

European energy demonstration projects

European File

Confronted with the energy crisis, Community countries have undertaken to conduct coordinated energy-saving projects and to diversify their sources of supply as much as possible. The methods used are not only legislative or regulatory. Considerable effort has been made to promote research and investment in the energy sector, and the European Community already plays a significant role at this level: ¹ on the one hand through joint research programmes, both in the coal and nuclear areas as well as in new energy sources, and on the other hand by granting investment aid through the European Coal and Steel Community, the European Investment Bank, the European Regional Development Fund etc.

In addition to scientific research and investment in projects which implement proven techniques, there is room for other types of intervention : aid for technological development and demonstration projects. These aim to demonstrate 'in the field' and in 'full scale', the viability of new techniques and technologies which have progressed beyond the research stage and been proven through prior trials, but whose use has been held back by the technical and financial risks inherent in any innovation. The Community can support such projects if they are likely to reduce energy dependence; if they really involve a risk whilst showing serious need; if they are likely to have a learning effect : rapid exploitation or commercialization, widespread distribution of the results obtained etc.

¹ See *European File* No 8/79 : 'Towards a European Energy Policy'. No 11/79 : 'Science, Research and the European Community', No 16/79 : 'Economic Growth and Energy conservation' and No 27/80 : 'New Energy Sources for the Community'.

Dealing with these schemes at the European level, helps to select projects on a wide basis (through calls for tender in the 'Official Journal of the European Communities'); to eliminate duplication of work and encourage the pooling of effort; to provide adequate financial support - according to common principles - for work likely to resolve problems which are familiar to all countries; to increase the opportunities for disseminating and commercializing new technologies throughout the length and breadth of the European market.

Community intervention in this sector was initiated through regulations dating from November 1973 for hydrocarbons, June 1978 and March 1979 for the gasification and liquefaction of coal, geothermal and solar energy as well as energy savings. The funds allocated to hydrocarbon projects are decided upon each year (they have stood at an average annual level of 25 million European units of account ¹ since 1974). Aid for energy savings alone can amount to 55 million EUA over four years, whilst within a five-year ceiling level of 95 million EUA, coal, geothermal and solar energy are accorded respectively 50, 22.5 and 22.5 million EUA. Support from the Community cannot, in general, be greater than 40% of the project and must be repaid (entirely for hydrocarbon projects, 50% for others) if successfully exploited or commercialized. In addition, the project promoters must agree to divulge the results obtained through implementing the new technologies.

Community aid for demonstration projects is granted within the framework of coordinated actions which also comprise, in the same sectors, a 1979-83 European research programme dealing with solar energy (46 million EUA) geothermal energy (18 million) and energy savings (27 million).

Hydrocarbons

The hydrocarbons sector (oil and natural gas) began the European technological development programme. The first call for tenders was in 1974 followed by four others in 1976, 1977, 1978 and 1979. In total some 300 projects were put forward by approximately 170 companies. The Community has allocated a budget of 183 million EUA to finance the 168 projects approved, whose total cost will amount to around 500 million EUA.

Projects already completed or under way, cover the whole spectrum of modern technology. Some thirty of them have resulted in industrial applications or registration of patents, and demonstrate progress at all levels of the hydrocarbons industry, both from the point of view of increases in supply as well as safety.

□ Two-thirds of total Community support has been devoted to the development of modern technologies aimed at :

- facilitating access to new oil-bearing zones (64 projects). This has helped develop some of the main equipment needed for deep-sea oil extraction, particularly in the North Sea : anchorage systems, well-heads, transfer pipes, underwater storage

¹ 1 EUA = about £ 0.59 or Ir. £ 0.67 (at exchange rates current on 15 September 1980).

tanks etc. The most recent work aims at developing completely underwater production systems which are both cheaper and safer;

- exploiting existing deposits (15 projects). Various techniques (injection of high temperature steam, carbon dioxide, polymers etc.) are being tested in Germany, France, the United Kingdom and in the Adriatic to try and eventually recuperate not just 30% but 50-60% of the oil present in the fields being exploited. Considerable progress has also been made in the North Sea to recuperate the associated gases from oil production;
- 16% of the total support has been allocated to 16 projects dealing with transportation techniques, of which should be mentioned the construction of the 'Verolme' methane tanker (Netherlands), and the attempt to lay an underwater pipeline between Sicily and Tunisia to channel through the large quantities of Algerian gas. This particular project has reached the realization stage thanks to financial assistance from the European Investment Bank and the European Regional Fund;
- 15% of the support has been accorded to 21 projects for improving geophysical techniques (boring techniques, use of computers etc.) as well as drilling techniques in depths over 1000 metres ('Petrel', 'Ben Lancer Ocean', 'Pelerin' drilling vessels etc.);
- 2% of the support has been allocated to 5 hydrocarbon storage projects.

Companies from all Community countries participate in these projects, but British and French firms followed by Italian companies have been at the forefront. A new call for tenders will be made at the end of 1980. The European Commission wishes to extend its assistance to oil exploration in its strict sense; European ministers agreed in 1979 to allocate 3.45 million EUA for exploration in Greenland.

Coal gasification and liquefaction

Coal may be gasified or liquefied using well-known techniques such as synthesis, methanization, hydrogenation etc., but one problem still remains, however : the high cost of these processes. But the stakes are high : large reserves still exist whose location, dispersion or diversity prevent exploitation using traditional methods. Also, the products obtained through gasification or liquefaction can substitute for methane or ordinary petrol and use the existing storage, distribution and combustion infrastructure. An initial European call for tenders for new extraction systems was published in 1978. 14 companies put forward requests for assistance covering 12 projects. Following the selection procedure, three of the projects are currently being pursued (a fourth German project was withdrawn by its promoter). The total investment amounts to 58 million EUA, 11.5 million of which is accorded by the Community. Projects receiving support are as follows :

- a Belgo-German experiment on underground gasification of coal being conducted near Thulin in Belgium by two national coal research organisations, INIEX and KFAJ. The four first bore-holes in a new site have already been made and they will subsequently be linked together and full-scale testing undertaken. The new gasification process involves

the alternation of high and low pressures through the use of a gasifying medium (air and oxygen) in deep-lying coal deposits. The object is to produce a gas of high calorific value which can be burnt in electricity generating turbines. The cost of the first phase of the project is put at 13.6 million EUA, 5.45 of which is paid by the Community.

- a French deep-level coal gasification project conducted by Charbonnage de France, by Gaz de France, by the French Oil Institute and by the Bureau de recherche de géologie minière. Currently in progress in the North of France, and soon to be extended to the Lorraine area, this work complements the Belgo-German project; it aims, in particular, at linking up bore-holes in different coal layers and studying the thermo-dynamics of the system. The cost of this initial stage is 3.4 million EUA, 1.35 million of which is financed by the Community.
- a UK coal liquefaction plant. The National Coal Board's project is to study, investigate and exploit an installation at Stoke Orchard (near Cheltenham) which could liquefy one tonne of coal per hour by combining high pressures and relatively low temperatures (450°C). The product obtained could be distilled by the chemical industry or refined to be used as car fuel. The cost of the initial phase of this project is 11.7 million EUA, 4.7 million of which is covered by the Community.

A new call for tenders was made in April 1980. 23 proposals have been received and a decision will be made on them in Autumn 1980. The needs of this sector are particularly great and the European Commission has requested that funds available for this sector be doubled.

Geothermal energy

Deep under the terrain of many regions with a history of early volcanic activity, lie water courses or rocks whose heat could be utilized for heating and even for the production of electricity. With the help of the Community, drilling is going to be extended and is now reaching record depths. Following the publication in June 1978 of a first call for tenders, 36 requests for support were presented and 13 projects accepted for a total cost of 70 million EUA of which the Community's share is 9 million. The Community is basically financing the geological risk i.e. the drilling stage. The objectives are :

- to supply district heating networks in Milan, Rotterdam, Fribourg-en-Brisgau, as well as the French towns Beauvais, Cergy-Pontoise, Jonzac and Strasbourg. This latter project, for example, aims at using geothermal water to heat dwellings in the Kronenbourg area. A pocket of water located between 2 200 and 2 900 metres underground, could provide some 150 m³ of water per hour heated to 140 °C. After use, the geothermal water would be reinjected into the wells at a temperature of about 80 °C. This 10.8 megawatt plant would save 7 000 tonnes of oil per year, for an investment of about 7 million EUA and Community aid of 934 000 EUA.
- for warming hot-houses at Hoogstraten, Belgium, and at Melleray in France. The Melleray project is one of the first in the Community with purely agricultural objectives. It should heat some 15.7 hectares of greenhouse used by ten farmers. A

suitable supply of water heated to 70 °C was discovered after sinking a 1 500 metre bore-hole and the first greenhouses could be linked to it in 1981. Through an investment of around 3 million EUA and Community aid of 693 000 EUA, it should be possible to save some 4 000 tonnes of oil per year.

- producing electricity from hot underground water at Cesano, Mofete and Larderello in Italy. The Larderello site has already been utilised to a depth of 1 000 metres for many years, but can still be developed to a depth of 5 000 metres. At Mofete, near Naples, oblique bore-holes have been drilled under urban zones towards volcanic layers located 1 500 to 3 000 metres underground containing liquids heated to 300 °C. The steam resulting from this can drive the turbines of a moderately powerful electricity power station. The cost of the first drillings is estimated at 2.7 million EUA, 807 000 EUA of which is charged to the Community.

A new call for tenders was made in February 1979; 33 proposals were received, and 17 projects accepted at a total cost of 132 million EUA, of which the Community's share is 10 million EUA.

Solar energy

One twentieth of our energy requirements to be provided by the sun in the year 2000? Though this may not sound a lot, it would save considerable quantities of oil. There is, however, a problem in that though solar rays cost nothing, the ways of utilizing them do not. Producing energy profitably is still a difficult problem, and the penetration of new techniques is inevitably very slow. The Community is trying to promote the commercialization of solar energy. Following the first call for tenders published in July 1978, 135 requests for support were presented; the 26 projects accepted represent a total investment of around 26 million EUA, 6.35 of which will come from the Community. This support will enable solar energy to be used for:

- heating public swimming pools at Esch-sur-Alzette in Luxembourg, and at Uchaud in France.
- raising the temperature of water to be used for heating and for health purposes: for hot-houses at Imperia (Italy), a building complex at Chabrières in the French Alps, a school in Tiverton (U.K.); this will also be a solar energy educational centre.
- the desalination of 300 litres of drinking water per hour for the inhabitants of Pantelleria, a small island off the coast of Sicily.
- producing steam for a distillery at Roussillon in France.
- producing electricity via photovoltaic cells, directly transforming solar radiation into electrical energy. This process is particularly valuable for operating pumps to irrigate 60 acres of farm land at Bourrio-Betgonce in France; operating a pumping, heating and refrigeration system for cultivating chrysanthemums at Bisignano (Cosenzo, Italy); powering mail delivery vehicles at the University of Louvain in Belgium.

- producing energy from biomass: the production of steam and electrical energy from flax wastes at Plessis-Belleville (France), a 5 megawatt wood-fired power station at Offaly in Ireland, heating of premises using methane produced by fermenting manure at Schijndel in the Netherlands.

In addition, certain projects supported by the Community combine several processes. At Sassari in Italy, solar rays are used to produce both electricity and warm air. The latter is used to dry vegetation for animal feeds; near Turin a farm is being built to illustrate a large range of the thermal, thermo-mechanical and biomass applications of solar energy.

Two new calls for tender were published in January 1980, one of which is devoted solely to solar swimming pools. The 152 proposals put forward will be processed in Autumn 1980.

Energy savings

Diversifying energy sources is one approach, saving energy is perhaps a better way. The possibilities in this area are enormous. Following publication of the first European call for tenders in June 1978, 326 requests for support were put forward. 53 projects were accepted to a total cost of 75 million EUA, 21.4 million of which are covered by the Community, which in this sector can finance projects to a maximum level of 49% of their cost. These projects which can save some 100 000 tonnes of oil per year, are found in a wide variety of sectors and involve very different types of processes. They deal with:

- heat pumps, which draw heat from the surrounding environment and transfer it inside buildings : workshops and offices as at Augsburg and Nuremberg in Germany; administrative buildings as at Warendorf in Germany; housing (a 20-building programme at Lyon, France); not to mention the public dish-washing plant at Villefranche-sur-Saône in France. The heat required can be drawn from the air, but also from water (e.g. from the Rhine at Arnhem, Netherlands) or from paper pulp (Corbehem, France).
- collective urban heating projects: using powerful heat pumps (Copenhagen), incinerating straw (Svendborg, Denmark); using a nuclear reactor (France), or in combination with electricity production (Reggio-Emilia, Italy), the yield from power stations can be doubled. The Community is also financing the extension of the Saarbrücken network in Germany and also the control of the one at Brescia, Italy.
- other possible ways of saving energy in buildings : the construction of 17 single-family houses at Rotterdam and at Skive (Denmark) and 53 specially insulated homes heated using non-oil consuming techniques (solar heating, etc.); a French project to recuperate heat in the polluted air; an Irish programme to optimize and control energy consumption in homes; automation of lighting in offices at Groningen, Netherlands; the insulation and recuperation of heat in a swimming pool at Darlington.
- transport : the development in France of new electronic devices for controlling lighting and fuel consumption in cars.

- waste treatment : the production of gas from sewage and household waste (Amersfoort, Netherlands); new incineration processes for recycling plastic (Liege, Belgium); the transformation of old tyres into heating oil and into raw materials (Birmingham, U.K.); the conversion of tar into industrial steam (Durham, U.K.).
- electricity power stations : desulphurisation of smoke at Cologne and Dellbrück (Germany); using residual heat to raise the temperature of water and underground piping and speed up crop ripening on the land at Lelystad (Netherlands) and at Milan; the construction in France of several mini-hydraulic power stations for small waterfalls.
- in industry:
 - controlling energy consumption in a Manchester textile factory;
 - recuperating heat produced in a textile dying plant at Schio in Italy, also that from smoke from steelmaking plants (Turin) or metal works (Darlaston, U.K.). In this way, workshops, offices and water can be heated. A steel plant in Liege (Belgium) also envisages producing both industrial steam and electricity;
 - the construction of a new type of motor for a glass-melting factory at Obernkirchen, Germany, also for building high-efficiency metal furnaces in London, for boilers using mine-gas at Warrington, or a special scheme for using fuel oil down to the last drop (Rome) (the fuel is attached to molecules of water and heat is applied to 'atomize' the fuel for combustion).

A new call for tenders on energy savings was launched in September 1979. 304 proposals were received and 60 projects accepted at a total cost of 88.4 million EUA, of which the Community's share is 27 million EUA ■



The contents of this publication do not necessarily reflect the official views of the Institutions of the Community.

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