for the development of the immobilized enzyme systems now in widespread use in bioreactors and bioanalysers, which have done much to trigger the present biotechnology boom. He showed in the 1960s (see for example *Nature* **188**, 856; 1960) how the charge distribution and the hydrophobic and hydrophilic properties of enzymes affect their interaction with a carrier agent and their catalytic activity, thus making it possible to define criteria for selection of proper enzyme carrier materials. Japanese companies now lead the world in immobilized enzyme technology and the prize may thus partly acknowledge a debt to his pioneering work.

Professor Katchalski-Katzir is now 69 and a professor at the Weizmann Institute. He also served as Israel's president from 1973 to 1978, continuing a tradition which began with Chaim Weizmann himself that prominent scholars should hold the presidency.

In the information and communication category, John R. Pierce received the prize for a number of studies, among them his leading role in the development of pulse code modulation theory which has made possible the digital communications technology now coming into use everywhere. His other key discoveries include the Pierce gun, the key to the design of practical travelling wave tubes and now in use in microwave communications systems, and the Pierce loop, which has made possible the rational design of Local Area Networks. Professor Pierce, now 75, has been guest professor at the Stanford University's Center for Computer Research on Music and Acoustics since his retirement as head of research at Bell Laboratories.

Alun Anderson

Chinese reactors

China plans for independence

CHINA'S nuclear industry must switch from military to civilian aims , Li Pong, vice premier of the State Council, urged last month. Addressing a "work conference" of the Ministry of the Nuclear Industry, he called for the ministry to direct its main efforts to nuclear power generation, while at the same time to diversify by providing services on a contract basis to other branches of industry. This could entail a major change from the defence-orientated stance in which good economic returns were desirable but not the prime necessity to a more cost-effective approach.

Li Peng's remarks have been widely publicized in the Chinese media, and contrast oddly with the last major coverage of nuclear matters — the twentieth anniversary, last October, of the first Chinese nuclear bomb. (Among more overtly political issues, it was noted, on that occasion, that the Lop Nor test site has made a good ecological recovery, with burgeoning grass and gazelles.) Much of his speech, however, related rather to the reform of the Chinese economy; the need to develop "horizontally" and the role of technology transfer in achieving the "four modernizations". As an example, he urged that the technology for exploiting uranium mines developed by the Ministry of the Nuclear Insdustry could be transferred to the coal and non-ferrous ore sectors. He also took the opportunity of annoucing the government's decision on the vexed question of ministerial responsibility in nuclear power development. Responsibility for the construction of large-scale nuclear power stations, Li Peng said, would rest with the Ministry of Water Resources and Electric Power, while the construction of the "nuclear island" would be borne by the Ministry of the Nuclear Industry.

Nuclear power in China, Li Ping suggested, must gradually become a completely Chinese matter. The Ministry of the Nuclear Industry already possessed, he said, a complete system for processing nuclear materials "from the exploration and exploitation of uranium mines to the post-processing of irradiated fuel". This expertise must be used so that nuclear fuel can be supplied to the power stations by Chinese enterprises, and so that a complete nuclear fuel cycle can be established.

The publication of Li Peng's speech was delayed for three weeks to coincide, on 24 January, with the start of construction of what was officially described as the first nuclear power plant designed and built exclusively by China. This is the 300 MW pressurized-water station at Qinshan, which will serve the east China industrial network centered on Shanghai. The Qinshan station is expected to provide a "complete range of experience for building power plants", and hence will have a key role in Chinese plans to contruct a total nuclear capacity of 10 GW by the end of the century.

Following Li Peng's lead, Chinese spokesmen have stressed the indigenous nature of the project, and rumours that China planned to purchase two nuclear-powered generating facilities from the Soviet Union under the 1986-1990 Sino-Soviet economic and trade agreement have been strenuously denied by the Chinese Foreign Trade Ministry.

But the Qinshan project may be less than exclusively Chinese. The reactor presssure vessel and reactor main coolant pump will be built by West German and Japanese companies to Chinese designs, and the design of all major equipment has been checked by consultants from the United States and Italy. Moreover, according to Zhou Ping, vice minister of the Nuclear Industry, the experience gained at Qinshan will enhance China's capacity to absorb imported nuclear power technology, paving the way for the import of large complete generating sets.

Vera Rich

French reactors

Problems only of plenty

FRENCH nuclear power strides on — even though the major nuclear constructor, Framatome, is tottering and the first commercial-scale fast breeder, Superphénix, is suffering problems that could delay its start-up by one or two years.

First, the good news. Last year, French 900-MW pressurized water reactors (PWRs, the bulk of the stations now operating) achieved an availability (energy delivered over energy theoretically available) of 79 per cent. These would seem to be extraordinary figures in relation to the results of only a couple of years ago, when availablity was in the sixties, and again confirm the claims of Electricité de France (EDF), the national utility, that these were only "teething problems" in reactors which were mostly very new. The first two 1,300-MW PWRs, Paluel 1 and Paluel 2, also came on line last year and reached full power in late December bringing — with the other reactors — some 178 TWh of nuclear energy into the French grid in 1984 (compared with British nuclear power production in the same year of 34 TWh).

The trouble now is that with many more PWRs under construction, France really needs no more electricity, and Framatome is in dire need of diversification. The problem can be solved only by finding new industrial partners (or products), by selling reactors abroad or by exporting electricity.

All options are open. On electricity exports, EDF nearly doubled to 25 TWh the amount of electrical energy exported from France in 1984, and plans to do better in 1985 with the establishment of a high-power cross-Channel link with the British grid. On the export of reactors, Framatome is bidding hard for contracts in Egypt and in Israel. France, it is believed, is prepared to let Israel buy its reactors without demanding that Israel sign the non-proliferation treaty — the stumbling block for a deal with the US company Westinghouse in the 1970s.

Meanwhile, Superphénix, the great white hope for European nuclear power in the next century, has been troubled by vibrations in certain components in the sodium cooling circuit, now under test before what was to be the fuelling of the reactor this summer. The elements are baffles in the stainless-steel "cauldron" in which the fuel elements sit, and they appear to vibrate, when the sodium is introduced and pumped. The problem is whether to rebuild the baffles, which could cause a lengthy delay in the operation of the reactor, or to load the fuel and hope the problem goes away when the reactor reaches its working temperature of 425°C, some 75°C above the temperature at which preliminary tests have been conducted.

Robert Walgate