

Community demonstration programmes in energy saving and alternative energy sources

European File

Periodic crises and conflicts in the Middle East and fluctuations in the price of oil, or the world oil currency, the dollar, demonstrate the energy-vulnerability of the European Community. Despite successful efforts since 1973 to diversify energy sources, oil still accounts for half of the total energy consumption of the Ten. The European Community remains the largest oil importer in the world. The way forward in this as in other areas is through a joint Community strategy.¹ For this reason, the countries of the European Community have established common objectives in energy saving and the development of alternative supplies, such as nuclear power, coal, natural gas and various forms of renewable energy. A high level of investment is needed to assure the success of this strategy.

Since 1978 Community activity has been concentrated on support for demonstration projects in energy saving and new sources of energy. Support has been given to experiments in solar and geothermal energy and the liquefaction and gasification of coal.² It has been estimated that energy saving schemes and geothermal, solar and other types of renewable energy could account for at least 20% of likely European energy needs by the year 2000. The Community intends to speed up this development of alternatives to imported oil. Through support for demonstration projects, it can help to prove the commercial and industrial viability of many schemes which fall in the grey area between research and development and straightforward commercial improvements. Such schemes

¹ See *European File*, No 8/82: 'The European Community's energy strategy'.

² See *European File*, No 15/80: 'European energy demonstration projects'.

go beyond R & D pure and simple because of their large-scale application in industry and their ultimate aim to be economically self-supporting. But they also involve technical and financial risks too great for business to bear alone. Public aid can bridge this gap with far-reaching benefits. Businesses need not be the only ones to take advantage. Support can also be given to local government projects or even private individuals who wish to improve the insulation of their homes. Benefits will also flow in the form of new jobs and lower charges and prices for consumers.

To identify worthwhile projects, the European Commission publishes regular invitations to tender for grant aid in its 'Official Journal'. In the first three years of the Community programme, the Commission opened 11 tenders and received a total of 1 500 applications, of which 300 were selected for grant aid. Community aid generally covers a maximum of 40% of the investment. Part of this must be refunded if the project proves commercially successful. Projects are selected with the help of expert committees taking account of the degree of innovation, technical quality and risk involved and the prospects for commercial success.

From 1978 to 1982 grants totalling 219 million ECU were awarded.¹ These were shared out as follows: 89 million ECU for 202 energy saving projects; 23 million ECU for 84 solar energy projects; 32 million ECU for 56 geothermal projects; and 75 million ECU for 13 projects for the liquefaction and gasification of coal. The total investment in these schemes was 950 million ECU. The annual average for Community-stimulated investment in new projects has therefore topped 300 million ECU.

Why take action at Community level?

- Community involvement in demonstration programmes helps to stimulate national action. When the European programme began in 1978 only two member countries had national legislation to aid demonstration work. A law passed in Italy in 1982 completed a full house of Member States undertaking action of this kind. In France, the Federal Republic of Germany and Denmark, in particular, demonstration projects have a central role in national energy strategy. Aid paid out by all the Member States reached 815 million ECU by the end of 1981. More than half was devoted to coal liquefaction and gasification projects. The balance went mainly to energy saving schemes and smaller amounts to the development of alternative energy sources. Priorities vary from country to country. So does the scale of the aid and the method and level of payment. This ranges from 25% to 100% of the total investment. Nevertheless, certain broad trends can be identified. Energy saving projects are concentrated in the building and manufacturing sectors, although in Germany there has been a lot of work on district house heating programmes and in the transport sector in France. Most Member States have supported solar heating and wind power schemes. A number of countries have given aid to energy generation from the biomass and geothermal sources as well as the gasification of coal.

¹ 1 ECU (European Currency Unit) = about £ 0.59, Ir. £ 0.69 or US \$ 0.96 (at exchange rates current on 7 December 1982).

- Community action can help to avoid duplication or dispersal of effort and distortions of competition in an area where the member countries face identical problems. It can help to make the different national energy policies more coherent and bolster their efforts at a time of national budgetary constraints. Community aid can often be a decisive factor in the approval of national projects.
- European demonstration programmes are often a logical extension of Community action in the research and development field. In many cases they also build on the results of national research.
- Community programmes help to disseminate technical advances to the whole continent. They force comparisons between innovations in different parts of the Community and encourage the distribution of findings through publications and conferences. The result should be not only a reduction in the Community's dependence on imported oil, but also a cutting of manufacturing costs, which will benefit consumers, improve competitiveness and preserve jobs.

Initial results

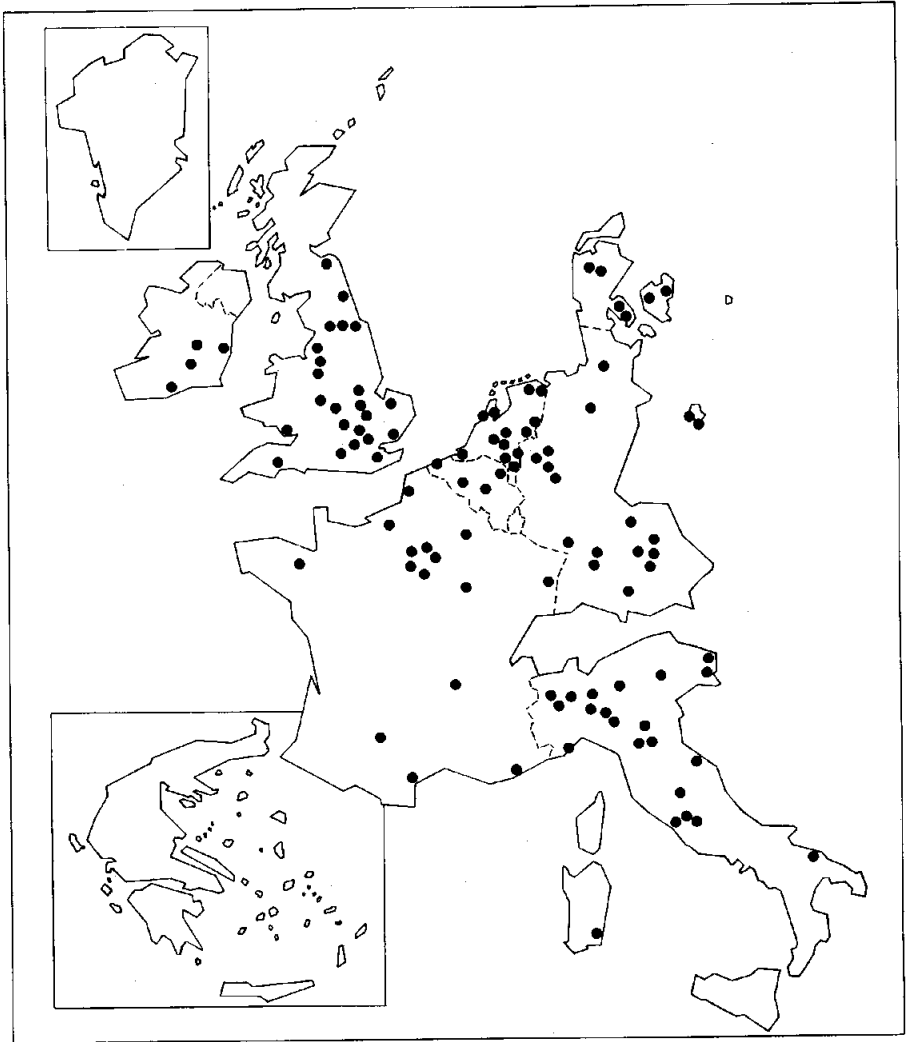
With the help of independent experts, European Commission officials have recently carried out a study of demonstration projects which have been or soon will be completed. Their findings were, for the most part, encouraging.

- Energy saving projects: by 1990 these could be saving the Ten between 130 and 150 million toe (tonnes oil equivalent) every year. This represents between 12% and 14% of current energy consumption and nearly one third of current oil consumption. Savings are possible in all sectors of the economy although the level of investment and return varies from one sector to another.
 - Buildings: heating, ventilation, lighting and hot water for homes, offices and other buildings swallowed up 252 million toe in 1980, 35% of total energy consumption. Savings can be accomplished in two ways. 'Passive savings' can be made through better insulation, better temperature control and improved construction methods. 'Active savings' can be achieved by improved heating boilers, the use of heat pumps, district heating networks and the simultaneous generation of heat and power. 'Passive' projects, often combined with solar energy or heat pumps, are being tried out with Community help in 157 new or renovated homes in seven cities in five member countries. Extremely useful comparisons will be possible when the different projects are completed. 'Active' projects have produced economies ranging from 30 to 65% in the heating of water and buildings, depending on the type of methods chosen. In Rome, for example a new type of emulsifier has given impressive results by improving the rate of combustion and reducing smoke emissions and clogging in hotel and hospital boilers. Fifty boilers have already been equipped and the commercial success of the scheme seems assured. In Groningen in the Netherlands, a 73% saving was achieved by improving the artificial lighting of an office block.

- **Industry:** this sector accounted for another 35% of Community energy consumption in 1980. Community energy-saving schemes have been concentrated in the steel industry, which has the greediest energy needs. Projects have included a scheme in Turin, Italy, for reducing the volume of air sucked in by electric furnaces. The saving was double the expected level. A much larger project at Dunkirk, France is expected to save 100 000 toe a year in a single factory.

Community grants have gone to other types of industry, including non-ferrous metals, glass, cement, building materials, chemicals, textiles and food processing. Energy savings have often been achieved by re-cycling heat. A project of this kind at Balineen, County Cork, in Ireland, cut the energy bill of a creamery by one quarter. Other schemes have included a 22 000 toe annual saving by a factory at Warrington in the UK which converted its boilers to take otherwise wasted gas from local coal mines. A refinery at Feyzin in France saved 2 500 toe a year by improving its method of separating oil from water. A project at Avonmouth in the UK was a hybrid between energy saving and the recycling of waste. It involved burning the waste material from re-treated, used lubricating oil and helped to increase efficiency without damaging the environment. Commercial application of this process on a Community scale could save 150 000 toe annually.

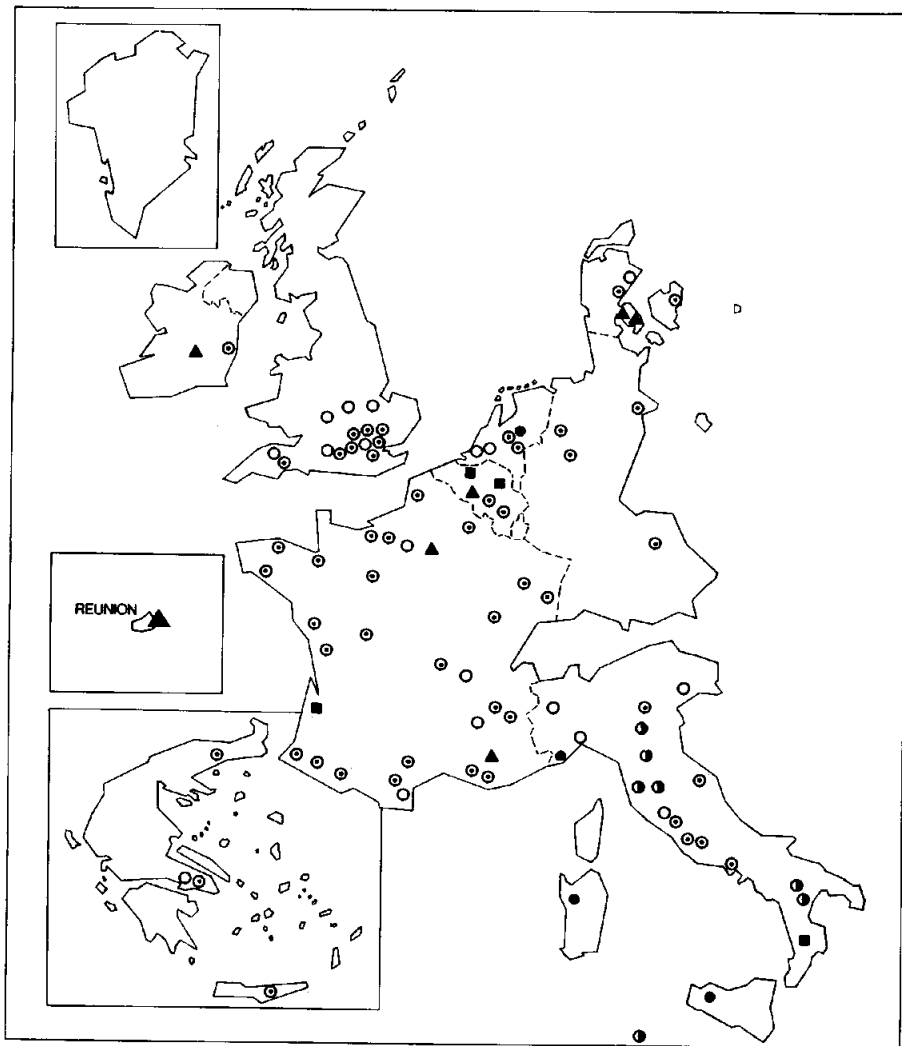
- **Transport:** this sector accounted for 25% of total energy consumption in 1980 and 44% of oil consumption. Nearly 85% of this energy was swallowed up by road transport alone. Advances are possible in this area through improved aerodynamics, tyres and transmissions and by making vehicles lighter and recycling exhaust gases. But very few projects have emerged. These have mainly involved increasing the efficiency of traditional engines and the development of electric vans.
- **Recycling waste:** each year Europe produces two billion tonnes of urban, agricultural and industrial waste. Between 70% and 90% could be recycled – with benefit to the environment – as animal feed, fertilizer or fuel. Some 100 to 120 million toe annually could be saved by burning waste materials or gasifying or fermenting them into alcohol or methane. A demonstration centre at Pavia, in Italy, built with Community assistance, shows how animal, vegetable and urban waste can be used to produce ‘biogas’. The waste materials are acted upon by ‘anaerobic digestion’ or micro-organisms in an oxygen-free environment. The centre has fused research material from all 10 Member States. It intends to market equipment for use with animal and household waste.
- **Solar energy:** the power of the sun’s rays is an intermittent but free and inexhaustible source of energy. It can be used to generate heat or electricity. Further development is needed, however, to iron out technical snags and reduce the high cost of the equipment needed. It is estimated that 40 to 70 million toe (about 5% of total energy consumption) could be supplied by solar energy by the year 2000. Community solar demonstration projects have taken three forms: heat conversion, photovoltaic conversion and biomass.
- **Heat conversion:** this process converts the sun’s rays directly into heat for buildings, water or even, in the southern part of the Community, industrial or agricultural



Demonstration projects receiving Community aid

● Energy saving projects

Source: European Commission, Directorate-General for Energy.



Demonstration projects receiving Community aid

Solar energy projects

Heating projects

○ Buildings

● Industry

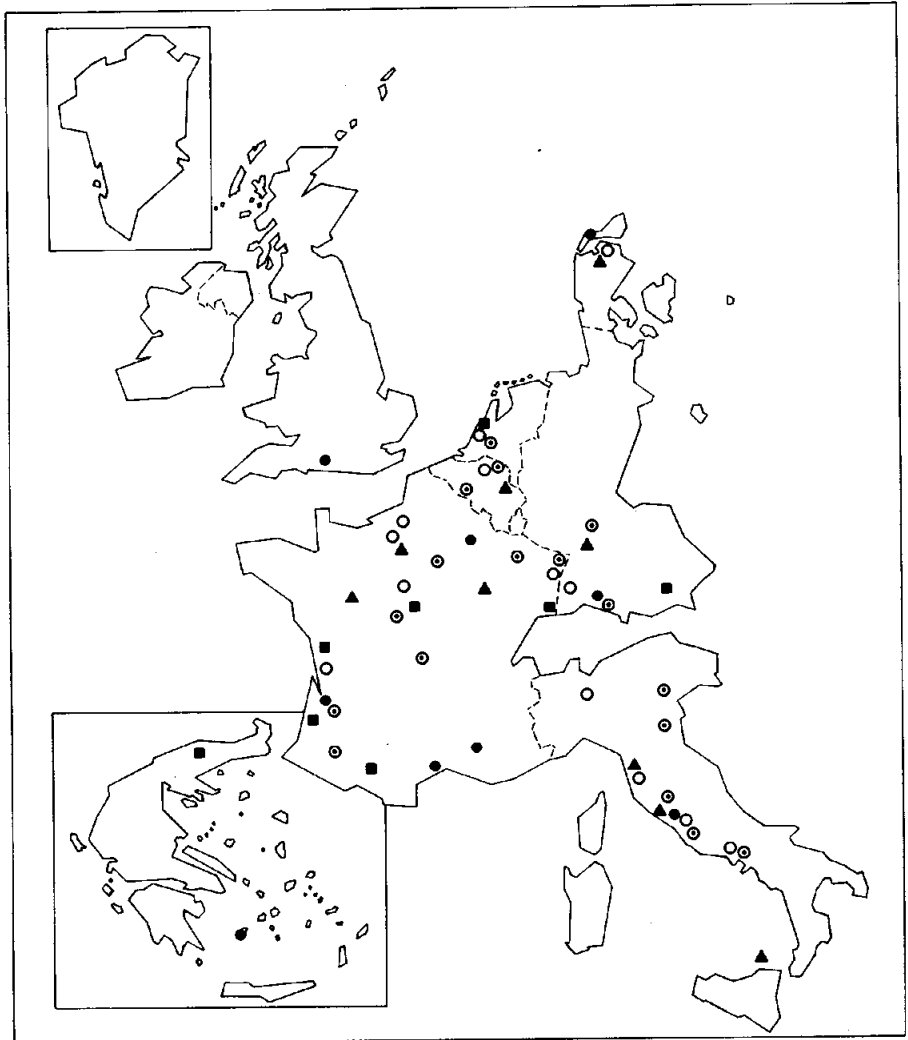
● Agriculture

⊙ Swimming pools

▲ Photovoltaic projects

■ Biomass projects

Source: European Commission, Directorate-General for Energy.

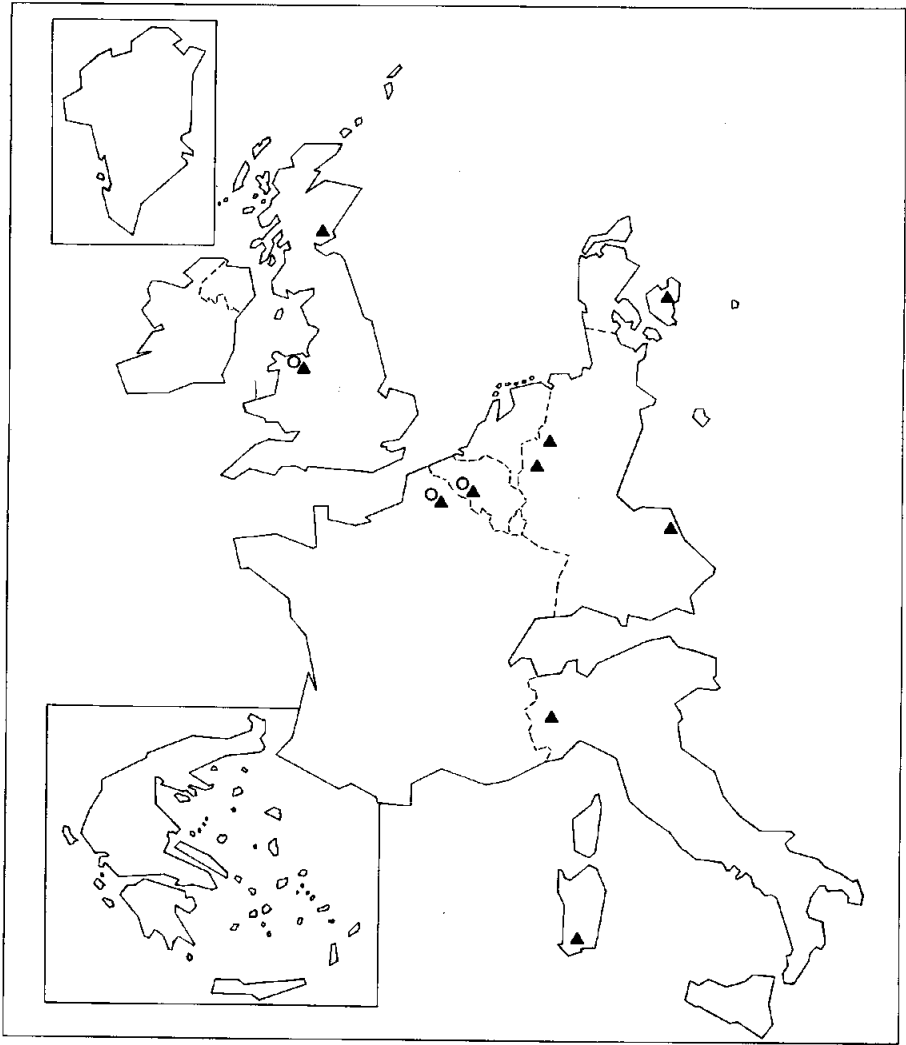


Demonstration projects receiving Community aid

Geothermal energy projects

- First decision (1979)
- ⊙ Second decision (1980)
- Third decision (1981)
- ▲ Fourth decision (1981)
- Fifth decision (1982)

Source: European Commission, Directorate-General for Energy.



Demonstration projects receiving Community aid

Liquefaction and gasification of coal

- First decision (1978)
- ▲ Second decision (1980)

Source: European Commission, Directorate-General for Energy.

uses. Community grants have helped to build 55 solar-heated swimming pools, scattered through all the member countries. Some have been heated by glass collecting panels, some by other methods. A fascinating project is the heating and air-conditioning of a factory at Lyons in France by roof and wall-mounted air ducts. The heat is stored in breeze blocks and boosted by heat pumps. The Sol og Vind project in Denmark involves the heating of 27 homes and a community hall by 640 square metres of collecting panels. The heat is stored centrally in two reservoirs. Agricultural projects include two in Italy. At Camporosso a greenhouse is heated by air ducts mounted on a bed of shingle, which stores the heat. At the University of Sassari in Sardinia a variety of solar installations provide both direct heat and electricity for the drying of agricultural by-products for animal feed.

- **Photovoltaic conversion:** photovoltaic cells convert solar energy directly into electricity. This is a 'clean' and promising technology but development is at an early stage and equipment is costly. One of the most successful projects is at Bourriot-Bergonce in the Landes region of France. Solar energy operates a pump which feeds a micro-irrigation system in a field of asparagus. Yields have tripled and water consumption has been cut by five times. The project is likely to become commercially viable in the near future. It has attracted interest from agricultural research centres and several developing countries.
- **Biomass:** this process encompasses all forms of energy from renewable biological material (through combustion, gasification fermentation or anaerobic digestion). Three projects are particularly promising. In Counties Offaly and Mayo, Ireland, 600 hectares of woodland are being cropped intensively to feed a power station converted for wood burning. At Plessis-Belleville in France a system is being developed for the gasification of flax waste on a fluidized bed. This process could be adapted for many other forms of dry, agricultural waste. On the French island of Réunion there are plans to use sugar-cane waste to generate electricity. Such processes present interesting opportunities for applications in developing countries.
- **Geothermal energy:** this consists of exploiting underground springs of hot water or steam and even hot, dry rocks. Its development is heavily dependent on public aid because of the considerable financial risks at the exploratory and mining stage and the many technical problems involved. But the widespread low temperature sources of geothermal energy in the Community should yield some 20 million toe annually by the turn of the century. In the short term, development prospects are best in Italy, Greece and France. But demonstration projects have been financed by the Community – often the first of their kind, nationally – in Belgium, the Netherlands, Germany, Denmark and the United Kingdom. Projects involving the district heating of buildings have been carried out at Ferrari in Italy and at Beauvais and Bordeaux in France. There is even a plan to use water vapour and brine to generate electricity on the Greek island of Milos.
- **The liquefaction and gasification of coal:** the Community attaches special importance to methods of substituting oil and gas with solid fuels. Western Europe still has large coal reserves but their awkward profile or great depth (sometimes under the North Sea)

makes mining costly and difficult by traditional methods. Hence the idea of gasifying such seams and then liquifying the gas to facilitate transport. Projects of this kind demand the latest technologies, large-scale installations and lengthy lead times (up to seven years) before results are achieved. This is where Community demonstration projects come in. Efforts are currently concentrated on gasification. One method under test at Salzbach-Rosenburg, in Germany has the dual advantage of producing good quality gas without unduly disturbing the environment. Another method is being tried out at Westfield in the United Kingdom. Attempts at gasification in coal-mines proper are under way at Thulin in Belgium — a joint project with Germany — and at great depth at Bruay and Faulquemont in France.

Priorities for the future

Evaluation of completed or nearly completed projects has, on the whole, vindicated the original selections made, particularly in the breadth of the range of new technologies involved. Results of most projects are satisfactory and some have surpassed expectations. The Community programme, carried out with the help of national specialists, has stimulated national programmes and often led to the extension of national and Community research projects. It has encouraged innovation, the dissemination of new methods throughout the Community and promoted increased cooperation between companies, large and small, in different Member States. The results of the Community programme, taken alongside the preliminary — and unfortunately partial — evaluation of national programmes, provide a basis for establishing priorities for the future:

- In the energy-saving sector efforts should be concentrated on large industrial consumers, such as steel, cement, glass, chemicals and paper as well as in administrative and business offices. On the domestic front, savings could be multiplied if successful projects were applied to large housing estates. Further efforts are needed in the recycling of waste and in the transport sector. More attention should be given to new forms of transport, improved heat generation and distribution and communal and district heating systems.
- In the alternative energy sector, support should be extended for geothermal projects and the gasification and liquefaction of coal. In view of the considerable financial risks involved in these areas, increased aid is justified. Community aid should also continue for all branches of solar-energy research but should concentrate on projects most likely to yield commercial results in the short and medium term. This means biomass projects and direct heating, except for swimming pools, where techniques are now fully developed. Community programmes should also be launched in new areas, such as wind and tidal power and the harnessing of energy from comparatively slow-flowing streams and rivers. Finally, efforts are needed to promote oil substitution programmes, including new technologies for solid fuel combustion, and the disposal of spoils and ash. The Community should also encourage the generation of electricity from fuels other than oil and gas.

Extension of the Community demonstration programme should also involve:

- Better coordination of national and Community activities.
- Support for projects outside the Community. Helping the spread of solar-energy technology could, for instance, contribute to the development of the Third World whilst encouraging the mass production of cheaper solar-energy equipment.
- Better and more systematic dissemination of results through seminars, large-scale European conferences, visits, publication of reports and press releases on successful projects.
- Greater financial resources. Coal liquefaction and gasification projects, for instance, should be allocated 80 million ECU between 1983 and 1985 and between 1983 and 1987 450 million ECU should be allocated to alternative energy projects and 250 million ECU to energy-saving schemes ■



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

Commission of the European Communities

Information offices (countries fully or partially English speaking*)

Ireland 39 Molesworth Street, Dublin 2 – Tel. 71 22 44

United Kingdom 20 Kensington Palace Gardens, London W8 4QQ – Tel. 727 80 90
– 4 Cathedral Road, Cardiff CF1 9SG – Tel. 371631
– 7 Alva Street, Edinburgh EH2 4PH – Tel. 225 2058
– Windsor House, 9/15 Bedford Street,
Belfast BT2 7EG – Tel. 40708

Australia Capitol Centre, Franklin Street, PO Box 609,
Manuka 2603, Canberra ACT - Tel. 95-50 00

Canada Association House (Suite 1110), 350 Sparks Street,
Ottawa Ont. K1R 7S8 – Tel. 238 64 64

USA 2100 M Street, NW, Suite 707,
Washington DC 20037 - USA – Tel. (202) 862-9500
– 245 East 47th Street, 1 Dag Hammarskjöld Plaza,
New York, NY 10017 - USA – Tel. (212) 371-3804

* Offices also exist in other countries including all Member States.

