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Approval sought for £22m. 100 MW atomic reactor

BY DAVID FISHLOCK, SCIENCE EDITOR

GOVERNMENT approval is sought for a £22m. project to provide British scientists with their most expensive research tool yet —a 100-megawatt atomic reactor.

This reactor, the most powerful of its kind anywhere in the world, is required as a generator of neutrons by the Science Research Council, which proposes to commission the U.K. Atomic Energy Authority to build the machine at the Council's expense.

The scheme represents the Council's most ambitious venture yet into "big science," but the scientific case for the reactor—known as the High Flux Beam Reactor—is particularly strong. ICI, for example, has leant its weight to the proposal in the belief, widely shared, that its neutron beams will afford an analytical tool of unprecedented power. Scientists of many different disciplines are requesting these neutron beams.

They would be generated in the core of a heavy water reactor fuelled by highly enriched (93 per cent.) uranium, so arranged that the core could be tapped for several neutron beams simultaneously.

Optimism runs high that the first step in an eight-year construction programme will be taken this autumn, with the commissioning from Harwell of a £2m. design study.

Harwell has argued the case for such a reactor for the past decade, but two successive Governments withheld approval. The new proposal, believed to stand an excellent chance of succeeding, is being advanced by the Science Research Council. The cost would be met out of its budget, not from a special grant. Peak spending, around £5m. a year, would be in the mid-1970s, and the reactor would go critical in 1977.

The idea is that Harwell shall build the reactor, a highly complex machine, on a site adjoining the council's nearby Rutherford Laboratory. It would remain responsible for operating the reactor, while the Rutherford's staff assembled experiments.

The reactor's value to science lies in the intensity of the neutron beams it will generate —between 10 and 20 times as intense as any available in Britain to-day. Neutrons have no electrical charge and can penetrate matter freely without the more devastating side effects of energetic beams of X-rays or gamma-rays.

The very properties that make the neutron so elusive for so long are now being turned to immense advantage. As an investigating tool neutrons are exciting a wide span of science, from detailed studies of carbon fibre materials to fundamental work in biology. Biologists, for instance, believe that the more intense beams will allow them to use neutron diffraction not only to work out the structure of complex living molecules but to follow the way to work.

The methods used in neutron difffraction are akin to those employing X-rays, in which structures are mapped automatically by computer. But neutrons afford powers of penetration no X-rays can match, and moreover have special magnetic properties that are yielding a new understanding of magnetism.

"It is far and away the most exciting science we can do, and will eventually have an industrial pay-off," said one research director.

The West Germans in particular tried hard to get Britain's participation in a £11m. Franco-German reactor at Grenoble for generating intense neutron beams, expected to go critical next year. But British scientists have left no doubt that they prefer the somewhat more powerful and considerably more versatile British scheme, even though it means waiting several years longer.