British Choose Own Reactor for Nuclear Power Program

The British proclivity for compromise shines through the Labour government's recent choice of a reactor for its next order of nuclear power stations. After considerable delay and controversy the government picked the homegrown steam-generating heavy water reactor (SGHWR) over an American design originally preferred by Britain's biggest electricity generating authority and by the public-private corporation that will build the reactors. Rejected is the internationally dominant Westinghouse light water reactor which the British call the pressurized water reactor (PWR).

Americans may view the decision as a straight act of nuclear nationalism, but a measure of caution seems to be mixed in with the "buy British" motives. American questioning of the safety of the light water reactor has been picked up in Britain and, particularly since the Central Electricity Generating Board expressed a preference for the PWR, the wisdom of choosing the light water reactor for Britain has been criticized, most notably and effectively by Sir Alan Cottrell, former chief scientific adviser to the cabinet.

The government white paper setting forth official policy tactfully avoided a direct reference to the safety issue by stressing the "reliability" of the SGHWR. The white paper also notes that the "SGHWR offers particular scope for British nuclear technology and we should exploit it." The British have invested heavily in civilian nuclear R & D and have so far failed to land the export orders which would help to justify the expenditures.

In choosing the SGHWR, however, the government left the options fairly wide open, apparently compromising in an effort to come to terms with the economic and technological realities. The new program calls for 4000 megawatts of new generating capacity, which will probably be achieved by building twin reactors on three sites. Each would be a 600- to 660-Mw reactor—smaller than many British engineers would have liked.

The new increment of nuclear power is much smaller than had been recommended by proponents of the PWR and will require construction of new fossil fuel plants to fill the power gap expected to open in this decade. For the time being, Britain seems to have renounced a nuclear power program which would reduce the country's reliance on the troubled coal industry and on its politically powerful miners union. The SGHWR decision does not seem to have foreclosed the possibility that PWR's might yet be viewed with favor at some future time. Another review of the nuclear power program is set for late in the decade, and meanwhile the Nuclear Installations Inspectorate will carry on their detailed examination of the "generic safety issues" raised by the PWR.

On examination, misgivings about the safety of the American reactor seem to have as much to do with the frailties of the British nuclear construction industry as with the inherent hazards of the Westinghouse design. Insiders acknowledge that the British have shown a particular weakness in what Americans call "project management" on the complicated nuclear power station jobs. Chronic troubles with construction of power stations using the British advanced gas reactor (AGR), which was viewed as a promising design for domestic and overseas sales in the 1970's, have delayed and virtually discredited the program. Cottrell's criticism of the PWR could be interpreted as faint praise for British engineering when he said, "The security of a light-water reactor vessel depends on the maintenance of an immaculate standard of manufacture and quality control, and on a regular in-service inspection of the most rigorous and detailed kind. I hope that the safety of this country will never be made dependent upon almost superhuman engineering and operational qualities."

In fairness, it should be noted that American companies had plenty of problems in the early days with the technology of light water reactors, particularly with the big pressure vessels required. And the British may legitimately question whether it is worthwhile to set up a big operation to manufacture PWR components and to develop expertise in plant construction when long-term export prospects do not seem very bright.

As for the merits of the SGHWR, it is true that no such reactor is now operating on a commercial scale, but a 100-Mw pilot reactor at Winfrith in southeast England is said to have been built on schedule and within budget and to have been performing well since 1967. SGHWR proponents say the problem of scaling up to the size projected for the new plants will be quite manageable. One reason is that steam under high pressure is not contained in a big pressure vessel, as in the PWR, but in a series of much smaller pressure tubes, enhancing safety and making construction easier. Many of the components of the SGHWR can be manufactured at a plant and rather easily assembled, which is said to reduce on-site engineering, a prospective advantage when dealing with customers in less developed countries.

A strong point for SGHWR in British eyes is the prospect of serious collaboration with the Canadians, who have developed a somewhat similar heavy water reactor in the CANDU type. Government spokesmen say they have assurances that the Canadians will provide supplies of heavy water for the first British stations and will cooperate both on reactor R & D and on the design and manufacture of components.

Skeptics point out that the economics of the SGHWR are not clear in comparison with either fossil fuel plants or the PWR and that scaling up from the pilot-plant to commercial size may be much more tricky than expected. They suggest it will be expensive to build heavy water production facilities and also ask if British officials are not deceiving themselves in thinking that by the time a system of SGHWR's is in operation, the plants will be competitive in export markets.

In opting for the SGHWR the British are obviously taking a gamble. Behind the public explanation for the decision is probably a fundamental and understandable unwillingness to sell short on the nuclear technology in which all British governments have invested heavily since World War II. For that is what further delay or choice of the PWR would have meant.

—JOHN WALSH