

National reports:

FRANCE

Observations from France

*A look at some reasons
behind the strong programme*

by **Georges Vendryès**

France is sorely lacking in domestic energy resources. Since World War II, the nation has relied heavily on foreign energy to meet its needs. For instance, the share of imports rose from 38% in 1960 to 77.5% in 1973 of the nation's total consumption of primary energy. As security of energy supply depended more and more on foreign sources, France became increasingly vulnerable. The oil crises in 1973 and 1979 emphasized the grave consequences of this situation for France. The amount paid out for energy by the nation in foreign exchange increased from 1970–80 by a factor of five in constant money. In 1980, it represented, in French francs, roughly as much as was collected in income tax.

This underlines the national drive to re-establish the nation's energy balance, one which has been endorsed by each successive French Government. The media have discussed the problem and its implications at great length. These are clearly perceived by the public.

Motivation of national independence

This shortage of domestic energy resources was partly behind the development of France's vast nuclear power programme. Despite similar problems, neighbouring Italy and Spain have not reacted in the same way. France has not ignored other solutions, such as diversification of its supply of oil and gas, stockpiling and energy-saving programmes. Contrary to its neighbours, however, France decided to make a full commitment to nuclear energy. Beyond the economic advantages, the real reason lies in the nation's emphasis on independence of supply, involving both the civilian and military aspects of nuclear power. Since 1945, when the Commissariat à l'énergie atomique (CEA) was

founded by General de Gaulle, France's civilian and military nuclear programmes have developed side by side.

As complementary parts of the policy on national independence, the civilian and military programmes naturally received close attention and high priority from the Government. The development of a large nuclear power programme became a national challenge which gathered the nation's forces under the close, continuous control of the Government. It might be said that the motivation behind the French programme can be compared to the thinking which inspired the Manhattan project or, closer in time, the US space programme.

Programme implementation

Once the basic policy decisions were made, their implementation was greatly facilitated by the Constitution of the Fifth Republic approved in 1958. Since then, power has been concentrated in the hands of the President who is elected for a 7-year term and may be re-elected.

This shift towards centralized Government and an executive branch with broad powers in the areas of defence, the economy, industry, and research has roots in the history of France. It is highly suited to the successful conduct of vast, expensive programmes. Their payoff lies in the distant future, their completion can take several decades and they require thorough planning and the co-ordination of numerous participants.

It is highly significant that the French nuclear power programme has only rarely been discussed in Parliament, and then only its broad outline and with little debate. In general, France's political parties have been pro-nuclear, and members of the majority in Parliament have closely heeded the wishes of the executive branch.

Safety oversight

All important aspects of France's nuclear power programme are subject to Government approval. Execution of the programme involves only a small number of players, working with the Government, who maintain close relations with each other.

Within the Government, the Ministry of Industry is in charge of the civilian nuclear programme and supervises Electricité de France (EDF), the nation's electric utility, and the CEA. It should be noted that the ministry's name, functions, and organization may change from one Government to the next.

This ministry includes the Central Service for Safety of Nuclear Installations (SCSIN). This department is charged with implementing procedures ensuring the safety of nuclear power plants and facilities, writing

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applications for their construction and start-up approval by the Government, and monitoring proper operation, among other things. This ensures the necessary separation, as a matter of principle, between those in charge of promoting and implementing nuclear technology and those responsible for authorizing its use.

However, the safety analyses, which are essential to the authorization procedures, are made for SCSIN by the CEA's Institute of Nuclear Protection and Safety (IPSN), which has the necessary technical skills. Its close knowledge of technical and industrial conditions puts it in the best position to make appropriate recommendations. Experience has shown that the level of safety achieved in this manner is at least equivalent to that found in other countries.

Decisions to build nuclear power plants are the responsibility of the Government, which issues the necessary authorizations. Some must be obtained before work may begin, such as the statement of public interest and the construction permit. Others, which are specific to the nuclear nature of the installation, affect operation of the plant; these are primarily the start-up permit and authorizations needed to discharge radioactive waste.

CEA's role

The CEA is an organization which has no exact equivalent outside France. In addition to responsibilities similar to those of the former US Atomic Energy Commission, it is engaged in commercial activities through a holding company, CEA Industrie. The CEA is a Government agency of which the main responsibilities, concerning the civilian applications of nuclear energy, are:

- The CEA advises the Government on French policy concerning the nation's nuclear programme, and on international nuclear policy, relating to exports and non-proliferation.
- It is in charge of most research and development programmes on nuclear reactors and their fuel cycle.
- As a shareholder in Framatome-Novatome, it is involved directly in the activities of the French builder of nuclear plants and participates in the development of its industrial and commercial strategy.
- Through its various affiliates, including Cogéma, Eurodif, SGN, and others, the CEA has become an industrial and commercial leader in all phases of the fuel cycle, including prospecting and working of uranium mines, enrichment, fuel fabrication, reprocessing, and packaging and storage of waste.
- As we have seen, through IPSN it provides technical support for the safety responsibilities of the Central Service for Safety of Nuclear Installations.

Industry involvement

Industrial activities in the nuclear field are highly concentrated in France. Framatome is the sole company which designs nuclear steam supply systems for EDF plants, provides their engineering and fabricates the

essential components, such as vessels and steam generators. Through its subsidiary Novatome, it plays a similar role concerning fast breeder reactors. In France, Fragéma, a joint subsidiary of Framatome and Cogéma, has a *de facto* monopoly on the design and sale of light-water reactor fuel. In addition, Alsthom Atlantique is the only company in France which designs, fabricates, and sells high-power turbogenerators, in particular all those used in EDF power plants.

All these organizations maintain close links. A Comité de l'énergie atomique meets every month under the chairmanship of the Minister of Industry or, in his absence, the Administrateur Général of the CEA. This committee totals some 20 high officials representing the various ministries concerned (industry and energy, research, defence, finance, external relations, and others) and leading figures from science and industry, including the chairman of EDF. These meetings discuss the main problems facing the nuclear power programme, and it is here that overall policy recommendations to the Government are prepared.

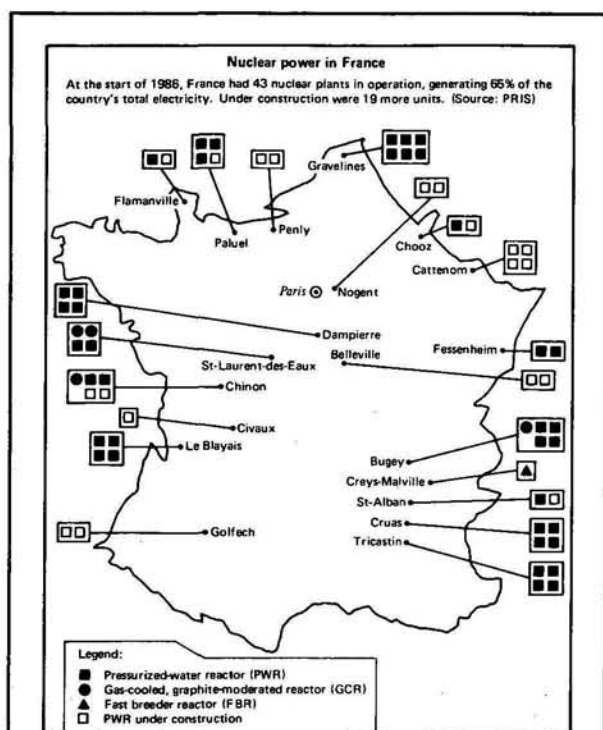
For 40 years, the main decisions on development of the French nuclear programme have been prepared if not made by a very small number of individuals, holding key positions in the Government or in the top management of EDF, CEA, and a few industrial firms directly concerned with the programme. The unchanging nature of the approach, even despite changes of ministers, is due to the long tenure of these officials, usually on the order of 10 years. The constant contacts and meetings between them have been facilitated by the proximity of their offices in the centre of Paris.

Lastly, the similar training of these individuals has indisputably contributed to good mutual understanding and the achievement of compromise between different points of view or divergent interests. Most of these officials are graduates of France's Ecole Polytechnique, an institution which both provides advanced scientific and technical instruction and prepares its students for leading positions in government or industry.

Public opinion and support

When antinuclear campaigns first occurred in France based on those in the United States, the French media obviously had a tendency to pick up the torch. It must be noted, however, that the most professional and influential press, radio, and television organizations never yielded to the temptation of scandal and the sensational to the extent of spreading inaccurate information and deliberately adding fuel to the flames. The main criticism of Government bodies was that they acted in secret or that they only provided selected, slanted information, especially concerning safety of the installations and protection of the public.

Highly effective methods were developed to inform or, more precisely, to eliminate criticism of the absence of information, because it is clear that a vast majority of people do not use the information provided to them. For



French nuclear generation

Electricité de France, the nation's electric utility, has a monopoly on the distribution and sale of electricity in France and accounts for 90% of the nation's electricity production. EDF employs 125 000 people; annual turnover totals 120 billion French francs. The utility has 55 400 megawatts-electric (MWe) of installed capacity, making it the Western world's largest electricity company. It has acquired experience in all types of power plants, using hydro, tidal, wind, and solar power, coal, oil, gas, and nuclear fuel. Today, EDF operates four natural uranium gas-graphite reactors, 38 pressurized-water reactor (PWR) plants (one 300-MWe unit, thirty-two 900-MWe units, and five 1300-MWe units) and a 1200-MWe breeder reactor. It is now building 19 more PWR plants (two 900-MWe units, sixteen 1300-MWe units, and one 1450-MWe unit).

As of 1 January 1986, cumulative operating time of EDF's nuclear power plants amounted to 350 reactor years. The operating experience acquired by the utility has produced high reliability and an excellent safety record in terms of accidents. Since the start of 1985, 65% of all electricity produced by EDF has come from its nuclear power plants.

In the era of conventional thermal power plants, EDF had a policy of building larger plants in successive steps of 60, 125, 250, and 600 MWe. It continued this policy in the massive nuclear programme. With the standardization it entails, this policy offers major advantages in terms of timetables and construction costs, it facilitates the transfer of experience, it simplifies management of the entire production system, and it improves plant operating safety.

As is its custom, EDF has chosen to be its own architect/engineer for the construction of the nuclear plants and performs general engineering.

example, it was officially decided that, for each nuclear installation, at the request of the public, an information commission would be created comprising elected officials and representatives of local unions and associations. Experience has shown that these commissions played a strongly positive role. Their very existence reassures the public by demonstrating that a means is available for supplying regular information on operation of the installation even to organizations which are openly hostile to nuclear power and that an alarm will be sounded in the event serious problems arise. At the same time, providing information openly prevents antinuclear groups from distorting it for their own purposes, out of fear of being exposed. EDF makes a considerable effort to provide information. The utility sends bulletins on each installation on a regular basis to thousands of local recipients; for Creys-Malville (fast breeder reactor), it has already issued more than 20 bulletins, for example. In addition, it organizes tours of nuclear power plants on a large scale, with tens of thousands of people visiting each site every year.

Today, in many communities nuclear installations are welcomed, and even sought, by the local elected officials. They recognize the substantial benefits to the public and that the plants are environmentally attractive neighbours. Nuclear facilities increase employment, business opportunities, and tax revenues. This means more and better schools, hospitals, parks, stadiums, and roads.



Control room of Kozloduy nuclear power station.

