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Breeder reactor politics in Europe

The pan-European fast-breeder-reactor program is not so much a triumph of international cooperation in a new energy age as a salvage effort for national programs with too much political investment to be allowed to die.

Anyone who thought the fast breeder was extinct should think again. Despite the demise of the US Clinch River project, the fast breeder is alive and well in Europe. Perhaps "well" is putting it too strongly; but alive it certainly is, and Europe is now its major habitat.

"Europe" here means just that: not individual countries but "Europe." Fast breeder policy on that continent is now, at least rhetorically, supranational - although the reality belies the rhetoric. On January 10, 1984, senior government ministers from Great Britain, France, West Germany, Belgium, and Italy signed a memorandum of understanding to say that thenceforth the five countries would pool their efforts in pursuit of the fast breeder. The British government disclosed this agreement on the day it was signed, with no prior discussion or debate by Parliament or the public; similar circumstances apparently prevailed in the other participating countries. Over the next two months this initial agreement was followed by others among the national nuclear agencies, the reactor vendors, the electric utilities, and the nuclear fuel companies of these countries.

The ceremonies were accompanied by the familiar litany: extolling the fast breeder's promise of cheap electricity and security of supply by "closing the fuel cycle" and eliminating dependence on imported uranium. The true stimulus for this pan-European collaboration was, however, quite otherwise, as a brief historical survey makes evident.

Only a decade ago Great Britain and France were engaged in a headlong race for the fast breeder leadership of the West. In 1973 France's 250-megawatt Phenix prototype fast breeder at Marcoule had gone critical. In March 1974 the British Atomic Energy Authority's prototype fast reactor at Dounreay went critical, the week before a major international conference in London on fast breeder power stations. On the last day of the conference, the French delegates announced in response that Phenix had just attained full power - nuclear one-upmanship at its most pointed.

Work was also underway on the SNR-300 fast breeder prototype at Kalkar in West Germany, owned jointly by West Germany, Belgium, and the Netherlands, but the project was already several years behind its European competitors. In the East, the Soviet Union had apparently beaten all its rivals; its BN-350 fast breeder at Shevchenko on the Caspian Sea had started up in 1972. A US surveillance satellite, however, had photographed evidence of what seemed to be an accident at the Shevchenko plant, although at the time the Soviet authorities would give no details. The United States was trailing as its planned Clinch River breeder reactor floundered in a financial and regulatory morass. As the British and French fast breeder people contemplated their circumstances, each group was convinced that its prospects had never looked brighter. The continuing reverberations of OPEC's oil-price shock reinforced this conviction. Nuclear power was the energy of the future, and its future depended on the plutonium-fueled fast breeder. The last thought in either British or French minds was any accommodation with their cross-Channel rivals.

The race was on. But it turned out to be an obstacle course for both countries. Stubborn problems with the steam generators kept the British prototype fast reactor off line for most of the following decade. By the end of 1984 it had a cumulative capacity factor of not quite 10 percent. The French

Phenix fared significantly better. Although it too suffered from assorted leaks and malfunctions, by 1984 its cumulative capacity factor was some 55 per cent. The Phenix plant was, however, only the launching pad for French fast breeder plans.

In 1972 French planners had embarked on stage two, the construction of a full-scale 1,200-megawatt fast breeder power station, to be called Super-Phenix. After a flurry of public opposition had been overcome by truncheons and tear gas, construction of Super-Phenix was unimpeded. The intention was to follow Super-Phenix with six identical replicas, plus a seventh in West Germany, dubbed SNR-2. It did not, however, work out that way.

Super-Phenix, originally scheduled to start up in 1982, did not go critical until September 7, 1985. Indeed its initial criticality had been scheduled for September 9, but was brought forward 48 hours to mark the sixty-fifth birthday and official retirement of Georges Vendryes, a member of the Commissariat a l'Energie Atomique, and a founding father of the French fast breeder program. A nice gesture - but it could not mask the uncomfortable fact that electricity from Super-Phenix would cost more than twice as much as that from conventional nuclear plants. Furthermore, Electricite de France, facing a mounting excess of generating capacity, was already drastically reducing orders for more nuclear plants. The plan to follow Super-Phenix with six siblings had long since vanished into the black hole that so often engulfs nuclear prognostications.

The British fast breeder adherents had seen their plans evaporate even more completely. In September 1975 the Atomic Energy Authority had given evidence to the Royal Commission on Environmental Pollution, the "Flowers Commission", whose 1976 report was a watershed in British nuclear power policy. The Authority postulated that by the year 2000 the total nuclear generating capacity in Great Britain might be 104,000 megawatts, of which 33,000 would be from fast breeders. By 1982 the Authority was forced to acknowledge that only one full-scale fast breeder power station might be ordered in Great Britain by the turn of the century.

The implications for the Authority were stark; the fast breeder was its last card. Conventional reactors were by this time the province of the National Nuclear Corporation and the Central Electricity Generating Board. Fuel design, manufacture and supply, and spent-fuel management had been the responsibility of British Nuclear Fuels since it was separated from the Authority in 1971. Only the fast breeder stood between the Atomic Energy Authority and the breadline.

A similar situation prevailed in France, where the Commissariat a I'Energie Atomique was having to cede practical power to Framatome, Electricite de France, and Cogema (Compagnie Generale des Matieres Nucleaires). Yet in both Great Britain and France the original national nuclear agencies - the Authority and the Commissariat - continued to wield substantial influence, one fruit of which was the perennial prominence of the fast breeder in projections of future energy strategies for the two countries.

Given these circumstances, the sudden plunge into pan-European collaboration on fast breeders is more comprehensible. The collaboration is in no sense a sign of health; quite the contrary. An early clue to the subsequent course of events came in a statement given to the British Parliament by then Secretary of State for Energy Nigel Lawson, on November 29, 1982. After the ritual recital of Britain's proud achievement in fast breeder technology came the crunch:

"In common with most other leading fast reactor nations, we now believe that the series ordering phase will begin in the earlier part of the next century, and thus on a longer timescale than we have previously envisaged. We shall therefore have more time in which to develop further the technology and before undertaking the construction of a first full-scale reactor ... and the development programme will be geared to this timescale."

This was the first official acknowledgment that the fast breeder would not contribute to Britain's energy supply for at least a generation. Its full import was summed up by the House of Commons Select Committee on Energy in a report, *Energy Research, Development and Demonstration in the United Kingdom,* published in July 1984:

"Since 1955-56 some £2400m [million] (in 1982-83 money values) has been voted [by Parliament] for fast reactor R&D, and in the twenty years since 1962-63 real expenditure has remained remarkably steady at between £85m and £120m a year . . . The Chairman of the UKAEA estimated that a further 25-30 years and additional R&D expenditure of £1300m (in 1982-83 prices) will be needed to reach the stage 'where one hopes to obtain a commercial station'. To this figure must be added £2 billion construction costs for a commercial demonstration reactor and £300 million for reprocessing facilities, giving ... a cumulative figure of £5.7 billion. This implies that at present the fast reactor is roughly half-way through a perceived 60-year research, development and demonstration programme ... Recall that in 1959 the then Parliamentary Secretary to the Minister of Power gave to the House of Commons 'about 1970' as the anticipated date for commercial operation of a fast breeder reactor. As recently as 1976, the UKAEA told the Royal Commission on Environmental Pollution that it envisaged some 33GW [gigawatts] of fast reactor capacity in place by 2000."

One of the most pointed criticisms in the report was directed at the joint pan-European development agreement, which - while purporting to rationalize the separate fast breeder programs in the participating countries - nevertheless foresaw the construction of not one but three "commercial demonstration fast reactors" in France, West Germany, and Britain. This was, as the report emphasized, "the same number as would have been the case if each country had pursued its own independent path. **There appears to be no obvious rationale for this decision**" (emphasis in original).

Nor was this the only curiosity of the "collaboration." Britain's fast breeder promoters were compelled to acknowledge that such commercial demonstration plants would probably be built in France and West Germany some years before any could be undertaken in Britain, which already had a surplus of generating capacity. Electricity use had barely begun to increase beyond the 1973 level. The nuclear industry was attempting to switch from British gas-cooled reactors to American-designed pressurized-water reactors. But this entailed many difficulties, including a disorganized, undercapitalized industry, starved of orders and ill-equipped for such a fundamental change of technology. For the British reactor industry to plunge into parallel development of yet a third technology would be to invite even more trouble. A further complication was that successive governments had agreed that any proposal for a "commercial" fast breeder would be subject to a full public inquiry. And based on past experience, such inquiries would probably result in a delay of some years.

How, then, would Great Britain benefit from the pan-European collaboration? One possible avenue emerged in late 1984. Clifford Blumfield, director of the Dounreay fast breeder center, suggested that Dounreay might be the appropriate site for a plant to reprocess fuel from Europe's fast breeder reactors. The remark prompted inquiries from the media and questions in Parliament; but the official government response was noncommittal.

In May 1985, with no public discussion, the government announced its support for a joint proposal by the Atomic Energy Authority and British Nuclear Fuels to build a fast breeder fuel reprocessing plant at Dounreay in Caithness. The installation was apparently to be based on a small pilot plant, in operation at Dounreay since 1980, which was said to be able to reprocess five metric tons of fast breeder fuel a year. The proposed plant was to have a capacity of some 80 metric tons of spent fuel a year.

The Dounreay plan triggered a modest furor. The local council of Caithness County favored it because of the jobs it would preserve at Dounreay. The councils of the nearby Orkney and Shetland Islands and the Western Isles were initially mildly concerned, but as the implications of the proposal became clearer, the neighboring councils became outspokenly opposed.

The national government, however, was no longer prepared to expose its nuclear plans to exhaustive scrutiny. In the autumn of 1985 the secretary of state for Scotland announced that the inquiry into the Dounreay project would be a traditional "local inquiry," to take place within a few weeks. Its terms of reference would allow objectors to question the color the plant would be painted, but not the policy underlying its construction. The major national environmental organizations, outraged at this railroading, declared that they would have nothing to do with such a futile charade and boycotted the inquiry. But the local councils and objectors, afraid that failure to appear would let the government claim that no one protested the plan, were caught in a dilemma.

Initial documentation on the proposed reprocessing plant was at best sketchy about actual design details. Two independent consulting groups, commissioned by the Islands Councils, held that information from British Nuclear Fuels and the Atomic Energy Authority was inadequate for environmental impact assessment. The documents nevertheless included certain startling comments.

It was noted, for example, that "considerable care has to be taken to ensure the physical security of plutonium, particularly when it is being transported. In this respect, air transport offers many advantages in providing the necessary security." Anyone familiar with the bleak remoteness of Dounreay's little airstrip, the proximity of a deserted coastline, and the sophisticated ruthlessness of airborne terrorism in the 1980s could read this only with incredulity. But such issues were deemed irrelevant to the official planning inquiry.

The true reason behind the pressure for the Dounreay proposal emerged only weeks after the government's first announcement. Across the Channel Britain's French "partners" in the pan-European fast breeder program declared that since they already had a pilot fast breeder reprocessing plant at Marcoule, not to mention the Super-Phenix plant itself at Creys-Malville, the only logical place to locate the European demonstration plant was at Marcoule. Furthermore, the French government did not have to go through any irksome "public inquiry"; if the government wanted to build the plant that was all there was to it.

The international political dimension of the controversy was clear. If Britain did not get to build the reprocessing plant, the pan-European scheme would leave it essentially empty-handed, probably for decades. Yet any "rational" program would find it hard to argue in favor of siting the reprocessing plant almost as far from the reactors as it could possibly be - with all the consequent transport safety and security implications.

It may be assumed that rationality will have little to do with the outcome. The pan-European fast breeder program is blatant international nuclear politics, an institutional power struggle with no bearing on the energy supply in the countries involved. Two further factors: the opportunity cost - investments and jobs that might have been created by more sensible allocation of resources - has already been substantial; and the global diplomatic cost of endorsing plutonium - nuclear weapons material - as a commercial fuel may soon be higher still.