

EUROPEAN COMMUNITY

BACKGROUND INFORMATION

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EUROPEAN COMMUNITY ENERGY PROGRAMS PRESENTED

In an effort to pull the separate elements of European national nuclear energy programs into a European Community framework and to prepare a common stand on nuclear development for coming International Fuel Cycle Program talks, the Commission of the European Communities has presented papers on fuel reprocessing, fast breeders and waste disposal to the Council of Energy Ministers.

The paper on fuel reprocessing was adopted by the Commission on July 13; those on fast breeders and on waste disposal were adopted on July 27.

In a press conference yesterday, Community Energy Commissioner Guido Brunner said that the Commission wanted to attend the International Fuel Cycle Program talks, proposed by U.S. President Jimmy Carter at the London summit in May, as a full and independent member. The Commission documents, he said, were prepared as a first step toward getting a clear picture of Europe's nuclear needs. They would signal other participants in the talks that Europe, which is 80 per cent dependent on imported uranium and recently revised its projected 1985 dependence for all energy imports to more than half, has special circumstances and must keep its options open for fast breeder reactors. On reprocessing, a Community strategy would insure that reprocessing capacities would be limited to Community needs, without excess capacity being built for national needs. Fewer reprocessing sites would lessen the danger to population and environment and facilitate the safeguarding of the reprocessing plants. A network of Community waste disposal sites is preferable for similar reasons, Brunner said.

President Carter has publicly opposed commercialization of the fast breeder reactor and urged other nations to curtail their exporting of breeder technology for fear of nuclear proliferation, but he has said he favors continued research into the process.

Brunner told reporters yesterday that he believed it important not to enter into the fuel cycle talks with the result prejudged. With proper handling and the needed technical experience, he added, there is no need for confrontations about a plutonium economy.

On the Joint European Torus, the Community's program for fusion energy that has been held up for several months pending a decision among the nine member states on where to build the massive, donut-shaped hydrogen test facility, Brunner said the Council of Foreign Ministers had taken a step toward resolution by continuing the program's funding for several weeks and deciding to reconsider the site issue at its next meeting on Sept. 20. Britain wants the JET site to be at Culham in England and Germany has asked that the reactor be built at Garching in Bavaria.

Because of the delays in building JET, some European scientists are reportedly considering job offers from the Princeton Plasma Physics Laboratory in Princeton, New Jersey. Brunner said he thought the European scientists should maintain "cautious optimism" on a resolution to the proposed \$170 million JET project.

Statements to the press summarizing the Commission's three nuclear energy communications and the new objectives in energy policy are attached.

THE COMMUNITY'S NUCLEAR STRATEGY: WASTE DISPOSAL

As a further contribution to the debate on the Community's nuclear policies accompanying the policy decisions on reprocessing and fast breeders, the Commission has also adopted an action plan for the management and disposal of nuclear waste.

In all three policy areas, the Commission has stressed the paramount necessity of maintaining the strictest standards of safety and protection for the citizen and for the environment.

The disposal of nuclear waste poses problems connected with its radioactivity and therefore its toxicity and, as far as highly radioactive waste and very long life are concerned, with the necessity for them to be stored away securely for thousands of years.

At the moment, nuclear waste is produced in relatively modest quantities and its existence has not posed important difficulties up to now. The foreseeable increase in the Community's nuclear power program during the coming decades, however, lends new dimensions to the problem.

The waste material has to be treated and conditioned in such a way as to satisfy the most stringent conditions for permanent storage. Various methods of processing highly active waste in the Community (vitrification, in particular) and their development on an industrial scale is now being studied.

As for permanent storage, some promising solutions are under study (for example, when conditioned, it can be stored in certain geological formations).

The Community institutions have for several years recognized the necessity of joint action in the field of waste disposal. For these reasons:

- member states face similar problems because of their nuclear programs;
- all are densely populated;
- all nuclear waste has to be handled and stored in such a way as to ensure protection of the population and the environment from radiological risks;
- commercial aspects have a very secondary importance, and therefore nuclear waste management is a public service;
- a Community action would avoid unnecessary multiplication of waste storage sites, and will facilitate surveillance and security.

Community action at present consists essentially in the execution of research and development (R and D) programs. These programs complement and are partly integrated in those of the member states. They represent a first effort, but waste disposal goes beyond the technical aspects of R and D. It also involves questions of a juridical, administrative, and financial nature, and all measures necessary to protect people in the Community. These considerations transcend the purely national concern.

Therefore, the Commission proposes now to set up a new Community action plan.

THE NEW PLAN

The plan will be directed at all the problems posed by the differing types of radioactive nuclear waste, and will pay special attention to wastes that are highly radioactive and/or with very long life, coming especially from reprocessing factories.

It will extend from 1978 to 1990. A shorter period would not be worth the effort, taking into account the duration and importance of work to be carried out. The plan is to be revisable every three years in the light of experience.

The plan centers on six main points:

1. analysis of the basic situation in the Community leading to the adoption of solutions in due time;
2. measures rendering it possible to draw up a Community network of storage sites;
3. harmonization and progressive standardization of practices and policies concerning waste management;
4. continuing efforts of research and development for the entire duration of the plan;
5. study of ways in which the Community could share certain costs, concerned with management - storage of the waste;
6. regular office information for the public issued at Community level.

THE COMMUNITY'S NUCLEAR STRATEGY: FAST BREEDERS

1) Given world shortages of uranium, the Commission has already proposed a program of action for reprocessing and recycling used nuclear fuel. The fast breeder is another essential link in the Community strategy of reducing dependence on outside sources of energy.

2) The Commission therefore proposes:

- that the Community and its member states must preserve the option of making fast breeder reactors available to utilities on a commercial basis during the early 1990s;
- that the demonstration of the fast breeder technologies by industry should continue without loss of momentum and that at the same time increased effort should be applied toward achieving fully adequate performance of this reactor system in terms of safety, radiological protection and impact on the environment;
- that the Community should support the implementation of these objectives by means of Community-funded actions, in particular in the field of fast reactor safety and codes and standards.

THE BACKGROUND

Against a background of continuing and accelerating deterioration of the hydrocarbon supply situation of the Community beyond year 2000, it is essential that nuclear fission maintain and possibly improve its contribution to the energy balance of the Community during the first part of the next century.

The potential contribution of nuclear energy is, however, limited. In 1976, nuclear energy contributed about 2.1 % of the total consumption of primary energy in the Community. This percentage may rise to about 10 % in 1985 and to a maximum of 20 % to 25 % in the year 2000, when nuclear power stations may cover an important part, but not all, of the demand for electricity. The share of nuclear power in the production of electricity for the years 1976, 1985 and 2000 is, respectively, 8.4 %, 30 % and 50 % to 70 %.

Natural uranium sources are finite and supplies are by no means assured. The Community reserves amount only to about 3.5 % of world reserves, which are estimated to total about 3.5 million tons. Reprocessing and fast breeders would make significant contributions to reducing dependence.

Fast breeders can extract at least sixty times more energy from natural or depleted uranium than thermal reactors. With the help of breeder reactors, 5,000 tons of uranium could provide as much energy as all the oil in the North Sea (recoverable reserves, about 3 billion tons).

A fully commercial fast breeder program will require more than 20 years. An expanded program will probably be needed in the first quarter of the next century in order to sustain the Community's nuclear power program and, at the same time, reduce annual uranium needs.

PRESENT PROGRAMS

Fast breeder development in the Community is unmatched in the world. During the past twenty years, more than \$2.5 billion has been spent. Present expenditure accounts for about 30 % of total research and development (R and D) expenditure on energy. Several experimental reactors and prototypes have been successfully built and operated. One large station of 1,200 MW is under construction (France, Super-Phenix), and two more are at an advanced stage of design (in Britain and Germany). A trend has already developed toward cooperation among several member states to build fast breeders. See table below:

	Experimental Reactors	Test Reactors	Prototypes (200-300 MW)	Demonstration Plants (+ or - 1200MW)
Britain	DFR (1963)		PFR (1974)	CFR (Project not yet adopted)
France	Rapsodie (1967)		Phenix (1974)	Super-Phenix (+) (1982)
Federal Republic of Germany	KNK II (++++) (1977)		SNR 300 (++) (1982)	SNR 2 (+++) (Project not yet adopted)
Italy		PEC (1981)		

(+) In collaboration with Italy, the Federal Republic of Germany, Belgium, and the Netherlands.

- (++) In collaboration with Belgium and the Netherlands. Britain is marginally involved through a nominal participation of the Central Electricity Generating Board (CEGB) at the utility level.
- (+++) In collaboration with France, Italy, Belgium, and the Netherlands.
- (++++) In collaboration with Belgium and the Netherlands.

PROBLEMS

The Commission is fully aware of the problems associated with a plutonium economy in the future.

Member states are already involved in research into reactor safety spending, about 50 million UA per year (about \$57.5 million). The Community's contribution at the moment is about 10 million UA (about \$11.5 million) spent in programs at the Joint Research Center at Ispra, Italy, and Karlsruhe, Germany.

SAFETY

The Commission believes that a greater Community involvement in fast breeder reactor safety programs is justified. Such involvement could contribute to a strengthening of the cooperation already existing at national level, to intensifying and increasing the efficiency of national efforts and ultimately to facilitating the acceptance of fast reactors by establishing a coherent Community approach.

The Commission therefore intends to submit during 1978 proposals for more joint research and development on fast reactors. Proposals will also be submitted with a view to rationalizing guidelines for design, manufacture, and inspection standards.

FINANCE

As for finance, the Commission acknowledges the problems involved in developing new technology of this kind and the crippling penalties involved in any delays for those first in the field. It suggests assigning high priority to the financing of fast reactor demonstration projects including the fuel cycle, possibly by exploiting devices such as the Euratom loans, or other measures.

THE COMMUNITY'S NUCLEAR STRATEGY : REPROCESSING

Because of the Community's great dependence on outside energy supplies, the Commission has come to the conclusion that in order to diversify sources nuclear energy is indispensable. The Community's own reserves of nuclear material, however, are insufficient for future requirements. The Community cannot, therefore, afford to throw away spent nuclear fuel, which can be reprocessed and reused in advanced types of reactors such as fast breeders.

The Commission also concludes that reprocessing is compatible with concern for the safety of the public, protection of the environment and with the exclusively peaceful use of nuclear material.

The following strategy is now being proposed to the Council for a rational approach to the nuclear technology of the future:

- by bringing together in joint ventures the promoters of reprocessing facilities and the power station operators,
- by offering member countries reprocessing services at the best possible price,
- by providing financial aid,
- by making it possible for third countries (particularly the Community's European neighbors) to participate in these joint ventures.

Such joint reprocessing facilities would be subject to the strict controls developed within the Community's EURATOM system and would help toward the general aim of avoiding the proliferation of potentially dangerous nuclear material. The concentration of reprocessing facilities in regional centers would also simplify the security problem in countering theft and sabotage. In addition, it would be possible to keep down the number of reprocessing plants, thus reducing costs and security risks.

The Commission is proposing to the Council the creation of a committee to study and implement this strategy. The committee would be composed of up to three members nominated by member states drawn from public utilities and interested industrialists. A representative of the Commission would take the chair. Their task would be to draw up a report for the Council by the end of 1978, on the means of financing and promoting joint reprocessing facilities.

THE REASON WHY

The Community will become one of the largest consumers of nuclear fuel by the year 2000, accounting for about one-third of world demand. At present 80 per cent of uranium consumed is imported. Development of a policy of reprocessing would bring medium-term benefits.

In the medium term (1985-90), reprocessing would secure a reduction in the requirement of natural uranium (in the order, on average, of 20 per cent per year) and in the workload of enrichment (in the order of 15 per cent per year) in the Community, with the aid of uranium and plutonium recycling at Light Water Reactor

power stations. The present difficulties with regard to reprocessing and the supply of plutonium to the first Fast Breeder reactor power stations would probably restrict this reduction to half of the percentage indicated above.

In the long term, reprocessing would secure the prospect of virtual freedom from dependency on external supplies, thanks to Fast Breeder reactors. It is thus no accident that the countries most heavily committed to the development of fast reactors and reprocessing are in the Community. This commitment has so far been reflected in a very high level of expenditure and investment.

The Commission proposal states that the risks connected with the production and storage of highly radioactive substances, and with plutonium, which could be manufactured into an atomic bomb, are manageable because of existing Euratom and International Atomic Energy Agency (IAEA) controls and measures of physical protection provided by member states. Radiological risks for future generations might be greater if reprocessing were not undertaken. In that case, the plutonium not recovered would remain in the spent fuel elements. This waste would remain radioactive for a very long time and thus its storage would be a long-term risk.

PRESENT HANDICAPS

At present, the development of reprocessing is handicapped by technological difficulties, by problems of finance, and problems connected with the industrial application of the technology of waste disposal.

There are also the problems of public acceptance, which are being encountered to differing degrees within the Community and are impeding some projects.

Most countries with a significant nuclear program have begun projects for reprocessing. But there are at present no big reprocessing plants anywhere in the world for treating fuel for existing types of reactors (Light and Heavy Water Reactors and the British advanced gas reactors) with the exception of that of La Hague (Cogema, France), which started operations at reduced capacity in 1976.

Consequently, there could be a world shortage of facilities in future years. In the Community, capacity will remain inferior to needs until at least 1986-89. That means that the stock of irradiated fuel accumulated since 1975 will not be entirely reprocessed until sometime after 1988 at best.

If these problems are not overcome in good time, the Community's nuclear objectives could be in danger. The lack of capacity means the used fuel has to be stored while awaiting treatment. On present calculations, the storage problem could be solved by 1990 by doubling the current storage capacity at the various nuclear power stations. It could also be solved by creating centralized storage facilities. As an example, the Community will need by 1990 some 10 to 15 units of 1,000 tons of extra capacity, representing an investment of the order of 1 to 1.5 billion units of account (about \$1.5 to 1.8 billion).

LATER STUDIES

The Commission will be putting forward soon proposals for further research and development work concerning nuclear waste. In addition, the Commission will set up a working group to make a detailed examination of diversion-proof technological processes. These proposals will include suggestions that could be incorporated eventually in the international nuclear fuel cycle evaluation program proposed by the United States.

A Community strategy could also provide for Community participation in the costs of the proposed regional centers for waste disposal (perhaps five might be needed by the end of the century). They would be open to all member states.

REPROCESSING: WHAT IS IT?

Reprocessing is a complex chemical operation involving spent fuel taken from nuclear power stations. The spent fuel is a mixture of reusable products (unburned uranium, and the plutonium created during the irradiation process in the reactor) and of radioactive waste. Reprocessing enables the uranium and plutonium to be used again. The plutonium may be burned together with the uranium in Light Water Reactors, but it is essentially the indispensable fuel for the Fast Breeder Reactors, which might permit the Community to ensure the long-term future of nuclear energy in the Community.

Plutonium may also be used for making nuclear explosives, which is why reprocessing must be subject to rigorous security measures. It is not highly radioactive, but very toxic if breathed in. The extracted uranium may also be used in reactors. Unless enriched, it poses few problems.

COMMUNITY'S NEW ENERGY POLICY OBJECTIVES FOR 1985

In a review of the latest forecasts of member states, the Commission has recommended to the Council a reaffirmation of the target of reducing the Community's energy dependence to 50 % by 1985. The Commission has also suggested that the share of oil in the consumption of energy should be reduced.

It is now accepted that the previous 1974 prediction which foresaw a reduction of energy dependence to 40 % is beyond reach.

The objective for 1985 is to set a platform for petrol imports of a maximum of 500 MTEP (million tons equivalent petrol), or 10 million barrels a day, and to make this a basis for the general energy policy.

The Commission also suggests the following new targets for 1985:

- coal production should be set at about 175 MTEP (= 250MTEC). The use of coal in power stations (target 20 MTEP extra) should be encouraged, notably in order to cover the delays in the nuclear programs of member states;
- the production of hydrocarbons should rise to at least 140 MTEP for oil and 160 MTEP for natural gas;
- more natural gas should be substituted for oil (target 10 to 25 MTEP more both Community and imported);
- policies for a rational use of energy should be maintained and intensified.

The Commission has also recommended that a start should be made now on forecasting energy policies for the year 1990.