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ENERGY IN EUROPE

LA ENERGÍA EN EUROPA

ENERGIE IN EUROPA

ÉNERGIE EN EUROPE

ENERGY POLICIES AND
TRENDS IN THE EUROPEAN COMMUNITY

20

DECEMBER 1992

COMMISSION OF THE EUROPEAN COMMUNITIES

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EUROPEAN COMMUNITY ENERGY AND NATURAL GAS POLICIES

Opening speech to the Conference on Natural Gas Policies and Technologies at Athens, Greece

Delivered by
C.S. Maniatopoulos, Director General for Energy
October 1992[1]

Ministers, Ladies and Gentlemen
I would like to say how happy I am to be here today in Athens and to participate in this Conference on gas, a sector which will be of increasing importance in the energy balance of Europe and of course of Greece too in the coming decades.
Before entering on the substance of my speech - the Community's energy policy and the perspectives for natural gas - allow me to describe the framework in which they are developing.
At this juncture, when we are faced with continuous economic and political upheavals, the Community is a unique pole of stability. It has a common political culture, a common will and, by virtue of its economic and political weight, a unique voice in world affairs.
The Community represents a unique and successful experiment in economic and political union between sovereign states. The success by now of this venture explains why the Community is so attractive to other established West European countries and also to the new emerging democracies of Central and eastern Europe and the ex-USSR. Many of these countries wish to share in this success by also becoming Members of the Community.

At the moment we are going through a critical moment in the history of the European Community. The forces of nationalist isolation, allied with those who are pessimistic as regards the chances of deeper integration, who underestimate the time dimension of these trends, may be crying the end of Europe. But political realities clearly indicate that the problems will soon be solved and that the political will of Europe's citizens for 'more Europe' will be strengthened by the ongoing debate. The focus of this debate is the Maastricht Treaty which will carry further the process of integration in the Community. Its main elements - economic and monetary union, greater political cooperation, improved economic and social

1 An account of this conference is to be found in Community News.

cohesion - are a logical consequence of the political commitment of its Member States to make the European Community the focus of change on the European continent. There may be different views on how best to push forward the process of integration and at what speed, but we believe that there is a general consensus on the need to go forward. This commitment is best illustrated by the will of all Members of the Community to complete the Single Market by the end of 1992.

Energy policy clearly is part of this integration process.

The European Community plays a leading role in the world economy. Its 343 million citizens with a GDP of ECU 5 500 billion account for 20% of world output and 38% of world trade. In the energy sector, the Community accounts for 14% of world consumption, 8% of world production and 38% of world energy trade. The Community still needs to import 50% of its energy supplies.

"I must admit that numerous obstacles still remain to real integration in these energy sectors"

In this context, it is clear that the Community depends on secure and competitive energy supplies - security of supply is at the heart of energy policy. However, it also has a vital interest in the rational use of energy and in minimising the negative environmental effects of energy use and production. In balancing these interests with the needs of production, transport and residential sectors for energy, there are sound reasons for advocating a Community approach and common policies if we are to secure the smooth functioning of our economies and the well-being of our citizens. This Community approach has three main dimensions:

- *the development of the Community's internal energy market and concomitant progress on economic and social cohesion;*
- *concrete action on the environment/energy issue and the need to develop energy technology and innovation responses;*
- *reinforcement of the Community's international role in the energy sphere.*

Where do we stand today on these issues ?

Internal Energy Market

Since 1988, we have made excellent progress towards completion of the internal energy market. However, it has to be recognised that we still face a formidable challenge in securing our goal of free and competitive markets in energy and it is clear that not all obstacles can be removed overnight.

The challenges we face are best illustrated by the situation in the electricity and gas sectors on which the Commission's latest proposals focus. The first steps in establishing free and competitive markets in these sectors were taken in 1991 with the adoption of Directives on 'Price Transparency' and 'Transit'. Under the first measure - price transparency - industrial customers now have access to aggregate data on charges made by gas and electricity utilities to all categories of customers throughout the Community, thus giving them the tool to negotiate more effectively their contracts with suppliers.

The transit Directive creates opportunities for gas and electricity to trade more effectively across the Community, even if there is a third grid between grid operators establishing a contract.

However, I must admit that numerous obstacles still remain to real integration in these energy sectors. For instance we find that new entrants cannot enter the market, as regards either production or transmission, nor can customers usually choose their supplier due to the monopoly structure of the industry. Energy markets in the Community are segmented for historic reasons and vested interests often block economically justified trade within the Community.

For the second phase of liberalization, it was necessary, therefore, to produce far-reaching proposals. These were approved by the Commission in January of this year and submitted to the Council of Ministers. The objective of these proposals is progressively to allow energy consumers, particularly large industrial ones, to have a choice in their purchase of electricity and gas and open up investment in production and transport to new independent operators.

Although these recent proposals on the internal energy market for electricity and gas will be at the top of the agenda in the coming months, as they pass through the Community institutional process, they constitute only one of our goals: we are also active in applying single market principles to other energy sectors.

For coal we are committed to limiting State subsidies by a rigourous application of the rules of the Treaty. The aim is to allow financial support only if it improves the competitiveness of the Community coal industry or in the case of new production, economic viability is guaranteed, account being taken, of course, of certain regional and social imperatives.

In the oil sector we intend to make sure that a competitive framework is the norm in the granting of production and exploration licenses and so end the current situation of privilege for national undertakings and discrimination against entrepreneurs from other Member States.

A more rational choice of plant in all energy sectors has been possible with the advent of public

procurement subject to Community rules. Progress is also being made on norms and standards - technical matters which are vital to the smooth running of the internal market.

What we are trying to achieve in the Community is of widening appeal to other European countries which wish to become more closely associated with our efforts. For instance, under the European Economic Area agreement which, after some teething problems of an institutional nature, comes into force on 1 January 1993, the countries of the European Free Trade Area will take on board most of the Community's energy legislation. The upshot will be that as regards energy, these countries will be adopting practically all the current legislation as well as being committed to future developments without being members as such of the Community. It would not be too fanciful to say, therefore, that what we are trying to achieve as regards a single energy market could eventually have a much wider application beyond the existing Community of 12.

"In achieving our stabilization goal we will have to improve energy intensity and to shift energy use towards fuels containing less carbon such as natural gas"

In achieving the internal market in energy, we cannot neglect the importance of trans-European networks as a force for integration. It is evident that the benefits of a single market depends as much on the existence of appropriate trans-European infrastructure, as on a favourable legislative framework.

The disadvantages faced by some Member States, particularly those at the edges of the Community, on account of inadequate energy inter-connections, need to be overcome if a real integrated market is to emerge. It is clear that the market will open up some possibilities, but in the Commission's view, the process needs to be speeded up. To this end, the Community is taking steps to ensure that the European dimension is incorporated into the design, implementation and operation of major networks. Projects that extend existing networks to other Community countries; help to enhance security of supply and also towards more efficient use of production capacities, clearly are of interest for the Community as a whole.

Given the scale of investments required in many of these projects of Community interest, essential prerequisites are economic viability and private funding. However, viability goes beyond the narrow financial sense; more general considerations also need to be taken into account, notably the binding together of the Member States by greater economic and social cohesion.

This explains why considerable financial resources from the European Regional Development Fund and the European Investment Bank are earmarked for energy infrastructures.

It is also worth underlining that the Maastricht Treaty makes a specific reference to trans-European networks, including energy, which in the coming decade could provide the springboard for further Community action.

ENERGY/ENVIRONMENT/TECHNOLOGY

The drive to achieve an integrated European energy market based on market principles within a pan-European framework is a major plank of our policy. There has also been increasing focus on the need for environmentally benign energy sources with lower levels of pollution. The Community's interest in environmental objectives is not new and the environmental consequences of energy choice has always been a major part of its energy policy.

This explains why we already have Community-wide regulations in place as regards emissions of sulphur and nitrogen oxides from power generation. However, such issues are now dwarfed by environmental issues with a dimension well beyond the Community or even the European continent. I refer here to C02 emissions and the associated problems of global warming.

As you know the Community is committed to stabilizing its C02 emissions by the year 2000 at 1990 levels and is a signatory of the Climate Change Convention, negotiated at the Rio Conference on the Environment, which links the principle of sustainable development to energy use. C02 emissions are estimated to increase by 11% over the period 1990 to 2000 if existing policies remain unchanged.

Stabilization will, therefore, not be an easy task. As a consequence the strategy proposed by the Commission to achieve its goals needs to have many facets.

In achieving our stabilization goal we will have to improve energy intensity and to shift energy use towards fuels containing less carbon such as natural gas.

To this end the Community has launched a series of innovative energy technology and energy efficiency programmes (Thermie, SAVE, Altener), which will have significant positive effects in the short to medium term. Over a longer horizon the Community is also putting important resources into energy research and development such as the JOULE programme.

However, our analysis, which has been confirmed by in-depth studies, shows that we cannot meet our stabilization target by relying solely on technology and research and development. Our strategy therefore includes a proposal to introduce a carbon/energy tax. This complements and reinforces the non-fiscal

dimension of the strategy, increasing energy efficiency and promoting renewable energies. It would enshrine the principle that the polluter should pay so that fuels with high emissions of C02, a major contributor to global warming, would bear a greater tax burden.

It is clear that Community action alone will not resolve this problem. Currently the EC accounts for about 15% of global C02 emissions and this share is likely to diminish as a result of increasing population and industrialization in the developing world. We are conscious, therefore, of the need to support the newly emerging democracies in the East and developing countries in their efforts to curb C02 emission and to ensure the transfer of clean and efficient technologies to these countries.

As regards other industrialized countries, most have taken a decision on C02 stabilization or reduction. Some countries are also already in the process of introducing a C02 tax. In our view a concerted effort by the richer countries of the world is essential if we are to persuade the developing countries to follow our example.

External Energy Dimension

In pursuing its energy policy goals, the Community cannot neglect the external energy dimension.

The Community still imports 50% of its energy, and for oil, its dependence, often on politically volatile regions, is even greater. It is clear that gas will become more important in the Community's energy balance in the coming decades, but our analysis shows that an increasing share will be provided by regions that are facing enormous political and social problems.

In these circumstances the Community needs to intensify and strengthen its relations with those countries on which it depends for energy, particularly when account is taken of their long term potential to supply natural gas as well as oil. In the wake of the Gulf war and the new political climate, steps were therefore taken to develop the consumer/producer dialogue.

".... the European Community launched its initiative back in 1990 for a European Energy Charter, which after a year of intensive negotiations was signed at the Hague on 16 December 1991 by around 50 countries"

Since developing countries will, in the future, play an increasingly important role in the global energy balance, we cannot ignore them. The Community is in the vanguard of efforts to cooperate constructively with them in the energy sector .

On its doorstep, the Community is attempting to find a way of integrating the newly emerging democracies of Eastern Europe and the former USSR into Europe, and the energy issue offers an excellent opportunity. It was in this context that the European Community launched its initiative back in 1990 for a European Energy Charter, which after a year of intensive negotiations was signed at the Hague on 16 December 1991 by around 50 countries.

The central idea of the Charter is to find a political framework in which East-West cooperation can develop in the energy sector with a view to expanding trade in energy and here gas could have a major role; making the optimum use of energy, obtaining adequate environmental protection and promoting the transfer of technology and investment.

Now that the Charter has been signed, intensive work is underway on the framing of a Basic Agreement designed to give practical effect to it. This Agreement needs to set out instruments and mechanisms as regards coordinated legislation, mining rights, taxation, treatment of investment, and free trade so that practical effect can be given to the Charter.

This will not be an easy task since it needs to address horizontal provisions larger than energy. For the Community the implementing agreements can in no way affect our obligations in other international agreements, such as the GATT. The touchstone of the agreement will be mutual advantage - all participants can gain from it in one way or another.

Once the Basic Agreement is signed, and we hope to see this by March 1993, rapid progress can be made on a number of sector protocols: hydrocarbons, energy efficiency, etc. These specific agreements are essential if we are to maintain the impetus provided by the Charter.

Outside this framework the Community has, for a long time, been providing substantial financial assistance to the energy sector in the countries of Central and Eastern Europe through the PHARE Programme and, more recently, to the new Republics of the ex-USSR in order to help them reform and restructure their energy sectors.

This assistance, usually in the form of grants, is intended to encourage progress towards a market economy and pave the way for investment from both public and private sectors. In 1991, the energy part of the PHARE programme provided MECU 3-5 for each country. For the ex-USSR, MECU 115 out of MECU 400 of technical assistance aid was allocated to energy. Some of this technical assistance will contribute to continuing production of hydrocarbons, essential for our own economies.

We must accept that without this help the Community could face the consequences of an energy crisis in these new transitional democracies.

GAS SECTOR

Against this background, allow me now to turn more specifically to the gas sector. In doing so, I would first like to recall to you the discussions we had in Portugal, in Vilamoura, in April 1992[2]. In that Conference, different views were expressed by producers, gas companies and consumers on a wide number of issues ranging from supply and demand perspectives to internal market developments.

However, all speakers agreed that natural gas will be a growing market in the coming decades, the main factors determining the future share of gas in the Community energy balance being: environmental concerns, pursuit of the right balance between supply and growing demand, and implementation of the Community's internal market policy.

"Community imports will have to increase to a level of 60% of consumption by the year 2010 due to additional gas demand"

Sessions four and five of the Conference in Vilamoura concentrated on those countries which are now developing their gas grids. Also, reference was made to the need for financial support for natural gas infrastructures in these developing markets, which in its turn will contribute to strengthening economic and social cohesion at Community level.

In his concluding remarks at Vilamoura, the Energy Commissioner, Mr Cardoso e Cunha, referred to the monopolistic features of the gas market and emphasized the need for further progress in market liberalization which, by making gas-to-gas competition possible, should increase further penetration[3] . The creation of the internal market will also increase opportunities for both gas companies and consumers to widen their perspectives, and it should therefore be a determining factor in reducing costs and improving productivity and quality of services.

He also highlighted the good relations which the Community enjoys with its major external suppliers of natural gas, and also to the ongoing efforts further to enhance the producer-consumer dialogue.

Let me now turn to prospects in the natural gas sector for the coming 10-20 years and the policy implications as we at the Commission see them.

GAS DEMAND

The natural gas market in the Community is expected to be a growing market in all Member States in the 1990s, even though the situation differs considerably between Member States. One has to distinguish between ***mature gas markets*** *in Belgium, Germany, France, Italy, the Netherlands, the United Kingdom and Luxembourg with more than 95% of Community consumption,* ***developing gas markets*** *in Denmark and Spain, and* ***new gas markets*** *in Greece, Ireland and Portugal.*

Total gas consumption in the Community is at present 208 M toe or 18.8% of total energy consumption in the Community. 60% of consumption is covered by indigenous consumption while the remaining 40% is mainly imported from three non-Community sources, CIS (ex-USSR), Algeria and Norway, who each supply approximately one-third of the Community imports.

According to more recent developments, the share of natural gas in Community energy consumption is likely to increase and Community imports will have to increase to a level of 60% of consumption by the year 2010 due to additional gas demand. The main factors which will determine increasing gas consumption are environmental concerns, the completion of the internal market for gas and the potential for gas use in the power sector.

Environmental concerns mainly related to the greenhouse effect and the fact that natural gas will be privileged by the energy/CO2 tax will probably lead to an increase in the use of this fuel in all industrial sectors, including the power generation sector.

Implementation of the Community's internal market policy will increase the potential for gas consumption by opening up existing national markets. Liberalization of the gas market, enabling gas-to-gas competition, will facilitate increased gas penetration. Further integration of the European gas grid and the development of a gas infrastructure in Member States with new or developing gas industries will allow gas penetration in regions where up to now little or no gas is consumed. This will be complemented, as I have already indicated, by extension of the infrastructure with the support of the Community's structural funds. The opportunities opened up in the Maastricht Treaty for trans-European networks, and technological advance in gas power generation, will give a boost to the development of gas in the Community's energy balance. Greece is going to be a major beneficiary of these policies to which we in the Commission attach great importance as it will give a new dimension to the country's energy structure. Furthermore, the Greek gas project will link Greece with the European and international natural gas markets.

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2 *See Energy in Europe No 19, p.86.*

3 *Commissioner Cardoso e Cunha's speech appears in English in Energy in Europe No 19 and in French in this issue.*

GAS SUPPLY

It is reassuring to know that ***additional gas supply*** *to meet demand growth is potentially available as the Community is surrounded by 70% of the world's gas reserves within 4000 km of its perimeter. However, exploration and production within the Community will have to be kept at the highest possible level in order to limit the* ***dependence*** *on external supply. Then again, all forecasts show that much of the expected increase in demand, if not all of it, has to come from sources outside the Community.*

Additional supply from present sources (CIS, Norway, Algeria) and from new sources (Iran, Gulf countries, Nigeria) as well as the creation of transport facilities (pipelines and LNG facilities) therefore need to be encouraged.

At the same time, the Community should avoid undue over-dependence on any one external supplier and aim at a balanced external supply pattern. Further integration of the interconnected grid system will allow the security of supply issue to be addressed on a global Community basis.

To turn to the external policy aspect, the EEA agreement covers our relationship with Norway. The Energy Charter will define the relationship with the CIS and the Transit countries. As is the case for Norway, the Commission holds regular bilateral meetings with the Algerian Government at Ministerial level during which energy policy aspects which are of mutual interest are discussed. In the framework of the Gulf cooperation agreement, the relationship with the Gulf countries is being reinforced. When external policy action with Iran and Nigeria is envisaged, the natural gas aspect will have to be taken into account.

Additional gas supply needs major ***investment*** *in exploration, production, pipelines and LNG facilities. The internal market policy will facilitate the entry onto the market of new players who will invest in the growing gas market. Existing gas companies will have the opportunity to strengthen their position as their customer base is enlarged and they are no longer restricted to national markets.*

CONCLUSIONS

I should like to conclude by sharing a few thoughts with you on the future path of EC energy policy and its implications for gas. It is clear that whatever the difficulties encountered over the ratification of the Treaty of Maastricht, the process of European integration will continue. The existing Treaty and the Single Act already provide the necessary foundation of integration for many of our internal market and environmental proposals. Furthermore, the Community has both the power and the political will to play a major role in international political developments and the changing geopolitical situation. It is also likely to constitute the centre of any future distribution of powers resulting from these changes. As a result, the Community will guarantee stable progress and security for the policies of uniting Europe.

In welding these diverse elements together, the gas sector will, in view of its growing importance in the Community energy balance, require special attention.

"the Community should avoid undue over-dependence on any one external supplier and aim at a balanced external supply pattern"

The Commission will closely follow the development of demand and supply with a particular view to supply security, the achievement of the internal market and especially the further integration of the Community gas grid as well as the efficient use of natural gas. It goes without saying that, where necessary, the Commission will propose appropriate policy measures. ■

CO_2 EMISSIONS STABILIZATION: THE COMMUNITY STRATEGY

BY Peter Faross and Manfred Decker, DG XVII
Energy and Environment Unit

At the United Nations Conference for Environment and Development (UNCED) in Rio de Janeiro, the Community and its Member States signed the Framework Convention on Climate Change, which in order to enter into force needs to be ratified by at least 50 countries. The overall objective of this Convention is to stabilise atmospheric concentrations of greenhouse gases at a level that would prevent dangerous interference by human activity with the climate system. For developed country Parties, this means taking steps to limit emissions of greenhouse gases, 'with the aim of returning individually or jointly to their 1990 levels of these anthropogenic emissions of carbon dioxide and other greenhouse gases'.
Although not fully satisfied by the commitments under the Convention, the Community and its Member States view this Framework Convention as a significant first step in the progress towards elaborating a global response to the global problem of climate change. When signing the Convention, the Community reaffirmed the objective of stabilization of CO2 emissions by 2000 at the 1990 level in the Community as a whole.

COMMUNITY STRATEGY

To contribute to the achievement of this stabilization objective, the Commission presented to the Council in May 1992 various proposals which together represent the Community Strategy **to limit carbon dioxide emissions and to improve energy efficiency**[1].
The following draft legal acts have been proposed by the Commission:

- Council Decision concerning the promotion of renewable energy sources in the Community (Altener programme)[2];
- Council Directive to limit carbon dioxide emissions by improving energy efficiency (SAVE programme)[3];
- Council Decision for a monitoring mechanism of Community CO2 and other greenhouse gas emissions[4]; and
- Council Directive introducing a tax on carbon dioxide emissions and energy[5].

Furthermore, the Commission has targeted its most recent call for tender in the framework of the Thermie programme on innovative energy technologies reducing CO2 emissions.

ALTENER

As fossil energy consumption is the main source for the emission of greenhouse gases, increased use of renewable energy sources has become a priority. The proposed Altener programme (dealt with in detail elsewhere in this issue) focuses on:

1 *COM(92) 246 final and SEC(91) 1744*
2 *COM(92) 180 final (OJ N°C 179 of 16.7.92).*
3 *COM (92) 182 final (OJ N°C 179 of 16.7.92).*
4 *COM (92) 181 final*
5 *COM (92) 226 final (OJ N°C 196 of 3.8.92).*

- further market penetration of renewable energy sources;
- economic and financial actions;
- training and information; and
- co-operation with third countries.

Harmonization of legislation in Member States and standardization will be the actions of priority. Quantified objectives for the year 2005 are:

- to double the share of renewables in the Community energy balance from its current 4% to 8%;
- to triple its share in electricity generation; and
- to cover 5% of transport fuels by bio-fuels.

The programme should last for five years with a budget of MECU 40. Most of the CO2 limitation results will only materialize after the year 2000. However, by 2000 the implementation of the Altener programme should result in a 1% reduction of the 11% increase otherwise expected in Community CO2 emissions between 1990 and the year 2000.

SAVE

Under present conditions there are no economic CO2 abatement technologies available comparable to those effective against 'traditional' air pollutants (SO2, NOx, and particulates): there is a direct relationship between the amount of fossil energies consumed and the level of CO2 emissions. Thus improvement of energy efficiency has become even more a priority.

The proposed SAVE framework Directive covers measures in seven specific fields of action to be implemented by Member States. The Directive clearly defines the objectives to be aimed at but leaves a large margin of manoeuvre to Member States as regards the detailed implementation phase (principle of sub-sidiarity). The action focuses on consumer information through energy certification of buildings, on energy audits in industry as well as on more responsible consumer behaviour through the real billing of energy consumption, thermic insulation, third party financing and periodic inspections of certain energy-conscious equipment, like boilers and cars.

The seven measures proposed could bring about a slowing of anticipated CO2 emissions growth of the order of 2%-3%. The new activities foreseen as part of the Thermie programme could contribute another 1.5% reduction in incremental CO2 emission growth.

ENERGY/CO2 TAX

One of the key elements of the Community strategy to limit carbon dioxide emissions and to improve energy efficiency is the introduction of a new tax modulated as to 50% according to the energy content and 50% according to the carbon content of fuels. The energy part of the tax should by its impact on energy prices stimulate more efficient use of energy sources while the carbon part should stimulate a switch to fuels the combustion of which produces no, or at least less CO2.

Such a tax would be introduced in steps, beginning with ECU 0.21/GJ and ECU 2.81/t CO2 in 1993 (or somewhat later given the condition that other OECD countries also implement similar measures). Each year up to 2000, these amounts would be increased by one third of the 1993 tax rates; by the year 2000 these rates could therefore have reached ECU 0.7/GJ for energy and ECU 9.4/t of CO2.

Per tonne of oil equivalent the effect of these tax rates can be illustrated as follows:

	ECU/toe	
	1993	2000
Lignite	21.1	70.5
Hard coal	19.9	66.2
Residual fuel oil	18.0	59.9
Diesel/heating oil	17.5	58.3
Petrol	17.3	57.5
Natural gas	15.4	51.3

For electricity, the CO2 part of the tax would be levied on the basis of the carbon content of the fuel input, while the energy part of the tax would be based on the electricity output. Electricity would be taxed at ECU 2.1/MWh with the exception of hydropower-produced electricity from installations above 10 MW which will pay a rate of ECU 0.76/MWh.

The remaining main characteristics of the proposed energy/CO2 tax can be summarized as follows:

- all energy sources will be taxed with the exception of renewables (however, as just mentioned, hydropower from sites above 10 MW is taxed);
- the tax will follow the existing excise system very closely;
- the tax will be additional to existing taxes;
- it is a Community tax but will be levied by Member States;
- revenue from the tax will go to national budgets, but the principle of revenue neutrality will be respected (no increase to result in overall statutory contributions and charges).

It is important that the tax should not jeopardize the international competitive position of the Community's industry. Therefore, and also with an eye on the global nature of the greenhouse effect, it is suggested as a 'conditio sine qua non' that the tax Directive should only enter into force when other OECD trading partners impose a similar tax or measures having an equivalent financial impact. In addition, some reductions or exemptions from the tax for industries are provided in the case of unfair competition from countries not applying such measures, or in the case of new industrial investment expenditure for CO2 limitation.

MONITORING MECHANISM

A proposal for a Decision on a monitoring mechanism to follow up the national implementation measures and the individual programmes of Member States has been included in the overall Community Strategy. Apart from CO2 emissions, it would also cover other greenhouse gas emissions as well as the economic burdens stemming from the implementation of the Community Strategy in Member States (burden sharing principle). One of its objectives is to verify whether even the effective implementation of all the action provided for will result in CO2 emissions stabilizing at their 1990 level by the year 2000. The monitoring mechanism should also become a major tool in the reporting process provided for in the international Convention on Climate Change.

As all proposals concerning CO2 limitation will touch on energy efficiency improvements and/or fuel switching, their implications for energy policy may prove to be quite substantial. This is the reason why the Commission has proposed to integrate the monitoring process as closely as possible into the existing periodic review of national energy policies.

COUNCIL WORK

Preliminary discussions in various Council working groups have already started. The workload was split up by the UK Presidency as follows:

- the Council's Energy Working Group will deal with the Altener and SAVE proposals;
- an ad hoc ECOFIN group will cover the energy/CO2 tax proposal; and
- the Environment group of the Council will discuss the proposal for the monitoring mechanism.

Finance Ministers met on 14 December 1992 to have a first broad exchange of views with regard to the energy/CO2 tax proposal. The last Energy Council meeting of Ministers took place on 30 November.

A major study on the economic and energy policy consequences of the tax has been completed and an extended abstract follows this article[6] are in the process of finalization. The CO2 emission situation in the 1990 base year will be of major importance with a view of stabilization by 2000 and some statistical information can be found in the following tables. *Energy in Europe* will continue to keep you informed on this central feature of the Community's energy policy. ■

Energy-related CO2 emissions in 1990 (M tonnes)

EUR 12	3042
B	112
DK	53
D	1005
EL	74
ESP	211
F	366
IRL	31
I	402
L	13
NL	157
P	40
UK	579

Energy-related CO2 emissions by sector and fuel in 1990 (M tonnes CO2)

1990	Solid fuels	Oil	Gas	Other	Total
Power generation	699.0	135.1	110.5	6.1	950.6
Energy sector	4.9	90.4	34.2	0.0	129.5
Final consumption,	373.7	1130.0	458.5	0.0	1962.2
industry	235.5	144.5	221.1	0.0	601.1
transport	0.3	706.6	0.5	0.0	707.5
residential/ commercial	137.9	278.9	236.9	0.0	653.6
Total	1077.5	1355.5	603.1	6.1	3042.3

Energy-related CO2 emissions per capita in 1990 (tonnes CO2) - EUR 12

P	E	F	IT	EL	IRL	EUR-12	UK	DK	NL	B	D*	LUX
4.07	5.41	6.48	6.98	7.34	8.73	8.86	10.09	10.31	10.52	11.26	12.71	33.16

Energy-related CO2 emissions per unit of GDP in 1990 (tonnes CO2/1000 ECU) - EUR 12

F	IT	DK	E	EUR-12	NL	B	UK	D*	P	IRL	EL	LUX
0.39	0.47	0.51	0.54	0.63	0.72	0.74	0.75	0.79	0.85	0.92	1.42	1.82

* *including the ex-GDR*

6 *SEC(92) 1996 of 23.10.1992.*

THE ENERGY CONSEQUENCES OF THE PROPOSED CARBON/ENERGY TAX

BY Manfred Decker, Peter Faross, DG XVII
Energy and Environment Unit

The following analysis details the energy-elated CO2 emissions in the base year 1990 broken down by Member State, by sector of activity and by fuel; it also gives the results of DG XVII's most recent reference scenario to the year 2000 as well as a scenario reflecting the introduction of Community-wide carbon/energy taxation[1].

THE 1990 BASE YEAR SITUATION

Energy-related CO2 emissions in 1990 in the Community (former GDR included) amounted to 3042 million tonnes broken down by Member State in the table:

Table 1:
Energy-related CO2 emissions in 1990

	M t CO2	%
Belgium	112.0	3.7
Denmark	53.1	1.7
Germany	1005.0	33.0
Greece	73.7	2.4
Spain	210.7	6.9
France	365.7	12.0
Ireland	30.8	1.0
Italy	402.4	13.2
Luxembourg	12.5	0.4
Netherlands	157.3	5.2
Portugal	39.9	1.3
United Kingdom	579.2	19.0
Community	3042.3	100

CO2 emissions per capita or per unit of GDP vary widely between Member States. Per capita emissions range from 4.1 tonnes in Portugal to 12.7 tonnes in Germany the Community average amounts to 8.9 tonnes per capita (excluding the special case of Luxembourg - 33.2 tonnes).

Table 2:
Energy-related CO2 emissions per capita
(tonnes)

P	ES	F	I	EL	IRL	COM	UK	DK	NL	B	D	LUX
4.1	5.4	6.5	7.0	7.3	8.7	8.9	10.1	10.3	10.5	11.3	12.7	33.2

Reasons for such variations in per capita emissions include differences of industrial structures, different structures of energy balances, different climatic conditions and differences in the level of economic activity across Member States.
Related to economic activity, CO2 emissions per unit of GDP show a rather more even picture, and the positioning of Member States is also changed.

Table 3:
Energy-related CO2 emissions
per unit of GDP
(tonnes CO2/1000 ECU)

F	I	DK	ES	COM	NL	B	UK	D	P	IRL	EL	LUX
0.39	0.47	0.51	0.54	0.63	0.72	0.74	0.75	0.79	0.85	0.92	1.42	1.82

In 1990 power generation was the most important source of CO2 emissions (31%), followed by transport (23%), domestic and tertiary (21%) and industry (20%). It is only in Belgium, France, Luxembourg and Spain that CO2 emissions are not dominated by power generation.

[1] *Both scenarios are presented in detail in the September 1992 supplement to Energy in Europe 'A View to the Future' (p.95 ff).*

Table 4:
Community CO2 emissions by sector 1990

	M t CO2	%
Power generation	950.6	31.2
Energy sector	129.5	4.3
Industry	601.1	19.8
Transport	707.5	23.3
Domestic & tertiary	653.6	21.5
Total	3042.3	100.0

In 1990 oil was the major energy source of CO2 emissions in the Community. The second place was taken by solid fuels and natural gas was in third position. Waste incineration contributed only marginally.

Table 5:
Community CO2 emissions by energy source 1990

	M t CO2	Share in CO2 emissions	Share in primary energy consumption
Oil	1355.5	44.6%	42.8%
Solid fuels	1077.5	24.4%	35.4%
Gas	603.1	19.8%	18.0%
Waste	6.1	0.2%	0.2%
Total	3042.3	100%	85.4%

The share of solid fuels in CO2 emissions is significantly higher than their share in energy consumption. This is due to the fact that the specific emissions of lignite and coal are higher than those of other fuels. Specific emissions from natural gas are particularly low. Energy sources not emitting CO2 (e.g. nuclear, hydro, solar and wind) contributed only some 15% to the 1990 energy supply.

It should be noted that the 1990 base year was one of the warmest years on record in the Community. The reference scenario assumes normal weather conditions for the year 2000. It is clear that the growth in CO2 emissions would be somewhat reduced if in 2000 the same weather conditions would prevail as in the 1990 base year.

THE REFERENCE SCENARIO UP TO 2000

The following analysis for the 1990s is based on the scenario prepared for projected energy demand in the Community and the world up to 2005 and already published in detail[2]. The main parameters are shown in the table below for the **no-tax reference case**. Since comparable data for the 1980s are not available for the ex-GDR, this comparison needs to be based on the Community excluding the new German Länder.

Table 6:
Basic assumptions and implications for the 1990s compared with recorded values for the 1980s (Community excl. ex-GDR)

	1980/1990	1990/2000
GDP growth p.a.	2.3%	2.2%
Population growth p.a	0.3%	0.4%
Real oil price (1990 ECU)		
first half	49 ECU/bbl	16 ECU/bbl
second half	19.5 ECU $/bbl	17.5 ECU/bbl
Additional capacity		
nuclear/hydro/ renewables	76 GW	14 GW
fossil fuels	14 GW	60 GW
Energy intensity* p.a.	-1.5 %	-0.7 %
Carbon intensity p.a.**	-1.2 %	-0.2 %
CO2 emissions p.a.	-0.4 %	1.3 %

* *gross energy consumption/GDP*
** *CO2 emissions/gross energy consumption*

On account of the continuing recession only moderate economic growth is expected for the period up to 1995: 2.1% p.a.; the corresponding figure for the period 1985 to 1990 in the Community (excluding the ex-GDR) had been 3.1%. Economic growth for the 1990s is forecast to be slightly lower than was experienced in the 1980s.

As compared with the first half of the 1980s oil prices are expected to remain low in this decade, as they were for most of the second half of the 1980s. Prices for other fuels should remain at comparatively low levels as well.

Investment in power generation equipment, which predetermines energy structures for quite a long time, is expected to be cautious as regards fuel choices and capital commitment in general. Overall investment expenditure is likely to be lower in the 1990s and to concentrate much more on fossil fuel technologies than in the 1980s. In effect, whereas between 1980 and 1990 there was a net increase in CO2-free generating capacity of some 76 GW, in this decade only one fifth of that investment in zero-carbon equipment can be expected. By comparison, investments in fossil fuel plants will be about four times as high in this decade as they were in the 1980s. However, new fossil fuel investment is concentrated on combined cycle gas power stations, whereas it had been based on coal and lignite stations, which emit much more CO2 per kWh.

As a result of the above, CO2 emissions per unit of energy consumed will decrease at a much slower pace in the 1990s (-0.2% p.a.) as compared to the 1980s (-1.2% p.a.). Moreover, due to factors such as change in the industrial structure, pace of capital turnover, and commitment to energy savings by limiting energy

2 *Supplement to Energy in Europe, cit. pp. 25-51; 95-163.*

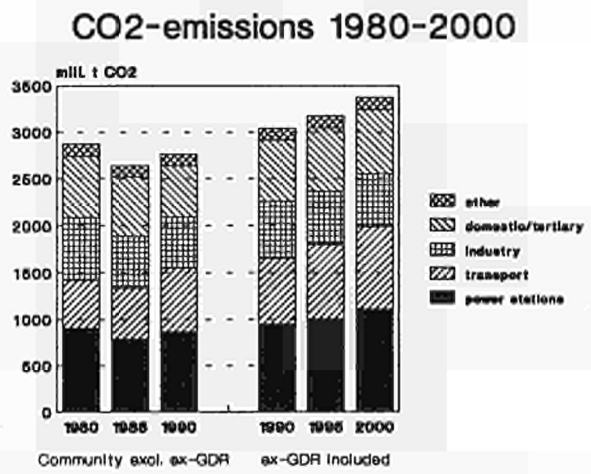
service requirements, the energy intensity of GDP is expected to decline over the coming years at only half the rate of the last decade (-0.7% p.a. instead of -1.5% p.a.).

The consequence of all the above will be an energy balance structure which gives rise to CO2 emissions 13% higher in 2000 than in the base year 1990 in the old Community. As the ex-GDR is restructuring its energy system away from lignite, on which it was based in 1990, the relevant emission path for the Community, including the ex-GDR, will show a smaller growth. **CO2 emissions are forecast to increase by 11% between 1990 and 2000 in the present Community.**

The corresponding average annual growth rates between 1990 and 2000 for the Community, including the ex-GDR, are as follows:

CO2 emissions	1.0% p.a.
GDP	2.3% p.a.
Energy intensity	-0.9% p.a.
Carbon intensity	-0.3% p.a.

Chart 1: CO2-emissions by sector up to 2000



This increase of 11% over the value of 1990 is the yardstick to assess the amount of CO2 emissions to be avoided by the year 2000 in order to stabilise emissions at 1990 level. According this reference scenario, final energy demand will increase by 15.0% between 1990 and 2000. GDP is expected to increase faster and the ratio of final energy demand to GDP is continuing to improve at an average annual rate of 0.9%.

Demand will increase most for **transportation** (25.5%). Most of this increase of 60 mtoe will be accounted for by oil which remains the only readily available large scale transport fuel. Biofuels are expected to increase by only 2 mtoe, and the additional contribution of electricity will be below 1 mtoe. CO2 emissions in transport are therefore bound to increase substantially, in fact by 24.6%.

Mobility remains a basic need and car ownership will continue to increase. Energy demand in transport is influenced by population and income levels as well as by other factors such as spatial distribution, urban congestion and transport infrastructure and policy. Improved fuel efficiency will restrain growth in fuel demand. Specific fuel consumption has indeed decreased considerably, but it takes several years before the average efficiency of the fleet is significantly improved on account of rather slow turn-over rates. In addition, there are counter-effects of faster driving, increased congestion and consumer preference for larger cars.

In the **domestic and tertiary** sector, energy demand is expected to grow by 16.9%, also above the average. Energy demand in this sector rises due to much higher demand for services and an increasing number of households with larger housing units. Moreover, an age distribution increasingly skewed towards the older age brackets, and life-style changes including more leisure activities contribute to rising energy demand.

With millions of individual decision-makers cost-consciousness has not been sufficient to ensure a rapid penetration of energy efficient equipment mainly on account of

- residential housing stocks having on average very long lifetimes;
- owner and user of housing stocks often being different individuals or institutions.

In the 1990s solids continue to diminish, especially in the ex-GDR where energy consumption in this and other sectors had been based on lignite. Oil demand will increase (mainly driven by substitution in the new German Länder). Gas and electricity demand are expected to be buoyant with growth of 32% and 31% respectively. With this replacement of high carbon fuels by less CO2 intensive energies, CO2 emissions should increase by only 6.2%, which is less than half the rate of energy demand growth.

Industrial energy consumption is forecast to increase only marginally (+2.5%) and industry's share is continuing to decline. The industrial base is shifting away from energy-intensive branches such as steel production to less energy intensive sectors such as electronic equipment. Furthermore, the competitive environment, reinforced by the completion of the internal market, will force most industrial users to keep close track of their energy costs. Significant energy intensity gains can therefore be expected for the industrial sector.

The fuel mix will continue to change throughout this decade. Solid fuels and oil should decline; gas and electricity will increase their contribution. The shift towards electricity and gas are driven principally by

technology and - to a lesser extent - by prices. Owing to this replacement of carbon rich fuels, CO2 emissions are indeed expected to decrease by 7.1%.

This analysis of CO2 emissions related to final energy demand sectors could be somewhat misleading, as the CO2 emissions produced while generating the **electricity** used in the various sectors have not been accounted for in the respective sectors. Although these emissions are quite substantial, they cannot be partitioned among sectors in an unambiguous way, since the origin of the electricity consumed cannot in general be traced.

Electricity consumption is rising at a fast pace, increasing 24% by the year 2000. This increase of 33 mtoe is for the most part due to the domestic and tertiary sector (over two thirds) and for the rest almost exclusively to industry.

Inputs into **power generation** are undergoing significant shifts. While solid fuels burn will increase, their relative contribution will decrease. Oil consumption is declining further. On the other hand, the use of gas in power stations is expected to more than double. It is indeed this substantial switching to natural gas, which prevents emissions from power generation from growing as fast as electricity demand. Emissions growth from power stations should indeed be restricted to 17% in spite of a growth in electricity demand of about one quarter in this decade.

Only a few years ago such developments were not foreseen. It was coal which was expected to make up for increased demand and shortcomings in the construction of nuclear plants. Power generation from natural gas in combined cycle mode has indeed been recognised to offer several advantages compared with coal-fired electricity generation. These include significantly higher efficiency, less environmental drawbacks, short installation times and substantially lower capital expenditure.

Overall the electricity generation picture is forecast to change as follows by the year 2000:

Table 7:
Electricity generation in the Community - by fuel

	1990	2000
Nuclear	33%	29%
Hydro	8%	8%
Solid fuels	40%	36%
Oil	10%	7%
Natural gas	7%	17%
Other *	2%	3%
Total	100%	100%

* *derived gas, urban waste and renewables*

With these trends in the final demand sectors and in power generation, gross energy consumption is expected to change significantly in this decade. Overall, **total energy consumption** is forecast to rise by 14.8%. The growth foreseen for total energy consumption exceeds the growth rate of CO2 emissions (10.9%), thus indicating that there will be substitution of low and zero carbon content energies for carbon rich fuels.

The structure of gross energy consumption is shifting as follows:

Table 8:
Structure of gross inland consumption by energy source

	1990	2000
Solid fuels	24.4%	20.3%
Oil	42.8%	42.0%
Natural gas	18.0%	22.9%
Nuclear	13.3%	12.6%
Hydro/others	1.6%	2.2%
Total	100%	100%

Natural gas can be expected to have the highest growth rate. In some regions of the Community it is being introduced, in the ex-GDR it should play a major role in the restructuring of the energy economy, and in general natural gas is considered to be an attractive alternative for power generation. The contribution of gas in the Community could therefore increase from 18% in 1990 to 23% by 2000 even without a specific CO2 policy. By 2000, it should move into second place after oil, replacing solid fuels.

Oil consumption is expected to increase somewhat more slowly than overall energy demand, and its share should therefore decrease slightly by nearly one percentage point to reach 42%.

The demand for solid fuels is bound to decrease by 2000, especially due to restructuring in the ex-GDR away from lignite. In the old Community, solid fuel consumption is slightly increasing owing to the virtual absence of significant additional nuclear capacity up to the year 2000. With growing overall energy demand the share of solids is thus expected to decrease from around 24% in 1990 to 20% in 2000.

Finally, nuclear, hydro and other minor primary energies should increase their contribution broadly in line with the overall growth of energy consumption so that their share could remain at about 15%.

Under the reference scenario, CO2 emissions by the year 2000 will have increased by 10.9% to reach 3375 M t. The development broken down by Member State is as follows:

Table 9:
Energy related CO2 emissions in 2000

	2000	2000	2000/1990
	M t CO2	%	% emission growth
Belgium	121.7	3.6	+8.7
Denmark	65.5	1.9	+23.3
Germany	1037.4	30.7	+3.2
Greece	96.6	2.9	+31.1
Spain	259.8	7.7	+23.3
France	431.4	12.8	+17.9
Ireland	36.0	1.1	+17.0
Italy	464.0	13.7	+15.3
Luxembourg	13.7	0.4	+9.6
Netherlands	178.1	5.3	+13.2
Portugal	57.0	1.7	+42.9
UK	614.1	18.2	+6.0
Community	3375.3	100	+10.9

Emissions are forecast to rise particularly strongly in Portugal, Greece, Spain and Denmark. While this reflects high economic growth expectations in the Southern Member States, the Danish case is particular as far as the base year 1990 is concerned: electricity imports were very high, substituting for coal-based power generation, and will have decreased substantially by the turn of the century.

These differences in growth rates affect the breakdown of emissions by Member state. Greece, Spain, France, Italy and Portugal will increase their shares by between 0.4 and 0.8 percentage points, whereas the share of Germany decreases by 2.3 percentage points. However, in 2000 Germany will again be the largest emitter accounting for over 30% of total Community CO2 emissions.

Energy-related CO2 emissions per capita will increase under the reference scenario in all Member States with the exception of Germany, where a slight decrease can be expected. The Community average is forecast to rise by 7% to reach 9.5 tonnes of CO2 per head.

Table 10:
Energy-related CO2 emissions per capita in 2000 - in tonnes

P	ES	F	I	EL	COM	IRL	UK	NL	B	D	DK	LUX
5.7	6.5	7.3	7.9	9.4	9.5	9.8	10.4	11.3	12.1	12.5	12.7	36.4

In 2000 CO2 emissions per capita will continue to vary widely between Member States. However, compared with the 1990 situation the variation is somewhat reduced (variation coefficient falling from 32.4% to 26.0%) thus indicating some narrowing around the Community average.

CO2 emissions per unit of GDP are expected to decrease by 2000 in all Member States except for Greece, where a slight increase is due to occur under the reference scenario. The Community average will be down 13% to reach 0.55 tonnes of CO2 per 1000 ECU.

Table 11:
CO2 emissions per unit of GDP in 2000 (tonnes CO2/1000 ECU)

F	I	DK	ES	COM	D	B	NL	UK	P	IRL	EL	LUX
0.37	0.42	0.50	0.50	0.55	0.63	0.64	0.66	0.69	0.82	0.83	1.46	1.49

Emissions per unit of GDP remain widely dispersed among Member States, but their variation around the Community average is slightly narrower in 2000 than in 1990 (variation coefficient decreasing from 30.2% to 29.5%).

THE CARBON/ENERGY TAX SCENARIO - COMMUNITY ENERGY DEMAND

INTRODUCTION

One of the key elements of the Community strategy to limit carbon dioxide emissions and to improve energy efficiency. As is well known, the Commission has proposed the introduction of a new tax modulated 50% according to the energy content and 50% according to the carbon content of fuels. Such a tax is to be introduced in steps, beginning with 0.21 ECU/GJ and 2.81 ECU/t CO2 in the first year. In each of the following seven years these amounts would be increased by one third of the tax rates in the initial year; in the last year (that is in 2000 at the earliest) these rates would therefore have reached 0.7 ECU/GJ and 9.4 ECU/t CO2. Purely for analytical purposes it is assumed that the tax will be introduced in 1993.

The assumptions underlying the following analysis have been made in a way which reflects as closely a possible the tax proposal in the draft tax Directive (Com (92) 226 final)[3].

For this analysis tax rates in real terms have been assumed. This allows inflation to be deliberately excluded from the analysis. For some key variables a comparison with the same tax in nominal terms will also be presented.

Per tonne of oil equivalent the tax rates would be as follows:

[3] *OJ N°C 196 of 3.8.1992.*

Table 12:
Illustrative tax rates in ECU/toe
(1993 ECU)

	INITIAL YEAR	FINAL YEAR
	ECU/toe	
Petrol	17.3	57.5
Diesel/heating oil	17.5	58.3
Residual fuel oil	18.0	59.9
Natural gas	15.4	51.3
Hard coal	19.9	66.2
Lignite	21.1	70.5

Energy prices would not only increase by these amounts, but as with all excise taxes the overall price increase would be somewhat higher according to the VAT rates applied in each Member State.

Electricity will be taxed in a somewhat different way. For the carbon part of the tax, the inputs in power stations are taxed according to the carbon content of the fuels used. As regards the energy part, the tax rate is fixed in terms of ECU per MWh. These rates are uniform for fossil fuels and nuclear, but they are lower for hydro power above 10 MW installed capacity. Small hydro and other renewables are exempt from the tax. Electricity prices in the initial year of the tax might therefore increase as follows way (first order effects not including the effects of any change in behaviour of market participants):

Table 13:
Illustrative first order electricity price effects in the initial year

	Energy part	Carbon part	Total
	ECU/MWh		
Nuclear	2.10	0	2.10
Hydro (large)	0.76	0	0.76
Renewables	0	0	0
Coal	2.10	2.73	4.83
Oil	2.10	2.14	4.24
Natural gas	2.10	1.49	3.59

In seeking to analyse the effects of such taxation, it is crucial to start from certain **key assumptions** as to the nature of the tax. Firstly, it is **not** a revenue-raising tax, but a tax intended to change behaviour. It is therefore announced well in advance and introduced in steps. Moreover, the tax revenue is to be recycled into the economy, keeping the overall tax burden unchanged. In this energy analysis, it is assumed that thanks to the revenue neutrality of the tax there are no negative feedbacks to the overall economic development.

The conditionality of the tax on other OECD countries undertaking similar measures together with the safeguard clause of Art. 10 should go a long way towards allaying negative competition effects and dislocation of energy intensive industries outside the Community. The analysis therefore focuses on the direct effects on energy demand and supply including world markets and no attempt has been made to include uncertain effects outside the energy sector in this energy policy analysis. For the purpose of this analysis **the industrial production index has been retained as in the reference case.**

Special treatment and tax reduction/refunding as provided for in Articles 10 and 11 of the draft tax Directive are not granted automatically but depend on specific conditions and procedures which cannot be defined in advance. In this analysis the tax has been applied to all industries.

A partial energy sector model (MIDAS) has been used for highlighting the energy consequences. The following analysis is based on the results of the MIDAS model for eleven Member States. The model does not exist for Luxembourg and in the case of Germany only the old Federal Republic could be modelled, since econometric estimation based on the statistical data for the centrally-planned former GDR would not be a sensible approach. In the case of Luxembourg a similar reaction to the tax, as in the other Benelux countries, has been assumed while for the new German Länder the tax effects have been estimated by taking into account the pertinent results of a recent energy scenario analysis by the Prognos Institute commissioned by the German government.

OVERALL RESULTS OF THE CARBON/ENERGY TAX

The new tax would give support to some ongoing trends like increased contribution of natural gas and it is expected to contribute to the improvement of energy efficiency. If carbon/energy taxation is put into effect, total primary energy demand would therefore be 2.8% lower for 2000 than in the no-tax reference case. The increase of primary energy demand between 1990 and 2000 would be reduced from 14.8% as foreseen in the reference scenario to a rise of 11.6% with carbon energy taxation.

CO2 emissions would grow at a lower pace in the Community and would be 3.5% below the reference case results for the year 2000, in other words, or compared with the base year emissions of 1990 they would be some 7.1% higher in 2000. In the no tax reference case CO2 emissions are forecast to increase by 10.9% and **the contribution of the tax to the stabilization objective therefore amounts to 3.8%, which represents 35% of the total effort required.**

Table 14:
Energy consumption and CO2 emissions

	1990	2000		1990/2000	
		Reference	Tax	Reference	Tax
Primary energy (mtoe)	1193	1370	1331	+14.8%	+11.6%
Fossil fuels (mtoe)	1016	1168	1130	+15.0%	+11.3%
CO2 emissions (M t)	3042	3375	3257	+10.9%	+7.1%

The growth of CO2 emissions in both the reference and the tax case is more limited than that of primary energy demand, which indicates that there is some replacement of carbon-rich by low carbon fuels. Fossil fuel consumption in both cases is increasing broadly in line with total primary energy, from which it can be deduced that CO2 abatement from fuel switching is mainly a result of intra-fossil fuel substitution.
Therefore, in addition to its effect on the level of energy consumption, the proposed carbon/energy tax affect the structure of the Community energy balance. These effects will be analysed starting with a comparison between the tax and the no-tax case for the target year 2000 and followed by highlighting key issues of the development between 1990 and 2000 under the hypothesis of carbon/energy taxation.

Tax Effects in the Year 2000 Compared with a No Carbon/Energy Tax Reference Case

In the year 2000 the tax would bring about a reduction in energy demand and CO2 emissions. The magnitude of change varies across sectors and fuels according to different elasticities and fuel mixes.

Table 15:
2000: energy consumption and CO2 emissions: tax versus reference case

	Reference case	Tax case	Change
ENERGY CONSUMPTION	Mtoe	Mtoe	%
Transport	296	288	-2.6
Domestic/tertiary	350	336	-3.9
Industry	246	234	-4.8
Power stations	488	482	-1.3
Total primary	1370	1331	-2.8
CO2 EMISSIONS	M.t. CO2	M.t. CO2	%
Transport	881	858	-2.6
Domestic/tertiary	694	656	-5.5
Industry	558	525	-5.9
Power stations	1108	1087	-1.9
Energy sector	134	130	-2.5
Total	3375	3257	-3.5

Because of the existing high level of taxation on **transport** fuels and the low demand response to price increases for automotive fuels the impact of the tax would be relatively modest. In fact, demand for transportation fuel which is of course nearly all oil, is expected to decrease by only 2.6% on account of taxation; CO2 emissions in 2000 are reduced accordingly.
In the **domestic and tertiary** sector there is already an ongoing and significant trend away from solid fuels and from heating oil. The tax will accentuate this trend with gas being the likely beneficiary. In effect, while oil and solids could both lose some 8% compared with the no-tax reference case, gas would only lose about 2%. The effects on electricity and heat demand would be even smaller (under 1%). The overall CO2 decrease resulting from these reductions would be 5.5%.
Industry and particularly heavy industry is a leading candidate over the medium term for significant efficiency improvements. Notwithstanding the substantial changes in energy intensity observed over the past years there remains an important potential for further efficiency improvements, and, over the longer term, for fuel substitution. In 2000, the tax would bring about demand reduction of nearly 5%. CO2 emissions would be reduced even more by about 6% - as solids and liquids would be affected more markedly (drop of almost 11% for solids and 9% for liquids), while for both gas and electricity demand the reduction would be only 2%.
Charging the carbon tax on electricity inputs means that **power station** fuel input costs are most markedly increased for solids, followed by burning oil and gas, and consequently the taxation should encourage the switch away from solid fuels. As compared to the reference case, the input of solid fuels in electricity production of the year 2000 would diminish by 2.0%. Oil and gas demand would decrease by 1.9% and 1.5% respectively. **The power generation sector does not show a pronounced reaction to the proposed taxation by the year 2000,**. CO2 emissions being reduced by just under 2%.
Reasons for this include the tailoring of the energy part of the tax as an average rate for all fossil fuels and nuclear, by which price increases for fuels used in less efficient power stations have been limited and which does not by itself give incentives for fuel switching. Moreover, for power stations with lifetimes of several decades the time left until 2000 is particularly short; energy consuming equipment in other sectors is replaced at a much faster pace. Finally the reference case already assumes a massive switch to natural gas in power generation, leaving little room in the tax case for further increases in new gas facilities to replace older CO2-intensive generation capacities.

As regards the Community fuel mix, there would be a discernible trend towards low carbon fuels by the year 2000. This change would however only really accelerate in the new century, when the existing energy capital stock will be due for replacement or has in part already been replaced by low CO2 technology.

Table 16:
The Community fuel mix in the reference and tax case in the year 2000

	ENERGY CONSUMPTION		
	Reference	Tax	% change
	Mtoe		
Solid fuels	279	268	-3.8
Oil	576	555	-3.6
Natural gas	314	308	-2.0
Nuclear	172	172	-0.2
Other	29	29	-1.5
Total primary	1370	1331	-2.8

The contribution of **solid fuels** would be 3.8% lower mainly on account of substitution in the industrial sector.

Total **oil** demand would be lower by 3.6%; this decrease is mainly due to reduced demand in the domestic/tertiary and transport sectors. In power generation, oil input drops less than solid fuel input, as oil would gain advantage over coal and lignite.

Gas demand would decrease least of all fossil fuels by 2.0%. Carbon/energy taxation would reduce domestic/tertiary and industrial gas demand by 2.3% and 2.4%, while the reduction in power generation compared with the no tax reference case is less pronounced (-1.5%).

As a result of the price-induced consumption drop of **electricity** of about 1.4%, for the most part in industry and the domestic/tertiary sectors, there would be a decrease in primary electricity production from hydro and nuclear of 0.2 %.

Replacement of high carbon by low carbon fuels due to the carbon weighting of the tax will only occur if the potential price advantage for low carbon fuels materializes at the level of the consumer. Where the price of a low carbon fuel (e.g. natural gas) aligns towards the price of fuels which are taxed at a higher rate (e.g. oil), the expected substitution and CO2 reduction effects may not fully materialize. For natural gas such alignment has been a widespread practice in the absence of direct gas-to-gas competition.

Moreover, refineries producing different fuels from crude oil are in principle free to add a smaller or larger portion of the crude price on to those of final products. Thus, if consumers react differently to price increases on different product markets, refiners may decide to shift some part of the additional tax burden for, e.g. residual fuel oil on to transportation fuels, for which the price elasticity of demand is normally significantly lower than that for other oil products. Therefore, it cannot be taken for granted that the price increase for each oil product will fully reflect the respective tax levels; for some products experiencing strong competition the increase may be lower, while it could be higher for products having a low price elasticity of demand. It has not been possible to take into account these effects in this analysis.

Over and above the effects which can be modelled there are others which tend to increase tax impact in terms of CO2 reduction and energy effect, such as the tax incentives provided for in Article 11 and targeted implementation measures in the framework of tax neutrality (as illustrated in the explanatory memorandum) as well as voluntary agreements.

The tax instrument would also have the effect of reducing CO2 emissions per capita and per unit of GDP in the year 2000.

Table 17:
Energy-related CO2 emissions per capita in 2000 in the case of taxation
in tonnes

P	ES	F	IT	EL	COM	IRL	UK	NL	B	D	DK	LUX
5.6	6.4	6.9	7.7	9.0	9.2	9.4	10.1	11.0	11.5	12.0	12.3	34.1

Carbon/energy taxation would reduce per capita CO2 emissions in all Member States. The Community average decreases from 9.5 tonnes without tax to reach 9.2 tonnes in the tax case. However, per capita emissions continue to vary widely between Member States, but compared with the reference case the variation is slightly reduced (variation coefficient falling from 26.0% to 25.8%) thus indicating some narrowing around the Community average.

Taxation would also reduce CO2 emissions per unit of GDP in all Member States. The Community average would decrease from 0.55 tonnes of CO2 per 1000 ECU in the reference case to reach 0.53 tonnes.

Table 18:
CO2 emissions per unit of GDP in 2000 in the tax case (tonnes CO2/1000 ECU)

F	IT	DK	ES	COM	D	B	NL	UK	P	IRL	LUX	EL
0.35	0.41	0.49	0.49	0.53	0.61	0.61	0.63	0.67	0.79	0.80	1.40	1.40

Emissions per unit of GDP, however, remain widely dispersed among Member States. Their variation around the Community average would be unchanged in the tax case (variation coefficient constant at 29.5%).

THE TAX CONTRIBUTION TO THE STABILIZATION TASK

How would carbon/energy taxation change the development path of CO2 emissions between 1990 and 2000

In summarizing likely development under the reference scenario and the effects of taxation the following developments up to 2000 should emerge in the case of implementing the carbon/energy tax in 1993.

- Total CO2 emissions would increase by 7.1% instead of 10.9% under the reference case; the tax would therefore contribute 3.8 percentage points to the stabilization objective for 2000;
- CO2 emissions in all sectors would be abated:
  - in transport they would be down by 3.3 percentage points, which still leaves a heavy emission growth of 21.3%;
  - in industry emissions are curbed by 5.5 percentage points, which means an even more pronounced emission reduction compared with 1990 (12.6% decrease in the tax case);
  - in the domestic and tertiary sectors emission growth would be reduced by 5.9 percentage points to achieve stabilization for this sector (+0.3 %);
  - in power generation after tax emission growth would be lower by only 2.2 percentage points to reach still 14.4%;
- The development of energy consumption would be somewhat altered with gas and oil demand growing slightly slower than in the reference case and solid fuels declining somewhat faster.

CO2 abatement through fuel switching is one side of the coin, and changes in the present energy structure, which had been brought about by market forces and policy intervention, are the other. Between 1990 and 2000 there are already some changes in the structure of total energy consumption in the reference case; this change would be reinforced in the tax case as can be seen from the following table.

Table 19:
Structure of gross inland consumption
(in %)

	1990	2000 reference	2000 tax
Solids	24.4	20.3	20.1
Oil	42.8	42.0	41.7
Gas	18.0	22.9	23.1
Nuclear	13.3	12.6	12.9
Other*	1.6	2.2	2.2
Total	100.0	100.0	100.0

* *includes hydro, waste, geothermal, other renewables and net electricity imports*

In fact, changes stemming from taxation are not dramatic, and taking into account the overall reduction in gross inland demand due to the tax, in no case would the absolute contribution of any single fossil energy source be higher in the tax case than in the reference case.

The contribution of non-fossil energy sources is projected to increase until 2000 broadly in line with overall growth of energy demand, and its share will therefore remain constant at 15%. Interestingly, carbon/energy taxation is likely to bring about only a slight increase in the relative contribution of energy sources not emitting CO2 by the year 2000. This is due to the long lead times involved in power generation investment and the present de facto moratorium on nuclear in many Member States. Moreover, for renewables it also takes several years before any tax-induced competitive advantage translates into investment decisions, as various technical and non-technical obstacles have still to be tackled (addressed inter alia by the programmes Altener and Thermie). ■

A NEW PROPOSAL IN THE FRAMEWORK OF THE 'SAVE' PROGRAMME TO LIMIT CARBON DIOXIDE EMISSIONS BY IMPROVING ENERGY EFFICIENCY

BY Derek Fee, DG XVII
Unit for New and Renewable Sources of Energy and Rational Use of Energy

In its Communication to the Council of 14 October 1991[1] the Commission stated that for the period 1990-2000, CO2 emissions are likely to grow by 11% in the European Community, excluding the new German Länder.
With low energy prices for most of the early 1990s and the rather slow introduction of energy efficiency measures, the considerable energy efficiency improvements on which inter alia, this emission forecast was based have not yet materialized. On the contrary, according to the initial estimates, energy consumption and CO2 emissions grew rapidly in 1991. Present indications are that the growth of each could have been as high as 4%.
For the period 1990-2000, CO2 emission growth for the old Community is now estimated at 13-14%, which corresponds to growth of about 12% for the Community including the new Länder.
Moreover, the above estimate is based on an average annual economic growth rate of 2.4% compared to the 2.6% assumed in the October 1991 Communication. Higher growth rates would lead to a proportionate increase in CO2 emissions and require a much greater effort in order to prevent CO2 emissions from growing between 1990 and 2000.
Without specific measures for CO2 abatement, CO2 emissions are therefore likely to increase between 1990 and 2000 by 12% or even more. Consequently, there is a clear need for a Community strategy. On 13 December 1991[2] this prompted the Council to consider measures that must be taken, particularly in order:

- *to improve energy efficiency;*
- *to increase the share of the Community's energy consumption accounted for by renewable sources of energy; and*
- *to reduce the specific energy consumption of vehicles.*

In reply to the Council the Commission tabled in the framework of its SAVE programme a new proposal to limit CO2 emissions by improving energy efficiency.

THE SAVE ENERGY EFFICIENCY CONTRIBUTION TO THE CO2 DEBATE

In order to assist Member States in augmenting and coordinating their national energy efficiency programmes, on 29 October 1991 the Council of Ministers approved a five-year Community energy efficiency programme entitled SAVE and commencing in 1991. The main thrust of this programme is a comprehensive series of legislative measures supported by targeted pilot actions as well as a significant effort to improve the flow of information between Member States and between the Community and other interested parties.
It is estimated that full and timely implementation of the SAVE programme could reduce the growth of CO2 emissions by about 3%, from at least 12% growth in CO2 to 9%.
This reduction will be achieved primarily by applying a consistent package of measures. Two Directives,

1 *Communication from the Commission to the Council 'A Community strategy to limit carbon dioxide emissions and to improve energy efficiency' SEC(91) 1744 final.*

2 *Doc. SN/283/91 of 13 December 1991.*

presented in the framework of SAVE, have already been adopted by the Council:

- the Council Directive concerning the efficiency requirements for new, hot water boilers fired with liquid or gaseous fuels on 21 May 1992;
- the Council Directive on the indication by labelling and standard product information of the energy consumption of household appliances on 22 September 1992.

Seven other essential measures, as described further on in this article, covering buildings, transport and industry, were tabled by the Commission on 26 June 1992.

1 Specific Measures to be Taken

On 26 June 1992, the Commission presented a directive within the framework of the SAVE programme containing a series of measures aimed at contributing to the Community's CO2 objective. The following seven areas were identified as having potentially the greatest impact on Community energy efficiency, and thereby on CO2 emissions:

- the certification of energy consumption in buildings;
- the billing of heating, air-conditioning and hot water costs on the basis of actual consumption;
- promoting third-party financing of investments in energy efficiency in the public sector;
- thermal insulation of new buildings;
- regular inspection of boilers;
- regular inspection of cars;
- energy audits of businesses.

This approach will allow action on every energy-related source of CO2 emissions, except for power stations, which could fall under other types of measure.

In view of the different situations and behaviour patterns within the Community, it will be left to the Member States to define the procedures best suited to their specific circumstances.

Some of these measures can be implemented rapidly without any special infrastructure or any significant spending. Conversely, others will have a substantial financial impact because they will require investment in joint energy-saving measures. The Member States will undoubtedly take these factors into account when adopting their national implementing measures.

2 Energy Certification of Buildings

Energy certification of buildings is a procedure for providing information about the energy characteristics of existing buildings in the residential and tertiary sectors.

This information should be produced by the owner when a property is sold and subsequently whenever it is put up for rent; the same document will be used, unless in the meantime major changes have been made to the energy characteristics.

Those Member States which encourage or require the provision of information about the energy efficiency of buildings have generally found that schemes of this kind have stimulated the efforts of economic operators to a significant extent: not only have investment decisions been speeded up, they have also been directed towards the most cost-effective work.

Naturally, the benefits of energy certification of any given building depend on its commercial, cultural or historical value, the architecture of the building and the local climate. It is therefore up to the Member States to define the buildings for which such certification will be phased in.

After the first five years, this scheme is expected to save over 1.5 Mtoe annually, year, cutting CO2 emissions by some 3 million tonnes.

3 Billing of Heating, Air-conditioning and Hot Water Costs on the Basis of Actual Consumption

Many buildings, or parts of buildings, in the Community are supplied by collective heating, air-conditioning or hot water systems.

All too often the services are billed on a flat-rate basis (based on unit surface area or share of the property) which creates no incentive for prudent management of natural resources.

Introduction of a method of billing of heating, air-conditioning and hot water costs on the basis of actual consumption would mean that consumers would pay only for what they actually consume. As a result, this would create an economic incentive to use resources more rationally and take greater care of the environment.

Together, all homes under this system can be expected to attain an average saving of 10 to 15%.

Consequently, the long-term objective of this measure is to phase out flat-rate billing of heating, air-conditioning and hot water costs.

The resulting greater awareness on the part of consumers could save at least 1.2 Mtoe and, in the process, reduce CO2 emissions by another 3 million tonnes.

4
Promotion of Third Party Financing for Energy Efficiency Investments in the Public Sector

Third party financing is defined as the provision of the auditing, installation, operations, maintenance and financing services on a turnkey basis for an energy efficiency investment, recovery of their cost being contingent, either wholly or in part, on the level of energy savings achieved.
Energy service company (ESCO) financing or third-party financing is still relatively little used in the Community.
In general the provision of private capital for third party financed investments involves an ESCO borrowing the capital from private sources and using part of the resulting cost savings to pay off the loan. The energy savings are, therefore, viewed as a 'cash flow' which can support a business: the ESCO's business of investing in, and providing performance guarantees for, energy conservation. The concept of the energy service company is, therefore, central to successful operation of the third party financing mechanism. An ESCO must provide a combination of engineering, financial and marketing skills. It must be capable of carrying out detailed energy audits, and of selecting reliable technologies suitable for making planned energy savings.
The public sector with an annual energy consumption of 45 Mtoe in 1989 represents a very significant area for potential energy savings. Although some Member States have encouraged energy saving in the public sector, several factors have in practice militated against the achievement of attainable energy savings.
Where investment in energy savings must be paid for from the annual operating budget allocation, it is in practice unlikely to be made.
Procedures associated with applications to use innovative financing mechanisms (including third party financing) are generally novel and uncertain. This tends to complicate and prolong such applications and discourages public bodies from making them.
In many cases public bodies which carry out innovative energy efficiency programmes are penalized by being forced to remit part or all of the savings achieved to a central treasury. This type of imposition leads to apathy towards energy saving by many public bodies.
Contracts already carried out in the public sector demonstrate that public sector TPF contracts tend to have higher transaction costs because of the administrative inertia which must be overcome. These high transaction costs tend to make the public sector less attractive as a market for ESCOs.
If TPF *were* universally applied a total energy saving of about 5 Mtoe per annum in the EC public sector would be possible.

5
Thermal Insulation of New Buildings

The choice of insulation standards in a new building is a decision having major financial consequences on the rest of the life of the building.
In practice, it is technically difficult to improve insulation levels in existing stock and the cost is out of proportion to installation of efficient insulation during construction.
Insulation standards for new buildings vary considerably from one Member State to another, even when differences in climate are taken into account.
There is a need to define a method of setting equivalent thermal insulation standards for newly-constructed buildings in each climatic region.
This method should lead to the definition of minimum insulation standards taking account both of local conditions and of the intended use of the building (housing, offices, hospitals).
A 0.2 toe reduction in the annual energy consumption of each new unit of housing built between now and the year 2000 would reduce energy consumption by over 2 Mtoe and cut CO2 emissions by over 6 million tonnes per year.

6
Regular Inspection of Boilers and Vehicles

A particular effort must be made to control products used in large numbers. They inevitably play a prominent part in the energy balance, even if their unit consumption is low.
To capitalize on safety inspections already carried out in a number of Member States, it makes sense for such inspections also to take account of factors with a direct impact on CO2 emissions.
An additional advantage of measures of this type is that they produce rapid results.

7
Energy Audits

In most businesses, the motivation to save energy takes second place to the pressures of production and the market.
Nevertheless, there is enormous potential for savings, as has been illustrated by the French scheme to conduct an energy audit of businesses every three years. However, the situation varies considerably from one Member State to another. Consequently, the important component is to ensure that the twin concerns of conserving the environment and saving energy are audited, although it makes little difference whether this is done by the staff of the company itself or by outside teams.

EXPECTED RESULTS

There is undeniably considerable potential for energy savings in the Community.
A reduction in energy consumption goes hand in hand with reduced CO2 emissions. For this reason, the SAVE programme plays a prominent part in the strategy to stabilize CO2 emissions.
The seven measures proposed would allow a reduction of approximately 61 million tonnes in the total CO2 emissions of 2 800 million tonnes related to energy use. The individual reductions expected are as follows:

MT CO2	
Buildings	
- certification	3
- billing	3
- third party financing	5
- insulation	6
Inspection of boilers	20
Inspection of motor vehicles	8
Audits of industry	16

The Community measures will also have to conform to the principle of subsidiarity which dictates that action must be taken at the level capable of providing the best solution to the problems faced. Since some Member States are more active than others, there is a legitimate case for action by the Community implemented on a highly decentralized basis.
In practice, without action of this type there is a danger that national initiatives taken at different times and with diverging resources could actually slow progress, with negative effects both on the internal market and on much-needed convergence of Member States' energy and environmental protection policies.
The diversity of the energy-saving measures in this consistent Community package provides the requisite flexibility while at the same time allowing all levels concerned to work within a clearly defined framework. ■

SPECIFIC ACTIONS TOWARDS GREATER PENETRATION OF RENEWABLE ENERGY SOURCES (ALTENER)

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After examining the Commission communication 'A Community strategy to limit carbon dioxide emissions and to improve energy efficiency', the joint Energy/Environment Council, meeting on 13 December 1991, specifically asked the Commission to propose measures designed to increase the development of renewable energy sources as well as other types of action to reduce CO2 emissions. The ALTENER programme is the Commission's response to that request.

In its resolution of 16 September 1986 concerning new Community energy policy objectives for 1995[1], the Council stated:

> "The output from new and renewable energy sources in place of conventional fuels should be substantially increased, thereby enabling them to make a significant contribution to the total energy balance."

Only a few months later, on 26 November 1986, a Council resolution was entirely devoted to Community guidelines to develop new and renewable energy sources[2].

The Council subsequently confirmed in detail its desire to pursue its policy of developing alternative energy sources in its recommendation of 9 June 1988 on developing the exploitation of renewable energy sources in the Community[3], and a further recommendation (8 November 1988) to promote cooperation between public utilities and auto-producers of electricity[4], in particular those using renewable energy sources.

These texts already contain the essential elements of a Community policy for renewable energy sources and form the basis for a coherent and balanced programme of promotion, namely:

(a) implementation, where appropriate, of legislation and administrative procedures for removing obstacles to the development of renewable energy sources;

(b) promoting the completion of national inventories of the potential of renewable energy resources and widest possible dissemination of these inventories at regional and local level to inform the public about the practical possibilities for exploiting these energy sources;

(c) preparation and starting-up of a statistical recording system for renewable energy sources, in conjunction with the Statistical Office of the European Communities;

(d) preparation of uniform standards for products and equipment in the field of renewable energy sources to facilitate the free movement of such products and equipment within the Community;

(e) promotion of feasibility and pre-feasibility studies concerning projects to exploit renewable energy sources, in particular for the benefit of local authorities and small and medium-sized enterprises;

(f) promoting cooperation between the industries manufacturing equipment for the exploitation of renewable energy sources, and promoting the transfer of technologies;

(g) promoting exchanges of information about the development of renewable energy sources between Member States;

(h) taking into account in public investments the possibility of using renewable energy sources in conjunction with energy-saving measures.

1 *OJ No C 241 of 25.9.1986, p. 1.*

2 *OJ No C 316 of 9.12.1986, p. 1.*

3 *OJ No L 160 of 9.6.1988, p. 46.*

4 *OJ No L 335 of 8.11.1988, p. 29.*

On 8 November 1988, when reviewing the progress made towards achieving the energy objectives for 1995, the Council issued the following conclusion:

> "The Council attributes particular importance to new and renewable energy sources, taking account of their economic viability, for future energy supplies, even if, despite the efforts already made in the past, only a small increase in their contribution can be anticipated by 1995. The competitiveness of these forms of energy has suffered as a result of falling prices of traditional energy sources."

In 1991 commercialized renewable energy sources (including the electricity produced by large hydroelectric facilities), the only ones to be statistically recorded, covered less than 2% of primary energy demand. Including fuelwood, which now represents about 20 million toe in the Community, renewable energy sources' share may be estimated at nearly 4%, with a total in absolute terms of 43 million toe/year.

Where research and development and the promotion of energy technologies are concerned, the specific programme in the field of non-nuclear energy sources[5,6] and the Thermie programme[7], which run until the end of 1994, will continue to supplement the national programmes in an effective way and help ensure the wider use of renewable energy sources.

However, these technology-promotion measures, and tax measures such as the 'ecotax' and the reduced taxation of biofuels, will not be sufficient to enable renewable energy sources to play a significant role in the strategy for the stabilization of CO2 emissions. They should be supplemented by other, flanking measures which come under the ALTENER programme and which will have to be underpinned by national measures.

How Would More Rapid Penetration of Renewable Energy Sources be Advantageous To the Community

Security and Diversification of Supplies

After the coal era and the oil era, when at given moments each of these two energy sources has had a market share of around 50%, the world is increasingly moving towards a multi-energy scenario.

World energy demand will in future be met by a broader range of energy sources and technologies than has been the case so far. New and renewable energy sources will have their role to play in this scenario.

In the short term we must keep a sense of proportion about the contribution that renewable energy sources can make to the Community's overall energy balance. In the longer term, however, their contribution could be substantial (5 to 6% in the year 2000 and 8% in 2005 or shortly thereafter, compared with nearly 4% in 1991).

Within the limits of their possibilities, renewable energy sources can also, by improving the security and diversification of supply, help to reduce fossil fuel imports. The extra 66 million toe that could be produced in 2005 from renewable sources compared with now would represent a foreign exchange saving of over ECU 7 billion (at 1991 crude oil prices).

Environment

While they certainly cannot all be placed on the same footing, renewable energy sources offer undoubted benefits in terms of protection of the environment. Admittedly, fierce local opposition to the establishment of hydroelectric power stations, even small-scale ones, has been encountered, as has often been the case with municipal waste incineration plants, and noise and visual intrusiveness have sometimes hampered the development of wind power.

In general, however, the environmental impact of renewable energy sources is slight. When used instead of fossil fuels they make a considerable contribution towards reducing emissions of greenhouse gases.

Of all the renewables, the use of biomass in particular is likely to expand considerably.

This source of energy has major advantages: the great variety of its end-uses, encouraging the development of new and sustainable technologies, and the possibility it offers of favourably influencing emissions of carbon dioxide into the atmosphere and establishing synergy with agriculture in the Community.

Very large areas are needed in order to obtain significant quantities of energy from the sun, the wind and biomass. However, land-use intensity should not be an argument against using renewable energy sources when it is clear that with solar energy, for example, the main obstacle is not the amount of land involved but the intermittent nature of production and the difficulties regarding economic storage.

Economics and Industrial Prospects

Certain technologies for exploiting renewable energy sources are already competitive today, while others could become competitive within five to ten years. However, it should be pointed out that the economic

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5 *OJ No L 185 of 17.7.1990.*

6 *OJ No L 257 of 09.09.1991.*

7 *OJ No L 185 of 17.7.1990.*

comparisons normally made with fossil fuels are biased because they only take direct costs into account. If all the external costs that society has to bear (damage to the environment and public health, social charges) were taken into consideration, the economic assessment would be substantially different, making it easier for renewable energy sources to increase their share of the market.

Because of their scattered nature, renewables are particularly suitable for decentralized, regional or local applications. Also, the regions with high levels of exploitable potential are often to be found in the countries with the highest degree of dependence on imported energy. It is very important to make use of alternative energy sources in the Community's peripheral regions in order to further the objective of economic and social cohesion enshrined in the Treaty on European Union.

Developing a renewable energy industry in the Community may have positive effects on industrial activity and on the balance of payments, bearing in mind the scale of the market outside the Community. Many countries throughout the world with particularly favourable conditions for the wider use of renewables have neither the engineering expertise nor the industrial structures required to produce the equipment needed to harness these resources. The Community industry, which in this sector mainly comprises labour-intensive small and medium-sized enterprises, could secure significant outlets.

Apart from the provision of technical assistance services, the equipment to be supplied is very varied, ranging from turbines and generators for hydroelectric, wind and geothermal power stations and waste incinerators to boilers, gasifiers, digesters, stills, plants for the esterification of vegetable oils, photovoltaic generators, and solar collectors, not to mention the whole gamut of auxiliary and control equipment.

The impact on employment in rural areas as a result of developing the use of biomass and biofuels will be no less important. If, instead of lying fallow, agricultural land can be used to produce biofuels, this will obviously have a beneficial effect on employment in agriculture. Biomass harvesting can bring farmers extra income; it may slow down the flight from the land and thus be of benefit in terms of regional development.

Wind Power

The report 'Wind energy in Europe: a plan of action'[8] indicates that wind power is a particularly important renewable energy source. The European wind-power equipment industry, which is growing considerably, already occupies a significant position on world markets. At present the installed capacity for the production of electricity from wind power totals 640 MW in the Community, of which 380 MW in Denmark, 90 MW in Germany and 55 MW in the Netherlands. According to the equipment plans known about at present, the installed wind-power capacity in the Community in 2005 should be between 4 000 and 5 000 MW. The cost per kWh produced is comparable to the cost of electricity generated by a coal-fired power station fitted with flue-gas purification equipment. Some 80% of the plants in the Community have been built using Danish materials, the remainder being produced in Germany, the Netherlands and Belgium. In 1990 the world market was shared almost equally between the Community on the one hand and the United States and Japan on the other.

The most widespread capacity class at present is the medium range: 200-250 kW and 25-30 m rotor diameter. Equipment technology has now reached maturity to some extent. There is a ready market for units in this range for the generation of electricity for small local networks or large grids. In 1992 a 1500-2000 kW prototype with a 60 m diameter rotor started operating in Sardinia.

Outside the Community much of the production of electricity from wind power is concentrated in California. At the end of 1990 the total installed wind-power capacity in the United States was estimated at 1 500 MW, with over 15 000 wind turbines. The Department of Energy is forecasting a very substantial increase in installed wind-power capacity for the next decade. India and China also have ambitious development programmes.

Biomass

The renewed interest in the world as a whole for the use of biomass as a source of energy is attributable to the efforts to secure sustainable energy supplies for a rapidly growing world population.

In the industrialized countries the greatest interest in the development of biomass is at present being shown in the following sectors: timber end- uses, treatment of organic waste and manufacture of new energy products (ethanol, methanol, esters of vegetable oils, etc.).

The Community consumes some 20 million toe of fuelwood per annum, of which 9 million toe in France. Production could double or even treble if an intensive production/utilization policy were implemented (short-rotation coppices-forest policy). The main applications, some of which are competitive with conventional sources, concern domestic heating and the production of steam and heat. Advanced technologies, in particular gasification combined with gas turbines, offer interesting prospects for the production of electricity.

8 *Published by the European Wind Energy Association.*

The development of the use of organic waste by means of anaerobic digestion basically depends on resolving problems relating to protection of the natural environment. Wastewater regeneration techniques, with energy recovery, have spread rapidly in all European countries. For several years now there has been a considerable expansion in plants for the production of biogas from agro-industrial waste (distilleries, sugar refineries, livestock farming, etc.). The number of such facilities in Europe can be estimated at over 600.

Extraction of biogas from controlled landfill sites is also becoming widespread within the Community. Over 200 sites fitted with biogas-recovery systems now produce some 400 000 toe/year, representing 9% of the Community's potential. Burning the methane produced by the sites rather than simply discharging it into the atmosphere helps reduce emissions of greenhouse gases.

Where the treatment of municipal waste is concerned, the situation varies quite considerably from one Member State to another. Of the most widespread practices, incineration is the solution most frequently employed to recover energy. In the Community some 20% of waste is disposed of by means of incineration, and it is often possible to derive energy in the form of heat and/or power production. District heating networks, in particular in France, Germany and Denmark, distribute nearly one and a half million toe of heat produced from municipal waste.

The use of agricultural products as motor fuels has started to spread throughout the world following the interest aroused in the United States and Brazil. In the United States it seems likely that the production of ethanol mixed with petrol, which totalled 3.4 million m3 in 1990, will increase in future. In Brazil, on the other hand, ethanol production from sugar cane is stagnating at around 11 million m3/year. A dozen other countries, especially in Africa and Latin America, have launched programmes for ethanol as a fuel. Specific schemes to produce methanol and ethanol from agricultural and forest crops have been devised in the Community. Oilseeds, in particular rape and sunflower, are also very attractive, since their oil can be used in the unaltered state in special engines or in the form of methyl esters to replace (partially or totally) gas oil in conventional diesel engines.

Solar Energy

Over the last decade significant progress has been made in all the basic applications of **active solar energy**: heating of swimming pools, production of domestic hot water, space-heating, heat for commercial, agricultural and craft end-uses. As a result of the progress made, certain technologies, such as the heating of swimming pools and the production of domestic hot water, have reached a high level of maturity. The efficiency of commercial solar panels has increased by 30% compared with the last decade and certain new types of solar collectors (vacuum tubes) have been developed and launched on the market. In the world as a whole there are some 30 million m2 of solar panels installed, of which 4.5 million in the United States, 5.0 million in Japan, 2.3 million in Turkey, 1.5 million in Australia and 340 000 in Cyprus.

In the Community, the total surface area of solar panels installed at the end of 1990 was 3 million m2, of which 1 300 000 m2 in Greece, 490 000 m2 in France and 350 000 m2 in Italy. Their annual production can be estimated at 200 000 toe.

Annual world production of solar collectors (glazed and unglazed) is now estimated at 3 million m2. The production volumes achieved in 1983 and 1984 in the United States and Japan have fallen considerably in recent years (600 000 m2 in Japan and 400 000 m2 in the United States in 1989). The ending of tax allowances granted by the Federal Government in the United States and the comparative stability of energy prices have had an adverse effect on sales of solar thermal equipment.

In Japan, on the other hand, government policy on solar energy (subsidies and low-interest bank loans) did not change until 1989. Consumer disaffection is mainly attributable to the trend in the price of oil and to the economic slow-down.

At present a considerable proportion of the total production of solar panels is in the countries of the Near and Middle East. Turkey and Israel in particular, each with a production of 400 000 m2/year are among the world leaders, followed by Jordan (200 000 m2/year) and Cyprus (33 000 m2/year). While Israel exports a lot of its production, Turkey's is mainly for the home market.

In the Community, the biggest manufacturing industry in this sector is in Greece, which at present has the biggest home market in the European Community. With a production of 130 000 m2 per annum, Greece is well ahead of Germany which in 1990 manufactured 40 000 m2 of solar panels. In 1990 Community production totalled some 250 000 m2 of solar panels. In the Community, 500 firms manufacture, sell and install solar collectors and employ 3 000 people, with a turnover estimated at ECU 180 million. However, the market prospects are encouraging only in Greece, Germany, the Netherlands, the United Kingdom and Denmark. In the North of the Community, the sensitivity of public opinion to environmental problems is a major stimulus. In countries such as Italy, France, Spain and Portugal, sales of solar collectors are falling even though the climatic conditions favour this form of

energy. This trend may be explained by current energy prices, bad experiences with first-generation solar panels and inadequate promotion campaigns.

In the world as a whole, there is a rapidly growing market for the manufacture and installation of **photovoltaic systems** for the production of electricity. The photovoltaic industry, initially linked with monocrystalline silicon as the basic element of the cell for converting solar radiation into electricity, is now making greater use of less expensive materials, such as polycrystalline silicon and amorphous silicon. The cost of cells and modules has fallen considerably in recent years. Since 1973 the cost of photovoltaic systems has been divided by 15 in real terms. This fall in prices has enabled the world photovoltaic market to grow rapidly from 1 MW in 1978 to 56 MW or thereabouts in 1991, having increased by more than thirty-fold in the ten-year period after 1978.

An annual growth rate of 20 to 30% should be achieved in the medium term through applications in isolated sites (telecommunications, rural and village electrification, water pumping), and then by the beginnings of the commercial development of grid-linked applications. By the end of the decade the world photovoltaic market should already represent over 300 MW/year, giving a turnover of about ECU 2 billion/year, i.e. four times the 1990 figure. In the Community, annual sales are forecast to increase from 10.2 MW in 1990 and 13.4 MW in 1991 to approximately 50 MW in the year 2000. At present Japanese companies have 36% of the world market, but the Community industry, which is also established in the United States, is with 25% of the market - in a very good position. European demand is at present well in excess of its production capacity.

Heliothermal conversion technology (high-temperature active solar power) makes it possible to obtain high-temperature fluids which can be used for the production of steam for industrial processes and electricity using various types of concentrators. As a result of several projects under study throughout the world, this technology, which had been marking time, is now arousing renewed interest. However, it is impossible at present to evaluate the real chances of economic success for these production methods.

In most industrialized countries, **passive solar heating** is already a proven technology in new dwellings and in modernized housing. A vast information and data-collection network has resulted in detailed knowledge of the application of passive solar heating in the residential sector.

Passive solar contributions are not normally taken into account in energy balances, but they nevertheless play an important role in the heating of buildings, and are estimated for the Community as a whole at 24 million toe in 1986.

Other passive solar techniques now under study concern air cooling and conditioning but the research is less advanced. An increasingly important role in air conditioning is being played by household automation, resulting in energy savings as well as increased comfort.

Geothermal Energy

World electricity production from geothermal sources has increased considerably, rising by 50% from 3 900 MW in 1980 to 5 850 MW in 1990. In the Community, France (4.2 MW in Guadeloupe) and Portugal (3 MW in the Azores) have joined Italy (545 MW in 1991) as geothermal electricity producers. Between 1990 and 1995 the world production potential should increase by 50%. The biggest contribution to this will be in the countries with the longest-standing tradition in this area: the United States, the Philippines, Mexico, New Zealand, Japan and Italy. New producer countries will emerge in Central America (Costa Rica, Guatemala and Salvador). In the Community, Italy has a programme to double capacities by the year 2000, and France is continuing to exploit geothermal resources in the Antilles (25 MW in 1994). As a result of the investment programme of the Greek Public Power Corporation in the islands of Melos and Nisyros, the installed power in Greece could amount to 100 MW in the year 2000.

The direct end-uses of low and medium-temperature thermal energy (heating of buildings, district heating, agriculture, etc.) are estimated at 370 000 toe (1990). France has carried out several projects to exploit geothermal reservoirs for district heating (170 000 toe). Thermal end-uses of this resource have also spread in a few regions of Italy (200 000 toe) for domestic heating, agriculture and industry. Germany, Spain, Portugal and Greece have significant potential in terms of commercial low-temperature geothermal energy resources.

ALTENER - A Community Action Programme for the Period 1993-1997

Over the last decade there have been numerous initiatives by the Member States in favour of renewable energy sources. With the fall in energy prices in 1986, the competitive position of renewables deteriorated compared with conventional energy sources. Nevertheless, most of the Member States have kept up their efforts in the field of renewable energy sources.

The action taken by the Member States and the measures introduced in the field of renewable energy sources should have positive effects in the short term and improve the unsatisfactory situation reported by

the Commission in 1988. However, to enable renewables to play a genuinely significant role in the Community's energy balances, and thus make a significant contribution towards reducing CO2 emissions, it is essential to consolidate this positive trend in the longer term by means of Community action.

Community competence should come into play for example in matters concerning the harmonization of technical specifications and standards and the removal of barriers to the free movement of products and equipment and appliances using renewable energy sources. Difficulties have emerged on several occasions in connection with the free movement of equipment such as aerogenerators. In the absence of safety and environmental protection standards, the development of the market in equipment for other renewable energy sources will inevitably result in other barriers to free movement.

Member States are invited to simplify existing administrative procedures where these form a deterrent to the development of renewable energy sources and favour generally more flexible conditions to further the development of renewables.

Biomass, which is very abundant in the Community, and has a wide range of potential applications, is the only renewable energy source which will be able to make a substantial contribution to the replacement of conventional fuels and play a significant role in the overall energy balance in the short and medium term.

Given the close links with the reform of the common agricultural policy, priority will be given to the commercial penetration of biofuels and fuels of agricultural origin.

Community Actions Under the ALTENER Programme

The purpose of the ALTENER programme is to develop the penetration of renewable energy sources in the Community, and increase trade in products, equipment and services within and outside the Community.

It will contribute towards better utilization of local energy resources, efficient allocation of public funds, protection of the environment by limiting emissions of greenhouse gases and other pollutants, and will play its part in completing the internal market and reducing the Community's dependence on imported energy.

The ALTENER programme will comprise actions in the following areas:

1. Promoting the market for renewable energy sources and their integration into the internal energy market;
2. Financial and economic measures;
3. Training, information and outreach activities;
4. Cooperation with third countries.

1 Promoting the Market for Renewable Energy Sources and Integrating them into the Internal Energy Market

The variety, or non-existence, of legislative provisions relating to renewable energy sources, is an obstacle to their development.

The harmonization of legislation and the formulation of common technical standards at European Community level is part of the process of completing the internal energy market, and will also put Community industry in a better position to face up to competition on the international market.

Measures encouraging production from renewable energy sources and investments in their exploitation, as well as more attractive conditions for the purchase of electricity produced from such sources will provide a powerful impetus for their development.

Small Hydro

The report on the application of Council recommendation 88/611/EEC to promote cooperation between public utilities and auto-producers of electricity[9] indicates a favourable trend in the development of small-hydro power. Nevertheless, a number of obstacles remain, particularly concerning authorization to build and operate hydroelectric power stations.

The obstacles could be overcome by **establishing a general framework** within which each Member State can determine:

- the qualifications to be satisfied by a plant in order to obtain a building and operating licence;
- the content of the file to be submitted with the licence application;
- the time limit for processing files submitted as part of the licensing procedure, which should not exceed one year;
- the period of validity of the operating licence, which should be sufficiently long to allow a return on the investments.

Moreover, the need to develop hydro-power must be reconciled with the need to protect the environment. Small hydro alters a watercourse's flow only very slightly and does not consume any water. Applied correctly it has very little direct impact on the environment and when used instead of fossil fuels it helps reduce emissions of greenhouse gases and other pollutants.

[9] *SEC (92) 1411 final of 22.7.1992.*

In the sphere of standardization, certain countries have drawn up standards for the characteristics and testing of small turbines; these are being examined by CENELEC with a view to approval at European level.
The Commission will make a survey of the standards in force in the Community Member States and, where necessary, will mandate the standards bodies to draw up European standards.
The data available for an assessment of small-hydro resources and potential are incomplete and are not comparable in all Member States. In cooperation with Member States the Commission will continue its work on the establishment of a register of such resources.

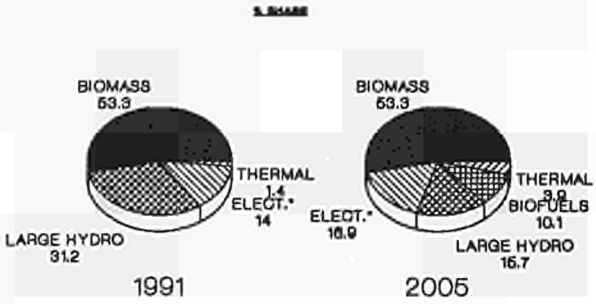
Wind Power

As provided for by Directive 83/189/EEC (which lays down a procedure for the provision of information in the field of technical standards and regulations) certain Member States have asked the Commission to take steps to harmonize technical specifications and draw up uniform safety standards for the Community as a whole.
The Commission has asked the Danish Energy Agency to prepare the ground for harmonizing technical and environmental specifications relating to aerogenerators. The work in question consists in finding out what rules and regulations are now in force in each country, evaluating the similarities and differences and taking stock of the wishes and requirements of the various countries in relation to future European regulations, which should lay down the minimum requirements regarding safety, performance and environmental impact.
On completion of the work involved, the Commission will submit a proposal for a Directive on the safety, performance and environmental impact of aerogenerators. Where necessary, mandates will also be given to the standards bodies to draw up draft European standards.

Thermal Solar Energy

The existence of common standards could help European solar collector businesses both on the single European market and in world trade. Moreover, consumers would also derive benefit from this if they were to be offered certified products, possibly with a seal of quality.
The ISO (International Organization for Standardization) is working on the texts of standards which should be published shortly. Certain Member States are considering referring these documents to the CEN (European Committee for Standardization) so that they can be taken into account.
Work is also being carried out by the Community Joint Research Centre establishment at Ispra in Italy on the performance of solar collectors, and life-span tests have already been conducted.
At the CETB (Centre d'Essais Techniques du Bâtiment) in France, a 'technical opinion' procedure has been devised for all solar-water heaters appearing on the market.

ENERGY PRODUCTION FROM NEW AND RENEWABLE ENERGY SOURCES-OBJECTIVES



*EXCL. LARGE HYDRO

Greece has started standardization work on the basis of the activities at Ispra and the ISO standardization proposals.
The certification of solar equipment and materials is vitally important to the development of the market and to guarantee quality standards for consumers. It must be based on a joint approach by manufacturers, consumers and public bodies, resulting in:

- the formulation of testing procedures (performance, strength, safety, etc.) and the performance of the tests in question by approved laboratories;
- the publication of an appraisal document for each product;
- the laying down of a manufacturing control procedure to verify the constancy of the quality of products marketed;
- the formulation of specific informative labelling setting out the essential features of the product.

In compliance with the usual procedures regarding standardization, the Commission will take the necessary steps to ensure that methods of certifying solar equipment and materials, as set out above, can be finalized and agreed at European level. It will propose quality standards for solar collectors and hot- water production systems.
Community-backed programmes for the wider use of solar energy for the production of domestic hot water have been launched throughout the South of Europe by a European business grouping. These businesses offer a contract of quality to users: a 'guarantee of solar results'. Via this contract, the businesses involved (solar collector manufacturers, designers and installers) jointly guarantee that the installation will provide a certain quantity of solar power each year. If the results

guaranteed are not achieved, they will compensate the user.

In France an idea has been developed and tested whereby the contract for the guarantee of solar results (GSR) is incorporated into the rules in force relating to the construction of buildings (public procurement code). The Commission, with the help of the European Federation of Thermal Solar Equipment Manufacturers, will make a contribution towards adapting and integrating this idea into each Member State's building regulations.

Photovoltaic Solar Energy

In the photovoltaic energy field, the JRC's Ispra establishment has carried out experiments and certification and approval work, following commercial developments very closely. The photovoltaic modules produced in the Community are generally accompanied by a test certificate issued by an approved testing institute or by the JRC's Ispra establishment which in November 1987, in cooperation with a panel of experts, drew up guidelines for the acquisition of data relating to photovoltaic installations.

No cases of technical or other barriers to trade in photovoltaic equipment have come to the attention of the Commission so far.

Biofuels

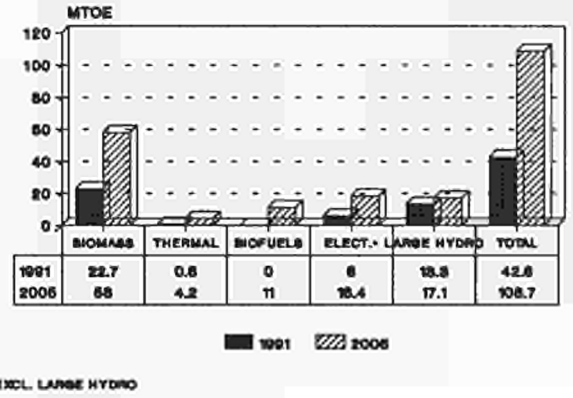
The considerable reduction that the Commission is proposing[10] in taxes on biofuels compared with petroleum fuels will make biofuels competitive and encourage the development of the market in such fuels.

In the Community, units for the production of methanol and ethanol from agricultural and forest products have already seen the light of day. The mixing of these products and their ether derivatives (MTBE and ETBE) in petrol is authorized in small quantities pursuant to Directive 85/536/EEC of 5 December 1985[11]. The Commission will propose revising this Directive so as to increase the quantities of these products permitted to be mixed with petrol.

In addition, oilseeds, in particular rape and sunflower, have proved to be of value for the manufacture of motor fuels; their oil can be used in the unaltered state in modified diesel engines or in the form of methyl esters in standard diesel engines. Tests have been conducted on such fuels, and the findings bear out the feasibility of using them commercially. The Commission will prepare a proposal on the use of vegetable oils and esters of vegetable oils in diesel engines.

It is essential that there should be precise and recognized technical specifications for these products, which are to be distributed both within and outside the Community. To this end, the Commission will submit a proposal for a Directive on the technical specifications of biofuels for diesel engines. At the same time, it will give the standards bodies mandates to draw up European standards for these fuels.

ENERGY PRODUCTION FROM NEW AND RENEWABLE ENERGY SOURCES-OBJECTIVES



*EXCL. LARGE HYDRO

Geothermal Energy

Four studies carried out for the Commission have enabled geothermal data collected during oil-prospecting to be collated for Spain, Greece, Italy and Portugal. The Commission will extend these studies to include other Community countries and will conduct a legal examination of the possibilities for circulating the data in question. This effort to improve knowledge of the existence of geothermal reservoirs and their access conditions should help to increase the use made of them considerably.

2 Financial and Economic Measures

Tax Measures

As touched upon elsewhere in this issue, the Commission has submitted to the Council a Communication followed by operational proposals[12] on a Community strategy to limit carbon dioxide emissions and to improve energy efficiency[13]. The tax measures proposed involve the reinforcement of certain existing arrangements (inclusion of external costs, in particular environmental costs) as well as the much-debated introduction of a tax on conventional energy

10 *COM(92)36 final of 28.2.1992 (OJ N°C 73 of 24.3.1992).*

11 *OJ L 334 of 12.12.1985, p. 20-22.*

12 *COM(92) 226 final of 30.6.1992 (OJ N°C 196 of 3.8.1992). COM(92) 182 final of 26.6.1992 (OJ N°C 179 of 16.7.1992).*

13 *SEC (31) 1744 final of 14.10.1991.*

sources to reduce CO2 emissions and curb energy consumption. This 'ecotax', which would not apply to renewable energy sources (except large hydroelectric power stations), will if adopted also have the effect of reducing the production cost differential between conventional and renewable energy sources, making the latter more competitive.

The Commission recently proposed a Directive[14] on reduced taxation for biofuels which calls for excise duties on biofuels (ethanol, methanol, vegetable oils, esterified oils) not to exceed 10% of the excise duties on the fossil fuel which they replace.

Promoting the Third-Party Financing of Investments

In the SAVE programme the Commission proposed measures to promote third-party financing for energy-efficiency projects.

With the ALTENER programme the Commission is proposing to extend these measures to encourage the third-party financing of projects exploiting renewable energy sources: establishment of a European network of institutions interested in promoting third-party financing, renewable energy demonstrations, and removal of obstacles to the use of the third-party financing mechanism in the public sector.

Integrated Resource Planning

In the SAVE programme the Commission stressed the importance of least-cost planning in the choice of energy investments and energy supply and demand-side projects. The Commission is encouraging the development of this planning technique through a series of pilot schemes.

To extend the range of possible options and pay equal attention to all the energy resources offered on the market, the possibilities of renewable energy sources should also be taken into account in this type of planning.

Coverage of Financial Risks - Geological Uncertainties

While the operating costs relating to renewable energy sources are generally low, this is often not the case for the investment costs involved in harnessing and using them. The financial risks for the investor are therefore considerable. These risks are further increased if the renewable resources in question are uncertain. With geothermal energy, the mining risks attributable to geological uncertainties (risk that insufficient resources will be found) are considerable.

Guarantee funds, financed by the public authorities, to cover such risks are sometimes set up by those operating in the sector. These funds also make it possible to provide bank guarantees to obtain investment loans.

Quite exceptionally and in the case of major operations to exploit renewable energy sources, the Community may contribute towards the financing of guarantee funds to cover particularly high financial risks.

Local Plans for the Development of Renewable Energy Sources

Renewables are local energy sources which can only be harnessed and exploited on a decentralized basis.

In compliance with the procedures regarding the management of the Structural Funds, regions, provinces and cities will be urged to adopt renewable energy development plans. Where appropriate, the Community may provide aid for planning studies and studies into the establishment of renewable energy development programmes.

Feasibility and Pre-feasibility Studies

When constructing a new building, dwelling, school, hospital, swimming pool, etc., the feasibility of making use of renewable energy sources is rarely considered. To give renewables every possible chance, the Member States should take steps to ensure that in all such cases an examination is carried out of the possible contribution of renewable energy sources to the lighting and heating of buildings and the production of hot water, just like conventional energy sources. To this end, the competent national or local bodies should have simplified 'pre-feasibility' studies carried out to enable the contracting authority to assess the technical feasibility and economics of using a particular renewable energy source. On the basis of the findings, the possibility of using renewable energy sources would either be abandoned or examined in greater detail in a full feasibility study or a project would be drawn up. Similar studies could be carried out for renewable energy production, conversion or utilization equipment.

Developing the Market for Biofuels and Biomass

The reform of the Community agricultural policy will result in the gradual withdrawal of part of some cultivable land areas. This will have a major impact on employment in the sector. In the past the reduction in manpower in agriculture has been offset by extensive mechanization heavily dependent on petroleum products which represent the main energy source in

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[14] *COM(92)36 final of 28.2.1992 (OJ N°C 73 of 24.3.1992).*

this sector (nearly two-thirds of energy consumption being met by oil, 11 million tonnes in 1990).
Community agriculture can not only meet its own oil requirements but also help to supply alternatives to petroleum- based fuels. The various systems which can be developed will make it possible to preserve the landscape, in keeping with the requirements of environmental protection. It has been estimated that the land released, or not needed for food crops, could allow a theoretical production of 15-30 million toe/year, depending on the type of energy crop.
A broad range of energy systems can be introduced in agriculture. Biomass, which is already well represented and supplies 14% of world energy demand, could make a bigger contribution and take a bigger share of the Community's energy consumption balance: a doubling or even trebling of the use made of biomass in 2005 looks possible.
Of the many possible support measures, the Commission will concentrate on action towards the development of biodiesel, short-rotation coppices, and biogas installations, three particularly promising options in the specific context of the revision of the common agricultural policy.

Production of Vegetable Oil Ester (Biodiesel)

The use of derivatives of vegetable oils (methyl and ethyl esters) as motor fuel is now a well-established technique. These products can be used in place of gas oil or mixed with gas oil in diesel-engined vehicles without having to modify the engine. Rapeseed oil ester is at present manufactured in a few small pilot plants. Bigger plants are under construction: 20 000 t/year at Compiègne in France, 8 000 t/year at Kiel in Germany, and 60 000 t/year at Leghorn (Livorno) in Italy.
The European Community produces enough oilseeds to supply the biofuel industry. Self-sufficiency will be increased with the reform of the CAP, since land set aside could be used for non-food purposes.
Biodiesel produced from vegetable oils from European agriculture can be marketed at prices comparable to that of gas oil if it is subject to minimal or zero tax rates. This applies with world market prices of 20 dollars a barrel for oil and 0.4 dollars a kilo for rapeseed oil.
The economic benefits of producing biofuels are numerous:
- development of a new energy source with an economic impact on agriculture and on processing industries;
- maintenance of employment in rural areas and creation of new jobs in processing industries: approximately 6 500 new jobs with a production of 500 000 tonnes of ester per annum;
- generation of a tax gain as a result of this new economic activity;
- reduction of the dependence on external energy supplies;

As biodiesel does not contain any sulphur, it does not give off any SOx gases when burned. The overall quantity of pollutants emitted is generally much lower than with the combustion of gas oil. This is true in particular of aromatic hydrocarbons, particulates, nitrogen protoxide and carbon monoxide. There is only a slight increase in NOx if biodiesel is used in an engine adjusted to burn gas oil, and this drawback can be overcome by proper injection adjustment.
The energy balance of the methyl ester of rapeseed oil is extremely positive: the total energy obtained from the biofuel is three times the fossil energy expended to make it. The CO2 conversion factor (CO2 emission avoided compared to CO2 otherwise emitted) is about three.
Future biodiesel production units will have optimum capacities of between 40 000 and 100 000 tonnes/year. The investment cost for the oil esterification section of the units is between 250 and 500 ECU/tonne of annual production.
The Commission will examine the possibility of supporting the industrial launching of this project by providing aid for the construction of 10 or so industrial pilot plants for vegetable oil methyl ester and by encouraging the replacement of fossil fuels by this product in vehicle fleets (transport companies, municipal vehicles, taxis, company fleets).
The contribution will relate to the investment and to pre-investment studies, including market studies.
The following are examples of the sectors from which the investors might come:
- oil mill operators (which already have oil pressing and refining units);
- farmers' associations;
- operators in the petrochemical industry (which already have plants for mixing biodiesel with gas oil and which could use their distribution network for gas oil).

Short-Rotation Coppices

Among the possible crops opening up new markets for agriculture, wood cellulose production involving short-rotation coppices (SRC) and new plants (C4) can be contemplated in many countries. It is a source of wood cellulose raw materials which can be exploited both for energy production and by industry. The many studies carried out throughout the world into the potential for the development of renewables generally agree on one thing: they acknowledge that SRC combined with advanced gasification techniques occupy pride of place among the various options capable of making a significant contribution to the problem of securing

sustainable and economic energy supplies in the long term.

Industrial and energy schemes covering anything between a few hundred and tens of thousands of hectares are now taking shape, more often than not involving industrial plantations to supply timber for crushing plants for the manufacture of pulp and for board manufacturers; about one-third of the timber produced in these units (tree-canopy brushwood) is waste which can be used to make compost or to produce energy. The wood is used in industrial cogeneration installations supplying industrial heat and producing electricity, or is burned in boilers to heat dwellings and other buildings.

Other plantations, grown purely for energy purposes, and involving very short rotation coppices (two years for poplar) are also encountered. However, the particularly promising concept of producing electricity by means of wood gasification, feeding a gas turbine or even a combined-cycle plant, is not yet operational in the Community. Plants of this type are, however, already planned or in operation, e.g. in Sweden and the United States.

Especially to the extent that it involves new technologies which still present a high risk to the investor, the introduction of this concept in the Community could be facilitated by support under the Thermie programme. Under the ALTENER programme, and in accordance with the afforestation programme under discussion as part of the reform of the CAP, the Community could initially encourage the carrying out of SRC projects, and the use of the new C4 species by providing financial support for the studies needed to lay their agro-industrial foundation: identification of appropriate sites and varieties of coppices, organization of planting and harvesting, organization of timber handling, transportation and possibly storage, energy production in high-performance and low-pollution installations, and evaluation of the economic viability of the project as a whole. These detailed feasibility studies should be carried out for appropriate structures, e.g. economic interest groupings bringing together agricultural and industrial operators; one of the aims of action by the Community is to encourage the establishment of such structures.

Biogas

In certain Member States livestock effluent is a source of serious environmental problems owing to the large quantities arising, and the difficulties involved in treating this waste. Biogas production in large digesters, with power and/or heat production (cogeneration), is of considerable interest on environmental, economic and energy grounds.

The Commission is conducting market and technological studies to determine the most suitable areas for installing large digesters for the centralized treatment of livestock effluent. Waste production density, available storage capacities in farms and the distance between the places of production and the digester are particularly important factors for evaluating economic viability. Other factors, such as nitrate load per hectare of agricultural area, and nitrate concentrations in surface and ground water, must also be taken into consideration. The Community will support pilot actions aimed at building installations of an optimum size for the treatment of livestock effluent with power and/or heat production.

3
Training, Information and Outreach Activities

The Community will support training, information and outreach activities in the field of renewable energy sources which have suffered from insufficient and often uncoordinated development in most of the Community.

It will call upon Member States and the regions to establish or reinforce their infrastructures for the organization of training in the field of renewable energy sources.

Particular attention will be paid to the training and information of architects on the use of passive solar energy. Putting passive solar techniques to good use may have a very significant impact on the energy consumption of a building, while entailing little or no extra investment (e.g. good orientation of the building, making use of thermal inertia, judicious arrangement of glazed surfaces, etc.). So far few architects have had an opportunity to follow specific courses in the application of passive solar energy.

In certain Member States training and information centres have seen the light of day, bringing together on one and the same site a series of different installations for the exploitation of renewable energy sources. These 'shop windows' for renewables are intended not only to provide information for the general public and school children (who are after all the next generation of investors), they also act as training centres for professionals wishing to acquire, in a short space of time and with a minimum of travel, practical experience of the very varied techniques for applying these energy sources. The establishment and development of such centres throughout the Community will be encouraged. Production installations making use of the most advanced technologies could be supported under the Thermie programme. The centres could also act as permanent

exhibition halls for the Community's various technology programmes.

The Commission will also continue with its information and exchange of experience activities, particularly aimed at local authorities.

To this end it will be helped chiefly by the existing network of government bodies responsible at national or regional level for the promotion of renewable energy sources, in order:

- to examine periodically legislative, fiscal and other decisions and any other promotion measures adopted by the Member States;
- to encourage various initiatives, such as the organization of conferences and the establishment of an information bulletin;
- to supplement the statistical data on renewable energy resources and consumption;
- to analyse the results of studies ordered by the Commission and the Member States; and
- to set up new data bases on renewable energy resources.

4 Cooperation with Third Countries

Greater use of renewable energy sources in the world as a whole would ensure greater security of energy supply and would make a major contribution to protecting the environment. The Community will therefore encourage the exchange of experience and will continue to cooperate:

- with the developing countries, with a view to the exploitation of renewable energy sources and to slow down the damaging exploitation of forest resources;
- with the countries of the former Soviet Union and the countries of Central and Eastern Europe, with which cooperation has already begun under PHARE and the other technical assistance programmes, and with which a specific protocol on renewable energy sources will be drafted under the European Energy Charter.

These countries, which often have considerable renewable energy resources, will be associated with the operations provided for under the ALTENER programme.

Many types of equipment in several areas (aerogenerators - hydroelectric plants - photovoltaic modules - solar collectors) are already exported throughout the world by European companies. The Community will encourage trade with third countries and transfers of technologies. Technical standards for renewable energy equipment will be drawn up in consultation with the member countries of the European Economic Area in order to avoid creating trade barriers.

ALTENER Procedures

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

- The Commission will be responsible for the implementation of the programme, with the assistance of an Advisory Committee composed of representatives of the Member States and chaired by a Commission representative.
- In consultation with the Advisory Committee, the Commission will establish guidelines each year for all the support measures except for studies and technical evaluations, and will decide upon the allocation of the budget appropriations.
- The Member States, through their designated competent national bodies, will submit each year a report on their initiatives for extending or creating infrastructures concerned with renewable energy sources. These reports will be accompanied by requests for financial contributions from the Community.
- During the third year of the programme, the Commission will submit a report to the European Parliament and to the Council on the results achieved and, where appropriate, any amendments to be made to the programme.

On expiry of the programme, the Commission will assess it. It will also assess the application of the Council Decision on the ALTENER programme and the coherence of national and Community actions. The Commission will submit a report on all these matters to the European Parliament and to the Council.

The Budget Allocation for the ALTENER Programme

The ALTENER programme will receive appropriations totalling **ECU 40 million** over a five-year period. This budget is merely indicative and will depend on the annual budget procedure and the Community's financial perspective for the period 1993-1997. It does not include industrial pilot operations regarding bio-fuels.

The budget breaks down between the proposed actions roughly as follows: studies, technical evaluations and standardization mandates 9%; various financial support measures 55%; training, information and outreach 36%.

The Objectives of the ALTENER Programme: Cleaner Energy and Environmental Protection

On three separate occasions the Community has set energy policy objectives, in Council resolutions, for 1985, 1990 and 1995. In the texts in question the

objectives for renewable energy sources were never quantified. Without prejudice to further energy strategy guidelines with different time-frames that the Community may adopt in future, the Council's decision to stabilize carbon dioxide emissions in the Community in the year 2000 at their 1990 levels calls for the first time for the establishment of specific quantified objectives for renewable energy sources in the Community. These are figure on the international level, among the terms of the recommendation of the Toronto Conference for a reduction in CO2 for 2005. Given these commitments entered into by the Community, 2005 does seem to be the most appropriate time-horizon. By then, it should be possible to reconcile the need for a minimum time-span to prepare an ambitious policy and the need to assess the progress made in the not-too-distant future. ■

A reduction in carbon dioxide emissions of 180 million tonnes can be achieved in 2005 by:

A. ***Increasing renewable energy sources' contribution to the coverage of total energy demand from nearly 4% in 1991 to 8% in 2005.***

To achieve this objective, the production of renewable energy sources would have to be increased from nearly 43 Mtoe in 1991 to approximately 109 Mtoe in 2005.

B. ***Trebling the production of electricity from renewable energy sources (excluding large hydroelectric power stations).***

To achieve this objective, the capacity and electricity production of all power stations (excluding hydroelectric power stations above 10 MW) using renewable energy sources would have to rise from 8 GW and 25 TWh in 1991 to 27 GW and 80 TWh in 2005.

C. ***Securing for biofuels a market share of 5% of total fuel consumption by motor vehicles.***

Production in 2005 of 11 Mtoe of biofuels on an agricultural area of approximately 7 million hectares (under present technology and other conditions) will be necessary in order to achieve this objective.

STANDARDIZATION AND THE INTERNAL ENERGY MARKET

BY Ian Gowans, DG XVII
Task Force on Community Integration

Completion of the internal market cannot take place without an ***internal market in energy****: energy is an essential component of all economic activity within the Community. Thus the Community energy objectives for 1995, adopted by the Council in September 1986, refer to the need for 'greater integration, free from barriers to trade, of the internal energy market with a view to improving security of supply, reducing costs and improving economic competitiveness'. They also refer to the need for 'balanced solutions as regards energy and the environment, by making use of the best available and economically justified technologies and by improving energy efficiency, as well as by taking account of the desire to limit distortions of competition in the energy markets by a more coordinated approach in environmental affairs in the Community'.*

On this basis, the Commission working document on the internal energy market published in May 1988 described the general problems of integrating energy into the single market, drew an inventory of existing obstacles and identifies priority programmes for the completion of the internal market. These priorities include eliminating technical borders by ***harmonising technical rules and standards****. The document showed how different national rules and standards obstruct completion of the internal market in general and the internal energy market in particular. These differences concern the manufacture of both equipment used by the energy industry and products intended for energy users. To overcome these obstructions, the Community must pursue the process of standardization at Community level.*

THE PRINCIPLES OF ENERGY STANDARDIZATION IN THE COMMUNITY

Standardization of energy and energy products follows the overall pattern of standardization within the Community.

Since 1985, the Commission has changed its approach to standardization entirely. It now works on the principle of mutual recognition by Member States of each others' standards, and only steps in itself with a Directive where certain 'essential requirements' have to be laid down for health or safety reasons. Even then, the manufacturer can choose to meet the requirements in his own way, although he is better advised to meet the European Standards worked out, often at the request of the Commission, by the international standards bodies CEN, CENELEC and ETSI. These European Standards are seen as an essential means to the completion of the internal market.

The basic characteristics of European standardization make it the most important harmonization tool in ensuring the free movement of products and their use throughout the Community. Unlike national technical rules, which impose binding technical specifications within a single country, European standards lay down voluntary technical specifications drawn up by

consensus among all the parties concerned at European level. However, the application of certain European standards can be made obligatory by Community legal instruments.

The advantages of standardization along these lines are that:

- it increases transparency, enabling widespread participation;
- it is democratic and it reflects the state of the art;
- it transfers the cost of producing standards from the public to the private sector and reflects the technical realities of the market better than regulation can;
- it will help to improve the level of environmental protection, of energy safety and efficiency and will stimulate advanced energy technologies.

European standards also reduce costs for producers and distributors and stimulate competition to the advantage of consumers. They do not only serve to remove regulatory barriers to trade; they are also an economic objective in themselves.

Commission Communication on Energy Standardization

In June this year, the Commission adopted a Communication (SEC(92)724 final) which reports progress on energy standardization to the Council and suggests further action. Its purpose is to:

- explain the Commission's approach to standardization in the energy sector to the Council, as outlined above;
- inform the Council of progress on the standardization of energy products and equipment for the production, transport and distribution of energy products;
- present to the Council the Commission's strategy for future work with a view to completing the internal market.

The Communication reports progress in the various fields as follows and where appropriate recommends future action:

Oil

As regards oil, the quality of petroleum products was made the subject of a remit from the Commission to CEN in 1984 which resulted in the adoption in 1987 of European Standard EN 228 for unleaded petrol. In 1998 the Commission gave CEN a further remit for the preparation of five new European standards concerning unleaded petrol (Euro-super 85/95) supplementing EN 228, substitute fuels (two standards), liquefied petroleum gas for motor vehicles and diesel. These five new standards should be finalised in 1992.

Problems remain in this area, because the lack of specifications for a number of products at Community level has prompted certain Member States to introduce autonomous national legislation, and also because the new environmental directives require changes involving both engines and fuels.

The Commission therefore proposes to adopt a comprehensive approach which takes account of the links between fuel quality, engine technology and exhaust emissions in order to meet the new requirements at minimum cost, by means of either Community rules or voluntary standards.

Oil and gas exploration and production equipment

This is covered by various Community directives including the Directive on public procurement, which makes it compulsory for tender specifications for procurement contracts to refer to existing European standards or other standards in established use in the Community. The report drawn up by CEN in 1989 noted the use of standards laid down by the American Petroleum Institute (API) and recommended their transposition into European standards. The Commission is discussing with CEN the best way of carrying out such a transposition where possible, bearing in mind that in this sector excessive European standardization would be artificial.

Electricity

In electricity a new EN is being prepared by CENELEC at the request of the Commission to harmonise the physical characteristics of low- and medium-voltage electricity; this is expected to be ready during 1992. Electricity generating equipment is the subject of action by a CEN/CENELEC Joint Task Force which is to draw up an inventory of existing standards, identify additional standardization requirements, and propose a list of priorities. The Commission is to provide financial support for the implementation of the programme and its subsequent carrying through of its content.

Electricity transport and distribution equipment

Electricity transport and distribution equipment is the subject of a special CENELEC Committee - the Public Procurement Coordination Committee - which manages a work programme on the hundred or so items for which standards need to be supplemented or drawn up. Although its budget measures are limited, the Commission intends to encourage and accelerate implementation of this programme, which is aimed at helping to complete the internal market in this sector.

Gas

Gas quality is the subject of a remit given to CEN by the Commission for the standardization of appliances burning gaseous fuels. This remit covered the preparation of 54 ENs, one of which was to define the characteristics and quality of test gases. CEN is expected to adopt the new EN 437 towards the end of 1992.

Gas transport and distribution equipment

As regards gas transport and distribution equipment, CEN has set up four specialised committees enabling work to start in the field and nine draft standards are currently under preparation for gas supply equipment.

Solid fuel

Solid fuel quality is being standardised by the International Organization for Standardization (ISO); specific action at Community level is not necessary in the short term. Solid fuel production equipment is the subject of safety standards which are being prepared by CEN: the Commission does not consider further action necessary in this sector.

Energy efficiency

Under the SAVE programme on energy efficiency (1991-1995), standardization efforts will be concentrated on the domestic appliance sector. At present energy efficiency standards are being developed for refrigerators and freezers, for which European measurement standards already exist. As CEN/CENELEC completes its work on other appliances, the Commission will develop appropriate efficiency standards.

Renewables

The European standards institutes have drawn up virtually no European standards relating to renewable forms of energy. The Commission is currently investigating whether it is necessary to harmonise the essential requirements of wind generators as regards performance, the environment and safety and to introduce a certification system. It is also considering the need for standards in the area of thermal solar energy.

Nuclear power

Nuclear power is covered by the Illustrative Nuclear Programme for the Community (PINC) which includes aspects dealing with the standardization of nuclear power generation and nuclear safety. The Commission is working on the safety aspects of nuclear power generation. The CEN/CENELEC Joint Task Force set up to report on standardization requirements in electricity generation (see above) considers work in the nuclear power generation sector to have lower priority than others. Nevertheless, the Commission intends to continue with its examination of the sector.

The environment

With regard to the protection of the environment, the Commission stresses the need for technical specifications and standards to take account of environmental considerations, so that the Single Act objective of a high level of environmental protection can be achieved. Should it be necessary, the Commission will submit proposals for an appropriate level of environmental protection in accordance with that objective.

The ***Commission's conclusions*** as set out in the Communication are:

- standardization in the energy sector is of prime importance for the completion of the internal market, the reduction of environmental impact, energy safety and efficiency, and for the development and spread of advanced energy technologies.
- completion of the internal energy market calls for standardization work to be stepped up, particularly in the sectors of oil (environmental aspects); oil refining and distribution equipment; electricity generation, transport and distribution equipment; gas transport and distribution equipment; renewable energies; and environmental protection.
- the preparation of new European standards not explicitly required by Community legislation may need to be combined with Community legislation making reference to standards compulsory;
- where necessary, the Commission may propose Community harmonization legislation based upon the new approach (essential requirements);
- energy programmes aimed at specific objectives such as the energy efficiency or the development of renewable energies should include a standardization aspect. These programmes will also make a contribution to the achievement of environmental targets, in particular the stabilization of CO2 emissions.

To implement these measure and thus boost technical harmonization, the Commission proposes to step up consultations with interested parties at all levels of production, transport, distribution and consumption of energy products, in order to encourage more active participation; and to organise with CEN and CENELEC conferences bringing together those responsible for different energy sectors, so as to exploit their many common features for standardization purposes.

Conclusion

This approach, together with the progress achieved so far in the various sectors by the Commission working with the standardization bodies, was welcomed at the Council's Energy Group meeting of 14 September 1992. The Commission now looks forward to continuing along the lines it suggests in its Communication. ■

TRANSPARENCY OF ENERGY PRICES

First results of the application of the Directive[1]

BY Gonzalo Dechamps, DG XVII
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Achieving transparency in prices on the energy market is the prime objective sought by the Commission with the completion of the internal energy market. The Council reflected the same view in adopting the major Directive in this area on 29 June 1990[3]*. The Statistical Office of the European Communities (Eurostat), assigned the task of surveying gas and electricity prices, made rapid progress in its work and by December 1991 published initial results in its Rapid Reports series with prices recorded as at 1 July 1991.*
In May this year Eurostat finished its second survey, relating to prices recorded on January 1992[4]*.*
The deadlines set for supplying the data have been observed. It should be emphasized that the data was supplied at a time when some Member States had still not transposed the Directive into national law.
Certain problems remain but it can be said that the purpose of the Directive - to ensure transparency of prices for gas and electricity for industrial end-use - has been fulfilled, whilst respecting the confidentiality of contracts.
The difficulties relate to supplying Eurostat with information giving a breakdown of consumers and corresponding volumes by categories of consumption to make it possible to check the representativeness of these categories on each national market. This information, to be supplied every two years, was to set out the situation for the first time as of 1 January 1991 and was not due to be published. A number of Member States have not yet fulfilled this obligation.
As regards the survey on electricity, the definitions of the marker prices relating to consumers whose maximum demand exceeds the 10 MW ceiling, should be defined more strictly, so that organizations whose job it is to notify the prices, can work, as far as possible, on comparable bases.

This results from a requirement of the Directive itself (second part of paragraph 15 of Annex II) and refers in particular to the load factor and the distribution of consumption into various charge bands during the day. Similarly, any possible reductions connected with special conditions of consumption, the communication of which to Eurostat is provided for in paragraph 17 of Annex II, should be identified more precisely in order to improve the clarity and comparability of the data.
For consumers, it is important to have a better understanding, via knowledge of the prices and pricing systems in force in the Member States, of how prices are established and to check that there are no unfair elements in the price applied to them.
For this reason the Commission has undertaken an

1 This text was completed in May 1992 and is based on the prices published at that date: updating to 1 January 1992 is in progress.
2 This article reflects the opinion of the author which are not necessarily those of the Commission services.
3 Council Directive 90/377/EEC of 29 June 1990 concerning a Community procedure to improve the transparency of gas and electricity prices charged to industrial end-users published in OJ No L 185 of 17.7.1990.
4 The results of the second survey have since been published.

analysis of the communicated data. The comparisons it has made reveal major price differences between Member States. These are evidence of rigid divisions between the various national markets and differences of conception with regard to pricing.

New proposals for Directives, presented to the Council as part of the completion of the second phase of the internal energy market and aimed at creating a competitive gas and electricity market, will enable prices to be established with reference to the market value of these energy forms. In particular, it is proposed to extend transparency to the field of cost management and accountancy within firms (unbundling).

Meanwhile, the identification of disparities in prices, made possible under the Directive by highlighting any anomalies, represents a first step towards the removal of sources of discrimination with regard to consumers, and this is essential for smooth operation of the internal energy market.

CROSS-SUBSIDIZATION

Whatever the structure of charges and the method of establishing them, firms are primarily concerned with breaking even, i.e. covering costs with revenue. This has a very important result: insufficient revenue in a specific sector must be made up by additional revenue from elsewhere. This phenomenon, known as **cross-subsidization**, helps to determine the character of each country's pricing system according to the importance attached to this sort of subsidization.

In comparing the Member States it can be presumed that cross-subsidization exists, as a point of reference is available for one Member State.

In one Member State subsidization of industry by the domestic sector via tariffs is imposed by the State and has been publicly recognized by the Minister for Economic Affairs.

For each location featured in the survey the tension[5] is calculated between the prices exclusive of taxes applied to a domestic consumer, chosen in such a way as to remove the element of possible public subsidy, and those paid by a large industrial consumer. Hence a series of coefficients is obtained which are ranked in ascending order and which enable locations to be divided up between:

- those above the median corresponding to the series of observations and approximating to the situation in the Member State openly practising cross-subsidization,
- those situated around the median,
- those situated below it.

When the tension coefficients are compared with the series of prices corresponding to large industrial consumers it can be seen that within each of these three groups:

- where high tension corresponds to a low industrial price, it can be presumed that there is cross-subsidization in favour of industry,
- the pricing structure is balanced where tension close to the median corresponds to low or medium industrial prices,
- where there is low tension but high industrial prices, two hypotheses are possible:
  - either firms may have uncompetitive cost structures,
  - or monopoly situations may be present.

For want of other references, a price indication is said to be high or low always in relation to a median or Community average.

Graphs 1 (electricity) and 4 (gas) and comparison with prices for industry confirm these hypotheses.

It can also be seen that tension for electricity prices, which ranges from 1.23 to 3.10, is about half of that for gas (2.7 to 5.0) but the extent of the variation is much greater (as much as treble for electricity, but only up to double for gas).

HEATING

Generally, for electricity and gas, tariffs are on a sliding scale according to various parameters, including the essential one of quantities. In spite of this, there are certain cases in which identical offtakes may be priced differently according to category. Hence a tariff preference is given in most Member States to electric storage heating and to gas heating. This situation is justified by the need to modulate tariffs in order to level out peaks in consumption and stagger demand in a way which reduces costs. However, considerable differences can be seen in this preference from one Member State to another, which local competition conditions on the heating markets do not always justify. A comparison of relevant energy prices (all taxes included) shows that prices of domestic fuel oil, natural gas and electricity for heating change in the Member States, independently of each other, as a result of causes peculiar to them (see Table A). This appears to indicate that market forces could have relatively little effect on the heating market.

5 *In this study, 'tension' is used to mean the difference between the extreme values in a series of prices.*

Table A

Comparison between prices of useful energy (including all taxes)
Domestic consumption: ECU/GJ (PCI) heating oil = 100

Natural gas (125.6 GJ/yr)* at 1 January of each year

EUR 12

	B	DK	DE	EL	ESP	FR	IRL	IT	L	NL	P	UK	Average
1973	152.5	-	197	-	-	192.1	-	147	89.68	94.39	-	143.2	146.9
1978	128.4	-	166.2	-	-	107	-	119.2	-	83.35	-	75.15	106.6
1979	114.4	-	128.1	-	-	105.8	-	95.69	101.2	87.30	-	76.50	91.93
1980	78.66	153	78.02	-	-	93.11	183.7	83.71	68.78	59.62	-	52.33	68.51
1981	85.66	154.8	98.41	-	-	86.65	218.2	94.71	76.18	68.56	-	55.44	79.59
1982	97.88	132.3	104.2	-	-	90.30	221.7	79.39	92.98	67.06	-	55.74	80.42
1983	104.3	142.6	109.2	-	-	83.00	107.1	87.89	84.53	74.06	-	60.07	84.16
1984	103.3	143.7	101.5	-	-	91.25	112.2	93.05	86.36	74.28	-	69.66	89.36
1985	108.8	127.5	96.43	-	-	91.82	102.6	85.85	98.79	75.11	-	62.54	83.57
1986	126.9	131.3	130	-	123.1	101	126.9	94.69	99.36	92.03	-	75.50	96.86
1987	141.8	90.35	118.1	-	137.3	99.20	134.5	80.96	104.9	81.27	-	106.3	94.78
1988	162.2	106.1	157.5	-	137.3	104.3	115.7	82.07	91.30	93.37	-	116.7	106.4
1989	144.9	112.6	127.2	-	148.7	98.44	140.3	92.40	79.52	75.76	-	136.6	103.1
1990	144.9	138.2	126.1	-	142.5	85.02	128.1	77.76	81.84	77.52	-	101.5	91.35

* *Spain: natural gas and town gas.*
Works gas for Ireland (< 1986), Denmark and Portugal.

Electricity (13000 kWh/yr) 1: at 1 January
2: at 1 July

	B	DK	DE	EL	ESP	FR	IRL	IT	L	NL	P	UK	Average
1973	-	-	-	-	-	-	-	-	-	-	-	-	-
1978	320.2	-	253.1	-	-	220.5	168.5	-	-	297.2	-	163.6	189.6
1979	277.8	232.2	198.7	-	-	219.4	167.5	-	-	258	-	156.8	169.2
1980	188.9	153.4	119.1	116.3	-	181	142	-	137.5	180	-	119.3	115.9
1981	179.9	184.3	126	136.9	-	148	154.2	-	112.9	178.8	-	130.5	121.9
1982	168.6	167	127	137.3	-	141.9	157.6	-	122.4	184.7	-	114.6	116.1
1983	186.5	157.7	141.3	119.3	-	133.9	129.7	-	124.8	201.4	-	107.1	114.8
1984	172	144.9	143.3	134	-	154.4	138.7	-	147.6	183.9	-	118.8	120.4
1985	172.1	142.9	132	127.6	-	143.9	134.9	-	146.2	182.4	-	109	111.6
1986-1	198	149.1	177.5	135.1	137.1	170.9	138.3	-	149	203.3	-	129.1	141.1
1986-2	388.1	185.9	394.3	147.7	165.6	267.3	206.3	-	313.4	353	-	220.2	228.1
1987-1	291.1	133	263.7	169.4	204.5	206	182.2	-	295	194.2	-	164.1	170.5
1987-2	282.8	132.8	304.9	190	212.6	227.5	155.3	-	272.4	215.4	-	183.3	186.1
1988-1	341.9	148.7	362.2	186.8	212.6	234.9	156.9	-	285.8	218.2	-	196.3	196.5
1988-2	323.7	153.3	372.9	198.2	229.9	237.7	185.3	-	298.9	205.3	-	242.2	205.4
1989-1	316.8	149.3	295.3	198.2	229.9	232.8	190.1	-	281.5	183.8	-	234.4	185.1
1989-2	320.4	160.3	303.2	198.2	219.5	227.4	183.4	-	274.3	200.9	-	255.2	184.2
1990-1	299.5	158.4	258.2	224	219.5	192	157.6	-	231.6	173.4	-	180.1	157.1
1990-2	370	173.5	299.5	191.4	232.7	245.1	206.2	-	279.8	213.6	-	256.3	183.7

Averages weighted by current annual consumption, except for 1989 and 1990 for which 1988 consumption is used.
Source: EUROSTAT-Energy prices, 1978-1990 Theme 4, Series D: Studies and Analyses: p. 116.

Industrial Prices

Another field of investigation concerns the relative level of prices to industry in the Community where big differences can be seen which even the extremely disparate economic conditions to be encountered in the Community do not always justify.

Here too, a comparison of prices for useful energy (excluding VAT and recoverable taxes) shows that respective prices for residual fuel oil, natural gas and electricity for industrial use evolve independently, and in this evolution competition must play only a marginal role.

Table B

Comparison between useful energy prices (ex-VAT and deductible taxes)
Industrial consumption: ECU/GJ (PCI)
Residual heating oil = 100
Natural gas (418600 GJ/yr) [1,2] at 1 January of each year

EUR 12

	B	DK	DE	EL	ESP	FR	IRL	IT	L	NL	P	UK	Average
1973	123.2	-	139.6	-	-	169.9	-	106.8	82.58	132.14	-	211.9	155.3
1978	119.5	-	123.3	-	-	104.7	-	107.8	-	97.16	-	112.9	118.6
1979	138.1	-	138.7	-	-	104	-	103.5	128.7	119	-	127.5	124.4
1980	99.00	-	117.2	-	-	90.54	-	92.52	89.94	96.34	-	120.5	128.7
1981	79.74	-	108	-	-	87.14	-	107.3	82.13	79.67	-	115.2	125.1
1982	132.2	-	145.6	-	-	101.2	-	118.1	145.2	105.1	-	99.21	147.4
1983	119.3	-	150.5	-	-	95.49	-	118	127.3	99.69	-	95.61	143.3
1984	107.9	-	123.2	-	-	82.24	-	107.1	105.5	88.19	-	84.57	128.8
1985	101.6	-	100.8	-	-	88.35	-	112.2	107.9	82.98	-	69.98	119.8
1986	148.5	-	154.1	-	104.5	111.4	-	121.5	150.8	100.4	-	111.9	121
1987	121.7	-	146.1	-	108	95.91	-	107.8	157.1	66.74	-	-	97.01
1988	184.8	-	185.5	-	108	149.3	-	136.4	159.3	101.7	-	-	118.1
1989	150.4	-	149.6	-	112.6	123.7	103.6	115.8	146	69.53	-	179.5	133.1
1990	130.2	-	162.6	-	114.6	110.4	71.10	93.79	142.4	72.49	-	122.4	121.2

1. Spain: Natural gas and town gas
2. Luxembourg: 41860 GJ.

Electricity (24 GWh/yr) 1: at 1 January
2: at 1 July

	B	DK	DE	EL	ESP	FR	IRL	IT	L	NL	P	UK	Average
1973	-												-
1978	499.6		437.1			351.4	306.5	430.3		493.8		353.2	418.5
1979	566.7		463.4			461	302.5	462.1		558.9		397.9	450.8
1980	366.8		285	465		272	267.2	320.3	365.8	437		288.9	327
1981	274.9		239	379		232	305	314.6	173.6	315.4		306.3	296.1
1982	328.8		267	276		231	337.2	348.3	236.4	405.2		295.3	315.7
1983	319.2		282	308		222	304.5	384.4	232.2	348.2		294	319.9
1984	263		253	347		199	307.8	344.4	228.4	284.5		252.7	292.4
1985	237.5	161	209	267		184	256.1	276.5	196.9	253.1		201.1	253.7
1986-1	374.5	201	345	282	258.5	251	334.1	397.8	274.4	370.3	334.8	314	318.5
1986-2	849	479	861	321	360.8	426	608.9	801.2	763.9	804.2	438	699.7	574.5
1987-1	522.1	242	516	392	620	365	431.4	557.3	581.9	363.8	564.8	406.8	484.8
1987-2	465	241	688	392	643.5	365	395	534.6	481.2	411.6	558.9	412.1	512.7
1988-1	794	376	813	392	643.5	565	483.8	696.6	603.5	472.9	508.3	570.9	639.6
1988-2	713	405	888	415	672.1	543	486.3	661.7	630.1	459.4	534.2	618.1	651.2
1989-1	708.5	405	705	415	694.5	517	494.7	660.5	564.3	364.9	534.2	648.9	625.7
1989-2	563	382	709	415	649.7	462	438.6	541.9	451	387.8	558.6	552.8	569.1
1990-1	534.3	306	599	469	575.1	445	409.8	459.2	431.5	312.3	496.5	522.6	508.8
1990-2	834	591	889	516	939.4	653	629.3	523.6	560.8	453.1	558.4	773.7	693.8

Averages weighted by current annual consumption, except for 1989 and 1990 for which 1988 consumption is used.
Source: EUROSTAT-Energy Prices, 1978-1990 Theme 4, Series D: Studies and Analyses: p. 118.

Price Differences and the Internal Energy Market

There have always been differences in industrial tariffs between Member States. However, relocations of firms brought about by excessively high tariffs have taken place only in rare cases. What is a cause of concern is that the abolition of frontiers may lead to excessive differences being maintained and more cases of this sort arising. The liberalization of the gas and electricity sectors proposed by the Commission may prevent this happening, through the elimination of unfair competition and greater convergence between prices.

METHODS

BACKGROUND

Analysis is based on prices published by Eurostat, pursuant to the 'transparency' Directive for prices to industry and on the basis of public tariffs for prices in the domestic sector.

If prices **for domestic users** have remained outside the scope of the Directive, this is because domestic tariffs are generally subject to advertising which automatically ensures their transparency.

However, transparency does not always cover **methods for determining prices and tariffs** which are largely linked to the distribution of costs within firms. This transparency would not be necessary if markets were competitive; then prices would reflect costs as contracts would be negotiated at their market price and a good degree of price transparency would be sufficient.

In view of the gaps in competition on the market in energy transmitted by pipelines, it is still necessary to ensure transparency in the methods of price and tariff formation.

The lack of interpenetration of the markets within the Community and the absence of competition in the respective national electricity and gas markets are highlighted by the significant **price differences** which are visible in the Community between:

- domestic prices and industrial prices;
- prices for heating and those for equivalent offtakes resulting from the application of other tariffs;
- gas and electricity prices excluding and including taxes for domestic and industrial use.

These differences between prices are the result of structural differences between the tariffs applied. The structural differences are linked in turn to differences in local conditions of competition, arising from fragmentation of the markets, as well as economic operating conditions which are peculiar to each national industry. The main cause of these distortions, however, is action taken by the public authorities as a result of problems of security of supply and economic, financial, social and environmental concerns.

Economic operating conditions mainly relate to:

- access to raw materials for electricity;
- composition of the generation system;
- location of power stations;
- level of interconnection;
- relative density of the transmission system;
- breakdown of customers.

Public authority assistance is connected with the way the sector is organized. There are many variations, ranging from open systems, based on free competition, to closed systems, monopolized by the state with, between the two, mixed systems which allow private ownership of production plant or transmission infrastructure, in the context of strict supervision by the public authorities, and tolerating a generally high level of assistance.

Apart from the factors mentioned above, there are external constraints behind the divergences to be seen in the evolution of prices and tariffs between the various Member States.

These constraints are mainly the variability of currencies provoked by inflation and changes in taxation. These divergences also originate from changes in the thinking of the supervisory authorities as regards tariffs, giving rise to most of the **cross-subsidization** which can be seen in the Member States.

THE OBJECTIVES

This analysis concentrates on prices, leaving aside other aspects of the global economic context and the situation in industry, in particular the distribution of income concerning coverage and breakdown of costs.

In practice, it will:

- examine where possible the tension between prices recorded at the same date, for a non-subsidized average domestic consumer and for the largest industrial consumer whose price is known through Eurostat surveys;
- determine the level of preference given to heating as regards an equivalent supply to industry and households, for both electricity and gas;
- highlight the tension between industrial prices and price differentials for industry in the Member States and between them, as well as the influence of indirect taxation on the level of industrial tariffs.

THE INSTRUMENT OF ANALYSIS

WHICH PRICES?

The instrument of analysis will vary according to the objective pursued. Hence use will be made of:

- **prices excluding taxes, in the national currency** to examine the tension between prices in the domestic sector and industry; **excluding taxes**, in order to neutralize the disruptive effect of taxation on price comparisons and to come as close as possible to industry costs; **in national currency**, because the intention is not to compare Member States with each other but to examine the situation within each of them. The same instrument will serve to determine the level of tariff preference for heating;
- **prices excluding and including taxes** (where they exist) but always excluding VAT, **in ecus**, in order to compare the industrial sectors of the Member States with each other and because differences in monetary

units may encourage a firm to change location; it must also be possible to measure this incentive; including taxes to show distortions which exist in indirect taxation, even after neutralization of the VAT.

WHICH CONSUMERS?

All these comparisons are based on statistics published by Eurostat and reference will be made to Eurostat price publications for the technical aspects and definitions of standard consumers, exchange rates and units used.

STANDARD CONSUMERS

Electricity

For households, the following standard consumers were used:

Dd: prices as of 1 January 1991, corresponding to an offtake of 7 500 kWh/year, including 2 500 kWh at the night tariff with a subscribed demand of between 6 kW and 9 kW; representative medium consumer not receiving 'social' tariff.

De: prices as of 1 January 1991, corresponding to an offtake of 20 000 kWh/year, including 15 000 kWh at the reduced night tariff and a minimum subscribed demand of 9 kW in **all-electric heating.**

For **industry**, the standard consumers chosen for comparisons are:

Ic: prices as of 1 January 1991, corresponding to an offtake of 160 000 kWh/year, for a maximum demand (net) of 100 kW and a maximum annual period of 1600 h.

As there were gaps in the data available for consumers Ia and Ib, the consumer for whom full price information was available, namely Ic, was chosen.

Ii: prices as of 1 July 1991, corresponding to an offtake of 70 000 000 kWh/year, for a maximum demand (net) of 10 000 kW and annual use of 7 000 h.

This consumer category was preferred to use of the marker prices which still need fine tuning as explained in the introduction.

Natural gas - Households

D2: prices as of 1 January 1991, corresponding to an offtake of 16.74 GJ (4 650 kWh) for cooking and hot water (two uses).

D3: prices as of 1 January 1991, corresponding to an offtake of 83.7 GJ (23 260 kWh) for cooking, hot water and central heating (three uses).

Natural gas - Industry

I1: prices as of 1 January 1991, corresponding to an offtake of 418.6 GJ (116 300 kWh) without provision for modulation.

I5: prices as of 1 July 1991, corresponding to an offtake of 4 186 000 GJ (1 163 GWh), 330 days and 8 000 hours.

RESULTS OF THE ANALYSIS

Six graphs (three for electricity and three for natural gas) show the results of the comparisons referred to above. A brief comment amplifies the most important conclusions in each case.

GRAPH 1
ELECTRICITY - TENSION BETWEEN PRICES EXCLUSIVE OF TAXES FOR HOUSEHOLDS AND INDUSTRY

As complete sets of statistics at the same date, either 1 January 1991 or 1 July 1991 for both markets were unavailable, it was necessary to record prices as of 1 January for households and as of 1 July for industry. This difference in date should not influence the tension coefficients other than in a few cases.

For the 26 locations studied, the highest tension corresponds to Italy (x 3.1), the lowest to Hannover (x 1.2) followed by Portugal (x 1.3). The median values correspond to Düsseldorf (x 1.64) and the Westliches Gebiet (x 1.69).

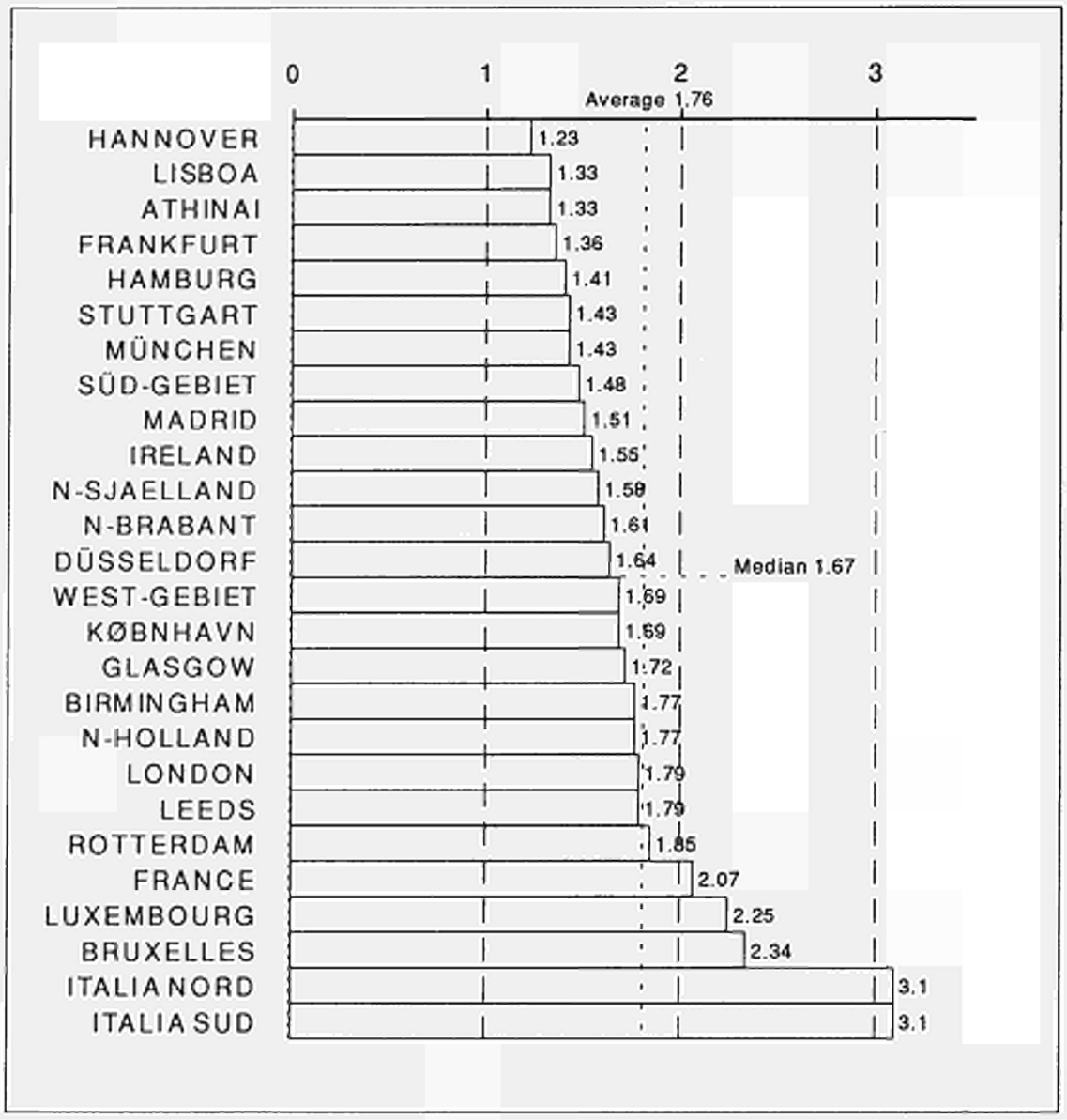
Italy, Belgium, Luxembourg and France exceed the coefficient x 2; Frankfurt, Portugal and Greece, on the other hand, have particularly low coefficients (from x 1.23 to x 1.36); Spain, Ireland and Denmark occupy a position close to the median (x 1.51 to 1.58); the United Kingdom and the Netherlands both occupy a position above the average (x 1.72 to 1.85).

It should be noted that several Member States give tariff subsidies for social reasons to the smallest consumers of electricity (Belgium and Italy), subsidies which do not appear in the graphs.

If the tension coefficient were calculated between other standard consumers some variations would occur but not to a degree such that the above conclusions are materially affected.

Graph 1
Community: Electricity Prices

Tension coefficient between domestic consumer (7 500 kWh/year) as of 1.1.1991 and industrial consumer (70 GWh/year) as of 1.7.1991. (exclusive of all taxes in national currencies)



GRAPH 2
ELECTRICITY - COMPARISON BETWEEN PRICES PAID BY LARGEST INDUSTRIAL CONSUMERS (Ii) IN ECUS/100 KWH AS OF 1 JULY 1991

The 'transparency' Directive enabled a complete series of data to be obtained for Ii, except for the United Kingdom where the confidentiality rule applies. However, the position indicated for the United Kingdom between Northern Italy and the Westliches Gebiet would be only slightly different if the prices for Ii had been available instead of the prices shown in the graph.

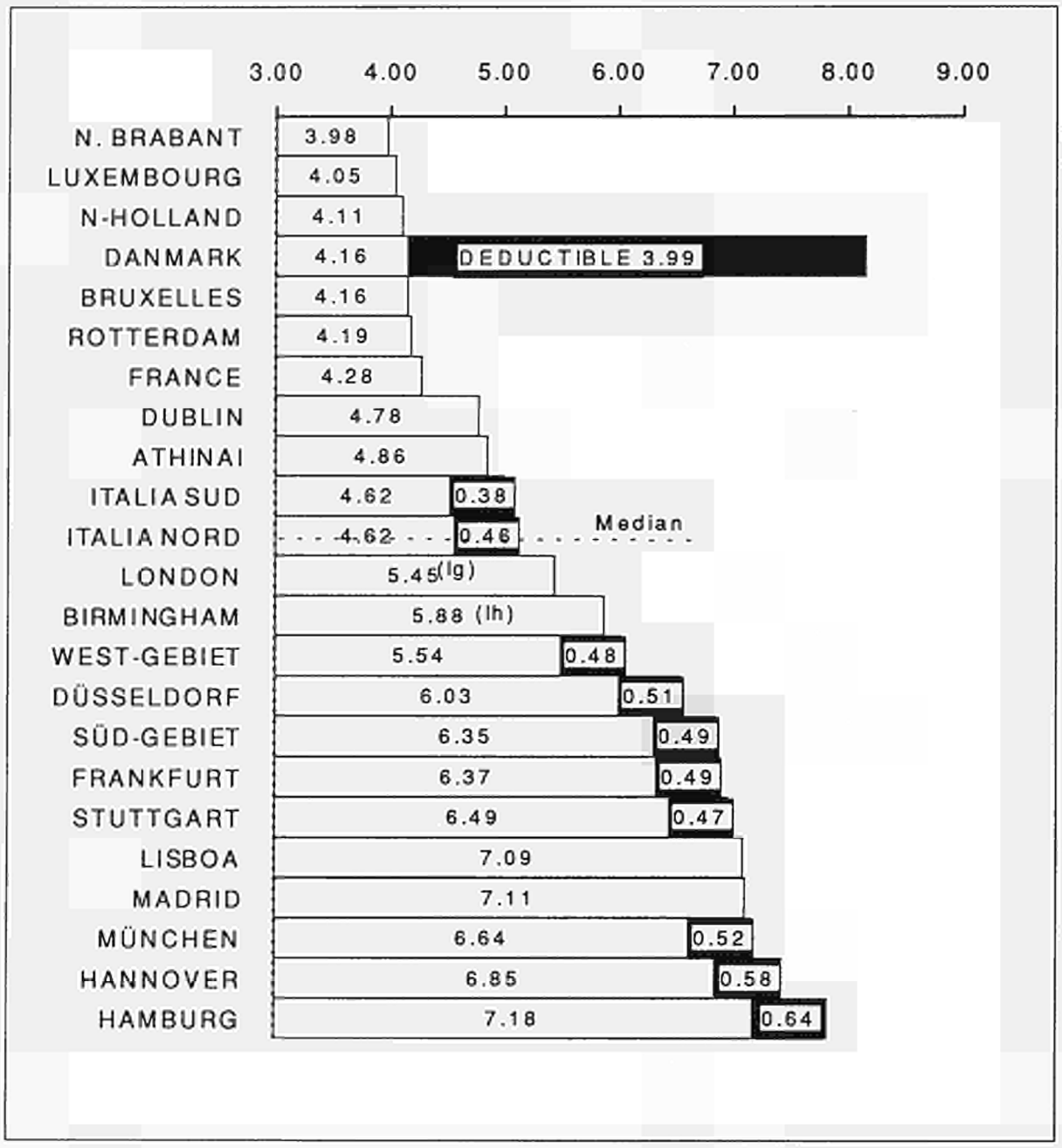
The lowest price (North Brabant) and the highest (Hamburg) are ECU 3.98 and ECU 7.82 respectively, i.e. a difference of ECU 3.84. This divergence of nearly 100%, which is accentuated in Germany by the Kohlepfennig ('coal penny') (ECU 0.64 in Hamburg), between two places less than 400 km apart is particularly eloquent as regards the compartmentalization of the markets.

If Graphs 1 (tension households/industry) and 2 (prices for industry) are compared, it can be presumed that **prices to industry are the subject of cross-subsidization where high tension corresponds to a low market price.** This is the case with Italy, the Netherlands, Luxembourg, Belgium and France.

Where there is low tension with a high price to industry, this points to an uncompetitive cost structure or a monopoly position, with all the prices high: this is the case in Portugal, Spain, Greece and for the places in Germany covered by the data, with the notable exceptions of Düsseldorf and the Westliches Gebiet.

With low or medium industrial prices and tension close to the median, Denmark, Ireland and the United Kingdom display the most balanced tariff structures, with Düsseldorf and the Westliches Gebiet for Germany.

Graph 2
Community: Electricity Prices
Consumer type Ii, in ECU/100 kWh including taxes except VAT
70 GWh/yr/max 10 000 kW for 7 000 h)
as at 1.7.1991
(taxes other than VAT are shaded)



GRAPH 3
ELECTRICITY - TARIFF PREFERENCE FOR ELECTRIC STORAGE HEATING

This is a general practice in all the Member States except Denmark (which favours remote heating) and Italy (whose sales of over 10 000 kWh to households are negligible).

This preference applies to domestic consumers from other tariff categories. For the comparison, use has been made of consumer Dd (the nearest to De, in the series published by Eurostat).

As regards standard consumer Dd, this preference is highest in Stuttgart and Munich (41%) followed by Hamburg (40%).

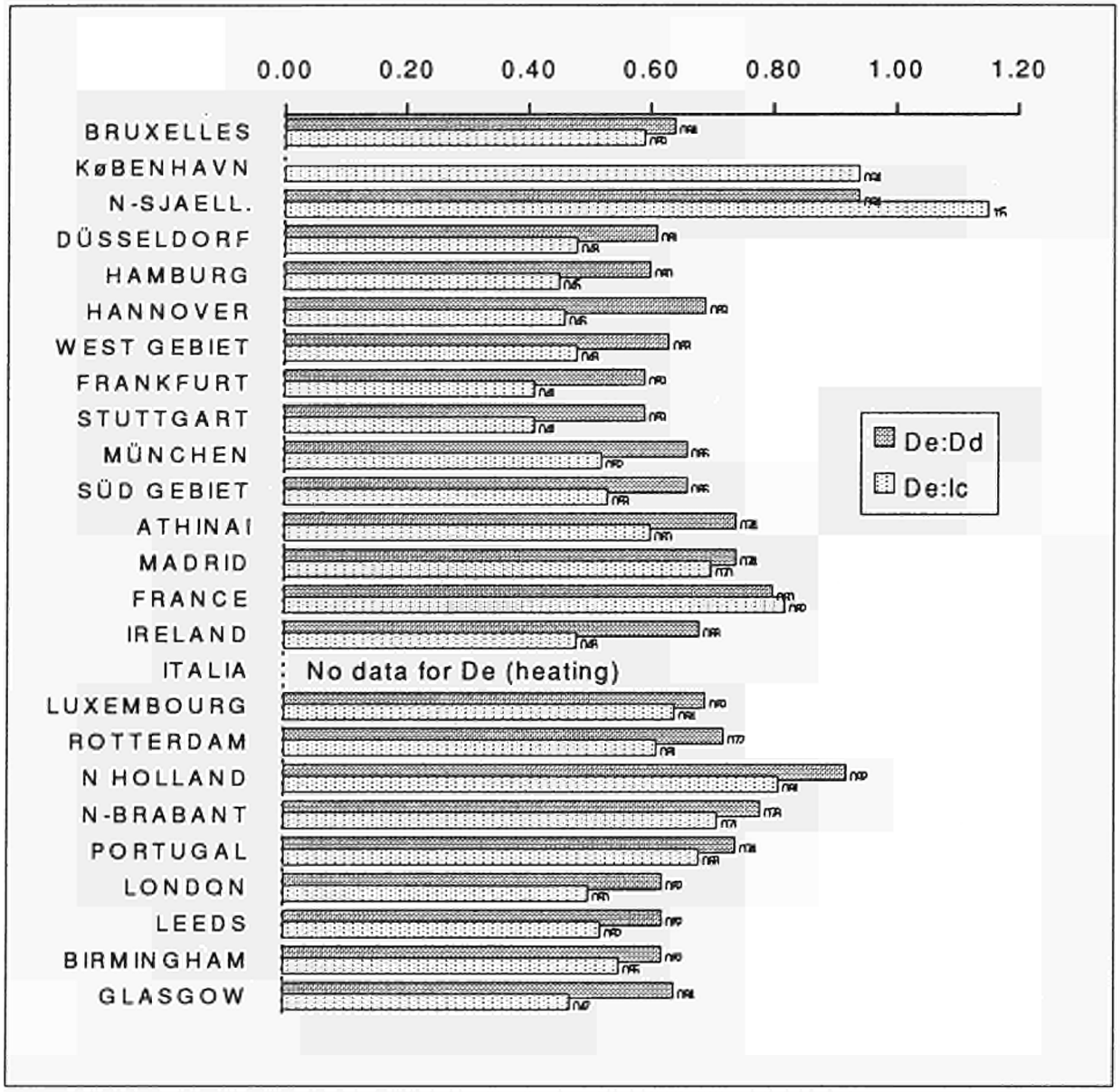
Contrary to general impressions, the figure for France is only 20%.

The trend is even more clearly visible vis-à-vis industrial consumers.

In relation to the standard consumer Ic (160 000 kWh), this preference is as high as 59% in Frankfurt and Stuttgart.

Except in Denmark and Italy where the preference vis-à-vis industry does not exist, the lowest figure is in France (18%).

Graph 3
Community: Tariff Preference for electric storage heating compared with closest related domestic (Dd) and industrial (Ic) consumers, as percentage (basis: national currency at 1.1.91 - Dd and Ic = 1.00



GRAPH 4
NATURAL GAS - TENSION BETWEEN PRICES *EXCLUSIVE OF TAX* IN NATIONAL CURRENCIES FOR A DOMESTIC CONSUMER D2 AND THE LARGEST INDUSTRIAL CONSUMER CONTAINED IN THE EUROSTAT SURVEY (I5)

Unlike for electricity, the complete series for industry as of 1 January 1991 is available, which enables homogeneous coefficients to be obtained.

The choice of household consumer (D2 = 16.74 GJ/year: two uses) was made on the assumption that there was no subsidized tariff involved which could artificially reduce the tension (except in Italy, above Rome).

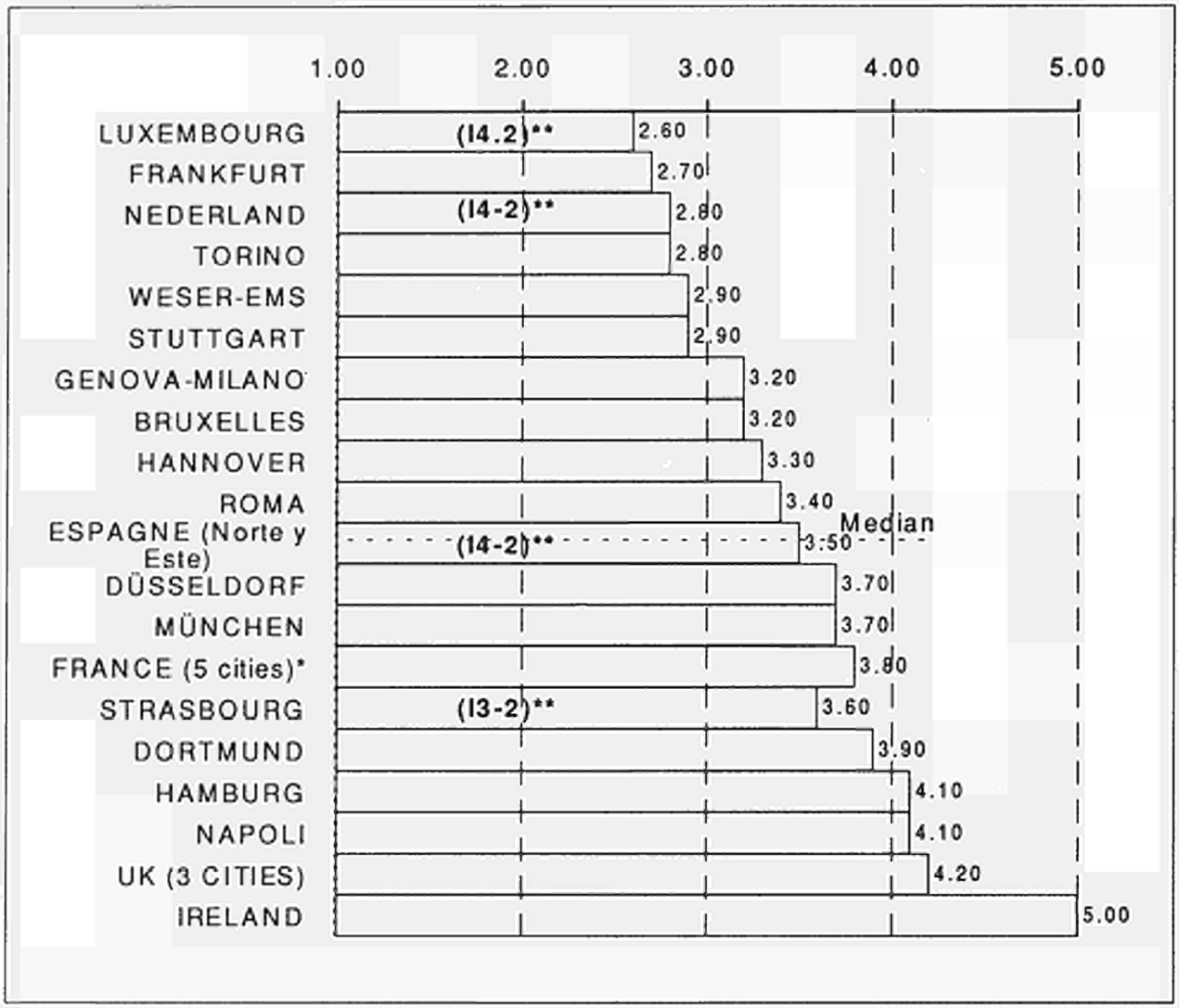
In industry, where there was no price indication for I5 at the time of recording the data, the price indication immediately below was taken, namely I4-2 (I3-2 for Strasbourg).

The tension in the prices reaches its maximum in Dublin (x 5), followed by the United Kingdom (x 4.2), Naples and Hamburg (x 4.1). It reaches the minimum level in Luxembourg (2.6), Frankfurt (2.7) and the Netherlands (2.8). However, the prices for I5 are not known in Luxembourg and the Netherlands; in accordance with the sliding scale of charges, this price must be lower and therefore the tension higher than that indicated. Tension is the lowest in Turin at present (x 2.8), followed by Weser-Ems and Stuttgart (x 2.9). It is thus in Germany and Italy that the greatest interregional tensions can be observed since both the lowest and highest tensions are visible there. In Italy, tariffs for industry are adjusted at a national level and are the same all over the country; the divergence is therefore linked to the domestic sector. In France, Spain and the German cities of Düsseldorf and Munich, results are close to the median.

Compared to electricity, where tension is between 1.23 and 3.10, tension for natural gas is almost twice as great (between 2.7 and 5.0) but the variation is less.

Note should be made of the existence in Belgium of a tariff subsidy in favour of the smallest domestic consumers; for methodological reasons this subsidy does not appear in the graphs. As for electricity prices, calculating the tension between other standard consumers is in itself a source of variations, but these do not significantly alter the above conclusions.

Graph 4
Community: Natural Gas Prices
Tension coefficient between domestic (D2 two uses, non-subsidized - 16.74 GJ/year) and industrial (I5 4 186 000 GJ/year 330 days - 8 000 h) consumers (or immediately below) exclusive of all taxes at 1 January 1991 (basis: national currencies)



Missing: *Portugal and Denmark (town gas);*
Greece: *no gas*
(*) *Negligible differences between cities featured in sample.*
(**) *Industrial consumer immediately below for which a price is available.*

GRAPH 5
NATURAL GAS

A. COMPARISON BETWEEN PRICES INCLUDING TAXES EXCEPT VAT FOR INDUSTRIAL CONSUMER TYPE I5, IN ECUS/GJ, AS OF 1 JULY 1991

(I5 = 100 to 120 million m3, according to gas GCV; I4 = 10 to 12 million m3).

The comparison covers six countries only: the four countries which communicated this price pursuant to the 'transparency' Directive (France, Germany, the United Kingdom and the Netherlands), and Ireland and Italy for which prices are given as of 1 January 1991, since their relative position in the series did not vary between 1 January 1991 and 1 July 1991.

The greatest price divergence for the I5 sample is 2.34. However, if the extremes are eliminated (Stuttgart and Frankfurt), prices are contained in a relatively narrow margin (2.13 - 3.31), which indicates the existence of limited competition at this level of consumption.

The **median value** corresponds to Lille (ECU 2.55) within the margin indicated for France.

B. COMPARISON FOR INDUSTRIAL CONSUMER I4-2 (INCLUDING TAXES, EXCEPT VAT) AS OF 1 JULY 1991

By lowering the quantities threshold, four more Member States than in the previous comparison can be included: Belgium, Luxembourg, Italy and Spain. In these four Member States, price results indicate application of a national tariff without regional variations.

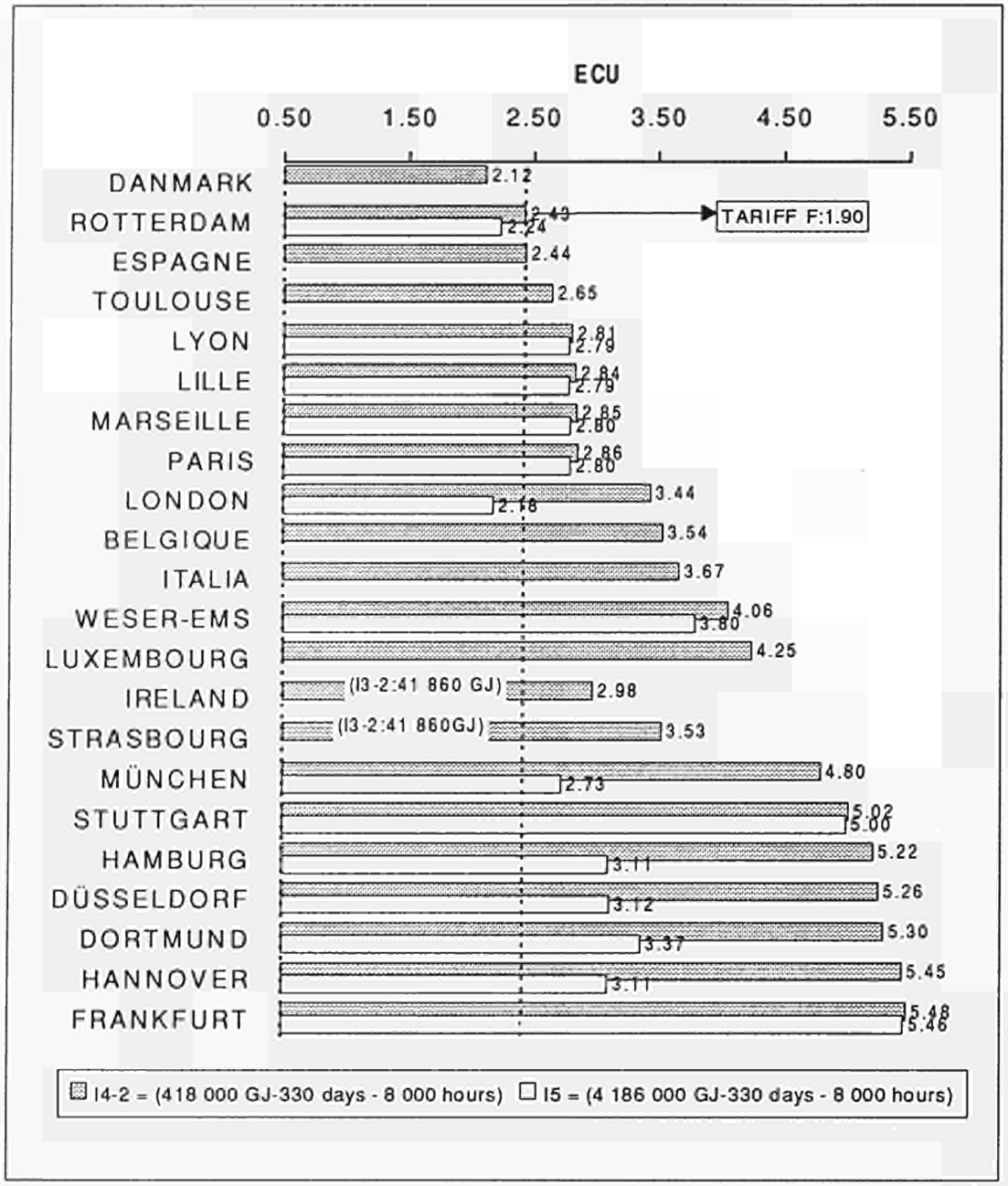
As regards the sample as a whole, Spain shows the **lowest price** (ECU 2.44), which practically coincides with the price for the Netherlands (ECU 2.43) despite distinctly less favourable supply conditions. These are followed by Ireland (ECU 2.60, as at 1 January 1991: single price for any offtake of 418 600 GJ/year or above, whatever the modulation).

The highest prices were recorded in Luxembourg (ECU 4.25) and in the German cities where the range of prices in this category is considerably narrower than in I5, with a divergence of only 14% (from ECU 4.80 in Munich to ECU 5.48 in Frankfurt) if Weser-Ems is excluded (ECU 4.06).

The other Member States occupy **intermediate positions**: France (ECU 2.81 - ECU 2.86) excluding Strasbourg (not communicated); United Kingdom (ECU 3.44), Belgium (ECU 3.54) and Italy (ECU 3.67).

Note: in the case of the Netherlands, the F tariff price is added, i.e. that applied to industrial consumers using gas as raw material for 500 million m3/year take-off, 90% loading, interuptible supply.

Graph 5
Community: Natural Gas Prices to Industry
Comparison between standard consumers I5 and I4-2
(including non-recoverable taxes except VAT) as at 1 July 1991, in ecus/GJ
(except Portugal and Greece)
(non-recoverable taxes are shown in the shaded areas)



GRAPH 6
NATURAL GAS

INTENSITY OF TARIFF DIVERGENCES BETWEEN PRICES FOR A MEDIUM CONSUMER OF NATURAL GAS FOR HEATING AND A 'DOUBLE USE' DOMESTIC CONSUMER, ON THE ONE HAND, AND A SMALL INDUSTRIAL CONSUMER (418.6 GJ/YEAR) ON THE OTHER HAND.

The comparison is made on the basis of national currencies, excluding all taxes, as of 1 January 1991. (*Note:* Denmark did not have natural gas, at the time, hence its omission).

The tariff preference is greatest in Luxembourg (-55.2%) in relation to the chosen domestic consumer. It is clearly negative in almost all regions of Italy. Half the sample (10 readings) shows a preference of between 37.5 and 42.2%, i.e. a small divergence.

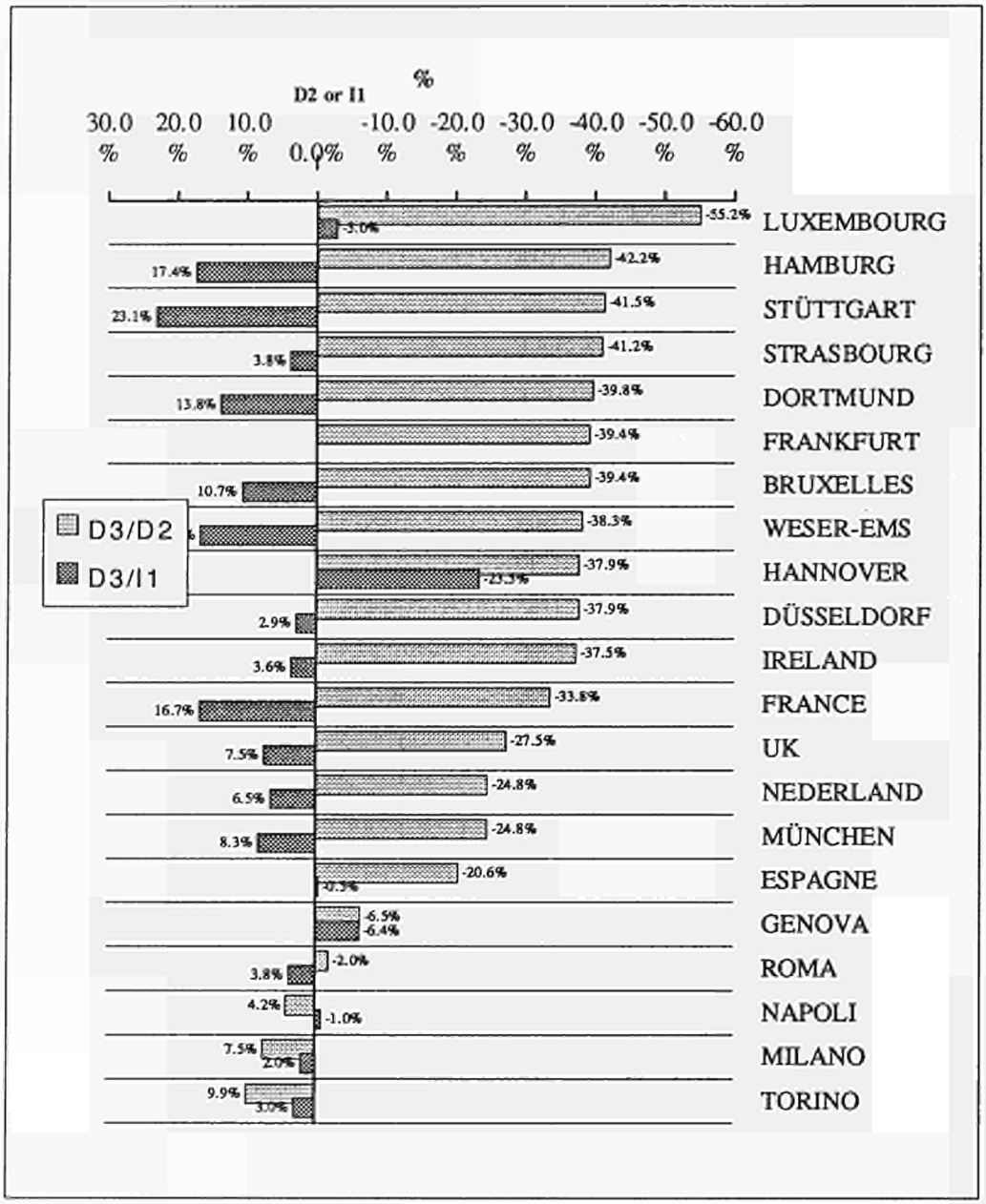
If the gas/electricity tariff preference is compared, gas has a clear advantage in France (-33.8 as against -20% for electricity) in Luxembourg (-55.2 as against -31) and in Ireland (-37.5 as against -32).

The opposite situation, however, is to be found in Munich (-41 for electric heating as against -24.8 for gas), in the United kingdom (-38 as against -27.5) and in Spain (-26 as against -20.6). In the other locations for which both sets of information are available (i.e. Stuttgart, Hamburg, Düsseldorf, Brussels and the Netherlands), there is a preference of the same relative order of magnitude for the two heating systems.

Unlike for electricity where there was a preference vis-à-vis the industrial consumer, the sliding tariff for natural gas is normal and the industrial consumer pays on average 5% less than the 'heating' consumer, except in Luxembourg, Spain, Italy and Hannover where he pays more. The price difference is 23.5% in Hannover.

Graph 6
Community: Natural Gas

Comparison of prices between consumer D3 (83.7 GJ/yr, three uses) and domestic consumer D2 (16.74 GJ/yr) on the one hand and industrial consumer I1, 418.6 GJ/yr) as of 1.1.1991, on the other hand



Missing: *Denmark and Portugal = (town gas)*
Greece: no gas
Shaded areas: *Overlapping segments between prices.*

SOURCES

1. Gas and electricity prices charged to **industrial consumers:**
   EUROSTAT - '*Statistiques Rapides*': Energy and industry: No 1991/20; 1992/3; 1992/18 (electricity prices); No 1991/19; 1992/4; 1992/17 (gas prices)
2. Prices charged to **households:**
   EUROSTAT - Electricity Prices, 1985-1991
   EUROSTAT - Gas Prices, 1985-1991,
   (in Series C: Studies and Analyses - Theme 4: Energy and Industry)
3. Prices of petroleum products:
   EUROSTAT: Energy Prices, 1978-1990 (Series D, Theme 4)

These publications are available from the Office for Official Publications of the European Communities in Luxembourg.

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THE OIL MARKET AND THE REFINING INDUSTRY IN THE COMMUNITY: RECENT DEVELOPMENTS AND PROSPECTS

BY Peter Thompson, DG XVII
Hydrocarbons Unit

As the 15 year period of rationalization of the Community's refining industry comes to an end, during which primary distillation capacity was cut by over the 40% to 582 million tonnes in 1991, the challenge for the industry over the coming decade will be to choose the most appropriate technologies and make the correct investment decisions so as to meet increasingly demanding environmental standards. Those investment needs, estimated in tens of billions of ecus, will prove difficult to finance against a background of low and sometimes negative refining margins.
In this brief article, which summarises and highlights parts of the Commission's communication to Council, 'The oil market and refining industry in the Community: recent developments and prospects' (COM (92) 152 final), the operations of the oil market through the Gulf crisis, oil demand and supply prospects and the Community's refining industry are examined.

GULF CRISIS

The invasion of Kuwait by Iraqi forces on 2 August 1990 very quickly shut off over 4 mbd of oil to the rest of the world (about 7% of world demand). International efforts enforced the isolation of the Iraq/Kuwait market through a UN embargo (adopted within days of the invasion) though very quickly the oil shortfall was mostly made up through, in particular, added supplies from Saudi Arabia, the United Arab Emirates and Venezuela.

There were **increases in the prices of crude oil** and more or less, in parallel, **products.** The markets remained volatile throughout the conflict. Kuwait's export-orientated refineries, with an output of about 0.750 mbd, were unable to supply their traditional markets in South East Asia and the Far East. These refineries will take some time to come back on stream given the damage inflicted.

Differentials (crude to product prices) along with differentials between crude oils, between products and between market location **fluctuated.**

At the beginning of the crisis, **stocks** in OECD countries were very high by historical standards and adequate for all main products. This situation also held true for the Community.

Throughout the conflict, only limited use was made of official stock release mechanisms. In fact, on 11 January 1991 the Governing Board of the IEA drew up **a contingency plan.** The plan was to make available 2.5 mbd of oil with emphasis on stockdraw for four fifths of the response. The other fifth consisted of demand restraint and fuel switching.

In the event, the successful military initiative of 17 January saw prices fall from around $30/bbl to $20/bbl returning the world to the pre-crisis price levels thus reducing the interest of companies to take up the offer of purchasing government-controlled stocks.

A number of studies were called for both during and after the conflict to see if the markets operated properly and to investigate whether market instruments relatively new to the oil market (including forward, paper and futures markets) had introduced distortions. Deciphering market signals, even ex post facto, is not always a precise science, and it is not surprising that there have been differences of view expressed.

The generally accepted view shared by a consultant engaged by the Commission to study 'The Operations of the Market' and the IEA was that **the industry had adapted quickly to the crisis, the markets had worked efficiently** and that those operating in the

market had been aided by **new and improved trading practices.**

The IEA Ministerial Communiqué of June 1991 went on to state that the unimpeded pass-through of oil price changes had played an important role in reducing overall demand and averting imbalances in the supply of products, and to underline the value of efficiently operating markets in emergency response.

Oil Situation and Outlook

World demand for crude oil which had grown steadily since 1983 continued to rise between 1988 and 1989 (up 1.7%) and then stagnated in 1990 at 65.9 millions of barrels per day (mbd). This growth is expected to continue, particularly in the Far East and certain LDCs, moderately in the Community and is expected to stabilise in the US/Canada. For the immediate future, the former USSR will probably witness negative growth in energy consumption.

World supply of crude oil grew from 64.7 mbd in 1988 to 66.9 mbd in 1990. OPEC's volume increased from 21.7 mbd to 25.1 mbd over the same period increasing its share of world production from 34% to almost 38% though still a long way from its historic maximum share of 54% in 1973.

In the period from 1988 up to the Gulf crisis, **prices** oscillated around $16/bbl (barrel) within a $3 margin. Reaching around $40 in September/October 1990, prices were back at the end of 1991 around their pre-Gulf Crisis level i.e. around $18-19/bbl.

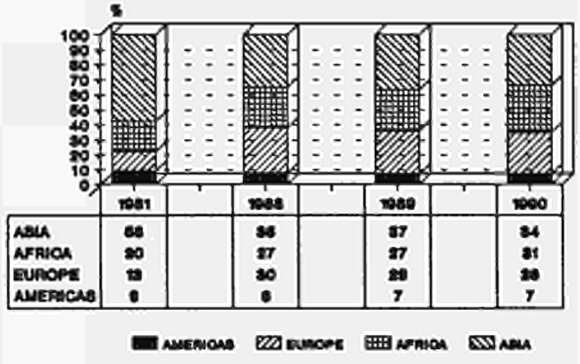
The crude oil market is now international in the sense that prices are formed at the world level to changes in global supply and demand. Prices in the Community therefore follow those of the world market. The market for products may be considered as more regional. Price centres exist in Singapore, New York, Rotterdam and the Mediterranean and though they inter-relate, they tend to reflect local specificities. Product specifications differ throughout the world, transport is relatively expensive (requiring 'clean' vessels) and there are no recognised 'world' market prices from which to benchmark.

Primary energy consumption for the Community excluding the new German Länder is expected to continue growing at a little over 1% per annum for the next eight to ten years. The **consumption of natural gas will rise more quickly** than other energy sources, probably at 2-2.5% per annum. There is expected to be some limited increase in the use of solid fuel, nuclear and renewable energy sources.

Since the mid 1980's, the **Community demand for oil has increased. Representing around 45% of the Community's primary energy demand,** oil demand is expected to **continue growing** in absolute terms, at between 0.5 and 1.0 per cent per annum, but to decline marginally in relative terms.

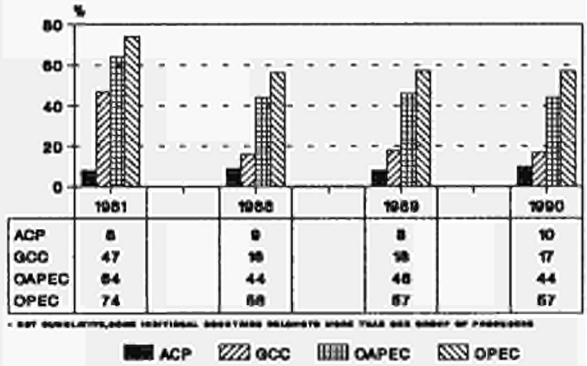
Figure 1

EUR-12 ORIGIN OF OIL IMPORTS BY REGION (THIRD-PARTY COUNTRIES)



SOURCE : EUROSTAT

EUR-12 ORIGIN OF OIL IMPORTS BY GROUP OF PRODUCERS *



SOURCE : EUROSTAT

One of the major uncertainties concerning these projections is the extent to which gas, solid fuels and oil (in particular fuel oil) will compete. Gas experts urge caution on the potential for its growth, especially as a number of projects either to construct or convert power stations to gas remain on the drawing board. Similarly, as well as the pricing factor, the social and environmental constraints of continuing to import and use ever larger quantities of solid fuels may limit their contribution to primary energy demand.

As Community production fell between 1986 and 1989 from 149 mio t to 112 mio t so the absolute quantities and the proportion of total supplies of crude oil imported into the Community increased. By 1990, having slumped in the first half of the 1980's, the level of imports returned to that of a decade earlier (380 mio t) to represent over 80% of total crude oil demand.

The **UK contributes more than 80% of the Community's production** and, of that, 98% is produced off-shore. The Cullen report of the accident on the platform Piper Alpha of 6 July 1988 led to tougher safety regulations. The combined effect of increased maintenance (for operational and safety reasons) and reduced output from the more mature fields led to reduced production in 1989/90 over 1988. 1990 marked a new record for exploration activity in the North Sea and though many of the large fields are past peak production, the combination of employing new technology to reduce costs and enhance recovery (such as 3D seismic, horizontal and deep-water drilling, improved lifting gear etc.) and new discoveries may well lead to a growth in oil outturn in the early part of the next decade.

The **sources of oil imports changed radically** through the 1970's and early 1980's as demand was restrained by high prices and UK production came on stream. OPEC's market share in Community imports was cut from 94% in 1974 to 44% in 1985 and in particular, Saudi Arabia and Iran's combined share fell from almost a half to a tenth. Since then, following the reduction in prices and the fall in the value of the $US, oil demand has risen and since 1986 imports have grown. In 1989 and 1990, annual imports from OPEC stood at 230 mio t (about 50% of Community supply or 64% of third country imports). The Community's supply structure is diversified in that it is less reliant on a single supplier with no one country contributing much more than 10% of total supplies. (See Figure 1)

Community product demand, in particular for automotive fuels (petrol and diesel) is expected to continue growing quite strongly in all Member States except Denmark and the western part of Germany where, on the one hand, the private vehicle population and number of kilometres travelled are expected to level off and on the other, vehicle fuel efficiency is expected to improve. Demand growth is likely to be particularly marked in eastern Germany and Spain. Between the two products, petrol and diesel, most consider that diesel demand will grow faster, partly because of the growth in road haulage and partly because thanks to their greater fuel efficiency, the proportion of diesel cars in the total car population will continue to grow.

Fuel oil and gas oil consumption (other than for the transport sector) are expected to fall. The magnitude of the drop in their consumption depends, in large part, on the competitive position of gas, to a lesser degree to the competitive position of other fuels and to the problems of removing sulphur from fuel oil so that it can be used in power generation.

As far as the cut from other parts of the barrel is concerned, an increase in the demand for jet kerosene, LPG and Naphtha is expected.

Net imports of oil products increased by 2 mio t between 1988 and 1989 to 15.7 mio t and has remained at that level in 1990, though overall it would be difficult to identify any discernible trend. It remains **at below 4% of inland consumption.**

The picture of **net product imports** is **not expected to change fundamentally** though regional shifts in the trade balance are likely. In particular, there is likely to be growth in trade with the US and the rest of Europe.

REFINING

World refinery capacity, which had grown steadily and strongly through the 1970's (about 7% per annum) to almost 81 mbd in 1981 was forced into a period of rationalisation in the 1980's as expectations in the growth of petroleum demand were not realised. The capacity cutback in the first half of the 1980's was particularly acute in the Community though was also significant in Japan, the US and Latin America.

There has been **a continuous reduction in primary distillation capacity** in the Community since 1976 (947 mio t) though in the last few years the rate has slowed. The primary capacity on 1 January 1991 stood at 582 mio t almost 40% below its 1980 level (see Figure 2).

Distillation capacity reduction was larger in the Northern part of the Community (excluding Denmark and Ireland) than the South.

The **rates of utilization of primary capacities have increased** since 1981 (59%) and are now at particularly high levels. At certain times of the year, these distillation capacities are utilised at 95%, raising the risk of distillation shortages on a localised basis at those moments when for example cold weather may coincide with refinery shut-downs. Of course, with a more cohesive internal market and a liberal trade policy, relatively brief localised shortfalls can be made up quickly by buying on the market. A change in the stock-holding management can also go some way to alleviating seasonalised demand peaks.

There are no immediate plans to expand the Community's primary distillation capacity though 'debottlenecking' may bring about a small increase in the effective capacity by 1992.

Apart from the de-mothballing of the refinery at Wilhelmshaven in Germany, which reintroduces 160 000 barrels per day of primary distillation capacity, there are no reported plans to close, reopen or construct further primary distillation units in the Community. Should this situation remain, utilization rates should continue to rise in line with increases in the Community's oil consumption.

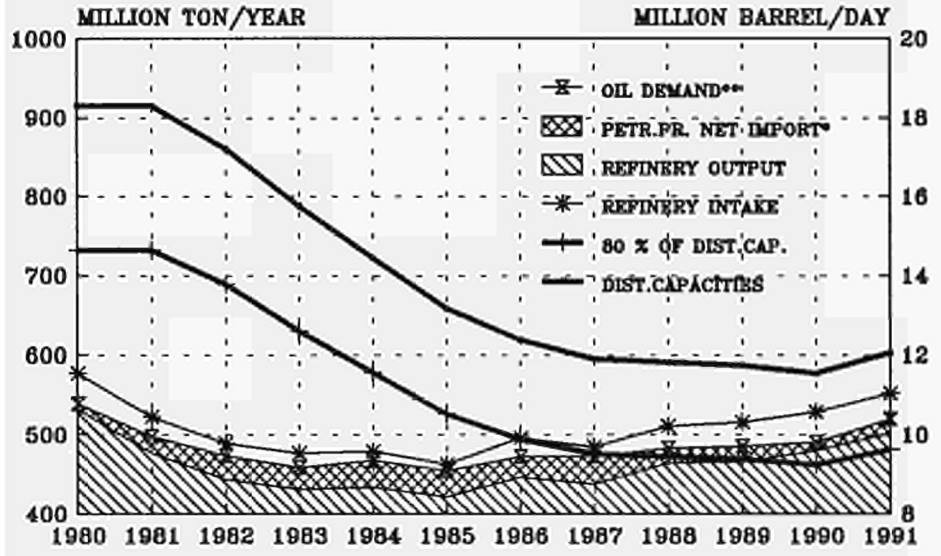
A consortium led by *Elf* has acquired a formerly state-owned petrol distribution company, *Minol*, in the new

German Länder and will manage two existing refineries (at Leuna and Zeitz) until a new refinery is constructed at Leuna. When completed the operation is expected to add to overall refining capacity.

Conversion capacity (to convert primarily residual fuel oil into products for which there is a greater demand) **almost doubled since** 1980 to 155 mio t/year (based on the catcracker equivalent). Further capacity is to come on stream, in particular in Italy, Belgium and Spain. This side of refining, including other conversion processes such as reforming petrol to improve its anti-knock properties, isomerisation and alkylation to produce lead free petrol, is driven to a large extent by changes in technology.

Figure 2

EUR-12 DISTILLATION CAPACITY VS DEMAND EVOLUTION 1980-1991



* NET IMPORT + STOCK VAR. OF PETR. PROD.
** INLAND DELIVERIES + BUNKERS
SOURCE : COMMISSION

The development in conversion capacity within the Community may be summarised as follows:

- thermal cracking (a mature technology other than as regards visbreaking and coking, detailed separately) which relies on heat pressure and time to 'crack' molecules, has increased very little since 1980;
- marked growth between 1980 and 1985 in catalytic crackers, visbreakers, hydrocrackers and coking;
- continued growth between 1985 and 1990 in hydrocrackers and to a lesser extent visbreakers;
- introduction between 1985 and 1990 of new technology in the form of hydroconversion (advanced catalytic process in which heavy residue feedstock is upgraded into middle and heavy distillates for further processing) and flexicoking (modifying earlier coking technology to dispose of the coke itself by means of gasification for use in electricity generation).

As mentioned above, there is expected to be reduced fuel oil use coupled with a growing demand for automotive fuels thus bringing a further need for conversion capacity. Further, there is a growing need for higher octane petrol as the Community continues to switch from leaded to unleaded, and for lower sulphur levels in diesel. To meet octane requirements there has been an expansion of isomerisation and alkylation capacity as well as capacity to produce MTBE, and this is expected to continue.

Industry Structure

A number of forces have been brought to bear on the Community's refining industry which have caused its **structure to evolve**. There have been three developments which have taken place (reduced involvement of the 'majors', increased participation of state-controlled oil-producing companies and the

gradual internationalization of the Community's remaining national companies).

Surplus distillation capacity coupled with the decline in the demand for products weighed on product prices and adversely affected profitability particularly in the early 1980's. This, in turn, led some major oil companies to divest themselves of capacity from that part of European business.

Crude oil exporters, predominantly from OPEC, that had built up considerable financial reserves, especially in the period of high prices of 1979-1981, became increasingly concerned about lost market volume and share, and therefore sought guaranteed outlets. As opportunities to build new refineries on new sites are extremely limited in the Community, these exporters tended to acquire existing refining capacity, where possible.

Traditional national oil companies based in the Community, spurred on by the need to secure access to crude, exploit domestic expertise and know-how outside their national boundaries and take advantage of an increasingly cohesive internal energy market, widened their vision beyond national boundaries. Simultaneously, Governments saw less need to secure oil through 'nationalised' companies and initiated programmes of privatisation.

These factors have helped **reduce the involvement of the 'major'** oil companies in downstream operations (though this trend may be coming to an end), increase the participation of producer country companies, and change the role of the traditional Community-based national oil companies. These latter changes are expected to continue through the 1990's, possibly through increased joint ventures between the two types of company.

Environment, Investment and Profitability

Environmental legislation is likely to continue to put pressure on refiners to remove sulphur from products. In particular, reduced sulphur is already required in diesel and gas oil and further measures may be called for as a result. Capacity may prove tight, especially in countries where product demand is expected to grow significantly over the decade (Greece, Spain, Portugal) and will require further investment in desulphurisation.

One environmental initiative was made by the Commission earlier this year when it requested the two European associations, *Europia* and *ACEA* (the European motor manufacturers' association) to work with the Commission on the subject of polluting discharges emitted by motor vehicles. For given limits of polluting emissions, it is advisable to find the optimum solutions, in terms of cost/benefit, i.e. what modifications to fuels and/or engines would minimise the cost to the consumer, in particular, and the economy in general. Standards for the year 1996 are now agreed and work continues for further possible changes by 2000.

As the process of refining becomes increasingly complex, so balancing the streams for the various units in order to meet market demand will continue to place greater constraints on an individual refinery system. To add flexibility within this ever demanding environment there is likely to be increasing linkage between refineries, even if plants are owned by different companies, in order to make the most rational use of complementary facilities.

Industry estimates put the investment cost of meeting ever stricter environmental demands at around ECU 15-18 billion for those measures already adopted or in an advanced stage of implementation. Additional investments of up to ECU 40 billion may be required if some of the measures currently under consideration are to be imposed (see Table 1).

Given the size of the potential investment the Commission has committed itself to early consultation with industry on future environmental measures. It is also against this massive investment programme that future industry profitability should be considered.

Using information communicated to the Commission under the Directive on price transparency (76/491/EEC) it is possible to calculate a theoretical gross refining margin resulting from the difference between the value of petroleum products sold on the Community's market and the supply cost in crude oil including refinery use.

Between the period of the first quarter of 1988 and the second quarter of 1991, the gross margin for the Community tended to follow cyclical variations and the fluctuations of the dollar with respect to European currencies. In 1988 the average gross margin for the Community was $27/t. In the second half of 1989 the margin grew and continued to increase during 1990, up until the invasion of Kuwait by Iraqi forces, reaching an annual average of $33/t.

Between 1991 and early 1992, the costs of crude oil supplies fell, so that the gross margin improved in the first quarter, then fell back slightly during the second quarter, giving an average for the first six-month period of 1991 of $51/t. The average gross margin during the last three years was about $32/t. i.e. ECU 26/t making it possible to cover assumed costs (variable, fixed, overhead expenses and return on the capital) of around $25/t i.e. ECU 21/t for a complex refinery. Clearly these figures, calculated for the report adopted in April, should be seen against a background of recent uncertainty in both prices (crude and products) and exchange rates.

There is also uncertainty over the projected drop in fuel oil consumption. If this turns out to be smaller

than expected, for example because projects to expand the use of natural gas in power plants are not realised, the cracking margin (the price difference between light products and fuel oil) could well be reduced to below levels which could justify heavy investment in sophisticated conversion capacity.

CONCLUSIONS

The report has initiated debate in Council and is expected to lead to the (Energy) Council of 30 November 1992 coming to conclusions on a number of points along the following lines:

- markets worked efficiently and the European oil industry succeeded in maintaining supply during the Gulf Crisis;
- a competitive European refining industry contributes to the stability of the markets of refined products, to the security of oil supply in the Community and to its energy independence;
- protection of the environment will remain a high priority and environmental issues will continue to place a heavy burden on the oil industry. The Commission will consult industry fully at an early stage in the drafting of environmental measures, particularly as regards the cost implications for producers and consumers;
- the policy of encouraging diversification in oil supplies and strengthening the incentives for a more rational use of energy must continue;
- the dialogue between oil producing and consumer countries will remain a central platform in Community policy;
- future reports are likely to put even greater emphasis on the European Economic Area and the gradual integration of Central and Eastern European markets into that of the Community.

Table 1

Investment estimates for current environmental measures

Measures	Investments billions ecu
Reduction of sulphur level in heating gas oil (0.1%) and diesel fuel (0.05%)	5-7
Reduction of hydrocarbons (VOC) emissions by Stage I	0.74-0.75
Reduction of sulphur level in fuel oil and bunkers (French Memorandum proposal)	9-10
Total	14.74-7.75

Source: Concawe, oil companies, Consultant

Possible measures mentioned by national and/or European bodies
Investment Estimates by Industry*

Measures	Investments billions ecu
Reduction of hydrocarbons (VOC) emissions by Stage II	1.36-1.45
Lowering of aromatics (10%) and sulphur (0.02%) levels in diesel fuel	26
Increase of cetane index (52) in diesel fuel	2-5
Lowering of final distillation point of diesel fuel (340°C max at 95%)	2.5
Lowering of sulphur level in gasoline (0.05%)	2.5
Lowering of volatility of gasoline by 1 psi	0.3
Lowering of benzene level in gasoline (1%)	1.7
Total	36.4 - 39.5

** Costs for changing from top to bottom loading excluded*

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* *Estimates presented to the services of the Commission by selected oil companies*

ENERGY TECHNOLOGY PROMOTION IN RUSSIA

EC-Energy Centres opened by Commissioner Cardoso e Cunha

BY Hans van Steen, DG XVII
Energy Technology Unit

Following Commissioner Cardoso e Cunha's official inauguration of, among others, the EC-Energy Centres in Moscow and St Petersburg, as announced in Energy in Europe N°19, this article provides further information on Thermie activities in Eastern and Central Europe and in the CIS, and focuses on the activities of the Energy Centres in Moscow and St Petersburg.

The 12 EC-Energy Centres, which are currently operating in Central and Eastern Europe and the CIS, are managed by the OPET network (Organizations for the Promotion of Energy Technology). This network was, as reported earlier, created by the Commission to assist the Community in encouraging market penetration of relevant technologies with the aim of ensuring the effective application of those energy technologies that are available on the market, and to encourage the implementation of new energy technologies throughout Europe. The Energy Centres serve as instruments for all energy techology promotion carried out by OPETs in Central and Eastern Europe and the CIS. They are independent organizations with a basic staffing of EC and local experts in each Centre and documentation and meeting facilities for interested experts, in particular experts from the OPET network.

IMMEDIATE ACTION

In **Russia**, as in all other countries covered by the action, the Commission attached great importance to avoiding any unnecessary delay in implementing appropriate initiatives. Therefore, a so-called 'crash programme' was devised in order to launch immediate, short-term activities on the spot. Most of these activities were assessment and audit actions concentrating on technological energy efficiency improvements, mainly in the industrial sector. In this area, energy savings in many cases could be achieved within short timescales and at a very low cost. This part of the programme has now been completed, with 25 operations having been carried out in Moscow and St Petersburg.

In **Moscow** the programme addressed the rational use of energy through a variety of projects in the public, commercial and industrial sectors. The meat processing plant *Myasokombinat* was selected for an energy audit, which resulted in the identification of large potential savings through the reduction of steam losses. Acting on the advice of the western experts, a number of steam traps in the plant were replaced. The resulting steam savings are estimated at 20-25% of the factory's energy requirements. Similar action in the many other meat processing plants in Russia could produce energy savings of up to 1.5 Mtce/per year.

At one of the main cardiology centres in Moscow, an assessment by western experts has resulted in substantial savings in the electricity consumption of the building. Many of the long electricity lines between wards, workshops and operating theatres have been replaced by switches sensitive to light, motion and time. It is estimated that 40% of electricity consumption in the respective areas will be saved.

As a third example, an energy audit carried out at the open-air Chaika swimming pool helped to achieve considerable energy savings by improving the efficiency of lighting, adapting showerheads and insulating the pools. The results are expected to show 20% electricity savings and 15% heat savings.

Many of the 16 operations carried out in all in Moscow have benefitted from the Centre's EC Energy Bus. This bus carries equipment for audits and assessments and is used for measuring and managing energy usage at various installations.

In **St Petersburg** a project to tune bus engines and to train the drivers of the city's bus fleet has shown remarkably good results. Western experts, together with the local St Petersburg company *Lenpassazhiratotrans*, measured the consumption of motor fuel before and after the initiative. The results showed savings of 20 000 toe, with the abatement of 60 000 t of CO2, and 19 t of lead per year.

Other operations carried out in St Petersburg involve technology for district heating, temperature control for space heating and gas consumption management and metering.

Overall the crash programme in Russia and elsewhere has provided an excellent information base for continuing technology promotion in the energy field. It has demonstrated that efficient technology and modern management techniques can play a vital part in improving the situation in the energy sector in Russia and the Central and Eastern European countries.

Longer Term Activity for Technology Promotion

To maintain the impetus already generated, promotional programmes for the Centres have recently been prepared with a view to longer-term co-operation in the technology field. Initial assessments of the most appropriate types of energy technology promotion for each area in question were undertaken by contractors and formed the basis for establishing the promotional programmes themselves. These contain a number of operations that extend the technology assessment and audits introduced under the crash programme. Also included are:

- organization of and participation in conferences,
- workshops, fairs, business meetings, etc;
- establishment of databases;
- production of documentation;
- training of personnel.

All of these activities will be carried through by the organizations in the OPET network using the EC Energy Centres as permanent bases.

The Energy Centres therefore have as their main task to act as a focus and a channel for information from the West to reach the East. For this process to be most effective, the Commission believes that the expertise and opinions of local staff are vital. To target investment where it will be most productive requires extensive knowledge of local conditions and environment. Regular contact between the Energy Centres, the OPETs concerned in each case, and the Commission is therefore an aspect of the programme which has assumed a great importance.

Future Prospects and the Interface With Other Programmes

Another aspect of the programme is the interface between different Community instruments in the energy field. As far as Russia is concerned, a number of projects are underway in the framework of the TACIS programme (Technical Assistance to the former Soviet Union). One major project in the TACIS energy savings sub-programme aims to strengthen the four EC-Energy Centres in the CIS, including the Moscow and the St Petersburg Centres, and will allow them Centres to get more involved in political and economical matters related to energy efficiency. The **Thermie** technology promotion effort will hence be complemented by actions which are directly aimed at contributing to the economical and political reform process.

The Moscow Energy Centre's EC Energy Bus

In fact, the interface between politics, economics and technology were among the issues raised by Commissioner Cardoso e Cunha during his visit to Russia to inaugurate the Centres. During discussions with, among others, Mr Chernomyrdin, Deputy Prime Minister of Russia, and Mr Sobtchak, Mayor of St Petersburg, Mr Cardoso e Cunha emphasised the need for an integrated approach to cooperation between East and West in the energy field. The European Energy Charter will provide a general framework for such cooperation encompassing all the various sectors and disciplines involved. Great importance should therefore be attached to the ongoing negotiations on the protocols of the European Energy Charter, which will also help facilitate continuing cooperation on technology transfer, which has now been embarked upon within the framework of the Thermie programme and with the establishment of the EC-Energy Centres. Together with other EC inititiatives, these operations play a fundamental role in the process of restructuring the energy sector of the former Soviet Union and provide a basis for continuing cooperation in the energy field. ■

EC AID TO THE NUCLEAR SECTOR IN CENTRAL AND EASTERN EUROPE AND THE CIS

BY D.J.Wilkes, DG XVII
Nuclear energy Unit

Looking forward to the next decade or so it is probable that there will be a need for some moderate expansion in electricity generating capacity in most of the countries of eastern Europe and the former USSR. Its extent will depend on rates of economic recovery and the extent to which efficiency of electricity use can be improved: this itself is influenced by economic conditions since the bulk of energy savings must come from modernization of the industrial sector. Many of the countries in the region look to the continuation of nuclear power programmes for strategic, environmental and economic reasons.

They have, however, made a commitment towards their own populations to ensure safe operation of nuclear power which has led to the shut-down of some of the less satisfactory plants and the formulation of plans to refurbish and upgrade them. Cited as particularly unsatisfactory are the graphite-moderated, water-cooled, pressure tube reactors (RBMK type) which exist only in the former USSR and suffer from a reactor design with unsatisfactory neutronic characteristics. Given the problems of electricity supply in the very regions where these reactors are installed, it is not possible in the majority of cases to shut them down without causing severe problems (even loss of life) during the winter period. The authorities have requested help from the international community and a consortium of Western countries have agreed to their nuclear safety support organizations undertaking a review of safety aspects of this reactor type in collaboration with Russian design institutes. The EC is providing MECU 4 out of the MECU 7 total budget for the project, the rest being provided by the non-EC countries taking part, namely Sweden, Finland and Canada.

The remaining reactors of Soviet design (apart from two fast breeder reactors) are of the pressurised water type (called VVERs) and do not suffer from have any of the neutronic instability problems of the RBMKs. The older version, VVER 230, whilst possessing a number of positive inherent safety features, however lacks adequate redundant and diverse back-up systems which one would find in a modern plant. In addition the older plants suffer in some countries from an inadequate level of 'housekeeping', including routine maintenance and testing. If these plants are to continue to operate without posing too high a risk it is necessary as a first step to bring them back to the as-new condition and then to effect a programme of upgrading measures, the extent of which depends on the length of time for which they will be operated, pending decisions on the provision of alternative means of electricity generation, which could include new nuclear plant, gas-fired plants, etc.

The newer designs of VVER, the 213s and the 1000s, are closer to Western plants in so far as safety provisions and design are concerned. It appears to be practicable to upgrade these plants to a satisfactory standard for operation for a longer period, maybe for the normal design life. Upgrading is obviously easier for those plants which are still under construction. Some countries view the reconstruction of the unfinished plant as a means to allow them to phase out older and less satisfactory units. Others are keen to continue to have their older plants available because, being of much smaller size than the newer plants (440 MWe against 1000 MWe) they lend a vital degree of flexibility to operation of the electricity grid. The imposition of 1000 MW plants on a system with a peak load of, say, only 7000 MW (as in Bulgaria) is an unfortunate legacy of the centralized decision-making processes of the past.

The technical assistance provided by EC and other Western European countries to the nuclear sector is based on know-how and culture transfer. The Western countries are not, of course, in a position to dictate whether and under what conditions nuclear power stations, or indeed other industrial plants, shall be operated within the borders of other sovereign states. Nevertheless, we have the duty to provide such countries with the benefits of our experience accumulated over four decades of designing, building and operating plant under the scrutiny of independent safety authorities. It is clear that there existed under the previous authoritarian regimes no such effective, independent safety authorities and that in some countries standards of operation and maintenance in the plants themselves were very low. Deficiencies in other aspects such as plant design inevitably arose from an emphasis on production targets unchecked by independent safety review. The EC is providing aid via a consortium of Western European safety authorities to advise on the legal framework and *modus operandi* of safety authorities in the countries of Eastern Europe and of the former USSR. In most cases there is also a lack of independent technical support to the safety authorities. A separate consortium of Western technical support bodies is providing advice and actual technical support where requested.

It is important that aid given to both safety authority and plant operator be balanced: one must not overwhelm the other. To this end it is desirable to give assistance to the plant operator in helping him make safety submissions to the authorities requesting a license to operate following outages, modifications and so on. A major part (about 70%) of the EC technical assistance budget is being spent on design reviews carried out in partnership between Western firms and Eastern firms leading in the end to the specification of a package of proposals for modifications aimed at raising safety standards to a satisfactory level. Following on from this it will be the responsibility of the plant operator to decide on a programme of backfitting and upgrading measures and to submit a safety case to the national safety authority (NSA). The judgement of what is acceptable will be made by the NSA.

It must be emphasised that it should not be the intention of European industries to take over from the Eastern firms nor to attempt to steal their home markets, but rather to work together in partnership to build up joint capabilities.

In some countries, notably at the moment Bulgaria, there is a strong need for assistance to plant operators to provide training in modern power station operating practise; i.e. maintenance, planning, housekeeping, etc. This is being undertaken by the World Association of Nuclear Operators (WANO) with funding by the EC. In the case of Bulgaria, an assistance team has been sent to the plant in question and have arranged exchanges of operators under the WANO 'twinning' scheme. Assistance programmes based on the above scheme have been implemented in Bulgaria since October 1991. Such help could be extended to other countries in the region, based on the needs of individual stations.

The cost of the overall EC programme is of the order of 100 MECU per year which finances aid to safety authorities and support institutes for the production of design proposals, plant upgrades, and assistance to operators. Preliminary action is in hand to define a programme of work covering the fuel cycle plants (i.e. reprocessing and fuel fabrication), waste management and plant decommissioning. A number of major environmental problems arise within this sector.

The financing of this 'software aid' is being done on a bilateral basis by the EC and individual donor countries from outside the Community. The EC provides by far the largest contribution. The hardware aid, that is, money provided to undertake plant backfitting and other engineering tasks, is on an altogether different scale and can only be provided by banks (e.g. World Bank, European Bank for Reconstruction and Development) or by a multilateral fund. In reality it can be envisaged that the banks might provide money for completing partly constructed plants or backfitting the better plants on the basis of the security constituted by the future electricity revenue: there may be a need for some fairly imaginative payback schemes. For some of the projects on the older and less safe plants with only a short operating future or projects on decommissioning, waste or environmental remediation, it may be that no obvious pay-back mechanism can be envisaged. It is for such projects that a multilateral fund has been proposed.

It has to be recognised that as yet the funding arrangements are far from clear and we are still some way from having workable concrete proposals. One possibility not mentioned above is that Western electrical utilities might choose to buy shares in some of the better power plants with a view to improving the safety level and taking a share of the electricity revenue. Such is the case in one of the partially completed plants in Slovakia.

Finally we must recognise that our assistance programmes will not succeed without the wholehearted cooperation of the beneficiaries, and in particular of the Russians who are the holders of all the design and technical information. It is essential to work in partnership and to establish trust and credibility at professional, managerial and political levels. And indeed this is arguably the biggest challenge of all. ■

ASSISTANCE TO EASTERN EUROPE/EX-USSR IN THE ELECTRICITY SECTOR

BY Pierre Mallet, DG XVII
Electricity Unit

This article presents a brief update of the progress of the Commission's activities in the field of assistance to Eastern Europe and ex-USSR, more specifically in the electricity sector. More detailed information on this topic was given in Energy in Europe No 19, including in the 'Focussed on the East' feature[1].

PHARE

Under the Phare programme, the main recent event has been the presentation in July in Bucharest of the final results of the overall restructuring study for the Roumanian electricity Board (RENEL). The study allowed a thorough analysis of the present organization of the sector to be carried out, which led to the establishment of a whole set of recommendations to ensure effective transition towards market-oriented management of the power supply sector. The local authorities expressed great satisfaction as regards the work performed. Quite clearly, good working relations between the consultant in charge of the study and the recipients have been the rule, which allowed an extensive transfer of know-how. The Minister of Energy as well as the President of the Electricity Board have committed themselves actually to implement the proposed changes, and indeed some concrete steps have already been taken, such as the renewal of the board of directors, which now has new functions and membership, more in line with Western practice.

TACIS 91

Good progress was also made in the implementation of the programme of technical assistance to the new republics of the former Soviet Union CIS (Tacis). Concerning the 1991 programme, the start of which was much delayed due to the collapse of the USSR, the summer period was actively used to draft terms of reference for selected projects, to launch calls for tenders and start evaluation of the proposals received. The first contracts will be signed soon and consultants were on the spot before the winter began. The first projects will include the following:

- definition of acceptable arrangements for the structure, organization and financial and operating arrangements for the electricity supply industry in the Russian Federation;
- advice for drawing up and certifying tariff procedures (Moscow and Tver regions);
- improvement of the management in a regional electricity company (St Petersburg);
- introduction of new personnel management methods (Tver region);
- action aiming at the introduction of market-oriented management on the distribution side of the electricity supply industry, notably through the creation of a pilot distribution agency for the Moscow electricity company.

The Commission's work programme provides that all projects under the 1991 exercise will be under way before the end of 1992. In the electricity field, the total number of projects is 30, for a total budget of MECU 17, with the following breakdown: 19 projects in Russia, six in Ukraine, two in Kazakhstan, one in Belarus, one in Georgia and one in Tajikistan. The preponderance of projects in Russia was due to the limited opportunity, within the time frame of the 1991 programme, for direct discussions with the other Republics.

1 *See Energy in Europe No 19 p. 66. The 'Focus on the East' feature is also available as an offprint from DG XVII's Information Group.*

TACIS 92

Simultaneously, implementation of the 1992 programme has started. The first step has been the appointment by each Independent State of a National Coordinator and the establishment of national coordinating units in each CIS State and Georgia. The National Coordinators are high-ranking local officials who will act as official interlocutors of the Commission, annually identifying priorities for assistance and presenting them to, and consulting with, the Commission. The main role of the Coordinating Units is day-to-day management of the TACIS programme in their respective countries. Originally, the Programme was negotiated with the 'all-Union' government and coordinated by a single Unit in Moscow set up for this purpose. This Unit is now responsible for the Russian programme only.

The next step has been the definition of the Indicative Programmes for 1992; such programmes have now been agreed and signed with each of the CIS countries and Georgia. These form the framework for specific sectors and projects identified within each State's 'Action Programme'. These programmes involve activities sometimes lasting several years. The 1992 programme builds on the 1991 programme, but aims to increase the efficiency of its Technical Assistance through linkages between different sectors or regions. The focal sectors for cooperation are:

- human resources;
- food production and distribution;
- networks: energy, transport, telecommunications;
- enterprise support services;
- nuclear safety.

In addition, some funding has been set aside for a regional inter-state programme related to:

- policy advice to governments, parliaments and other relevant institutions on matters concerning inter-state economic relations and money, tax reform, budgetary procedures and techniques;
- programmes of common interest to several states, e.g. ecological projects, joint projects in energy, transport or telecommunications.

During the summer, programming missions visited all the Republics of the CIS and Georgia. These missions proved particularly valuable, not only in identifying potential projects, but also in establishing contacts and in familiarising the republic's authorities and operators with the situation in the West and with the opportunities offered by the Community assistance programmes. These missions facilitated the drafting of Financing Proposals which present the projects to be supported in detail. Proposals were submitted to the Tacis Management Committee (made up of representatives of the EC Member States) in the autumn and at the time of writing signature is awaited of the relevant Financing Memoranda, signed by the Commission and each recipient State.

Throughout the energy sector, to which some MECU 40 will be allocated under TACIS in 1992 (not including nuclear safety), priority is given to large projects common to several sectors, such as, for example, the setting up of management training centres for executives from both the oil and gas and the electricity sectors. Operations to be financed aim at an immediate impact on the overall economic reform process at macro level: they usually offer guidance as to policy frameworks, rather than an actual technology. This brief review will hopefully demonstrate that things are progressing now, and that even if the start has been a little bumpy, largely due to unexpected political events in the East, the Commission will soon be able to operate on a normal one-year cycle. The established tools, procedures and organizations now available will be of great help in this case. It should not be forgotten that Phare and Tacis, together form the largest such concerted assistance programme ever implemented. ■

THE EUROPEAN ENERGY CHARTER
ORIGINS AND OBJECTIVES

Speech by Clive Jones
Secretary-General of the European Energy Charter Conference

GIVEN AT THE SEMINAR ON THE CHARTER

HELD IN MOSCOW, SEPTEMBER 1992

Origins

The initiative which led to the European Energy Charter was first proposed by the Prime Minister of the Netherlands, Mr Ruud Lubbers, at the European Council in June 1990.[1]

Mr Lubbers pointed out that there was a natural complementarity between the vast energy resources of the East, particularly the former USSR, and the resources of business skills, technology and investment funds available in the West.

His proposal was that these strengths should be brought together in a new East-West cooperation which could act as a driving force for economic recovery in the East.

The other European Community heads of government present at the European Council welcomed Mr Lubber's proposal and asked the European Commission to study ways to put his ideas into action.

In February 1991 the Commission proposed the idea of a European Energy Charter.

The Commission's Charter proposal was discussed amongst the European Community's Member States who reached agreement on a revised version of the Charter proposal in July 1991.

However, the Charter envisaged cooperation over a much wider area than the European Community, so the Community called together an international Conference to discuss the proposal with other countries.

The Charter Conference met for the first time in July 1991 and was attended by all the countries of Europe, including the USSR as it then was, as well as the non-European countries of OECD such as the US and Japan.

The July Conference decided to begin negotiations on the Charter and its associated Basic Agreement and Protocols, and created a number of Working Groups. Ambassador Charles Rutten of the Netherlands was named as Conference Chairman and Mr Clive Jones, Deputy-Director General for Energy in the Commission was appointed interim Secretary General in charge of an international negotiating Secretariat.

Successful negotiations during the autumn of 1991 led to signature of the European Energy Charter at a Conference in the Netherlands on 17 December 1991, chaired by Prime Minister Lubbers.

The Charter has been signed, then and since, by 47 countries and the European Community. These signatories include all 12 EC member countries, all the countries of Western Europe, seven countries of Eastern Europe, the three Baltic Republics 11 Republics of the former Soviet Union, the United States, Japan, Canada and Australia. Three more countries - Croatia, Slovenia and Turkmenistan - are expected to sign in the next few weeks.

The signature of the Energy Charter in December 1991 was the first independent act of the Republics of the former USSR on the international stage.

Objectives

The European Energy Charter itself is a Political Declaration which commits its signatories to cooperate in trade, investment and policies in all energy sectors.

The Charter reflects the original Lubbers proposal by putting its emphasis on the role of industry and the creation of a true energy market throughout Europe and internationally. It is not an aid programme or an attempt by governments to plan energy developments.

Since the key to the success of the Charter initiative will be industry's willingness to invest and operate in the East, it is essential that the Charter's political

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[1] *See also 'Progress in the Negotiations Towards the European Energy Charter' in Community News.*

declaration should be given force by a legal framework. Companies will need to have the same legal guarantees of fair treatment and free trade that they already enjoy in Western countries.

This legal framework will be provided by the Basic Agreement of the European Energy Charter which is now under negotiation.

The Basic Agreement will cover all the main issues of concern to investors, such as access to resources, fair and non-discriminatory treatment at the investment stage and after the investment is made, rights to sell energy production in home or export markets, including transit through third countries and dispute procedures.

Negotiations on the Basic Agreement are now well advanced in a Working Group chaired by Sydney Fremantle (UK) and will shortly be taken up at the full Conference level.

In addition to the Basic Agreement, the Conference will in due course adopt Protocols defining cooperation in each specific energy sector. Negotiations are well-advanced on a Nuclear Protocol, with the emphasis on safety concerns, and on an Energy Efficiency Protocol with important benefits for the environment.

Additional Protocols will be negotiated later for oil, gas, electricity, coal and renewable energies.

The particular importance of the Basic Agreement negotiations has been emphasised recently, at the highest political level, in the conclusions of the European Council in Lisbon in June and the Western Economic Summit (G7) in Munich in July:

The European Council 'emphasised the importance of rapid progress in the negotiation of the Basic Agreement for the implementation of the European Energy Charter and urged the Charter Conference to intensify its efforts in order to reach early agreement.'

The Western Economic Summit 'noted the importance of the European Energy Charter for encouraging production and ensuring security of supply' and 'urged rapid conclusion of the preparatory work.'

Support for the Charter initiative is also strong in the East. Eastern and Western countries joined together at the Conference for Security and Cooperation in Europe (CSCE) Summit in July in expressing their full support for 'the further development of the European Energy Charter which is of particular importance in the period of transition.'

In his message to a Seminar for Charter participants in Moscow on 28 September 1992 the Deputy Prime Minister of Russia, Victor Chernomyrdin, emphasised Russia's support for the Basic Agreement negotiations and described the Basic Agreement as 'an instrument for an accelerated exit from the economic crisis and for the introduction of the market system and the progressive transformation of a closed economy into an open type economy which is naturally integrated into the world market.'

These high level declarations of support reflect the fact that the importance of the European Energy Charter cooperation goes far beyond the energy field; It will certainly increase the security of energy supplies in Europe and in the world market. But it will also:

- *benefit the European and world environment by encouraging investments in energy efficiency and transferring know-how and technologies in this field to the CIS and Eastern Europe;*
- *create major business opportunities for both Eastern and Western industries at a time of depressed economic growth;*
- *provide a driving force for economic recovery in the East;*
- *create a sense of partnership across the whole of Europe.* ■

THE OPET NETWORK

ACHIEVEMENTS TO DATE AND GUIDELINES FOR THE 1992-1993 PROGRAMME

Over the last two years, following the adoption of Council Regulation 2008/90 ('Thermie Programme'), the Commission has undertaken a number of associated measures under Article 5 and Annex V of the regulation. Consistent with these provisions, the Commission has delegated these operations to existing organizations involved in similar activities in the Member States (Organization for the Promotion of Energy Technology: OPETs) which were selected by two public calls for tender in 1990 and 1991). Over 90% of Commission activities as regards associated measures is implemented through this OPET network in accordance with the EC's principle of subsidiarity.

After almost two years of operation, the 'Community dimension' of the OPET network is becoming more and more apparent. The OPET network has now reached 'cruising speed' and the aim is to maintain the number of organizations at around 40 (see up-to-date list overleaf). The OPET network operates throughout the Community, and represents a wide variety of organizations, with a wide range of technical expertise. Some are funded by national governments, others are private companies; some operate on a national basis, some regional, and yet others operate throughout the Community in specific sectors. The operation of the network should be guaranteed until at least the expiry of the current present Thermie regulation and a review of its functioning will be undertaken by mid-1994.

OPETs are involved in the Commission's associated measures mainly as regards the following activities:

- ***analysis and evaluation of the market potential*** for the application of energy technologies as regards their market penetration;
- ***dissemination of information*** on the promotion of energy technologies and of the project results;
- ***industrial co-operation with Third Countries*** in these areas.

Approximately MECU 20 are available every year for the associated measures, and a substantial proportion of this is disbursed through the OPET network.

The associated measures to be carried out in 1992/93 will follow the same lines as those carried out up to now. The 40 OPETs will co-operate in about 400 measures (200 in the EC and 200 outside it). The programmes are drawn up on the basis of results of market and technology assessments, and of proposals from the OPET network itself.

The measures will cover the different fields of application of the Thermie programme as follows:

Rational use of energy	60%
Renewable energy sources	20%
Solid fuels	10%
Hydrocarbons	10%

ANALYSIS AND EVALUATION OF MARKET POTENTIAL

In the field of ***rational use of energy in industry***, eleven market evaluations and technology assessments have been prepared by external consultants in collaboration with OPETs, covering the following industrial sectors: iron and steel, non-ferrous metals, chemicals, agrofood, paper and board, bricks and heavy clays, pottery and ceramics, glass, cement, brewing and textiles. Also a multi-sector technology, CHP (combined heat and power or cogeneration), has been the subject of a market assessment. Each of these

12 evaluations has been directed towards defining the market potential within the real situation in each specific sector, analysing major concerns and obstacles including financing problems. As a consequence, specific dissemination strategies for specific technologies have been proposed. In addition, the markets for 'variable speed drives for rotating machinery' and 'medium and large size industrial heat pumps' are now being evaluated.

For 1992/93 these industrial sector market assessments and other activities to date will be followed up by more targeted ones, in order to help meet real specific needs. These market activities will be closely related to the second step of the dissemination strategy being followed during this period.

With regard to ***rational use of energy in buildings***, the main end-use of energy is for space heating (70% of the total for domestic buildings and 55% of the total for commercial and office buildings) followed by hot water in domestic buildings (12%) and electrical appliances in commercial and office buildings (25%). Taking into account current market penetration and the efficiency of available technologies, global savings could be achieved[1] of 16% for domestic buildings and 27% for commercial and office buildings. Most of the above savings would come about through the introduction of best available technologies in space heating (16% of total energy consumption).

In 1992/93, five main lines of action will be followed in the buildings sector:

- analysis of the potential for large targeted projects with a major impact on the environment and on improved energy efficiency and the environment;
- market assessment and evaluation of energy saving potential for low CO2 houses, combined district heating and cooling networks, and building energy management systems (BEMS) in small and medium sized enterprises;
- analysis of the dissemination potential in the Member States for building in environmental assessment methods at the design stage, in order to promote the concept of the 'environmentally friendly' building;
- identification of old industrial sites to be renovated into commercial or office buildings which could be a good basis for targeted dissemination activities;
- close contact with manufacturers and building companies in order to ensure better integration with Thermie activities.

In the field of ***rational use of energy in transport***, priority areas for dissemination operations are: promotion of public transport, and traffic control and management in cities. Furthermore, optimization of freight transport management and the use of alternative fuels constitute two further important areas of activity.

In 1992/93, market studies in this field will concentrate on detailed evaluation of urban transport demand. The aim is to consider how best to match supply to demand through modern and adapted systems, enabling public transport to regain an important market share for city centre journeys. Special attention will be given to the feasibility of improved deployment of electric vehicles in cities.

In the field of ***renewable energy sources***, a number of market evaluations have been undertaken: 'Biogas from Animal Manure', 'Energy from Industrial Wastes', 'Energy from Large-scale use of Wood in Industry', 'Wind Parks and Isolated Windmills', 'Solar Thermal Technologies in Large-scale Industrial Water Usage', 'Commercial and Industrial Opportunities for Photovoltaic Technologies in Hungary and Czechoslovakia'. Also several studies on 'Market Potential for Efficient Technologies in Rural Areas of the Community and in Eastern Countries' and 'Market Strategies for the Promotion of New and Renewable energy sources for Local Authorities' are in progress. Thereafter, further market assessments will complement these and particular emphasis will be placed on targeted market assessments in line with the dissemination strategy.

In the ***solid fuels*** sector an initial study on the 'Market Potential for Derived Fuels from Coal Liquefaction' has been undertaken as a follow-up to Point of Ayr Liquefaction Plant project. Taking into consideration that a significant market for clean and efficient coal combustion technologies also exists in Central and Eastern European countries and elsewhere, a series of six market analyses are being conducted on the potential of boilers, dryers and furnaces in Poland, Hungary, Czechoslovakia and China. In 1992/93 similar market assessments will be undertaken in further third countries (e.g. Bulgaria, Romania, CIS, Indonesia, Colombia) where there is an important potential market for coal and/or lignite.

In the ***hydrocarbons*** sector, a market study has been undertaken for technologies related to process facilities on off-shore installations. Other studies have been launched relating to multiphase technology, exploration techniques or automatic operation using robots. Various technology assessments will be carried out in this sector, closely linked to dissemination activities in Third Countries (Central and Eastern Europe, Northern Europe and North America).

DISSEMINATION OF INFORMATION

A total of 58 operations have been undertaken or are in progress in order to progress the dissemination strategy as regards the ***rational use of energy in industry***, under

1 These savings are based on the total consumption of the 12 EC Member States.

which heading more than 220 demonstration and Thermie projects have been supported in the past by the Community. These actions can be classified in four groups:

- activities at EC level, where the basic aims are to clarify the situation of industrial sectors from an energy point of view in relation to the technology and market assessments, analysis of legal and administrative barriers and political aspects;
- activities where the primary objectives are concentrated on direct marketing actions at local/regional/national level, aimed at directly facilitating business operations;
- activities aimed at providing a wide range of information tools covering specific sectors and technologies such as publications, videos, etc;
- activities which further motivate industrial sectors through a coordinated set of activities following a successful event.

In the second phase (1992/93), the dissemination strategy is targeted towards creation of the infrastructure necessary to facilitate these marketing activities between manufacturers, engineering companies, financiers and industrial associations.

Under the ***rational use of energy in buildings*** heading, the dissemination programme involved the organization of seminars in both the Community and Eastern Europe, and the production of maxi-brochures and videos on the following themes: building shells, retrofitting technology for existing buildings, high efficiency boilers, bioclimatic architecture, building energy management systems, CHP, district heating and efficient lighting technology.

In 1992/93, the dissemination programme in this sector will concentrate on low energy housing, retrofitting of existing buildings, condensing boilers and energy management systems for buildings. Major promotional campaigns will be undertaken by the OPETs in close collaboration with building companies, equipment suppliers and manufacturers in order further to increase the effectiveness of the activities.

With regard to ***rational use of energy in transport***, the priority has been to facilitate the exchange of experience between the different participants involved, using a variety of promotional techniques, such as a European seminar on urban public transport, a video showing significant experience and results in the sector, a Community-wide campaign targeted at municipalities and transport companies, and seminars in maritime and road freight management as well as on the use of alternative fuels (diesel). A substantial effort to promote and strengthen the exchange of results and experience of selected European cities is envisaged for the coming period. This can be enhanced by improving technological knowledge through the setting up of targeted projects, especially in urban traffic management and also in certain specific operations for the promotion of public transport and the use of alternative fuels.

A total of 32 operations have been undertaken in the field of ***renewable energy sources***. Most of the information disseminated in this sector was obtained from Community programmes, with input from Member States' programmes and private projects. It focused on solar photovoltaic (large grid-connected photovoltaic plants, smaller sized plants interconnected and then connected to the grid system, as well as isolated applications) and solar thermal heating (in buildings, industry, agriculture and swimming-pools). To follow, a large promotional effort will be made in close cooperation with local authorities in rural areas and in combination with other international organizations such as UNESCO and the WHO.

In the ***solid fuels*** sector, a total of 10 operations have been undertaken, concentrated in two fields of activity:

- Activities at EC level, where the objective is to assess the current state of technologies for clean and efficient combustion of coal and lignite, in relation to technology, market potential and environmental aspects;
- Activities in Third countries (mainly Eastern European Countries) such as market and technology assessments, technical visits by decision makers to EC project sites, marketing operations with the participation of decision makers, financial institutions and technology suppliers.

As information to be disseminated, the Community can offer more than 120 projects which have been supported under its programmes, covering coal conversion, clean combustion of coal in fluidised beds or pulverised coal with environmental protection equipment and integrated combined cycle gasification.

In the ***hydrocarbons*** sector, dissemination of information has been carried out through participation at exhibitions, where companies have presented Community-supported technologies. Brochures have been produced; also a newsletter giving short information on the availability of particular technologies. Preparatory work is well in hand on workshops in almost all Member States. To follow up, special emphasis will be placed on analysis of the potential for a targeted project in multiphase technology.

CO-OPERATION WITH THIRD COUNTRIES

A substantial part of the assessment and dissemination activities are of importance for Third Countries. In fact, they offer wide scope for penetration of technologies which are being promoted by the EC on its internal market. In line with its general policy objectives, the Commission has directed its activities

as a priority towards Central and Eastern Europe, including the CIS, and to the EFTA Countries. In order to secure effective action on the spot, focal points staffed with permanent experts have been established: 12 EC-Energy Centres[2] have been set up in Central and Eastern Europe and in the CIS following the Commission Decision of 5 December 1991, and all are now operational. Their first task was the implementation of 100 technology assessments in industrial plants and buildings. These provided the EC with valuable information on the state of equipment and the potential for penetration of European energy technologies. In order to obtain reliable data, a substantial amount of metering was carried out on the spot. This was greatly appreciated, since it produced immediate results, reducing energy consumption in plants and buildings visited by an average of 15 to 25%. The political benefits of these rapid and effective measures are very high, for both the governments in Central and Eastern Europe and for the industries involved. These measures will be consolidated and tied in with complementary support given under other EC programmes (TACIS and PHARE). Furthermore, a programme of promotional activities, including the organization of conferences, business workshops and fairs, production of documentation, establishment of databases and training of personnel, has been launched, with a view to effective application of the energy technologies available in the EC market. In 1993 the programme will continue along the same lines, with due regard to Third Countries' needs and capacities.

Co-operation is also envisaged with other important neighbour regions of Northern and Southern Europe, and in particular with Mediterranean countries and with the promising markets of North America.

For further information concerning Thermie events please contact:

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[2] *EC-Energy Centres have been established and are operational in: Warsaw (Poland), Prague and Bratislava (Czech and Slovak Federal Republic), Budapest (Hungary), Sofia (Bulgaria), Tallinn (Estonia), Riga (Latvia), Vilnius (Lithuania), Moscow and St. Petersburg (Russia), Kiev (Ukraine) and Minsk (Belarus).*

FORTHCOMING THERMIE EVENTS

TITLE	DATE	PLACE	OPET CONTACT
Seminar on space heating measuring and regulation	27-28 January	Bulgaria	INNOTEC Mr Andreas Jahn
Training course - Energy management	10-11 February	Russia	BCEOM Miss Barbara Chenot
Application of load control projects in Czechoslovakia	March	CSFR	GOPA Mr H-J Siegler
New technologies for RUE in the bricks and heavy clay sector	March	Portugal	CCC Mr Luis Silva
Photovoltaic Symposium between Bulgarian, Romanian and CEC Photovoltaic industrialists	March	Bulgaria, Romania	ASTER Miss Milena Guizzardi
Exhibition stand 'Energiesparmesse 1993'	5-7 March	Austria	Zr-E Mr Helmut Windschiegl
Workshop on performance improvement on existing boilers	Spring	Hungary	ENEA Mr Walter Cariani
Energy saving by recycling of materials	Spring	The Netherlands	NOVEM Mr William Gerardu
Efficient industrial and domestic natural gas equipment	Spring	Greece	LDK Mr Spyros Pavlidis
Efficient use of energy in open-cast mining	April/May	EC	ICEU Mr Thorsten Körner
Organization and execution of a promotional campaign in the CIS in selected energy intensive industries	April/May	CIS	ICEU Mr Thorsten Körner
Control strategies for large boilers	April	Germany	TÜV Mr Jörg Bostel
New technologies for RUE in the ceramics industry	April	Portugal, Spain	CCC Mr Luis Silva
Photovoltaics: A challenge for Portugal and Spain	26-28 April	Portugal, Spain	CCC Mr Feliz Mil-Homens
Targeting the Norwegian market	May	Denmark	ICEU Mr Thorsten Körner
Anaerobic digestion of sewage sludge and co-digestion of organic wastes	May-June	Ireland	EOLAS Ms Rita Ward
Workshop on rational use of energy in the glass sector	May	CSFR	FIZ Karlsruhe
Use of geothermal sources for district heating and other applications	May	Germany, Poland	POTSDAM Mr Jurgen Socher
Energie technologies for the European ceramics industry	May	Italy	ASTER Miss Milena Guizzardi
Technologies for the rational use of energy in the clay, brick and tile sector	10-11 May	North Africa	ICIE Miss N Del Bufalo
Third party financing: advantages, energy saving and pollution	June	Italy	ICIE Miss N Del Bufalo
Workshop on efficient public transport in Riga and Tallinn	June	Latvia	ASTER Miss Milena Guizzardi
Advanced climatisation systems: passive and active climatisation	3-4 June	Spain	ICAEN Mr Joan Josep Escobar
Energy saving through rationalisation interventions of low demand public transport	10-11 June	EC	ICIE Miss N Del Bufalo

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ENERGY COOPERATION WITH DEVELOPING COUNTRIES

BY Pavlos Dinopoulos, DG XVII
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Increased energy consumption in developing countries will be a major factor in the near future. Although at present high income countries are still the major energy users, by the middle of the next century today's developing countries will account for the largest share of the world's commercial energy use.
The importance of technical cooperation in the energy field of is underlined by the fact that many developing countries possess abundant fossil fuel resources which they need to use more efficiently. Sustainable energy production and consumption can make a major contribution to the trade performance of developing countries, in particular by improving competitiveness, and thereby ensuring a viable external position.
Energy cooperation between EEC and developing countries needs to be firmly anchored in a policy framework conducive to sustainable development. This requires developing countries to examine in detail the impact of their policies on the level and pattern of energy consumption, in all sectors.

POLICY PLANNING AND TECHNICAL ASSISTANCE

The Community has developed several instruments of technical cooperation mainly oriented towards policy planning and energy development.

There are two categories of Community instruments in this area:

- those with rather broad geographical scope: **horizontal instruments**, and
- those operating in specific geographical areas: **geographical instruments.**

HORIZONTAL INSTRUMENTS

The main horizontal instrument is the **International Energy Cooperation Programme.** This programme covers Asia, Latin America, the Mediterranean and Eastern European countries with the main focus on the high energy consuming countries and those in the vicinity of the Community, and concentrates on:

- planning support at the strategic level through technical assistance and training;
- regional integration of energy markets (e.g. OLADE, ASEAN, etc.);
- institutional support to an international network of energy research institutes (COPED); and
- joint ventures promoting measures in the field of energy technologies.

Its total financial endowment is MECU 8.0 annually.

GEOGRAPHICAL INSTRUMENTS

Asia and Latin America

Programme of Cooperation for Energy Development. This programme concentrates on the improvement of energy use at a national, sub-regional and regional level in Latin America and Asia.

There are five main lines of action:

- identification, evaluation and deployment of local energy resources, in response to the priority needs of the countries and regions involved;
- technological cooperation on developing, testing, producing and installing energy equipment best able to exploit local energy resources;

• development and dissemination of techniques permitting efficient utilization of energy in industry, transport, housing, production, transport and distribution of electricity, etc;
• strengthening institutions in the energy sector, particularly through technical assistance, and implementing training activities;
• disseminating information, particularly through training, organizing seminars and publishing literature on energy.

The programme's present endowment is about MECU 13, subdivided between Asia (MECU 8) and Latin America (MECU 5). However, financial allocations in the energy sector are greater than this amount if one takes into account the energy component of broader Development Aid activities. For 1992, for example, MECU 21 is expected to be devoted to energy in Asian countries.

Mediterranean countries

The Community can finance any project (e.g. energy production and transmission) from its initial to its final stage (both by the Commission and EIB). However, the institutional framework (financial protocols) entrusts the final decision to the third countries themselves. In the past, the majority of projects in this field were financed mainly by EIB's own resources in the form of loans with subsidised interest payments. Horizontal operations were limited to seminars and data collecting.

Among the pillars of the new Mediterranean cooperation strategy of the EC are the regional cooperation programmes which may also cover energy schemes at the regional level. Another pillar is the accent placed on safeguarding the environment: for instance the Commission provides interest subsidies on loans contracted by Mediterranean countries with the EIB.

At present, attention is particularly focused on providing assistance to Mediterranean countries for the interconnection of electric power distribution grids and gas pipelines.

In the case of Algeria, energy is the main field of cooperation. For example, the EC-APRUE (Agency for Promotion and Rational Use of Energy) cooperation programme amounts to MECU 3.6.

THE LOMÉ CONVENTION

Energy development is specifically mentioned in the LOME IV Convention as one of the priority areas of ACP-EC cooperation. All phases of an energy project can be financed by Lomé Convention funds (from the provision of technical assistance to the actual investment, either by the European Development Fund or by the European Investment Bank).

However, under the institutional framework, it is up to partner states to define their existing priorities within the geographical allocations. Under Lomé III the energy sector absorbed 5.8% of the total budget (about MECU 500).

Within this institutional framework the Community can only encourage ACP governments to attach higher priority to appropriate energy projects. It can also ensure a more systematic appraisal of all projects from the energy/environment point of view.

CONCLUSION

The main aim of cooperation with developing countries in the energy field is to contribute towards the promotion of sustainable energy production and consumption through:

• implementation of effective energy policies and introduction of more efficient technologies for energy production, transmission and consumption;
• substitution of high-carbon-intensity fossil fuel with low or zero-CO2 emission fuels;
• development of renewable energy resources.

To achieve these objectives the main priority of the Community will be to improve the capacity of the developing countries to manage energy in a sustainable way. ■

SESAME

BY Keith Joels, DG XVII
Information Resource Manager

THE EUROPEAN COMMUNITY'S ENERGY TECHNOLOGY DATA BASE

Information on the hundreds of innovative Energy and Technology projects supported by the European Community is regularly published in Energy in Europe, project brochures and final reports. Publicity is also given to projects by way of workshops and conferences organized by the European Commission. Use of either the printed or spoken word however, places limits on the extent to which information can be disseminated. The number of people who can be informed of and subsequently participate in conferences is restricted. Without widespread publicity, knowledge of Community publications is also limited.
It was therefore clear that a dissemination technique with the potential of reaching many thousands of people was necessary and it was for this reason that the Commission set up an electronic information system; the data base SESAME. Available throughout the world to anyone having access to a PC or terminal and electronic communication networks, the information in SESAME can be obtained as simply as by making a telephone call.

SESAME is a documentary or full text data-base containing information on 12 000 ongoing and completed Community energy technology projects administered by the Commission, Community Member States and Norway. From design to construction and on to the important monitoring phase of each project, up-to-date details are continually entered into the data base for every project. The data provide a valuable source of information for those who need to follow the latest developments on the European energy market.
Sector coverage is wide, including new and renewable sources of energy, energy saving, solid fuels, electricity, heat and the hydrocarbon extraction industry. Each record in the data base gives concise details of the technical aspects of a single project. Immediately interim project results are available, or important conceptual or design changes are made, then the relevant details are added to SESAME. The successful development of, or challenges posed by, each project are clearly noted.
In addition to technical information, the data-base also contains the names and addresses of contact points, information on the undertakings carrying out the projects and details of manufacturers supplying state-of-art technology used. Useful details on the project location, costs, energy savings and payback times are also listed.
The wealth of information can now be accessed by users of either Teletype terminals (or micro-computers with suitable communication software) or, videotext terminals such as those used for Minitel, Prestel and Bildschirmtext.
SESAME is more than a technical data base; its potential for opening up market opportunities is not insignificant. Many project contractors are looking for partners either to set up joint ventures in order to further develop their technology or exploit new markets. Manufacturers working with the contractors are often willing to licence their technology. By identifying technology which has successfully entered one market, SESAME users maysee opportunities for introducing it elsewhere; either in another country or in a different industry. SESAME moreover is a shop window where one can see how sector market leaders are improving their processes. SESAME is also

available on diskette from Infopartners and CD-ROM from Longman.

The data base may also be used as a Eurocontact point for enterprises who wish to know who is operating in a specific sector.

SESAME must be seen furthermore in the much wider context than energy technology; many of the projects also address important environmental problems such as waste disposal and desulphurization of process exhaust gases, to name but two.

A number of projects have led not only to improvements in processes but also in project quality. Lastly the export opportunities presented should not be under-estimated. Technology which is tried and tested in one country may be highly innovative in another. Problems frustrating one contractor may very well already have been solved elsewhere.
SESAME is therefore a valuable source of information for any organization, large or small which is using, developing or requiring modern high technology solutions to many of today's problems. ■

Online access to SESAME may be obtained from:

EUROBASES
Kurt Glazer, CEC Loi-57
200 Rue de la Loi
B-1049 Brussels
Tel: 235 00 01
Fax: 236 06 24

and

STN INTERNATIONAL
Postfach 2465
D-7500 Karlsruhe 1
Tel: 49 7247/82 4566
Fax: 49 2968/49 2868

CDROM version is available from:

LONGMAN INDUSTRY AND PUBLIC SERVICE MANAGEMENT
6th Floor
Westgate House
The High
Harlow, Essex
UK - CM20 1YR
Tel: 0279 442601
Fax: 0279 444501

A disc version is available from:

INFOPARTNERS SA LUXEMBOURG
Airport Centre
5 rue Hohenhof, BP 262
1736 Senningerberg
L-2012 Luxembourg
Tel: 352 3498 1440
Fax: 352 3498 1234

and

STATENS DATASENTRAL
Mrs Anne Røed
Ulvenveien 89B
N - 0581 Oslo
Norway
Tel: 47 2 95 63 00
Fax: 47 2 64 84 07

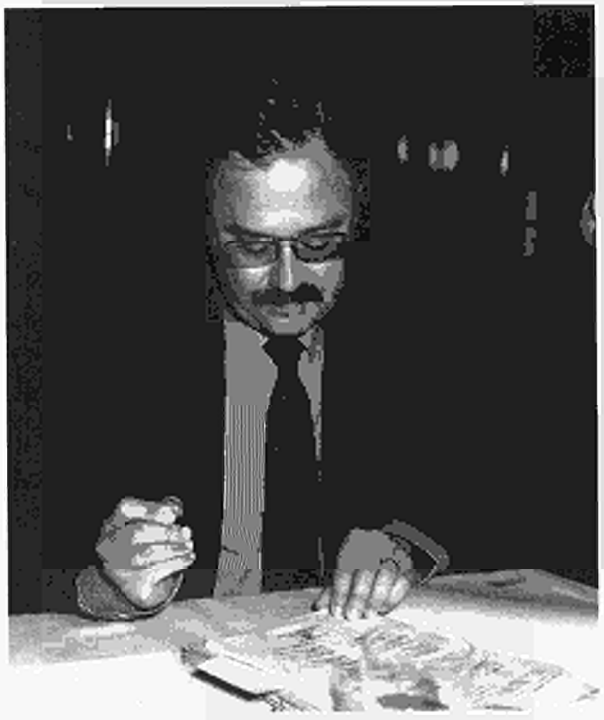
SIGNATURE OF THE PUERTOLLANO IGCC CONTRACT

Madrid, 23 September 1992

Address of Mr C.S. Maniatopoulos
Director General for Energy

Mr Chairman,
Directors-General,
Ladies and gentlemen,

I am very happy to be present today at this rather special event, the signing of the contract of the IGCC power plant project in Puertollano.



Mr C.S. Maniatopoulos signing the Puertollano contract

To carry out this project, you formed an ad hoc company 'ELCOGAS' last April; to have done this to carry out a joint project with six electric companies from three countries is itself very symbolic. It shows that Europe is becoming more and more a reality - companies of various Member States joining their efforts to carry out difficult tasks with a common interest in collaboration.

The project to be carried out by Elcogas reflects the Puertollano IGCC power plant four years' preparation by Commission services. My institution and the Council of Ministers recognized in 1989 that IGCC technology could take on a special importance in the years to come in the field of clean electricity generation, but that its development would not be easy. This is why the Commission received a political mandate from the Council to promote a concrete European project in this sector which would include companies interested in pooling their efforts. We are happy to see that the electricity companies understood that political message making it possible to set up the Puertollano project.

Investment participation in Elcogas

Endesa	36.67%
Electricité de France	35.0%
Iberdrola II	13.33%
Sevillana de electricidad	8.89%
Hidoelectrica del Cantabrico	4.44%
Electricadade de Portugal	1.67%

This project is financed under the Community programme Thermie. As you probably know, this programme, launched in 1990, aims at the promotion of energy technology in Europe. It includes action for the promotion of innovative technologies, the dissemination of the successful projects and diffusion of information through a network of organizations, called OPETs, throughout geographical Europe. But the Thermie regulation also allows the Commission to coordinate efforts in order to achieve precise

objectives in the field of energy technology, in other words so-called 'targeted projects'. I am happy to stress that Elcogas in fact is the first company to carry out a targeted project within the Thermie framework. This project is also significant not only because it is, I think, the first time that electricity companies will join forces to develop a new type of thermal power plant, but also, and perhaps more importantly, the first time that will show the public opinion in our countries that the electricity companies and the Commission are doing something concrete in order to find a solution to the problem of the greenhouse effect by the limitation of CO2 emissions. The IGCC technology is by far the cleanest way of using coal in electricity production. Obviously it will take some years before IGCC becomes widespread within the Community, but there is no doubt that our own technologies must be promoted if we are to satisfy the growing public demand for cleaner energy. As you know, the Council has decided that by the year 2000, emissions of CO2 should not exceed their 1990 level. But we expect substantial increases in electricity consumption in the future, for obvious reasons. Consequently, in order to reach this 'political' target, improvement of plant efficiency must be improved - in addition to the other measures already announced. The Commission, aware of this challenge, is currently analysing the situation of electricity production from solid fuels. On the basis of these results, we will plan the feasibility of new actions in order to respect our political obligation.

I am sure that all here present, representing the electricity companies, the technology suppliers and the public bodies, share my conviction that electricity production and protecting our environment can go hand-in-hand in the future. European public opinion observes what we do closely and we must neither mislead nor disappoint it. Consequently, this first targeted project has to be a total success and the Commission strongly hopes that it will be carried out without delay. Our presence today stresses our wish to come together with you towards its realization, and our desire is to lead it to term as a successful example of European collaboration. I know that you share this same goal.

I hope to meet you in 1996 in Puertollano to celebrate the opening of this first truly 'European' power station.

MAIN CHARACTERISTICS OF THE PUERTOLLANO IGCC POWER PLANT (ISO Conditions)

GROSS ELECTRIC POWER	337 MW
NET ELECTRIC POWER	305 MW
TYPE OF FUEL	Wide range
NET EFFICIENCY ON LHV BASIS PUERTOLLANO COAL (5 400 Kcal/Kg, 22% ash	44.5%-45.5% (cooling water conditions)
EMISSIONS	
SOx (basis 15% O2)	< 10mg/Nm3
NOx (basis 15% O2)	< 60mg/Nm3
CO2	80% compared to conventional power plants
SOLID RESIDUES	Free of dangerous compounds

NEW CLEAN COAL-WASTE-BURNING POWER PLANT AIDED BY COMMISSION WINS INTERNATIONAL AWARD

THE CIRCULATING FLUIDIZED BED COMBUSTION (CFBC) UNIT AT THE EMILE HUCHET (CHARBONNAGES DE FRANCE) POWER STATION AT CARLING IN LORRAINE

BY Samuele Furfari, DG XVII
Energy Technology Unit

When in 1987 the Commission was asked to grant financial assistance for a 125 MWe power plant based on the Circulating Fluidized Bed Combustion (CFBC) technology, the scale of the challenge attracted wide interest in Europe. Nevertheless, the foreseeable benefits of the CFBC technology, which combines low pollutant emission levels with the capability to burn low-grade fuels were such that the decision to finance the project under the Demonstration Programme - the THERMIE programme predecessor - was widely welcomed. The project received a grant of MECU 10.55 between 1987 and 1989.

The merits of this project have been recognized by *Electric Power International* which has conferred its 1992 International Power Plant Award on the Emile Huchet power station with the citation 'for pioneering the application of large Circulating Fluidized Bed Boilers firing coal-waste slurries'. Today, the unit is one of the most significant installations burning coal waste and the first on such a scale to fire coal in slurry form.

A delegation of Members of the European Parliament led by Prof. Claude Desama, Chairman of the Parliament's Committee on Energy and Scientific Research (CERT), paid a visit to the station on 9 April 1992, and were able to see at first hand the incentive provided by the very encouraging experience of the CFBC project for more widespread application of the technology. The project would probably not have been carried through without support from the Commission and there is every reason for other CFBC-based projects to be promoted within the Programme.

The Huchet power plant is at Carling in Lorraine. In this frontier region both French and German operators were involved in the project: the Charbonnages de France subsidiary COREAL was responsible for the engineering and Stein Industrie (a GEC-Alsthom company) for the construction work. The CFBC process was developed by Lurgi GmbH of Germany. In fact the plant itself was constructed and is operated by a company set up for the purpose, 'SODELIF' (Société pour le développement du lit fluidisé) also with financial support from the French authorities and the Banque de Lorraine. The total cost of the project to date has been 515 MFF (MECU 73.6 at 1987 prices).

One major characteristic of this unit is that it is able to burn a mixture of coal wastes containing 33% water; this slurry or 'Schlamm' was produced over the years in the area by coal-washing plant in the Charbonnages de France coal industry. The use of this low quality fuel means that in fact although rated at 125 MWe nominal output the plant is equivalent to one of 150 MWe firing normal-grade coal.

The incentive to construct this unit stemmed from both economical and ecological considerations:

- the need to keep unit 4 of the power station in operation;
- combustion of a 'cost-free' fuel for which there is no other use and which is lying in settling ponds close to the power plant;
- clean combustion limiting SOx and NOx emissions;
- restoration of sites previously used for unsightly slag storage;
- the opportunity to pave the way for bigger units using this new technology.

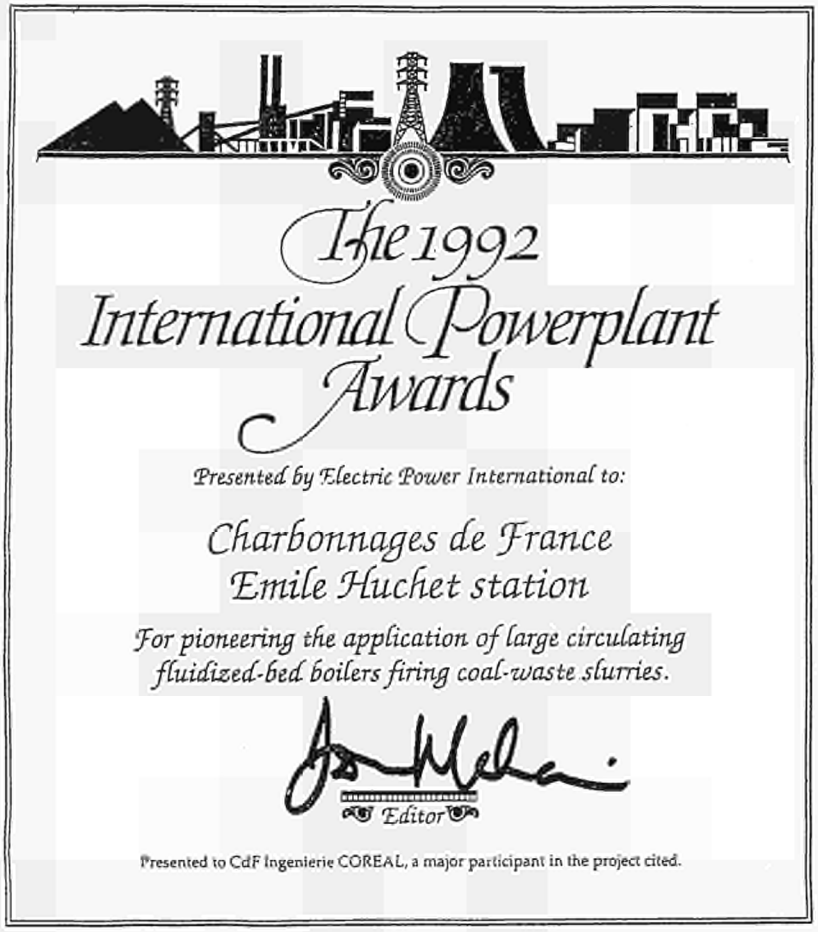
Members of the European Parliament visiting the Emile Huchet power station

The project was completed according to plan and connected to the EDF grid as soon as the industrial starting-phase was reached; despite this difficult task all tests have been carried out successfully.
Main technical results are as follows:

- load variation is supported up to 6 MW/min;
- if only slurry (i.e. no normal fuel in support) is burnt the unit can still be operated at up to 50% of full load;
- at normal load capacities this auxiliary fuel consumption amounts only to about 9.5%;
- emissions are well under the maximum permitted levels:
  250 mg SO2/Nm3 with a Ca:S ratio of 1:9 (EC Directive No 88/609 prescribes 400 mg SO2/Nm3);
  170 mg de NOx/Nm3 (Directive No 88/609 prescribes 650 mg NOx/Nm3);
- high availability: utilisation rate was 88% in 1991, despite the period necessary for final adjustments for operation with slurry.

CFBC technology has a bright future. It can operate with difficult or hitherto unusable fuels which results in lower operating costs and benefits for the environment. Thus potential users are all power plant operators in coal-mining countries having large amounts of slurry available. This could be of particular interest in Eastern and Central European countries.

The success of this project has already paved the way for the construction of another unit of twice the size (250 MWe) at Gardanne in Provence. This plant belongs to EDF (Electricité de France) but was designed and supplied by the consortium responsible for the Carling unit, and also received financial support from the Commission through the THERMIE Programme. It will thus be the largest of its type in the world with this technology and should demonstrate conclusively that in the future there will continue to be an important role for large scale clean coal-burning electricity generation, offering environmental as well as economic gains. ■



COMMUNITY ENERGY PROFILES: LUXEMBOURG

OUR SERIES OF MEMBER STATE'S ENERGY PROFILES CONTINUES WITH LUXEMBOURG. THE ANALYSIS WAS CARRIED OUT BY THE INTERNATIONAL ENERGY AGENCY TO WHOM WE ARE GRATEFUL FOR AGREEING TO PUBLICATION. IT IS FOLLOWED BY THE ABSTRACT OF A STUDY ON THE DEVELOPMENT OF AN ENERGY MODEL FOR LUXEMBOURG CARRIED OUT WITH THE SUPPORT OF DG XVII.

Luxembourg, the smallest country in the IEA, is heavily dependent on imported energy, with only 1.1% of total supply based on domestic sources (mainly hydroelectricity). The energy balance of Luxembourg is also characterized by a high level of consumption in the industrial sector[1] *due to the importance of energy-intensive industry, predominantly the iron and steel and tyre industries, in the country's economy. In addition, consumption in the transport sector is high because petroleum prices are lower than in neighbouring countries.*

Since 1973, TFC (total fuel consumption) has declined by 1% per year, essentially because industrial energy demand has fallen 3.4% per year. This resulted from the decline of crude steel production - from 6.4 million metric tons in 1974 (the last year before the crisis in this sector) to 3.6 million metric tons in 1990 - and from new, less energy-intensive production processes. By contrast, energy demand in the transportation sector grew strongly in the same period, 7.7% a year, reflecting the continually increasing consumption of petroleum and diesel oil by non-residents due to low prices in Luxembourg.

On average from 1973 to 1990, total net energy imports declined 1.4% a year as net imports of coal, mainly for the iron and steel industry, decreased 4.6%. While net oil imports declined 0.1% per year during this period, net imports of gas and electricity strongly increased. However, the trend changed: Total net imports grew by 7.7% in 1989 and 5.3% in 1990. Net oil imports increased 11.2% and 10.7% in these years.

The economy decelerated sharply in 1990, essentially as a result of the stockbuilding cycle. Real GDP growth dropped by more than half to a little over 2.5% and industrial production declined since the steel sector, beset by falling world demand and heightened competition from abroad, was one of the weakest spots of the economy. Consumer price inflation accelerated somewhat, reflecting the rise in international oil prices.

Luxembourg maintains its traditional energy policy goals: strengthening efforts to improve energy efficiency further in all consumption sectors, pursuing the diversification of energy supplies and strengthening the supply and distribution infrastructures. The Luxembourg authorities follow an energy policy based on three essential factors: the building of the internal energy market at EC level, the world energy situation with the possible risks for security of supply from the Middle East and the growing concern about environmental protection.

[1] *Includes non-energy use.*

ENERGY SUPPLY AND DEMAND

TPES (total primary energy supply) rose 1.5% in 1989 and 4.4% in 1990. In 1990 oil still accounted for the largest share of TPES, with 46%; coal accounted for 31.7% and gas for 12.0%. Net electricity imports were 9.5%. After a period of declining demand from 1973 to 1983, TFC is increasing. The growth rate was 7.3% in 1989 and 4% in 1990. Oil demand grew by 10.1% in 1990 with increased use in industry and transport. Demand for coal decreased by 5% as a result of decreased use in industry; almost 90% of coal demand, however, comes from the iron and steel industry. Gas demand increased by 7.7%; growth in industrial demand more than offset lower heating needs due to good weather. Energy intensity, as shown by the TFC/GDP ratio, has strongly improved, from 1.43 in 1973 to 0.77 in 1989 and 0.79 in 1990; per capita TFC increased from 8.59 in 1989 to 8.85 in 1990, but was still down from 11.4 in 1973.

COAL

Luxembourg has no indigenous coal production. Most of its coal imports consist of coke for the iron and steel industry. Coal requirements are covered by contracts with German suppliers valid until 1999. As the outlook shows, demand for coal is expected to decline, reflecting developments in the iron and steel industry such as technical improvements, changes in product mix and replacement of another blast furnace by an electric arc furnace.

OIL PRODUCTS

Having neither oil resources nor refineries, Luxembourg imports almost all of its oil products from Belgium. Fourteen importing enterprises are located near the rail network by which most of the products are transported.

The increase of oil demand in recent years has been driven mainly by the transport sector, both air and road traffic. Consumption of motor fuels has doubled in ten years. The continually increasing number of flights at the Luxembourg airport, with increasing demand for jet fuel, is added to fuel consumption for ground vehicles. Since Luxembourg's petroleum prices are remarkably lower than in neighbouring countries, about 50% of petroleum consumption is accounted for by workers and tourists from these countries, who regularly fill up their cars in Luxembourg.

Despite growth in construction, oil demand in the residential and commercial sector[2] declined further in the last few years, as a result of mild weather and increased use of natural gas. According to the outlook, total final consumption of oil products is expected to decline in all sectors, which would be a reversal of recent developments, particularly in the transport sector.

NATURAL GAS

SOTEG, jointly owned by the state and the iron and steel industry, imports natural gas from Belgium (85% of the country's requirements) and France. A high-pressure domestic grid, about 80 kilometres long, serves the capital and the south of the country, where the iron and steel industry is located. In 1990, the Government decided to extend the gas supply and distribution networks. Three new pipelines are to be completed by 1995: a second pipeline from Belgium (100 kilometres in Belgium and 76 kilometres in Luxembourg) to supply the northern part of the country, one extension to the west and another to the east.

To meet further demand, the Government signed a new contract with Distrigaz of Belgium in 1990, covering 1995-2010. Under this contract, the maximum amount of delivered gas increases from 95 000 cubic metres per hour to 180 000 cubic metres per hour. The Government is also negotiating with German contractors about the possibility of importing natural gas from the former USSR.

Luxgaz, established in June 1990 as the fourth distributing company in Luxembourg, is responsible mainly for development of new local networks. Forty per cent of its shares are held by the state. The Government expects that investment costs of about LF 2 billion[3] will be necessary to realise the plans of SOTEG and Luxgaz to extend the grid by 1995. About 70% of potential customers are expected to be connected to the gas grid by then.

Since gas prices are very competitive with those of other fuels, nearly all new buildings near existing networks are supplied by gas. The share of natural gas in total final consumption in the residential and commercial sector is expected to increase from 24.2% now to 32.7% by 2005. Industrial enterprises consuming more than 150 000 cubic metres of gas are obliged to install dual-firing equipment so they can switch to oil in peak periods if necessary. Industrial gas consumption is expected to decline slightly.

ELECTRICITY

SOTEL and CEGEDEL, which have separate distribution networks, supply Luxembourg with electricity. SOTEL, fully owned by the iron and steel

2 *Includes public and agricultural use.*

3 *On average in 1991, LF 1 = $0.029.*

industry (ARBED), imports electricity from Belgium and handles distribution to the steel industry. CEGEDEL supplies the public grid with electricity under a contract with SEO/RWE, a joint venture of Société Electrique de l'OUR SA of Luxembourg and the German electricity company RWE. Electricity demand is expected to increase further in all sectors, with the most pronounced growth in industry.
In 1990, the Government extended the existing supply contract with SEO/RWE for ten years. New conditions in this contract allow CEGEDEL to take advantage of price reductions. In addition, RWE takes precautions to enable parallel function of the 220 kV lines Bauler-Flébour and Trèves-Hesidorf. This will provide more flexibility and security for Luxembourg's electricity supply.
A new six-year agreement between the government and CEGEDEL includes obligations to reduce average tariffs, to invest LF 30 million in energy efficiency, CHP and renewable energy sources and to continue modernising and extending the electricity grid.

Renewable Energy Sources

The potential of renewable energy sources in Luxembourg is not promising. However, in order to diversify its energy supplies, the Government is devoting attention to the development of renewables and a study on their potential is being made. The Agence de l'Energie, established in 1991, is in charge of studying and promoting new renewables technology as well as energy efficiency. Partners in the new agency are the state (50%), CEGEDEL and SEO.
Some small hydroelectric plants and a waste-fired thermal plant contribute to public electricity production. Luxembourg's largest power plant - the pumped storage station in Vianden, with total capacity of 1 100 MW - is used as a peak-shaving plant for RWE. It is operated by SEO, whose main shareholders are the state and RWE with 40% each. Project studies of a new hydropower plant at Schengen-Apach are in the final stage. This plant at the French border will have capacity of about 4.5 MW.
The Government gave low interest loans to home owners to install systems using new and renewable energy sources, but they proved unsuccessful. Therefore, since October 1990 these loans have been replaced by direct subsidies covering 25% of the cost of installation, with a ceiling of LF 60 000 per installation. The subsidies are granted for introduction of systems using solar energy, biomass, hydropower and wind, or for new technologies that promote energy savings, such as heat pumps and co-generation.

Combined Heat and Power

Based on studies partly financed by the CEC through its Thermie programme, at the end of 1989 it was decided to build a major CHP plant on the Kirchberg plateau. To manage this vast project, the company Luxenergie SA was created in July 1990 by the Ministry of Energy, CEGEDEL and four private companies. The first phase of the work, in the 'quartier des banques' with nine new buildings, is in the course of completion, with capacity of 6 100 kWt and 720 kWe. In cooperation with a chemical company, CEGEDEL has carried out a study for an 18 MW CHP project, which is now being decided.
In the frame of its general energy investment programme, the Ministry of Energy is promoting energy concepts on regional and Community levels, in order to optimise energy supply and demand throughout the country.

Energy Efficiency

Luxembourg's energy efficiency programme has been directed primarily at the residential sector. In 1990 the Ministry of Energy launched an information campaign including radio, television and press advertising and distribution of posters and brochures. The energy conservation public advice bureau, established in 1988, continued its operations. In the current climate of lower energy prices, however, this service attracted little attention. The Ministry will attempt to encourage its use by organizing information meetings in municipalities.
At present, 35% of dwellings in Luxembourg have benefited from the Government's grant programme. The Government believes that further savings can be achieved in residential and public buildings. Since 1980 it has offered direct grants to home owners for thermal efficiency improvements. The programme for thermal insulation and regulation of heating installations and hot water pipes was modified and prolonged by five years in September 1990. The grants are up to 25% of the cost, and the ceiling for such subsidies was raised from LF 7 500 to LF 10 000 per household. In ten years, 20 400 requests were addressed to the Government and about LF 87 million was spent under this programme. In addition, from 1980 to 1987 25 000 requests were received in a double glazing programme.
The 1990 programme to replace oil and gas combustion units and retrofit chimneys was extended at the end of 1990 for two years. The subsidies are up to 50% of the cost with a ceiling of LF 40 000 per household.
Since 1978, minimal efficiency standards and periodic controls apply to boilers for space heating. A planned

law on efficient energy use will include thermal insulation standards in buildings.

The Luxembourg Government's Energy Bus project for small and medium-sized enterprises was abandoned in 1989 because of a lack of interest by firms. A special 60% depreciation rate is offered to commerce and industry on investments in energy saving and renewable energy sources until the end of 1992, according to a revised law of December 1988. However, companies also make very little use of this opportunity. Nevertheless, since October 1990, a regulation provides for financial support for technical studies on companies' energy situations and on potential energy savings, again focusing on small and medium-sized firms. The Government bears one-third of the cost. The grant ceiling is LF 30 000 per enterprise, but this can be repeated for a follow-up investment.

Almost 90% of total coal demand and 30% of total electricity demand comes from the iron and steel industry. ARBED has made considerable efforts to rationalize its operations. Energy consumption was reduced from 21.5 GJ per metric ton of raw steel in 1978 to 17.2 GJ in 1990. Further improvements of 1% per year, on average, are envisaged. While 20 blast furnaces were needed in 1977/78 to produce 4.5 million metric tons of steel, in 1989 only two blast furnaces produced 3.7 million metric tons, and there are plans to replace one of them by an electric arc furnace using scrap steel.

The iron and steel industry has switched 16% of its coke use to heavy fuel oil. This measure may appear contrary to the target of reducing oil dependence, but as it is possible to switch back to coke at any time, long-term dependence on oil is not seen as a risk. Furthermore, if economic or other conditions warrant, ARBED can use a proven technology of injecting steam coal directly into blast furnaces to substitute for coke or heavy fuel oil at short notice.

The Government is working on a thermal diagnosis project for public buildings to identify where energy efficiency might be improved, and then take the necessary actions using third-party financing.

The road transport sector accounted for 30.6% of TFC and 62.8% of total oil consumption in 1990. Various measures were taken to reduce emissions from cars. There is also a tax of 12% on the purchase of cars and an annual road tax based on engine size. Subsidies are available for the support of public transport.

The Government is working on a proposal for an 'ecology tax' on cars, based on emissions of air pollutants and CO2 as well as noise. Efforts to make public transport more attractive involve favourable tariffs and limited parking places in city centres.

ENVIRONMENT

Environmental matters receive high priority in Luxembourg because of the country's energy-intensive industries (in 1985, 48% of SO2 and 27% of NOx emissions were from the iron and steel industry) and its geographic position near large industrial areas with possible transfrontier pollution. For example, the proportion of healthy trees in Luxembourg's forests declined from 81% in 1984 to 61% in 1989.

The Luxembourg Government decided in November 1990 to stabilise emissions of CO2 by 2000 at the latest and to achieve a 20% reduction of these emissions by 2005. The authorities carefully follow the developments of environmental policies in the context of the European Communities, and have regulatory and financial incentives to limit emissions of atmospheric pollutants. For example:

- by 1 January 1989, fuel oil had been completely phased out in the residential sector and replaced by gas oil with a maximum sulphur content of 0.2%;
- for combustion units rated at 50 MW and above, the EC Directive of 24 November 1988 to limit emissions from large combustion plants is applied. The sulphur content of heavy fuel oil used in combustion units with capacity of more than 3 MW was limited to 1% starting on 1 January 1988 and only gas oil with sulphur content of 0.2% may be burned in combustion units smaller than 3 MW;
- ARBED uses coking coal with a maximum sulphur content of 1%;
- two grades of lead-free petroleum, Euro-super and Super-plus, have been on sale since 1986. They are about 10% cheaper than premium grade leaded petroleum;
- since 1 January 1990, purchasers of new cars up to 2 000cc fitted with three-way catalytic converters qualify for a subsidy of up to LF 20 000. For similar vehicles with oxidising converters, the maximum subsidy is LF 10 000. Older cars fitted with new catalytic converters also qualify for the grants.

LUXEMBOURG
ENERGY BALANCES AND KEY INDICATORS

(Mtoe)

		SUPPLY						
		1973	1979	1989	1990	1995	2000	2005
TOTAL PRODUCTION		-	0.03	0.04	0.03	0.03	0.04	0.04
of which								
Coal[1]		-	-	-	-	-	-	-
Oil		-	-	-	-	-	-	-
Gas		-	-	-	-	-	-	-
Nuclear		-	-	-	-	-	-	-
Hydro/geothermal[2]		-	0.01	0.01	0.01	0.01	0.01	0.01
Other[3]		-	0.02	0.03	0.03	0.02	0.03	0.03
TOTAL NET IMPORTS		**4.51**	**3.93**	**3.37**	**3.55**	**3.35**	**3.19**	**3.09**
Coal[1]	Exports	-	-	-	-	-	-	-
	Imports	2.44	1.88	1.15	1.13	1.16	1.14	1.06
	Net imports	2.44	1.88	1.15	1.13	1.16	1.14	1.06
Oil	Exports	0.01	0.04	0.03	0.01	-	-	-
	Imports	1.69	1.39	1.52	1.67	1.41	1.24	1.20
	Bunkers	-	-	-	-	-	-	-
	Net imports	1.67	1.35	1.49	1.65	1.41	1.24	1.20
Gas	Exports	-	-	-	-	-	-	-
	Imports	0.22	0.47	0.41	0.43	0.43	0.44	0.44
	Net imports	0.22	0.47	0.41	0.43	0.43	0.44	0.44
Electricity	Exports	0.07	0.02	0.06	0.06	0.06	0.06	0.06
	Imports	0.24	0.25	0.39	0.40	0.41	0.43	0.45
	Net imports	0.18	0.23	0.33	0.34	0.35	0.37	0.39
TOTAL STOCK CHANGES		**-0.01**	**-0.08**	**0.01**	**-0.01**	-	-	-
TOTAL SUPPLY (TPES)		4.51	3.88	3.42	3.57	3.38	3.23	3.13
of which								
Coal[1]		2.44	1.84	1.15	1.13	1.16	1.14	1.06
Oil		1.67	1.31	1.50	1.64	1.41	1.24	1.20
Gas		0.22	0.47	0.41	0.43	0.43	0.44	0.44
Nuclear		-	-	-	-	-	-	-
Hydro/Geothermal[2]		-	0.01	0.01	0.01	0.01	0.01	0.01
Electricity trade[4]		0.18	0.23	0.33	0.34	0.35	0.37	0.39
Other[3]		-	0.02	0.03	0.03	0.02	0.03	0.03
Fuel Shares (%)								
Coal		*54.1*	*47.5*	*33.7*	*31.7*	*34.3*	*35.3*	*33.9*
Oil		*37.1*	*33.7*	*43.8*	*46.0*	*41.7*	*38.4*	*38.3*
Gas		*4.9*	*12.1*	*11.9*	*12.0*	*12.7*	*13.6*	*14.1*
Nuclear		-	-	-	-	-	-	-
Hydro/Geothermal		*0.1*	*0.2*	*0.2*	*0.2*	*0.3*	*0.3*	*0.3*
Electricity trade		*3.9*	*6.0*	*9.6*	*9.5*	*10.4*	*11.5*	*12.5*
Other		-	*0.5*	*0.8*	*0.7*	*0.6*	*0.9*	*1.0*

DEMAND
FINAL CONSUMPTION BY SECTOR

(Mtoe)

	1973	1979	1989	1990	1995	2000	2005
TFC	**4.00**	**3.58**	**3.24**	**3.37**	**3.17**	**3.03**	**2.94**
of which							
Coal[1]	2.03	1.64	1.01	0.96	0.97	0.95	0.88
Oil	1.54	1.28	1.49	1.64	1.40	1.23	1.19
Gas	0.18	0.36	0.39	0.42	0.42	0.43	0.43
Electricity	0.25	0.30	0.35	0.35	0.38	0.42	0.44
Heat	-	-	-	-	-	-	-
Other[3]	-	-	-	-	-	-	-
FUEL SHARES (%)							
Coal	*50.8*	*45.8*	*31.1*	*28.6*	*30.6*	*31.4*	*29.9*
Oil	*38.4*	*35.9*	*45.9*	*48.5*	*44.2*	*40.6*	*40.5*
Gas	*4.4*	*10.0*	*12.1*	*12.5*	*13.2*	*14.2*	*14.6*
Electricity	*6.4*	*8.4*	*10.8*	*10.5*	*12.0*	*13.9*	*15.0*
Heat	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
TOTAL INDUSTRY[5]	**3.15**	**2.44**	**1.78**	**1.76**	**1.78**	**1.72**	**1.63**
of which							
Coal[1]	2.00	1.61	1.00	0.96	0.96	0.94	0.87
Oil	0.81	0.36	0.32	0.30	0.30	0.24	0.22
Gas	0.14	0.26	0.23	0.28	0.27	0.27	0.25
Electricity	0.20	0.21	0.22	0.22	0.25	0.27	0.29
Heat	-	-	-	-	-	-	-
Other[3]	-	-	-	-	-	-	-
FUEL SHARES (%)							
Coal	*63.5*	*66.2*	*56.4*	*54.5*	*53.9*	*54.7*	*53.4*
Oil	*25.6*	*14.6*	*17.9*	*16.8*	*16.9*	*14.0*	*13.5*
Gas	*4.4*	*10.6*	*13.0*	*15.9*	*15.2*	*15.7*	*15.3*
Electricity	*6.4*	*8.6*	*12.7*	*12.8*	*14.0*	*15.7*	*17.8*
Heat	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
TRANSPORT[6]	**0.29**	**0.49**	**0.87**	**1.03**	**0.88**	**0.77**	**0.76**
TOTAL OTHER SECTORS[7]	**0.56**	**0.65**	**0.59**	**0.58**	**0.51**	**0.54**	**0.55**
of which							
Coal[1]	0.03	0.02	0.01	0.00	0.01	0.01	0.01
Oil	0.44	0.44	0.30	0.31	0.23	0.23	0.22
Gas	0.04	0.10	0.16	0.14	0.15	0.16	0.18
Electricity	0.05	0.08	0.12	0.12	0.12	0.14	0.14
Heat	-	-	-	-	-	-	-
Other[3]	-	-	-	-	-	-	-
FUEL SHARES (%)							
Coal	*6.1*	*3.8*	*1.2*	*0.5*	*2.0*	*1.9*	*1.8*
Oil	*78.4*	*67.8*	*51.4*	*53.9*	*45.1*	*42.6*	*40.0*
Gas	*6.8*	*15.1*	*27.2*	*24.2*	*29.4*	*29.6*	*32.7*
Electricity	*8.8*	*13.1*	*20.3*	*21.4*	*23.5*	*25.9*	*25.5*
Heat	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-

DEMAND
ENERGY TRANSFORMATION AND LOSSES

(Mtoe)

	1973	1979	1989	1990	1995	2000	2005
INPUT (MTOE)	**0.44**	**0.32**	**0.19**	**0.20**	**0.21**	**0.23**	**0.22**
OUTPUT (MTOE)	**0.12**	**0.09**	**0.05**	**0.05**	**0.06**	**0.07**	**0.07**
(TWh gross)	1.39	1.10	0.63	0.62	0.64	0.80	0.80
OUTPUT SHARES (%)							
Coal	*58.8*	*39.0*	*70.3*	*76.4*	*70.3*	*76.3*	*76.3*
Oil	*27.6*	*14.4*	*3.0*	*1.4*	*3.1*	*2.5*	*2.5*
Gas	*10.2*	*35.5*	*7.3*	*5.4*	*6.3*	*5.0*	*5.0*
Nuclear	-	-	-	-	-	-	-
Hydro/Geothermal	*3.4*	*8.3*	*13.4*	*11.2*	*14.1*	*11.3*	*11.3*
Other	-	*2.8*	*6.0*	*5.4*	*6.3*	*5.0*	*5.0*
TOTAL LOSSES	**0.50**	**0.30**	**0.18**	**0.20**	**0.21**	**0.20**	**0.19**
of which							
Electricity generation[9]	0.32	0.23	0.14	0.14	0.16	0.16	0.15
Refineries[10]	-	-	-	-	-	-	-
Other losses[11]							

KEY INDICATORS

	1973	1979	1989	1990	1995	2000	2005
GDP (1985 billion dollars)	**2.80**	**3.03**	**4.18**	**4.27**	**4.60**	**4.96**	**5.34**
Population (millions)	0.35	0.36	0.38	0.38	0.38	0.38	0.38
TPES/GDP[12]	1.61	1.28	0.82	0.84	0.73	0.65	0.59
Energy production/TPES	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Per capita TPES[13]	12.83	10.69	9.06	9.37	8.87	8.48	8.22
Oil supply/GDP[12]	0.60	0.43	0.36	0.38	0.31	0.25	0.22
TFC/GDP[12]	1.43	1.18	0.77	0.79	0.69	0.61	0.55
Per capita TFC[13]	11.40	9.86	8.59	8.85	8.32	7.95	7.72

GROWTH RATES (% PER YEAR)

	73-79	79-83	83-89	89-90	90-95	95-00	00-05
TPES	-2.5	-7.5	3.1	4.4	-1.1	-0.9	-0.6
Coal[1]	-4.6	-9.2	-1.4	-1.7	0.5	-0.3	-1.4
Oil	-4.0	-6.1	6.6	9.5	-3.0	-2.5	-0.7
Gas	13.6	-13.8	7.7	5.9	0.0	0.5	-
Nuclear	-	-	-	-	-	-	-
Hydro/geothermal[2]	12.2	-	-2.2	-14.3	10.8	-	-
Other[3]	-	2.7	5.8	-10.7	-4.4	8.4	-
TFC	-1.8	-6.8	3.1	4.2	-1.2	-0.9	-0.6
Electricity consumption	2.7	0.2	2.5	1.4	1.4	2.0	0.9
Energy production	36.6	1.9	3.8	-11.4	-0.7	5.9	-
Net oil imports	-3.5	-6.9	6.6	11.0	-3.1	-2.5	-0.7
GDP	1.3	1.1	4.8	2.2	1.5	1.5	1.5
Growth in the TPES/GDP ratio	-3.7	-8.5	-1.6	2.2	-2.5	-2.4	-2.1
Growth in the TFC/GDP ratio	-3.1	-7.8	-1.6	2.0	-2.7	-2.4	-2.1

Please note: rounding may cause totals to differ from the sum of the elements.

1 Including lignite (brown coal).
2 Includes hydro, geothermal, solar and wind.
3 Includes solid fuels other than coal (peat, wood, wood waste, black liquor, industrial and municipal waste). Data are often based on partial surveys and may not be comparable between countries.
4 Total supply of electricity represents net trade. A negative number indicates that exports are greater than imports.
5 Includes non-energy use.
6 Includes less than 1% non-oil fuels.
7 Includes residential, commercial, public service and agricultural sectors.
8 Inputs to electricity generation include those for both electricity and heat production. Output refers only to electricity generation.
9 Losses arising in the production of electricity and heat at public utilities, autoproducers and public combined heat and power plants. For non-fossil fuels electricity generation, theoretical losses are shown based on plant efficiencies of 33% for nuclear, 10% for geothermal and 100% for hydro.
10 Inputs of crude oil, natural gas liquids and feedstocks to refineries minus output of petroleum products and refinery fuel.
11 Inputs of primary and secondary solid fuels (hard coal, brown coal, coke oven coke) minus output of secondary fuels (coke oven coke, patent fuel, briquettes, gas works gas, coke oven gas, blast furnace gas etc). It also includes own use, statistical differences and losses at district heating plants. Note: Data on 'losses' for forecast years often include large statistical differences covering differences between expected supply and demand and mostly do not reflect real expectations on transformation gains and losses.
12 Toe per thousand US dollars at 1985 prices.
13 Toe per person.

This is the full and unabridged text of the in-depth energy policy review of Luxembourg by the International Energy Agency as recently published in 'Energy Policies of IEA Countries - 1991 Review' available from

OECD Publications
2 Rue André Pascal
F - 75775 Paris Cedex 16
Tel: 33-1-45-24-8200
Fax: 33-1-45-24-8500

Energy Planning at Regional and Urban Level in the European Community - Luxembourg

An Energy Model for use as a Decision Tool

Context

Since the oil shocks of the '70s, the world is increasingly conscious of the fact that fossil energy resources are not unlimited and that they constitute an important factor in the economic and social development of a country.

Objectives

Following this awareness, energy policies have been implemented with the aim of developing a growing consciousness on the existence of fossil energy resources and at promoting the rational use of these energy sources.
On behalf of the Ministry of Energy of Luxembourg and the Commission of the European Communities, TUV Rhineland has developed a model for defining energy policy at national and regional level.

Methods

The development of any energy model is based on a thorough knowledge of the energy consumption of different consumer groups and the distribution of this consumption between the various primary sources of energy.

Fixing parameters
As part of this study, an energy balance has been developed for the following sectors of consumption:
- households,
- public buildings,
- business, crafts and industry,
- transport.

This has involved determining and fixing the different parameters influencing the energy balance. For example, household energy consumption is deduced from consumer needs for useful energy on the basis of the number and type of dwellings, the calories required for heating, and on household electrical equipment, etc.
Data on industrial energy consumption, on the other hand, can be obtained essentially by requesting information directly from major consumers. These data are rounded off by calculations based on the number of employees occupied in the different industrial sectors.
In the transport sector, we have:
- energy demand as derived essentially from a calculation based on the number of registered motor vehicles in Luxembourg and on known statistical

values on average kilometres driven in the different types of cars;
- fuel consumption data provided by sales figures, which also include consumption by inhabitants of neighbouring countries and foreign traffic passing through the country.

A planning tool
Based on this detailed balance of energy flows, a computer model was developed, which will make it possible:
- to update the energy balance on a yearly basis, including, for example, changes in housing stock or the economic infrastructure;
- to analyse the impact of different energy policy measures on total energy consumption in the country. In this way, the effectiveness and, hence, the socio-economic usefulness of such measures can be evaluated.

Given that this energy balance is available not just at national level, but also in part at local level, the model also allows decisions to be made on extending the infrastructures for different forms of energy, such as natural gas and electricity, in certain regions of the country.

Impact and Application

Forecasts for the future
In order to forecast energy consumption and distribution in different sectors for the year 2000, for example, researchers simply vary the parameters influencing energy consumption. These parameters include:
- Luxembourg's housing stock;
- the level of thermic insulation of buildings;
- the number and size of households,
- household electrical equipment,
- the substitution energy sources, e.g. conversion to natural gas;
- changes in the economic infrastructure, such as the transfer of production units, number of employees, new industries;
- changes in the numbers and types of motor vehicles and specific consumption.

Such scenarios can be established both nationally and for specific sectors.

A basis for decision
The distribution of energy consumption among the different final energy vectors shows that oil is currently the largest single source of energy in Luxembourg. Although in the industrial sector oil represents only some 18% of total energy contribution, its share of household energy consumption exceeds 50%. Greater diversification of energy sources is therefore desirable in this sector.

On the other hand, given the correlation existing at this level, energy consumption can also be analysed as to its influence on the reduction of environmentally harmful emissions. This provides the Ministry of Energy with an instrument to evaluate the impact of certain energy policy measures and decisions. This model can also contribute to developing strategies for assuring the future supply of energy in the country.

Area
2 600 km²
Population
400 000
Primary Energy Consumption
3 400 000 toe
Energy Independence
1%
Final Energy Consumption
3 200 000 toe

Responsible Authority
Ministry of Energy
Boulevard Royal, 19
L-2499 Luxembourg
Contractor
TUV RHEINLAND E.V.
Energy and Environmental
Protection Institute
Am Grauen Stein
D-5000 Köln 91 (Poll)
Postfach 10 17 50
D-5000 Köln 1
Period: 1989-1990

Study carried out with the support of the CEC (DG XVII)
Task Force - Community Integration
Rue de la Loi 200
B-1049 Brussels

DG XVII Co-sponsors Athens Conference on International Energy Policy

The Hellenic Centre for European Studies and Research together with TEPSA, the Trans-European Policy Studies Association organized this event from 3-5 December, sponsored by DG XVII as well as the General Secretariat for Research and Technology of Greece and Motor Oil Hellas. It was attended by well-known academics and industry personalities in the energy and related fields, as well as Commission, Member State, and international officials. Director-General Maniatopoulos and Mr R. Debauw, recently retired as Principal Adviser in DG XVII, introduced sessions on 'energy considerations in European International Affairs' and 'Energy Policies and Programmes' respectively and a representative of the Commission's Directorate-General for External Relations (DG I) that on '(sc. energy crisis...) Management at an International Level', analyzing the experience and lessons of the Gulf Crisis and its predecessors of the Seventies. The session on the former Soviet Union and Central and Eastern Europe was introduced by Mr K. Brendow, Director of the Energy Division of the United Nations' Economic Commission for Europe.

Mr Maniatopoulos set his address against the background of the Community's own experience and opportunities in the international energy arena, and its unremitting efforts towards effective cooperation between partner countries, especially producers and consumers, and between itself and the other major world institutional and corporate actors involved.

He concluded that with adequate policy-making and constructive dialogue, energy could actually play a stabilizing role in international relationships, and a source of balanced and sustainable development, rather than inevitably being a bone of contention - indeed in the past on occasions a literal *casus belli*. Sound energy markets, working on market principles, could provide the framework for producers and consumers to meet their economic needs. But the fragility of energy as a resource was amply borne out by the conflicts of the past, and should be a powerful reminder of the pressing need to organize and structure international energy relationships, and indeed to do so soon in the present context of post-cold-war uncertainty, rather than wait until the eleventh hour. The high risk concerned, for contrasting reasons, both the newly emerging democracies of the East, confronted by daunting economic and structural problems, and the countries of the Middle East, with uncertain relationships in a context of age-old rivalries and ambitions. The Community was itself traversing a period of great uncertainty marked by incoherence between its own external responsibilities and the political will necessary to implement ambitious but necessary policy, especially in the field of integration, within its own house. The first step was clearly to decide clearly on the main lines of the energy policy the Community needs for itself, in the wider global context, how this is to be organized in the context of the European Union, and subsequently to argue the case for it convincingly - in other words successfully - with the Member States.

DG XVII Represented at S.E. Asia Offshore Conference

Mr R. Meijer, Director (a.i.) for Energy Technology in DG XVII gave a keynote address on 'Energy Technology Cooperation in the EC' to the IXth S.E. Asia Offshore Conference and Exhibition at the World Trade Centre in Singapore, 1-4 December 1992.

An abstract of his remarks follows:

With the second half of this century the advance and spread of new technology became one of the main keys to international trade and economic development. The integrating economies of Western Europe, especially under the auspices of different energy technology programmes starting in the nineteen-seventies, have been in the forefront of these developments in the energy field. Thus, the European Community now devotes major financial resources, especially under its current Technologies for Energy Management programme known as THERMIE, to the promotion and dissemination of technology both within its own economies and in the context of wider international cooperation, with both industrialized and developing/industrializing countries in many parts of the world. THERMIE involves expenditure of almost a billion U.S. dollars in 1990-94.

Technology improvement has been incorporated as a major tool of energy policy objectives under the Community's medium-term energy strategy, and this includes a high priority to environmental concerns and constraints and a correspondingly radical approach to the potential role of new and renewable energies and the necessity to promote rational use of energy wherever feasible. Nevertheless the hydrocarbons and (clean) coal-burning sectors also receive a high level of support commensurate with the Community industries' leading position in developing and marketing innovative technology in these areas including offshore exploration and production.

In the field of international energy technology cooperation, a major preoccupation at the end of the cold war is obviously the Community's effort to coordinate and maintain its major contribution to the international effort to help the newly-emerged democracies of Central and Eastern Europe and of the Former Soviet Union rapidly to re-build their infrastructure and production base so as to participate fully in the world economy and raise their standards of living to equitable levels. In this area it has initiated a totally new process to make the best use of the reciprocal needs and opportunities of 'East' and 'West' in the shape of the European Energy Charter. But the Community also recognizes the need for recognition of the global nature of energy and environment challenges and gives tangible expression to this in the form of energy cooperation and other programmes and operations in areas further afield including Latin America and South-East Asia.

OIL AND GAS TECHNOLOGY IN A WIDER EUROPE 4TH EC SYMPOSIUM, BERLIN, GERMANY 3-5 NOVEMBER 1992

While Europe has confirmed its role as a leader in developing and applying new technologies in the oil and gas sector, the changes in Eastern Europe have opened up major new horizons for the European Community industry.

The EC has recognised the political importance of these changes and the need to play a leading role through the European Energy Charter and the Technical Assistance Programmes to the Commonwealth of Independent States (TACIS) and Eastern European countries (PHARE). The EC Symposium on Oil and Gas Technology in a Wider Europe held in Berlin 3-5 November, presented European technological development achievements; continued to build a dialogue with Eastern Europeans to determine their needs and discuss future cooperation; and focussed the attention of Community specialists on future requirements for the promotion of energy technology.

This symposium illustrated the vital role of the EC's Thermie programme for Community energy policies and confirmed the strength of the Community industry in the oil and gas sector.

Every four years the EC organises a symposium to present the latest upstream oil and gas technology developed within the Community. The symposium was held on the eastern borders of the Community, in Berlin, to emphasise the potential for technology transfer and collaboration with the new democracies of Central and Eastern Europe. The symposium provided an excellent opportunity to meet representatives of the East European oil and gas industry and to hear about the latest technological developments within the Community.

CONFERENCE ON NATURAL GAS POLICIES AND TECHNOLOGIES PART II: INFRASTRUCTURES AND TECHNOLOGIES ATHENS, GREECE 14-16 OCTOBER 1992

This Conference - Part II: 'Infrastructures and Technologies' is the second of two conferences the Commission has organized on 'Natural Gas Policies and Technologies' in Europe. The first Conference took place in Vilamoura, Portugal in April 1992 and focussed on natural gas policies (see *Energy in Europe No 19*).

These conferences have been organised in two Member States where natural gas is not yet on stream, but will

be shortly, and at a time when the energy sector in Europe is faced with new opportunities and challenges. Opportunities created by the European unification process, the institutional changes, the new environment regulations and the expansion of world cooperation and trade are expected to lead to significant developments and structural change in the energy industries and more specifically in the natural gas industry.

Conference on Natural Gas Policies and Technologies

The Athens conference examined the following topics:

- technological developments in the natural gas sector, namely gas transmission, storage, and use;
- new sources of supply;
- adaptation of existing facilities to meet demand;
- policies adopted in the past and those planned for the near future;
- opportunities and strategy to be followed in order to ensure the smooth and successful penetration of natural gas into new markets;
- integration of new user nations into the European gas grid;
- opportunities for financial support for projects or investment in new markets.

More than 350 participants attended the conference from all over the world. Over three days, in ten sessions, 46 presentations were made covering the above-mentioned themes.

During the opening session, the Chairman of the Conference, Director-General for Energy Mr C.S. Maniatopoulos gave an overview of the energy and natural gas policies of the European Community. The Greek Minister responsible for Energy, Mr J. Paleocrassas, acknowledged the importance of natural gas for his country, and expressed his appreciation for the organization of this conference in Greece by the Commission. The Minister of Petroleum of the Islamic Republic of Iran, Mr G. Aghazadeh, and the representative of the Algerian Minister for Energy, Mr Ali Aissaoui also addressed the conference. Representatives from Russia and other ex-Soviet Union states as well as from all the Central and East European countries, also attended the conference.

In his concluding remarks, Mr Maniatopoulos stressed that development of the natural gas sector in Europe will improve energy efficiency and security of supply, thus enhancing the benefits that gas presents for both supplier and user countries.

Russian Oil and Gas Legislation: European Community takes Initiative

The European Commission held a high-level Workshop in Moscow on petroleum legislation at a key moment in the Russian debate on the enactment of a sweeping new law for the oil and gas industry, under the Community's programme of technical assistance to the CIS (TACIS).

At the request of the Ministry for Fuel and Energy, the Commission co-sponsored a week-long workshop from 4-9 October 1992 in Moscow at which a number of international experts were put at the disposal of the Russian drafters to answer questions and offer advice. Experts were gathered from various Member States of the Community including France, Italy, Germany, Spain as well as the UK and the Netherlands. The meeting was coordinated by the International Institute of Energy Law of the University of Leiden in the Netherlands in a joint venture with the Centre for Petroleum and Mineral Law and Policy at the University of Dundee, UK.

The Co-chairmen were for the Commission José Sierra, Director of Fossil Fuels in DG XVII and for the Russian Ministry fo Fuel and Energy, Mr V. M. Tsjernak, Head of the Board of Economic Regulation. Deputy Ministers Konoplyanik and Samusev took part in the opening and closing sessions.

EC Ambassador Emerson speaks with Messrs Sierra and Garcia-Fraglo of DG XVII

The aim of the Workshop was to enhance the international assistance being provided in this area, drawing on the experience of EC Member States in the areas such as licensing, state participation, taxation, transport and environmental matters. Key international

organizations also taking part were the World Bank and the University of Houston Law Center, the IEA and Sir James McKinnon, Director-General of the Office of Gas Supply in Britain.

Since early this year the Commission of the European Community has been providing assistance to the Russian Parliament in their drafting work on oil and gas law by making available the services of an EC consultancy specialising in legal work, to advise the Parliament. In addition to providing assistance on the development of a legal framework for foreign investment, the Commission has provided many other assistance projects of a more technical kind in the oil and gas sector including in the Tyumen area.

At the end of the Workshop, the European experts drew a number of technical conclusions for consideration by the Russian experts (below). The Commission representative, Patrick Lambert, Head of Sector, Energy Cooperation with Eastern Europe and the former Soviet Union (DG XVII), concluded that the Russians should seek to balance the interests of the Russian Federation and those of the Western community wishing to invest in this vital area. The Workshop had shown that a number of experiences and 'models' existed in the European Community and it was for the Russians to decide which system of market economy was best for the Russian situation The oil and gas legislation in Russia should follow closely the aims and provisions of the European Energy Charter and its associated Protocols.

Conclusions of the Independent European Experts at the EC Hydrocarbons Legislation Workshop Moscow, 5-9 October 1992

General

• The Experts observed that experience in the design of hydrocarbons legislation in the European Community indicated that there was no single model which could be recommended for an oil and gas law. The uniqueness of the Russian situation would have to be reflected in the law produced by the Russian drafters.

• The Experts recognised the high value placed by the Russians upon the design of a comprehensive and clear oil and gas law. Nevertheless, many of the Experts expressed concern about the investment that may have been lost by the delay in concluding such a detailed petroleum law. Experience in other countries showed that a short framework law had many benefits. Even with a detailed law in place, additional time would be required to draw up detailed regulations and a model licence. The Experts noted the linkage between the basic law and a model licence or contract in many other regimes both in the European Community and elsewhere.

• On the form of the law, the Experts noted the difficulties in attempting to design a hydrocarbons law in Russia at a time when so many other aspects of the basic legal and constitutional framework were being revised, especially in the relations between central and local authorities. However, they noted that the general practice in the European Community has been for oil and gas laws to restrict themselves as much as possible to matters directly concerned with the activities of hydrocarbons exploration, development and production, as well as the most essential transportation and marketing aspects. In this sense, the umbrella created by the law has often been small.

• However, the umbrella character of a hydrocarbons law in Europe has usually been wider in covering natural gas as well as oil, especially in the exploration and production phases. The Experts emphasised that it is not necessary for the hydrocarbons law to provide more than a framework for the operations of the gas industry. A common practice has been for clauses to be introduced into an oil and gas law which take into account the special requirements of the gas sector. A separate gas law is not commonly found in the Member States of the European Community.

• Environmental protection standards should be an integral part of the hydrocarbon legislation, with EC standards taken as a reference point.

Problems in Specific Areas

Licensing

A priority in the design of licensing provisions is to identify the licensing authority and its powers to make awards by competitive bidding and/or direct negotiation. Drafters always take great care to establish this very clearly in the law. It has yet to be clarified in Russia. Some Experts noted that the European Energy Charter emphasises the importance of fairness, transparency and non-discrimination in the award of licences.

Bidding and Promotion

The Experts were sceptical about the value of strict rules on competitive bidding. In general, they favoured an 'invitation to make offers' procedure.

Taxation

The main issue in Russia's case was how to devise a fiscal regime which would provide sufficient incentives for capital to be injected into the Russian oil industry. Foreign investors need a competitive fiscal regime. After a discussion of excess profit taxes, the Experts agreed that these were better left to negotiations than to legislation.

Pipelines

The Experts noted that a major challenge to the European Community in recent years has been to promote efficiency and fair prices through the enhancement of competition in pipelines. However, the element of natural monopoly is likely to remain an issue in the transportation sector, especially in gas. Experience in Britain shows that non-discrimination in pipeline access can be achieved if the government is strongly committed to it. The legal freedom to construct new pipelines has been an aid to the entry of new players into the market in the European Community and should be seen as one of the conditions of competition in this sector. The right and obligation to transit gas through high pressure grids, following agreement between grid operators, is another key element to stimulate trade and enhance grid utilisation and development.

Where a transportation monopoly has been privatised, it is likely to require a measure of regulation in the public interest. In general, the greater the degree of monopoly, the greater the need for regulation of pipeline operations.

Central and Local Authority Relations

The Experts emphasised the crucial importance for potential investors of knowing the precise character of the rights to oil and gas in situ being offered and of a clear identification of the authority with the competence to award a licence.

Joint licensing for bigger projects has proved feasible in a number of jurisdictions. For smaller projects, the federal government might be expected to assume only a supervisory role.

State Participation in the Oil and Gas Sector

Many Experts agreed that it would be necessary to retain a measure of state control after any privatisation. This would involve the supervision of supply obligations in the case of gas, but also of oil in cases of national emergency. However, the Experts noted that experience in several Member States suggests that it is not necessary to have a 51% state share to exert control over the oil and gas sector. Golden or Special Shares or Transition Agreements can be used to exert control after privatisation for a specific period with a view to sheltering the company from hostile bids, among other things. This has been effective in Britain and is being considered in Italy. The various European experiences in restructuring of state oil and gas companies showed the value of competition in the improvement of management.

In general, it seems more important to encourage effective management than to privatise for its own sake.

Fourth General Meeting of the OPET's Combined with Energy Technology Meeting in Brussels

From 5 to 9 October an exhibition was organized in the rather unconventional setting of the *Halles de Schaerbeek*, a restored nineteenth-century covered market, at which all 40 Organizations for the Promotion of Energy Technology presented stands with a great variety of material showing their work and projects in the context of the Thermie programme. As well as publications and audio-visual demonstrations there were models, especially of innovative and energy-saving processes, and a large contingent of experts were present including from OPET's active in Central and Eastern Europe. There were also four central 'theme' stands around the major overall contexts of Community action in the energy field 'Third Country Cooperation', 'Social and Economic Cohesion', 'Greater Competitiveness for Small and Medium Enterprises' and 'Environment'.

The DG XVII Stand

The OPET's regular general meeting with DG XVII, which opened with an address by Director-General Maniatopoulos, discussed guidelines for the new 1992-1993 Thermie programme, and key special issues such as priorities in Eastern Europe, as well as financial matters and other ordinary business. The holding at the same time of the exhibition gave the additional advantages of giving a boost to exchange of ideas and experiences between the OPET's themselves, in the most practical and demonstrative way rather than simply as an audience in meetings. This was generally felt to have been the single most striking success of the combined event. Futhermore, invited guests were also familiarized with Thermie's objects, scope, arrangements, and successes: these included a number of members of the European Parliament, especially from the Committee on Energy Research and Technology, and also the Council Working Group on Energy. There was substantial press coverage including explanation to the public of what the Thermie

programme seeks to achieve and of the role of the OPET's. Television stations covered the event and interviewed personalities on these central energy technology themes.

The OPET Exhibition at the Halles de Schaerbeek

Mr Maniatopoulos in his address to the OPET's analysed the lessons of the past two years experience of the OPET network, and the lessons to be drawn from it. He also surveyed the future prospects for Thermie, which he found to be encouraging both for the current final two-year phase of the present programme, and also as regards the likelihood of the Council thereafter adopting a successor programme. "The word 'OPET' and its associated message are well known in the industrial energy sector of every Member State and in many countries beyond the Community". The Director-General stressed the great challenge the OPET's shared with the Commission as regards Central and Eastern Europe and the CIS, and exhorted them to even greater dynamism and coordinated efforts in the future. Lastly, he expressed particular thanks to DG XVII's Director of Technology, Mr Rolf Meijer, on the occasion of the latter's departure for other responsibilities in the Commission, and welcomed his successor, Mr Pedro Sampaio Nunes, who takes up his appointment towards the end of 1992.

HUNGARY/EC ENERGY CENTRE LAUNCHED IN BUDAPEST

The Hungary-EC Energy Centre was launched on 15 December 1992 in Budapest at a reception hosted jointly by the Hungarian Ministry of Industry and Trade and the EC Delegation in Hungary.

The Head of the Community delegation welcomed the launch of the Centre, commenting that it represents an important new phase in the developing relations between Hungary and the EC, especially in the energy field. He stressed also that the setting up of the Centre very much reflects the spirit of both the recently signed European Energy Charter and the EC-Hungary Association Agreement.

The purpose of the Centre is to strengthen cooperation in the field of energy management both in Hungary itself and between Hungary and the Community. In particular, energy conservation and efficiency, better management, and improved technologies will be promoted in order to ensure security of supplies for sustainable economic development. Energy efficiency plays a crucial role, not only in economic development, but also in protecting the environment.

The Centre will achieve its aims through a number of activities, including the exchange of experience and research and development results in energy, energy management training courses, information and marketing, energy planning, and the promotion of energy technology transfer between the EC and Hungary.

The Centre will be staffed mainly by Hungarian nationals, including the Director of the Centre, who will be assisted by a senior European Community adviser.

From the financial point of view, the setting-up of the Centre is a joint Hungarian-EC project. Funds have been made available by Hungarian Institutions, the Commission's Directorate-General for Energy and the EC PHARE programme.

The Energy Centre also hosts activities in the framework of the Community's THERMIE programme for the promotion of European technology in four energy sectors: rational use of energy, renewable energy sources, coal, and hydrocarbons. These activities facilitate industry-to-industry cooperation between Hungary and the EC, carried out within the EC's network of 40 Organizations for Energy Technology Promotion ('OPETs').

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EC/US Negotiations for a New Nuclear Cooperation Agreement

Representatives from the Commission of the European Communities and the United States Government met in Brussels on 28/29 September 1992 to continue negotiations for a new EC/US nuclear cooperation agreement.
The Head of the US negotiations team was US Ambassador-at-Large, Mr R.T. Kennedy; the Community team was led by Mr C.S. Maniatopoulos, Director-General for Energy of the EC Commission.
Both sides provided comments on, and compared their respective topics proposed for inclusion in the scope of the new agreement.
The discussions were constructive and it was agreed that a further round of negotiations would be arranged within the next few months.

Director-General Maniatopoulos Addresses Energy Meetings in France

Director-General Maniatopoulos delivered two keynote addresses in Paris during the month of September, at the 110th annual conference of the *Association Technique de l'Industrie du Gaz en France* on 9 September, and a week later at a Symposium organised by CEDEC, the European Confederation of Municipal Public Energy Distributors. The central theme of both was Community energy policy and its future context and responsibilities. He underlined in both presentations that with the end of the Cold War and the profound changes and geo-political uncertainties of recent times these responsibilities have grown enormously and that energy policy is no exception to this. From the impulse to coordination of then purely national policies which had been given by the first oil crisis of 1974, to the fresh impetus to a truly Community-level energy policy inherent in the gradual achievement of the Single Market since 1988, the contrasting elements and priorities for the future direction of energy policy choices has certainly been long in the making. Mr Maniatopoulos stressed that, against this background of gathering momentum, the era of stable energy supplies which appeared to have arrived - despite the Gulf War the disturbing effect on markets of which proved ephemeral - was no cause for complacency for policy makers. This stability could easily come under threat suddenly and soon, on both supply (USSR oil and gas difficulties, the Middle-East) and demand (probable heavy increases in world energy requirements, especially in developing countries) sides.
The Director-General, in setting the Community's own priorities put the accent firmly on the need for greater solidarity between Member States in the energy field. On the internal level this, especially in the gas and electricity sectors, means the ending of monopoly situations and exclusive rights affecting both production and network construction and use, and the introduction of unbundling and Third Party Access as put forward by the Commission in the February proposals for these sectors. Looking beyond the Community this search for greater solidarity with our partners was expressed in the initiative of the European Energy Charter and the extension of technical assistance and technology programmes, including Thermie, to our partners in the East. But solidarity both internally and on the international stage was also vital in terms of a common approach by Member States in case of supply difficulties, allowing the Community to play its full part in the international mechanisms set up to this effect. This would only be possible through the concerted pursuit of shared objectives, including reinforced cooperation with the East and also with Mediterranean suppliers like Algeria and the Gulf Countries, and also a coherent approach to environmental challenges.
In addressing these two contrasting audiences, the first of producers, the second of intermediate consumers as represented by the municipal energy distributors, the Director-General was able to conclude with an unambiguous reminder of the means and methodology of Community energy policy in the future, and to justify his call for both sides - industries and distributors - to play their indispensable full part in the continuing task of implementing an effective energy policy for the wider Europe in the making.

Progress in the Negotiations Towards the European Energy Charter

Between 12 and 20 October, discussions were held in Brussels in the context of the Working Group on the Basic Agreement and the Conference Plenary Session (15 October). The discussions covered notably issues such as trade relations, investment protection and the legal status of Protocols. A Sub-Group on transitional arrangements also met. Further intensive discussions on the Basic Agreement continued in November and December.
A consensus is emerging to complete the negotiations for the European Energy Treaty (Basic Agreement) no later than May.
The intention at the December Conference Plenary was to work towards an Easter target, much in line with the

EC position. Negotiations on the protocols can only pick up speed following the signature of the European Energy Treaty itself. Nevertheless the Nuclear and Environment/Energy Efficiency Protocols might be agreed in time for Parliaments to ratify them together with the main Treaty.

The European Energy Charter was adopted in The Hague in December last year and has been signed, then and since, by 48 countries. The European Community is also a signatory.

The aim of the Charter is to trigger economic recovery in the former USSR and Eastern Europe by a joint effort to develop the region's energy resources, modernise its energy industries and expand energy trade. The success of this initiative will depend mainly on harnessing the resources of Western industry.

The Basic Agreement is a comprehensive legal text which would provide industry with the legal safeguards it needs to invest and operate in Eastern countries in the energy field. These safeguards are in fact equivalent to normal market conditions in the West and cover fields such as investment, non-discrimination on nationality grounds, access to resources, access to markets, trade, transit and disputes resolution.

The European Council in Lisbon in June this year called for early completion of the Basic Agreement negotiations. The Western Economic Summit in Munich in July also underlined the urgency and importance of this work. So too, did the Summit of the Conference for Security and Cooperation in Europe (CSCE).

At the end of September, some 100 representatives of Central and Eastern Europe and the New Independent States participated in a Seminar near Moscow to discuss with experts some of the key issues of the Basic Agreement; the world trading system, energy policy and administration, competition law, the law of treaties, investment protection. Intensive and detailed discussion proved to be most useful and should give positive help to the ongoing negotiations. Subsequently a similar event took place on a smaller scale in Kiev.

Implementation of Measures Regarding Energy in the POSEIMA Programme

On 29 July 1992 the Commission approved the first Community contribution to the autonomous regions of the Azores and Madeira provided for by the of the Council Decision on the Poseima programme (No 91/315/EEC of 26 June 1991[1], designed to offset the higher cost of supplying the two archipelagos with oil in the year 1991.

This initial contribution is MECU 5, financed from the 1992 budget for the Thermie programme. According to the provisions of the Poseima Decision, at least half of this contribution is to be used for funding energy management projects (energy saving and renewable energy sources).

Producer-Consumer Dialogue

Commissioner Cardoso e Cunha represented the Commission at a meeting in Solstrand, Norway on 2-3 July 1992 that brought together both Foreign and Energy Ministers from around 25 major consuming and producing countries, as well as representatives from international organizations. This meeting was a continuation of the process that had begun with meetings at Ministerial level in Paris in 1991 and at the technical level under IEA auspices in February 1992.

This informal meeting enabled Ministers to discuss the economic, political and strategic dimension of the oil/energy question. In his intervention, Commissioner Cardoso e Cunha highlighted the importance the Community attached to the long-term stability of the oil market, particularly as regards hydrocarbons, since over 70% of the oil consumed by the EC (accounting for +/- 45% of its primary energy consumption) is imported. He welcomed the renewed dialogue between consumers and producers, which could provide a political framework for establishing stability in energy markets. However, he underlined the importance of other elements in energy security and said that the Community was currently examining, on the basis of a Commission report, how the Community could increase the effectiveness of the crisis measures and how best to mobilize and to improve our existing oil stock provisions.

He also tried to allay the fears of oil producing countries as regards the Community's proposed energy/CO2 tax. He emphasised the fact that the environmental aspects of energy use and production could not be minimised, public opinion regarded it as a major issue and so it was also in the interests of oil producers to take these political trends seriously. Considerable analysis had been done by the Commission to demonstrate that the proposed tax would not result in a new recession (the proposed tax was fiscally neutral) and that it would not lead to a drying-up of new investment in the industry. He argued that governments would have the opportunity to favour energy efficiency technologies by appropriate shifts in the structure of taxation. New and innovative energy technologies leading to energy efficiency and switches

[1] *OJ No L 171 of 29.6.1991.*

to low fuels was also a major part of the EC strategy. Consuming countries would continue to depend on oil producers well into the next century for a major part of their energy supplies. The proposed tax could inject a new element of stability into the market and contribute to the adjustments in the energy market that would be needed in the medium- to long-term.
There was a general consensus at the meeting that the dialogue should not lose momentum and that it would be in the interest of all to continue this process with further meetings at both political and technical level.

ENERGY NETWORKS

ENERGY TRANSMISSION INFRASTRUCTURES

On 27 March 1992 the Commission approved a communication to the Council concerning **'electricity and natural gas transmission infrastructures in the Community'** (SEC (92) 553 final).
The communication is a discussion paper which describes the current situation as regards electricity and natural gas transmission networks, indicates the way ahead for a genuine incorporation of the Community, and in some cases continental, dimension of these networks and lists projects already under way or planned, as well as potential projects for the future, for developing and strengthening the networks.
The communication represents the starting point for the preparation of guidelines for trans-European energy networks, which the Community is due to establish in accordance with the provisions of Title XII of the Treaty on European Union.
On 21 May 1992 the **Council** noted with interest the analysis and the approach contained in this communication. It considered that initiatives concerning energy transmission infrastructures should henceforth be based on the new provisions of the Treaty and it called on the Commission to continue the work of preparing the guidelines.
DG XVII has therefore since June 1992 embarked on wide-ranging consultations with the Member States, consumers organizations, and representatives of the sectors concerned.
A draft version of these guidelines concerning trans-European energy networks is due to be submitted to the Commission in early 1993.

REGEN PROGRAMME

Alongside its work on future guidelines regarding energy transmission networks, the Commission has continued to support the most advanced projects for setting up networks or interconnections in the least developed regions of the Community. Hence, in the context of the REGEN Community initiative financed from the structural Funds, the Commission has given substantial aid (around 35% of the investment provided for during the present period of the Funds) for the establishment up of a gas transmission network in Portugal and for interconnections between the Italian and Greek electricity networks.
With the previous decisions on aid, namely the setting up of a gas network in Greece and a gas link between the United Kingdom and the Republic of Ireland, the overall budget of MECU 300 for the REGEN initiative up to 1993 has thus already been disbursed.

REGIONAL AND URBAN ENERGY PLANNING: RESULTS OF THE INVITATION TO SUBMIT PROPOSALS IN 1992

The invitation to submit proposals for regional and urban energy planning in the Community[2] has once again been a success in 1992. DG XVII has received 174 proposals, 149 of which fulfil the administrative requirements.
Examination by DG XVII staff has resulted in the selection of about 40 projects eligible for funding under the budget available[3].
There are 19 planning studies, the aim of which is to help regions, towns and cities in the Community to consider their present and future energy situation in overall terms prior to future investment, 10 concern towns and cities, and the rest regions.
There are 16 feasibility studies, following on from earlier energy planning studies or relating to projects eligible for support under the Thermie programme.
Assistance in the setting up and launching of local and regional teams, which were eligible for support for the first time this year, has been given in five instances.
It should be pointed out that more than one project in three involves cooperation between regions and towns or cities in different Member States.

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2 *OJ C 36 of 14.2.1992; final date for submission: 30.4.1992.*

3 *With support varying between 20% and 40% of the total cost (average: 34%).*

DOCUMENT UPDATE

MAIN COMMISSION ENERGY DOCUMENTS, PROPOSALS, DIRECTIVES

COM/92/110 — Proposal for a Council Directive on the conditions for granting and using authorizations for the prospection, exploration and extraction of hydrocarbons
OJ No C 139 of 02.06.1992 - p.12

COM/92/145 — Proposal for a Council Directive providing for appropriate measures to be taken in the event of difficulties in the supply of crude oil and petroleum products to the Community
OJ No C 127 of 19.05.1992 - p.8

COM/92/152 final — Communication from the Commission to the Council on the oil market and the refining industry in the Community: recent developments and prospects

COM/92/180 — Proposal for a Council Decision concerning the promotion of renewable energy sources in the Community (Alterner Programme)
OJ No C 179 of 16.07.1992 - p.5

COM/92/182 — Proposal for a Council Directive to limit carbon emissions by improving energy efficiency (Save Programme)
OJ No C 179 of 16.07.1992 - p.8

COM/92/197 — Proposal for a Council Decision approving the conclusion of a safeguards agreement between the European Atomic Energy Community, the United Kingdom and the International Atomic Energy Agency (IAEA) pursuant to the additional protocol No 1 to the Treaty of Tlatelolco.

SEC(92)1327 — Community grants and loans to the energy sector in 1990

SEC(92)1411 — Report from the Commission to the Council on the progress on cooperation between public utilities and auto-producers of electricity.

SEC(92)1996 — The energy consequences of the proposed carbon/energy tax

THERMIE

Thermie - European Oil and Gas Technology Projects - Fifth status report, October 1992. Commission of the European Communities (DG XVII).

Promotion of Energy Technologies for Europe - Information Activities September 1992

Thermie - Energy technology for our Environment - Address List of 'Organizations for the Promotion of Energy Technologies (OPETs); EC Energy Centres in Central & Eastern Europe; Coordinating OPET Listing of OPET events from today's date for the next three months.

Flag Brochure - Thermie: Promoting European Energy Technology - An important initiative

Thermie: Fremme af europaeisk Energiteknologi

Coal Can be Green - A review of Coal Technologies, June 1992

EUROSTAT

RAPID REPORTS - ENERGY AND INDUSTRY

1992-1 Industrial trends - January 1992 - EC industrial production stagnant
1992-2 Industrial development sluggish
1992-3 Electricity prices (Supplement to No 20 - 1991)
1992-4 Gas prices (Supplement to No 19 - 1991)
1992-5 Report on the Community Coal Industry in 1991
1992-6 Electricity statistics
1992-7 Downturn in Germany too
1992-8 Inland deliveries of petroleum products in 1991
1992-9 Evolution of inland deliveries of unleaded motor spirit
1992-10 Statistical aspects of the natural gas economy in 1991
1992-11 European Industry without engine for growth
1992-12 Hard Coal - Extra-Community Imports 1988-1991
1992-13 Statistical aspects of the economy in 1991
1992-14 Domestic deliveries of hard coal and coke in 1991
1992-15 Industrial trends - May 1992
1992-16 Renewable energies statistics
1992-17 Gas prices - 1st January 1992
1992-18 Electricity prices - 1st January 1992

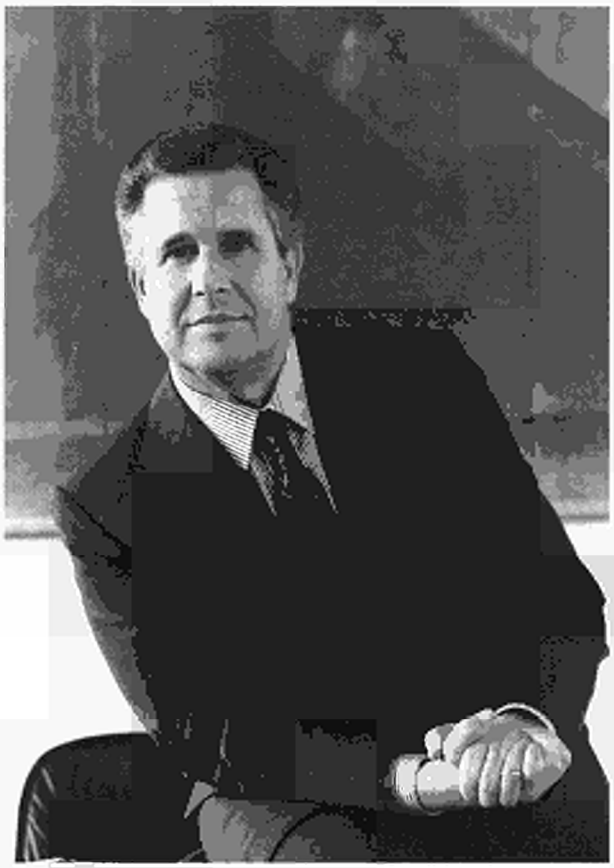
1992-19 Europe sees slight recovery
1992-20 Hard coal mines - Personnel underground
1992-21 Sluggish recovery in European industrial production
1992-22 Enterprises in Europe, 2nd report
1992-23 Price systems - gas (supplement to No 23 - 1991)
1992-24 Prices systems - electricity (supplement to No 22 - 1991)
1992-25 Recovery in EC industrial production slow in coming
1992-26 Hard coal supplies - EUR 12
1992-28 EC industrial production in decline
Electricity prices 1985-1992 - Eurostat
Office for Official Publications of the European Communities Luxembourg

Energy Monthly Statistics
1992 - 1
1992 - 2
1992 - 3
1992 - 4
1992 - 5
1992 - 6
1992 - 7
1992 - 8
1992 - 9
1992 - 10
Office for Official Publications of the European Communities, Luxembourg ■

LE GAZ NATUREL EN EUROPE - L'AVENIR INEVITABLE

Discours de clôture de la Conférence sur le Gaz Naturel prononcé par le Commissaire Cardoso e Cunha Vilamoura - avril 1992

Mesdames et Messieurs,
En réponse à notre invitation, les grands opérateurs gaziers européens, les représentants des intérêts européens et non européens qui opèrent sur notre marché ainsi que les administrations nationales dépendant des gouvernements des douze Etats membres, se sont réunis ici pendant deux jours.
Il convient de souligner que dans l'histoire, même récente, du gaz naturel en Europe, il n'y a jamais eu, à mon avis, de réunion de cette envergure.
Si la participation de nos invités est due en grande partie à la curiosité suscitée par certaines initiatives de la Commission, ils ont à présent l'occasion réelle d'introduire une dynamique de changement dans ce secteur qui revêt une telle importance. Il n'est peut-être pas inutile d'expliquer pourquoi la Commission prend de telles initiatives.



En effet, la Commission n'est un opérateur ni dans le secteur gazier, ni dans le secteur pétrolier, ni dans aucun autre secteur, elle ne défend aucun intérêt économique particulier, elle agit en totale indépendance, et, en tant qu'institution de droit public, elle se distingue des gouvernements nationaux qui, tout en étant une émanation d'un système démocratique et parlementaire, sont néanmoins soumis à de lourdes contraintes.
La durée de vie de tous les gouvernements européens est limitée aux périodes comprises entre deux élections. Cette situation rend le marché européen (le plus élaboré et le plus complexe au monde) particulièrement fragile, parce que les organes responsables de cette grande société et de ce grand marché sont naturellement contraints de programmer leur action sur une période restreinte de deux ou trois ans, voire quatre ans, entre deux élections parlementaires.

On risque dès lors de prendre, dans notre société, des décisions vitales motivées par des vues à court terme et parfois même à très court terme, et donc tout à fait inacceptables, alors que nous devons assumer des responsabilités à l'échelle continent.
C'est ici qu'interviennent l'intelligence et la sagesse des pères fondateurs, qui ont créé un élément de droit public - la Communauté européenne - qui constitue un intermédiaire entre la société et les gouvernements. La gestion de la Communauté a été confiée à la Commission, dont les membres sont désignés par les gouvernements issus des élections nationales, et son action est controlé par le Parlement Européen. Forte de son mandat démocratique et de son indépendance, la Commission peut se permettre de lancer des discussions qui seraient absolument impossibles si l'initiative était cantonnée aux pouvoirs publics nationaux. La Commission le fait dans un esprit de

responsabilité, car elle est consciente des changements et de l'inquiétude que ses initiatives peuvent susciter dans une société comme la société européenne.

La Commission ne peut être qualifiée de trouble-fête. En réalité, la Commission détient le monopole de l'initiative des propositions, mais elle n'est pas responsable de leur adoption, qui relève de la compétence des douze Etats. Si les propositions de la Commission manquaient de cohérence, si elles étaient inutiles, elles s'accumuleraient dans les archives du Conseil.

Or, une majorité écrasante des propositions de la Commission finissent, tôt ou tard, par être adoptées en Conseil de ministres, qui est révélateur du prestige que la Commission a réussi à acquérir au cours de ses quarante années d'existence et permet naturellement de supposer que les propositions présentées par la Commission deviendront des lois communautaires.

Le débat d'aujourd'hui revêt de ce fait une importance particulière. C'est bien entendu pour cette raison que nous avons réussi à capter l'intérêt des grands opérateurs que j'ai l'honneur et le plaisir de saluer.

Il ne m'appartient pas d'expliquer à une assemblée comme celle-ci, qui est bien plus informée que moi sur le gaz naturel, les particularités ou les caractéristiques du réseau européen de gaz naturel. Mon exposé portera plutôt sur l'aspect politique du fonctionnement des réseaux, sans oublier les responsabilités qui incombent aux opérateurs et aux législateurs nationaux.

Force est de constater que le rythme de pénétration du gaz naturel l'énergie à la mode - s'accélère en ce moment en Europe sous l'influence de trois éléments essentiels.

Le premier est la dynamique qui résulte d'une nouvelle, et sans doute imminente, orientation ou organisation du marché, qui va évoluer dans le sens d'une plus grande libéralisation et d'une compétitivité accrue. Cette situation dont je suis convaincu qu'elle s'instaurera, entraînera une nouvelle dynamique dans ce marché, à laquelle, j'en suis certain, tous les opérateurs s'adapteront sans problème majeur.

Le deuxième, qui stimule la pénétration du gaz naturel sur le marché européen, est lié aux préoccupations mondiales dans le domaine de la politique de l'environnement.

Et le troisième, qui encourage la pénétration du gaz naturel sur le marché européen, est une plus grande diversité de l'offre. Actuellement, l'offre extérieure qui intéresse l'Europe est complétée de deux façons. Tout d'abord, grâce aux nouvelles perspectives qu'ouvrent de nouveaux sites d'exploration, plus particulièrement au Quatar, au Nigéria et en Iran; ensuite, du fait de la reformulation des règles économiques chez deux fournisseurs traditionnels. Je veux parler des Etats de l'ancienne Union soviétique et de l'Algérie. Ces deux marchés, qui représentent une part fondamentale de l'approvisionnement européen, évoluent actuellement vers des pratiques commerciales et financières qui vont modifier les stratégies et les tactiques de négociation qui avaient cours jusqu'à présent dans le secteur gazier. Toutes vos expériences devront être revues en fonction de cette nouvelle réalité.

Je vais tenter de vous exposer ces trois points et de vous expliquer pourquoi la discussion qui a eu lieu dans cette salle au cours des deux derniers jours marquera, à mon sens, l'évolution du secteur énergétique européen.

Voyons tout d'abord le marché intérieur et la dynamique qu'il engendre. C'est aujourd'hui pour moi une occasion exceptionnelle de clarifier la position de la Commission et de justifier certaines initiatives qu'elle a prises au cours des trois dernières années.

Je précise que la Commission ne peut ni ne veut se présenter comme le 'big brother' de la société européenne. Nous essayons d'être une administration de qualité, nous nous efforçons de prévoir les évolutions et les tendances des secteurs dans lesquels nous travaillons et nous nous conformons scrupuleusement aux fondements en faisant montre d'une grande prudence politique (compte tenu du lien délicat qui existe entre les institutions européennes et les gouvernements nationaux).

N'oublions pas que toutes les actions de la Commission peuvent être attaquées devant la Cour de justice de Luxembourg par n'importe quel opérateur, ce qui confère naturellement une responsabilité particulière à la Commission. Mais j'ajouterai que dans la plupart des cas, la Cour confirme les décisions de la Commission.

Il convient de souligner le sérieux qui règne en la matière. C'est sur la base du droit primaire de la Communauté que je vous invite à analyser les propositions de la Commission.

Le principe de base de notre travail rejoint l'idée exposée aujourd'hui par le professeur Bergmann: le 'Magic Triangle'. Selon lui, et selon la Commission, l'équilibre d'une politique énergétique communautaire devra reposer sur **'un approvisionnement adéquat et sûr de l'énergie'** (premier côté du triangle), sur **'des conditions économiquement satisfaisantes'**, (deuxième côté du triangle), et sur **'un compromis raisonnable face aux exigences environnementales'** (troisième côté du triangle). Je n'ai rien à ajouter à l'analyse du professeur Bergmann, si ce n'est qu'il ne s'agit pas d'un triangle magique, mais d'un triangle logique. Les trois conditions sont tributaires de la volonté des citoyens s'exprimant à travers les structures politiques. La politique énergétique n'est pas le résultat d'un équilibre décidé unilatéralement mais le résultat d'une orientation que les citoyens doivent aider à définir.

La seconde base de notre travail est le marché intérieur. Le marché intérieur n'est pas en soi un

objectif de la Communauté. Les objectifs de la Communauté sont des objectifs politiques et sociaux, c'est-à-dire un développement harmonieux de la société européenne, une expansion économique équilibrée, un rapprochement des niveaux sociaux des différents Etats et l'amélioration des relations entre leurs citoyens. Nous devons à cet effet tirer le meilleur parti des complémentarités des marchés nationaux et optimiser les ressources disponibles, tant les ressources primaires que les ressources d'infrastructure et les ressources technologiques. Il s'agit également de rationaliser les activités de production, le transport et la distribution dans tous les secteurs de l'économie. Tels sont les objectifs de la Communauté, tels sont les objectifs de la Commission.

Les instruments qui permettront d'atteindre ces objectifs sont le marché intérieur et l'union économique et monétaire. Et, dans ce contexte, le marché intérieur de l'énergie s'inscrit clairement comme un élément d'un plan plus vaste - le marché intérieur européen. La liberté d'établissement, de concurrence et de circulation des personnes, des services, des biens et des capitaux, est une philosphie qui transcende la volonté, l'initiative, le dogmatisme, ou l'arbitraire d'une politique nationale ou communautaire.

Nous travaillons dans un contexte qui est irréversible et qui ne sera probablement pas modifié dans un avenir proche ou lointain.

La Commission est consciente de la dimension et de la complexité des problèmes qui en découlent. La Commission veut assurer l'expansion du réseau européen de gaz naturel dans des conditions qui respectent deux principes:

Tout d'abord, la stabilité et la prospérité des opérateurs économiques. L'idée d'un secteur énergétique européen où les opérateurs ne trouveraient pas des bases solides pour rentabiliser leurs investissements est inconcevable.

Le deuxième principe, tout aussi important, consiste à trouver l'équilibre entre les intérêts des producteurs et les intérêts des consommateurs tout en respectant la philosophie du marché intérieur.

Nous avons fait beaucoup de progrès par rapport à la situation qui existait dans la Communauté il y a trois ans, lorsqu'il était courant de dire que l'énergie n'était pas couverte par le Traité. Nous avançons à pas de géants, mais la Commission entend maintenir et renforcer le dialogue avec les professionnels qui ont une connaissance plus directe et, partant, plus parfaite que nous, du secteur.

Je pense que l'organisation et le déroulement de cette conférence montrent clairement que le secteur n'a pas à redouter le dogmatisme de la Commission. La Commission a évolué en fonction des impulsions qu'elle a reçues du secteur et le dialogue garantit que ces impulsions sont bien comprises. Le fonctionnement des institutions communautaires est entièrement régi par des règles de droit primaire auxquelles nous souscrivons tous.

Voyons à présent certaines habitudes et pratiques commerciales qui ont cours sur les marchés et plus particulièrement sur les grands marchés.

Je vous demande de ne pas voir dans mes propos un quelconque jugement de valeur. Je ne suis pas ici pour définir le bien et le mal. Si j'étais l'un des responsables d'un monopole européen du secteur de l'énergie, j'agirais probablement de la même manière que lui. Je tirerais parti des conditions du marché pour rentabiliser au mieux mes investissements. Mon propos n'est donc pas de définir ce qui est correct et ce qui ne l'est pas.

Je tiens pourtant à signaler que dans tout secteur économique, le protectionnisme est une maladie d'enfance. Tous les secteurs économiques passent par une période de protectionnisme qui est inhérente à la phase d'établissement et de développement. L'histoire de l'économie le prouve.

Les concepts de concurrence et de compétitivité n'ont jamais eu la faveur des producteurs. Même les producteurs les plus efficaces préfèrent opérer sans concurrents, quel que soit le secteur économique. Seuls les consommateurs y trouvent leur intérêt. Le degré d' intensité, voire l'agressivité, de certaines oppositions qui vont à l'encontre les tentatives de libéralisation n'a donc rien d'étonnant et est tout à fait prévisible.

Selon la Commission, le protectionnisme est contraire aux intérêts généraux, parce qu'il comporte certains dangers inéluctables pour la société que je vais maintenant vous énumérer.

Premièrement, le protectionnisme offre la possibilité de répercuter sur les consommateurs le coût d'une mauvaise gestion éventuelle. Toutes les entreprises protégées ont naturellement tendance à faire supporter par les consommateurs les conséquences de leurs propres erreurs. Lorsque celles-ci sont couvertes par des aides d'Etat, c'est le budget public qui les supporte. Ce sont donc les citoyens dans leur ensemble, même ceux qui n'utilisent pas le service en question, qui supportent ces coûts. Cette situation est inacceptable au niveau de la Communauté.

Deuxièmement, il y a un risque de stagnation technologique et opérationnelle. Je sais qu'on ne peut accuser les réseaux gaziers européens de stagnation technologique. Du point de vue technique, nous avons en Europe les meilleurs réseaux gaziers au monde, mais du point de vue opérationnel, je n'hésite pas à affirmer qu'il y a stagnation, plus particulièrement dans le domaine commercial.

Troisièmement, le protectionnisme entraîne une mauvaise évaluation des risques commerciaux, parce que toutes les entreprises protégées ont tendance à

évaluer les risques de façon conservatrice. C'est tout à fait naturel, le contraire serait étonnant.

Quatrièmement, le protectionnisme incite les entreprises protégées à se rapprocher des gouvernements. Cette situation entraîne divers inconvénients. Les gouvernements interviennent dans la gestion en nommant des gestionnaires, parfois incompétents, souvent choisis dans des domaines qui ne nécessitent pas de compétence commerciale, et en fondant l'évolution économique des entreprises sur des prix fixés aux plans administratif, politique ou bureaucratique, sans rapport avec le marché réel. L'aspect irrationnel de cette façon de gérer les entreprises se traduit par le recours inconsidéré à toutes les mesures anti-compétitives.

Cinquièmement, le protectionnisme aboutit à un excès de dépendance ou au développement exacerbé de certaines pratiques commerciales, certes légitimes, mais trop rigides, comme les contrats 'take or pay' ou les contrats de très longue durée. Un régime de libre concurrence ne justifierait jamais un pourcentage aussi élevé d'opérations basées sur des contrats aussi rigides. Cette rigidité entrave l'évolution harmonieuse de l'économie.

Sixièmement, le protectionnisme entretient, dans le monde des consommateurs, un sentiment de méfiance et d'insécurité, parce que les consommateurs n'ont pas la possibilité de vérifier le bien-fondé des conditions commerciales qui leur sont imposées.

Septièmement, on risque de sous-utiliser les infrastructures, en particulier les gazoducs, qui, rappelons-le, sont souvent financées par la société tout entière. Il n'y a pas de raison de ne pas les utiliser au maximum dans la mesure du possible, pour qu'elles soient rapidement amorties.

Huitièmement, le protectionnisme conduit inévitablement à la mainmise des fournisseurs sur les clients, parce que les relations sont, d'entrée de jeu, déséquilibrées.

Neuvièmement - le secteur de l'offre s'oriente en priorité sur les problèmes d'infrastructure. Il n'y a aucune critique à formuler à l'endroit des réseaux européens en ce qui concerne la qualité technique des infrastructures, mais comme il s'agit généralement d'entreprises protégées, d'autres obligations, qui concernent les consommateurs et qui sont liées à l'organisation économique et commerciale, sont reléguées au second plan.

Le protectionnisme représente, en dernier lieu, l'établissement d'une dictature de fait sur les clients, qui n'ont pas la possibilité de choisir librement leurs fournisseurs. Il s'agit d'un droit fondamental, d'un droit démocratique que les sociétés exigent, même au prix de certaines répercussions économiques. Dans cette situation, les clients deviennent peu à peu insensibles aux carences éventuelles de l'approvisionnement puisqu'ils ne connaissent pas les avantages ou les inconvénients des solutions de remplacement.

La Commission n'attend pas une obéissance scrupuleuse, elle ne prétend pas juger les comportements. Les directives que la Commission propose ouvrent des possibilités aux opérateurs économiques qui souhaitent les utiliser. Quiconque veut maintenir les structures traditionnelles des relations client/fournisseur est libre de le faire. La Commission récuse toute accusation de mainmise ou d'interventionnisme. Elle est toutefois absolument convaincue que le protectionnisme dans la société européenne est un risque qui doit être évité, qu'il faut absolument éviter. En droite ligne avec le marché intérieur, ce principe est appliqué à tous les secteurs de la vie sociale de la Communauté. Il ne concerne pas exclusivement l'énergie, il ne concerne pas exclusivement le gaz.

Tous les secteurs de la société européenne qui comptent déjà une forte composante protectionniste, notamment la politique agricole commune, doivent se préparer au changement, parce que le changement est inévitable. C'est une erreur de penser que l'on pourra maintenir indéfiniment une situation de protectionnisme. Dans son indépendance et sans vouloir intervenir dans la gestion de vos affaires, la Commission a le droit et le devoir de lancer ce cri d'alarme.

Les entreprises de production, de transport et de distribution du secteur énergétique possèdent, heureusement pour elles, une dimension, une qualité et un niveau intellectuel suffisants pour exercer un pouvoir important. Je respecte ce pouvoir et je sais qu'il pourra entraîner un retard dans la restructuration opérationnelle que propose la Commission, si les entreprises s'y opposent. Je suis cependant convaincu qu'il ne sera pas possible d'éviter cette restructuration.

Nous nous trouvons face à un problème d'échéance. Tout peut arriver en six mois ou en six ans. Je n'en sais rien. C'est une question qui relève du jeu des forces en présence et de la capacité de gérer un changement qui approche inéluctablement.

Je perçois également de façon claire et je suis convaincu que l'action d'un organisme de droit public tel que la Commission doit être régie par des principes très rigoureux. Nous ne pouvons pas nous transformer en interventionnistes, nous n'avons ni le droit ni les moyens de gérer vos affaires, l'action d'une institution de droit public doit être strictement limitée.

En premier lieu, il incombe aux institutions de droit public de maintenir des conditions de concurrence équilibrées et d'éviter l'existence de discriminations dans les concessions octroyées par les pouvoirs nationaux.

En deuxième lieu, il incombe aux institutions de droit public d'harmoniser progressivement les secteurs

secondaires de l'économie. Je vais ici au-devant d'une demande répétée du secteur de la production. Nous devons harmoniser progressivement la fiscalité, les règles, les normes et toutes les conditions parallèles du marché. C'est une requête légitime que nous avons l'obligation de satisfaire.

En troisième lieu, les pouvoirs publics doivent garantir l'existence et le fonctionnement d'organismes de régulation, animés de préférence directement par les intérêts du marché.

Il est ensuite du devoir des institutions publiques de sortir du jeu économique, d'éviter d'intervenir dans la fixation des prix ou de maintenir un déséquilibre des marchés en octroyant des droits exclusifs ou des aides d'Etat.

Les pouvoirs publics doivent rester vigilants concernant les conditions de sécurité des installations.

Lorsque les pouvoirs publics, les gouvernements, sont également actionnaires d'entreprises de ce secteur, il doivent avoir le sens de leurs responsabilités et agir en respectant les principes de gestion établis et en évitant les situations de complaisance. Le plus grand problème des entreprises publiques provient de ce que les gouvernements sont, généralement, des actionnaires accommodants.

En septième lieu, il incombe aux institutions publiques d'assurer la transparence de leurs relations avec les opérateurs économiques, qu'ils soient clients ou fournisseurs, en reconnaissant le besoin de disposer de délais d'adaptation raisonnables, si cela est nécessaire pour éviter que les réorganisations ne soient marquées par la rigidité et la confusion.

Enfin, il leur incombe d'arbitrer en dernier recours lorsque les méthodes directes des opérateurs économiques ne sont pas suffisantes.

Je peux garantir que la Commission ne sortira pas du cadre de ces règles. Elle veut naturellement remplir sa mission, avec les obligations que le Traité lui a attribuées, mais sans aucune exagération. La Commission récuse les accusations de bureaucratie et d'interventionnisme. Au contraire, elle estime qu'il importe avant tout d'abolir de nombreuses réglementations actuelles qui accordent des protections excessives à quelques opérateurs économiques ou confèrent au marché une rigidité insupportable.

En résumé, dans cette phase d'établissement du marché intérieur de l'énergie, il existe réellement une demande de gaz. Cette demande est certainement en augmentation. Le potentiel de la demande ou les possibilités de diversification de la demande, sont très importants. L'économie européenne pourrait disposer de 70% des réserves mondiales. Lorsque la demande est garantie et que l'offre est garantie, lorsque la croissance de la demande et la croissance de l'offre sont garanties, il n'existe aucune raison, sinon des raisons mesquines que nous ne pouvons accepter, d'entraver le fonctionnement du marché. Il doit fonctionner comme il le fait déjà dans les autres régions du monde. Et les opérateurs économiques qui acceptent les règles du jeu dans les zones de marché libre n'ont aucun argument pour les refuser en Europe.

Je n'ignore pas que cette discussion soulève des questions qui demandent une réponse. Trois problèmes ont été évoqués ici, qui constituent les principales objections soulevées à l'encontre du caractère innovateur de notre proposition: sécurité de l'approvisionnement, avenir des investissements, situation des petits consommateurs. Nous avons constaté qu'au cours de la discussion, les deux parties en présence ont échangé des arguments sans parvenir à se convaincre l'une l'autre.

La Commission est intimement persuadée qu'il existe une réponse appropriée à toutes les objections soulevées, dans le contexte d'un marché compétitif, libre et concurrentiel. Nous allons poursuivre le dialogue, comme il est de notre devoir. Néanmoins, dans le processus communautaire, nous utiliserons tout notre pouvoir pour convaincre le plus rapidement possible les législateurs (Conseil de ministres et Parlement européen). Nous n'acceptons pas l'idée que le dialogue permanent puisse se substituer à l'action, en faisant obstacle aux adaptations nécessaires.

Je ne veux pas clore ce chapitre sur la réalisation du marché intérieur avant d'avoir évoqué les efforts que nous déployons pour promouvoir le développement harmonieux des réseaux européens, en tant qu'instruments destinés à réduire l'abîme qui existe entre les régions communautaires sur le plan du bien-être économique.

Dans le contexte de sa politique de soutien à la réalisation du marché unique, la Commission encourage en conséquence l'extension du réseau de gaz naturel aux régions périphériques. Il a été décidé d'accorder une aide financière substantielle des fonds structurels communautaires à la création d'industries de gaz naturel en Grèce et au Portugal, et à l'interconnexion des réseaux de l'Irlande et du Royaume-Uni.

Il est également question d'accorder d'autres aides aux infrastructures de transport et de distribution dans les régions moins développées. De la même manière, l'octroi de prêts de la part de diverses institutions communautaires et d'autres institutions financières internationales pourra renforcer les efforts des autorités et des opérateurs nationaux et régionaux pour encourager l'utilisation du gaz naturel.

De nouveaux types de soutien ont été accordés aux réseaux transeuropéens lors du sommet de Maastricht en décembre 1991 (financement d'études de viabilité, réductions de taux et garanties de prêt); les projets qui concernent le transport du gaz naturel pourront

bénéficier de ces conditions avantageuses de financement.

Un mot sur le second élément moteur de la pénétration du gaz naturel sur le marché: le problème de l'environnement. Il s'agit d'un défi auquel aucun d'entre nous ne peut se soustraire: nous vivons tous sur cette planète et chacun d'entre nous, dans notre existence quotidienne, exerce une certaine influence sur l'environnement.

En particulier, chacun de nous consomme de l'énergie et la production de cette énergie nuit à l'environnement.

Au niveau mondial, 80% environ des émissions de CO2 proviennent de la production, de la transformation ou de la consommation d'énergie.

En conséquence, le message est clair: si nous voulons avoir une quelconque influence dans ce domaine, nous devons apporter une solution aux défis énergétiques.

Nous savons tous que la Communauté est parvenue à un accord concernant l'objectif de stabilisation des émissions de CO2, en l'an 2000, aux niveaux de 1990; ce problème devra trouver une solution à l'échelle mondiale, bien qu'il soit peut-être déjà trop tard pour espérer obtenir l'accord de tous les intéressés; il nous reste à être confiants dans la dynamique que pourra engendrer l'exemple de la CE.

Il y a quelques mois, la Commission européenne a publié ses réflexions sur une stratégie élaborée en vue d'atteindre cet objectif ambitieux concernant les émissions de CO2.

A cet égard, c'est bien sûr la taxe carbone/énergie qui a principalement retenu l'attention, par son caractère innovateur et controversé.

Je ne voudrais pas vous donner l'impression que la taxe est l'unique problème à résoudre. Non! Nous proposons un vaste éventail d'actions, y compris le renforcement des activités dans le domaine de la technologie énergétique. Le gaz en sera le grand bénéficiaire, étant donné qu'il s'avère mieux adapté aux techniques avancées de combustion, telles que les cycles combinés, la postcombustion, la combustion catalytique et la transformation de chaleur résiduelle dans de petits appareils. Toutes ces techniques améliorent considérablement le rendement thermique. L'utilisation accrue du gaz naturel en remplacement des autres combustibles fossiles contribue donc à la conservation de l'énergie.

Le troisième élément qui favorise l'accroissement du marché du gaz dans les prochaines décennies est l'émergence d'un nouveau climat de coopération et de dialogue avec les pays producteurs non communautaires et avec les nouveaux pays de transit.

La Communauté a resserré dernièrement ses liens avec la Norvège par la signature de l'accord économique avec les pays de l'AELE, qui devra être considéré comme un facteur de profonde intégration et comme un élément de sécurité supplémentaire pour les importations communautaires.

Du coté de l'Est, je n'oublie pas la responsabilité que la Communauté a acceptée, tant en Europe centrale et orientale que dans la Communauté des Etats indépendants, pour assurer la transition vers des méthodes cohérentes d'économie de marché.

La CEI et les pays d'Europe centrale et orientale sont au rang de nos priorités politiques et nous sommes tous conscients de la nécessité de redoubler les efforts, non seulement dans le contexte de la Charte européenne de l'énergie et de ses protocoles relatifs notamment au programme PHARE et aux programmes d'assistance technique à la CEI, mais également dans le cadre des pays de l'OCDE, où la Commission assume le rôle de coordinateur.

Du côté du Sud, je me réjouis de constater que l'Algérie s'intéresse au développement d'un point d'entrée supplémentaire en Europe, par le gazoduc ouest qui traverse le Maghreb et la péninsule ibérique. Je me réjouis aussi de ce que l'Algérie soit disposée à ouvrir la prospection et la production d'hydrocarbures aux investissements étrangers par le biais de formules intelligentes de partenariat. Il faut concevoir des politiques d'accompagnement pour accroître la coopération avec les pays du Maghreb, politiques qui devront contribuer à la stabilité souhaitée dans cette région.

Les nouveaux fournisseurs potentiels, au tournant de ce siècle, seront le Nigéria, l'Iran et les pays du Golfe. Il est également particulièrement intéressant de suivre l'évolution des projets éventuels dans ces régions du monde. La Communauté accueillera favorablement toutes les évolutions futures, de manière à rendre le marché communautaire plus accessible et à faciliter les échanges de gaz dans toutes les directions.

Avant de clôturer mon discours, j'aimerais évoquer en particulier le cas du Portugal: à Bruxelles, personne ne remet en cause l'importance du gaz naturel pour ce pays. Je m'emploie de mon mieux à garantir que le Portugal ne sera pas le seul Etat membre à ne pas posséder d'infrastructure de gaz naturel.

Le Portugal peut espérer recevoir le soutien politique de la Commission étant donné que, dans ce pays, le développement du gaz naturel répond à un nombre élevé d'objectifs politiques communautaires, notamment dans le domaine de l'énergie, de l'environnement et de l'aide aux petites et moyennes entreprises.

Il n'est pas toujours facile de promouvoir et d'accélérer les financements publics nécessaires. Dans le cas de la contribution financière de la Communauté au projet de gaz portugais, la démarche s'est avérée extrêmement longue étant donné qu'il a fallu éliminer de sérieux obstacles. J'ai le grand plaisir de constater que la

dernière difficulté majeure a été surmontée il y a exactement deux jours.

L'emploi du gaz naturel dans la production d'électricité représentera un nouvel atout important dans la situation actuelle, non seulement du fait qu'il permet la constitution d'une gamme de combustibles plus diversifiée et signifie l'utilisation du moins polluant de tous les combustibles fossiles, mais également pour des raisons d'ordre purement économique. Le gaz naturel permet des frais d'investissement plus limités et une planification plus souple des investissements grâce à la réduction des délais d'exécution.

Les centrales qui utilisent du gaz requièrent, pour être économiquement viables, une dimension nettement inférieure à celle des autres centrales, et peuvent donc être construites plus près des centres de consommation, limitant ainsi les pertes dues à la transmission de l'énergie. Le gaz naturel sert à la fois à la production de chaleur et d'électricité. Dans le cas du Portugal, la production d'électricité à partir du gaz stabilisera les variations saisonnières de la demande de gaz naturel et augmentera l'économie du système.

Tout évolue rapidement dans l'Europe nouvelle et le dynamisme engendré par 1992 entraîne déjà des modifications profondes dans la mentalité des entreprises et dans les habitudes des citoyens.

Les producteurs, les entreprises gazières et les consommateurs vont apporter une contribution précieuse à cette construction nouvelle que nous commençons à bâtir. Les bénéfices de demain compenseront, c'est certain, tous les efforts consentis.

Nous ne demandons pas au secteur gazier d'adhérer aveuglément à des modifications abstraites et nous ne voulons pas que le changement proposé devienne un objectif en soi. Nous affirmons que la Communauté est tout cela, un travail en commun, auquel aucun secteur ne peut rester indifférent ou étranger. Par le biais de la concurrence, nous voulons donner des garanties d'équité relative et de bon fonctionnement. La participation de tous est, comme dans la vie politique, la seule assurance de stabilité. Nous défendons la démocratie dans nos institutions politiques même lorsque des raisonnements simplistes et à court terme paraissent donner partiellement raison à certaines quasi-dictatures. Nous manquerions de cohérence si nous abandonnions le principe de la concurrence ou si nous le considérions comme un produit réservé à l'exportation vers l'Est. L'économie et la société européenne ont dépassé ce stade de la discussion sur la concurrence dans une majorité écrasante de secteurs économiques. Nous allons également le dépasser dans le secteur de l'énergie et, à plus forte raison, dans le secteur gazier. Nous voulons une industrie du gaz prospère, une industrie du gaz stable, mais nous ne voulons pas que cette prospérité ou cette stabilité soit acquise au prix de pratiques contraires à la concurrence, telles que la fermeture des marchés, les clauses d'exclusivité, ou la fixation des prix à l'échelon administratif. Pareille démarche irait à l'encontre des principaux idéaux européens et aboutirait à des résultats contraires à nos grands objectifs. Nous allons maintenir le respect mutuel, la considération réciproque et, ensemble, résoudre les problèmes que pose l'adaptation. Ces problèmes peuvent être résolus, ces problèmes seront résolus.

ACHEVEMENT DU MARCHÉ INTÉRIEUR POUR L' ÉLECTRICITÉ ET LE GAZ

PAR Yvan Capouet, DG XVII
Task Force sur 'l'Intégration Communautaire

Le 22 janvier 1992 la Commission des Communautés européennes a adopté des propositions de directives du Conseil visant à l'achèvement du marché intérieur du gaz et de l'électricité[1]. Elles se fondent sur l'article 100A du traité CEE qui prévoit un dialogue politique avec le Parlement européen et le Conseil dans le cadre de la procédure de coopération.
L'ouverture du marché de l'énergie est indispensable pour la réalisation de l'objectif 1992. Elle augmentera la sécurité de l'approvisionnement, rendra les industries européennes plus compétitives sur le marché mondial et permettra aux producteurs de gaz et d'électricité d'optimaliser leur performance.
Les propositions transmises au Conseil font partie d'une approche progressive visant à rendre opérationnel le marché intérieur de l'énergie, défini par la Commission en 1989. Elles complètent les directives adoptées en 1990 et 1991 concernant le transit intra-européen de l'électricité et du gaz et la transparence des prix pour les consommateurs industriels.
La décision de la Commission est le résultat de consultations longues et poussées avec les administrations nationales et avec toutes les autres parties intéressées.

HISTORIQUE DES PROPOSITIONS

Le Conseil a déjà arrêté un certain nombre de directives qui constituent une première étape vers la réalisation du marché intérieur pour le gaz et l'électricité.
Les directives concernant le transit de l'électricité et du gaz[2] prévoient que les sociétés de transport faciliteront le passage à travers leur réseau de l'électricité et du gaz demandés par d'autres sociétés de transport, si la fiabilité n'est pas affectée.
La directive concernant la transparence des prix[3] prévoit que les compagnies d'électricité et de gaz communiquent à l'office statistique les prix demandés à toutes les catégories de clients.
C'est une première étape vers l'établissement d'un marché intérieur du gaz et de l'électricité. En vue de la poursuite des travaux, la Commission, dès septembre 1989, a exprimé son désir d'examiner d'autres mesures possibles, et elle a notamment proposé des consultations avec toutes les parties intéressées dans le cadre de son évaluation portant sur l'opportunité de l'accès de tiers aux réseaux européens d'électricité et de gaz naturel et des modalités d'application de tels arrangements.
A la suite de ces consultations, les propositions actuelles prêtent une attention particulière aux caractéristiques des marchés de l'électricité et du gaz et à leur extension au sein de la Communauté. Elles réconcilient les impératifs techniques de gestion des réseaux d'électricité et l'élargissement du champ ouvert aux possibilités d'investissement et de commercialisation.

1 *COM(91) 548 final.*

2 *JO NO L 313/30, du 13.11.1990 ET JO NO L 147/37, du 12.6.1991*
3 *JO NO L 185/16, du 17.7.1990*

PRINCIPES DES PROPOSITIONS ET CALENDRIER

Les propositions de la Commission sont fondées sur quatre principes généraux.
Le premier est la nécessité d'une approche échelonnée. Le marché intérieur pour l'électricité et du gaz naturel devrait prendre forme sur une période suffisamment longue pour permettre à l'industrie de s'adapter d'une façon flexible et ordonnée à son nouvel environnement, ce qui implique une approche graduelle.
La première étape est celle de l'application des trois directives déjà adoptée. La deuxième étape est celle qui maintenant proposée, et que la Commission aimerait voir entrer en vigueur le 1er janvier 1993, date fixée dans le Traité pour la réalisation du marché intérieur. Puisque le secteur de l'énergie revêt une importance essentielle pour beaucoup d'autres secteurs industriels, l'absence de progrès dans ce domaine créerait des problèmes dans d'autres secteurs.
Une troisième étape sera définie en détail à la lumière de l'expérience acquise pendant la seconde. La Commission prévoit que cette étape entrera en vigueur le 1er janvier 1996.
Le deuxième principe est celui de la subsidiarité. La Communauté ne doit pas imposer de mécanismes rigides, mais devrait plutôt définir un cadre permettant aux Etats membres d'opter pour le système le mieux adapté à leurs ressources naturelles, à l'état de leur industrie, à leurs politiques énergétiques, et à leurs pratiques règlementaires.
Le troisième principe est le souci d'éviter une règlementation excessive. Les secteurs en question sont caractérisés par ces situations de monopole qui demandent un certain degré de réglementation. Le mouvement vers une plus grande libéralisation obligera sans nul doute à introduire de nouveaux règlements, cependant ceux-ci remplaceront plutôt qu'ils ne compléteront les règlements existants, et ils seront dans de nombreux cas plus transparents.
Sur le plan institutionnel, la Commission a opté pour une approche fondée sur les articles 57.2, 66 et 100a, qui prévoient un dialogue politique avec le Conseil et le Parlement européen, selon la procédure de coopération. Cependant, la Commission se réserve le droit d'utiliser opportunément tous les pouvoirs qui lui confére par le Traité.

CONTENU DES PROPOSITIONS

Les propositions poursuivent le processus de libéralisation déjà engagé et introduisent de nouveaux facteurs de changement tout en respectant les structures existantes.
Elles sont fondées sur les éléments suivants:

- ouverture de la production d'électricité à la concurrence;
- libéralisation de la construction des lignes de transport et des gazoducs;
- liberté des transactions d'achat et de vente, par un système limité d'accès de tiers aux réseaux d'électricité et de gaz;
- filet de sécurité pour s'assurer que la sûreté de l'exploitation sûre des réseaux d'électricité et de gaz n'est pas mise en danger;
- protection des petits consommateurs contre le risque de subventions croisées;
- transparence des activités de production, de transport et de distribution des compagnies intégrées de gaz et d'électricité.

CONCURRENCE DANS LA PRODUCTION D'ELECTRICITÉ ET SÉCURITÉ D'APPROVISIONNEMENT

La production est l'activité dans laquelle la concurrence dans le secteur de l'électricité peut se développer le plus rapidement étant donné les contraintes techniques et économiques du secteur. Il est donc opportun de permettre l'accès au marché à des nouveaux venus qui souhaitent investir et concurrencer les producteurs existants.
Il est proposé que les Etats membres instaurent doivent un régime d'octroi pour de permis visant à harmoniser les conditions d'accès au marché pour les producteurs d'électricité. Des propositions visant à assurer un environnement concurrentiel dans l'exploration et la production de gaz naturel et de pétrole seront présentées sous peu.
L'ouverture de la production d'électricité devrait être réalisée d'une façon transparente et non discriminatoire et ne pas faire obstacle aux objectifs politiques légitimes des Etats membres.
En conséquence, les propositions prévoient l'intervention des Etats membres aux niveaux suivants:
i) la définition d'un certain nombre de critères pour les installations de production concernant la sécurité, la sûreté, l'environnement et l'implantation;
ii) la possibilité d'introduire un certain nombre de critères restrictifs en ce qui concerne la nature de la source primaire utilisée, en vue de la diversification;
iii) la possibilité de rendre le recours prioritaire aux sources indigènes de production d'électricité obligatoire jusqu'à concurrence de 20% des besoins;
iv) l'utilisation prioritaire jusqu' à un certain niveau, de sources d'énergie renouvelables ou de sources utilisant des déchets, ou de la production combinée.
Les propositions exigent l'abolition des droits exclusifs pour la production de l'électricité.
Afin de s'assurer que la capacité de production couvrira la demande, l'exploitant ou le réseau de

transport dans chacune des régions est invité à réexaminer régulièrement l'équilibre entre l'offre et la demande et son évolution future. Cet examen doit s'étendre sur une période suffisamment longue pour permettre la détection précoce des pénuries prospectives de capacité de production et doit être rendue accessible au public de sorte que tous les intéressés, y compris les consommateurs et les sociétés de distribution, ainsi que les producteurs existants et potentiels, soient au courant de la situation.

Dans ce cadre, les principaux acheteurs, les sociétés de distribution et les grands consommateurs industriels pourront décider de la meilleure manière de couvrir leurs besoins. Ils peuvent décider dans quelle mesure ils investissent dans la capacité de production, ou bien font appel à des achats à court terme, ou à des contrats d'approvisionnement à long terme avec de nouveaux investisseurs.

De cette façon, l'Etat membre et l'exploitant du réseau de transport peuvent évaluer si l'offre est globalement suffisante sans aller à l'encontre des décisions des acheteurs qui sont à l'origine des investissements.

LIBÉRALISATION DE LA CONSTRUCTION DES LIGNES ELECTRIQUES ET DES GAZODUCS

Les exploitants publics ou privés devraient avoir le droit de construire des lignes et gazoducs afin de desservir leurs clients et de s'approvisionner dans une autre région ou un autre Etat membre, et de connecter leurs propres lignes au réseau interconnecté, s'ils remplissent des critères techniques et d'exploitation non discriminatoires.

Pour rendre ce droit d'initiative efficace, il est proposé que les Etats membres instaurent un système d'octroi de permis pour la construction des lignes électriques et des gazoducs, afin d'harmoniser les conditions pour les investisseurs.

Dans le cas de l'électricité, les lignes qui relient directement un producteur et un consommateur tout en n'étant pas raccordées au réseau interconnecté ont relativement peu d'attrait, puisque le réseau offre les avantages importants de la souplesse et de la fiabilité. Cependant, il est probable que de nouvelles lignes puissent s'avérer attrayantes sur les courtes distances et, dans le cas des réseaux de distribution, dans les secteurs qui sont nouveaux ou en voie de reconversion.

Le droit d'initiative de construire des lignes ne change rien au fait que la gestion technique d'un réseau doit être la tâche d'une entité spécifique. Au contraire, il implique la fixation par cette entité des critères techniques et d'exploitation non discriminatoires auxquels les propriétaires des lignes et des réseaux de distribution indépendants doivent se conformer afin d'être reliés au réseau principal.

ACCÈS DES TIERS

Le développement de la concurrence dans la production exige que les producteurs indépendants puissent transporter l'électricité à leurs propres installations de consommation, et le vendre à leurs propres filiales ou à des tiers. De telles transactions seront effectuées essentiellement par l'intermédiaire du réseau interconnecté, sur lequel il est indispensable que la liberté commerciale règne afin de permettre effectivement la concurrence dans la production.

Les propositions stipulent donc que les sociétés de transport et de distribution offriront l'accès à leur réseau à des prix raisonnables, dans les limites de la capacité disponible de transport et de distribution.

La concrétisation de l'accès des tiers incombera donc aux exploitants de réseau.

Étant donné la complexité technique et la nature innovatrice de la liberté des transactions dans le secteur de l'électricité, il serait souhaitable que les Etats membres prévoient une période d'adaptation progressive et restreignent initialement l'utilisation du réseau interconnecté à un nombre limité d'entreprises qui sont les plus aptes à en faire usage, c'est-à-dire, les grands consommateurs et entreprises de distribution.

Pour les entreprises industrielles, il est prévu que les Etats membres peuvent limiter l'accès par des tiers au réseau électrique aux grandes sociétés, pour l'approvisionnement d'installations ayant une consommation annuelle (individuelle) de plus de 100 GWh/année.

De cette façon, 400 à 500 consommateurs industriels seraient concernés dans la Communauté, notamment dans les industries grandes consommatrices d'électricité: aluminium, ciment, acier, produits chimiques, etc...

Pour le gaz, le seuil a été fixé à 25 millions de m3 par installation. Ce seuil comprend toutes les installations utilisant le gaz comme matière de base et il est également approprié pour les autres grandes industries chimiques. D'autres grands utilisateurs tels que les grandes aciéries sont également concernés. Pour la production d'électricité, seules les centrales de 50 MW ayant une durée annuelle de fonctionnement de 2000 heures ou plus sont intéressées,soit en pratique, les seules centrales de charge de base.

Les distributeurs qui seront admissibles sont ceux qui fournissent au moins 3% de l'électricité distribuée dans un Etat membre. Pour le gaz, le seuil a été fixé à 1% de la consommation nationale de gaz. Pour éviter d'introduire une discrimination entre les distributeurs de différentes tailles, il est encore prévu que les distributeurs peuvent former des consortiums d'achat afin d'atteindre le seuil fixé. Au total, une centaine de distributeurs, individuels ou associés, seront

admissibles dans toute la Communauté dans chaque secteur.

Le Filet de Sécurité

Les trois mesures concernant l'accès limité au réseau pour les tiers, la libéralisation de la production et la construction des lignes, doivent être appliquées dans de façon transparente et non discriminatoire, sans mettre en danger la fiabilité de la gestion technique du réseau.
Le fonctionnement efficace et sûr des réseaux de transport et de distribution ne pourrait pas être maintenu sans une gestion responsable unique.
Il appartient aux Etats membres de désigner l'exploitant approprié du réseau de transmission ou de distribution dans chaque région ou de déléguer la charge de cette désignation aux entreprises propriétaires des réseaux.
Le terme 'region' signifie dans ce cas une zone géographique appropriée à la gestion du réseau d'électricité. Dans certains cas cela peut être la totalité d'un Etat membre, ou de plus petites divisions, voire une région comprenant des parties de plusieurs Etats membres. Il n'est pas dans l'intention que des directives de modifier la structure existante.
Les exploitants de réseaux doivent poursuivre leurs efforts visant à développer un réseaux sûr et, fiable et efficace. Ils doivent coopérer avec les exploitants d'autres réseaux avec lesquels les leurs sont interconnectés. Ils doivent définir les conditions techniques pour le raccordement à leur réseau des installations de production (contrôles, installations de gaz naturel liquéfié et équipements de stockage de gaz), des réseaux des consommateurs, et des lignes ou gazoducs.
Telles sont les conditions essentielles du filet de sécurité qui doivent être maintenant explicitées étant donné le nombre plus grand d'exploitants prévu par suite de la libéralisation.

La Protection de Plus Petits Consommateurs

La directive proposée ne prévoit pas de procédure permettant à des consommateurs finals se trouvant au-dessous des seuils d'admissibilité d'être accordé l'accès aux réseaux. Bien que les seuils puissent être abaissés dans la troisième phase à la lumière de l'expérience acquise, il restera en pratique une franchise de fourniture de fait au stade de la distribution (dans la plupart des cas).
Il est donc opportun de permettre aux Etats membres de régler les relations entre les consommateurs captifs et leur fournisseur local. Étant donné la grande variété de structures de distribution, on devrait donner aux Etats membres une marge de manoeuvre aussi grande que possible pour adapter la définition des droits et des obligations de service public de la société de distribution, et des droits et des obligations du consommateur aux circonstances locales et aux structures existante.
Le consommateur captif profitera du cadre réglementaire établi par l'Etat membre, notamment des règles régissant l'obligation d'approvisionnement. Il profitera également des mécanismes de contrôle des prix appliqués par l'Etat membre.
Mais surtout, la source principale de protection pour le petit consommateur non admissible à l'"accés des tiers' sera la possibilité pour son distributeur de négocier son approvisionnement avec différents producteurs, grâce à l'"accés des tiers', et d'en faire profiter à la totalité de sa clientèle.
De cette façon, il n'y a aucune raison de craindre des distorsions ou des discriminations entre les catégories de consommateurs après la libéralisation du secteur de l'électricité.

Transparence

Afin d'harmoniser les conditions dans lesquelles les entreprises d'électricité et de gaz opèrent, des mesures sont proposées pour séparer les activités de production, de stockage (dans le cas du gaz naturel), de transport et de distribution des entreprises verticalement intégrées, soit publiques soit privées.
L'approche de la Commission est d'exiger que ces activités soient exercées dans des divisions distinctes. En outre, ces divisions doivent publier des comptes distincts. Afin d'éviter, à cet égard, un traitement différent des entreprises publiques et privées, toutes les entreprises sont invitées à observer les pratiques de comptabilité classiques pour les sociétés commerciales. Le respect de ces pratiques garantira que les comptes sont établis de manière comparable, de sorte que la concurrence soit équitable, que la discrimination soit évité et les autorités réglementaires ou de concurrence soient en mesure de vérifier le caractère non abusif des tarifs facturés pour la prestation des services qui ont certaines caractéristiques d'un monopole naturel.
Les directives proposées améliorent également la transparence sur un certain nombre de questions qui sont importantes pour la rentabilité économique globale des réseaux d'électricité et de gaz. Les exploitants des réseaux doivent faire rapport sur l'utilisation qui est faite de la capacité de transport du réseau et sur sa capacité à faire face aux besoins futurs. Ils doivent sont évaluer les demandes d'utilisation des réseaux présentées par les sociétés de distribution et les gros utilisateurs. Surtout, ils explicitent et publient les éléments de base utilisés dans la fixation des conditions financières pour d'utilisation des réseaux.

Au niveau des sociétés de distribution, une forme de concurrence indirecte est introduite du fait de la publication des rapports sur la qualité de l'approvisionnement et la qualité du service.

CLAUSES DE CONSOMMATION MINIMALE FACTURÉE (CMF) DANS LE SECTEUR DU GAZ

Les engagements CMF existants de consommation minimale facturée ('take or pay') doivent être pris en considération lors de la libéralisation du marché du gaz naturel pour ne pas mettre en danger la viabilité économique des sociétés de gaz existantes. Des clauses CMF existantes ont été convenues comme mécanisme de répartition du risque entre les producteurs et les sociétés de gaz; aux termes de ces clauses les sociétés de gaz garantissent de payer un volume annuel au préalable au prix contractuel, indépendamment de l'enlèvement effectif de ce volume.

Cette pratique est jugée importante, particulièrement sur les marchés en développement où aucun marché établi ne garantissait un enlèvement minimal.

La Commission a donc proposé dans la directive une clause de sauvegarde spéciale qui permet à un Etat membre, avec l'approbation de la Commission, de prendre les mesures appropriées au cas où l'une de ses sociétés de gaz est confrontée à des difficultés économiques en raison d'engagements CMF existants.

L'achèvement du marché intérieur modifiera l'environnement économique pour l'industrie de gaz. Dans un environnement plus concurrentiel les clients pourront acheter le gaz directement. Les sociétés de gaz devront tenir compte de cette nouvelle situation avant de contracter de nouveaux engagements CMF.

Dans la mesure où les sociétés de commercialisation de gaz pourront vendre leur gaz n'importe où dans la Communauté, elles auront de nombreuses occasions de s'assurer de nouveaux débouchés car on prévoit un développement sensible de la demande.

Dans un système CMF, d'autres types de partage de risque peuvent également être mis au point. Des garanties d'utilisation peuvent
être données non seulement par les sociétés de gaz mais également par les sociétés de distribution locales et les grands utilisateurs industriels comme les centrales et les acheteurs de matières de base, qui ont des besoins à long terme réguliers.

CONCLUSIONS

Le but de la Commission est d'achever la réalisation du marché intérieur de l'énergie. A cet effet, elle doit créer un marché de l'électricité et du gaz naturel, c'est-à-dire un espace économique dans lequel les acheteurs et les vendeurs sont en mesure de traiter les uns avec les autres.

Il n'y a aucune raison de croire que le secteur de l'énergie ne profitera pas des différents gains définis dans les rapports Cecchini. Une situation où les monopoles régionaux se concurrencent pour l'implantation des industries grandes de consommatrices d'énergie sans tenir suffisamment compte des possibilités pratiques de transporter de l'énergie est préjudiciable à l'économie dans son ensemble. La tarification de la même électricité ou du même gaz différemment des deux côtés d'une frontière ne permet pas d'atteindre l'optimum économique.

Mais, surtout, le marché intérieur n'a pas pour effet d'équilibrer avantages et inconvénients mais de faire prévaloir les avantages. En répartissant les risques de façon différente, il favorisera l'accroissement de l'efficacité dans l'industrie et introduire davantage de discipline dans le choix et la gestion des investissements. Il permettra d'atteindre à un meilleur équilibre dans les relations contractuelles entre les fournisseurs et les consommateurs. Il y aura davantage de possibilités de négociation, davantage de flexibilité, davantage de choix.

Le marché intérieur n'est pas une menace pour les structures et les organisations existantes, mais un moyen de résoudre les problèmes de manière flexible,en se fondant sur la décentralisations des prises de décisions par les acteurs économiques ce qui permettra à la Communauté de poursuivre le développement économique avec dynamisme dans le secteur de l'énergie. ■

L'ENERGIE ET LES VILLES

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Dans le passé la programmation énergétique a été une action ayant pour objet la stimulation, la planification et formulation d'actions au niveau régional.
Dans le souci de cibler les activités de la Commission de la manière la plus efficace une initiative a été prise par la Direction Générale de l'Energie en 1989 à l'égard de l'énergie en milieu urbain. La raison en est qu'a peu près 70% de la population des communautés vit déjà actuellement dans des villes, la tendance étant croissante. Dans le cadre de cette action l'objectif principal est la promotion du management énergétique local qui inclue à la fois l'optimisation de la distribution et production d'énergie, la valorisation de ressources locales, l'augmentation de l'efficacité énergétique et les aspects relatifs à la dimension du marché intérieur.

Depuis lors le soutien financier pour l'élaboration des stratégies d'énergie locales est l'objet d'appel d'offres annuels dans le cadre desquels des projets sont sélectionnés répondant à certains critères mais notamment à celui qu'ils doivent être exemplaires. Cet élément est d'importance puisque l'intégration communautaire dans laquelle s'intègre ladite action en matière d'énergie exige la diffusion et l'échange d'un bon savoir faire à travers la Communauté.
Afin d'éveiller la conscience des villes européennes que l'énergie est un domaine duquel elle devrait se préoccuper davantage à l'avenir un symposium intitulé Energie et l'Environnement Urbain a été organisé à Mannheim en RFA les 7 et 8 février 1991. Il formait le cadre pour la présentation d'une brochure regroupant les expériences des 12 villes européennes en matière de maîtrise de l'énergie urbaine et en présentait les conclusions générales.
Simultanément ce symposium était le forum qui permettait de proclamer la fondation d'un réseau européen des villes pour la maîtrise de l'énergie et l'environnement. Cette initiative étant promue par la DG XVII, était en quelque sorte le fruit et la suite de la coopération des villes sus-mentionnées. Ce réseau, ayant 22 membres, se veut une plate-forme d'échanges d'expériences et de savoir faire dans les domaines où les villes peuvent prendre en main la politique locale en matière d'énergie et d'environnement. Il est important à cet égard de souligner que les villes sont en somme des acteurs qui peuvent contribuer à une amélioration de la situation locale ainsi que communautaire. De cette façon elles sont les porteurs d'une politique qui peut être intitulée 'act locally, think globally'.
Une série d'études de planification énergétique urbaine étant terminée ou en voie d'achèvement[1], un atelier a été organisé le 16 décembre 1991 afin de valoriser en présence de toutes les villes concernées les projets ayant été soutenus dans le cadre des appels d'offres 1989 et 1990. Cette réunion, lors de laquelle 24 villes, dont 6 capitales, étaient représentées permettait un échange d'expériences et des résultats obtenus au sujet de différentes problématiques urbaines ainsi que de nouer de relations entre les participants venant de presque tous les Pays Membres de la Communauté.
Toutes les présentations des projets soulignaient une préoccupation commune, à savoir que l'énergie, l'environnement et le développement urbain sont trois éléments clés, étroitement liés, qui déterminent la future évolution de la ville. C'est la raison pour laquelle les villes qui sont confrontées à un usage d'énergie croissant dans les domaines domestique, commercial et industriel ont besoin d'un management

[1] *Aix en Provence, Amsterdam, Athènes, Berlin, Bremen/Rostock, Brescia, Bristol, Bruxelles, Copenhague, Cork, Dublin, EETAA (Grèce), Helsingør/Fredensburg, Helsingør, Kiel, Lyon, Madrid, Milan, Newcastle, Rotterdam, Rouen, Saarbrücken, Turin.*

énergétique de haut rendement afin de réunir l'énergie, l'écologie et l'économie en tant que potentiel de progrès future.

Ce qui précède est la raison pour laquelle pratiquement toutes les villes présentes avaient considéré, dans le cadre de leurs projets, l'inter-action entre l'énergie et l'environnement. Un certain nombre de villes est allée plus loin en établissant des plans d'énergie et d'environnement pour la ville (Turin, Newcastle upon Tyne, Bristol, Aix en Provence, Madrid, Copenhague, Amsterdam, Berlin et Athènes). Dublin et Lyon ont entrepris d'établir des modèles de dispersion pour la pollution atmosphérique afin d'établir des stratégies énergétiques en vue de la pollution de l'air. Brescia et Helsingør ont développé des systèmes de contrôle et de management énergétique et les villes de Saarbrücken, Kiel, Aarhus, Rostock et Rotterdam ont approfondi les méthodes ayant pour but l'augmentation de l'efficacité énergétique du chauffage urbain et de la cogénération. Un autre domaine, la valoration énergétique des déchets, a été traité par les villes de Cork et de Rouen.

Au vue de l'importance de toutes ces questions pour la vie des villes et en vue de la poursuite des objectifs communautaires en matière d'énergie et de environnement, la Direction Générale de l'Energie continuera de promouvoir le développement nécessaire à cet égard en combinaison avec l'intégration communautaire dont la cohésion économique et sociale est un élément important. Dans cette optique, une réunion similaire à celle de villes sera organisée en automne au sujet des études de programmation énergétique régionale afin d'intensifier l'échange des expériences en leur faveur également.

VERS UN NOUVEL ACCORD ENTRE L'EURATOM ET LES ETATS UNIS D'AMERIQUE DANS LE DOMAINE DE LA COOPERATION NUCLEAIRE

PAR Esteban Diaz, DG XVII
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La Communauté européenne de l'énergie atomique (Euratom) a conclu, jusqu'à présent, trois accords nucléaires (avec l'Australie, le Canada et les Etats Unis d'Amérique) qui, dans la pratique, traitent, de façon générale, des conditions politiques portant sur les fournitures relatives au cycle du combustible et certains des services qui s'y rattachent. Actuellement, l'accord de coopération nucléaire entre la Communauté et les Etats Unis est l'un des accords nucléaires les plus importants qui existent. En réalité cet accord est constitué par un accord de base, à durée indéterminée, entré en vigueur en août 1958 et par à un accord additionnel de coopération entre l'Euratom et les Etats-Unis concernant les utilisations pacifiques de l'énergie atomique. Ce dernier, entré en vigueur en 1960 et ses amendements successifs viennent à expiration le 31 décembre 1995.

LA DYNAMIQUE DE L'ACCORD EN VIGUEUR

L'application de l'accord s'est déroulée de façon entièrement satisfaisante et fluide jusqu'en 1978. Au cours de cette année et sous l'administration Carter, la loi américaine relative à la non-prolifération (Nuclear Non-Proliferation Act, NNPA) a introduit de nouvelles exigences à incorporer dans tous les accords des Etats Unis avec les pays tiers.

Les Etats Unis ont pris contact avec Euratom et lui ont soumis des propositions, respectivement en 1983, 1984 et 1986 visant à négocier un nouvel accord qui aurait dû refléter certaines dispositions conformes à la nouvelle législation américaine. La Commission a estimé que de manière générale, la révision dans le sens proposé par les Etats Unis n'était pas acceptable car elle comporterait des restrictions indues par rapport aux dispositions contenues dans l'accord en vigueur. L'industrie communautaire ainsi que les Etats membres, ont partagé cette opinion. Par ailleurs, il aurait été inacceptable que l'accord international existant fusse modifié du fait que l'une des parties au dit accord ait modifié sa législation interne.

Prévoyant que cette éventuelle nouvelle négociation dans le contexte du NNPA n'aurait pas abouti facilement, le Gouvernement américain avait introduit dans le NNPA une clause, dite clause Euratom, qui permet de poursuivre la coopération nucléaire pacifique avec la Communauté sur la base de l'accord existant pendant que se déroulerait la renégociation de celui-ci.

Ce maintien en vigueur de l'accord existant est cependant fragile dans la mesure où il dépend d'un 'annual Presidential Waiver' (dérogation Présidentielle annuelle), qui intervient chaque année au mois de mars. Théoriquement donc, le Président des Etats Unis pourrait refuser ce 'waiver' ce qui aurait pour effet de rendre impossible des transferts de matières nucléaires américaines dans la Communauté. Cette alternative serait fort dommageable non seulement pour la Communauté mais aussi pour les USA et les pays tiers qui détiennent des matières nucléaires américaines et désirent les transferer dans la Communauté en vue de leur faire subir des traitements indispensables pour leur utilisation dans le cycle nucléaire civil.

Ainsi, chaque année depuis 1978, l'accord Euratom/Etats Unis vit sous le régime du 'waiver' présidentiel annuel ce qui représente une base de coopération limitée et peu sûre.

DE NOUVELLES DIFFICULTÉS

L'adhésion de l'Espagne et du Portugal à la Communauté en 1986 a compliqué davantage la situation existante. En effet, ces deux Etats avaient conclu avec les Etats Unis des accords bilatéraux de coopération nucléaire. Ces accords comportent des droits de regard ('consent rights') plus contraignants pour ces Etats membres que ceux contenus dans l'accord Euratom/Etats Unis.

Cette situation crée, de facto, une discrimination du fait que malgré leur appartenance à la Communauté, l'Espagne et le Portugal doivent subir une situation plus défavorable dans le domaine de la coopération nucléaire avec les Etats Unis que les dix autres Etats membres.

La solution de cet état de fait passe par la reprise (folding in) des deux accords bilatéraux par l'accord Euratom/Etats Unis. La Commission, en vertu des dispositions de l'article 106 du Traité Euratom s'est attachée à essayer de réaliser la reprise susmentionnée. Les discussions buttent contre les dispositions actuelles de la législation interne américaine qui ne permet pas de renoncer aux dits droits de regard. Cette situation représente un véritable noeud gordien qui ne pourra être défait que par la conclusion d'un nouvel accord Euratom/Etats Unis.

EN ROUTE VERS UN NOUVEL ACCORD

Depuis la conclusion, il y a plus de trente ans (c'est-à-dire au début de la Communauté) de l'accord de coopération en vigueur, la situation a radicalement changé. La Communauté est devenue une grande entité mondiale dans le domaine nucléaire. Dans le domaine de la fusion thermonucléaire contrôlée, la Communauté occupe une position de pointe au niveau mondial (pour la première fois, les physiciens européens du JET -Joint European Torus- ont réussi en novembre 1991 à produire de l'énergie par fusion nucléaire) tandis que l'industrie communautaire possède un savoir-faire dans toutes les phases du cycle nucléaire.

Par ailleurs, dans une déclaration commune du 23 novembre 1990 concernant les relations en général entre la Communauté et les Etats Unis, ces derniers, la Communauté et ses Etats membres se sont déclarés convaincus de l'utilité de renforcer et d'élargir leur partenariat sur un pied d'égalité. Le nouvel accord de coopération nucléaire devrait fournir un cadre stable et prévisible pour la continuation d'une coopération nucléaire mutuellement bénéfique.

Le nouvel accord devrait, donc, refléter de façon adéquate l'accroissement de l'importance et de la diversification de l'industrie communautaire et le renforcement du rôle de la Communauté européenne dans les relations internationales depuis 1960. Il devrait aussi assurer une base solide et équitable à la coopération industrielle, commerciale et technique dans le domaine de l'utilisation pacifique et non explosive de l'énergie nucléaire. Dans ce contexte, on constate une convergence de plus en plus marquée entre la Communauté européenne et les Etats-Unis d'Amérique en matière de non-prolifération nucléaire ainsi qu'une approche semblable vis-à-vis des moyens à utiliser pour l'atteindre.

S'appuyant sur ces principes directeurs, la Commission a arrêté, dès le 23 juillet 1991 et proposé au Conseil, un projet de décision contenant les directives à la Commission pour la négociation d'un accord de coopération entre Euratom et les Etats-Unis d'Amérique. Après discussion au sein du Conseil, ce dernier a arrêté le 16 décembre 1991 et en vertu des dispositions du paragraphe 2 de l'article 101[1] du traité Euratom les directives de négociation pour la Commission.

Les négociations devraient être terminées pour 1994 afin que les Etats Unis puissent achever leurs procédures d'approbation à Washington au cours de l'année 1995. Le nouvel accord prendra alors le relais de celui en vigueur qui expire le 31 décembre 1995.

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[1] *Ces accords ou conventions sont négociés par la Commission selon les directives du Conseil; il sont conclus par la Commission avec l'approbation du Conseil qui statue à la majorité qualifiée.*

L'AVENIR DU CONTROLE DE SECURITE NUCLEAIRE DANS LA COMMUNAUTE EUROPEENNE

***Rapport de la Commission sur le fonctionnement du Contrôle de Sécurité d'Euratom*[1]**

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L'organisation du contrôle de sécurité nucléaire d'Euratom a fait l'objet d'un article paru dans le no 18 d''Energie en Europe'. Cet article présentait l'histoire de ce système depuis 1957, ses aspects juridiques, les activités qu'il implique et son évolution probable à l'avenir.
Comme l'expliquait ce premier article, la Commission des Communautés Européennes veille au respect intégral des obligations découlant du chapitre VII du Traité Euratom et des accords internationaux applicables conclus par la Communauté. Elle coopère étroitement avec l'Agence Internationale de l'Energie Atomique (AIEA).
Le présent article examine plus en détail l'évolution récente et quelques autres principes en matière de contrôle de sécurité.

L'objectif global de la politique énergétique de la Communauté Européenne est d'assurer un approvisionnement en énergie à un prix raisonnable et avec une incidence faible sur l'environnement.
Le public attache une grande importance aux différents aspects de l'utilisation pacifique de l'énergie nucléaire dans la Communauté : la sûreté nucléaire, le respect de l'environnement, la protection physique et, enfin et surtout, les garanties contre les détournements d'usage. Il faut s'en féliciter car cet intérêt du public contribuera au moins à lever le voile de mystère et de secret qui entoure les affaires nucléaires. Il faut d'ailleurs encore faire davantage d'efforts pour expliquer à un public plus large l'objet du contrôle de sécurité et les principes sur lesquels il se fonde, ainsi que les moyens que cela suppose. Il le faut afin notamment de faire comprendre que le contrôle de technologies complexes exige des systèmes de contrôle complexes, que l'augmentation du coût et les moyens à mettre en oeuvre pour réaliser ces contrôles ira de pair avec l'usage de ces technologies complexes et avec les attentes concernant le caractère efficace et exhaustif de ces contrôles. Le contrôle de sécurité ne fait pas exception à cette règle.

Le Contrôle de Sécurité de 1970 à 1990

L'agencement et la structure des installations nucléaires en fonctionnement au cours des deux dernières décennies impliquaient en général des modes opératoires clairement définis, les matières nucléaires étant manipulées physiquement dans les limites imposées par les exigences en matière de sûreté et de santé des personnes.
Les quantités de matière manipulées correspondaient au type d'opérations de fabrication et à la taille de l'usine. Une caractéristique de ce type de fonctionnement est que les matières sont normalement accessibles à certains points précis du processus, là où le personnel d'exploitation intervient en matière de contrôle de qualité, de comptabilité interne et de sûreté, entre autres.
Les Caractéristiques Techniques Fondamentales d'une telle installation décrivent le flux de matières nucléaires pour l'ensemble du processus, et définissent les points d'accès. Les procédures de contrôle de sécurité pourraient donc être établies après achèvement de la construction et au cours de la mise en service de l'usine sans provoquer d'interférences importantes des points de vue des possibilités de contrôle et des moyens consacrés à l'inspection.
C'est à ces emplacements caractéristiques précis que les inspecteurs recueillent les informations nécessaires

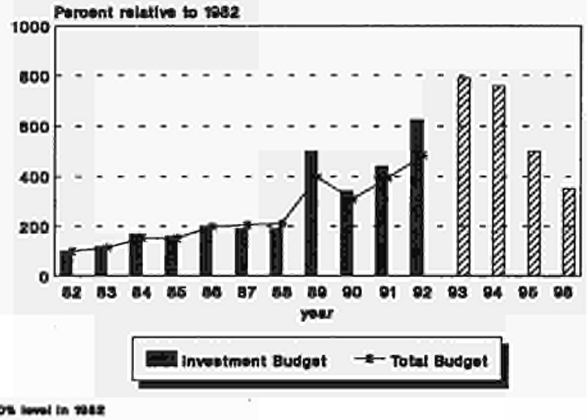
(1) SEC(92)80 final du 24 janvier 1992.

à l'exécution des contrôles. Ces objectifs de contrôle ont trait aux probabilités de détection et aux quantités de matières nucléaires au cours d'une période donnée.
Les activités des inspecteurs à cet effet portent sur l'ensemble des matières passant par ces points et comportent des mesures au moyen d'un équipement portatif ou du moins transportable. Ces opérations ont une forte composante de main-d'oeuvre, mais sont considérées comme propres à assurer un contrôle efficace et effectif si l'on tient compte à la fois de leur coût mis en rapport avec la taille des installations et les quantités de matières nucléaires en jeu.
Au cours de la durée de vie d'une installation, différentes parties de celle-ci sont généralement modernisées pour des raisons économiques et également en vue de réduire la dose globale d'irradiation en faisant appel aux techniques récentes les plus adéquates. Jusqu'à ce jour, les techniques de contrôle de sécurité existantes pouvaient s'adapter aux changements et répondre aux exigences du contrôle en raison de l'échelle relativement faible des opérations.

Le Contrôle de Sécurité à Partir de 1990

Le contrôle de sécurité dans la Communauté Européenne au cours de la présente décennie sera caractérisée par une disponibilité accrue et une utilisation plus grande du plutonium dans le cycle commercial du combustible. Cela nécessitera des efforts supplémentaires si l'on veut maintenir, ou mieux accroître, la rentabilité et l'efficacité des applications du contrôle de sécurité. Dans la poursuite de cet objectif, de nouvelles techniques ont dû être mises au point pour répondre aux nouveaux problèmes que posent les usines modernes. Plusieurs de ces usines sont récemment entrées en activité, d'autres sont au stade des projets ou de l'autorisation et leur mise en service est prévue pour les deux ou trois prochaines années.
C'est ainsi que la Communauté Européenne compte trois ou quatre usines de fabrication de combustibles MOX[2] (soit en service soit proches de leur mise en service), produisant des quantités allant jusqu'à 5 tonnes par an de plutonium, ainsi que trois usines de retraitement en fonctionnement. Toutes ces installations constituent le dernier cri de la technique, réduisant au minimum le contact de l'homme avec le déroulement des processus et faisant au maximum appel à l'automatisation et à la télécommande. L'accent mis sur l'automatisation modifie le rapport des coûts capital/travail, permettant que de grandes quantités de matières soient manipulées avec un degré optimal de rationalisation.
Afin de garantir un contrôle de sécurité adéquat dans ces usines automatisées, le service d'inspection doit suivre cette tendance et accroître en conséquence ses investissements en matériel. La figure 1 montre l'effet de cet accroissement sur le budget de la direction du contrôle de sécurité d'Euratom.

Figure 1
Budget d'investissement d'Euratom pour 1982-1986



Nouvelles Caractéristiques Des Exigences du Contrôle de Sécurité

La démarche de contrôle de ces installations traitant de grandes quantités de matière doit en conséquence refléter des exigences de trois types: quantités caractéristiques, temps de traitement et probabilités. Il y a cependant de nouveaux facteurs dont il faut également tenir compte, du fait que ces installations exigent que l'on passe de manière substantielle d'un mode de mesure et de surveillance nécessitant l'intervention d'un inspecteur à un mode de travail sans intervention humaine; ces facteurs sont les suivants :
a) exigences de disponibilité des inspecteurs;
b) nécessité de réduire au minimum l'exposition au rayonnement du personnel de l'usine et des inspecteurs;
c) nécessité de réduire au minimum les temps d'arrêt pour les opérations courantes de contrôle de sécurité dans une chaîne de production automatisée;
d) la nécessité d'utiliser des composants identiques dans des situations semblables dans de telles installations de manière à minimaliser les coûts de développement et à maximaliser la normalisation de l'équipement.
Dans ce cadre, la question des coûts est primordiale car les organismes de contrôle de sécurité, tout comme de nombreux autres organismes publics, sont soumis à la double pression d'une limitation de leurs ressources et de l'obligation de respecter leurs normes de qualité. C'est particulièrement vrai dans le domaine nucléaire

2 *CS Maniatopoulos, W. Gmelin, R. Schenkel : 'Le rôle de l'énergie nucléaire dans la Communauté Européenne' Actes du Symposium ESARDA 1991, Avignon (France).*

étant donné le haut niveau des attentes et des préoccupations légitimes du public.

Définition D'un Nouveau Projet

La Direction du Contrôle de Sécurité d'Euratom est informé de différentes manières de l'intention d'un exploitant de construire une nouvelle installation. Tout d'abord, l'Article 41 du Traité Euratom fait obligation aux personnes et entreprises de communiquer à la Commission les projets d'investissement concernant les installations nouvelles ainsi que les remplacements ou transformations d'installations existantes. De cette manière, la Commission peut discuter avec les intéressés avant de se former un point de vue sur tous les aspects des investissements se rattachant aux objectifs du Traité. Les projets doivent être notifiés au plus tard trois mois avant la conclusion d'un premier contrat.

Toutefois, dans le cas d'une usine de retraitement, la Commission doit également approuver les techniques qui seront utilisées pour le traitement chimique des matières irradiées, dans la mesure nécessaire au respect des obligations du Traité. Cette approbation implique que l'exploitant doit soumettre les plans de l'installation immédiatement avant leur mise au point définitive, c'est-à-dire avant que la construction puisse commencer.

Pour les autres types d'installations, les Caractéristiques Techniques de Fondamentales doivent être soumises à Euratom au plus tard 45 jours avant toute introduction de matières nucléaires. Dans le cas d'installations traitant de grandes quantités de matière, ce délai serait insuffisant pour incorporer les instruments de contrôle de sécurité sans coût supplémentaire à la fois pour les exploitants et le Contrôle de Sécurité, ce qui entraînerait un retard dans l'exécution du projet.

L'expérience a montré en fait que les exploitants des nouvelles installations sont bien conscients de la nécessité de discuter en temps utile et de prendre contact à cet effet avec la Direction du Contrôle de Sécurité le plus rapidement possible. Le calendrier des opérations s'étend normalement sur quatre ans, ce qui donne suffisamment de temps pour concevoir un projet de contrôle de sécurité comprenant l'infrastructure technique appropriée, et incorporer ce projet dans l'aménagement de l'installation au cours de sa construction, c'est-à-dire sans retarder sa mise en service.

Collecte des Informations

Dès que les contacts nécessaires ont été établis, des consultations sont organisées, si nécessaire, à différents échelons de travail, à l'effet d'établir des orientations pour les différents types d'information à fournir. Ces détails sont essentiels pour la conception de base de l'agencement de l'installation ainsi que pour les procédures que l'exploitant se propose de suivre afin de permettre la surveillance, la mesure et donc la vérification, en quantité et en qualité, des matières, à travers l'ensemble du processus de production, depuis leur réception jusqu'au stade du produit final. Le règlement relatif au contrôle de sécurité d'Euratom prévoit un questionnaire pour chaque type spécifique d'installation, et ce questionnaire peut servir de référence. Les discussions peuvent suggérer de mener des enquêtes supplémentaires plus détaillées portant sur certains détails des plans de la future installation.

Les principaux domaines de collecte des données sont la comptabilité et les relevés d'opérations, ainsi que les points du processus et le système qui servent à leur établissement. A cet égard, il est important de connaître le type et l'emplacement des appareils de mesure de l'exploitant, ainsi que leur exactitude et leur précision, de même que les détails d'autres systèmes que l'exploitant se propose d'installer et qui pourraient avoir une incidence sur l'exécution des contrôles de sécurité.

Il est clair que la sensibilité commerciale de l'installation et du processus peut inciter les exploitants à limiter la fourniture des données au minimum légalement indispensable. Il peut en résulter un conflit dont l'autorité de contrôle estime qu'il est impératif qu'il soit résolu de manière à permettre une conception et une application d'un plan de contrôle crédible. Dans la Communauté, ces difficultés ont généralement été surmontées grâce à un règlement de la Commission relatif au traitement des informations restreintes ou confidentielles, procurant aux exploitants, aux autorités publiques et bien sûr à Euratom lui- même, la protection nécessaire contre une divulgation non autorisée.

Approche du Contrôle de Sécurité

Au reçu des informations, un plan de contrôle de sécurité est élaboré. Dans le cas de nouvelles installations de production d'électricité, la conception nécessite évidemment de nombreuses consultations avec les exploitants en cause. La taille et la complexité de l'exploitation des installations ainsi que leur haut degré d'automatisation nécessitent également un déplacement d'accent de la part du contrôle de sécurité : d'interventions fréquentes des inspecteurs on passe à des équipements nouveaux, intégrés, très élaborés, et dans certains cas 'faits sur mesure', destinés normalement à fonctionner sans surveillance humaine en raison des contraintes d'exploitation et de coût.

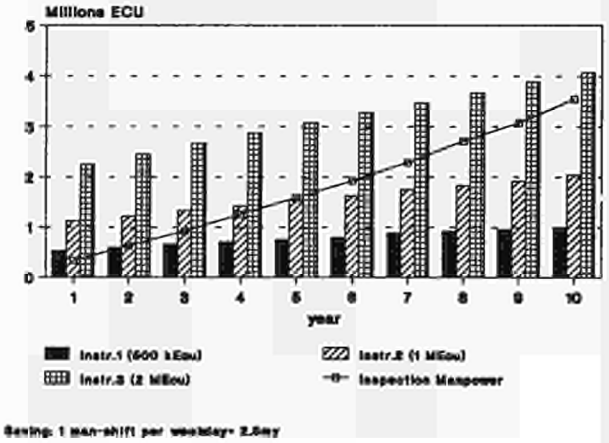
Considérations sur les Ressources

Ce passage d'une inspection à forte composante de main-d'oeuvre à une inspection automatisée résulte aussi, bien sûr, des contraintes en matière de recrutement d'inspecteurs. Une étude a montré que le point critique de rentabilité des investissements d'automatisation vis-à-vis de la variante à forte composante de main-d'oeuvre se situe à environ quatre ans, c'est-à-dire une fraction seulement de la durée de vie utile d'une telle installation, comme le montre la figure 2.

La source du financement nécessaire à de telles conceptions de réalisation à forte composante en capital constitue toujours une question cruciale dans les discussions relatives au contrôle de sécurité. Bien sûr, un exploitant conçoit son installation en tenant compte en premier lieu des limites que lui imposent à la fois les règles en matière d'autorisation, et les stricts paramètres commerciaux, en recherchant un taux de rentabilité optimal de son investissement, les considérations de contrôle de sécurité n'étant pour lui au sens strict que secondaires.

Euratom, cependant, continue à attirer l'attention sur les obligations qu'impose la législation européenne résultant du Traité et sur ses implications pour la continuation de l'acceptation de l'énergie nucléaire dans un cadre plus large. Le fait que les exploitants en soient devenus de plus en plus conscients indique qu'ils reconnaissent la nécessité de faire mieux accepter l'énergie nucléaire par le grand public, malgré certaines divergences de vues en ce qui concerne les exigences de la non-prolifération, d'une part, et la contribution de l'énergie nucléaire à la sécurité d'approvisionnement, d'autre part.

Figure 2
Comparaison des coûts investissements/main-d'oeuvre pour des stations de mesure sans surveillance humaine.



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Appareillages Installes par le Contrôle de Sécurité

Le Contrôle de Sécurité détermine pour une installation spécifique, les points où l'appareillage de contrôle doit être installé. Pour les raisons expliquées plus haut, ce dernier sera conçu de manière à fonctionner, autant que possible, sans surveillance humaine.

Pour chaque installation individuelle, l'inventaire du matériel nécessaire sera dressé avec l'exploitant et fera l'objet d'un accord de sa part. Après obtention des données de base nécessaires sur les besoins en espaces, en électricité, en conduites, etc..., l'exploitant peut veiller à intégrer ces besoins dans les plans de l'installation avant que ceux-ci ne soient finalisés ou, du moins, veiller à ce qu'il en soit suffisamment tenu compte.

Spécifications Techniques

Après détermination de l'ensemble des instruments nécessaires, un temps suffisant doit être prévu pour l'élaboration des spécifications techniques détaillées.

Ces dernières sont alors utilisées pour l'achat du matériel soit au moyen d'un appel d'offres soit par achat direct. Nous avons constaté, dans le passé, que l'expérience acquise dans un cas permettait de réaliser des économies substantielles dans des cas semblables, de faire progresser la normalisation des équipements tout en se maintenant au niveau de l'état de la technique pour ce qui concerne les objectifs d'utilisation économique des ressources de contrôle, de diminution du niveau de rayonnement et de la réduction au minimum des charges pour l'exploitant.

La Direction du Contrôle de Sécurité d'Euratom a acheté, au cours des dernières années, une grande variété d'instruments relativement complexes, représentant le dernier état de la technologie. La politique d'achat s'est également concentrée sur les équipements destinés à une installation permanente, en tenant compte des exigences de l'automatisation de l'installation.

Ces équipements comprennent différents types de stations de mesure automatique des matières nucléaires basés sur les techniques neutroniques et/ou gamma, des systèmes de surveillance faisant appel à la technologie vidéo la plus récente, ainsi que des systèmes de collecte, d'enregistrement et de transmission des données accompagnés du logiciel de contrôle approprié. Des détecteurs déclenchés par des événements spécifiques mettant en marche et arrêtant les appareils sont également installés.

Le matériel et le logiciel informatiques utilisés pour faire fonctionner ces instruments répond également

toujours aux derniers critères disponibles en matière de performance.

Réseaux de Transmission de Données

Les signaux des instruments produits par l'ensemble d'une installation de grande taille exigeraient un grand nombre d'inspecteurs travaillant à plein temps pour recueillir l'ensemble des données d'inspection intéressantes fournies par les différentes stations d'enregistrement local. La solution consiste à transmettre les signaux à un bureau central où ils sont traités et stockés. Cette solution a l'avantage de réduire le nombre des inspecteurs nécessaires à l'interrogation du système à des fins d'évaluation au dessus du nombre qui serait nécessaire en cas d'enregistrement local. Cet effectif réduit d'inspecteurs peut encore organiser son travail de manière à réaliser les objectifs d'inspection conformément aux procédures prescrites.
Cette optimalisation de l'effort d'inspection est la raison essentielle de l'installation d'un réseau central de transmission réservé exclusivement à des fins de contrôle de sécurité à travers une installation et connectée au bureau des inspecteurs. Les expériences initiales sont très encourageantes et tout est mis en oeuvre pour promouvoir le recours à ces systèmes partout où cela s'avère possible.

Echantillonnage et Analyse

La quantité et la qualité de matières nucléaires exigent qu'un grand nombre d'échantillons soient prélevés pour des essais destructifs. S'il s'agit d'installation de la vieille génération, les échantillons sont transportés à un laboratoire de contrôle de sécurité pour analyse.Outre la nécessité d'une lourde logistique, les résultats ne sont communiqués que juste avant l'expiration du délai de détection, lorsque le lot de matières en cause a déjà souvent été l'objet d'un traitement ultérieur.
C'est pour cela que le Contrôle de Sécurité d'Euratom installe à l'heure actuelle un dispositif appelé 'Densitomètre hybrid K-Edge' dans les usines de retraitement. Ce dispositif mesure les solutions d'entrée sur le lieu même et détermine la concentration en uranium et le rapport uranium/plutonium avec un haut degré de précision. Ces mesures sont effectuées par les inspecteurs eux-mêmes avec l'aide de l'exploitant pour la manipulation des échantillons. Euratom considère que cette technique constitue un progrès technologique substantiel, permettant aux inspecteurs de connaître le résultat de la mesure presque simultanément, sinon antérieurement, à la déclaration de son propre résultat par l'exploitant, et cela avec une précision comparable à celle des méthodes classiques.

Laboratoire sur le Site

Le densitomètre 'Hybrid K-Edge' fait partie d'un plan mis au point par Euratom pour parvenir à traiter le grand nombre d'échantillons différents provenant d'une usine de retraitement : il s'agit d'un laboratoire installé sur le site et affecté au contrôle de sécurité connu sous le nom de 'Laboratoire analytique sur le site' (OSL). Ce laboratoire sera équipé au moyen des instruments analytiques indépendants apportés par les inspecteurs eux-mêmes, les analyses étant effectuées par le personnel de la Commission. Le système est donc indépendant de l'exploitant qui continuera cependant à être responsable de tous les aspects d'autorisation et de sûreté. Les travaux de conception de l'OSL sont à un stade avancé et nous espérons mettre en service le premier de ces laboratoires dans un an environ.

Authentification

Les autorités de contrôle de sécurité devraient donc, en règle générale, faire installer leur propre équipement indépendant.
Il peut, cependant, se présenter des situations où cela n'est pas réalisables en raison de circonstances particulières. En ce cas, ce sont les instruments de contrôle de l'exploitant lui-même qui doivent être utilisés, soit que leur résultat soit lu directement, soit que l'on extraie, en un point approprié, un signal de ces dispositifs de contrôle. Ce signal est ensuite traité par les systèmes propres des inspecteurs. Dans de tels cas, il est essentiel d'assurer l'authenticité de ces lectures ou de ces signaux au moyen d'un contrôle indépendant opéré sur toutes les lignes de communication intervenantes, depuis le point de production du signal (par exemple détecteurs) jusqu'au point d'entrée dans le réseau des inspecteurs.
Diverses techniques ont été conçues pour cette authentification dont le but est bien sûr d'éviter que les systèmes puissent être altérés. Une étude au cas par cas est nécessaire afin de déterminer les mesures requises ainsi que l'ensemble des actions appropriées et le calendrier de leurs réalisations. Des calibrages, des essais fonctionnels, des remesurages, etc... sont effectués et les systèmes sont scellés ou mis sous surveillance après authentification en vue d'assurer leur intégrité. Le chiffrement des données constitue une autre mesure très efficace d'authentification qui a déjà fait l'objet de recherches et été mise en pratique.

Gestion des Projets

Il apparaît des différents points résumés ci-dessus que la réalisation du contrôle de sécurité dans les grandes installations du cycle de combustibles ne sera vraiment

assurée du succès que dans le cadre d'un programme convenable de gestion du projet assurant la coordination de l'ensemble des activités en cause. Ce programme doit être appliqué depuis le moment de la fourniture des Caractéristiques Techniques Fondamentales jusqu'au stade des opérations de routine, en passant par la phase de mise en service, afin d'assurer le fonctionnement efficace de toutes les interfaces du contrôle de sécurité.
Un tel programme doit tenir compte des contraintes principales suivantes :

- coordination de toutes les études conceptuelles conformes au calendrier convenu;
- établissement de toutes les spécifications techniques nécessaires et livraison des instruments en vue de leur incorporation et de leur installation respectant le calendrier de construction de l'installation;
- liaison efficace avec toutes les parties intéressées;
- authentification de tous les instruments en cause au fur et à mesure de l'avancement de la construction de l'installation, à moins qu'ils ne soient scellés ou deviennent inaccessibles d'une autre manière;
- établissement d'un calendrier de vérification des Caractéristiques Techniques Fondamentales allant de pair avec l'avancement des travaux de construction, en veillant ici encore à ce que les vérifications soient effectuées avant que la partie d'installation en cause devienne inaccessible;
- rassemblement des ressources nécessaires y compris pour ce qui concerne le recrutement des inspecteurs et le rassemblement des capitaux;
- assurance des fonctions de maintenance et de service après la mise en fonctionnement.

Il a été démontré qu'il est essentiel pour la bonne marche du projet que l'exploitant et le Contrôle de Sécurité établissent leur programme de gestion interne et se tiennent en liaison dans un esprit de coopération pratique.

Vérification des Caractéristiques Techniques Fondamentales (CTF)

La vérification des Caractéristiques Techniques Fondamentales est essentielle pour assurer l'efficacité du contrôle de sécurité, et une condition préalable à la validation de l'inspection de routine des flux de matières nucléaires ainsi qu'à l'établissement de l'état des stocks.
Dans les installations 'classiques' de l'ancienne génération, cette opération était normalement faite une seule fois après réception des CTF, dans le délai fixé au règlement Euratom (au moins 45 jours avant la date prévue pour la première réception de matières nucléaires ou la mise en service de l'installation).
Dans le cas des usines de retraitement, cette opération servait également à confirmer que l'installation avait été construite en conformité avec les plans approuvés, condition pour que la Commission accorde son autorisation finale.
Une revérification régulière des CTF est effectuée habituellement une fois par an environ afin de confirmer le maintien de leur validité.
Dans les installations à grande échelle de la nouvelle génération, la vérification des CTF poursuit généralement les mêmes objectifs. Les procédures doivent cependant être adaptées pour tenir compte de la conception automatisée et complexe, et des nécessités de l'accessibilité des équipements clés pour la vérification, la calibration et la validation après authentification.
Ces opérations doivent débuter à un stade précoce du programme de construction, et non pas seulement après la transmission formelle des CTF rappelée ci-dessus.
Parmi les contraintes de gestion du projet, il faut citer la détermination des équipements concernés par le contrôle de sécurité, ainsi que l'établissement du calendrier optimal - c'est-à-dire des moments où les équipements peuvent être vérifiés le plus aisément avant qu'ils soient scellés et deviennent inaccessibles de manière permanente.
Bien que les exploitants ne soient pas, dans tous les cas juridiquement tenus, aux termes des obligations de contrôle de sécurité, de déclarer les opérations en cause avant la mise en exploitation, l'expérience acquise par Euratom jusqu'à présent a prouvé que les discussions à un stade précoce de la construction sont en fait très souhaitables. Il semble que les exploitants soient de plus en plus conscients de l'importance d'avoir une bonne réputation en matière de contrôle de sécurité vis-à-vis du public et au regard de leurs engagements internationaux.

Conclusions

La bonne réalisation de toutes les étapes d'un plan conceptuel particulier de contrôle de sécurité, à savoir :

- analyse des aspects techniques de la nouvelle installation;
- définition détaillée de l'approche de contrôle de sécurité;
- inventaire des moyens humains et financiers nécessaires;
- définition, achat et installation de l'appareillage et des autres moyens techniques requis;
- coordination efficace de l'ensemble du projet;

garantira la bonne mise en route des inspections de routine lorsque l'installation deviendra opérationnelle.
Les systèmes modernes de contrôle de sécurité intégrés et/ou sans personnel qu'Euratom a mis au point et utilise chaque fois que cela est possible dans le cas des

nouvelles installations de grande taille utilisant du plutonium, ont pour résultat une augmentation des coûts d'investissement et une diminution des coûts de fonctionnement. Euratom prévoit que cette tendance favorisera la rationalisation indispensable dans la réalisation des contrôles de sécurité de ce type d'installation, tout en assurant le maintien du haut niveau, également indispensable, de qualité de ce contrôle. ■

1. ZUSAMMENARBEIT DER EG MIT DEN MITTEL- UND OSTEUROPÄISCHEN LÄNDERN IM ENERGIEBEREICH

Peter NAGY, GD XVII
Abteilung Koordinierung

Durch die Umwälzungen von 1989 in Mittel- und Osteuropa haben sich die politischen und wirtschaftlichen Aussichten dieses Kontinents grundlegend verändert.
Die Europäische Gemeinschaft und die übrige westliche Welt haben sich dieser Herausforderung rasch gestellt, indem sie Vereinbarungen über Wirtschaftshilfe und Zusammenarbeit mit den mittel- und osteuropäischen Ländern getroffen haben und sich unverzüglich an der Umgestaltung in diesen Ländern beteiligt haben. Die conditio sine qua non für diese Wirtschaftshilfe und Zusammenarbeit war, daß sich die betreffenden Länder den Grundsätzen der Demokratie einschließlich freier Wahlen unterordnen und sich zur Umstrukturierung ihrer Wirtschaft nach den Grundsätzen der freien Marktwirtschaft verpflichten.
Folgende Länder Mittel- und Osteuropas kommen inzwischen für diese neue Unterstützung in Frage: Polen, Ungarn, die CSFR, Rumänien, Bulgarien, Albanien, Lettland, Estland und Litauen. Die Situation in Jugoslawien sollte nach der1992 erfolgten Anerkennung der neuen Staaten Kroatien, Slowenien und Bosnien-Herzegowina neu überdacht werden. Die Koordinierung der Unterstützung seitens der 24 OECD-Staaten (G 24) wurde auf dem G-7-Gipfel im Juli 1989 in Paris der Kommission übertragen. Die Beihilfen der Kommission selbst werden weitgehend im Rahmen von PHARE gewährt.
Diesen Initiativen in Mittel-und Osteuropa folgten ein Programm über Technische Hilfe für die Gemeinschaft Unabhängiger Staaten (GUS) und Verhandlungen über eine Europäische Energiecharta, die nun mit den Basisabkommen und den Protokollen in die Endphase getreten sind.

ZUSAMMENARBEIT DER EG MIT DEN MITTEL- UND OSTEUROPÄISCHEN LÄNDERN IM ENERGIEBEREICH

Der Energiebereich ist für die (wirtschaftliche) Umstrukturierung Mittel- und Osteuropas von maßgeblicher Bedeutung. Er ist außerdem für Ost und West ein entscheidender Sektor. Energie ist von strategischer Bedeutung. In diesem Zusammenhang sollten wir bedenken, daß - selbst wenn einige dieser Länder über eigeneEnergieressourcen verfügen - (z.B. Öl in Ungarn und Rumänien, Ölschiefer in Estland, Wasserkraft in Albanien, feste Brennstoffe in der CSFR und Polen), alle weiterhin abhängig von den Lieferungen der GUS und insbesondere Rußlands sind.
Andererseits kann sich künftig Energie aus dem "Osten" als sehr willkommen für unsere eigene Versorgungssicherheit und Diversifizierung erweisen. Energie ist selbstverständlich unerläßlich für die Weiterentwicklung der Industrie und damit für den Wohlstand der Nationen. Wir teilen unsere Bedenken hinsichtlich der nuklearen Sicherheit und

anderen Umweltproblemen wie CO_2-, NO_x- und SO_2-Emissionen mit Mittel- und Osteuropa.

Darüber hinaus sind die Chancen für Unternehmen im Energiebereich (z.B. im Technologiesektor) im Osten und im Westen gleichermaßen vorhanden.

Nach der Golfkrise und den G-24-Beschlüssen vom Oktober 1990 hat der Energiebereich einen eigenen Stellenwert im Rahmen der G-24 und PHARE-Prozesse. Auch andere Gebiete der Zusammenarbeit zwischen der Gemeinschaft und den mittel- und osteuropäischen Ländern im Energiebereich wurden erschlossen, wie etwa der Zugang zu EGKS-Darlehen, den derzeit Polen, Ungarn, die CSFR, Bulgarien und Rumänien haben.

Davon abgesehen gehört der Energiebereich auch zu den die in den im Dezember 1991 mit Polen, Ungarn und der CSFR abgeschlossenenen 'Europäischen Abkommen' für eine Zusammenarbeit vorgesehen sind. Die Verhandlungen mit Bulgarien und Rumänien sind demnächst beendet.

Die Beziehungen zwischen der Gemeinschaft und den mittel- und osteuropäischen Ländern im Energiebereich können daher am besten unter folgenden Titeln behandelt werden:

- Bilaterale Beziehungen zwischen der GD XVII und den mittel- und osteuropäischenLändern (Programm über die internationale Zusammenarbeit im Energiebereich und Thermie)
- G 24
- PHARE
- Verhandlungen über 'Europäische Abkommen'
- EGKS-Darlehen

Bilaterale Beziehungen Zwischen der GD XVII und den Mittel- Und Osteuropäischen Länderen

Die GD XVII bearbeitet zwei 'bilaterale' Programme, die u.a. mittel- und osteuropäische Länder betreffen: das Programm über die internationale Zusammenarbeit im Energiebereich und Thermie.

Programm Über die Internationale Zusammenarbeit im Energiebereich

Ein spezifisches Programm für Mittel- und Osteuropa, das Polen, Ungarn, Jugoslawien und die Tschechoslowakei erfaßt, besteht im Rahmen des allgemeinen Kooperationsprogramms seit nunmehr zwei Jahren. Diese Unterstützung, deren finanzielle Ausstattung bescheiden ist (insgesamt 1 Million ECU für 1990 und 91 zusammen), wird derzeit zur Förderung der institutionellen Einrichtungen der betreffenden Länder, insbesondere auf städtischer und regionaler Ebene, zur Ausarbeitung einer Energiepolitik und -planung sowie zur Verbesserung der Energieeffizienz in Industrieunternehmen eingesetzt.

Für Ungarn wurde eine Studie über das Potential für Fremdfinanzierungen abgeschlossen. Ferner wurde mit einer Untersuchung über den Energieverbrauch in der ungarischen Nahrungsmittelindustrie begonnen, Beihilfen für das Energiemanagement in der Stadt Miskolc gewährt und das Zentrum für Energiemanagement und Technologieverbreitung EG-Ungarn errichtet (dieses soll gemeinsam von PHARE und den ungarischen Behörden finanziert werden).

In Polen werden Studien über den Wiederaufbau der Ölförderung, Energiemanagement in der Stadt Gliwice und die Erstellung eines Fernheizungs-Gesamtplans in Bydogoszcz durchgeführt. In der Tschechoslowakei werden Beihilfen für eine bessere Energieeffizienz in der Bauwirtschaft bereitgestellt. Weitere geplante Vorhaben betreffen ein Energiespar-und ein Ausbildungsprogramm. Aus Begegnungen im ehemaligen Jugoslawien ergaben sich die Vorbereitung eines Seminars über Energiemanagement, eine Konferenz über Energiemanagement und die Erstellung einer Studie über Energiepreise.

Thermie

Das Programm 'Thermie' der Gemeinschaft[1] zur Förderung der Energietechnologien in Europa richtet sich vor allem an die Gemeinschaft selbst. Unter bestimmten Voraussetzungen können jedoch auch Förderungstätigkeiten außerhalb der Gemeinschaft unterstützt werden. Die Gesamtmittel für die ersten drei Jahre (1990-92) beliefen sich auf 350 Mio ECU[2].

Insbesondere können sogenannte 'Begleitmaßnahmen' zur Förderung der Anwendung und Markteinführung von Energietechniken auch in Drittländern wie etwa den mittel-und osteuropäischen Ländern und den Republiken der ehemaligen UdSSR finanziert und durchgeführt werden. Diese Begleitmaßnahmen umfassen Marktuntersuchungen, Marktbewertungen und Verbreitungstätigkeiten wie die Vorbereitung von Seminaren und Konferenzen, Veröffentlichungen usw. Die meisten dieser Tätigkeiten werden von dem kürzlich errichteten Gemeinschaftsnetz der

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1 *Verordnung (EWG) Nr. 2008/90 des Rates vom 29. Juni 1990; ABl. Nr. L 185, vom 17.7.1990, S. 1.*

2 *Siehe* Energie in Europa *Nr. 17 und 18 sowie* Energie in Europa *Nr. 19,* 'Focus on the East'.

3 *Verordnungen Nr. 3906/89 des Rates vom 18. Dezember 1989 ABL. Nr. L 375, vom 21.12.1989, S. 11 und Nr. 2698/90 des Rates vom 17. September 1990, ABL. Nr. L 257 vom 21.9.1990, S.1.*

Organisationen zur Förderung der Energietechnik ausgeführt. Ferner wurde eine begrenzte Anzahl von spezifischen Vorhaben über den Technologietransfer auf den Weggebracht.
Darüber hinaus hat die Kommission vor kurzem einen ausdrücklichen Beschluß zur Ausweitung der Tätigkeiten dieses Netzes auf Osteuropa gefaßt. Zunächst sollen Zentren in den drei baltischen Staaten, in Moskau, St. Petersburg, Kiew, Minsk, Warschau und Prag entstehen. In Ungarn sollen die Tätigkeiten über das Energiezentrum EG-Ungarn laufen.

GRUPPE DER 24

Der Rahmen der G 24 für eine Unterstützung der mittel- und osteuropäischen Länder wurde nach dem Weltwirtschaftsgipfel am 14. und 15. Juli 1989 in Paris, auf dem die sieben wichtigsten Industrieländer (G-7) zusammenkamen, geschaffen. Die Koordinierung der Hilfe wurde der Kommission übertragen.
Zunächst wurden Zugang zum Markt, Landwirtschaft, Umwelt, Investitionen und Wirtschaftsreformen als wichtigste Bereiche ausgewählt, auf die sich die G-24-Hilfe konzentrieren sollte, und Arbeitsgruppen für diese Bereiche eingesetzt. Der Energiebereich wurde unter dem Thema Umwelt behandelt.
Angesichts zahlreicher Strukturprobleme im Energiebereich in den mittel- und osteuropäischen Ländern (die durch die Einführung harter Währung als Zahlungsmittel im früheren COMECON-Block ab Januar 1991, die Unsicherheit über Lieferungen aus der UdSSR, sowohl hinsichtlich der Lieferungen selbst als auch der Preise, und schließlich durch die Golfkrise noch verschärft wurden), kamen die 24 OECD-Länder auf ihrer Tagung auf hoher Ebene vom 30. Oktober 1990 überein, den Energiebereich zum neuen vorrangigen Sektor der koordinierten Unterstützung zu erklären. Die Kommission wurde beauftragt, zusammen mit der IEA und anderen internationalen Organisationen einePrioritätenliste zu erstellen. An der neu eingesetzten Arbeitsgruppe Energie beteiligten sich die G 24 und fünf internationale Organisationen (EIB, EBWE, die Weltbank, die IEA und die UN-Wirtschaftskommission für Europa).
Unter dem Vorsitz des Generaldirektors für Energie, Herrn Maniatopoulos, arbeitete die Arbeitsgruppe Energie ein Strategiepapier für mittel- und langfristige Hilfen im Energiebereich aus, das auf dem G-24-Treffen auf hoher Ebene am 30. Januar 1991 angenommen und den mittel- und osteuropäischen Ländern übermittelt wurde. Das Strategiepapier, das im Anschluß an diesen Artikel im Wortlaut wiedergegeben wird, soll flexible 'Leitlinien' für die Hilfe vorgeben. Nach einer Analyse der derzeitigen Probleme im Energiebereich werden drei weitgefaßte vorrangige Gebiete der Zusammenarbeit festgelegt: a) Ausarbeitung und Planung einer Politik, die die Umstrukturierung des Sektors, die Preisgestaltung, Prognosen, die Ausarbeitung eines Regelwerks usw. umfaßt; b) Energieversorgung und -nachfrage - kurzfristig unter Einbeziehung von Energieeffizienz und Einsparung und längerfristig Verbesserungen in Produktion und Vertrieb sowie (geographische) Diversifizierung der Energieversorgung; und c) Energie, Umwelt und Sicherheit -mit besonderer Berücksichtigung der nuklearen Sicherheit; auch sonstige Fragen wie der Bedarf an sauberen Kohletechnologien werden behandelt.
Unter den sonstigen Koordinierungstätigkeiten der Arbeitsgruppe Energie sind das Ziel der Vermeidung von Doppelarbeit und Ressourcenverschwendung sowie eine wirksame Zusammenarbeit der Geberländer, einschließlich der Schaffung einer sag Energie informations tafel, auf der die Energie laufenden und geplanten Aktionen der G-24-Mitglieder aufgelistet sind, zu nennen.
Auf einer G-24-Sondertagung zum Elektrizitätssektor am 4. Juni 1991 wurden Schlüsselbereiche für Hilfen an die mittel- und osteuropäischen Länder in diesem Teilsektor festgelegt. Sie umfassen den Netzverbund, Umweltschutz und Energieeffizienz, Tarif- und Preisgestaltung, Ausbildung, Umstrukturierung der Industrie und nukleare Sicherheit.

PHARE

ALLGEMEINES

PHARE ist das Programm der Gemeinschaft für Mittel- und Osteuropa, das 1989 ursprünglich für Polen und Ungarn bestimmt war und später auf andere mittel- und osteuropäische Länder ausgedehnt wurde.[3]
PHARE zielt auf die Gewährung finanzieller und technischer Unterstützung für den wirtschaftlichen Reformprozeß in den mittel- und osteuropäischen Ländern ab, der zu einer auf Marktkräften basierenden Wirtschaft führen soll und erstreckt sich mehr oder weniger auf die gleichen Schlüsselbereiche für die Hilfe wie die G-24-Maßnahmen.
Die Hilfen werden in Form von Zuschüssen gewährt, jedoch können auch kapitalbildende Darlehen in Betracht gezogen werden. Im Rahmen von PHARE wird normalerweise eine sogenannte 'sanfte Unterstützung' gewährt, d.h. technische

Hilfe, Ausbildung, Durchführbarkeitsstudien, Tätigkeiten zur Überarbeitung des Regelwerks, Aufbau von Institutionen und kleine Pilotprojekte. Auch der Kauf von Ausrüstung ist in begrenztem Ausmaß möglich (z.B. PCs und sonstige Büroeinrichtung). Investitionenwerden nach dem PHARE-Modell nicht finanziert, da dies die Aufgabe des privaten Sektors und der Banken, einschließlich der internationalen Banken (EIB, EBWE, Weltbank usw.) ist.

Bei der Entscheidung über die zu finanzierenden Projekte berücksichtigt die Kommission die vorrangigen Bereiche und Wünsche der Empfängerländer in angemessener Weise. Praktisch bedeutet dies, daß den mittel- und osteuropäischen Ländern die Initative überlassen wird, Vorschläge zu unterbreiten. In anderen Worten: PHARE gewährt diesen Ländern Hilfe zur Selbsthilfe!

Projekte, die die Empfängerländer der Kommission vorlegen wollen, müssen also in sich geschlossen sein und sollten nicht lediglich aus einer Aufzählung einzelner und möglicherweise unkonkreter Anfragen bestehen.

Die Hilfe wird über die Regierungen der betreffenden Länder gewährt, jedoch sollten die Projekte danach streben, einen Rahmen zu schaffen, in dem sich auch die private Industrie entwickeln kann.

Parallel zu dem länderweisen Vorgehen gibt es bei PHARE auch einen regionalen Ansatz, d.h. drei oder mehr mittel- und osteuropäische Länder sind beteiligt. Förderungswürdige Projekte im Rahmen des regionalen Ausares die 10 % des PHARE-Jahresbudgets ausmachen, sollten derart beschaffen sein, daß sie nur auf regionaler Ebene durchgeführt werden können (aufgrund der Unteilbarkeit der Aktion; z.B. Probleme der nuklearen Sicherheit oder Verbundnetze) oder erhebliche Vorteile bieten, wenn sie auf regionaler Ebene durchgeführt werden.

Die Gesamtmittel für PHARE in allen Sektoren beliefen sich 1990 auf 500 Mio ECU, 1991 auf 785 Mio ECU und 1992 auf 1 000 Mio ECU.

Zur Koordinierung der PHARE-Hilfe in den Empfängerländern hat jedes Land einen nationalen Koordinator auf Ministerebene bestimmt.

Bevor ein Projekt anlaufen kann, müssen die Gemeinschaftsverfahren für Beihilfen, an Drittländer einschließlich der Vergabeverfahren, durchgeführt werden. Dieses Verfahren soll Wettbewerb und Transparenz gewährleisten. Generell können Aufträge nur dann freihändig vergeben werden, wenn ihr Umfang
50 000 ECU nicht überschreitet; bei höheren Beträgen sind offene oder beschränktes Ausschreibungsververfahren anzuwenden. Bei den meisten Energieprojekten, die normalerweise in Form technischer Hilfe vergeben werden, wird ein beschränkte Verfahren durchgeführt.

Bei der Kommission ist der Operationelle Dienst des programms •'PHARE' der Generaldirektion Außenbeziehungen die Haushaltsbehörde. Er arbeitet eng mit den zuständigen Generaldirektionen, einschließlich der GD XVII, zusammen. Auf der Ebene der Projektdurchführung kommt den EG-Delegationen in den Empfängerländern, soweit sie existieren, ebenfalls eine wichtige Rolle zu.

Ein typischer PHARE-Projektzyklus kann wie folgt zusammengefaßt werden:

- ein Richtprogramm für alle Sektoren, auf das sich die Kommission und das Empfängerland geeinigt haben, gibt für jedes Land die Prioritäten für ein oder zwei Jahre an;
- Festlegung von Projekten bei Informationsbesuchen seitens der Kommission;
- die im PHARE-Ausschuß verkelenen EG-Mitgliedstaaten geben eine Stellungnahme zum Entwurf eines Finanzierungsvorschlags ab, in dem das sektorale Hilfsprogramm einschließlich der Projekte dargelegt wird;
- die Kommission entscheidet über den Finanzierungsvorschlag;
- Unterzeichnung der Finanzierungsvereinbarung (bei der es sich um einen angepaßten Finanzierungsvorschlag handelt) durch die Kommission und das Empfängerland;
- Errichtung einer Programmdurchführungsstelle (PIU) im Empfängerland (im Falle von Energieprojekten im Energieministerium), die die Projektdurchführung leitet. Die PIU besteht aus Vertretern des Empfängerlands und wird von EG-Beratern unterstützt;
- die PIU veröffentlicht Ausschreibungen, nachdem sie mit Zustimmung der Kommission den (endgültigen) Rahmen für die Projekte und die engere Auswahlliste festgelegt hat;
- Bewertung der Angebote durch die PIU in Zusammenarbeit mit der Kommission, anschließend Ausarbeitung und Unterzeichnung der Verträge;
- Durchführung der Projekte unter Leitung der PIU. Bei Problemen sind die EG-Delegationen vor Ort der erste Ansprechpartner.

Ausführlichere Angaben zu den Teilnahmebedingungen für Berater im Rahmen des PHARE-Programm werden am Ende dieses Artikels erteilt.

PHARE UND ENERGIE

1990, im ersten Jahr des Bestehens von PHARE, wurde Energie nach dem G-24-Modell im Rahmen des Umweltprogramms behandelt, obwohl nach der Verordnung Nr. 3906/89 des Rates zur Einsetzung

von PHARE Energie ausdrücklich als einer der Sektoren genannt wird, in denen eine Zusammenarbeit angestrebt werden sollte. Etwa ein Viertel der 100 Mio ECU, die 1990 für Hilfe im Umweltbereich in Ungarn, Polen, der ehemaligen DDR und der Tschechoslowakei vorgesehen waren, ist für Projekte im Energiebereich bestimmt.

Nach dem auf hoher Ebene gefaßten Beschluß der G 24 vom 30. Oktober 1990, mit dem Energie zum neuen vorrangigen Förderungsbereich in den mittel- und osteuropäischen Ländern erklärt wurde, enthielt ab 1991 ein eigenes Kapitel zum Thema Energie in das Programm PHARE aufgenommen. Für die meisten Länder waren 1991 Hilfen in Höhe von 3 bis 5 Mio ECU in den einzelnen Richtprogrammen vorgesehen. In Anbetracht der nur begrenzt verfügbaren Mittel müssen die Gelder für die Bereiche des Energiesektors verwendet werden, in denen sie am dringendsten benötigt werden. In der Regel gelten die im Rahmen der G 24 festgelegten vorrangigen Bereiche auch für das Programm PHARE. Dazu gehören Ausarbeitung und Planung einer Politik, einschließlich der Preisgestaltung, Fragen der Energieversorgung und -nachfrage (z.B. Diversifizierung und Energieeinsparung) sowie Umwelt-und Sicherheitsfragen im Energiebereich (z.B. nukleare Sicherheit).

Das Programm für 1991 sah folgende Beträge für die einzelnen Länder vor:

Bulgarien: 10 Mio ECU für 1991 und 1992; regionale Projekte und Kernkraft: 11,5 Mio ECU 1991-1992; Tschechoslowakei: 5 Mio ECU; regionale Projekte und Kernkraft zweite Phase: 3,5 Mio ECU 1991, entsprechend dem Betrag für Phase 1 im Jahre1990; Ungarn: 5 Mio ECU; Polen: 3 Mio ECU; Rumänien: 1 Mio ECU. Die drei baltischen Staaten erhielten 1991 Hilfe im Rahmen des Programms für die ehemalige UdSSR in folgender Höhe: Litauen: 1,75 Mio ECU; Lettland: 1,25 Mio ECU; Estland: 0,25 Mio ECU.

In den meisten Ländern sollte die Einrichtung der PIU nach der Auswahl der Berater spätestens bis zum Sommer1992 abgeschlossen sein. Mit der Durchführung der Projekte wurde im Frühjahr 1992 begonnen. In Rumänien und der CSFR sind die Studien zum Elektrizitätssektor bereits angelaufen; auch das Nuklearprogramm in Bulgarien hat bereits gute Fortschritte gemacht.

Unabhängig vom 'Standardprogramm' für die Länder beschloß die Kommission aus humanitären Gründen im Dezember 1991, Bulgarien mit Stromeinfuhren zu unterstützen, um die schweren Engpässe des Winters 1991/92 zu überbrücken. Dieser Energiemangel, der in Sofia wiederholt zu Stromabschaltungen führte, ist weitgehend auf die von der IAEA aus Sicherheitsgründen angeordnete Stillegung mehrerer Blöcke des Kernkraftwerks Kozloduj zurückzuführen: dieses Kraftwerk kommt fuss zu 40 % des bulgarischen Stromversorgung auf. Eine vollständige Liste der geplanten PHARE-Projekte ist *Energie in Europa* Nr. 19 zu entnehmen.

Die Planungsphase für PHARE im Jahre 1992 war im Frühjahr 1992 beendet. In einigen Ländern ist bereits ein begrenztes Energieprogramm angelaufen. Unabhängig von dem grundlegenden länderweisen Vorgehen plant die Kommission für 1992 auch 'regionale' Energiestudien. Dies kann beispielsweise Studien über einen Strom- und Gasverbund, Erdölraffination und -transport oder Managementkurse umfassen.

Europäische Abkommen

Die Gemeinschaft hat im Dezember 1991 Verhandlungen über Assoziierungsabkommen oder 'Europäische Abkommen' mit Polen, der Tschechoslowakei und Ungarn abgeschlossen. Bei ihrem Inkrafttreten werden diese Abkommen an die Stelle der bisherigen ersten Generation von Handels- und Kooperationsabkommen mit diesen Ländern treten.

Die Europäischen Abkommen sehen die Schaffung einer Freihandelszone, einen politischen Dialog, finanzielle Unterstützung und Zusammenarbeit auf den Gebieten Industrie, Technik und Wissenschaft vor. Energie, einschließlich der nuklearen Sicherheit, ist eines der Gebiete der Zusammenarbeit, über die gegenwärtig verhandelt wird.

Längerfristig wird die Kommission die Beziehungen mit den mittel- und osteuropäischen Ländern in einem weitergesteckten Rahmen fortsetzen müssen - dies schließt sicherlich auch die Frage des späteren Beitritts dieser Länder zur Gemeinschaft ein.

Die Verhandlungen für ein Europäisches Abkommen mit Rumänien und Bulgarien wurden Ende 1991 aufgenommen. Mit den drei baltischen Ländern und Albanien wird derzeit über ein Handels- und Kooperationsabkommen der erstenGeneration verhandelt, das auch den Energiebereich einschließt.

EGKS-Darlehen

Im Rahmen des EGKS-Vertrags können Darlehen von bis zu 200 Mio ECU für Investitionen in den Sektoren Kohle und Stahl in Polen, Ungarn, der Tschechoslowakei, Bulgarien und Rumänien vergeben werden. Im Kohlesektor beziehen sich die geplanten Projekte, an denen zumindest ein

Unternehmen aus der Gemeinschaft beteiligt sein sollte, auf Sicherheits- und Arbeitsbedingungen in Zedien, die Umstrukturierung der Kohleindustrie und den Umweltschutz. Zwischen der Kommission und den polnischen Behörden finden bereits Erörterungen über die EGKS-Darlehen statt. Weitere mittel- und osteuropäische Länder haben ihr Interesse bekundet.

SCHLUSSFOLGERUNG

Die Kommission hat sich der Herausforderung, nach den Ereignissen von 1989 in Mittel- und Osteuropa Ost und West einander nahezubringen, rasch gestellt. Dabei ist der Energiesektor einer der Schlüsselbereiche.

Wie wir gezeigt haben, hat Energie seit 1991 einen Platz sowohl bei PHARE als auch im G-24-Prozeß gefunden. Mit fast allen mittel-und osteuropäischen Ländern wurden inzwischen Kooperations-programme ausgehandelt.

Vorrang für 1992 haben die Durchführung des Programms von 1991, die Förderung der Zusammenarbeit mit Ländern, in denen es bereits ein Programm gibt, und die Ausarbeitung von Programmenin den übrigen Ländern wie Albanien, Kroatien, Slowenien und möglicherweise noch weiteren Ländern. Auch die Einrichtung einer regionalen Energiekomponente bei PHARE ist ein wichtiger für dieses Jahr geplanter Schritt. ■

BETEILIGUNG VON WESTLICHEN SACHVERSTÄNDIGEN UND BERATERN AM PROGRAMM PHARE

Die Kommission wendet sich für die Durchführung der PHARE-Programme über technische Hilfe normalerweise an westliche Sachverständige und Beratungsbüros. Die Berater werden unter anderem in mittel- und osteuropäische Länder geschickt, um Vorstudien zu erstellen und die Aufgabenstellung der Projekte festzulegen, sowohl als Mitglieder einer PIU (Programmdurchführungsstellen in den Empfängerländern leiten die Durchführung der sektoralen Programme einschließlich der Energieprogramme) als auch zur Durchführung der Projekte selbst. Das Amt für amtliche Veröffentlichungen der Gemeinschaft in Luxemburg hat kürzlich einen 'praktischen Leitfaden' zum Programm PHARE herausgegeben. Für Sachverständige und Berater, die sich am Programm PHARE beteiligen wollen, ist der folgende Teil der Broschüre von besonderem Interesse. Es sei darauf hingewiesen, daß in der Broschüre noch nicht auf Besonderheiten der Länder eingegangen wird, die erst kürzlich als förderungswürdig im Rahmen von PHARE eingestuft wurden (die baltischen Länder, Albanien usw.)

Sachverständige und Berater, die sich am PHARE-Energieprogramm beteiligen wollen, können ihren offiziellen Antrag, in dem sie die (energiebezogenen) Fachgebiete, die Länder, an denen sie interessiert sind, sowie einen Überblick über Erfahrungen und Fähigkeitsnachweise angeben, an eine der folgenden Anschriften richten:

Kommission der Europäischen Gemeinschaften
Generaldirektion Auswärtige Beziehungen
operationeller Dienst 'PHARE'
Herrn M. Franco
200, rue de la Loi
B-1049 Brüssel
und:
Kommission der Europäischen Gemeinschaften
Generaldirektion Energie
Herrn P. Lambert
200, rue de la Loi
B-1049 Brüssel

AUSZUG AUS DEM PRAKTISCHEN LEITFADEN FÜR PHARE

"...DURCHFÜHRUNG DER PHARE-PROGRAMME

Bei einem typischen PHARE-Programm werden westliche Sachverständige und Berater für die technische Hilfe benötigt, es werden Lieferaufträge ausgeschrieben und/oder Anschubfinanzierungen ermöglicht.

WER IST ZUSTÄNDIG?

Nach den PHARE-Grundsätzen werden die Liefer- und Dienstleistungsaufträge im allgemeinen vom Empfängerland selbst vergeben, und zwar nach den bei der Kommission üblichen Verfahren. Oft beauftragen die zuständigen Behörden der Empfängerländer einen speziellen Dienst (programme implementation unit - PIU) mit der Programmdurchführung.

WELCHE ROLLE SPIELT DIE KOMMISSION?

Die PIU arbeitet eng mit den Kommissionsdienststellen - ihrem Operationellen Dienst PHARE in Brüssel und ihren Delegationen in den mittel- und osteuropäischen Hauptstädten zusammen. Diesebeschränken sich nicht darauf, bei der detaillierten Ausarbeirung der Ausschreibungen und Aufträge gemäß der Haushaltsordnung der Gemeinschaft mitzuwirken, sondern überwachen und prüfen auch die Ausschreibungsverfahren, die Zuschlagserteilung und die Zahlungen. Unabhängig von diesem Beitrag der Kommission liegen jedoch die letzte Verantwortung und die Entscheidungsbefugnisse beim Empfängerland.

NACH WELCHEN VERFAHREN WIRD VORGEGANGEN?

Die PHARE-Hilfe wird nach den Verfahren gewährt, die in der Haushaltsordnung für den Gesamthaushaltsplan der Gemeinschaft im Kapitel über ihre Auslandshilfe festgelegt sind.

Nach einer allgemeinen Regel dürfen Aufträge nur bis zu einem Wert von 50 000 ECU freihändig vergeben werden, bei einem höheren Volumen müssen Vergleichsangebote eingeholt bzw. eine Auswahl aus einem beschränkten Bewerberkreis durchgeführt werden.

Größere Lieferaufträge werden im Wege öffentlicher Ausschreibungen vergeben, an denen alle Interessienten in der Gemeinschaft und den Empfängerländern gleichberechtigt teilnehmen können. Der Aufruf zur Einreichung der Angebote wird im Empfängerland nach den dort üblichen Praktiken und in der Gemeinschaft als Kurzfassung in allen neun Amtssprachen in der Reihe 'C' oder dem Supplement 'S' des Amtsblatts der Europäischen Gemeinschaften veröffentlicht.

Für Beratungs-und ähnliche Aufträge gelten im wesentlichen die gleichen Regeln, doch ist es aufgrund der zumeist erforderlichen besonderen technischen Fachkenntnisse und professionellen Kompetenzen zweckmäßiger, die Ausschreibungen und Aufträge auf Firmen oder Personen zu beschränken, die auf dem betreffenden Gebiet schon Erfolge und einschlägige Erfahrungen aufweisen können.

Bei der Auftragserteilung greifen die nationalen Behörden weitgehend auf Vorschläge des Operationellen Dienstes PHARE zurück. Der Dienst stützt seine Beurteilung der Bewerberbeurteilung im allgemeinen auf die Informationen, die ihm im Rahmen seiner zahlreichen Arbeitskontakte zugehen, auf Datenbanken, die wie Dacron für verwandte Bereiche (Entwicklungshilfe) gegründet wurden, oder auf Beiträge anderer Generaldirektionen aus ihrem besonderen Tätigkeitsbereich.

Der operationelle Dienst bemüht sich aktiv um eine Verbreiterung dieser Informationsbasis. Bei der Bearbeitung der zahlreichen Zuschriften von Beraterfirmen klassifiziert der Dienst einschlägige Firmendarstellungen, damit sie später abrufbereit sind. Bei Bedarf kündigt er im Amtsblatt der Europäischen Gemeinschaften Vorauswahlen - für ein besonderes Programm oder für allgemeine Zwecke - an, bei denen alle interessierten Berater sich melden und ihre Qualifikationen in dem betreffenden Bereich dokumentieren können. Beraterfirmen, die aufgrund ihrer Erfahrung und ihrer Fähigkeiten geeignet erscheinen, werden in eine sogenannte 'lange Liste' aufgenommen, die den auftragsvergebenden Behörden der verschiedenen Empfängerländer als Referenzmöglichkeit für den Bedarfsfall zugesandt wird.

Zur Vergabe eines Technische-Hilfe-Auftrags im beschränkten Auswahlverfahren wird aus dieser Akte unter Hinzunahme der Vorschläge der Vergabebehörden eine sogenannte •'kurze Liste' möglicher Firmen zusammengestellt. Die Auswahl erfolgt ausschließlich nach Preis- und Leistungskriterien, ein Quotensystem gibt es nicht.

Worin bestehen die Teilnahmebedingungen der Gemeinschaft?

Die von Fall zu Fall zu erfüllenden Voraussetzungen und Förmlichkeiten werden in der Ausschreibung beschrieben. Daneben gelten folgende allgemeine Teilnahmebedingungen:

- In gleicher Weise teilnahmeberechtigt sind alle natürlichen oder rechtlichen Personen, die die Staatsangehörigkeit eines Mitgliedstaats der Gemeinschaft oder eines Empfängerlandes - Bulgarien, Jugoslawien, Polen, Rumänien Tschechoslowakei, Ungarn besitzen bzw. in einem der genannten Ländern ihren Hauptgeschäftssitz haben.
- Für die Lieferungen dürfen nur Waren gekauft werden, die ihren Ursprung in der Gemeinschaft haben, und zwar nach dem dort geltenden Ursprungsbegriff. Diese Klausel ist in allen Ausschreibungen und Aufträgen enthalten.
- Ausgewählt wird das wirtschaftlich vorteilhafteste Angebot mit dem besten Preis-Leistungs-Verhältnis. Dazu sind die einzelnen Kriterien wie technischer Wert, Qualität der technischen Hilfe, Betriebskosten, Lieferzeiten und natürlich der Preis jeweils unter den Ausschreibungsbedingungen aufgeführt.
- Preise sind in ECU anzugeben und werden in ECU oder der Währung eines EG-Mitgliedstaats oder des Empfängerstaats gezahlt.

Wo sind Informationen über PHARE-Programme erhältlich?

Aufforderungen zur Einreichung von Lieferangeboten oder Unterlagen für Vorauswahlen werden im Supplement "S" des Amtsblatts der Europäischen Gemeinschaften in allen neun Amtssprachen veröffentlicht. Das Supplement "S" ist beim Amt für amtliche Veröffentlichungen derEuropäischen Gemeinschaften in Luxemburg und seinen Vertriebsbüros erhältlich.

Die detaillierten Beschreibungen für öffentliche Ausschreibungen sind bei den in den Bekanntmachungen aufgeführten Stellen anzufordern. Alle Ausschreibungen werden von den nationalen Vergabebehörden nach den jeweils gewohnten Verfahren veröffentlicht." ■

2. ZUSAMMENARBEIT DER EG MIT DEN LÄNDERN DER EHEMALIGEN SOWJETUNION IM ENERGIEBEREICH

Claudia Gintersdorfer, GD XVII *(Sachverständige)*
Direktion Energiepolitik, Abteilung Politische Entscheiungen

Seit der Rat auf seiner Tagung im Dezember 1990 in Rom beschlossen hat, die Wirtschaft der ehemaligen Sowjetunion zu unterstützen, zu reformieren und wieder in Gang zu bringen, haben bedeutende Ereignisse die ehemalige UdSSR in einen loosen Verband unabhängiger Staaten verwandelt. Gemäß der Vereinbarung von Minsk vom 8. Dezember, der die nicht-slawischen Republiken (mit Ausnahme von Georgien) nach und nach beitraten, erkennt die Gemeinschaft die Souveränität der 11 GUS-Republiken an. Zu diesem Zeitpunkt war bereits ein Richtprogramm zur technischen Unterstützung (1991) mit den Vertretern der zentralen Sowjetbehörden unterzeichnet worden, in dem allgemeine Leitlinien sowie sektorale Programme für die Bereiche Energie, Ausbildung in Unternehmensführung, Nahrungsmittelverteilung, Verkehrswesen und Finanzdienstleistungen festgelegt waren. Daher stieß die Gemeinschaft bei der Durchführung des Programms zur technischen Unterstützung von 1991, das noch vor dem Auseinanderbrechen der Sowjetunion erarbeitet worden war, aufgrund der neuen polititschen und wirtschaftlichen Gegebenheiten auf erhebliche Schwierigkeiten. Viele der ehemaligen gesamtsowjetischen Ministerien sind aufgelöstworden oder werden neu organisiert; daher haben Informationsreisen zur Ermittlung zuverlässiger Gesprächspartner in den GUS-Republiken wertvolle Zeit in Anspruch genommen. Nach der Durchführung des Programms von 1991 wurde für das laufende Jahr ein neuer dezentraler Ansatz beschlossen, in dem sich die besonderen Erfordernisse der einzelnen Republiken besser widerspiegeln. Hauptthema dieses Artikels ist das EG-Programm zur Technischen Unterstützung der GUS-Staaten (TACIS); daneben wird auch ein kurzer Überblick über andere Formen der gemeinschaftlichen Zusammenarbeit mit den neuen unabhängigen Staaten, insbesondere Thermie, die Europäische Energiecharta, bilaterale Abkommen und die Folgemaßnahmen der Konferenz von Washington, gegeben.

HINTERGRUND INFORMATIONEN

Das Gebiet der ehemaligen Sowjetunion ist mit 21% der Weltenergieproduktion eines der rohstoffreichsten Gebiete der Welt, wobei Rußland über die meisten Energieressourcen verfügt: 91% der Ölvorkommen, 77% der Erdgasvorkommen und über 50% der Kohleproduktion der früheren UdSSR liegen hier. Weitere Republiken mit bedeutenden Energiereserven sind Kasachstan und Aserbeidschan (Öl), Turkmenistan und Usbekistan (Erdgas) und die Ukraine und Kasachstan (Kohle).

Ausgerechnet einer der einträglichsten Industriezweige Rußlands und dessen wichtigste Einnahmequelle für Exporterlöse ist aufgrund jahrzehntelanger mangelnder Investitionen in Ausrüstung, mangelnder Erforschung neuer Lagerstätten, Erschöpfung der leichter zugänglichen Vorkommen sowie der üblichen allgemeinen Ineffizienz aufgrund der zentralistischen Verwaltung zusammengebrochen:

- die Rohölproduktion sinkt seit derSpitzenleistung von 1988 weiterhin rapide; die Überprüfung des russischen Systems der Öllizenzen hat die Lage noch weiter verschlimmert, da sie in den ersten drei Wochen des Jahres 1992 zu einem Rückgang der Exporte nach Übersee um 40% gegenüber Dezember des letzten

Jahres geführt hat. Besonders akut sind die Probleme in dem wichtigsten Ölfördergebiet Tyumen in Westsibirien, wo soziale Unruhen unter den Arbeitern zu dem steilen Produktionsabfall beigtragen haben;

- die Lage der Erdgasindustrie ist etwas besser, allerdings hat sich das Wachstum seit 1986 verlangsamt und kann den Niedergang der Ölproduktion nicht ausgleichen. Die schlechte Wartung der Pipelines und die Gefahr einer Unterbrechung der Lieferungen aufgrund polititscher Streitigkeiten zwischen erdgasfördernden und Transit-Republiken sind die potentiellen Bedrohungen einer künftigen Entwicklung.
- der **Kohle**sektor stagnierte während der letzten 20 Jahre. Alte Gruben befinden sich in einem beklagenswerten Zustand und arbeiten unwirtschaftlich, während ungenutzte Lagerstätten in weit abgelegenen Gebieten liegen. Die Beförderung per Schiene wird durch die mangelnde Kapazität behindert. Bergarbeiterstreiks aufgrund schlechter Lebensbedingungen haben zu einem Rückgang der Produktion beigetragen.

Heute stoßen Kapitalinvestitionen großer ausländischer Gesellschaften auf politische und rechtliche Hindernisse, einschließlich der unsicheren politischen Lage, die durch ethnische Konflikte, das Fehlen einer umfassenden angemessenen Besteuerung und anderer rechtlicher Regelungen, sowie durch Kompetenzstreitigkeiten zwischen zentralen und regionalen Behörden noch erschwert wird.

Daher wurde wenig einträglichen gelegentlich auch äußerst profitablen Dienstleistungsverträgen, die darauf abzielen, die bloße Verschwendung durch den Austausch schadhafter Pipelines oder die Wiedereröffnung ungenutzter Bohrlöcher zu verringern, der Vorzug vor langfristigen Investitionen gegeben.

Die russische Regierung hat ein ehrgeiziges Reformprogramm eingeleitet, um ein günstiges Investitionsklima zu schaffen. Am 21. Februar 1992 wurde ein **Gesetz über die Gewinnung von Rohstoffen** verabschiedet, mit dem ein Lizenzsystem für den Zugang zu Rohstoffquellen sowie Regeln über die Aufteilung der Gewinnanteile zwischen zentralen und lokalen Behörden eingeführt wird. Der Entwurf für ein **Gesetz über ausländische Konzessionen** wird derzeit beraten und seit Mitte April werden die Preiskontrollen für Energie und Rohstoffe schrittweise verschärft.

Eine erfolgreiche Reform wird allerdings durch zahlreiche Faktoren wie den Produktionsrückgang, den Anstieg der Inflation, Zahlungsbilanzschwierigkeiten, den Rückgang der Exporte und den steigenden Bedarf an Einfuhren von Lebensmitteln, Arzneimitteln und Ersatzteilen behindert.

Daher wird dringend Unterstützung benötigt, um diese schwierige Übergangsphase, die als "weder Markt- noch Planwirtschaft" beschrieben wird, durchzustehen. Die Gesundung des Energiesektors ist ein Schlüsselement in diesem umfassenden Reformprozess, da dieser Bereich sowohl die Ausfuhreinnahmen, die Einfuhren als auch andere Sektoren und Industriezweige betrifft.

Schließlich ist es aufgrund der Reaktorkatastrophe von Tschernobyl und der im Anschluß daran in den meisten Kernreaktoren sowjetischer Bauart (RBMK und der ältere WWER) entdeckten Sicherheitsmängel unumgänglich, ein Notprogramm durchzuführen, um einen weiteren Atomunfall zu verhindern. Auf dem Gebiet der Energieeinsparungen, einem in der früheren Sowjetunion völlig unbekannten Begriff, liegen außerordentliche Möglichkeiten, um rasche Ergebnisse zu erzielen, indem zur Deckung des Energiebedarfs die verschwenderische Nachfrage verringert wird anstatt die Produktion zu steigern, wobei gleichzeitig die Umweltbelastungen zurückgehen.

Energieproduktion in der ehemaligen UdSSR (1989)

	ÖL	ERDGAS	KOHLE	STROM
ex-UdSSR (%)	100.0	100.0	100.0	100.0
Rußland	90.9	77.4	55.4	82.5
Ukraine	0.9	3.9	24.3	17.2
Weißrußland	0.3			2.2
Moldawien				1.0
Estland				1.0
Lettland				0.3
Litauen				1.7
Georgien			0.2	0.9
Armenien				0.7
Azerbeidschan	2.2	1.4		1.4
Kasachstan	4.2	0.8	18.7	5.2
Turkmenistan	1.0	11.3		0.8
Usbekistan	0.5	5.2	0.8	3.3
Tadschikistan			0.1	0.9
Kirgisien			0.5	0.9
ex-USSR	607 Mt	796 Mrd m3	740 Mt	1722 TWh

Quelle:OECD, IWF, Weltbank, 'A study of the Soviet economy' (Le Monde 27.8.91), Planecon.

Öl in der ehemaligen UdSSR

	RAFFINATIONSKAPAZITÄT				PRODUKTION
	1970		1989		1989
	Mt	%	Mt	%	
ex-UdSSR, insgesamt	264	100	455	100	100
Rußland	199.0	75.4	284.0	62.4	90.9
Ukraine	14.0	5.3	53.0	11.6	0.9
Weißrußland	12.0	4.5	41.0	9.0	0.3
Moldovawien					
Estland					
Lettland					
Litauen			14.0	3.1	
Georgien	4.0	1.5	4.0	0.9	
Armenien					
Aserbeidschan	21.0	8.0	22.0	4.8	2.2
Kasachstan	4.0	1.5	22.0	4.8	4.2
Turkmenistan	5.0	1.9	7.0	1.5	1.0
Usbekistan	5.0	1.9	8.0	1.8	0.5
Tadschikistan					
Kirgisien					

Quelle: Planecon.

PROGRAMM ZUR TECHNISCHEN UNTERSTÜTZUNG

ERSTE ENTSCHEIDUNGEN

Im Dezember 1990 beschloß der Europäische Rat auf seiner Tagung in Rom, 400 Mio. ECU für das Programm zur technischen Unterstützung der ehemaligen Sowjetunion bereitzustellen, um den Übergang zur Marktwirtschaft zu fördern. Der Gesamtbetrag wurde auf die folgenden fünf prioritären Sektoren aufgeteilt:

	MECU
Energie	115
Ausbildung in Unternehmens-führung	103
Nahrungsmittel-verteilung	74
Verkehr	45.8
Finanzdienst-leistungen	37.5

Im Gesamthaushalt wurden 15 Mio. ECU für die drei baltischen Republiken vorgesehen, die allerdings von 1992 an in das Programm PHARE aufgenommen werden.

Mit der Verordnung (EWG/EURATOM) Nr. 2157/91 des Rates vom 15. Juli 1991[1] wurde das Programm über die technische Unterstützung auf eine rechtliche Grundlage gestellt; nach Zustimmung der EG-Mitgliedstaaten wurde das 'Richtprogramm' am 2. August 1991 vom Vizepräsidenten der Kommission, Andriessen, und dem Botschafter der UdSSR, Voronin, unterzeichnet.

RICHTPROGRAMM

In dem sogenannten 'Richtprogramm' sind allgemeine jährliche Leitlinien für die verschiedenen Sektoren festgelegt, um den Übergang zur Marktwirtschaft zu fördern. Zu den Unterstützungsmaßnahmen gehören Ratschläge für politische Entscheidungen, die Erarbeitung rechtlicher und verwaltungstechnischer Rahmenbedingungen, Ausbildung, die Neuordnung vorhandener und der Aufbau neuer Institutionen. Auch die angemessenen Kosten für Lieferungen, die zur Durchführung dieser Maßnahmen erforderlich sind, werden abgedeckt. Die Durchführung beruht auf einem dezentralen Konzept, bei dem die Begünstigten stark miteinbezogen werden; Ziel ist die Erhaltung eines Gleichgewichts zwischen den Republiken, wobei integrierten Programmen mit einer gewissen geographischen Konzentration Vorrang eingeräumt wird.

DURCHFÜHRUNGSVERFAHREN

Unterstützt durch den 'Verwaltungsausschuß für die Unterstützung der UdSSR', der sich aus Vertretern der Mitgliedstaaten zusammensetzt, ist die Kommission für die endgültige Auswahl von Vorhaben und die Durchführung des Programms verantwortlich. Unternehmen, die ihren Sitz entweder in der Gemeinschaft oder in der ehemaligen Sowjetunion haben, können an dem Programm teilnehmen.Auf Seiten der GUS unterstützt eine Koordinierungstelle,mit sitz in MOSKAU die aus Sachverständigen aus der GUS und der EG zusammengesetzt ist, die Tägliche Abwicklung des Programms. Zu ihren Aufgaben gehören die Information möglicher Beihilfenempfänger, Entgegennahme und Prüfung von Finanzierungsanträgen vor der Weitergabe an die Kommission sowie die Beteiligung an der eigentlichen Durchführung des Programms.

[1] *ABl. Nr. L 210 vom 24.07.1991, S. 2*

SEKTORALES PROGRAMM FÜR DEN ENERGIEBEREICH

Nach Zustimmung des Verwaltungsausschusses faßte die Kommission am 10. Oktober den Finanzierungsbeschluß. Das sektorale Programm für den Energiebereich wurde am 12. Dezember 1991 von Vizepräsident Andriessen und dem Vorsitzenden des zwischenstaatlichen Wirtschaftsausschusses der UdSSR, Silajev, unterzeichnet.
Die wichtigsten Leitlinien für die Unterstützung im Energiesektor lauten wie folgt:
·übergeordnetes Ziel ist die Unterstützung der Reform und die Gesundung der sowjetischen Wirtschaft;
·den allgemeinen Rahmen bildet die Energiecharta, die darauf abzielt, die Ost-West-Zusammenarbeit auf dem Energiesektor durch die Nutzung komplementärer Bedürfnisse und Ressourcen zu entwickeln; bei der technischen Unterstützung geht es um die praktische Durchführung dieses Prozesses;
·Ermittlung der fünf prioritären Bereiche für die Unterstützung, d.h. nukleare Sicherheit, Energieeinsparung, Strom, Öl/Erdgas und sektorale Strukturen (rechtlicher und verwaltungstechnischer Rahmen).
Von den insgesamt 115 Mio. ECU entfällt der Löwenanteil (53 Mio. ECU) aus naheliegenden Gründen, d.h. der Gefahr eines erneuten schweren nuklearen Zwischenfalls, auf die nukleare Sicherheit. Weitere 21 Mio. ECU sind für Energieeinsparung vorgesehen, da hier außerordentliche Möglichkeiten für eine effizientere Energienutzung in der ehemaligen UdSSR liegen, wodurch deutliche Verbesserungen innerhalb eines relativ kurzen Zeitraums erreicht werden können. Eine genauere Aufstellung der Zuweisungen aus dem Haushalt nach Sektoren folgt im Anschluß an diesen Artikel.

BISHERIGE FORTSCHRITTE

Es wurde bereits darauf hingewiesen, daß die Durchführung des Programms von 1991 durch die dramatischen politischen Veränderungen, die nach dem Beginn des Programms TACIS eingetreten sind, erschwert wurde. Eines der größten Hindernisse für weitere Fortschritte ist die Schwierigkeit, die verantwortlichen Gesprächspartner in der russischen Föderation und den anderen Republiken zu ermitteln, mit denen Vorhaben fortlaufend erörtert werden können.
Im Februar dieses Jahres fand eine Reihe von Arbeitsbesuchen für die Bereiche Kernenergie, Strom sowie Öl und Erdgas statt, um Vorhaben mit den Behörden in den Republiken und mit den betreffenden Endbegünstigten abschließend zu klären. Einige Vorhaben wurden ausgewählt, mit denen umgehend begonnen werden kann, während bei anderen noch Arbeiten zur endgültigenAufgabenstellung erforderlich sind, bevor eine Aufforderung zur Angebotsabgabe ergehen kann.

DAS PROGRAMM FÜR 1992

Es ist geplant, in jeder der zwölf Republiken eine nationale Koordinierungstelle einzusetzen, die einem hohen Beamten untersteht, der wiederum Ansprechpartner für die Gemeinschaft ist. Für eine Übergangszeit wird die bereits vorhandene Koordinierungstelle in Moskau, die gegebenenfalls die nationale Koordinierungstelle für Rußland wird, die anderen GUS-Republiken weiterhin vertreten. Dadurch wird die Dezentralisierung gefördert und gewährleistet, daß jede Republik einen gerechten Anteil der Mittel für technische Unterstützung erhält; außerdem werden die direkten Verbindungen mit der Kommission und interessierten Wirtschaftsbeteiligten in den EG-Mitgliedstaaten verbessert.
Das Programm für 1992 wird auf den bereits 1991 festgelegten prioritären Sektoren - mit der Möglichkeit, einige neue Prioritäten hinzuzufügen - beruhen, um die Kohärenz zu wahren. Die Auswahl und die relative Gewichtung jedes Sektors wird jedoch von den Prioritäten jeder einzelnen Republik abhängen.
Darüber hinaus wurden Mittel aus dem Haushalt für regionale Vorhaben vorgesehen, an denen sich drei oder mehr Republiken beteiligen, um horizontale bzw. umfassendere Fragen wie Wirtschaftsreform, Telekommunikation und Energie zu behandeln.

THERMIE/TACIS-ENERGIEZENTREN

Die vier in der GUS eingerichteten Energiezentren, die bereits in *'Energie in Europa'* Nr. 19/1991 behandelt wurden, sollen im Rahmen des Programms zur technischen Unterstützung in bezug auf ihre Tätigkeiten zur Energieeffizienz verstärkt werden; außerdem ist die Einrichtung weiterer Zentren an anderen Orten geplant. Auf diese Weise soll in der GUS mit dem Aufbau einer Infrastruktur zur Energieeffizienz begonnen werden, um den Energieverbrauch durch ein systematisches Konzept zu senken.

EUROPÄISCHE ENERGIECHARTA

Mit der Idee einer gesamteuropäischen Energiecharta, die der niederländische Premierminister Ruud Lubbers angeregt hat und die an anderer Stelle in dieser Ausgabe eingehender behandelt wird, sollen vorhandene Komplementaritäten zwischen Energieproduzenten und Energieverbrauchern, sowie

denjenigen, die über die entsprechende Technologie verfügen, mit dem Ziel genutzt werden, die Errichtung einer Marktwirtschaft in Europa und auch darüber hinaus zu fördern. Dabei wurde offensichtlich von den Erfordernissen und Möglichkeiten der ehemaligen Sowjetunion und der mittel- und osteuropäischen Länder ausgegangen.
Doch die Unsicherheit darüber, wer die Charta am 16./17. Dezember in Den Haag für die Sowjetunion unterzeichnen würde, drohte den Prozess der Energiecharta buchstäblich in letzter Minute scheitern zu lassen. Man einigte sich auf einen Kompromiß, wonach sowohl jede einzelne Republik als auch der zwischenstaatliche Wirtschaftsausschuß die Charta unterzeichnen sollte; die Souveränität der Republiken wurdejedoch nicht offiziell anerkannt. Es wurde beschlossen, daß auch die nicht in Den Haag vertretenen Republiken die Charta noch unterzeichnen könnten (bei Fertigstellung dieses Artikels war noch offen, ob Turkmenistan an einer Teilnahme am Prozess der Energiecharta interessiert ist).
Neben organisatorischen Schwierigkeiten liegen die entscheidenden Probleme der GUS-Republiken vor allem in dem raschen Tempo der Verhandlungen, wodurch die Republiken kaum die Möglichkeit haben, sich mit den komplexen Fragen vertraut zu machen und ihren Standpunkt untereinander abzustimmen, sowie in der Tatsache, daß sie an vielen internationalen Vereinbarungen nicht beteiligt sind, die in unmittelbarem Zusammenhang mit Fragen stehen, die in dem Basisabkommen angesprochen werden (insbesondere GATT und OECD investment code).
Daher hat die russische Delegation darum gebeten, den Zeitplan für einige Sitzungen neu festzulegen, um sich mit den Unterlagen und den Spielregeln zwischen den Ländern der internationalen Wirtschaftsgemeinschaft vertraut zu machen. Hierzu fand im Mai ein besonderes Seminar statt; außerdem wird die Möglichkeit geprüft, in Moskau ein Charta-Koordinationszentrum einzurichten. Darüber hinaus soll im Rahmen des Basisabkommens eine 'Arbeitsgruppe Übergang' eingesetzt werden, die Entwürfe für Übergangsvereinbarungen für die GUS-Staaten und die Länder Mittel- und Osteuropas erarbeiten soll.

Bilaterale Kooperationsabkommen

Die Gemeinschaft möchte spezifische Kooperationsabkommen mit den GUS-Republiken abschließen, die auf die besondere Situation des jeweiligen Partners unter Berücksichtigung seiner geographischen Lage abgestimmt sind. Diese Abkommen, die über reine Wirtschaftsabkommen hinausgehen, wären eine Vorstufe zu den sogenannten 'Europäischen Abkommen', über die bereits mit einigen mittel- und osteuropäischen Ländern verhandelt wird. Abkommen mit der Russischen Föderation, mit Weißrußland, mit der Ukraine und mit Kasachstan werden vorrangig behandelt.

Folgemassnahmen der Konferenz von Washington

Auf Initiative der Vereinigten Staaten wurde eine internationale Konferenz über die Koordinierung von Sofortmaßnahmen für die neuen unabhängigen Staaten einberufen, die erstmals vom 21. - 23. Januar 1992 in Washington zusammentrat. Fast 60 Länder und zahlreiche internationale Organisationen nahmen daran teil. Es wurden fünf Arbeitsgruppen für die Bereiche Energie, medizinische Hilfe, Nahrungsmittel, Wohnungsbau und Technische Unterstützung eingesetzt; in der letzten Gruppe stellt die Kommission den zweiten Vorsitzenden. Die Folgemaßnahmen der Konferenz von Washington liegen in den Händen der Gemeinschaft, die im Mai eine Ministerkonferenz in Lissabon einberief, zu der auch die GUS-Republiken eingeladen waren.
In der Zwischenzeit traf sich die Arbeitsgruppe Energie am 7. Februar in Paris, im dreiparallele Informationsreisen zu planen, die die meisten der GUS-Republiken abdecken, die eine genauere Bestandsaufnahme der jeweiligen Erfordernisse zum Ziel sollen haben Die entsprechenden Berichte im April in Brüssel vorliegen. Die Organisation der Informationsreisen wurde der IEA und der Kommission übertragen, die auch Vertreter der Industrie zur Teilnahme einladen wird. Eine weitere Sitzung zur Vorbreitung der Ministerkonferenz in Lissabon fand im Mai in Paris statt.

Schlussfolgerung

Trotz der oben beschriebenen Schwierigkeiten läuft das Programm zur technischen Unterstützung der GUS (TACIS) jetzt ohne größere Probleme. Zwar nimmt Rußland als größte Republik und zugleich wichtigster Energieproduzent immer noch die erste Stelle ein, doch wird in dem diesjährigen Programm von einem dezentralen Ansatz ausgegangen, um der neuen politischen Realität gerecht zu werden.
Das Programm über die technische Unterstützung bildet einen Pfeiler in der im Rahmen der Europäischen Energiecharta errichteten Architektur, indem es den Transfer von EG-Know-how in den Osten fördert und als Katalysator für ausländische Investitionen dient, die für den Wiederaufbau des Energiesektors in den GUS-Republiken erforderlich sind.

Die Koordinierung der Gemeinschaftshilfe mit der jenigenanderer Länder und internationaler Organisationen findet im Rahmen des Prozesses der Konferenz von Washington statt, der zum das Ziel hat, kurzfristig Hilfe auf einigen vorrangigen Gebieten bereitzustellen, um den dringendsten Energiebedarf zu decken und so die Probleme des Übergangs zu mildern. Wenn es gelingt, politische Stabilität zu erreichen und die Verpflichtung zu einem radikalen Reformprozess, den Rußland bereits eingeleitet hat, eingehalten wird, könnte der Energiesektor zu einem entscheidenden Element bei der Integration der GUS-Republiken in das Weltwirtschaftssystem und ihren Übergang zur Marktwirtschaft werden. ■

TACIS: SEKTORALES PROGRAMM FÜR DEN ENERGIEBEREICH 1991: ZUWEISUNGEN AUS DEM HAUSHALT

	MECU	
Sektorale Strukturen		**2**
Energieeinsparung		
Energiesparstrategie	1	
Energiezentren	10	
besondere Vorhaben und Tätigkeiten	10	
Insgesant		*21*
Nukleare Sicherheit		
Betriebssicherheit (einschl. Sicherheitsanalysen)		
WWER V-230	30	
RBMK	8.5	
alle Reaktoren	5	
Ausbildungs- und Verwaltungszentren	4	
Zwischenbetrag	47.5	
Stärkung der Sicherheitsbehörden und Information der Öffentlichkeit	5.5	
Insgesamt		*53*
Strom		
Umstrukturierung und Anpassung an die Marktwirtschaft	10	
Stromerzeugung und Umweltaspekte	5	
Ausfuhr von Strom aus der UdSSR	2	
Insgesamt		*17*
Öl und Erdgas		
Rahmenregelung	3	
Beförderung von Öl und Erdgas	5	
Öl- und Erdgasförderung und Raffinerien	9	
Insgesamt		*17*
Durchführung		**4**
Überwachung und Bewertung		**1**
INSGESAMT		**115**

BEIHILFEN DER GEMEINSCHAFT FÜR DEN STEINKOHLENBERGBAU

Bericht der Kommission an den Rat

Direktion Fossile Energien - Abteilung Feste Brennstoffe

Am 11. November 1991 verabschiedete die Kommission ihren Zwischenbericht über die Anwendung der Entscheidung Nr. 2064/86/EGKS[1] über die Gemeinschaftsregelung für Maßnahmen zugunsten des Steinkohlenbergbaus. In Artikel 16 dieser Entscheidung heißt es, daß die Kommission dem Rat einen Bericht über die Anwendung der Entscheidung und die dabei aufgetretenen Probleme unterbreitet und Änderungen vorschlägt, die sie für notwendig erachtet.

Obwohl solche staatlichen Interventionen im EGKS-Vertrag (Artikel 4c) als unvereinbar mit dem gemeinsamen Markt für Kohle definiert werden, wurde die Annahme einer Reihe von Gemeinschaftsentscheidungen seit 1965 durch die alles überragende Notwendigkeit, diesen Industriezweig neu zu strukturieren, gerechtfertigt; durch diese Entscheidungen kann die Kommission übergangsweise Beihilfen oder Subventionen genehmigen, wenn es darum geht, die Umstrukturierung des gemeinschaftlichen Steinkohlenbergbaus zu erleichtern und die dabei auftretenden sozialen Probleme in den Griff zu bekommen.

In der Entscheidung Nr. 2064/86/EGKS, die am 31. Dezember 1992 ausläuft, heißt es, daß eine Beihilfe mindestens zur Verwirklichung eines der drei folgenden Ziele beitragen muß, um von der Kommission genehmigt zu werden:

- Verbesserung der Wettbewerbsfähigkeit des Steinkohlenbergbaus,im Himblick auf,eine bessere Versorgungssicherheit;
- Errichtung neuer Förderkapazitäten sofern sie wirtschaftlich lebensfähig sind;
- Lösung der mit der Entwicklung des Steinkohlenbergbaus zusammenhängenden sozialen und regionalen Probleme.

Deshalb sollte darauf hingewiesen werden, daß eine einfache Aufrechterhaltung der Produktion im Rahmen der derzeitigen Regelung kein ausreichender Grund mehr für Beihilfen an die Industrie ist. Dies bedeutet eine deutliche Straffung der Gemeinschaftspolitik.

Zu Beginn des Berichts werden zwei Arten staatlicher Beihilfen unterschieden, und zwar erstens danach, ob sie mit der laufenden Produktion zusammenhängen und zweitens danach, ob es sich um direkte oder indirekte Beihilfen handelt.

Auf der Grundlage dieser Unterscheidung werden in dem Bericht dann sowohl die quantitative als auch die qualitative Entwicklung aller seit 1987 aufgrund der Entscheidung Nr. 2064/86/EGKS genehmigten Beihilfen untersucht sowie der jenigen früheren die bereits 1986 und aufgrund Entscheidung genehmigt worden.

Der Gesamtbetrag der auf Gemeinschaftsebene für die laufende Produktion genehmigten Beihilfen stieg von 4 624 Mio. ECU 1986 auf 4 954 Mio. ECU 1990 an; das bedeutet einen Anstieg um 7% bei konstanten Preisen. In dem gleichen Zeitraum stieg die durchschnittliche Beihilfe pro geförderte Tonne von 19,8 ECU auf 24,8 ECU, ein Anstieg um etwa 25% bei konstanten Preisen. Dieser Anstieg auf Gemeinschaftsebene verdeckt einen deutlichen Rückgang der Beihilfen in einzelnen Mitgliedstaaten.

Neben dieser rein quantitativen Analyse nach Ländern wird in dem Bericht auch auf die zunehmende Tendenz einiger Regierungen verwiesen, die laufende Produktion eher durch indirekte als durch direkte Beihilfen zu unterstützen. Während die indirekten Beihilfen 1986 nur 35% der Gesamtsumme ausmachten, stieg dieser Anteil 1990 auf über die Hälfte.

[1] *ABl. Nr. L 177 vom 1.7.1986, S. 1*

Genauer gesagt, stellt die Kommission fest, daß Beihilfen und parallele Maßnahmen in einigen Mitgliedstaaten Teil eines Prozesses der Modernisierung, Rationalisierung und Umstrukturierung dieses Sektors waren, und darauf abzielten, den Steinkohlenbergbau wettbewerbsfähiger zu machen oder vollständig stillzulegen, während die getroffenen Maßnahmen in anderen Ländern die Durchführung von Rationalisierungs- und Umstrukturierungsprogrammen nicht gerade gefördert haben.

Unbestreitbar hat das derzeitige System von Beihilfen die Voraussetzungen für eine grundlegende Umstrukturierung der Kohleindustrie geschaffen. Doch die Höhe der derzeitigen Produktionskosten in der Gemeinschaft macht deutlich, daß die Umstrukturierung auf weitere Kohlefördergebiete der Gemeinschaft ausgedehnt und mit zunehmender Intensität durchgeführt werden muß. Verglichen mit dem Weltmarktpreis von etwa 50 ECU/t SKE[2] lagen die durchschnittlichen Produktionskosten 1989 in Spanien immer noch bei 145 ECU, in Deutschland bei 131 ECU, in Frankreich bei 98 ECU und im Vereinigten Königreich bei 87 ECU.

In dem Bericht werden dann die Schwierigkeiten, die bei der Anwendung der geltenden Entscheidung aufgetreten sind, zunächst in drei große Bereiche unterteilt: erstens die Schwierigkeit festzulegen, welche Zahlungen als Beihilfen anzusehen sind, zweitens, einen Endwert für solche Beihilfen festzusetzen und drittens, die verspätete und häufig unvollständige Mitteilung der Beihilfen durch die Mitgliedstaaten, die es der Kommission unmöglich macht, umgehend die erforderlichen Entscheidungen zu treffen.

Der Bericht schließt mit der von der Kommission vertretenen Ansicht, daß die Entscheidung Nr. 2064/86/EGKS vor ihrem Auslaufen Ende 1993 keiner Änderung bedarf. Allerdings wird besonders betont, daß die Bemühungen um größere Transparenz verstärkt werden müssen und weitere Verbesserungen bei der Darstellung, der Einbeziehung in den Haushaltsplan und der schrittweisen Verringerung der Beihilfen erforderlich sind. Die Ziele der Entscheidung gelten heute noch genau so wie zum Zeitpunkt ihrer Festlegung, und die Kommission ist der Ansicht, daß die Entscheidung weiterhin einen geeigneten Rahmen zur Durchführung von Rationalisierungs-, Umstrukturierungs- und Modernisierungsmaßnahmen in diesem Sektor darstellt.

Auch in Zukunft hat die Verbesserung der Wettbewerbsfähigkeit der Kohleindustrie absoluten Vorrang, obwohl die Kommission einräumt, daß der Weltmarktpreis für Kohle sicher nicht als realistisches Ziel für die Entwicklung der Produktionskosten in der Gemeinschaft angesehen werden kann. Im Weltmarktpreis spiegeln sich so wichtige Kriterien wie die Versorgungssicherheit oder mögliche Auswirkungen langfristiger Kostentrends auf dem Markt nicht wider. Die Kommission ist daher der Meinung, daß in einer neuen Beihilfenregelung, die der jetzigen Entscheidung nach ihrem Auslaufen 1993 folgen könnte, ein Referenzpreis festgelegt werden sollte, mit dem Ziel, die Zukunft der gemeinschaftlichen Kohle sicherer und unabhängig zumindest von den größten Unsicherheitsfaktoren zu machen und gleichzeitig die Obergrenzen einer angemessenen Prämie zur Sicherung der heimischen Kohle festzulegen. ■

[2] *t SKE = Tonnen Steinkohleäquivalent*

AUSSICHTEN FÜR DEN KOHLEPREIS AUF DEM WELTMARKT BIS 2010

***Veröffentlichung eines von der GD XVII herausgegebenen Berichts*[1]**

Direktion Fossile Energien, Abteilung Feste Brennstoffe

In dieser Studie soll untersucht werden, wie sich der Preis für in die Europäische Gemeinschaft eingeführte Kohle in den nächsten zwei Jahrzehnten entwickeln wird. Die Kommission soll so in die Lage versetzt werden, die Wettbewerbsfähigkeit der gemeinschaftlichen Kohleproduktion zu bewerten und so Orientierungshilfen bei der Vorbereitung künftiger Entscheidungen über staatliche Beihilfen für die Kohleindustrie zu geben.

Der Autor stützt sich auf den Bericht der GD XVII mit dem Titel '*Energy for a new century: The European perspective*'[2]; da in diesem Bericht jedoch nur die Nachfrage der Gemeinschaft untersucht wird, bezieht er auch Vorausschätzungen für andere Länder mit ein, bei denen von denselben makroökonomischen und politischen Voraussetzungen ausgegangen wird.

Das wichtigste vom Autor verwendete analytische Instrument ist das weitverbreitete Modell des internationalen Kohlehandels '*World Coal Trade Expert System*' (Expertensystem Weltkohlehandel) (oder WOCTES). Es handelt sich dabei um ein Modell des räumlichen Gleichgewichts, in dem Käufer und Verkäufer versuchen, ihre Gewinne zu maximieren, indem sie so billig wie möglich kaufen und zu einem möglichst hohen Preis verkaufen, wobei sie bestimmten Zwängen wie Beförderungskosten, Hafenkapazitäten, Angebotsunterschieden, usw. unterliegen. Die Nachfrage jedes Landes/jeder Region wird mit der Einfuhrnachfrage (Nachfrage nach Berücksichtigung der heimischen Produktion und der Ausfuhren) gleichgesetzt und als eine konstante Nachfragefunktion mit geringer Elastizität simuliert, bei der sich eine bestimmte prozentuale Preisänderung als feste prozentuale Nachfrageänderung auswirkt. Hierdurch wird sichergestellt, daß die Angebotsreaktion des Marktes im Mittelpunkt der Untersuchung steht.

Demgegenüber wird das Kohleangebot der wichtigsten Produzenten in einer preiselastischen linearen Funktion dargestellt, deren Steigung den Anstieg der Grenzkosten bei erhöhtemAusfuhrangebot darstellt. Bei den kleineren Produzenten wird von einem unelastischen Angebot ausgegangen, das nicht auf Preisänderungen auf dem Weltmarkt reagiert; diese Produzenten verkaufen stets ihre gesamte für die Ausfuhr bestimmte Produktion.

Mit diesem Modell untersucht der Autor sowohl den Markt für unmittelbar zur Verbrennung geeignete Kohle (Kraftwerkskohle) als auch den Markt für Kokskohle im einzelnen, wobei er von folgenden Voraussetzungen ausgeht:

- beide Märkte stehen miteinander im Wettbewerb
- Käufer wählen stets das kostengünstigste Angebot
- Käufer machen keine Unterschiede zwischen den Anbietern.

Für die Preisspanne bei Kraftwerkskohle werden in dem Bericht drei mögliche Nachfrageszenarien untersucht. Zwei dieser Szenarien entsprechen denen der Studie 'Energy for a new century': zum einen ein Szenario mit einer sehr hohen Nachfrage und zum anderen ein Szenario der Bestandserhaltung, bei dem die Nachfrage nach dem Jahr 2000 zusammenbricht.

Bei der ersten Projektion wird davon ausgegangen, daß die Kohlenachfrage nicht durch ökologische Bedenken eingeschränkt wird, während die heimische Produktion in der EG und in Japan mit dem Abbau von Schutzmaßnahmen zurückgeht. Diesem Szenario zufolge sind im Jahr 2000 Einfuhren von Kraftwerkskohle aus Übersee von über 400 Mio. t SKE (Millionen Tonnen Steinkohlenequivalent) und 2010 von 570 Mio. t SKE zu erwarten. Dem steht eine Menge von 150 Mio. t SKE im Jahr 1989 gegenüber.

Das Szenario des Nachfragezusammenbruchs geht von einem starken Wirtschaftswachstum aus, im Rahmen dessen ein rascher Kapitalumschlag dramatische Verbesserungen bei der Energieeffizienz ermöglicht und zusammen mit wachsenden Bedenken wegen des

1 Die in diesem Bericht geäußerte Meinung gibt nicht unbedingt die Meinung der Dienststellen der Kommission wieder.

2 'Energie in Europa', *Sonderausgabe, Juli 1990*

Treibhauseffekts dazu führt, daß sich die Verbraucher weg von der Kohle orientieren. Bei einer Renaissance der Kernenergie, die für die zweite Hälfte des Projektionszeitraums angenommen wird, werden die Einfuhren von Kesselkohle auf 335 Mio. t SKE im Jahr 2000 ansteigen, bevor sie 2010 auf knapp über 250 Mio. t SKE zurückgehen.

Ein drittes Szenario, das unabhängig von der Studie 'Energy for a new century' erstellt wurde, wurde miteinbezogen, da es eine im Kohlehandel weitverbreitete Ansicht widerspiegelt. Es handelt sich hierbei um eine vorsichtigere und weniger dramatische Projektion, bei der davon ausgegangen wird, daß die Einfuhrnachfrage in den nächsten zwei Jahrzehnten weiterhin steigen wird, wenn auch etwas langsamer. Dies wäre in erster Linie auf zunehmenden ökologisch bedingten Widerstand, zunächst in Nordeuropa, gegen neue Kohlekraftwerke zurückzuführen. Zwar schreckt man in diesem Szenario davor zurück, von einemweithin unterstützten internationalen Abkommen über einschneidende Verringerungen der CO2-Emissionen auszugehen, doch kommt man trotzdem zu weit niedrigeren Einfuhrprognosen: etwa 275 Mio.t SKE im Jahr 2000 und knapp über 330 Mio t SKE im Jahr 2010.

Angesichts der Hinweise aus den 80er Jahren wird in der Studie ein überraschend enger Spielraum für den Preis für Kraftwerkskohle vorausgesagt. Hier spiegelt sich die Annahme einer leicht ansteigenden langfristigen Angebotskurve wider, bei der durchschnittlich jeder Anstieg der FOB(frei an Bord)-Hafenpreise um 1 US$ pro t SKE ein zusätzliches Angebot von 17-24 Mio. t SKE bringt. Außerdem wird angenommen, daß die kleineren Exporteure nicht preiselastisch sind: das bedeutet, daß sie die Preise auf den höchstmöglichen Stand anheben, bei dem sie noch ihre gesamte Produktion absetzen können. In dem Szenario der hohen Nachfrage wird deshalb erwartet, daß sie mehr verkaufen als in dem Szenario mit der niedrigeren Nachfrage, wodurch die Preisspanne eingeschränkt wird.

Der Bericht kommt zu dem Schluß, daß nach einem Zeitraum, in dem die realen Preise für Kraftwerkskohle fallen, die Preise in den nächsten zwei Jahrzehnten real wieder beträchtlich steigen werden. Es wird vorausgesagt, daß die CIF-Preise (einschl. Kosten für Verladung, Versicherung und Fracht) für Kraftwerkskohle zu den wichtigsten EG-Häfen, Amsterdam, Rotterdam, Antwerpen, aufgrund der steigenden Nachfrage, die die vorhergehende Angebotssteigerung weit übersteigen wird, bis zum Jahr 2000 auf 60-68 US$/t SKE (oder 20-30% über dem Stand von 1990) und bis 2010 auf 57-76 US$/t SKE steigen werden.

Auf der anderen Seite besteht ein allgemeiner Konsens darüber, daß der Markt für Kokskohle vergleichsweise stabil bleiben wird, da die Nachfrage nach Stahl voraussichtlich sehr viel langsamer ansteigt, als die nach Strom. Darüber hinaus werden technische Veränderungen wohl zu einer Verringerung der für eine Einheit Stahl benötigten Menge an Kokskohle führen.

Zwei Szenarien werden für diesen Markt in Betracht gezogen: auf der einen Seite ein Szenario mit starkem Wachstum, da die Stahlnachfrage und -produktion in den Regionen, die nicht der OECD angehören, steigt und diese auf steigende Kokseinfuhren angewiesen sein werden; dies führt bis zum Jahr 2010 zu einer um etwa 30% (45 Mio. t SKE) höheren Nachfrage als 1989. Auf der anderen Seite gibt es ein Szenario mit sinkender Nachfrage, da das Wachstum im Stahlsektor sich verlangsamt und neue Technologien (wie PCI (pulverized coal injection; Einblasen von Kohlestaub) und Elektrostahl) den Bedarf an Kokskohle pro Rohstahleinheit erheblich verringern. Bei diesem letzten Szenario könnte sich die Nachfrage in den nächsten zwei Jahrzehnten um etwa 30% verringern.

Für die Zwecke des Berichts nimmt der Autor ein einziges Szenario für den mittleren Fall an. Bei diesem wird ein geringfügiger Nettoanstieg der Nachfrage vorausgesagt, wobei die Gesamteinfuhren aus Übersee von 150 Mio. t SKE 1989 auf 159 Mio. t SKE im Jahr 2000 steigen und sich bis zum Jahr 2010 bei 157 Mio. t SKE einpendeln. Angesichts der geringeren Reserven an Kokskohle gegenüber der Kraftwerkskohle und da neue, billige marginale Anbieter fehlen, wird allgemein erwartet, daß die Kosten in den nächsten zwei Jahrzehnten real steigen werden. Daraus wirdgefolgert, daß die Preise bis zum Jahr 2000 auf 68 US$/t SKE (oder um 24%) und bis 2010 auf 69 US$/t SKE (oder um 25%) steigen könnten.

In dem Bericht werden außerdem mögliche Vorlieben künftiger Käufer im einzelnen untersucht, und zwar sowohl in Bezug auf eine Diversifizierung der Lieferquellen als auch die Möglichkeit einer stärkeren Nachfrage nach Kohle mit geringerem Schwefelgehalt. Auch die Seefrachtgebühren und die Kosten werden untersucht und in die Gleichungen aufgenommen, wobei vorausgesagt wird, daß diese in den nächsten zehn Jahren aufgrund des höheren Durchschnittsalters der Flotten (was zu höheren Betriebskosten und Versicherungsprämien führt), einer weltweit geringeren Kapazität im Schiffbau und einer geringeren Bereitschaft der Banken, Kredite an Schiffseigentümer zu vergeben, höher sein werden.

Der Autor schließt seinen Bericht mit einer kurzen Analyse der Folgen des Golfkrieges und des Zusammenbruchs der ehemaligen Sowjetunion. Er ist jedoch der Ansicht, daß keines dieser Ereignisse seine grundsätzlichen Voraussagen wesentlich verändern wird. ■

3. COOPERACIÓN ESTE-OESTE EN EL ÁMBITO DE LA ENERGÍA POR SECTORES

A. HIDROCARBUROS

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El sector de los hidrocarburos de la CEI se ha encontrado con un número creciente de dificultades a pesar de los esfuerzos realizados por los planificadores centrales para corregir la situación. Ahora, tras la caída del comunismo, el sistema está evolucionando de manera gradual hacia una economía de mercado y se está abriendo a la ayuda exterior. Aquí se esbozan algunos problemas del sector de los hidrocarburos y se describen más detenidamente los esfuerzos llevados a cabo por la Comunidad para ofrecer asistencia técnica con arreglo al presupuesto de 1991.

Algunos Datos y Cifras Sobre el Petróleo y el Gas en la CEI

Alrededor del 40% de las reservas mundiales demostradas de gas se encuentran en el territorio de la CEI. La Federación Rusa es el mayor productor mundial de gas con una producción anual de cerca del 80% del total de 830.000 millones de metros cúbicos que produce la CEI. La producción de gas se cuadriplicó en el período comprendido entre 1970 y 1990 y se ha mantenido prácticamente constante en los últimos dos años.

La red de distribución de gas de la CEI se desarrolló paralelamente al incremento de la producción de gas y tiene en la actualidad una extensión superior a los 230.000 km, de los que 21.000 km, aproximadamente, tienen 30 años de antigüedad.

El sistema integrado de gas de la CEI incluye más de 250 yacimientos de gas natural y de gas natural/condensado, varios cientos de estaciones de compresión de gas y más de 45 depósitos subterráneos de gas, que totalizan 140.000 millones de metros cúbicos. Tan gigantesca producción y red de distribución de gas es proporcional

- la enorme dimensión del territorio;
- la fuerte concentración de las áreas de producción, ya que aproximadamente el 85% de la producción de gas natural procede de Siberia occidental y de Asia central;
- el hecho de que el consumo de gas se concentra en la actualidad en las zonas sumamente industrializadas y densamente pobladas de la parte europea de Rusia, Ucrania y Bielorrusia, que se encuentran a gran distancia de las áreas de producción.

La CEI es también una gran potencia petrolífera mundial, aunque su producción y reservas de petróleo representan, en términos mundiales, una cuota inferior a la del gas. De hecho, el territorio de la CEI sólo tiene el 6%, aproximadamente, de las reservas mundiales totales de petróleo demostradas, aunque produce actualmente cerca del 15% del total mundial. La Federación Rusa es el mayor productor, con cerca del 90%, siendo los demás productores principales Kazajstán, Azerbaiyán, Ucrania, Bielorrusia, Uzbekistán, Turkmenistán, Tayikistán y otras repúblicas de Asia central.

La producción de petróleo alcanzó su punto álgido en 1988, con 624 Mtep y disminuyó hasta 518 Mtep en 1991. Se prevé una continuación de esta tendencia a la baja en 1992 y cabe esperar que la producción de petróleo haya caído un 25% a finales de 1992 con respecto a los niveles máximos de 1988.

Características Principales y Problemas Generales del Sector de los Hidrocarburos

La baja de los precios mundiales de la energía, acaecida a mediados de la década de los 80, coincidió con el principio de la disminución de la producción de hidrocarburos en la antigua Unión Soviética. La producción de petróleo cayó por primera vez en 1985, se recuperó en 1986-87 y volvió a caer en picado a partir de 1988, poniendo así de relieve las

contradicciones y la rigidez del sector de los hidrocarburos en la antigua Unión Soviética.

Al igual que en el resto del ámbito energético, las actividades de los hidrocarburos se regían mediante directrices centrales, que asignaban cuotas de producción, fijaban las inversiones y los precios, ante la falta de cualquier tipo de interconexión entre productores y clientes. Hasta cinco Ministerios[5] diferentes tenían competencias en el sector de los hidrocarburos (en ocasiones con intereses que se solapaban e incluso entraban en conflicto) y controlaban los organismos de perforación, producción y transporte responsables de las operaciones.

La falta de flexibilidad de un sistema establecido de acuerdo con unos objetivos planificados a nivel central dio origen a numerosas deformaciones y anomalías. Por ejemplo, a fin de cumplir los objetivos de metros perforados, sobre cuya base eran remuneradas las empresas de perforación, éstas parecen haberse centrado en la perforación de gran número de pozos superficiales en lugar de en un menor número de perforaciones generalmente más difíciles y profundas, lo que produjo en ocasiones modelos subóptimos de drenaje de los yacimientos. En cuanto a la producción, la fuerte presión para incrementar ésta a fin de satisfacer la necesidad de divisas se tradujo en programas de extracción rápida y no en planteamientos más racionales basados en valores de extracción máximos.

El conocido cuadro se completaba con unos niveles de precios poco realistas que no reflejaban los costes reales y la escasez de los productos y no permitían el eficaz equilibrio entre la oferta y la demanda. Se tiene constancia de enormes pérdidas en toda la cadena de producción-distribución. Parece ser que se han quemado importantes cantidades de gases asociados en los emplazamientos de producción, además de las pérdidas en los sistemas colectores de tuberías, que podrían representar hasta un 2% del total del petróleo producido, según algunas fuentes ex soviéticas.

Además de los efectos directos de la economía centralizada en el sector de los hidrocarburos, con sus rígidos mecanismos de control e incentivos inadecuados, también se han dejado sentir los efectos del aislamiento y la autarquía propios del sistema comunista. Las industrias petrolera y de equipos petrolíferos presentan años de retraso con respecto a la industria occidental; el hundimiento de los precios ocurrido en la década de los 80 obligó a ésta última a mejorar la eficacia y a reducir los costes de producción, así como a emprender nuevos programas tecnológicos. La industria petrolera soviética no tuvo que hacer frente a este desafío y permaneció anclada en su tradicional modo de explotación. La inexistencia de modernos equipos de yacimientos petrolíferos, como los necesarios para una elevación artificial, la pobre calidad de los tubos de acero, la escasez de protectores anti-erupción y la falta de una moderna tecnología de lodos de perforación no constituyen sino algunos ejemplos de las acuciantes necesidades tecnológicas existentes en la antigua URSS.

No obstante, no se debería finalizar esta visión aparentemente pesimista de la situación general en el sector de los hidrocarburos sin reconocer los enormes esfuerzos realizados en el desarrollo de la red de tuberías, principalmente de gas. El resultado tangible es que la red de la CEI desempeña actualmente un importante papel en la seguridad del suministro de gas a la mayor parte de la Europa continental. Cabe mencionar asimismo que la antigua URSS siempre cumplió con sus compromisos contractuales con Occidente en materia de abastecimiento de gas.

Después de la transformación de la URSS en la -cierto es que inestable- Comunidad de Estados Independientes, se están llevando a cabo de manera gradual reformas estructurales e institucionales. Por ejemplo, en la Federación Rusa parece estar emergiendo una nueva estructura administrativa más descentralizada con jerarquías sectoriales y territoriales, se está abordando el asunto de la propiedad de los recursos minerales en una nueva legislación que se está redactando actualmente y se está revisando el papel de las anteriores entidades centrales y asociaciones estatales de producción. Todo ello deberá traducirse en una nueva estructura en el sector de los hidrocarburos, más acorde con las tendencias liberalizadoras y descentralizadoras que están ganando fuerza hoy en día en la desaparecida URSS, a pesar de la incertidumbre y de la quizá inevitable fragilidad política.

Problemas Específicos

El Descenso de la Producción de Hidrocarburos: Causas Técnicas y Económicas

Aparte de las razones de orden organizativo antes citadas, el descenso de la producción de petróleo en el territorio de la CEI puede imputarse a una combinación de factores tanto económicos como técnicos. De un lado, las inversiones de capital en la prospección y producción de petróleo han sufrido una progresiva regresión desde 1989 simplemente como consecuencia directa de los recortes realizados por las autoridades centrales en la asignación directa de fondos, a lo que se suma el hecho de que los bajos precios nacionales de

5 *El Ministerio del Petróleo y del Gas, el Ministerio de la Industria del Gas, el Ministerio de la Industria Química y del Refinado de Petróleo, el Ministerio de la Construcción de Instalaciones de Petróleo y de Gas, el Ministerio de Geología de la URSS.*

venta apenas cubrían los costes medios de producción y no permitían que los productores tuvieran excedentes para inversiones adicionales.
Además, ha habido importantes penurias de equipos debidas en parte a la desorganización y a la agitación en las principales repúblicas productoras de equipos de yacimientos petrolíferos, así como a la reducción en la disponibilidad de divisas, necesarias para compensar el déficit de la producción de la CEI mediante el pago de las importaciones en moneda fuerte. Cabe mencionar además dos factores adicionales:

- costes cada vez mayores vinculados a una prospección y una producción más difíciles a medida que se agotan las reservas de fácil extracción y se explotan otras remotas y de mayor dificultad técnica;
- desde una perspectiva puramente técnica, las prácticas de funcionamiento y de ingeniería de yacimientos utilizadas hasta la fecha no han sido siempre las más aptas para hacer frente a la actual regresión progresiva de la producción de los yacimientos. Se ha abusado de las técnicas de inyección masiva de agua, que, si bien en un principio permitían unos elevados índices de recuperación, ahora que se han alcanzado altos niveles de agotamiento pueden dar origen a unos índices de producción más reducidos.

El Incierto Estado de la Red de Tuberías

La desaparecida Unión Soviética ha sido durante años un líder mundial en la instalación de canalizaciones, no sólo debido al alto índice medio anual de construcción de tuberías sino también al hecho de que una gran proporción de sus principales gasoductos está compuesta de tubos de gran diámetro y espesor para los que se han necesitado, sin duda, importantes esfuerzos económicos y tecnológicos. De hecho, la mayor parte de las canalizaciones de gas de 56 pulgadas existentes en el mundo se encuentran en el territorio de la CEI.
Sin embargo, esta inmensa capacidad de construcción, que ha sido posible gracias únicamente a la asignación de enormes inversiones y a la gran disponibilidad de mano de obra, no siempre ha ido acompañada de procedimientos de construcción, explotación y mantenimiento acordes con los actualmente aplicados en Occidente.
El anterior Ministerio de la Construcción de Instalaciones de Petróleo y de Gas, responsable del diseño y de la construcción de canalizaciones de petróleo y gas y de las instalaciones de transporte asociadas, primaba invariablemente la cantidad sobre la calidad. Prácticas como la inspección a cargo de terceros, la garantía de la calidad, el control y la certificación de calidad independientes, consideradas primordiales en la fabricación y la construcción occidentales, no fueron desarrolladas como tales en el sistema de planificación central. El resultado ha sido que, si bien los institutos de investigación soviéticos gozan de una gran reputación internacional en cuanto a investigación de materiales y de soldadura, quedan aún hoy muchas cuestiones pendientes por lo que respecta a la fiabilidad de distintos aspectos de la red de tuberías, como los sistemas de control y mantenimiento, incluidos los procedimientos de detección de fugas y control de la corrosión, y el propio funcionamiento.

Un sector del Refinado Obsoleto

Más de la mitad de las refinerías existentes en la CEI fueron construidas antes de 1970 y los productos medios y ligeros sólo representan en torno al 55% de la producción, mientras que en las modernas refinerías occidentales la producción de estos productos es superior al 75%. Los planes elaborados a finales de los 70 y principios de los 80 para construir nuevas refinerías regionales dotadas con unidades de craqueo catalítico, a fin de reemplazar una parte de la capacidad de refinado tradicional, fueron abandonados a causa de otras prioridades existentes en el sector del petróleo y del gas.

Las repercusiones de esta falta de inversiones en las refinerías de petróleo se han dejado sentir cada vez más desde mediados de los 80, cuando comenzó a crecer la demanda de productos ligeros. La única manera de que las refinerías soviéticas pudieran producir más productos ligeros era simplemente refinar más crudo, produciendo también así, evidentemente, más aceite pesado, cuya demanda, a su vez, estaba disminuyendo de manera progresiva como consecuencia del incremento del uso de gas como sustitutivo del petróleo en los sectores industrial y energético.

El Programa de Asistencia Técnica de la Comunidad

Respaldar la reforma y la recuperación de la economía soviética y garantizar la coherencia de las medidas adoptadas con los principios y disposiciones de la Carta

Europea de la Energía constituyen dos directrices fundamentales del Programa de Asistencia Técnica en el sector energético. Las prioridades fijadas en un principio fueron la determinación de proyectos piloto o de demostración que pudieran ser repetidos posteriormente y la creación de un nuevo marco estructural y jurídico de efectos perdurables y beneficiosos.

Principales Características del Programa de 1991

En los anteriores apartados se ponen de relieve algunas de las áreas en las que es necesaria la cooperación y en las que deberá centrarse la ayuda internacional para que el sector de los hidrocarburos pueda beneficiarse a corto y medio plazo, así como los efectos catalizadores gracias a los cuales el sector podrá adaptarse mejor al nuevo entorno del mercado.

Para que el sector del petróleo y del gas pueda recuperarse de la situación en la que se encuentra actualmente, son precisos cambios fundamentales en los ámbitos de fijación de precios y de reformas institucionales y estructurales. Esta es la razón por la que la Comisión ha dado prioridad en un principio, entre otras, a las medidas encaminadas a crear un nuevo marco jurídico-económico y administrativo que contribuya a eliminar progresivamente la carga de la toma de decisiones centralizada y en el que puedan operar compañías independientes. El programa comunitario prevé así el establecimiento de nuevos marcos reglamentarios que cubrirán la propiedad y el desarrollo de los recursos de hidrocarburos, la introducción de un sistema de precios y tarifas basado en el mercado y la ayuda en la reestructuración del sector, con miras a introducir la competencia entre las empresas.

Sin embargo, los responsables de la toma de decisiones de las compañías, los directivos y los mandos intermedios deberán también adaptarse a las nuevas formas de pensamiento empresarial mientras se lleven a cabo las reformas legislativas e institucionales; de ahí la otra área prioritaria de asistencia y formación empresarial, que incluye la gestión, la comercialización y la financiación de sociedades y las técnicas de gestión propias del sector.

Teniendo en cuenta la situación actual y desde una perspectiva más directamente relacionada con el funcionamiento y la evolución del sector de los hidrocarburos en la actualidad, también se han considerado prioritarias medidas específicas en los ámbitos de la producción y el transporte del petróleo y gas y del refinado de petróleo.

En cuanto a la producción de petróleo y gas, y en vista de la compleja estructura organizativa del sector petrolero, se determinó que era preferible seleccionar un objetivo regional específico en lugar de un enfoque sectorial más amplio que cubriera las actividades previas en general. La región de Tyumen, con aproximadamente el 70% de la producción rusa de petróleo crudo, ha sido seleccionada para un estudio de caso real en el que la asistencia incluirá desde el asesoramiento técnico sobre prospección y producción hasta la organización y la reestructuración, además de abordar la estrategia de desarrollo regional.

En lo relativo al transporte de petróleo y gas, se consideró que la red de tuberías en progresivo deterioro y las instalaciones con ella relacionadas podían ser objeto de un amplio programa de asistencia técnica a fin de mejorar la seguridad, perfeccionar los sistemas de control, reducir las pérdidas y recortar los costes de mantenimiento.

Por lo que al sector del refinado respecta, la situación actual viene dada en buena medida por las antiguas e ineficientes instalaciones de elaboración, cuya calidad deberá mejorarse para aumentar la eficacia y para hacer frente a la futura evolución de la demanda. Por consiguiente, la asistencia prioritaria adoptará la forma de estudios encaminados a definir la futura reestructuración del sector, combinados con estudios de casos reales específicos relativos a la posible mejora de varios tipos seleccionados de refinería.

Características Principales del Programa Sobre Petróleo y Gas

De acuerdo con estas prioridades y con las directrices previstas para el sector, la Comunidad decidió financiar más de veinte proyectos, con un coste total de 17 millones de ecus imputados al presupuesto de 1991.

Los principales proyectos relativos al marco institucional y reglamentario son los siguientes:

- Asistencia en el ámbito de la legislación sobre hidrocarburos, que no sólo inluye las leyes y la reglamentación 'per se' sino también su aplicación y el tipo de organismos normativos que serán necesarios.
- Un seminario sobre legislación de hidrocarburos que deberá posibilitar un debate abierto con los expertos y funcionarios rusos en la materia sobre el marco jurídico que se está estableciendo y deberá desembocar en recomendaciones sobre los cambios institucionales y organizativos necesarios para aplicar dicha legislación.
- Un estudio de la reorganización del sector del gas en la CEI encaminado a:

(i) determinar los cambios estructurales necesarios para permitir un funcionamiento eficaz de la industria en una economía de mercado,

(ii) detectar las fases de transición,

(iii) observar cómo pueden afectar a la transición en el sector del gas los cambios que ya se están produciendo en otros sectores de la economía.

- Un estudio para elaborar una futura estructura de las tarifas de transporte del gas, tanto en el interior de la CEI como para las exportaciones de gas, así como para establecer los principios de tarificación de las ventas de gas en la CEI.

Un segundo grupo de proyectos relacionados con el transporte de petróleo y gas tiene por objeto evaluar el estado actual de la red de canalización de hidrocarburos y establecer procedimientos de inspección y de mantenimiento a fin de reducir las

pérdidas y mejorar la fiabilidad. También se incluye en este grupo de proyectos la valoración del estado de las instalaciones de compresión de gas de la CEI, con miras a su modernización. En el campo de la distribución de gas, han sido seleccionados dos proyectos piloto que abordan la instalación de tubos de polietileno de baja presión.

Por último, bajo el epígrafe de transporte de petróleo y gas, también se prestará asistencia para mejorar el sistema de control de la circulación de gas a través de los gasoductos principales.

En lo referente a la producción de hidrocarburos, se prevé el establecimiento de una 'fuerza operativa' en la región de Tyumen, que ayudará a las autoridades en la creación de las condiciones económicas, legales, sociales y técnicas para el desarrollo futuro de la región.

Estas actividades cubrirán las siguientes áreas:

a) Aspectos jurídicos vinculados a la legislación sobre hidrocarburos, tomando en consideración los resultados obtenidos en virtud de otros proyectos financiados en el marco del Programa de Asistencia Técnica.

b) Aspectos financieros, con la mira puesta en los medios y maneras de movilizar y concentrar toda capacidad de financiación generada.

c) Asuntos contractuales, con miras a garantizar un marco jurídico-administrativo para establecer relaciones sólidas y seguras con las industrias del petróleo y de los servicios del petróleo.

d) Aspectos sociales, incluidas estructuras de salarios e instalaciones sociales y que cubran, en general, todos los factores pertinentes para utilizar de manera óptima los recursos humanos en Siberia occidental.

e) Condiciones técnicas para restablecer la producción a corto plazo y permitir un incremento de la producción en el futuro, en particular:

- asesoramiento sobre instrumentos de prospección para evaluar las reservas tanto en la búsqueda de nuevos yacimientos como para mejorar el conocimiento de los yacimientos ya operativos;
- recomendaciones sobre el uso óptimo de las técnicas modernas de optimización en la extracción de petróleo;
- determinación de las necesidades de modernización de los equipos de perforación, las instalaciones de producción y los sistemas de conducción;
- valoración de los requisitos de mantenimiento y mejora de la calidad en las instalaciones de producción a fin de mejorar las condiciones ambientales;
- recomendaciones sobre una logística perfeccionada con miras a satisfacer los actuales niveles de producción y preparar futuros planes para hacer frente a posibles incrementos.

En cuanto al sector del refinado, se han determinado las refinerías que serán objeto de ayudas en una serie de repúblicas y se están realizando dos estudios generales, uno sobre el uso potencial de técnicas modulares en la mejora de las refinerías y otro que investiga la logística y los balances de flujo de las redes de transporte existentes a fin de determinar las limitaciones actuales y futuras.

Se ha hecho especial hincapié en la formación, tanto en proyectos concretos como en programas de formación sectorial, en todo el sector de los hidrocarburos, dado que este elemento se considera determinante para garantizar unos beneficios a largo plazo.

Conclusiones

Para hacer frente a los profundos cambios políticos, sociales y económicos que se están produciendo en la CEI se requiere tiempo y un esfuerzo considerable. A la dificultad de pasar de una economía de planificación central a una economía de mercado se suma la magnitud sin precedente de este cambio, que afecta a cerca de 300 millones de personas, ciudadanos de la que antes era considerada primera potencia en su zona mundial de influencia.

Debido a la posición que ocupan el petróleo y el gas en la economía de la CEI y a su importancia como fuente de divisas, la asistencia técnica y la inversión extranjera pueden desempeñar un paper particularmente importante en este período de transición. Para revitalizar el sector de los hidrocarburos se necesitan y se buscan con urgencia conocimientos de administración empresarial y tecnologías y equipos modernos. ■

B. COMBUSTIBLES SÓLIDOS

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Los países de Europa central y oriental, así como varias repúblicas de la Comunidad de Estados Independientes (ex-URSS), son importantes productores de combustibles sólidos. En 1987, el antiguo bloque soviético en su conjunto, esto es, la Unión Soviética y sus seis socios europeos de la CAEM (COMECON), produjo 1,6 gigatoneladas - ó 950 millones de toneladas equivalentes en carbón (Mtec) - de hulla y de lignito de calidad inferior y reunió el 36% de la producción mundial de carbón (30% en equivalente en carbón). Los recursos de combustibles sólidos existentes en estos países son muy importantes, pues representan el 28% de las reservas mundiales.
La minería de carbón solía ocupar un lugar estratégico en los sistemas económicos que se esforzaban por conseguir la autosuficiencia. Todas las economías de Europa central y oriental (salvo Albania) son profundamente dependientes de los combustibles sólidos de producción local, que representan el 75% de la energía nacional producida y el 55% del consumo total de energía.

En Polonia, los combustibles sólidos representan el 80% del consumo de energía primaria, seguida de Checoslovaquia con el 60%, aproximadamente. La mayor parte de la producción es nacional, aunque también se registran importaciones de carbón de coque destinadas a la fabricación de acero. En Bulgaria y en Yugoslavia los combustibles sólidos constituyen el combustible primario más importante, con alrededor del 40% del consumo en cada caso. Sin embargo, en Hungría y en Rumania el carbón es menos importante que el petróleo o el gas, con un 25% del consumo de energía primaria. Excepto en Polonia, la producción de combustibles sólidos se limita principalmente al lignito, que se extrae y se utiliza generalmente según unas pautas que en Occidente serían inaceptables desde una perspectiva ambiental.

Polonia es uno de los más importantes países productores de hulla a nivel mundial y en 1989 registró el 83% de la producción de Europa oriental. La producción se mantuvo constante en aproximadametne 190 Mt anuales entre 1982 y 1988 pero disminuyó a 178 Mt en 1989 y a 147 Mt en 1990. La producción en Checoslovaquia se ha mantenido también bastante estable en 25 Mt anuales, aproximadamente. Rumania es el otro país productor a gran escala, con cerca de 9 Mt en 1989 y sólo 4 Mt en 1990. Tanto Hungría como Bulgaria tuvieron una producción cercana a los 1,8 Mt en 1990.

El dato más significativo de la economía energética de Europa oriental es la magnitud y el predominio de la industria del lignito, que es consecuencia de decisiones políticas para aumentar la autosuficiencia energética, en particular para la producción de electricidad. La producción de lignito en los PECO, excluida la antigua RDA, se eleva a un total aproximado de 340 Mt anuales (aproximadamente 110 Mtec anuales). Este lignito no sólo es pobre en poder calorífico sino que gran parte del mismo tiene un elevado contenido de azufre y apenas si existen medidas de control para limitar las emisiones de SOx. Tampoco se realizan esfuerzos para regenerar la tierra devastada por la extracción de lignito. Consecuencia directa de ello es que muchas partes de Europa oriental cercanas a los centros de producción o consumo de carbón se han convertido en zonas siniestradas desde el punto de vista del medio ambiente.

La cuota de los combustibles sólidos en el cuadro energético total de las repúblicas de la CEI difiere de la correspondiente a Europa oriental porque desde la década de los 60 el petróleo y, más tarde, el gas han sustituido al carbón en muchas aplicaciones en la industria, el transporte y el sector doméstico/servicios públicos. En 1987 los combustibles sólidos representaban menos del 24% de las necesidades energéticas primarias totales de la URSS, porcentaje próximo a la media del 21% de los países de la OCDE.

La mayoría de las doce repúblicas de la CEI cuentan con minas productivas. Sin embargo, ocho cuencas principales se reparten el grueso de la producción. La producción está más o menos dividida a partes iguales entre las regiones europea y asiática de la antigua

URSS. En Ucrania, Donetsk es la principal cuenca carbonífera con una producción aproximada de 200 Mt anuales de carbón bituminoso y antracita procedentes en su mayor parte de minas subterráneas. La mayoría de los recursos menos costosos de extraer han sido agotados en gran parte en esta tradicional región caboníferа.

La más importante república productora es la Federación Rusa. La cuenca de Pechora, en el círculo polar ártico, la cuenca de Moscú y la región de los Urales, en la parte oriental de la República, producen carbones de inferior calidad con una producción cercana a los 30 Mt anuales en cada caso.

También en Rusia oriental, la cuenca de Kuznetsk es la región dominante con una producción de alrededor de 150 Mt anuales de carbón bituminoso. Unos dos tercios de esta producción procede de minas subterráneas. Excepto la nueva región productora de hulla de Yakutia del Sur, en el Extremo Oriente ruso (15 Mt anuales), la estrategia de desarrollo continúa centrada en la expansión de las minas a cielo abierto orientales, de entre las cuales la cuenca de Kansk-Atchinsk es una de las más grandes del mundo (50 Mt anuales).

La República de Kazajstán es el tercer productor, con dos cuencas carboníferas: Karagana, que produce 50 Mt anuales, aproximadamente, de carbón bituminoso de extracción profunda, y Ekibastuz, que produce 90 Mt anuales de carbón de calidad inferior extraído a cielo abierto.

El transporte interno es un factor de gran importancia en el panorama carbonífero al este de los Urales, dadas las enormes distancias existentes entre estos vastos recursos y el mercado.

Sistemas tales como conductos para transporte de lechada de carbón y transporte de 'carbón por cable', esto es, transmisión de electricidad producida con carbón a una tensión muy elevada (UHV), se encuentran aún en una fase incipiente de desarrollo.

Se prevé que los combustibles sólidos, tanto hulla como carbón de calidad inferior (lignito), seguirán siendo una opción energética determinante en Europa central y oriental, incluidas algunas repúblicas de la CEI, debido a las repercusiones de seguridad energética derivadas del abundante suministro nacional. No obstante, para conseguir esto, aparte de las reformas políticas y económicas que deben acompañar la transición general de estos países desde sistemas de planificación central hasta sistemas basados en el mercado, será fundamental hallar nuevas formas de conjugar la incipiente eficacia con los requisitos ambientales.

La cooperación con los Estados miembros y las instituciones de las Comunidades Europeas será vital para el buen desenlace de este período de transición. La Comunidad tiene una gran experiencia en resolver problemas tales como la reestructuración, la racionalización y la modernización de la industria del carbón, la aplicación de políticas complementarias dirigidas a los problemas sociales y regionales resultantes y la reconversión y reindustrialización de las zonas mineras.

También se ofrecen soluciones prácticas para reducir el impacto ambiental de la extracción y el consumo de carbón, sobre todo en áreas muy pobladas, métodos de cooperación interregional y otras experiencias relacionadas de gran utilidad para estos países en su transición hacia una economía de mercado. ■

C. SEGURIDAD NUCLEAR

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La energía nuclear es importante para el abastecimiento de electricidad de una serie de países: Rusia, Ucrania y Lituania (aproximadamente el 30% del suministro de electricidad entre los tres), Hungría (casi el 50%), Bulgaria (33%) y Checoslovaquia (casi el 25%). Se han paralizado los reactores nucleares existentes en los nuevos Estados federados de Alemania (antigua RDA).

La mayoría de las centrales nucleares de estos países están basadas en dos diseños soviéticos: el tipo VVER (reactores de agua a presión, de diseño similar a la mayor parte de los reactores occidentales), por un lado, y el tipo RBMK (tubos de presión, refrigerados por agua, moderados por grafito, diseño 'Chernobil'), por otro. Existen aproximadamente 50 reactores de tipo VVER en funcionamiento o en construcción. Los más antiguos (VVER 440-230) son bastante resistentes pero no reúnen todas las características de seguridad exigidas por las normas de seguridad aceptadas a nivel internacional: un ejemplo lo constituye la inexistencia de edificio de contención. Equipos de expertos internacionales del OIEA (Organismo Internacional de la Energía Atómica) y de la AMON (Asociación Mundial de Operadores Nucleares) han realizado exhaustivas auditorías de seguridad. Se ha publicado una lista de recomendaciones y de las medidas de mejora propuestas, cuya aplicación debe comenzar ahora con la mira puesta, en primer lugar, en los aspectos de máxima prioridad. Las dos generaciones siguientes de reactores VVER (VVER 440-213 y VVER 1000, respectivamente) se acercan más a las normas internacionales de seguridad, aun cuando son también precisas algunas mejoras.

El otro tipo de reactor (RBMK), de los que están en funcionamiento quince en cinco emplazamientos situados en Rusia, Ucrania y Lituania, es de sobra conocido por dar origen a mayores problemas de seguridad.

La comunidad internacional ya ha estudiado una serie de mejoras sustanciales tras el accidente de Chernobil, en virtud principalmente de acuerdos bilaterales, y el OIEA inicará asimismo en 1992 una evaluación general de la seguridad de este tipo de reactor.

Además del perfeccionamiento técnico de las centrales, se ha de hacer hincapié en mejorar la 'cultura de seguridad', que deja bastante que desear en los países de Europa oriental y en la CEI. Se deben realizar actividades de formación, así como mejorar la capacidad de las autoridades independientes de seguridad. Por último, hay que elaborar asimismo programas de mejora de la calidad del ciclo de combustible, principalmente en lo que respecta al tratamiento de residuos.

La Comunidad Europea ya ha iniciado una mejora de la calidad del equipo lógico informático con arreglo a los presupuestos de PHARE (en todos los países de Europa oriental) y de TACIS (asistencia técnica a la CEI), con el fin de perfeccionar la seguridad de las centrales en funcionamiento y las actividades relacionadas con el ciclo del combustible, y de consolidar las autoridades nacionales de seguridad.

Al igual que con el resto de las actividades PHARE Y TACIS, la Dirección General de Relaciones Exteriores (DG I) está gestionando los programas en cada caso con el apoyo de la Direcciones Generales técnicamente competentes. Así, a la DG XVII le corresponde la dirección técnica en su sector a nivel industrial (operadores, secciones de diseño e ingeniería, arquitectos y proveedores).

Actividades PHARE

Se han elaborado hasta la fecha tres proyectos para Checoslovaquia con arreglo a PHARE 1990: Evaluación Probabilística de la Seguridad (EPS) de Bohunice VVER 230; estudio de instrumentación y control (I&C) VVER 213; estudio I&C VVER 1000. La convocatoria de propuestas ha sido ya publicada y se están evaluando actualmente las ofertas.

A mediados de 1991 se elaboró con carácter de urgencia un programa regional PHARE 1991 en respuesta a la inquietud mostrada por el OIEA en relación con la seguridad de las cuatro instalaciones VVER 230 de Kozloduy, en Bulgaria.

Las principales operaciones emprendidas en este ámbito dentro del programa están relacionadas con:

- actividades preparatorias en Kozloduy;
- acuerdos de hermanamiento entre las centrales nucleares de Kozloduy y de Bugey;
- consolidación de las actividades de seguridad;
- inicio de las actividades industriales descritas en el programa de la AMON (seis meses).

Las tres primeras actividades se iniciaron en 1991. En cuanto a la cuarta, han sido seleccionados los contratistas industriales y los contratos deberán firmarse en breve. Aún se dispone de parte del presupuesto para financiar dos proyectos en Checoslovaquia.

Los servicios de la Comisión han preparado un proyecto de propuesta de financiación del programa nuclear regional para 1992, proyecto que es en la actualidad objeto de debate con las autoridades competentes de los países beneficiarios.

Actividades TACIS

Del presupuesto de 1991, se asignarán 53 millones de ecus a la mejora de la seguridad nuclear. A principios de febrero se celebró en Moscú un fructífero encuentro entre una delegación de la Comisión y diversos representantes de Rusia, Ucrania, Lituania y Armenia. El resultado es la concertación de una lista de unos 30 proyectos con sus presupuestos correspondientes. El grueso de la financiación se destinará a mejorar los reactores VVER 230 más antiguos. También se aprobaron proyectos de transferencia de tecnología en el ámbito de la formación y de la seguridad de funcionamiento del reactor. El 25% del presupuesto total se dedicará a la consolidación de las autoridades normativas de seguridad.

Para 1992 se ha reservado una cantidad provisional de 450 millones de ecus para Asistencia Técnica a la CEI, aunque queda aún por decidir el desglose entre los diferentes sectores.

Parte del presupuesto del programa de 1992 se dedicará a la formación y reconversión profesionales de los antiguos expertos nucleares soviéticos y que trabajaban hasta ahora en programas militares.

El Futuro

Es evidente que las medidas puestas en marcha hasta la fecha con la financiación de la Comunidad Europea no constituyen sino un punto de partida y serían ineficaces si no estuvieran integradas en una perspectiva más amplia. Se han de hallar los medios para financiar la modificación del equipo físico informático y la mejora de las instalaciones en funcionamiento y de las centrales en construcción. El coste de tales actividades será superior al de las actuales medidas de evaluación del equipo lógico e irán más allá del ámbito de los presupuestos de PHARE y de TACIS. La Comunidad Europea investiga en la actualidad los medios para financiar estas actividades a largo plazo, que constituyen el único medio de incrementar definitivamente la seguridad nuclear en los países de Europa central y oriental y en la CEI. ■

D. ELECTRICIDAD

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Lenin definió en una ocasión el comunismo como dar el poder a los Soviets más llevar la electricidad a todo el país; no es por tanto sorprendente que nuestros vecinos orientales hayan realizado desde entonces grandes esfuerzos en este sector. Ahora, con la caída del comunismo, la asistencia en la transición hacia una economía de mercado en este ámbito específico ha adquirido una evidente significación simbólica.

La Electricidad en el Este: Situación Actual

En primer lugar, y al igual que en el resto de la economía de los antiguos países comunistas, no existe aún una clara diferenciación entre el Estado y la industria: bien las tareas de las empresas de servicios públicos las lleva a cabo simplemente un departamento del Ministerio de Energía o, cuando existen compañías de electricidad como entidades diferenciadas, éstas no son independientes en sentido estricto y es la administración la que sigue tomando casi todas las decisiones. Además, los métodos de gestión aplicados no están en consonancia con las condiciones de una economía de mercado: por ejemplo, no existen procedimientos de contabilidad adecuados, no se conocen los métodos de financiación de sociedades, la descentralización de responsabilidades es insuficiente, etc.

Otra característica del sector, que es de hecho un problema que comparten la mayoría de los servicios públicos en los países del Este, es el inadecuado nivel de los precios. Entre otras cosas, esto impide todo incentivo real de ahorro energético y el acceso a los recursos financieros, muy necesarios para las inversiones.

Por otra parte, al igual que en otros sectores del ámbito energético, los países de Europa central y oriental se caracterizan por un elevado consumo por habitante en comparación con su nivel de desarrollo. Por consiguiente, el cálculo de la demanda futura es extremadamente difícil dado que, por lo general, cuando un país alcanza un nivel de desarrollo superior, su intensidad energética disminuye a medida que aumenta la participación de la electricidad en el consumo energético total. Ello implica la futura aparición de dos tendencias enfrentadas en los países de Europa Central y Oriental: de un lado, la intensidad energética decrece y las políticas de ahorro comienzan a dar resultados positivos, con lo que la demanda caerá; de otro lado, se implantarán efectivamente los nuevos usos de la electricidad, haciendo subir el consumo.

Otra característica, vinculada a la muy elevada intensidad de capital del sector de la electricidad, es el hecho de que se necesitarán grandes inversiones en estos países: hablamos aquí de decenas de miles de millones de ecus o quizá más; además, este esfuerzo gigantesco deberá realizarse en un contexto de escasez de recursos económicos.

En cuanto a la producción de la industria de la electricidad, la situación se caracteriza por unas instalaciones obsoletas, ineficaces y contaminantes. En algunos países, el insuficiente mantenimiento, la falta de piezas de respuesto y la utilización de combustibles inapropiados han provocado unas tasas de uso de las instalaciones muy bajas.

Con mucha frecuencia, el uso intensivo de combustibles sólidos nacionales sigue siendo la norma. Algunos países de Europa Central son aún muy dependientes de la desaparecida URSS. Asimismo, muchas centrales nucleares fueron construidas y se siguen explotando con arreglo a normas de seguridad inapropiadas. Además, en los países de Europa Central y Oriental la producción de electricidad es responsable de una gran proporción de las emisiones contaminantes y la desastrosa situación del medio ambiente en esta zona exige medidas drásticas.

Por lo que al transporte respecta, sigue existiendo un verdadero 'telón de acero eléctrico' dado que las redes de electricidad del Este y de Occidente, aun cuando utilicen la misma frecuencia, no se explotan de manera sincrónica. Por lo tanto, los intercambios entre estos dos sistemas sólo son posibles mediante estaciones de conversión de recuperación recíproca (que convierten la corriente alterna en corriente continua y otra vez en corriente alterna) o aislando determinadas zonas dentro de uno de los sistemas y conectándolas al otro sistema. La primera solución es muy costosa y la segunda es incapaz de ofrecer una calidad de suministro

satisfactoria: es evidente que esta situación limita en gran medida los intercambios. Además, la introducción de un funcionamiento sincrónico requerirá tiempo dada la actual diferencia existente entre los niveles de rendimiento de los dos sistemas, lo que significa que la calidad del suministro que ofrecen actualmente las compañías de electricidad occidentales podría verse adversamente afectada en caso de una conexión prematura y que son necesarias, por tanto, mejoras previas.

Directrices de las Medidas Comunitarias

El análisis precedente da una idea clara de las prioridades que deben regir las medidas comunitarias. La asistencia resulta necesaria y urgente para reestructurar el sector, para establecer un nuevo marco legislativo, para introducir métodos de gestión modernos adaptados a la economía de mercado, para fomentar la eficacia energética, para contribuir a la modernización de las centrales eléctricas, incluida la modernización para una mejor protección del medio ambiente, en particular mediante las transferencias de tecnología, así como para contribuir al futuro desarrollo de los intercambios mediante una mejora de las redes.

Ejemplos de Actividades en Europa Central y Oriental

En la mayoría de los países de Europa oriental la Comunidad financiará 'grupos de reestructuración energética' que asesorarán a las altas autoridades locales en materia de política energética global y, evidentemente, el sector eléctrico es un elemento fundamental en este proceso.

En Rumanía se está llevando a cabo, con el patrocinio de la Comunidad, un estudio preparatorio en dos partes para reestructurar el sector de la electricidad: la primera parte aborda el marco reglamentario e institucional, incluida una revisión crítica de los procedimientos y estructuras de organización existentes, una evaluación de las estructuras organizativas alternativas (por ejemplo, integración vertical frente a compañías independientes basadas en criterios funcionales, organización nacional frente a regional, oportunidades de desinversión, etc.), y una valoración de las formas de propiedad actuales y futuras, incluida una evaluación de las mejoras de eficacia que cabe esperar de la participación del sector privado. La segunda parte del estudio tratará los aspectos de gestión e incluirá una evaluación de los procedimientos y técnicas de gestión actuales, una revisión crítica de la política de personal y formación, los recursos y las necesidades en relación con las propuestas de reestructuración, y una valoración de los sistemas de contabilidad y las prácticas financieras actuales. Cada uno de los puntos citados incluirá recomendaciones prácticas con un plan detallado de aplicación por etapas.

En Rumanía y en Checoslovaquia se están financiando otros estudios en forma de programas de desarrollo con un coste mínimo para sus sectores de electridad respectivos.

En Bulgaria, la Comunidad está patrocinando un estudio estrátegico del sector eléctrico en cooperación con la Agencia estadounidense para el Desarrollo Internacional. Éste cubre cinco aspectos: reestructuración del sector, previsión de la demanda y preparación de recomendaciones sobre la gestión de la demanda, un plan de desarrollo para la produción de electricidad y para la red de alta tensión, y problemas ambientales.

Se prevé un estudio regional con el fin de mejorar la situación de las redes de transmisión: su objetivo será hallar las soluciones técnicas para incrementar los intercambios de electricidad entre el Este y el Oeste a corto, medio y largo plazo, y para evaluar su rentabilidad. El estudio deberá examinar los posibles beneficios de un funcionamiento sincrónico de los sistemas, determinar los requisitos previos para ello y valorar la conveniencia de conectar todos los países a la vez o de adoptar un enfoque gradual. También deberá determinar 'redes objetivo' con arreglo a diversas hipótesis. Ello ofrecerá una perspectiva a medio y largo plazo de gran utilidad para los inversores dados los elevados costes y la prolongada duración de las inversiones necesarias en este ámbito. El estudio deberá centrarse en las medidas e incluir y justificar una lista de las inversiones necesarias para las redes de alta tensión a corto, medio y largo plazo.

Por último, dado que una eficaz transición hacia una economía de mercado exigirá un gran cambio en las actitudes y conocimientos del personal clave tanto en los ministerios gubernamentales como en las empresas energéticas de los países del Este, se debe realizar un trabajo considerable en materia de educación y desarrollo de la gestión en el sector de la energía. Con este objetivo, está previsto un programa de formación regional en virtud del cual el personal del Este pasará prolongados períodos de tiempo en organizaciones comunitarias homólogas. De esta forma, se propagará al Este una cultura de gestión común con técnicas, actitudes y valores compartidos.

Ejemplos de Actividades en la CEI

En el marco del Programa de Asistencia Técnica a la CEI, la Comunidad apoyará alrededor de 30 proyectos en el sector eléctrico, con un presupuesto total de

17 millones de ecus, que incluirán los estudios siguientes:

- acuerdos aceptables para la estructura, la organización y los mecanismos financieros y operativos del sector eléctrico;
- definición del marco jurídico en el que operará la industria del suministro de electricidad, con inclusión de los siguientes aspectos: legislación sobre propiedad, sociedades y personal, condiciones de servicio y obligaciones, legislación en materia de electricidad (autorización, deberes públicos, estatuto de autoproductores, obigaciones en materia de transparencia de precios, procedimientos de autorización de inversiones, procedimientos de licitación,...);
- un proyecto de programa de salarios e incentivos para los trabajadores de una compañía de electricidad regional (región de Tver);
- una mejora de la gestión en una compañía eléctrica regional (región de San Petersburgo);
- asesoramiento sobre el establecimiento y la certificación de procedimientos de tarificación en dos compañías de electricidad regionales (regiones de Moscú y Tver);
- medidas encaminadas a introducir una gestión orientada al mercado en el subsector de la distribución de electricidad, principalmente mediante la creación de una agencia de distribución piloto para la compañía eléctrica de Moscú;
- ayudas a la renovación de las centrales eléctricas;
- transferencia de la experiencia técnica occidental en el ámbito de la protección ambiental en el sector de la producción de electricidad; por ejemplo, asistencia para la instalación de sistemas de supervisión y control o para el desarrollo de sistemas Denox;
- introducción de técnicas de utilización occidentales para las redes de transmisión de alta tensión;
- una serie de proyectos de formación, incluido un programa que permitirá a una gran parte del personal del sector eléctrico pasar temporadas en las compañías de electricidad occidentales.

Asistencia Urgente a Bulgaria

Además de estas actividades, algunas de las cuales darán resultados tangibles en un plazo de meses, en el mejor de los casos, aunque la mayoría sólo lo harán a más largo plazo, la Comunidad se ha enfrentado a peticiones más urgentes. Se pidió a la Comisión que coordinara la asistencia occidental a Bulgaria tras la recomendación formulada en junio de 1992 por expertos del OIEA en el sentido de que no era aconsejable que siguieran en funcionamiento algunas unidades de la instalación nuclear de Kozloduy. Se ha emprendido un programa específico que incluye tres aspectos: mejora de las condiciones de funcionamiento de la central, fortalecimiento de la capacidad de las autoridades locales de seguridad y sustitución del suministro eléctrico durante el invierno. Un estudio dado a conocer a finales del pasado año confirmaba la elevada probabilidad de graves penurias y proponía las soluciones apropiadas. En efecto, con la llegada del invierno se tuvo que interrumpir el suministro eléctrico en Sofía una de cada cuatro horas, con unos efectos potencialmente perniciosos en los esfuerzos de Bulgaria por reconstruir su economía. El cierre de las unidades 1 y 2 de Kozloduy, a petición de los países occidentales, ha venido a agravar obviamente aún más los problemas de suministro eléctrico existentes. Se decidió asignar 10 millones de ecus para pagar las importaciones de electricidad, que han compensado hasta cierto punto la caída de la producción local.

Conclusión

Cabe hacer dos observaciones finales a propósito de las medidas comunitarias en el Este en el ámbito de la electricidad:

- La definición de proyectos que hacen hincapié en medidas concretas: los proyectos no deben limitarse a la redacción de útiles informes que quedan luego arrinconados. Por esta razón, se incluye, en la medida de lo posible, un seguimiento de la aplicación real de las recomendaciones formuladas. Además, casi todos los proyectos incluyen un componente de formación para garantizar un auténtico efecto duradero en la mayor medida posible. En aras de un mayor impacto y de una mejor relación coste/eficacia, los proyectos financiados están concebidos para que puedan ser reproducidos siempre que sea posible y la difusión de los resultados queda siempre garantizada.
- En segundo lugar, a fin de evitar una duplicación de esfuerzos, en la selección de las medidas que van a patrocinarse siempre se tienen en cuenta las iniciativas de otros donantes, como el BEI, el BERD, el Banco Mundial, el OIE y la CEPE. Se mantiene un intercambio periódico de experiencias, principalmente a través del G-24, y cabe destacar que el año pasado se celebró una reunión especial del grupo de trabajo sobre energía del G-24 para abordar específicamente asuntos relativos a la electricidad. Además, en un caso en el que tanto la CE como EEUU, a través de su Agencia para el Desarrollo Internacional, preveían financiar proyectos similares en Bulgaria, se tomó la decisión de organizar formas de cooperación que se tradujeran en un apoyo conjunto. En realidad, las medidas comunitarias deberían complementar las medidas de los bancos de desarrollo, cuyo objetivo es financiar las inversiones y, de manera más general, contribuir a la creación de un clima favorable y un marco seguro para los inversores nacionales y extranjeros.

Cabe esperar que todas estas iniciativas concretas, que son aún modestas en comparación con las necesidades, contribuyan a consolidar la democracia en estos países y a instaurar unas relaciones pacíficas basadas en el respeto mutuo. A cambio, los donantes pueden aprender mucho de las riquísimas culturas de nuestros vecinos del Este. ■

5. EL PROGRAMA THERMIE EN EUROPA ORIENTAL Y EN LA CEI

Hans van Steen, DG XVII
Dirección de tecnología energética. Unidad de estrategia, difusión y evaluación

Una de las novedades importantes del programa Thermie para el fomento de las tecnologías energéticas en Europa[1] es el requisito de cooperación industrial con terceros países en los cuatro sectores cubiertos por el programa[2], principalmente en lo referente a las llamadas medidas de acompañamiento. Éstas incluyen una gran variedad de actividades de evaluación, valoración y difusión de las tecnologías energéticas que se exponen en el Anexo V del Reglamento.

Las mejoras tecnológicas constituyen desde hace tiempo una prioridad política en el intento de mejorar la situación energética de los países de Europa Central y Oriental y en la Comunidad de Estados Independientes (CEI). Se ha reconocido la importancia de la transferencia de tecnologías energéticas como medio de mejorar la situación ambiental, ya que gran parte del impacto pernicioso que ésta sufre está directamente relacionado con la utilización de tecnologías energéticas obsoletas y de precario mantenimiento. Por consiguiente, la Comisión ha decidido centrar su atención en estos países, aunque también se están tomando medidas en países de la AELC, como Austria y los escandinavos. Esta nueva dimensión del programa Thermie está estrechamente vinculada al fomento de las tecnologías energéticas que se está realizando en la Comunidad, en el que la red de OPET establecida por la Comisión[3] tiene una función determinante. En efecto, la decisión de la Comisión de llevar a cabo actividades de fomento en terceros países supone una ampliación de la red de OPET a Europa Central y Oriental y a la CEI, principalmente.

Poner en Marcha la Cooperación

El fomento efectivo de las tecnologías energéticas exige un enfoque descentralizado. Ésta era la filosofía que estaba detrás de la creación de la red de OPET en la Comunidad y, evidentemente, esta estrategia también es válida por lo que a terceros países respecta.

A fin de poner en práctica este enfoque descentralizado, la Comisión convocó una licitación abierta[4] con el objetivo de hallar los socios adecuados para llevar a cabo esta tarea.

De acuerdo con las ofertas recibidas, la Comisión decidió suscribir contratos con ocho organizacionesradicadas en la Comunidad para establecer lazos de cooperación con Polonia, Checoslovaquia, Hungría, Estonia, Letonia, Lituania, Rusia, Ucrania, Bielorrusia, Austria y los países escandinavos[5].

Un enfoque descentralizado del fomento tecnológico requiere una infraestructura operativa que no existía en la mayoría de los países afectados, por lo que la primera tarea de las ocho nuevas organizaciones OPET fue la de establecer dicha base de cooperación. Tras varias misiones de indagación a todos los países afectados, se han seleccionado asociados y ya se han establecido Centros de Energía en Varsovia (Polonia), Praga (Checoslovaquia), Budapest (Hungría), Talín (Estonia), Riga (Letonia), Vilna (Lituania), San Petersburgo y Moscú (Rusia), Kiev (Ucrania) y Minsk (Bielorrusia). Más adelante se expone una lista de estos centros.

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1 *Véase el Reglamento del Consejo (CEE) nº 2008/90, DO L 185 de 17.7.90.*

2 *El programa incluye el uso racional de la energía, las fuentes de energía nuevas y renovables, los combustibles sólidos y los hidrocarburos.*

3 *La red de OPET fue creada en virtud de la Decisión de la Comisión C(90)2562 de 15.12.1990. Una descripción detallada de la red de OPET puede encontrarse en la pág. 55 de 'La energía en Europa', nº 17 (julio de 1991).*

4 *Véase el D.O. nº C 124 de 14.05.1991.*

5 *Decisión de la Comisión de 5 de diciembre sobre cooperación tecnológica con terceros países (COM(91)2729).*

Estos Centros de Energía son ya operativos y forman la base institucional de las actividades de cooperación con una plantilla básica de dos o tres expertos comunitarios y entre 3 y 5 expertos nacionales en cada Centro. Cuentan asimismo con instalaciones de oficina y de reuniones, así como con documentación para los expertos visitantes como, por ejemplo, los pertenecientes a la red de OPET. Obviamente, la infraestructura ya existía en Austria y en Escandinavia y la presencia de la Comisión puede limitarse a los Servicios de Información de Thermie localizados en Oslo (para toda Escandinavia) y Viena. La Comisión está considerando además la apertura de Centros en Katowice (Polonia), Bratislava (Checoslovaquia) y Sofía (Bulgaria).

Actividades Incluidas en el Programa

En el caso de Europa Oriental y la CEI, y por razones obvias, la Comisión consideró sumamente importante evitar todo retraso innecesario en la aplicación del programa. Por consiguiente, se ha lanzado un programa de choque y se han comenzado inmediatamente las actividades sobre el terreno. La mayor parte son evaluaciones y auditorías centradas en mejoras tecnológicas de la eficacia energética, principalmente, en el sector industrial. En este campo se puede alcanzar en muchos casos un ahorro de energía a corto plazo y a muy bajo coste. Esta parte de la ayuda deberá estar concluida antes de finales de mayo y para entonces se habrán llevado a cabo más de 100 actuaciones.

Se están preparando los programas de trabajo de los Centros para la cooperación tecnológica a largo plazo. Los contratistas han iniciado las primeras valoraciones sobre el tipo de fomento de las tecnologías energéticas necesario y adecuado para cada zona, estas evaluaciones sirven de base para la elaboración de los programas. Éstos no sólo incluirán la continuación de la evaluación y las auditorías tecnológicas realizadas dentro del programa de choque, sino también el acopio de documentación, la organización de conferencias, talleres, ferias, reuniones de negocios, etc., el establecimiento de bases de datos y, por último, aunque no por ello menos importante, la formación de personal.

Todas estas actividades se llevarán a cabo en estrecha colaboración con las 35 organizaciones restantes de la red de OPET, que participarán directamente cuando resulte conveniente. El concepto de red, que implica a la totalidad de las 43 organizaciones, prevé mecanismos de hermanamiento por los que las actividades desarrolladas y, en algunos casos, aplicadas en la CE pueden adecuarse en la medida necesaria y transferirse a organizaciones similares de terceros países.

Coordinación con Otros Programas Comunitarios

Thermie no es el único programa de cooperación con terceros países en el campo energético. Tal como se describe en el nº 19 de *'La energía en Europa'*, la energía ha sido considerada un sector clave de la ayuda dirigida a la CEI en el marco del Programa de Asistencia Técnica, así como a Europa Central y Oriental en el marco del programa PHARE. Con miras a coordinar las diversas actuaciones y evitar duplicaciones o pérdidas, se ha garantizado una estrecha interacción con estos programas.

Aun cuando las operaciones financiadas con arreglo al programa Thermie se centran obviamente en la cooperación tecnológica, mientras que los otros dos programas abordan la cooperación energética en un contexto más amplio, existe de hecho un amplio campo de acción para esta interacción. A modo de ejemplo, se ha decidido que aproximadamente la mitad de los fondos reservados para fomentar el ahorro de energía en la CEI, en virtud del Programa de Asistencia Técnica, se utilizará para fortalecer los Centros establecidos inicialmente con arreglo a Thermie o para abrir Centros en zonas aún no cubiertas por Thermie. Otro ejemplo en Europa central y oriental lo constituye el Centro de Budapest, concebido en un principio como un proyecto que debía ser financiado por el programa PHARE.

Conclusiones

El objetivo de la Comisión en esta cooperación con terceros países en el marco del programa Thermie es garantizar que las tecnologías energéticas europeas desempeñen un papel destacado en el desarrollo del sector energético, también en países extracomunitarios. Esto es muy importante para el proceso de reestructuración de los sectores energéticos de la CEI y de los países de Europa Central y Oriental, en donde también se pretende establecer la infraestructura necesaria para la transferencia de tecnología energética siguiendo, por ejemplo, las directrices de la Carta Europea de la Energía.

Otro objetivo paralelo de dicha cooperación es demostrar que la tecnología energética eficiente constituye un factor clave para una política energética sostenible por parte de estos países. También se puede reducir significativamente el daño causado al medio ambiente y mejorar la calidad de vida en estas regiones, que tienen obviamente gran importancia política y económica para la Comunidad.

LISTA DE CENTROS EN EUROPA CENTRAL Y ORIENTAL Y EN LA CEI

EC-Energy Centre Moscow
Enin
19 Leninsky Prospekt
117927 Moscow
Russian Federation
Tel: 7-095-9525527 or 9521117
Fax: 7-095-9525527
Telex: 411 700 for Box N 13010 ENCONS

EC-Energy Centre St Petersbourg
Appec
Lenelectronnash
111 Grazdanski Prospekt
195265 St Petersbourg
Russian Federation
Tel: 7-812-9060225 (satellite)
Fax: 7-812-531 1405
Telex: 064000 121 345

EC-Energy Centre Kiev
Institute for Energy Saving
Academy of Sciences of Ukraine
11 Pokrovskaya Street
254070 Kiev
Tel: 7-0144-4170737
Fax: 7-0144-4170737

EC-Energy Centre Minsk
Belviec
PO Box 154
220002 Minsk
Belarus
Tel: 7-0172-236949
Fax: 7-0172-213618
Telex 252 101 Neman SU

EC-Energy Centre Tallin
Institute of Thermophysics
1 Paldiski Road
200001 Tallin
Estonia
Tel: 7-0142-452973
Fax: 7-0142-452435

EC-Energy Centre Riga
Lea
I Gamibu Dambis, 12, 1st floor
226810 Riga
Latvia
Tel: 45-302 49903 (international)
32 88 57 or 32 88 56 (local)
Fax: 45-302 49903 (international)

EC-Energy Centre Vilnius
Litovenergo
13 Juozapaviciaus Street
232748 Vilnius
Lithuania
Tel: 7-0128-290224
Fax: 7-0128 290224

EC-Energy Centre Sofia
1407 Sofia
51 James Boucher Blvd
Bulgaria
Tel: 359 681461
Fax: 359 2 668951
Telex: 22219 ENPRO BG

EC-Energy Centre Prague
Vupek
18 Stetkova
140 00 Prague 4
CSFR
Tel: 42-2-430948
Fax: 42-2-235 0415

Hungary: *The EC-Hungary Energy Centre, Budapest, is currently moving to new premises.*

EC-Energy Centre Warsaw
IPPT PAN - Institute for Fundamental Technological Research
21 Swietokrzyska
PL-00-049 Warsaw
Poland
Tel: 48-22-266508
Fax: 48-22-266593
Telex: 815638 IPPT pl

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6. EL CENTRO DE GESTIÓN DE LA ENERGÍA Y DE DIFUSIÓN TECNOLÓGICA HUNGRÍA-CE

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Dirección de Política Energética, Unidad de Planificación Energética

Están dando fruto en la actualidad muchos de los proyectos iniciados en 1990 en Europa Central y Oriental en virtud del Programa Internacional de la Dirección General de Energía (véase La energía en Europa, nº 18). El logro más significativo es probablemente la creación del Centro Hungría-CE de gestión de la energía y de difusión tecnológica. El Centro ha sido inaugurado recientemente en Budapest y un asesor comunitario, el Sr. Ian Browm, se encargará de coordinar la aportación de la CE. Creemos firmemente que la creación de este tipo de instituciones puede suponer una contribución valiosa al establecimiento de prácticas eficaces de gestión energética y a una correcta planificación energética. Este artículo expone en profundidad los planes del Centro para 1992. El Centro también está financiado en parte por el programa PHARE de la Comisión.

ANTECEDENTES

El modelo de utilización de la energía en Hungría, al igual que en los demás países de la desaparecida CAEM, se ha basado hasta ahora en unos suministros baratos y abundantes de la antigua Unión Soviética y en una estructura de fijación de precios sin relación alguna con los costes de producción. Estos factores han dado lugar a un modelo de utilización de la energía notablemente menos eficiente que el de los Estados miembros de la CE.

La intensidad energética de la industria húngara es aproximadamente dos veces y medio superior a la media de Europa occidental y casi cuatro veces más elevada que la de su vecino occidental más próximo: Austria. Este nivel muy elevado de intensidad energética se explica principalmente por tres factores: el bajo nivel general de rendimiento de la industria, un uso ineficaz de la energía debido a los bajos precios de la misma y una estructura industrial caracterizada por una industria de gran consumo energético.

Es primordial mejorar la eficacia con la que se utiliza la energía en Hungría tanto en aras del desarrollo de una economía de mercado avanzada como del medio ambiente. Con el objetivo de sustentar este proceso, la CE y el gobierno húngaro han establecido conjuntamente el Centro Hungría-CE de gestión de la energía y de difusión tecnológica. Cabe observar que se trata de una empresa común a la que contribuyen tanto Hungría como la CE y, por consiguiente, la labor del Centro debe considerarse en buena medida un trabajo de cooperación.

¿COMO CONTRIBUIRÁ EL CENTRO A MEJORAR LE EFICIENCIA ENERGÉTICA EN HUNGRÍA?

El principal objetivo del Centro es reforzar la cooperación entre la Comunidad Europea y Hungría en el ámbito de la energía y de la gestión energética y fomentar una mejor gestión de la energía en Hungría.

La contribución del Centro consistirá en aunar los conocimientos técnicos de la Comunidad Europea y la mano de obra especializada húngara a fin de mejorar la eficacia energética. Es preciso cambiar tanto las pautas de conducta como la tecnología. Entre las actividades previstas del Centro de Energía figuran la formación y los programas de educación, la información, la transferencia de tecnología y la asistencia en la planificación energética.

FORMACIÓN Y EDUCACIÓN

La formación constituye una actividad prioritaria del Centro de Energía. Aun cuando se ha hecho anteriormente un gran esfuerzo de formación de gestores de energía en Hungría, esta labor ha sido en gran parte abandonada. El Centro de Energía introducirá nuevamente en Hungría los cursos de

formación de cuadros energéticos con la financiación del programa PHARE.
El Centro elaborará y organizará una serie de cursos de formación de carácter práctico sirviéndose de las experiencias húngara y comunitaria para desarrollar un programa dirigido a las necesidades de Hungría y que incorpore la experiencia comunitaria en la gestión de la energía y en la tecnología de la eficacia energética.
Estos cursos de formación se organizarán como actividades piloto en 1992 y los resultados se evaluarán posteriormente a fin de poner a punto todo un programa de cursos de formación. Estos cursos de formación se impartirán en Hungría a gestores de energía tanto de la industria como de centros públicos e instituciones, hospitales, universidades y edificios públicos. Sin embargo, la formación no sólo se centrará en los ingenieros industriales y del sector de la construcción sino también en los operarios de calderas y en el personal de mantenimiento, que tienen en Hungría una influencia muy importante en el uso de la energía.

Información

El Centro de Energía funcionará asimismo como un centro de información técnica para la gestión de la energía. Se están preparando publicaciones específicas sobre tecnologías concretas y usos finales con el objetivo de mejorar la gestión de la energía en toda la economía húngara. La primera tarea que asumirá el Centro será la de aumentar el nivel de sensibilización entre el público en general y en la industria con respecto a la importancia de la gestión de la energía. Lo mismo cabe decir de la sensibilización respecto al vínculo existente entre el uso de la energía y el medio ambiente, cuyo nivel en éste y en el resto de los países del antiguo bloque soviético es bajo.

Seminarios y Talleres

El Centro de Energía organizará una serie de seminarios y talleres en apoyo de los objetivos del Centro: conseguir una mayor sensibilización respecto a la importancia de la eficacia energética, cambiar las pautas de conducta y servir de foco de difusión de las tecnologías avanzadas en Hungría.

Fomento de la Tecnología Energética

El cambio de las pautas de conducta es una condición previa para mejorar la eficacia energética y también se necesita urgentemente mejorar la tecnología del uso de la energía. El actual programa comunitario Thermie y su predecesor, el Programa de Demostración CE, han desarrollado tecnologías innovadoras que pueden ser de gran utilidad para Hungría. También se pueden difundir en este país mediante el programa Thermie las tecnologías desarrolladas tanto comercialmente como a través de los programas de los Estados miembros[1].
El Centro de Energía organizará en Hungría actividades de las OPET que serán coordinadas por la OPET de Italia, ENEA.
La transferencia de tecnología a Hungría con arreglo al programa Thermie incluye tanto la determinación de las tecnologías más adecuadas como la subsiguiente difusión de las mismas en Hungría a través de los más adecuados medios de promoción disponibles.

Planificación Energética

El Centro fomentará el desarrollo de conocimientos técnicos en el ámbito de la planificación energética en Hungría, lo que se llevará a cabo mediante la organización de intercambios de técnicas y de resultados entre los correspondientes centros comunitarios y húngaros y entre los gobiernos de los Estados miembros y el gobierno húngaro. Además, el Centro prestará asistencia directa a la planificación energética en Hungría en colaboración con instituciones húngaras asociadas.

Cooperación Internacional

La principal función del Centro es actuar como coordinador de los programas comunitarios a fin de fortalecer la cooperación en el ámbito energético entre la CE y Hungría. Sin embargo, son también numerosas las iniciativas paralelas y complementarias - seminarios, auditorías energéticas, etc. - que están tomando los gobiernos de los Estados miembros, así como diversas instituciones y organismos. Será importante en este sentido el intercambio de información entre el Centro y la UAP (Unidad de Aplicación del Programa), establecida por el Ministerio de Industria y Comercio para gestionar la aplicación del programa energético PHARE-CE. Uno de los proyectos que será financiado por PHARE es el establecimiento de una base de datos relativa a todos los proyectos apoyados por diversos donantes.
El Centro de Energía contribuirá así a evitar duplicaciones y pérdidas, manteniendo una base de datos adecuada que contenga detalles no sólo de sus

[1] *OPETS: Organizaciones para el fomento de las tecnologías energéticas. Constituyen una red de instituciones y empresas con conocimientos técnicos en el campo de las tecnologías energéticas y que actúan como agentes locales para la aplicación del programa Thermie en los Estados miembros.*

propios programas y resultados sino también de todas las demás operaciones relacionadas con la eficacia energética en Hungría. Esta base de datos estará a libre disposición de todas las instituciones pertinentes a fin de mejorar la coordinación, de acuerdo con la función coordinadora de la Comisión en el contexto del G-24 (Grupo de los 24 países de la OCDE). ■

EL CICLO COMBINADO CON GASIFICACIÓN INTEGRADA

Un proceso limpio de conversión de carbón en electricidad

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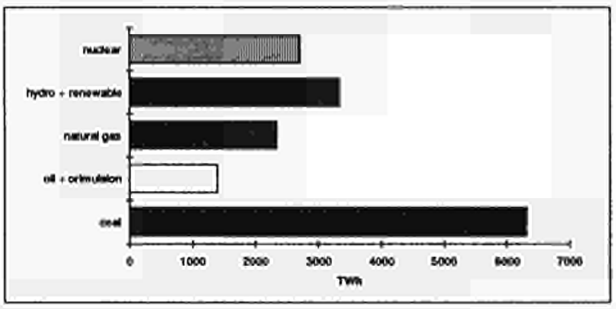
Dirección de tecnología energética

Las centrales eléctricas de carbón abastecen en la actualidad el 40% de la demanda mundial de electricidad y consumen más de la mitad de la producción mundial de carbón. Lo que quizá sea más significativo es que el Organismo Internacional de la Energía, aun cuando tiene plenamente en cuenta la inquietud ante el daño que provocan al medio ambiente los gases de la combustión de grandes cantidades de carbón, la competencia de otros combustibles (en particular el gas natural) y, en muchos casos, las dificultades para encontrar capital destinado a las nuevas centrales, llega a la conclusión de que el consumo mundial de carbón hasta finales de siglo aumentará un 1,5% anual. El consumo de las centrales eléctricas aumentará hasta una cifra cercana a los 3.000 millones de toneladas anuales a principios del próximo siglo, lo que equivale a un incremento en el consumo de más de 100.000 toneladas diarias. Este carbón seguirá produciendo casi el 40% de la electricidad mundial (véase la Figura 1).

Atendiendo a las reservas mundiales de combustibles fósiles (véase la Figura 2), resulta evidente que, a medida que el mundo avanza hacia el próximo siglo, la energía suministrada por el carbón debe aumentar en relación con el petróleo y el gas natural, ya que los consumidores están cobrando conciencia de que las reservas de estos últimos combustibles son obviamente limitadas. En las primeras décadas del próximo siglo, digamos que en un plazo de cuarenta años, el mundo se habrá rendido ante la evidencia de que estos combustibles líquidos y gaseosos deben reservarse para los usos preferentes para los que resultan más adecuados, entre los cuales no se incluye la producción de electricidad.

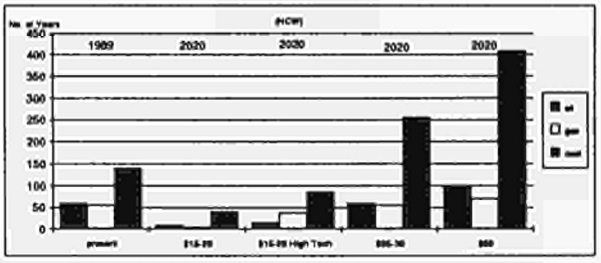
Una gran parte del incremento en el consumo de carbón, incluido el de la producción de electricidad, se producirá en países en desarrollo como China e India. Es evidente la necesidad de garantizar a estos países el acceso a las últimas tecnologías de combustión limpia y eficaz de carbón, así como el respaldo económico y político que garantice su correcta utilización.

Figura 1
Suministro mundial de electricidad en el año 2000 (uso de carbón en las centrales eléctricas: previsión para el año 2000)



Investigación sobre el carbón OIE, octubre de 1991

Figura 2
Evolución de las reservas restantes en función del precio del petróleo



Datos de BP, R. Malpas, Instituto de Energía, Reino Unido

Sin embargo, incluso en los países desarrollados y a pesar de las presiones ejercidas durante estos últimos años en contra del uso de carbón por razones ambientales y económicas, casi todas las previsiones coinciden en que el uso de carbón (incluido el carbón bituminoso y el lignito) aumentará en las próximas décadas. La Figura 3 muestra el actual (1991) uso de carbón, petróleo y gas natural junto con otras fuentes de energía. Se observará que la Comunidad está utilizando actualmente un total cercano a los 230 Mtep (o alrededor de 310 millones de toneladas de carbón.)

La Comisión ha establecido las previsiones de uso de la energía hasta el año 2000 a partir de una hipótesis 'clásica', esto es, basándose en los supuestos generalmente aceptados respecto a lo que ocurrirá si la economía de la Comunidad puede seguir creciendo de manera constante con las fuerzas del mercado como impulsoras del sistema. Tal como cabría esperar, la Comisión actualiza continuamente sus previsiones y considera asimismo hipótesis alternativas1. Cuatro hipótesis recientes, que tenían en cuenta tanto un crecimiento económico mayor como más moderado, los aspectos económicos del suministro y los costes relativos del combustible, y la problemática ambiental, mostraron unas necesidades de carbón en la Comunidad en el año 2000 que variaban entre 230 y 300 Mtep, lo que supone un alza de entre el 0 y el 30% con respecto al consumo actual.

Volviendo al uso de carbón en las centrales eléctricas, en la Figura 4 se puede observar que en la hipótesis clásica, pese a un incremento del 50% en la utilización de gas en los ocho próximos años, el carbón continuará abasteciendo la mayor parte del incremento de la demanda de electricidad que cabe esperar se produzca en los países de la Comunidad. Así, la cantidad de carbón quemado en la Comunidad, al igual que en el resto del mundo, seguirá siendo considerable y, en consecuencia, es de suma importancia procurar que este carbón se queme de la manera más limpia y eficaz posible. La historia ha demostrado que los supuestos que en general se dan por válidos raramente se cumplen, por lo que la Comisión estableció otras tres hipótesis basadas en diversos supuestos. Sin embargo, todo apunta de hecho a que el carbón seguirá constituyendo una importante fuente para la producción de electricidad. La eliminación progresiva del carbón no constituye una opción económica, si bien es cierto que el gas se ha convertido en un combustible interesante y que la energía nuclear es un sustituto potencial. No obstante, dados los volúmenes totales necesarios y los problemas inherentes a estas dos fuentes de energía, no será ni política ni económicamente viable dejar de utilizar carbón para la producción de electricidad. La Figura 5 muestra que, según todas las hipótesis, el carbón tendrá una gran importancia en los años venideros; incluso en el supuesto de que se materializara la menos prometedora de las previsiones, aún sería necesario sustituir un gran número de instalaciones que pasarán a ser obsoletas en los próximos años.

La Dirección General de Energía de la Comisión considera primordial seguir desarrollando y probando nuevas tecnologías que conduzcan a una utilización del carbón económica y aceptable para el medio ambiente. Estas tecnologías, sin embargo, deben ser demostradas a una escala lo suficientemente grande como para convencer a la industria de que es seguro invertir grandes sumas de dinero en ellas.

Figura 3: Balance energético de la Comunidad en 1991 (en % de 1132,5 Mtep)

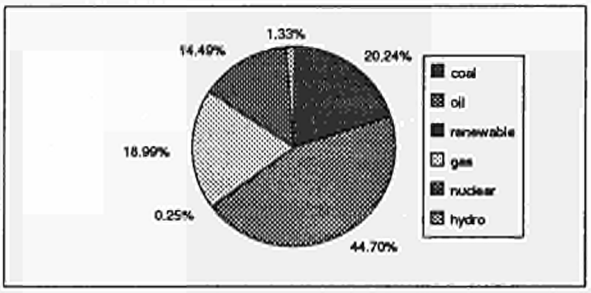
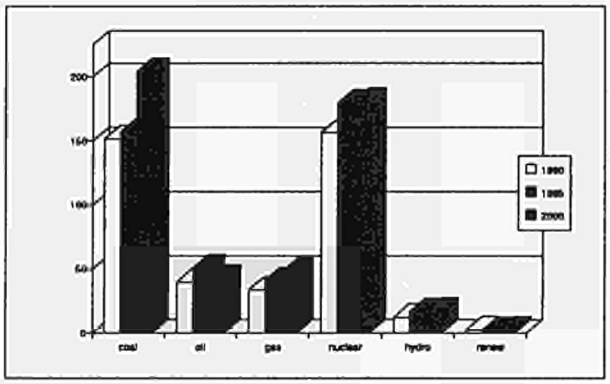
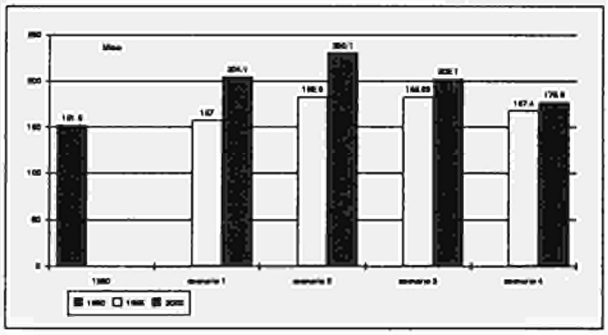


Figura 4: Producción de electricidad por combustible ('hipótesis clásica')



Datos de la DG XVII, agosto de 1991

Figura 5: Consumo de carbón de las centrales eléctricas según cuatro hipótesis y comparación con los datos de 1990



Datos de la DG XVII, julio de 1990 y agosto de 1991

1 *Véase la edición especial de 'La energía en Europa', julio de 1990.*

Como contribución propia a la consecución de dicho objetivo, esta DG continúa apoyando el desarrollo y la demostración de las nuevas tecnologías principales en los países de la Comunidad.

Puesto que una gran proporción del carbón utilizado se destinará a las centales eléctricas y dado el elevado coste de las nuevas centrales eléctricas, sobre todo las de nuevo diseño, es comprensible que muchos de estos esfuerzos estén dirigidos a la producción de electricidad.

La Comunidad Europea ha venido apoyando la investigación, el desarrollo y la demostración de nuevos procesos para la producción y la utilización de carbón y otros combustibles sólidos desde los años 50. Las crisis del petróleo de la década de los 70 llevaron al establecimiento del Programa Comunitario de Demostración de la Energía, puesto en práctica en 1978 y que incluía ayudas a la demostración de licuación del carbón y de tecnologías de gasificación. Éste se amplió en 1983 a la combustión. Su sucesor actual es, evidentemente, el programa Thermie de la Comisión.

A continuación se describen brevemente algunos proyectos del programa anterior, que se han revelado valiosos precursores del sistema CCGI, tema central del presente artículo (que se describe más adelante).

Ayudas Comunitarias al Carbón hasta 1989

En el período comprendido entre 1978 y 1989, las subvenciones concedidas por la CE sumaron un total de 302 millones de ecus, de los que 41 millones se destinaron a apoyar proyectos de licuación y 67 millones a proyectos de combustión, principalmente la demostración de combustión en lecho fluidizado. Otros 122 millones se destinaron a la gasificación del carbón y son precisamente los trabajos relativos al desarrollo de gasificadores presurizados los que están demostrando su importancia para el desarrollo de la más reciente tecnología del 'carbón limpio'.

A principios de los años 70, se hallaban en diferentes fases de desarrollo más de 20 modelos de gasificadores a presión con inyección de oxígeno en todo el mundo: en aquel entonces, el interés radicaba fundamentalmente en la fabricación de gas natural sintético y otros productos químicos industriales. Muchos de éstos nunca llegaron a realizarse, aunque la Comunidad Europea puede atribuirse el mérito de apoyar tres de dichos proyectos diferentes en cuanto a concepción y ahora listos para su utilización comercial. El gasificador Winkler de alta temperatura, concebido por Rheinbraun principalmente para gasificar lignito no lavado, fue desarrollado y demostrado durante algunos años, hasta 1990, en una central de lignito de 1.500 toneladas diarias en la que el gasificador operaba a 1000°C y 120 bar para producir 37.000 Nm3/h de gas de poder calorífico medio. El gasificador BGL es una versión presurizada del muy conocido gasificador contracorriente de lecho fijo Lurgi, desarrollado por British Gas y Lurgi pero con la diferencia de que la ceniza se elimina como escoria fundida gracias a la temperatura alcanzada por la inyección de una mezcla de vapor y oxígeno en la parte inferior del lecho. Se ha concluido un riguroso programa de prueba de este sistema en una pequeña unidad comercial que consume aproximadamente 600 toneladas diarias. La Comisión continúa prestando su apoyo al desarrollo de una versión presurizada del proceso de flujo arrastrado Koppers-Totzek. Aquí el carbón pulverizado se quema en una cámara de reacción con el oxígeno suficiente para oxidar parcialmente el carbón en una reación en la llama a temperaturas superiores a los 2000°C y a una presión de entre 24 y 30 bar. Krupp-Koppers ha construido y desarrollado una central de demostración de 48 toneladas diarias de carbón. Se han gasificado con éxito varios combustibles durante más de 8000 horas de funcionamiento, demostrando que este proceso, denominado Prenflo[2], es interesante desde el punto de vista ambiental y su funcionamiento es seguro y económico. Cabe citar en este punto, para completar el cuadro, otros dos modelos de gasificadores de flujo arrastrado de concepto muy similar al Prenflo pero, como era de esperar, con ciertas diferencias importantes de diseño. Se trata del gasificador Shell, ampliamente desarrollado en los Países Bajos y en EEUU, y del proceso GSP, desarrollado en la ex RDA y en la actualidad a cargo de Deutsche Babcock.

El Programa Thermie

En 1990, las ayudas a la demostración de procesos nuevos y, en particular, "limpios" de combustión y conversión de carbón pasaron a formar parte del programa Thermie, cuyo objetivo es desarrollar y explotar nuevas tecnologías en el sector energético como parte fundamental del establecimiento de una poderosa base energética en Europa para satisfacer las nuevas necesidades económicas e industriales del mercado interior único. El programa Thermie, previsto inicialmente para el período 1990-1994, fue establecido con un presupuesto de 350 millones de ecus para 1990-1992, repartido entre los trabajos de cuatro áreas principales: utilización racional de la energía, energías nuevas y renovables, prospección y explotación de hidrocarburos y, por último, aunque no por ello menos importante, combustibles sólidos. Por consiguiente, las propuestas correspondientes a las actividades cubiertas por 'combustibles sólidos' deben competir con las propuestas de los otros tres ámbitos.

2 *Véase el nº 16 de 'La energía en Europa', diciembre de 1990.*

Se presta apoyo a aquellas propuestas que se consideran técnica y económicamente viables y una condición para las ayudas es que se pueda demostrar el funcionamiento seguro del proceso y su capacidad de cumplir los requisitos de protección ambiental.

Los proyectos que se beneficien del apoyo del programa Thermie pueden estar concebidos para proponer o aplicar técnicas, procesos o proyectos innovadores que resultan prometedores una vez finalizada la fase de investigación y desarrollo.

En estos casos, la ayuda prestada por la Comisión podrá suponer hasta el 40% del coste de la parte innovadora de la propuesta. También se pueden conceder ayudas para que un proceso o producto cuyo valor ha sido probado en la Comunidad sea también demostrado en cualquier otro lugar, bien en condiciones económicas o geográficas diferentes en otro país comunitario o con modificaciones técnicas (proyecto de difusión). Las ayudas en este caso se limitan al 35% del coste subvencionable.

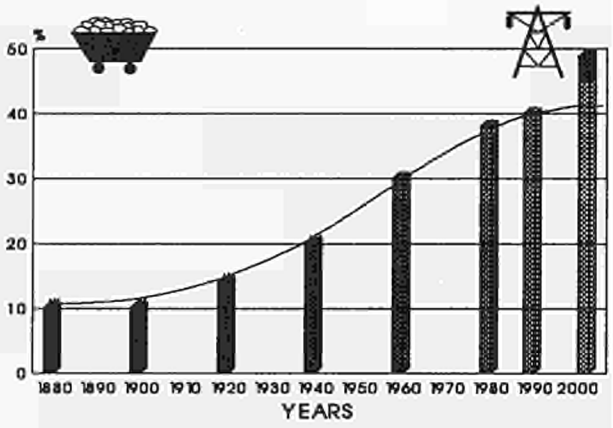
La gama de los temas que la Comisión acabará financiando en los campos de la combustión y la conversión de carbón está obviamente determinada en gran medida por las propuestas presentadas. Sin embargo, el programa Thermie también ofrece la oportunidad de que la Comisión financie un programa de trabajo, especialmente alentando a diversas partes interesadas de diferentes países comunitarios a emprender una ofensiva común sobre un tema que la Comisión considere digno de ser desarrollado. El primer y principal ejemplo de tal programa focalizado ha sido el proyecto relativo al Ciclo Combinado con Gasificación Integrada (CCGI), que seguidamente se describe.

El Concepto de Ciclo Combinado de Gasificación Integrada

Los expertos en combustibles han venido buscando durante muchos años métodos para producir electricidad a partir del carbón que no estén condicionados por las limitaciones termodinámicas de la conversión de la energía del carbón en energía eléctrica, limitaciones que son inherentes al ciclo del vapor. Al mismo tiempo, es fundamental que todo proceso ofrezca los medios para que la mayoría, si no la totalidad, de las principales fuentes de contaminación ambiental presentes en el carbón, como el azufre, el nitrógeno, los metales pesados, las partículas y el polvo, sean eliminados sin que se reduzca por ello el rendimiento.

Desde un 10%, aproximadamente, a comienzos de la revolución industrial, el rendimiento de la producción de electricidad ha experimentado un incremento constante (véase la Figura 6), aunque puede apreciarse en el gráfico que el índice ha comenzado a decaer en los últimos años, dado que es cada vez más difícil realizar mejoras significativas en el ciclo del vapor; esta evolución está siguiendo una curva en forma de 'S', como todo proceso de aprendizaje. Por lo tanto, no cabe esperar nuevas mejoras revolucionarias ya que no se ha alcanzado la parte asintótica de la curva. Evidentemente, se seguirán realizando progresos, pero a un ritmo mucho más moderado. A modo de ejemplo, se afirma que una central eléctrica de carbón pulverizado Preussen Elektra con DESOX y DENOX en Staudinger (cerca de Francfort) tendrá un rendimiento del 42%, con unas condiciones de vapor de 260 bar y 545/560°C,y comenzará a funcionar a finales de 1992. El CCGI está incorporándose actualmente al circuito productivo y cabe esperar por ello que se dará una nueva curva en forma de 'S', que tendrá como consecuencia nuevas mejoras del rendimiento de la central y, por tanto, una reducción de las emisiones de CO2.

Figura 6
Evolución del rendimiento de las centrales eléctricas de carbón



La proporción de calor en un fluido caliente que se puede transformar en trabajo (o electricidad) depende de la temperatura a la que se empieza a trabajar y a la que se termina. La máxima temperatura de vapor que se puede utilizar generalmente en la entrada de una turbina de vapor es 600°C, aproximadamente, aunque son factibles temperaturas de entrada próximas a los 1000°C e incluso será posible alcanzar temperaturas más elevadas a medida que mejoran los materiales y diseños de la turbina. Una turbina de gas caldeada directamente con los gases procedentes de una cámara de combustión a presión tiene, por tanto, un rendimiento de conversión potencialmente más elevado que un ciclo de vapor. Además, la temperatura del gas que sale de la turbina sigue siendo lo bastante alta para producir vapor con el que llevar a cabo también un ciclo de vapor eficaz. También es posible usar todo el calor generado al enfriar los componentes de toda la central en este ciclo de vapor, utilizando el diferencial de temperatura hasta la temperatura de condensación

del vapor. El gráfico de temperatura/entropía muestra cómo el ciclo del gas se sitúa en la parte superior del ciclo de vapor (vèase la Figura 7), y la combinación hace uso de una gama de temperaturas más amplia de la que sería posible con cualquier tipo de ciclo de vapor por sí mismo.

En consecuencia, la combinación de una turbina de gas movida por gases calientes de escape procedentes de la combustión de un combustible fósil, junto con una turbina de vapor, que usa el vapor producido por el calor de los gases de escape de la turbina de gas y el calor recuperado a lo largo de todo el sistema, ha demostrado tener un mayor rendimiento de conversión que el de un ciclo de vapor tradicional en centrales que utilizan un gas como combustible. Estas 'centrales de ciclo combinado' se están proponiendo ahora para muchas de las unidades de producción eléctrica de gas de última generación. A modo de ejemplo, cabe citar la central eléctrica de Ambarli: esta central de ciclo combinado de gas de 1350 MW, situada cerca de Estambul, tiene un rendimiento neto del 52,5%, comparado con el máximo típico del 40% utilizando un ciclo de vapor.

Cuando el combustible predominante es el carbón, es posible utilizar este mismo enfoque del 'ciclo combinado' gasificando primero el carbón para producir un gas limpio que mueve la turbina de gas. Este proceso, denominado sistema CCGI (ciclo combinado con gasificación integrada), es considerado actualmente la opción más prometedora en un futuro inmediato para las centrales eléctricas de carbón, por las siguientes razones:

1. Ofrece, utilizando la tecnología ya disponible y probada, una mejora en el rendimiento de la conversión, normalmente del orden del 45-47% (comparado con el 38% típico del combustible pulverizado con desulfuración y desnitrificación de los gases de combustión) (véase la Figura 8). Esto no sólo reduce el coste de la electricidad producida sino también la cantidad de anhídrido carbónico emitido por unidad de electricidad producida (el dióxido de carbono es uno de los gases causantes del efecto invernadero, de los que se afirma contribuirán a un calentamiento térmico de la atmósfera a nivel mundial provocado por el ser humano).

2. Una característica importante del sistema CCGI es que ofrece la posibilidad de nuevos aumentos en el rendimiento de la conversión a medida que se desarrollen turbinas de gas capaces de trabajar a temperaturas más elevadas en condiciones industriales. El límite de la temperatura de entrada en las turbinas de gases disponibles en la actualidad es inferior a 1000°C, aunque se están probando turbinas que admiten gases a un máximo de 1300°C y este aumento en las temperaturas de entrada deberá permitir obtener unos rendimientos del orden del 47-48%.

Figura 7
Diagrama termodinámico del ciclo combinado

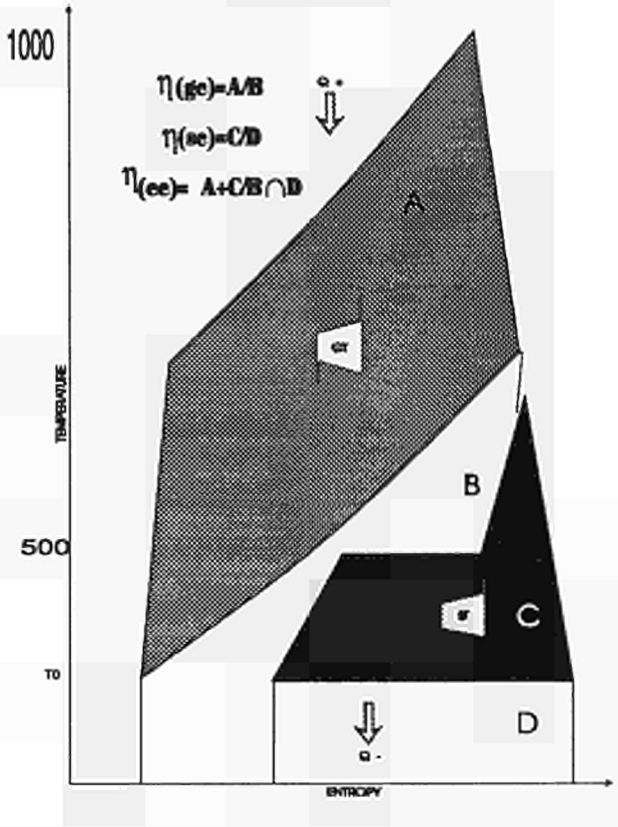
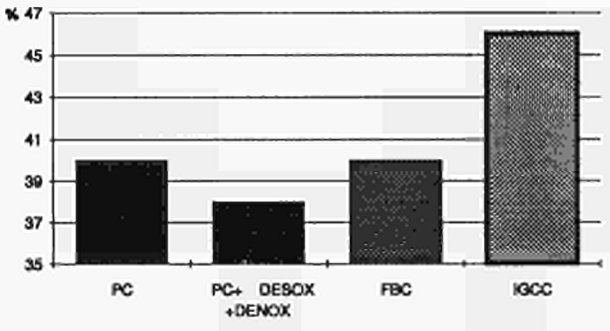


Figura 8
Comparación del rendimiento de varias centrales eléctricas de carbón



3. El sitema CCGI proporciona los medios para limitar las sustancias contaminantes presentes en los gases de escape a cualquier nivel que se considere justificado desde un punto de vista ambiental y económico. Existen ventajas termodinámicas derivadas de limpiar el gas del gasificador mientras está caliente y se están estudiando las formas de llevar esto a cabo. Sin embargo, en la mayoría de las centrales que se están ahora considerando se prevé enfriar el gas (recoger el calor para su retroalimentación en cualquier otra parte del ciclo) y limpiarlo posteriormente mediante lavado y otras técnicas para eliminar las

sustancias contaminantes. Este aspecto se trata más detalladamente a continuación.

Por consiguiente, el sistema CCGI representa la mejor opción para producir energía eléctrica 'limpia' utilizando carbón como combustible. No obstante, será preciso demostrar la viabilidad de todo el sistema antes de lanzarse de lleno a las aplicaciones comerciales.

Aspectos Técnicos del Proceso IGCC

¿Cuáles son los principales componentes de una central CCGI? (Véase la Figura 10).

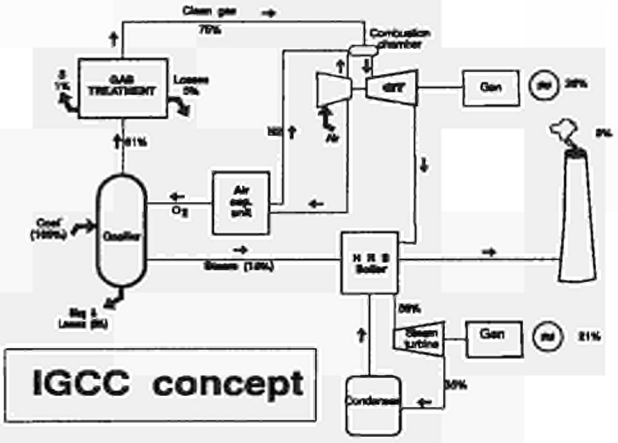
El carbón, una vez preparado, se introduce en un gasificador presurizado generalmente con inyección de oxígeno. La calidad del combustible que puede utilizarse depende del gasificador, aunque ahora se dispone de aparatos capaces de funcionar con carbones de todas las categorías, incluidos los de alto contenido de cenizas o humedad o de calidad variable. Anteriormente han sido mencionados algunos de los gasificadores apropiados desarrollados en la Comunidad.

Todos estos gasificadores insuflados con oxígeno vierten las cenizas del carbón en forma de escorias líquidas calientes. El gasificador se enfría con una camisa de vapor y el vapor generado utilizado alimenta el ciclo de vapor.

Hasta que se halle una manera eficaz de limpiar el gas de combustión mientras está caliente, el procedimiento que se aplica es enfriar primero el gas y luego limpiarlo mediante lavado (véase la próxima sección). A continuación, el gas limpio se quema con aire comprimido, posiblemente templado con nitrógeno o vapor para reducir la formación de óxidos de nitrógeno y para alcanzar la temperatura necesaria en la entrada de la turbina de gases. Los gases que salen de la turbina de gas se pasan a un generador de vapor y el vapor se introduce en el circuito de vapor que alimenta la turbina de vapor.

El diseño de la parte correspondiente al vapor debe aprovechar al máximo el calor disponible procedente del gasificador, del intercambiador de calor y de la caldera de los gases de escape de la turbina a las cargas energéticas apropiadas. El rendimiento final del sistema depende en buena medida del óptimo uso del calor generado en todas las fases, tanto en las turbinas de gas como de vapor, tomando en consideración el coste de la instalación utilizada. Además, todas las necesidades de calor en las diversas unidades del sistema de ciclo combinado se han de satisfacer con la adecuada calidad de vapor o de agua caliente, teniendo otra vez presentes los criterios de coste. También se han de integrar en el sistema una serie de funciones auxiliares, como la producción de oxígeno para el gasificador o la utilización del nitrógeno producido al mismo tiempo, cuyo uso óptimo sería templar la temperatura de los gases que alimentan la turbina de gas, tal como se ha descrito antes.

Figura 10
El sistema CCGI



Más adelante se verá que las características del gasificador utilizado, el rendimiento de la turbina de gas y la manera en que el gas y los ciclos de vapor son integrados afectan al rendimiento y al funcionamiento generales de la central. La selección de los componentes y la manera en que se integran son determinantes para producir un diseño que maximice las ventajas del ciclo combinado.

Consideraciones Ambientales

Ya se han mencionado las ventajas del sistema CCGI para limitar la contaminación atmosférica a unos niveles bajos. Resulta interesante examinar más detalladamente cómo se trata cada una de las sustancias contaminantes.

Los límites relativos a las emisiones de óxido de azufre, sobre todo en el caso de las instalaciones más grandes, son ya rigurosos (400 mg/Nm3). No cabe duda de que en los próximos años se impondrán límites aún más estrictos, que podrá satisfacer ciertamente el sistema CCGI. Existen varios procesos reconocidos para lavar los compuestos de azufre de los gases. Se pueden alcanzar rendimientos en la desulfuración superiores al 90% y se espera obtener unos niveles de emisión de óxido de azufre inferiores a 10 mg/Nm3. El azufre se produce generalmente en forma de azufre elemental, aunque también pueden producirse compuestos de azufre sólidos. Cabe esperar, al menos hasta que un gran número de instalaciones comerciales se incorporen a la producción, que se hallará un mercado para los productos del azufre, aun cuando será preciso abordar a su debido tiempo la cuestión de la

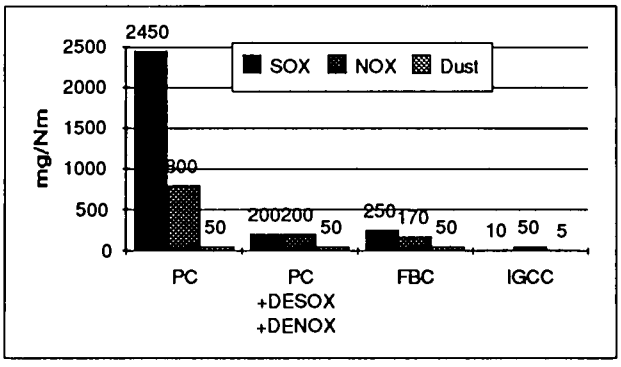
eliminación segura de este material junto con la escoria.

Los óxidos de nitrógeno presentes en el gas de combustión pueden proceder de dos fuentes: los compuestos de nitrógeno presentes en el carbón y el aire, como consecuencia de reacciones en la llama. El nitrógeno ligado al combustible puede ser eliminado casi en su totalidad en la fase de purificación del gas frío. La formación de NOx en el proceso de combustión puede limitarse mediante la dilución del gas de combustión con vapor de agua o nitrógeno. Se puede conseguir una nueva reducción de la formación de NOx utilizando un sistema de combustión 'por fases'.

El lavado húmedo del gas de combustión garantiza una emisión muy baja de polvo y partículas sólidas. Al mismo tiempo, se eliminan el sodio y otras sales metálicas. Ello no sólo evita cualquier daño ambiental causado por estos compuestos sino que reduce también la deposición y la corrosión en las paletas de la turbina de gas, un aspecto que adquirirá una importancia cada vez mayor a medida que aumentan las temperaturas de entrada de la turbina.

Es indudable, por tanto, que el sistema CCGI permitirá la combustión de carbón con muy bajas emisiones de SOx, NOx y polvo, tal como puede apreciarse en la comparación con otros sistemas en los que se quema carbón (figura 11).

Figura 11
Emisiones de SOx, NOx y polvo de las centrales eléctricas de carbón



La importancia de la reducción de las emisiones de anhídrido carbónico procedentes de las centrales eléctricas en el intento de limitar la formación de los 'gases causantes del efecto invernadero' es objeto de controversia. Parece ser que el impacto de las emisiones de las centrales eléctricas es menor, y el período en el que se producirá el calentamiento global mayor, que las previsiones establecidas hace algunos años. Aun así, es de todo punto conveniente limitar en la mayor medida posible las emisiones de anhídrido carbónico.

La Comunidad ha decidido fijar el objetivo de estabilizar las emisiones de CO2 en el año 2000 a su nivel de 1990. Se está estudiando la posibilidad de eliminar el anhídrido carbónico del gas de combustión y de almacenarlo a fin de que no se expanda en la atmósfera, aunque ésta está lejos de representar en la actualidad una propuesta práctica, de forma que la única opción disponible en estos momentos es incrementar el rendimiento de conversión al más alto nivel posible. Tal como se ha explicado, esto es lo que hace el sistema CCGI.

El Papel de la Comunidad Europea

La opinión de los expertos de la Comunidad Europea es que es fundamental desarrollar el CCGI a escala comercial lo antes posible para poder así disponer, con miras a su explotación, de una tecnología reconocida de 'carbón limpio' apta para la transformación de carbón en electricidad. El desarrollo de este sistema presenta claras ventajas comerciales y técnias para los países de la Comunidad. La Comisión es consciente desde hace años de la necesidad de realizar un proyecto de demostración que permita poner los conocimientos técnicos actuales a disposición de los Estados miembros de la Comunidad.

Sin embargo, un proyecto de este tipo es caro dado que se necesita una instalación relativamente grande que suministre un mínimo de 200-300 MWe de electricidad, de un coste aproximado de entre 400 y 550 millones de ecus. En estos momentos, y desde una perspectiva realista, sólo la Comisión sólo puede apoyar un proyecto semejante, lo que significa, tal y como ya se ha expuesto, tomar decisiones difíciles en cuanto a la selección entre tecnologías y configuraciones alternativas. La Comisión tiene el deber - y la voluntad - de financiar proyectos en los que pueda participar el mayor número posible de países y empresas de la Comunidad, posibilitándoles el acceso a la tecnología en ellos desarrollada. Al mismo tiempo, es consciente de que el apoyo económico de la Comunidad debe limitarse a la parte innovadora del proyecto, lo que significa que serán las empresas y las instituciones locales que propongan el proyecto las encargadas de financiar una parte muy considerable de éste.

Valiéndose de la disposición sobre proyectos 'focalizados' del Reglamento Thermie, tal como citamos anteriormente, la Dirección General de Energía convocó a las partes interesadas para debatir un posible proyecto comunitario de CCGI. La sesión se celebró en Bruselas el 15 de noviembre de 1988 con la participación de 180 delegados, entre los que se encontraban constructores de centrales, consultores, empresas de ingeniería y productores de electricidad.

En la reunión se llegó a la conclusión de que la tecnología estaba lo suficientemente avanzada como para construir una instalación experimental y que la construcción de ésta no debería posponerse mientras se ponían a punto cuestiones de detalle. Se confirmó la posición del CCGI como la mejor tecnología disponible para la utilización limpia del carbón y se tomó en consideración un proyecto que incorpora la flexibilidad suficiente para permitir la inclusión de diferentes aplicaciones.

Tras la reunión, los funcionarios de la Comisión concretaron reuniones con las compañías eléctricas de la Comunidad, en las que se formularon y evaluaron diversas propuestas. Se decidió finalmente apoyar la propuesta de construir la instalación de demostración en España. Así, después de más de cuatro años de preparación, el 4 de diciembre de 1991 la Comisión tomó la decisión oficial de financiar la construcción de esta central en Puertollano, España, aunque como una verdadera empresa común europea, apoyada por compañías de electricidad de diversos Estados miembros.

El Proyecto de Puertollano

El proyecto de Puertollano está respaldado por una serie de compañías eléctricas, entre ellas Endesa, Iberdrola II, Sevillana de Electricidad e Hidroeléctrica del Cantábrico, por parte del país anfitrión, así como Electricité de France y Electricidade de Portugal. Se espera que nuevos patrocinadores se adhieran al proyecto y, en el momento de escribir este artículo, algunas compañías ya han mostrado verdadero interés en patrocinar el proyecto o en participar plenamente en el mismo. El Cuadro 1 muestra la actual estructura participativa de Elcogas, la compañía que fue creada el 8 de abril de 1992 para la realización de este proyecto.

Cuadro 1: Participación en Elcogas

Endesa	36.67%
Electricité de France	35.0%
Iberdrola II	13.33%
Sevillana de electricidad	8.89%
Hidoelectrica del Cantabrico	4.44%
Electricadade de Portugal	1.67%

La propuesta consiste en construir una central capaz de quemar carbones bituminosos tanto locales como importados para producir 305 MWe netos (potencia bruta, 337 MWe) con un rendimiento (basado en la utilización de carbón local) del 44,5-45,5%. Las emisiones de dióxido de azufre (del 15% 02) serán inferiores a 10 mg/Nm3 y el nivel de óxido de nitrógeno inferior a 60 mg/Nm3. Gracias al rendimiento más elevado, las emisiones de anhídrido carbónico sopondrán sólo el 80% de las de una instalación convencional.

Puertollano es un gran enclave industrial situado en el centro de España, 200 km, aproximadamente, al sur de Madrid. El carbón local, una mezcla de carbones lavados y no lavados, tiene un 9-14% de humedad, un 20-25% de cenizas y un 13-25% de volatilidad. Sólo tiene un 0,02%, aproximadamente, de cloro, pero el contenido de azufre puede variar entre el 1,5 y el 4%, porcentaje éste bastante elevado. Sin embargo, la central estará concebida para quemar asimismo una gran variedad de otros carbones comunitarios e importados, incluida una mezcla de coque de petróleo y carbón. Estarán incluidos los carbones con un contenido volátil de hasta el 35% y un contenido de cloro de hasta el 0,5%.

Se deben tomar aún importantes decisiones en cuanto a la elección del gasificador y de las turbinas de gas y de vapor. Se calcula que el coste total del proyecto es de 565 millones de ecus. Aproximadamente el 12% de esta cantidad se destina a la central de oxígeno, el 30% al gasificador y el 37% a los equipos que componen las ciclos de la turbina de gas y los de vapor. La central podría entrar en servicio con gas natural en 1995 y a principios de 1996 podría iniciarse la utilización de carbón.

Se espera que, durante un período de demostración de tres años, será posible comprobar el rendimiento, la disponibilidad y el rendimiento de la instalación en condiciones de funcionamiento continuo y probar el funcionamiento del gasificador utilizando una serie de carbones locales e importados.

Éste será un proyecto europeo de gran envergadura, digno de un amplio apoyo en toda la Comunidad, mediante el cual la Comisión desea demostrar que el carbón puede ser transformado en electricidad mediante un proceso limpio y de gran rendimiento. ■

Abbreviations and symbols

:	no data available
—	nil
0	figure less than half the unit used
kg oe	kilogram of oil equivalent (41 860 joules NCV/kg)
M	million (10^6)
t	tonne (metric ton)
t = t	tonne for tonne
toe	tonne of oil equivalent (41 860 kjoules NCV/kg)
fob	free on board
cif	cost-insurance-freight
MW	megawatt = 10^3 kWh
kWh	kilowatt hour
GWh	gigawatt hour = 10^6 kWh
J	joule
kJ	kilojoule
TJ	terajoule = 10^9 kJ
NCV	net calorific value
GCV	gross calorific value
ECU	European currency unit
USD	US dollar

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

EUR 12 Total of member countries of the EC

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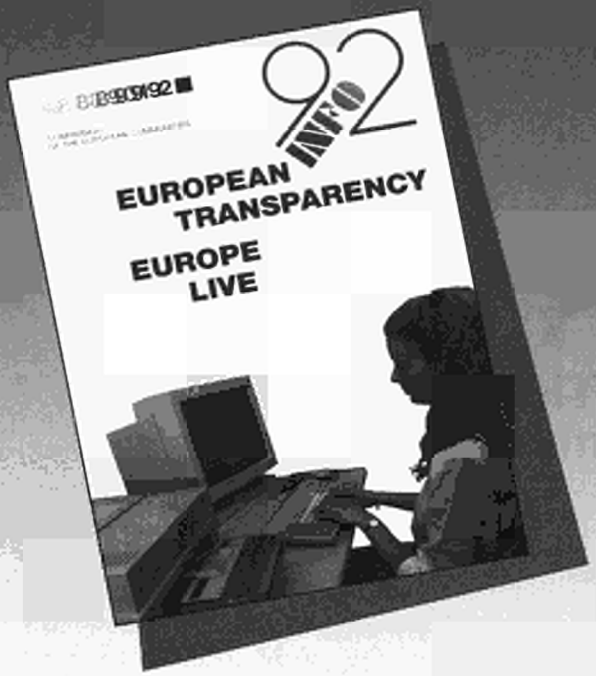

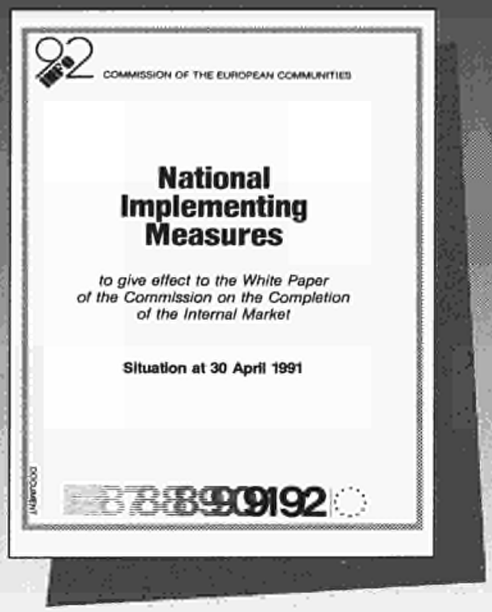

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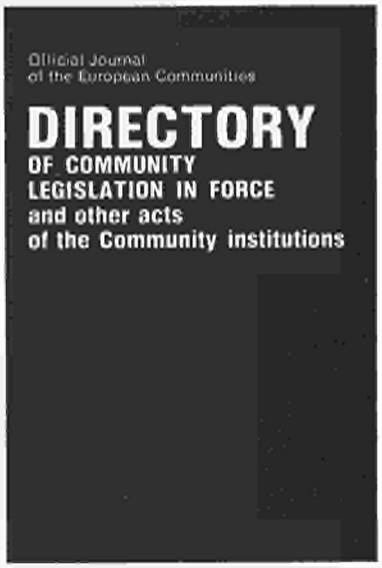

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