb. 1) hat die großtechnische Markteinführung zum Ziel.

Mit dem Projekt „48-t/d-Prenflo-Anlage“ (Abb. 2) wurden wichtige Grundlagen für die Planung eines Demonstrationskraftwerkes mit integrierter Kohlevergasung bereitgestellt. Die Kraftwerksplanung erfolgt gemeinsam mit der Siemens AG/Unternehmensbereich KWU. Für 1991 wird eine Bauentscheidung im Hinblick auf den Bau kommerzieller Kraftwerke mit Vergasereinheiten für 300 MWel ab Ende dieses Jahrhunderts erwartet.

### II. Zielsetzung

Das Gesamtziel der Prenflo-Entwicklung ist die Absicherung der technisch-wirtschaftlichen Attraktivität des Verfahrens für den kommerziellen Einsatz großer Vergasungseinheiten.

Wesentliche Ziele des Vorhabens „48-t/d-Prenflo-Anlage“ waren:

- Nachweis der Langzeitverfügbarkeit des Prenflo-Systems und seiner Komponenten;
- Optimierung der Effizienz des Prenflo-Verfahrens bei Einsatz fester Brennstoffe mit extremen Eigenschaften (Asche, Schwefel, Chlor);
- Minimierung von gasförmigen Emissionen, von Abwasser und festen Abfallstoffen;
- Nachweis der Betriebsflexibilität für die Anforderungen im Kraftwerkseinsatz.

### III. Prenflo-Prinzip

Die Prenflo-Vergasung erfolgt nach dem Flugstrom-Prinzip. Kohlenstaub mit einer Korngröße  $< 100 \mu\text{m}$  und geringer Restfeuchte wird mittels Stickstoff einem Reaktionsraum mit gekühlter, feuerfester Auskleidung zugeführt. Die Vergasung des Kohlenstaubes, d. h. die Partialoxidation des Kohlenstoffes zu Kohlenmonoxid, erfolgt in einer Flammenreaktion bei Temperaturen  $> 2000 \text{ }^\circ\text{C}$  und einem Druck von 24 bis 30 bar. Die Kohlenstoffsubstanz wird in Kohlenmonoxid, Wasserstoff und geringe Anteile an Kohlendioxid, der Schwefelgehalt in Schwefelwasserstoff und begrenzt in Kohlenoxisulfid, der Chlorgehalt in Chlorkohlenwasserstoff umgewandelt. Kohleasche wird bei den hohen Vergasungstemperaturen aufgeschmolzen.

Die Kohlenstaubdosierung, die Kohlenstaub/Sauerstoff-Verhältnisregelung, die Vergasungsbrenner und der Vergasungsraum bilden die wesentliche Prenflo-Funktionseinheit.

## IV. Prenflo-Verfahren

Das Prenflo-Fließbild (Abb. 3) kennzeichnet den erreichten Entwicklungsstand.

Kohlenstaub wird von einem Vorratsbunker pneumatisch zum Schleusystem des Vergasers transportiert. Das Schleusystem besteht aus Empfangsbunker, Schleusbunker und Zuteilbunker. Stickstoff wird als Transportmedium und zum Druckaufbau verwendet. Über ein Dosier- und Verteilersystem gelangt Kohlenstaub zu den 4 Vergaserbrennern des Prenflo-Moduls, denen ebenfalls die Vergasungsmittel Sauerstoff und Wasserdampf zugeführt werden. Der Vergasungsreaktor befindet sich im thermisch gering beaufschlagten Druckbehälter. Der Vergasungsraum wird von einem Verdampfungskühlsystem umschlossen, das mit feuerfestem Material vor direktem Schlackeangriff geschützt ist. Die flüssige Schlacke fließt über eine auf der feuerfesten Auskleidung erstarrte Schlackeschicht in ein Wasserbad. Ein Schlackebrecher stellt sicher, daß ggf. gröbere Schlackestücke vor der Ausschleusung gebrochen werden.

Das Rohgas strömt vom Vergaser in den auf diesen aufgesetzten Strahlungskessel. Der Strahlungskessel ist mit radialen Schottenwänden und mechanischen Abreinigungseinrichtungen ausgestattet. Zur Bauhöhenbegrenzung wird das Rohgas vor Austritt aus dem Strahlungskessel auf die festgelegte Schnittstellentemperatur für den nachgeschalteten Konvektivkessel mit rückgeführtem Produktgas gekühlt.

Die weitere Abkühlung des Gases erfolgt im Konvektivkessel. Die Dampfsysteme des Abhitzesystems und des Vergasers sind gekoppelt. Die Gasreinigung erfolgt in einem Zyklon mit Staubausschleusung und Flugstaubrückführung, des weiteren in Venturi-Wäschern und einem Hochdruckabscheider. Das Waschwassersystem ist mit einem Druckfilter und einem Stripper zur Abwasserreinigung ausgestattet. Das saubere und gekühlte Gas wird teilweise als Quenchgas zurückgeführt. Das Produktgas wird in einer trockenen Entschwefelungsanlage behandelt und als Heizgas verwendet.

Der Strahlungskessel hat noch ein Optimierungspotential, das im praktisch vollkommenen Verzicht von Kühlgas besteht. Im Rahmen des Projektes LG 255-89-DE werden die hierzu erforderlichen Entwicklungsarbeiten durchgeführt.

## V. Ergebnisse des Versuchsbetriebs

Im Versuchsbetrieb wurden in über 8080 Stunden 9 verschiedene Brennstoffe mit Aschegehalten bis zu 40 % erfolgreich eingesetzt. Komponenten und eingesetzte Werkstoffe erfüllen die technischen Anforderungen für den Kraftwerksbetrieb.

### - Effizienz

Alle eingesetzten Brennstoffe werden zu über 98 %, bei Flugstaubrückführung zu über 99,5 %, umgesetzt. Die Vergasung zeichnet sich durch hohes Nutzgasausbringen aus; CO<sub>2</sub>-Gehalte liegen zwischen 0,5 % und 3 %. Es resultieren hohe thermische Wirkungsgrade. Der Kaltgaswirkungsgrad für die 48-t/d-Prenflo-Anlage erreichte 80 %, in Großanlagen werden 82 % erwartet. Weitere 15 % des Brennwertes werden in Dampf hoher Qualität überführt. Wird das gereinigte Gas im Rohgas/Reingas-Wärmetauscher aufgeheizt, steht das Gas mit 85 % des Energieinhaltes der Kohle bei entsprechend verminderter Dampferzeugung der Gasturbinenkammer zur Verfügung.

### - Umweltverträglichkeit

Brennstoffasche wird als inerte granuliert Schlacke aus dem Vergaser ausgetragen. Die Schlacke ist nicht eluierbar und kann einer Verwertung oder einer Deponie entsprechend den Vorschriften für Bauaushub zugeführt werden. Bis zu 85 % der Kohleasche werden in einem Durchgang in Schlacke überführt. Trockene Flugstaubabscheidung und Flugstaubrückführung sichern eine nahezu vollständige Verschlackung. Eine Reststaubmenge von etwa 4 kg/t Kohle wird aus dem Waschsystem als Filterkuchen ausgetragen und ggf. nachbehandelt. Das gewaschene Reingas enthält weniger als 0,1 mg Staub/m<sup>3</sup> i. N.

Schwefelverbindungen werden ggf. unter Berücksichtigung einer COS-Hydrolyse durch konventionelle physikalische oder chemische Wäschen praktisch vollständig aus dem Rohgas entfernt und in einer Clausanlage zu elementarem, verkaufsfähigem Schwefel umgesetzt.

Halogenverbindungen werden in der Venturi-Wäsche vollständig aus dem Rohgas entfernt. Die Gewinnung von Alkalisalzen durch Eindampfen aufkonzentrierten Waschwassers (Kreislaufwäsche) erlaubt einen abwasserfreien Betrieb. Über 80 % des Produktsalzes ist mit hoher Reinheit verfügbar.

Der Einsatz des gereinigten Kohlengases in die Brennkammer der Gasturbine führt unter Berücksichtigung der Einbindung von Stickstoff aus der Luftzerlegung und einer Aufsättigung mit Wasserdampf zu äußerst niedrigen  $\text{NO}_x$ -Werten im Rauchgas eines Kraftwerkes. Der hohe Wirkungsgrad der Kohlevergasung begrenzt die  $\text{CO}_2$ -Emission.

#### – Flexibilität

Die Prenflo-Anlage zeichnet sich durch hohe Betriebssicherheit und Flexibilität aus. Das Anfahren einer Prenflo-Anlage erfordert kurze Zeiten, ein Start vom drucklosen Zustand bei warmem Dampfsystem erfordert 90 Minuten vom Zünden bis zur Vollast. Lastsprünge durch Abschalten einzelner Brenner führen innerhalb weniger Sekunden zu den gewünschten Betriebszuständen. Laständerungen im Lastbereich zwischen 35 % und 110 % können vollautomatisch mit Laständerungsgeschwindigkeiten von 2 % bis 20 % pro Minute durchgeführt werden. Die Gasqualität ändert sich bei Teillast praktisch nicht. Ein Brennstoffwechsel erfordert nur begrenzte Änderungen der Betriebsparameter.

Die Heizflächenverschmutzung bei Einsatz chlorreicher Brennstoffe wird durch mechanische Abreinigungseinrichtungen auf niedrigem Niveau gehalten.

## VI. Ausblick

Die großtechnische Integration des Prenflo-Verfahrens in ein Gas-/Dampfturbinenkraftwerk erlaubt bei Einsatz einer Vollwert-Steinkohle die Stromerzeugung mit einem Nettowirkungsgrad von 45 %, wobei ein zusätzliches Potential von ca. 2 %-

Punkten (höhere Gasturbineeintrittstemperatur, Heißgasreinigung) mittelfristig realisierbar ist.

Die hohe Umweltverträglichkeit, die insbesondere spezifisch geringe  $\text{CO}_2$ -Emission, die Betriebssicherheit und die Flexibilität des Prenflo-Verfahrens lassen dessen breite Anwendung erwarten.

Die notwendige Voraussetzung für die großtechnische Markteinführung der neuen Technik sind der Bau und der erfolgreiche Betrieb eines Demonstrationskraftwerkes geeigneter Größe (200 bis 300 MWel). Es ist das Ziel, die Hemmschwelle, die durch die hohen Kosten eines derartigen Demonstrationsprojektes gegeben ist, in naher Zukunft zu überwinden.

Weitere Informationen zu diesem Projekt sind erhältlich bei:

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# Le marché intérieur de l'énergie (1)

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unité «achèvement du marché intérieur» (TF 1)

*Cette revue avait présenté, dans un numéro spécial, le document de travail de la Commission sur le marché intérieur de l'énergie, adopté le 2 mai 1988. Depuis, la Commission a présenté un premier rapport d'étape (COM/90/124) accompagné d'un document de travail des services de la Commission.*

*Il nous a paru utile d'introduire dans cette revue un article sur le marché intérieur.*

La nécessité d'entreprendre la réalisation de ce qu'il est désormais convenu d'appeler le marché intérieur de l'énergie est le résultat d'un constat économique et d'une nécessité politique.

La faiblesse énergétique communautaire, caractérisée par une dépendance extérieure croissante et par une structure déséquilibrée de la consommation en faveur du pétrole, a été masquée durant les «30 glorieuses» par une expansion économique fondée sur une énergie à bon marché. La dépendance extérieure, dans les conditions du marché de l'époque, fut en partie un choix délibéré afin d'éviter d'obérer les budgets par des mesures de soutien à la production (essentiellement de charbon).

En 1973, la dépendance extérieure était de près des deux tiers de la consommation énergétique (65 %) et la part du pétrole dans une proportion équivalente (63 %). Il est vrai que la production de gaz et de pétrole de la mer du Nord n'était pas encore très intensifiée.

Il a fallu attendre les deux crises pétrolières de 1973 et de 1979 pour que l'énergie entre dans la sphère de compétence communautaire.

Ont été alors mis en œuvre: la fixation d'objectifs communautaires à échéance de dix ans, les soutiens financiers aux divers secteurs énergétiques (technologies énergétiques et projets de démonstration) et les règles communes sur des sujets économiques essentiels (crise d'approvisionnement, stratégie sur le raffinage pétrolier, transparence des prix pétroliers et stocks de sécurité). L'effort conjoint des États membres et de la Communauté a abouti à des résultats,

à certains égards, spectaculaires. Entre 1973 et 1986, l'intensité énergétique s'est améliorée de près de 20 %, la dépendance énergétique extérieure est passée à moins de 45 % (2) et la part du pétrole dans la consommation d'énergie a baissé de 15 points (de 63 à 48 %).

La situation énergétique actuelle, relativement abondante en quantité et de sources diversifiées, tant en pétrole (en dépit de la crise du Golfe), en gaz et en charbon qu'en uranium, se caractérise par des disparités nationales importantes entre États membres, préjudiciables à la reprise de la croissance. Disparités qui, parfois, se sont accrues, en partie en fonction des choix de politique énergétique antérieurs (3).

Ainsi, la dépendance énergétique extérieure obère-t-elle encore lourdement la situation de certains États membres (Grèce, Portugal), alors que d'autres sont parvenus à une relative indépendance énergétique (Royaume-Uni, Pays-Bas); l'Allemagne et la France bénéficient, pour leur part, d'un taux de dépendance réduit.

Certains États membres sont en mesure d'exporter un vecteur énergétique (France – électricité, Pays-Bas – gaz naturel et Royaume-Uni – pétrole), alors que d'autres importent toutes les sources d'énergie.

Enfin, les prix à la consommation varient sensiblement d'un pays à un autre: le prix de l'électricité au kilowatt-heure payé par un gros consommateur industriel, par exemple, passe de 0,05 écu à 0,08 écu de la France à l'Al-

(1) Cet article reprend pour partie, et met à jour, un article publié dans la Revue du marché commun de février 1990, n° 334, sous le titre «Le marché unique et la politique énergétique», cosigné par M. J.-C. Guibal et M<sup>me</sup> N. Commeau-Yannoussis.

(2) Alors que la production communautaire d'énergie s'est accrue de plus de 70 % (prospection pétrolière, gazière et choix d'une politique nucléaire civile par certains États membres).

(3) Par exemple: politique nucléaire (France, Belgique), soutien au charbon (République fédérale d'Allemagne, Royaume-Uni, Espagne), exploitations du gaz naturel (Pays-Bas).



Allemagne<sup>(4)</sup>, variations révélatrices de disparités diverses: fiscales, coût de la production, etc.

Une étude économique réalisée par la Commission sur le coût de la non-Europe en matière énergétique a montré quels pouvaient être les gains d'une Communauté au marché mieux intégré. Le rapport intitulé «Europe 1992 – Le défi global», publié en mars 1988, évalue entre 20 à 30 milliards d'écus par an le coût de la «non-Europe» dans la Communauté.

La politique énergétique est longtemps restée un domaine de compétence des États membres, malgré le poids de l'économie de l'énergie dans le PNB communautaire. Seuls le charbon, à la faveur de la réconciliation de l'après-guerre, et le nucléaire civil, dans une bien moindre mesure, ont bénéficié d'une politique communautaire, respectivement fondée sur le traité de Paris (CECA) et sur le traité Euratom.

À l'heure de la relance de l'Europe, il était nécessaire que l'énergie, indispensable à toutes les activités économiques du monde contemporain (industries, services et ménages), accompagne les mutations économiques de ces dernières années et renforce la réalisation du marché intérieur entreprise en application du livre blanc de la Commission<sup>(5)</sup>.

La Commission a adopté une approche globale et progressive, approuvée en novembre 1988 par le Conseil<sup>(6)</sup>.

Une **approche globale** s'imposait en effet à un double degré, par la prise en compte du contexte économique dans lequel évolue l'énergie et par l'analyse de tous les secteurs énergétiques dont la situation peut sensiblement varier<sup>(7)</sup>.

Une **approche progressive** commande la réussite de l'intégration des marchés nationaux dans un vaste marché communautaire permettant aux opérateurs économiques de s'adapter adéquatement aux nouvelles perspectives du marché.

Le marché intérieur de l'énergie s'inscrit dans les objectifs du «grand marché 1993», qui vise à réaliser l'intégration des marchés nationaux dans un vaste marché communau-

taire que permettra, notamment, l'accroissement des échanges transfrontaliers<sup>(8)</sup>.

Toutefois, la particularité du secteur de l'énergie amène à nuancer cette définition générale: le marché intérieur de l'énergie (MIE) doit permettre d'assurer une solidarité accrue entre les États membres et une allocation optimale des ressources disponibles.

L'action de la Commission s'est, en conséquence, orientée vers deux directions complémentaires: une intégration plus communautaire du marché de l'énergie et une plus grande solidarité énergétique entre États membres.

## Vers un marché décloisonné de l'énergie

Au regard du traité de Rome (modifié par l'Acte unique), le décloisonnement des marchés nationaux doit se réaliser par l'abolition des frontières nationales, dont l'instrument privilégié est la **libre circulation** des produits (article 8 A du traité CEE) ou, en d'autres termes, la suppression des obstacles aux échanges et, à titre subsidiaire, l'exercice d'une **saine concurrence** (entre produits, entre entreprises)<sup>(9)</sup>.

La directive sur la transparence des prix du gaz et de l'électricité<sup>(10)</sup> relève de la seconde orientation, alors que les propositions sur le transit du gaz et de l'électricité relèvent plutôt de la première<sup>(11)</sup>.

### La libre circulation des produits énergétiques dans la Communauté

La Commission a, dans ce domaine, accordé un traitement prioritaire au gaz et à l'électricité, car, compte tenu de leur mode de transport par réseau, ils ont bénéficié, jusqu'à présent, d'une protection que ne justifie peut-être pas la seule protection de l'«intérêt économique général».

(4) Publication des prix au 1<sup>er</sup> janvier 1989 par l'Office statistique de la Communauté européenne.

(5) COM(85) 310 de juin 1985.

(6) COM(88) 238.

(7) Au regard de la dépendance extérieure, de la libre circulation au sein de la Communauté, des coûts de production, etc.

(8) Voir article 8 A du traité de Rome.

(9) Cette distinction des instruments de réalisation du marché intérieur peut paraître quelque peu doctrinale, car ils ont un effet récurant et peuvent difficilement s'exercer pleinement séparément.

(10) COM(89) 332, du 14 juillet 1989.

(11) COM(89) 334 et COM(89) 336, du 14 juillet 1989.

## ● Transit du gaz et de l'électricité

La communication sur l'accroissement des échanges d'électricité et de gaz, approuvée le 12 juillet 1989 par la Commission, présente un programme de libéralisation progressif du commerce transfrontalier d'électricité et de gaz naturel.

La directive relative au transit sur les grands réseaux d'électricité a été adoptée le 29 octobre 1990 par le Conseil «énergie» et entrera en vigueur le 1<sup>er</sup> juillet 1991.

La directive relative au transit sur les réseaux à haute pression de gaz est encore en voie d'adoption. Son retard est essentiellement dû à l'opposition de l'Allemagne, des Pays-Bas et du Danemark ainsi qu'aux demandes d'informations approfondies du Parlement européen lors de la première lecture. L'adoption, à la majorité qualifiée, de la «position commune» du Conseil (Conseil «énergie» du 29 octobre 1990) ne saurait plus retarder l'adoption définitive de la directive, qui doit survenir dans le courant du premier trimestre de 1991.

Les deux textes, similaires dans l'ensemble, prévoient que les États membres doivent faire respecter le droit au transit à travers les réseaux qui exercent sur leur territoire.

L'opération de transit lie au moins trois réseaux du secteur électrique ou gazier, dont un ou plusieurs réseaux intermédiaires soumis à l'obligation de transit.

Les réseaux concernés <sup>(12)</sup> par une demande de transit portant sur un contrat d'au moins un an pour l'électricité et sans limitation pour le gaz ont pour obligation de négocier entre eux les conditions de transit.

Le transit n'implique pas nécessairement une obligation de transport effectif de l'électricité ou du gaz introduit d'un point donné à un autre, mais induit une obligation de transmission d'une quantité donnée d'électricité ou de gaz.

Pour assurer le bon fonctionnement du transit, la Commission a prévu la constitution, sous sa responsabilité, d'un organisme représentatif des entités responsables des réseaux. Il serait chargé de la double mission de conseiller la Commission pour établir la mise en œuvre du droit de transit, d'une part, et favoriser, si nécessaire, la recherche d'un accord entre les réseaux, d'autre part, par exemple en matière de tarification du transit.

<sup>(12)</sup> Réseaux intéressés par l'opération commerciale et réseaux soumis à l'obligation de transit.

## ● L'accès de tiers aux réseaux

L'étape envisagée ultérieurement pour la reconnaissance du droit de transit est l'étude d'une éventuelle généralisation, à l'ensemble des États membres, d'une forme de transport pour le compte de tiers déjà introduite selon différentes modalités, dans la législation de deux États membres (Pays-Bas et Royaume-Uni) sous la dénomination de «common carrier».

La mise en œuvre de ce principe est plus délicate que celle du transit et exige une analyse de faisabilité économique et technique approfondie que la Commission a engagée depuis juin 1990.

Cette réflexion est menée en collaboration avec les représentants des États membres et surtout avec les opérateurs économiques intéressés (industriels et consommateurs), au sein de comités consultatifs. Ceux-ci ont pour tâche, d'une part, d'analyser l'impact de l'introduction éventuelle de l'accès de tiers aux réseaux sur les différents stades menant de la production à la consommation, en comparaison de la situation actuelle tant au regard des industriels du gaz ou de l'électricité que des consommateurs et, d'autre part, de réfléchir sur les modalités possibles de mise en œuvre de ce principe.

## ● Autres développements

Par ailleurs, un travail de longue haleine sur la normalisation a été entrepris pour favoriser une circulation effective des produits énergétiques. Elle a, jusqu'à présent, surtout concerné les produits pétroliers, qui présentent de grandes variétés sur le marché, mais elle devrait prochainement également s'attacher aux autres vecteurs énergétiques. A cet égard, la mise à jour du «programme indicatif nucléaire de la Communauté» <sup>(13)</sup> engage à poursuivre une action de normalisation des équipements et composants nucléaires.

## La concurrence

Dans le traité CEE, la concurrence présente une double caractéristique: elle est la première règle à devoir être respectée par les politiques menées par la Communauté, et

<sup>(13)</sup> PINC COM(89) 347, du 7 août 1989.

les dispositions qui la gouvernement sont destinées à encadrer le libre jeu du marché afin d'en limiter les effets nocifs.

Dans le contexte du MIE, la concurrence doit, au contraire, être promue, car elle est pratiquement inexistante, au sens de concurrence interénergies, dans les secteurs du gaz et de l'électricité. Les propositions de la Commission vont, en conséquence, dans ce sens.

### La transparence des prix

La directive sur la transparence des prix du gaz et de l'électricité <sup>(14)</sup> de l'industrie communautaire est l'aboutissement des efforts menés par la Commission depuis ses premières orientations de politique énergétique communautaire de 1986. La directive sur la transparence des prix est fondée sur trois constats:

- la concurrence ne peut s'exercer sans une information minimale et adéquate des consommateurs;
- la transparence des prix de l'énergie est très inégale dans les États membres;
- le coût de l'énergie consommée par l'industrie est un des facteurs de compétitivité de l'industrie communautaire.

En conséquence, une transparence doit être assurée au niveau communautaire afin de permettre au consommateur industriel le libre choix de son énergie. Une pression à la baisse sur les prix devrait rapidement se répercuter sur le marché.

La directive érige en obligation la transmission, jusqu'ici volontaire, des données statistiques sur les prix de l'électricité et du gaz appliqués aux consommateurs industriels. Le respect du secret commercial sera préservé par la définition de consommateurs industriels types (au moins trois) et par la détermination de prix repères pour les très gros consommateurs, de sorte qu'aucun recoupement ne puisse permettre l'identification d'une société donnée.

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<sup>(14)</sup> La directive 90/377/CEE, du 29 juin 1990, entrera en vigueur le 1<sup>er</sup> juillet 1991. Les produits pétroliers ont déjà fait l'objet d'une directive équivalente (directive 76/491/CEE); le charbon est soumis par le traité CECA, en vertu de l'article 60, paragraphe 2, à la publication des barèmes en vigueur.

Les données de prix relevées seront publiées par la Commission en mai et en novembre de chaque année. Elles seront accompagnées des informations relatives au système de prix qui ont servi à leur élaboration.

### La transparence des coûts

La transparence des prix ne suffit toutefois pas à elle seule pour assurer ce que l'on appelle en anglais la «workable competition». La Commission s'est engagée, dans la ligne des recommandations du Conseil sur les prix de l'électricité et du gaz naturel (81/924/CEE et 83/230/CEE), à établir la transparence des coûts aux différents stades de la formation des prix. C'est également le vœu du Parlement européen et le désir exprimé par plusieurs États membres.

L'objectif poursuivi, outre celui de promouvoir la concurrence, est:

- de lutter contre les aides d'État dissimulées et/ou incompatibles avec le traité;
- de mettre fin aux subventions masquées par les politiques de tarification;
- d'éliminer les coûts externes tels que les impôts déguisés prélevés par les autorités locales.

La transparence des coûts ne constitue pas un but en soi, mais un moyen mis en œuvre en vue de réaliser le MIE plus homogène et plus dynamique.

Cette action ne devrait pas bouleverser la répartition des compétences entre la Commission et les États membres dans la définition des grandes options de politique énergétique. La fixation du niveau tarifaire général reste en pratique du ressort des législations nationales.

### ● Autres mesures

Une directive sur les procédures de passation des marchés publics dans les secteurs dits «exclus», dont fait partie l'énergie, a été adoptée le 17 septembre 1990. Elle impose qu'à partir d'un certain seuil de dépenses (5 millions d'écus pour les travaux et 400 000 écus pour les contrats d'approvisionnement), les entreprises et les autorités publiques s'adressent à toutes les entreprises de la Communauté et les mettent en concurrence.

Des réflexions approfondies sont en cours pour, d'une part, favoriser le développement de la production indépendante et de la cogénération et pour, d'autre part, assurer l'harmonisation de la fiscalité indirecte, notamment celle qui s'applique à l'énergie.

### ● La tarification

La concurrence peut s'exercer, schématiquement, à deux niveaux différents: entre produits substituables mais différenciés et présentant une élasticité entre eux, ou entre fabricants d'un même produit. L'étendue de la liberté de choix du consommateur sera un indicateur de l'exercice effectif de la concurrence. A l'heure actuelle, il n'y a, pour ainsi dire, pas de substituabilité entre les différents vecteurs énergétiques qui captent chacun des marchés distincts, ni de différenciation appréciable (technologique, qualitative ou de service) entre les différentes sources d'électricité ou de gaz. C'est pourquoi la Commission s'est attachée à introduire la concurrence dans ces deux secteurs à travers la tarification tout d'abord.

## Vers une plus grande solidarité énergétique entre les États membres

La réduction des disparités économiques et sociales entre les différentes régions de la Communauté est une préoccupation essentielle et constante du choix des orientations visant la réalisation du marché intérieur. Elle est sous-jacente à toutes les propositions de la Commission et n'est pas en soi spécifique au secteur énergétique.

On peut toutefois citer le programme Rechar, dont le principe d'aide aux régions affectées par le déclin des charbonnages a été adopté le 2 août 1989, ainsi que le programme Valoren décidé par le Conseil le 27 octobre 1986, qui vise le développement de certaines régions défavorisées de la Communauté par la valorisation de leur potentiel énergétique endogène.

Toutefois, la solidarité énergétique va au-delà de la cohésion économique et sociale (article 130 A du traité CEE) et doit également viser à réduire, autant que faire se peut, les risques de rupture d'approvisionnement et à améliorer l'allocation des ressources disponibles (en quantité et en

prix). La solidarité tant interne qu'externe poursuit ce double objectif.

## Solidarité interne

D'une façon générale, la coordination des politiques énergétiques que poursuit la fixation d'objectifs énergétiques communautaires à moyen terme est un élément important de solidarité interne. D'autres mesures plus spécifiques visent également à assurer la solidarité entre États membres. Elles tendent à garantir le transport d'énergie grâce à l'existence d'infrastructures suffisantes, à optimiser l'utilisation de l'énergie et à minimiser les effets d'une difficulté momentanée, voire d'une crise d'approvisionnement.

### ● Les investissements

L'existence d'infrastructures suffisantes, support de la libération des échanges intracommunautaires, est l'élément efficace propre à optimiser l'allocation des ressources disponibles dans les États membres et participe à la réduction des écarts entre les régions de la Communauté.

Le réseau européen d'infrastructures énergétiques révèle des lacunes et des déficiences affectant plusieurs États membres et régions de la Communauté de nature à entraver fortement leur développement et la réalisation du MIE. Cela a dernièrement été mentionné au préambule de la directive sur le transit de l'électricité et au Conseil «énergie» du 29 octobre à propos de la directive sur le transit du gaz.

Ainsi, l'Irlande et la Grèce ne sont toujours pas reliées au réseau européen de gazoducs ni connectées au réseau électrique communautaire. De même, le Royaume-Uni, l'Espagne et le Portugal ne sont pas inclus dans le système européen de transmission à longue distance de gaz naturel. Dans les régions périphériques, l'absence ou l'insuffisance de grandes infrastructures de transport, de transmission et d'interconnexion conditionne le développement économique et empêche l'insertion de ces régions dans la Communauté (15).

(15) La communication de la Commission «Vers des réseaux transeuropéens» [COM(89) 634], adoptée par la Commission le 6 décembre 1989, a fait l'objet d'une résolution du Conseil du 22 décembre 1989.

Une initiative, dénommée Regen, adoptée par la Commission le 2 mai 1990, se propose de combler le déficit en infrastructures énergétiques des régions en retard de développement et de renforcer l'action des cadres communautaires d'appui, en participant au financement d'investissements susceptibles de favoriser le développement économique et la sécurité de l'approvisionnement énergétique <sup>(16)</sup>.

A titre d'exemple, dans le secteur de l'électricité, certaines études tendent à prouver qu'un réseau en infrastructures plus rationnel à l'échelle de la Communauté favoriserait une économie additionnelle d'investissements comprise entre 12 et 15 GW, à l'horizon de 2010. Dans ces conditions, d'ici à l'an 2000, un accroissement du parc de moins de 1 % par an permettrait de répondre à une demande augmentant de plus de 2 % par an.

Un projet de règlement de la Commission, amendant le règlement (CEE) n° 1056/72 concernant la communication à la Commission des projets d'investissements dans les secteurs du pétrole, du gaz naturel et de l'électricité <sup>(17)</sup>, avait proposé une concertation et un examen commun – Commission, États membres et entreprises concernées – de solutions alternatives pour tout investissement projeté ayant un intérêt communautaire. Le souci de la Commission était de favoriser l'émergence d'un maillage en infrastructures efficaces au regard des avantages comparatifs et de la sécurité d'approvisionnement.

Le Conseil du 21 mai 1990 a préféré rechercher, par priorité, une meilleure application des dispositions du règlement de 1972 et revenir, le moment venu, sur la proposition de la Commission à la lumière de l'expérience acquise.

## ● Utilisation optimale des énergies

L'utilisation optimale de l'énergie commande que soient mises en œuvre des politiques de maîtrise de la demande

<sup>(16)</sup> Le Fonds européen de développement régional (Feder) a financé, dans le passé, diverses mesures en matière d'infrastructures énergétiques. Entre 1982 et 1987, il a ainsi contribué activement au financement de projets de transport et de distribution d'électricité et de gaz naturel pour un montant de 1,2 milliard d'écu dans les différents États membres.

<sup>(17)</sup> COM(89) 335, du 14 juillet 1989. Le charbon et le nucléaire bénéficient de dispositions propres dans le cadre des traités CECA et Euratom.

d'énergie, d'amélioration de l'efficacité énergétique et de la réduction de l'impact de l'énergie sur l'environnement. C'est le but assigné par les objectifs pour 1995 et par le programme Thermie (dissémination des technologies avancées).

Le programme Thermie d'innovation technologique, adopté le 2 mai 1990 par le Conseil, se propose de contribuer à combler le fossé qui sépare la mise au point d'une nouvelle technologie énergétique, de sa diffusion et de son utilisation commerciale. Il couvre quatre domaines essentiels, dont l'efficacité énergétique et les sources alternatives d'énergie.

En ce qui concerne le nucléaire, la mise à jour du programme indicatif nucléaire de la Communauté (PINIC) est également animée par le même souci.

La Commission, pour compléter le programme Thermie, vient d'adopter le programme SAVE concernant l'amélioration de l'efficacité énergétique. Il constitue un complément aux économies d'énergie rendues prioritaires par la nécessité d'une protection de l'environnement et de la conjoncture énergétique.

Enfin, les politiques de maîtrise de l'énergie, menées dans tous les États membres, sont soutenues par la Commission par des programmes tels que celui sur **l'amélioration de l'efficacité de l'utilisation de l'électricité**, qui tend à favoriser la promotion et l'utilisation d'appareils et d'équipements économes en énergie.

## ● Mesures de crise d'approvisionnement

Les mesures de crise adoptées le 24 octobre 1990 par la Commission (deux projets de directive) sur les mesures à prendre en cas de difficultés d'approvisionnement et sur les stocks pétroliers de réserve ont pour but d'accroître la solidarité communautaire.

En cas de difficulté qualifiée d'approvisionnement, la Commission, assistée d'un comité consultatif composé de représentants des États membres, sera chargée d'établir les objectifs à atteindre et les mesures à prendre pendant une durée de trois mois. En outre, une certaine communautarisation des stocks de crise et de leur utilisation est prévue; elle impose aux États membres de créer un organisme national de stockage disposant des deux tiers des obligations communautaires de stockage (90 jours de

consommation), le restant étant détenu par les compagnies pétrolières.

## Solidarité externe

La solidarité externe a essentiellement pour but de renforcer la sécurité d'approvisionnement en complétant de façon cohérente les réalisations du marché intérieur de l'énergie et en établissant des relations stables avec les pays fournisseurs d'énergie.

### ● Le volet externe du marché intérieur

Dans le cadre des directives sur le transit d'électricité et de gaz, il est apparu nécessaire, pour les rendre pleinement efficaces, d'une part, de les compléter par des accords avec les pays tiers directement concernés par le transit intracommunautaire et, d'autre part, de renforcer, voire de créer, des infrastructures de transport en vue, notamment, de faire face à l'accroissement prévisible des flux.

### Accords avec les pays tiers

Les textes des directives prévoient que les États membres prendront les dispositions nécessaires pour favoriser le transit entre les réseaux de la Communauté. Si le champ d'application est limité au territoire de la Communauté, sont toutefois indirectement concernés les États tiers qui se trouvent être des intermédiaires obligés. A titre d'exemple, les deux tiers de l'électricité française exportée en Italie transitent par la Suisse. Il est donc indispensable que des accords soient conclus avec les pays concernés.

Ainsi, dans le cadre des accords en négociation CEE/AELE sur l'espace économique européen, les textes sur le transit font partie de l'acquis communautaire pertinent que les pays de l'AELE doivent introduire dans leur législation nationale.

### Investissements en infrastructures

Afin d'assurer la sécurité d'approvisionnement et d'intégrer les pays périphériques européens (Portugal, Grèce et

Irlande), il est envisagé de construire des interconnexions internationales entre:

- les continents africain et européen en extension de ce qui existe ou est en cours d'étude entre l'Algérie et l'Italie via la Tunisie et bientôt avec l'Espagne (Algérie, Maroc, Espagne) ainsi que les interconnexions des réseaux d'électricité entre le Maroc et l'Espagne, la Tunisie et l'Italie;
- les deux Europe, par le renforcement des liaisons électriques et gazières (par exemple, doublement des capacités des pipe-lines Megal).

### ● Établissement de relations stables avec les groupes de pays limitrophes de la Communauté

La Communauté dépend encore des pays tiers pour près de la moitié de ses besoins énergétiques (globalement 45 %). Ce degré de dépendance atteint 70 % pour le pétrole, 35 % pour le gaz naturel et les combustibles solides. On estime que la dépendance communautaire ne fera que croître, compte tenu des conditions de consommation projetées et des connaissances des ressources disponibles. La sécurité d'approvisionnement revêt donc une importance essentielle pour l'avenir. Dans le cadre de la politique de «proximité évolutive» annoncée par le président de la Commission M. J. Delors le 17 janvier 1989, la Commission a entrepris de créer des liens plus étroits et durables avec les pays limitrophes: pays de l'AELE, pays de l'Est européen et de la Méditerranée. Les récents développements diplomatiques de ces trois groupes de pays sont d'une importance considérable au regard de l'approvisionnement énergétique futur de la Communauté, et plus particulièrement en gaz naturel et en pétrole.

L'accord de libre-échange sur un «espace économique européen» dynamique, cité plus haut, est en négociation. Des pays comme la Norvège, la Suisse et l'Autriche sont plus particulièrement intégrés dans les réseaux européens de gaz naturel et d'électricité. Il s'inscrit dans un cadre plus général en vue d'accroître l'intégration économique de ces deux groupes de pays, ce qui n'est pas sans conséquences sur l'énergie.

Les pays de l'Est européen ont amorcé un nouveau tournant dans leurs relations avec la CEE depuis la signature de la déclaration conjointe du 25 juin 1988, qui a permis d'engager des négociations en vue de la conclusion d'accords bilatéraux avec ces pays. Tous les accords signés

(18), ou en cours de négociations, comportent un volet énergétique. Il n'est pas besoin de souligner l'importance des réserves soviétiques en hydrocarbures pour l'Europe. A cet égard, une proposition d'origine néerlandaise (plan Lubbers) suggère la création d'une communauté européenne de l'énergie de l'Atlantique à l'Oural.

Enfin, la Communauté a conclu en juin 1988 un important accord de coopération avec les pays du Golfe (19). Celui-ci précise dans son préambule la détermination des deux parties à coopérer en vue d'améliorer la situation économique et énergétique mondiale. Cet accord est en voie d'être complété par un accord commercial qui viendra renforcer les relations euro-arabes sur la base des avantages mutuels.

Ces accords couronnent les efforts déployés depuis quinze ans par la Communauté pour établir avec ses partenaires des relations stables et de confiance.

La solidarité externe devrait être complétée par une politique commerciale commune. En effet, celle-ci est encore pour ainsi dire très incomplète dans le domaine énergétique, sauf pour les matières fissiles. Elle est explicitement exclue du traité CECA (article 71) et inexistante pour les produits énergétiques soumis au traité CEE. Ainsi, dans des domaines aussi importants que ceux relatifs à l'approvisionnement en hydrocarbures, les contrats sont conclus séparément par les importateurs nationaux, et non dans le cadre de la Communauté.

## Conclusions

Les obstacles à un véritable marché intérieur de l'énergie sont trop nombreux et souvent trop complexes pour qu'il soit possible de les résoudre simultanément. Une **appro-**

(18) CEE-Hongrie, CEE-Tchécoslovaquie, CEE-Pologne, CEE-Union soviétique.

(19) État des Émirats arabes unis, État de Bahreïn, royaume d'Arabie saoudite, sultanat d'Oman, État de Qatar et État du Koweït.

**che progressive** mais déterminée est indispensable, et il faut bien commencer par un bout pour démêler l'écheveau. Force est de constater que l'enjeu est suffisamment important pour que les acteurs économiques aient déjà réagi. En effet, on assiste actuellement à la mise en place, par les milieux industriels, de structures de concertation destinées à anticiper les exigences communautaires liées à la réalisation du MIE: Eurelectric, Eurogaz et Europia en sont des exemples.

L'œuvre que représente l'achèvement du marché intérieur a permis d'innover à plusieurs titres et d'instituer des procédures intéressantes:

- le nouvel article 100 A, introduit par l'Acte unique, a été choisi par la Commission pour servir pour la première fois de base juridique dans le domaine énergétique pour les deux propositions de directives sur le transit du gaz naturel et de l'électricité;
- la Commission a tenu à ce que toutes les entités intéressées par les nouvelles orientations soient associées. Ainsi, la rédaction du projet de directive sur la transparence des prix, et plus particulièrement sur les aspects techniques du système de collecte et de communication des prix, a été le fruit d'une large concertation engagée par la Commission avec les milieux concernés: distributeurs et consommateurs (grandes entreprises et PME).

De même, la mise en œuvre du droit de transit associera les organismes professionnels aptes à conseiller la Commission d'un point de vue technique.

Les réflexions sur l'accès direct au réseau sont effectuées au sein de comités consultatifs composés de représentants des États membres, des professionnels de l'énergie et des consommateurs.

Tous ces éléments sont les signes précurseurs d'une politique énergétique «commune» en voie de formation. Reste à savoir quel sera l'avenir du MIE face aux défis que constituent l'unification allemande, les nouvelles données des relations Est-Ouest en Europe, les préoccupations environnementales et, à court terme, la crise du Golfe.

# Programme de démonstration «énergie» 1979-1989

Une première évaluation des projets financés par la Commission des Communautés européennes

DG XVII, direction «technologie énergétique», unité «stratégie, dissémination, évaluation»

*Le programme de démonstration «énergie» et le programme de soutien au développement technologique dans le secteur des hydrocarbures ont expiré à la fin de 1989. L'analyse des projets qui ont été soutenus dans le cadre de ces programmes a fait l'objet d'une étude conduite par la DG XVII.*

*Le but de cette étude consistait à établir une série de critères de référence destinés à l'évaluation des propositions à venir et à guider les orientations des mesures de dissémination dans le cadre du programme Thermie.*

*L'étude s'est appuyée sur l'analyse des soutiens financiers accordés dans le programme de démonstration et sur l'examen de la tendance d'évolution des secteurs de consommation et de production de l'énergie. Elle s'est enfin limitée aux principaux secteurs de la démonstration, car on ne peut pas appliquer le même type d'analyse au programme «technologie des hydrocarbures» et au secteur du charbon.*

## Synthèse des propositions

Parmi les quatre grands secteurs inscrits dans le programme de démonstration, deux seulement, les économies d'énergie et les énergies renouvelables, se prêtèrent à une analyse suffisamment cohérente basée sur le coût éligible des projets et sur la quantité d'énergie économisée ou produite.

De ce fait, les 838 propositions acceptées par la Commission entre 1985 et 1989 dans les deux secteurs concernés ont fait l'objet d'un examen attentif. Un ensemble de 26 tableaux détaillant les résultats a été annexé à l'étude.

L'analyse des données enregistrées sur les projets et la prise en considération de critères propres à chacun des secteurs ont ainsi permis de recommander, pour la période à venir couverte par le programme Thermie (1990-1994), une valeur de référence permettant d'évaluer la perspective des nouveaux projets.

## Évolution dans les économies d'énergie

Pendant la période de l'analyse, on a pu constater dans l'industrie, dans les bâtiments et dans les transports, une grande disparité dans la ventilation du soutien accordé aux projets. L'industrie, avec 34 % de la consommation d'énergie primaire, a reçu 80 % du soutien, alors que les bâtiments (40 % de la consommation) n'ont obtenu que 14 % et les transports (26 % de la consommation) que 6 %. Un aperçu du soutien accordé à l'industrie, aux bâtiments et aux transports est repris dans le graphique 1.

Il existe à ce déséquilibre de nombreuses explications, dont la plus importante est sans doute le rôle prépondérant joué jusqu'ici par le temps de retour dans la sélection des projets.

La nature du proposant est aussi une cause à ce déséquilibre. Dans le secteur industriel, le proposant (qui est



aussi le futur utilisateur de la technologie) est habituellement «maître» de ses propres investissements. Dans le secteur des transports ou des bâtiments, les acteurs principaux sont divers et nombreux, si bien que la mise en place d'un partenariat se montre généralement plutôt difficile.

Dans l'industrie, l'évolution des coûts spécifiques des projets, légèrement à la hausse, passe de 300 à 800 écus/an/tep (tonne-équivalent pétrole) entre les années 1985 et 1990.

L'étude recommande donc, pour la phase Thermie (1990-1994), un coût de référence identique à celui défini par la tendance pour l'année 1990, à savoir 800 écus/an/tep.

Dans les bâtiments, l'évolution constatée des coûts spécifiques est aussi à la hausse, entre 500 et 1 000 écus/an/tep pendant la même période.

Pour les années futures, l'étude propose un coût de référence de 1 000 écus/an/tep.

Dans les transports, une légère tendance à la baisse se dégage depuis 1985. Les projets orientés vers la gestion des transports se montrent plus rentables en termes de bénéfices globalisés que les projets axés sur les améliorations mécaniques ou dynamiques des véhicules.

Un coût de référence de 1 500 écus/an/tep pour les années à venir paraît réaliste. Sensiblement plus bas que celui obtenu jusqu'à présent, il pourrait être atteint grâce à la mise en place de projets ciblés principalement dans les transports urbains.

Le graphique 2 rassemble les résultats obtenus.

## Évolution dans les énergies alternatives

Les propositions des sources alternatives affichent une fourchette très large en termes de prévisions économiques: si l'on se réfère, par exemple, au temps de retour, on commence par des valeurs moyennes de 2-3 ans pour la biomasse, de 5-6 ans pour l'éolienne, et on termine par une estimation de 20 ans pour le solaire thermique ou de 180 ans pour le photovoltaïque.

La grande hétérogénéité des résultats reflète les différences technico-économiques du secteur.

De nombreuses réalisations comme la biomasse présentent, en effet, dans le court terme des perspectives économiques intéressantes. Les autres sources comme l'énergie mini-hydro-électrique, géothermique ou éolienne ne montrent pas les mêmes avantages économiques, mais leur bilan global peut s'améliorer sensiblement si l'on tient compte d'autres bénéfices liés à la valorisation locale des ressources et à certaines opportunités d'intégration dans le réseau local.

Ce bilan pourrait encore être tiré à la hausse dans de nombreux cas si l'on tenait compte des coûts d'investissement, d'exploitation et de maintenance répartis sur l'ensemble de la durée de vie des installations.

Pour le programme Thermie, l'étude propose comme valeurs de référence 1 600 écus/an/tep dans le solaire thermique, 800 écus/an/tep dans la biomasse, 450 écus/an/tep dans la géothermie, 0,45 écus/an/kwh dans l'éolienne et 0,14 écu/an/kwh dans la mini-hydraulique (voir graphique 3).

## Recommandations pour le programme Thermie

A partir de l'analyse des propositions soumises dans le programme de démonstration et sur la base de l'expérience acquise dans la gestion des projets, l'étude propose certaines recommandations concernant la sélection des projets futurs et les orientations souhaitables du programme Thermie.

### Évaluation des propositions futures

Dans le secteur des économies d'énergie, l'industrie accorde une attention toute particulière aux critères économiques. Ces critères présentent l'avantage de fixer de manière simple la rentabilité d'une technologie innovante en termes d'économies d'énergie, de gain de productivité ou de qualité de produit.

Il serait cependant vivement souhaitable de lier ces indicateurs financiers à des critères d'évaluation plus larges.

Par exemple, la transférabilité du projet doit être une condition nécessaire dans l'octroi du soutien. Une attention particulière doit être, par conséquent, donnée lors de

l'examen des propositions, afin d'assurer l'intérêt du projet auprès des investisseurs futurs.

L'ampleur absolue des bénéfices générés par le projet renforce généralement l'attrait du temps de retour. Dans ce cas, il y a lieu de compléter l'évaluation des propositions par la prise en compte du poids relatif de l'énergie dans les coûts d'exploitation et par l'évaluation du montant absolu des bénéfices.

Le taux de renouvellement des équipements joue aussi un rôle non négligeable dans la commercialisation des technologies énergétiques, particulièrement dans l'industrie où la durée de vie des investissements est moindre que dans les bâtiments ou les transports.

Certains domaines sectoriels attribuent une large place à des considérations d'ordre collectif social ou écologique. Dans les transports urbains par exemple, les projets trouvent leur justification dans la prise en compte de facteurs autres qu'énergétiques, tels que la diminution de la pollution émise, la réduction des niveaux de congestion ou l'amélioration de la qualité de vie des citoyens.

Dans tous les secteurs où les investissements s'amortissent sur une durée de vie assez longue (bâtiments, transports, la plupart des énergies renouvelables) et, à plus forte raison, dans ceux où les coûts d'entretien sont marginaux par rapport au montant immobilisé, la rentabilité économique peut être considérablement améliorée par une évaluation globale élargie à la durée de vie entière de l'investissement. La prise en compte de ce facteur peut devenir particulièrement intéressante dans le cas où le décideur est institutionnellement habitué à calculer sur des périodes longues.

### **Une stratégie pour la promotion des technologies énergétiques**

Le programme Thermie fait partie de la stratégie énergétique mise en place par la Communauté. Il vise, entre autres, la promotion des technologies innovatrices dans

les secteurs de la production et de la consommation de l'énergie.

L'action de la Commission des Communautés européennes, dans le domaine de la promotion de telles technologies, repose sur deux axes principaux: le soutien financier aux projets et la dissémination des résultats, qui doit être stimulée dans le but de donner un «coup de pouce» à la pénétration des technologies performantes sur le marché.

L'importance de la dissémination soutenue – on s'en est rendu compte dans le passé – varie en fonction des technologies; elle doit être cependant limitée à un certain seuil de pénétration sur le marché au-delà duquel la percée de la technologie se fait d'elle-même par une diffusion purement commerciale, affranchie de toute aide publique.

Les études de marché visant la promotion de technologies devraient être en mesure d'apprécier ce seuil et de fournir de précieux renseignements sur l'importance des actions de dissémination.

Une bonne évaluation des propositions basée sur l'expérience passée; une intégration des technologies dans le contexte présent et futur de l'économie des marchés; et une dissémination appropriée des projets, voilà trois axes principaux qui doivent focaliser les actions futures du programme Thermie.

Répartition du soutien de la CEE (projets EE, EC et CS) entre 1979 et 1989, par secteur d'activité (industrie, bâtiments et transports)

Évolution du coût éligible entre 1985 et 1989 pour l'industrie, les bâtiments et les transports, et coût de référence pour la période Thermie

Évolution du coût éligible entre 1985 et 1989 pour les énergies renouvelables, et coût de référence pour la période Thermie

# Le programme Thermie – Promotion des technologies énergétiques en Europe

Michael Gowen – DG XVII, direction «technologie énergétique», unité «stratégie, dissémination, évaluation» (D 1)

*Thermie (programme concernant la promotion des technologies énergétiques pour l'Europe): encore un acronyme, encore un programme communautaire. Pourquoi faut-il un programme dans le domaine des technologies énergétiques? Quels résultats peut-il obtenir, et comment? Le présent article ambitionne de répondre à ces questions...*

*Depuis les chocs pétroliers des années 70, la Communauté s'est rendu compte du rôle important que doit jouer la technologie dans la politique énergétique: il s'agit de réduire la consommation énergétique sans compromettre la croissance économique; il s'agit de réduire la dépendance par rapport aux importations de pétrole, d'exploiter les ressources indigènes en hydrocarbures ainsi que les ressources en matière d'énergie renouvelable exploitables en Europe, de réduire la pollution de l'environnement, et de consommer et de produire l'énergie en polluant moins. La guerre du Golfe a révélé l'importance cruciale de ces aspects pour la prospérité économique future de la Communauté.*

*Pendant les années 80, la Communauté a consacré 1,4 milliard d'écus à deux programmes distincts, dont l'un visait à faire la démonstration de différentes technologies énergétiques et l'autre à soutenir le développement technologique dans le secteur des hydrocarbures (1). Ces programmes ayant été menés à bien à la fin de 1989, des évaluations indépendantes ont été effectuées (2). Ces évaluations ont montré que les technologies faisant l'objet des démonstrations et celles qui ont été élaborées ne se diffusent pas automatiquement dans toute la Communauté et ne sont pas utilisées dans une plus large mesure, notamment lorsqu'il faut franchir des frontières nationales. Il fallait donc un programme en vue de promouvoir vigoureusement les nouvelles technologies énergétiques européennes sur le marché. C'est ainsi qu'est né le programme Thermie (3). On considère que ce programme joue un rôle important dans la réalisation du marché unique de 1992.*

## Description de Thermie

Thermie est un programme d'une durée de cinq ans, qui couvrira la période 1990-1994. Il repose sur les projets de démonstration dans le domaine de l'énergie et sur le pro-

gramme de soutien au développement technologique dans le secteur des hydrocarbures. Thermie se distingue cependant de ces programmes sous plusieurs aspects importants. 350 millions d'écus ont été prévus pour les trois premières années du programme. Les mêmes sommes lui seront consacrées au cours des quatrième et cinquième années, compte tenu du budget communautaire pour ces années-là.

Thermie comprend quatre domaines d'application principaux assurant une couverture complète des sources d'énergie non nucléaires:

### a) l'utilisation rationnelle de l'énergie:

- dans les bâtiments (domestiques, commerciaux et administratifs),
- dans l'industrie,
- dans l'industrie de l'énergie,
- dans les transports et dans l'infrastructure urbaine;

(1) Voir règlement (CEE) n° 3639/85 et 3640/85 (JO L 350 du 27.12.1985).

(2) Évaluation du programme de démonstration énergétique:  
- «Energy efficiency and renewable energies projects», novembre 1988, M. Caprioglio et le «March Consulting Group»;  
- «Solid fuels», novembre 1988, M. Thurlow et M. Kallebach;  
- «Evaluation of the European Community's programme of support on technological development in the hydrocarbons sector», août 1988, Smith REA Energy Associated Ltd.

(3) Règlement (CEE) n° 2008/90 (JO L 185 du 17.7.1990).

**b) les sources d'énergie renouvelables:**

- énergie solaire (applications thermiques et applications photovoltaïques),
- énergie de la biomasse et des déchets,
- énergie géothermique,
- énergie hydroélectrique,
- énergie éolienne;

**c) les combustibles solides**, c'est-à-dire l'anhracite, la houille, le lignite, la tourbe ou tout combustible qui en dérive pour:

- des techniques nouvelles de combustion propre,
- la transformation des combustibles solides en produits énergétiques gazeux ou liquides,
- le traitement des déchets,
- la gazéification intégrée à un cycle combiné gaz/vapeur;

**d) les hydrocarbures** (y compris les sables et schistes bitumineux, mais à l'exclusion des combustibles solides visés ci-dessus), en ce qui concerne:

- l'exploration,
- la production,
- le transport,
- le stockage.

Les trois quarts du budget Thermie seront répartis d'une manière égale entre ces quatre domaines, le reste sera utilisé en fonction des besoins qui apparaîtront.

Trois principaux types d'activité sont prévus:

- soutien financier pour des projets de technologie énergétique;
- actions d'accompagnement visant à promouvoir l'application des technologies énergétiques et leur pénétration sur le marché;
- coordination entre les actions nationales et communautaires dans ce domaine.

Nous allons maintenant examiner ces activités en détail.

## Soutien financier pour des projets

85 à 90 % des ressources financières du programme Thermie sont affectés à des projets de technologie énergétique.

que. Un soutien financier (\*) peut-être accordé aux types de projets suivants:

**a) projets innovateurs**, dans lesquels une technique, un procédé ou un produit est utilisé pour la première fois sur une base commerciale. On part du principe que la phase de recherche-développement est terminée dans le cas de ces projets. Les coûts éligibles peuvent représenter jusqu'à 40 %;

**b) projets de diffusion** portant sur des techniques qui ont déjà été essayées, mais n'ont pas encore pénétré sur le marché, et qui sont désormais utilisées dans des conditions économiques ou géographiques différentes.

L'objectif est de promouvoir une plus large utilisation de ces techniques. En raison du caractère moins aigu des risques encourus, le soutien financier est limité à 35 % au maximum.

En outre, la Commission peut prendre l'initiative de mettre sur pied des «projets ciblés», lorsqu'il apparaît qu'un besoin n'est pas satisfait ou qu'une avancée technologique significative peut-être obtenue. Il doit s'agir de projets de coopération entre entreprises provenant d'au moins deux États membres.

En tout état de cause, lorsqu'un soutien financier a été octroyé par d'autres organismes publics, l'ensemble du soutien public, y compris la contribution de la Commission, ne peut dépasser 49 % du coût des projets.

Pour être éligible à un soutien au titre de Thermie, tout projet doit satisfaire aux conditions suivantes:

- il doit présenter des aspects **innovateurs**, car Thermie vise à promouvoir de nouvelles technologies énergétiques et non simplement à subventionner des investissements technologiques;

- il doit offrir de bonnes perspectives de **viabilité technique et économique**, car les crédits communautaires ne doivent pas servir à financer des entreprises en déclin;

- il doit être compatible avec les exigences en matière de **sécurité** et de **protection de l'environnement**. Il est évident que la mise en œuvre de la plupart des technologies énergétiques aura d'importantes retombées positives sur l'environnement;

(\*) Voir articles 2, 4, 6, 7, 8 et 9 du règlement Thermie (CEE) n° 2008/90.

il doit présenter des **difficultés de financement** en raison de l'existence de risques techniques et économiques importants, car une participation financière communautaire est évidemment superflue en l'absence de tout risque;

- le proposant doit être à même de mettre en œuvre ou d'appliquer les technologies visées, et de **contribuer à leur diffusion** en cas de réussite du projet. Il s'agit là d'un aspect très important, car, d'une manière générale, Thermie vise à promouvoir une utilisation plus large des techniques nouvelles;
- les projets dont le coût dépasse 6 millions d'écu doivent être présentés par au moins deux promoteurs indépendants établis dans des États membres différents, sauf dérogation exceptionnelle;
- les projets doivent être réalisés **dans la Communauté**, sauf dérogation exceptionnelle.

Lorsque des projets présentent un niveau d'intérêt comparable, une certaine préférence sera accordée:

- aux **projets de coopération** entre entreprises provenant d'au moins deux États membres, en vue de promouvoir la coopération technologique transnationale;
- aux projets proposés par des **entreprises petites et moyennes**, souvent très créatives sur le plan de l'innovation, mais parfois dépourvues des ressources nécessaires pour assurer par elles-mêmes une diffusion efficace de leurs innovations;
- aux projets de diffusion dans les **régions en retard de développement** <sup>(5)</sup>, eu égard à la nécessité de déployer des efforts particuliers pour éviter que ces régions soient désavantagées à mesure qu'approche la réalisation du marché unique de 1992.

Les entreprises seront invitées à faire des propositions par le truchement d'un appel d'offres annuel publié au Journal officiel au cours du premier semestre. Une date limite précise, située à la fin de l'été ou au début de l'automne, est fixée pour les propositions. Les décisions en matière de soutien financier sont prises au début de l'année suivante.

## Actions d'accompagnement

Bien que 10 à 15 % seulement du budget Thermie soient consacrés aux actions d'accompagnement <sup>(6)</sup> visant à promouvoir l'application des technologies énergétiques et leur pénétration sur le marché, ces actions constituent un élément essentiel du programme, du fait qu'elles sont généralement beaucoup moins coûteuses à mettre en œuvre que les projets technologiques, dont le coût en matériel est souvent élevé. On peut même affirmer que seules les actions d'accompagnement peuvent exploiter les résultats des projets technologiques qui réussissent (et non seulement ceux des projets financés par la Communauté), et promouvoir leur diffusion aussi bien à l'intérieur qu'à l'extérieur de la Communauté.

On peut citer, à titre d'exemple, les actions d'accompagnement suivantes:

- **analyse du potentiel du marché** pour l'application de certaines technologies énergétiques;
- **suivi et évaluation** des projets financés par la Communauté;
- **diffusion d'informations** sur les technologies énergétiques, par exemple au moyen de brochures, d'un matériel de documentation, de vidéocassettes, de bases de données, de séminaires, d'ateliers, de conférences.

La plupart de ces actions d'accompagnement seront réalisées par la Commission, par le truchement d'un réseau d'organisations pour **la promotion de la technologie énergétique** (OPET). Un réseau de 33 OPET couvrant l'ensemble de la Communauté est désormais établi. Il comprend essentiellement des organisations, tant publiques que privées, travaillant d'ores et déjà dans le domaine de la diffusion de technologies énergétiques. Certaines de ces organisations sont nationales, d'autres ont un caractère régional ou local, d'autres encore travaillent dans des secteurs spécifiques, dans l'ensemble de la Communauté. Toutes ces organisations exécutent un programme de travail précis convenu avec la Commission. Leur interconnexion est assurée par la direction générale de l'énergie de la Commission via un petit secrétariat central établi à Bruxelles.

Des actions d'accompagnement peuvent également être exécutées dans des **pays tiers**, dans le cadre d'une coopé-

<sup>(5)</sup> Au sens de l'article 8 du règlement (CEE) n° 2052/88 (JO L 185 du 15.7.1988).

<sup>(6)</sup> Pour plus de détails, voir article 5 et annexe V du règlement Thermie.

ration industrielle. De telles actions seront réalisées à l'aide des OPET fonctionnant déjà dans certains pays tiers et par la création ou la désignation d'OPET dans ces pays tiers. Dans un premier temps, on visera surtout l'Europe centrale et l'Europe orientale (y compris l'Union soviétique), ainsi que les pays industriels.

## Coordination

Il appartient à la Commission d'éviter tout double emploi des efforts tant nationaux que communautaires en matière de technologies énergétiques (7). Les programmes de démonstration ainsi que le programme sur les hydrocarbures ont mis en lumière la nécessité de consulter les États membres en matière de choix de projets à financer. Ce mécanisme consultatif, quelque peu modifié, est maintenu dans le programme Thermie (8).

La coordination doit cependant aller plus loin, et c'est à ce stade qu'intervient le réseau des OPET. Un certain nombre de ces organisations sont chargées par les gouvernements dont elles dépendent de diffuser les technologies énergétiques dans leur propre pays. A mesure que le réseau s'étendra, on y verra plus clair et on pourra élaborer une stratégie réellement européenne en vue de la promotion des technologies énergétiques.

Au cours de l'actuelle décennie, Thermie jouera un rôle important en matière de sécurité et de diversification des

approvisionnements énergétiques de la Communauté, et de réduction de la demande énergétique grâce à la mise en œuvre plus large de meilleures techniques. Au cours des dix-huit mois de discussions qui ont précédé l'adoption du règlement, l'accent a été mis sur les aspects environnementaux. D'aucuns avaient même affirmé que les approvisionnements énergétiques étaient suffisants au niveau mondial et que le niveau des prix de l'énergie ne constituerait pas un facteur décisif d'ici à la fin du siècle.

Les événements du 2 août au Koweït et ceux qui ont suivi ont montré les dangers d'une dépendance excessive vis-à-vis du pétrole provenant d'une région intrinsèquement instable depuis de longues années, et la nécessité impérieuse de réduire la consommation énergétique, de mieux utiliser l'énergie, de diversifier les sources et d'exploiter davantage les sources d'énergie indigènes. La prospérité économique future de la Communauté, et du reste du monde, exige un approvisionnement énergétique stable et à des prix acceptables. Le programme Thermie jouera un rôle important à cet égard.

Pour de plus amples informations sur le programme Thermie, écrire à l'adresse suivante:

Programme Thermie, DG XVII/D/1,  
Commission des Communautés européennes,  
rue de la Loi 200,  
B-1049 Bruxelles.

Fax (+322) 235 01 50.

(7) Articles 11, 12, paragraphe 2, et 17 du règlement Thermie.

(8) Articles 9 et 10 du règlement Thermie.

### Comparaison entre Thermie et les projets antérieurs (démonstration et hydrocarbures)

	Thermie [règlement (CEE) n° 2008/90]	Programme de démonstration [règlement (CEE) n° 3640/85]	Technologies hydrocarbures [règlement (CEE) n° 3639/85]
Secteurs d'application	<ul style="list-style-type: none"> <li>- Utilisation rationnelle de l'énergie</li> <li>- Sources d'énergie renouvelables</li> <li>- Combustibles solides</li> <li>- Hydrocarbures</li> </ul>	<ul style="list-style-type: none"> <li>- Économie d'énergie</li> <li>- Sources d'énergie alternatives</li> <li>- Substitution des hydrocarbures</li> <li>- Liquéfaction et gazéification des combustibles solides</li> </ul>	<ul style="list-style-type: none"> <li>- Hydrocarbures</li> </ul>
Types de projets soutenus	<ul style="list-style-type: none"> <li>- Projets innovateurs</li> <li>- Projets de diffusion</li> </ul>	<ul style="list-style-type: none"> <li>- Projets de démonstration</li> <li>- Projets pilotes industries (combustibles solides)</li> </ul>	<ul style="list-style-type: none"> <li>- Projets de développement technologique</li> </ul>
Types d'action envisagés	<ul style="list-style-type: none"> <li>- Soutien financier de projets (notamment projets ciblés)</li> <li>- Actions d'accompagnement pour la promotion technologique</li> <li>- Coordination</li> </ul>	<ul style="list-style-type: none"> <li>- Soutien financier de projets</li> </ul>	<ul style="list-style-type: none"> <li>- Soutien financier de projets</li> </ul>
Zone géographique	<ul style="list-style-type: none"> <li>- Pour les projets dans la CEE, sauf cas exceptionnel</li> <li>- Pour les actions d'accompagnement, à l'intérieur et à l'extérieur de la CE</li> </ul>	<ul style="list-style-type: none"> <li>- Dans la CEE, sauf cas exceptionnel</li> </ul>	<ul style="list-style-type: none"> <li>- A l'intérieur et à l'extérieur de la CE</li> </ul>
Conditions d'éligibilité	<ul style="list-style-type: none"> <li>- Caractère innovateur</li> <li>- Perspectives de viabilité technologique et économique</li> <li>- Compatible avec la sécurité et la protection de l'environnement</li> <li>- Difficile de financer en raison de risques</li> <li>- Proposants capables de contribuer à la diffusion</li> <li>- 2 promoteurs d'États membres différents pour les projets de plus de 6 millions d'écus</li> <li>- R &amp; D pratiquement terminée</li> </ul>	<ul style="list-style-type: none"> <li>- Caractère innovateur</li> <li>- Perspectives de viabilité technologique et économique</li> <li>- Prévoir des actions et moyens afin de multiplier les réalisations du même type de projets</li> <li>- Difficile de financer en raison de risques</li> <li>- R &amp; D terminée</li> </ul>	<ul style="list-style-type: none"> <li>- Caractère innovateur</li> <li>- Perspectives de viabilité industrielle, économique et commerciale</li> <li>- Difficile de financer en raison de risques</li> </ul>
Critères de préférence	<ul style="list-style-type: none"> <li>- Projets de coopération entre proposant provenant d'au moins 2 États membres</li> <li>- Petites et moyennes entreprises (PME)</li> <li>- Projets de diffusion dans les régions en retard de développement</li> </ul>	<ul style="list-style-type: none"> <li>- Projets de coopération entre proposant provenant d'au moins 2 États membres</li> <li>- Solutions appropriées en matière de protection de l'environnement</li> </ul>	<ul style="list-style-type: none"> <li>- Projets de coopération entre proposant provenant d'au moins 2 États membres</li> <li>- PME</li> </ul>
Soutien financier maximal	<ul style="list-style-type: none"> <li>- Projets innovateurs: 40 %</li> <li>- Projets de diffusion: 35 %</li> <li>- Soutien public maximal: 49 %</li> </ul>	<ul style="list-style-type: none"> <li>- 40 %</li> <li>- Soutien public maximal: 49 %</li> </ul>	<ul style="list-style-type: none"> <li>- 40 %</li> <li>- Prises en compte d'autres interventions financières</li> </ul>
Rôle du comité (composé des représentants des États membres) dans la sélection des projets	<ul style="list-style-type: none"> <li>- Projets &gt; ½ Mio ECU: le Conseil peut s'opposer à la décision de la Commission par vote majoritaire qualifié</li> <li>- Projets entre 100000 et 500000 écus: le comité émet un avis</li> <li>- Projets &lt; 100000 écus: le comité ne joue aucun rôle</li> </ul>	<ul style="list-style-type: none"> <li>- La Commission décide sur la base des avis du comité</li> </ul>	<ul style="list-style-type: none"> <li>- La Commission décide sur la base des avis du comité</li> </ul>
Répartition du budget	<ul style="list-style-type: none"> <li>- 85 à 90 % pour les projets: 10 à 15 % pour les actions d'accompagnement</li> <li>- 75 % à répartir également entre les 4 domaines d'application, le ¼ restant peut-être réparti par la Commission</li> </ul>	<ul style="list-style-type: none"> <li>- 100 % pour les projets</li> <li>- Environ 30 % pour les combustibles solides</li> </ul>	<ul style="list-style-type: none"> <li>- 100 % pour les projets</li> <li>- Pas de subdivision sectorielle</li> </ul>

# La France

N. Commeau-Yannoussis – DG XVII, task-force «intégration communautaire»,  
unité «achèvement du marché intérieur» (TF 1)

## *Énergie en Europe continue sa présentation des rapports énergétiques des pays communautaires avec la France*

Forte de ses 56 millions d'habitants (17 % de la population de la Communauté) répartis sur 550 000 km<sup>2</sup>, la France est un des pays les moins peuplés de la Communauté au km<sup>2</sup> (densité 100 h/km<sup>2</sup>). Près de 80 % de la population vit dans des zones urbaines. A ce titre, on pourrait parler «des villes et du désert français». Les agglomérations principales sont celles des régions parisienne, marseillaise et lyonnaise.

Le PIB de la France équivaut à un cinquième du PIB communautaire. Elle est la deuxième puissance économique de la Communauté derrière la République fédérale d'Allemagne. A elles deux, elles produisent près de la moitié (45 %) de la production communautaire.

En 1988, la France a connu un record de croissance de 3,5 % par rapport à l'année précédente. Cette croissance s'est confirmée en 1989 et devrait se maintenir à un niveau élevé en 1990 (1). Comme dans les autres pays de la Communauté, l'investissement industriel est la composante la plus dynamique de la demande, du fait de l'accroissement de la demande mondiale. L'essor de l'activité industrielle constitue une rupture avec le passé récent de l'économie française et contribue pour un quart de la croissance totale en 1988.

La population active occupée en 1988 dépasse les 21,5 millions de personnes. Grâce à la reprise de l'activité industrielle et des politiques d'insertion, le chômage a été ramené à 10,1 % de la population active totale (2 563 000 demandeurs d'emploi), alors même que celle-ci s'est accrue de 170 000 personnes. Le chômage a fortement diminué chez les jeunes et chez les hommes, au détriment des femmes.

La France consomme 201 Mio tep (2) en 1988, soit 19 % de la consommation communautaire (3) et produit moins de la moitié de ses besoins énergétiques (97,6 Mio tep). La production nationale est particulièrement insuffisante en pétrole et en gaz naturel (respectivement de 3,8 et 2,6 Mio tep). La France dépend de plus de 90 % de son approvisionnement extérieur en hydrocarbure.

Per capita, la France consomme 3,6 tep, pour une moyenne communautaire légèrement inférieure, dont la partie la plus importante est absorbée par la consommation des foyers domestiques (20 %). Elle connaît une consommation énergétique modérée, occupant le 7<sup>e</sup> rang dans la Communauté derrière le Royaume-Uni.

Malgré une faiblesse énergétique naturelle, la France bénéficie d'une situation énergétique satisfaisante grâce à une politique énergétique active et soutenue, fondée sur deux axes principaux: un équilibre de la structure de la consommation et la sécurité d'approvisionnement.

## **Une politique énergétique interne fondée sur la substitution du pétrole**

Les deux chocs pétroliers de 1973 et de 1979 ont incité les pays occidentaux à entreprendre des politiques rigoureuses pour limiter, voire réduire, la croissance de la demande énergétique et principalement pétrolière.

La part du pétrole dans la consommation d'énergie primaire en 1973 était de 70 % dans le bilan énergétique

(1) PIB 1988 = 743 359 Mio ECU (écu 1985);  
1989 = 769 377 Mio ECU (+ 3,5 %);  
1990 = 793 997 Mio ECU (+ 3,2 %).

(2) Consommation d'énergie primaire. Sources: EUROSTAT, OSCE.

(3) Rapport équivalent à celui de la population.



français; elle est passée à moins de 43 % grâce au développement de la production domestique d'énergie et à une politique d'économie d'énergie.

## Développement de la production nationale d'énergie

Le premier choc pétrolier a révélé la précarité de la situation énergétique française et déterminé les orientations de la politique énergétique à mener: agir sur l'offre en développant la production nationale d'énergies grâce à la promotion des énergies renouvelables et à l'intensification du programme électronucléaire français.

## Promotion de l'électricité

Dès la fin des années 50, la France lançait un plan de développement de l'énergie atomique fondé sur la pénétration progressive de l'électricité d'origine nucléaire dans l'économie nationale.

A partir de 1974, le gouvernement français a entrepris un important programme électronucléaire, qui n'a connu un ralentissement que ces dernières années. La puissance nucléaire installée est de 50 GW en 1987 et, à ce titre, la France est la deuxième puissance électronucléaire du monde, derrière les États-Unis.

La part du nucléaire dans la production totale d'électricité est passée de 8 % en 1973 à plus de 70 % en 1988.

En parallèle et en complément à l'accroissement des capacités de production, EDF a mené une politique de promotion de l'électricité dans la consommation d'énergie, par l'incitation, notamment, de l'introduction du chauffage électrique dans l'habitat.

Actuellement, la politique de promotion de l'électricité est complétée par deux actions en faveur d'une meilleure couverture des campagnes et d'une amélioration de la qualité du produit (réduction des coupures) et du service offert (adéquation de l'offre aux besoins du client).

La percée de l'électricité est tout à fait spectaculaire. Entre 1973 et 1988, la consommation électrique s'est accrue

de 437 %, alors que la consommation globale n'était que de 12,3 % supérieure. Toutefois, le «tout électrique» des années 70-80 présente l'inconvénient d'accentuer la demande de pointe. C'est pourquoi la politique française s'oriente vers l'exportation d'électricité de base à destination de l'Allemagne, de l'Espagne et du Portugal et vers l'importation d'électricité de pointe en provenance de pays limitrophes comme l'Espagne et l'Allemagne.

## Développement des énergies renouvelables

A la suite du deuxième choc pétrolier, le gouvernement Barre avait mis l'accent sur l'intérêt de développer les énergies renouvelables. Sont en conséquence créés le Commissariat à l'énergie solaire (Comes) et deux missions ministérielles sur la géothermie et le réseau de chaleur.

Il existe, à l'heure actuelle, 350 réseaux de chaleur dans plus de 250 villes, alimentés jusqu'à 20 % par des usines d'incinération d'ordures ménagères. Le traitement des déchets urbains est un des facteurs potentiels majeurs de la croissance des réseaux.

Entre 1973 et 1988, la part des énergies renouvelables ne s'est pas accrue sensiblement dans le bilan énergétique: elle est passée de 1 à 2 %. Cependant, en chiffres absolus, leur production a doublé, passant de 2 à 4 Mio tep. Elle représente, en 1988, 2 % de la consommation primaire d'énergie. Si ce résultat peut paraître peu satisfaisant, il cache d'importantes recherches qui ont abouti à des mises au point technologiques que l'avenir est susceptible d'exploiter à plus grande échelle, si cela s'avérait économiquement rentable.

Toutefois, il semblerait, d'après l'AFME, que ces données ne correspondent pas tout à fait à la réalité, compte tenu des imprécisions qui pèsent sur les estimations des consommations de bois de chauffage (évaluées à 8 Mio tep par l'AFME) et de l'exclusion de la grande hydraulique.

Les efforts de développement de la production nationale d'énergie se sont avérés payants: entre 1973 et 1988, la France a plus que doublé sa production nationale (+ 133,5 %), grâce, essentiellement, à l'électricité d'origine nucléaire.

## **Relance des économies d'énergies ou de la maîtrise de l'énergie**

### **Les moyens mis en œuvre**

Dès le premier choc pétrolier, le gouvernement français avait réagi par la mise en œuvre d'une politique d'utilisation rationnelle de l'énergie (création de l'Agence pour les économies d'énergie), essentiellement tournée vers l'industrie et, dans une moindre mesure, vers les transports et l'habitat. La création de l'Agence française pour la maîtrise de l'énergie (AFME) en 1982, héritière de l'AEE, poursuit la politique de cette dernière et la complète par la valorisation, déjà entreprise par d'autres organismes, des énergies renouvelables.

La brusque reprise de la demande en 1988 (+ 2,7 % / 1987), les conclusions du rapport BRANA (1989) sur la maîtrise de l'énergie et la reconnaissance de l'impact essentiel des énergies sur notre environnement ont relancé une politique active en faveur des économies d'énergie (accroissement sensible du budget de l'AFME en 1990), mais également d'une réorientation plus globale de cette politique vers une meilleure efficacité énergétique, la conservation des énergies et les questions environnementales (déchets et qualité de l'air). Les secteurs visés sont essentiellement ceux des PME (les grandes industries ayant déjà réalisé de substantiels investissements dans ce domaine), des transports et de l'habitat.

### **Des résultats encore imprécis**

Depuis 1974, la France a largement réussi le découplage de la croissance économique avec celle de la demande d'énergie. Entre 1974 et 1989, le produit intérieur brut marchand a augmenté trois fois plus vite que la consommation d'énergie. L'intensité énergétique s'est améliorée pendant cette période de 20 %. Ainsi, c'est le pays qui présente actuellement un des taux d'intensité énergétique les plus faibles de la CEE.

Entre 1980 et 1987, la consommation énergétique française est restée relativement stable avec un taux annuel légèrement décroissant estimé à 0,5 %, dû, pour une très large part, à la baisse de la consommation de charbon et surtout de pétrole. On estime à 34 Mio tep les économies d'énergie réalisées chaque année.

L'année 1988 est marquée par une explosion de la consommation d'énergie primaire qui a dépassé son ni-

veau de 1979 (185 Mio tep). La croissance de la consommation reflète un comportement moins économe en énergie ainsi que la reprise significative de l'activité industrielle.

Le gouvernement français a reconnu, lors des débats à l'Assemblée nationale, en décembre 1989, que les gisements en économie d'énergie sont considérables et qu'il convient de les développer de façon appropriée. Les moyens consacrés en 1990 se sont renforcés et une politique de sensibilisation du public s'est intensifiée; c'est pourquoi la fusion des activités de l'AFME, de l'ANRED (déchets) et de l'AQA (qualité des eaux) a été décidée fin novembre 1990.

## **Une politique externe soutenue**

La politique énergétique externe de la France est guidée par le souci de préserver la sécurité d'approvisionnement et de renforcer la solidarité communautaire.

Les importations totales d'énergie, en baisse jusqu'en 1987, ont permis de ramener le taux d'indépendance énergétique à 47,3 % en 1987. Cependant, la France dépend pour presque tous ses besoins de l'approvisionnement externe (Communauté et pays tiers) en pétrole (96 %), en gaz (89 %) et pour un peu plus de la moitié de ses besoins en charbon (53 %).

En 1988, la tendance s'est quelque peu inversée et les importations nettes d'énergie ont crû d'environ 3 % en 1989 au bénéfice du gaz (+ 5 %) et du charbon (+ 14 %).

### **Soutien à l'intégration communautaire**

La France s'est activement engagée, lors de sa présidence du Conseil des Communautés européennes, en 1989, en faveur de l'affermissement du marché intérieur de l'énergie poursuivi par la Commission. Elle a soutenu les propositions de directives sur le transit du gaz et de l'électricité ainsi que celle sur les marchés publics dans les secteurs exclus (dont fait partie l'énergie) (4). Elle y a vu l'occasion de développer une solidarité et une complémentarité énergétique communautaire. L'accord de coopération

(4) Même si elle n'a pas réussi à inclure les marchés d'achats d'énergie (gaz, électricité) dans la directive.

énergétique franco-allemand conclu à la fin de 1989 en est le reflet <sup>(5)</sup>.

La France a délibérément opté pour un renforcement de ses interconnexions électriques et gazières, ainsi que pour la stimulation de ses exportations d'électricité.

### Renforcement des interconnexions avec les pays limitrophes

L'importance croissante des importations de gaz ainsi que le désir d'accroître les exportations d'électricité nécessitent des investissements en infrastructures adéquats.

La construction d'interconnexions des réseaux électriques et gaziers est prévue ou en cours: renforcement de réseaux électriques à haute tension avec l'Allemagne, le Royaume-Uni, l'Espagne et l'Italie, et gazoducs avec l'Italie et la Corse, voire avec l'Algérie à travers l'Espagne.

### Exportation d'électricité

Les exportations françaises d'électricité s'élèvent à près de 50 TWh en 1988 et pourraient atteindre aisément 70 TWh; on parle même de 120 TWh. Elles sont surtout, actuellement, destinées à l'Italie, au Royaume-Uni et au Portugal. Ces exportations ont principalement été motivées par la nécessité de rentabiliser le suréquipement français. Actuellement, elles devraient permettre à EDF de se procurer des bénéfices appréciables.

La directive relative au transit de l'électricité <sup>(6)</sup>, adoptée le 29 octobre 1990 par le Conseil des Communautés européennes, devrait faciliter les exportations françaises d'électricité.

En 1989 et 1990, la France a conclu un important accord tripartite avec l'Espagne et le Portugal, un contrat de 1000

MW avec l'Espagne (et peut-être bientôt un deuxième) ainsi qu'un nouveau contrat avec le Royaume-Uni.

Afin d'assurer les importateurs étrangers de sa fiabilité, le gouvernement français prévoit d'étendre le service minimal (en cas de grève ou de panne) aux besoins contractuels internationaux: c'est un signe important et prometteur.

## Renforcement de la sécurité d'approvisionnement

La diversification des fournisseurs extérieurs ainsi que l'établissement de relations stables avec les pays producteurs sont les deux axes constants de la politique énergétique extérieure de la France.

La diversification des fournisseurs permet d'atténuer les effets d'une instabilité de l'approvisionnement: cela s'est avéré efficace à l'heure de la crise du Golfe; les accords de coopération énergétique favorisent l'établissement de relations stables avec les pays fournisseurs.

### Diversification des fournisseurs

La forte dépendance de la France en gaz et en pétrole a incité les différents gouvernements et entreprises importatrices à assurer une diversification équilibrée des sources géographiques d'approvisionnement.

En 1988, chaque pays fournisseur de pétrole participe au maximum pour 10 à 20 % de l'approvisionnement de la France. L'approvisionnement est globalement réparti entre le Moyen-Orient, l'Arabie saoudite, la mer du Nord, l'Afrique du Nord <sup>(7)</sup> et de l'Ouest, et l'Union soviétique.

Pour le gaz, une répartition égale est assurée entre l'Algérie <sup>(7)</sup>, la mer du Nord (surtout les Pays-Bas) et l'Union soviétique, fondée sur des contrats de longue durée (25 ans en général).

<sup>(5)</sup> Principalement, deux accords ont été conclus: l'un portant sur la coopération nucléaire et l'autre sur les dossiers d'intérêt commun (production nationale de charbon et échanges d'électricité entre les deux pays).

<sup>(6)</sup> Voir article sur le marché intérieur dans ce numéro.

<sup>(7)</sup> A titre d'exemple, la France a conclu avec l'Algérie, en janvier 1989, un nouveau contrat gazier de 9 milliards de m<sup>3</sup> et, en novembre 1989, deux contrats de production de pétrole.

Le charbon provient pour l'essentiel de régions stables du monde (États-Unis, Australie, Allemagne de l'Ouest et Afrique du Sud). Son approvisionnement ne connaît donc pas d'aléas particuliers.

### Accords de coopération

L'apparition de nouveaux clients sur le marché des hydrocarbures (pays de l'Est, États-Unis) et la croissance prévisible de la demande mondiale générale ont amené la France à nouer avec les pays exportateurs des relations plus globales de «partenariat».

L'Algérie et l'Union soviétique, tous deux exportateurs importants de pétrole et de gaz, ont dernièrement été signataires d'accords de cette nature.

Au courant de l'année 1990, la CFP (Compagnie française de pétrole) a signé avec la Sonatrach (compagnie nationale algérienne des hydrocarbures) un accord de coopération portant, notamment, sur la recherche et sur la production d'hydrocarbures.

Avec l'Union soviétique, GDF a signé un protocole d'intention en vue de créer des «joint-ventures» dans le domaine des transports, de la distribution, de l'ingénierie et de la fabrication de matériel.

### Conclusions

La politique énergétique française a mené à des résultats encourageants, mais des difficultés certaines demeurent.

Des difficultés, tant d'ordre économique que plus spécifiquement énergétique, restent à résoudre:

- **d'ordre économique, liées à la facture énergétique et au taux d'indépendance énergétique relatif**

La facture énergétique reste une des dépenses les plus lourdes pour la plupart des États importateurs d'énergie. La facture énergétique française, en baisse constante jusqu'en 1988, a connu un renversement de tendance en 1989, qui devrait se confirmer en 1990 du fait des tensions sur le marché pétrolier (crise du Golfe).

Les oscillations de la facture énergétique, dues à la fluctuation du cours du dollar et du prix du brut, sou-

mettent l'économie française à dure épreuve lors des chocs pétroliers. Ainsi, l'impact inflationniste de la crise du Golfe est-il évalué à 1,4 point pour 1990 (octobre 1990).

Si, entre 1973 et 1989, le taux d'indépendance énergétique est passé de 70 à moins de 50 % de la consommation d'énergie, grâce essentiellement à la limitation des importations d'énergie (pétrole) et à la hausse de la production nationale d'énergie primaire (électricité d'origine nucléaire), le pétrole demeure l'énergie la plus consommée et constitue, à ce titre, la limite irréductible de la dépendance énergétique française.

- **d'ordre plus spécifiquement énergétique, liées à la prépondérance du nucléaire**

La politique d'indépendance énergétique menée par la France depuis 40 ans, appuyée sur la prépondérance de l'électricité d'origine nucléaire, présente certaines caractéristiques techniques qui posent encore quelques problèmes. Bien que jusqu'à présent la fiabilité de la technologie électronucléaire française ne puisse être remise en cause, l'année 1989 est marquée par quelques difficultés de production liées à des défauts contrôlés sur l'ensemble des réacteurs de 1300 MW ainsi que sur la moitié des réacteurs de 900 MW.

Par ailleurs, malgré une technologie de pointe fiable mise en œuvre pour assurer le retraitement du combustible ou le stockage des déchets radioactifs, les déchets nucléaires ne cessent de provoquer de vives réactions au sein de l'opinion publique. La polémique sur la décharge de Saint-Aubin en est un des derniers exemples.

Un livre blanc sur le programme nucléaire, la sûreté des installations et l'élimination des déchets sera certainement l'occasion d'un vaste débat national et une chance de renforcer un consensus en faveur du nucléaire qui reste important.

- Les résultats sont encourageants, car la politique de substitution de la consommation de pétrole est un succès certain.

La politique énergétique est parvenue à redresser le bilan énergétique français, à certains égards de manière spectaculaire. La production nationale d'énergie primaire, en croissance constante depuis 1973 (41,8 Mio tep), est passée en 1988 à 97,6 Mio tep (soit un accroissement de 133 %): en 1989, elle subit un tassement sensible, qui n'est toutefois pas très significatif, car il est dû à des difficultés conjoncturelles.

La percée de l'électricité et du gaz durant les décennies 70 et 80 a été constante (accroissement annuel respectif de 2,5 et de 3,9 % par an). En 1988, l'électricité représente plus du tiers (34,7 %) et le gaz 12,1% de la consommation d'énergie primaire, alors qu'ils n'y contribuaient que pour 7 % chacun en 1973.

Cette situation se reflète dans l'emploi du secteur énergétique. Le nombre de personnes employées connaît une légère baisse globale que marque une forte diminution des

effectifs dans les charbonnages, compensée en partie par une hausse des emplois dans l'électricité et le gaz. En 1988, ces deux secteurs énergétiques représentent 65 % des emplois de l'énergie contre 56 % en 1980.

La France paraît avoir fait un choix énergétique judicieux tant au regard de la structure de la consommation énergétique interne et de la dépendance énergétique que des prévisions de l'accroissement de la demande énergétique mondiale.

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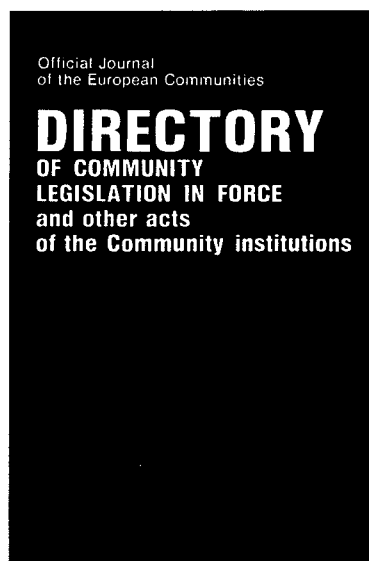
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