

## French nuclear power

# Problems of plenty and success

NUCLEAR power provided more than two-thirds of French electricity in 1985. With six more 1,300-MW reactors coming on line in 1986, more later, and four more ordered by the government from the national constructor, Framatome, could there soon be too much? That now seems the view of Marcel Boiteux, director-general of the national utility, Electricité de France (EdF), in an astoundingly open interview with *Le Monde*, France's leading daily, earlier this month. Boiteux has thus brought into the open a festering conflict between the utility and ministry of energy about the number of nuclear reactors France actually requires.

According to Boiteux, there are two major issues. First, EdF is now in debt to the tune of FF216,000 million (£20,000 million) due to its long period of investment in nuclear construction — but the government's policy of low pricing for electricity means that EdF cannot pay off the debt (a large fraction of which is in dollars) but can only cover the interest on its borrowing.

Second, although French electricity demand grew more than 7 per cent last year, EdF's need for new power sources is slight. Framatome has been required to develop and introduce a so-called "grey mode" technology, which allows a reactor to be switched from full power production to just 30 per cent within minutes, to cope with sudden falls in demand. If EdF had had its way, there would have been only one order for a reactor in 1984 (there were two), and none in 1985–87.

But EdF's overcapacity may be relatively shortlived. Orders would have had to begin again in 1988, Boiteux said, to start replacing earlier reactors coming to the end of their life. And, apart from the debt question, nuclear power had kept French electricity prices 30–50 per cent lower than they would have been if the utility had had to rely on coal or oil-fired power stations. The reactors will also "remain profitable" even if they are run at only 30 per cent of capacity, the EdF director insisted.

Meanwhile, Framatome, which is geared up to produce not one reactor a year as is now ordered by the government to 1989, but four, will be covering the gap with a recent order for two reactors from China (though these are rumoured to have been offered at below cost), and by a new strategy of shifting heavily towards after-sales service, concentrating on robotic aids for maintenance of reactor cores and steam generators. Those services will not be limited to Framatome reactors in France, but will be offered throughout the world to all reactor owners, including those in the United States.

One area of French business is nevertheless booming — the nuclear fuel cycle, where the national nuclear fuel company, Cogema, has announced that its revamped reprocessing plant at La Hague near Cherbourg on the Channel coast has worked so well over the past year that it can now reduce reprocessing charges. Previously, La Hague had been plagued by inefficiency and shutdowns, but last year its UP II plant was able to reprocess 418 tons of spent fuel from pressurized water reactors, compared with its nominal 400 tons. Cogema plans to quadruple that capacity to 1,600 tons a year by 1992, which will further reduce costs, and claims that it is already 11 per cent cheaper to reprocess fuel through La Hague than to deal with it in any other way (such as stockpiling).

Superphénix, the world's first commer-

cial-scale fast breeder reactor, has also just delivered the first tentative fraction of its full 1,200 MW of power to the French grid at Creys-Malville in the south of France, in what has been a busy few weeks for the French nuclear industry. The reactor, which is 51 per cent French, a third Italian, and 16 per cent German, Dutch and Belgian, is functioning as expected. But according to Boiteux, there is no hope for the moment of a "series" of reactors based on the Superphénix design being profitable, or competitive with the (over-supplied) EdF pressurized water reactors. The last thing EdF would want at present is another fast breeder — as is being planned by the national nuclear agencies of Europe. But, said Boiteux, anxious not to be too much of a thorn in the nuclear flesh, it would not be unreasonable to expect fast breeders to be profitable by the end of the century — and it is certainly necessary, in the meantime, to maintain the viability of the existing fast breeder design teams.

Robert Walgate

## Nuclear power

# Yugoslav plans approved

THE Yugoslav federal government is now accepting tenders for the construction of two nuclear power stations by the end of the century. According to present plans, a further two will be started in the year 2000. During the past few weeks, however, there has been a wave of opposition to the whole concept of nuclear power, on both economic and safety grounds. The situation is further complicated by Yugoslavia's federal structure. The Yugoslav constitution put considerable decision-making power in the hands of the governments of the six constituent republics, but foreign currency controls mean that a major contract with the hard-currency area must be decided at federal level.

The arguments advanced for and against atomic power during the past few weeks have been fairly predictable. A typical headline in the Belgrade daily *Politika* was "100 years of risk" above a photograph of the Three Mile Island power station. Yugoslavia has coal reserves for at least 100 years, say the opponents of nuclear power, so why not at least proclaim a 25-year moratorium as the Scandinavian countries have done? Moreover, although Yugoslavia does have some uranium of its own, if this runs out, the country might become dependent on one of the major powers for fuel supplies, which would imperil its non-aligned stance. It would be far better, therefore, to devote the huge sums of money that would otherwise be spent on nuclear power stations to better exploitation of Yugoslavia's potential water-power, developing energy-saving technologies and investigating unconventional energy sources, including solar

energy and biomass. The pro-nuclear lobby, on the other hand, maintains that a nuclear power programme would create jobs in the construction sector and provide a boost for Yugoslav science and technology generally.

So far, Yugoslavia has one nuclear power station, at Krsko on the Slovene–Croatian border. A second nuclear station was proposed at the end of the 1970s, was eventually shelved due to the policy of economic "consolidation" (retrenchment) introduced at the beginning of the 1980s.

The new plans so far have proposed only one site, Prevlak, also on the Slovene–Croatian border. The Slovenes, however, are not particularly enthusiastic about another joint project. The construction of Krsko was fraught with difficulties and delays, which not only greatly increased the costs, but also caused friction with the US supplier (Westinghouse); the Slovene government began to import more and more electricity from Austria which it now considers a cost-effective alternative. Croatia has considerable energy problems, but cannot afford to construct a nuclear power station on its own. Other countries either lack the necessary infrastructure, or are unsuitable geographically. Serbia proper would be possible from the point of view of infrastructure, but so far no site in the Serbian republic has been seriously mooted. It may be significant, therefore, that during his visit to Italy last week, the Croatian premier Ante Markovic was reported to be seeking long-term credits from the Italians to help finance construction of a nuclear station.

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