

connection with the long-standing and increasingly widely supported idea of a barrage across the Severn Estuary in the west country that would harness the energy from the tides. At a press conference to announce publication of results of three special studies relating to the barrage† and another more general report from the DEN§, Dr Walter Marshall, the department's chief scientist, could offer no date for a decision from the DEN's Advisory Council on Research and Development (ACORD) on the next step, a large-scale £1-2-million feasibility study.

This will not have encouraged people like Patterson, who argued strongly last week for a redistribution of Britain's energy R&D effort, and Arthur Palmer, the chairman of the House of Commons Select Committee on Science and Technology, from which a report on the barrage is due out in the coming months along with a separate report on other alternative energy sources. According to a spokesman for NEDECO, the Dutch engineering group which conducted one of the studies, the earliest that work could begin with a decision now is 1982, to allow for four years of preliminary study. Sixteen years later the project could be complete, at a cost variously estimated (depending on whether it is a 'single basin' or 'double basin' scheme) between £2,400 and £3,100 million at today's prices—excluding the turbines.

ACORD is now considering all the reports, which come 12 days after a one-day symposium on the subject in London. None of them examines the environmental effects of a barrage; that, says Marshall, would have proved both difficult and expensive. They were designed to consider, first, the influence of various barrage schemes on tidal levels and currents, and secondly, the technical feasibility of a barrage. The Hydraulics Research Station (HRS) study speaks cautiously of an increase in spring tidal ranges seaward of the barrages of about 1.4 m, but NEDECO speaks of a decrease of similar order. General changes in currents, however, would be small, but navigation, flooding and drainage would all be affected. On the positive side the Institute of Geological Sciences report finds the seabed at the barrage area uncovered by drift and with bedrock exposed. NEDECO's finding is the most positive: the complex project is technically feasible. The problems, therefore, are now economic and political. □

**The Fissile Society*, Walter C. Patterson, Pp. 117 (Earth Resources Research Ltd., London, 1977), £1.50.

†*Severn barrage study*, HRS, £2; *Severn tidal barrage scheme: pre-feasibility study of the closure of the estuary*, NEDECO, £4; *Geology of the Severn barrage area*, IGS, £1. (Obtainable from DEN, Millbank, London).

§*Tidal power barrages in the Severn Estuary*, Energy Paper No 23 (HMSO, £1.50). Also released, *Energy Policy Review*, Energy Paper No 22 (HMSO, £1.75).

SWEDEN

A developing nuclear policy?

Wendy Barnaby reports from Stockholm on recent developments concerning Sweden's nuclear programme

THE Swedish government is to give credit guarantees for the continued building of the Forsmark 3 nuclear reactor but not for Oskarshamn 3. In a classic case of a 'no-decision decision'—now the norm for the government's handling of the nuclear energy issue—the energy minister, Olof Johansson, said recently that about \$30 million would be guaranteed for Forsmark 3 while the reactor's owners agreed on the pace at which building should be continued. In a couple of months, when the negotiations were expected to be finished, the government would reconsider the question of more guarantees. He himself would not comment on the reactor's development, saying that he did not want to pre-empt the owners' negotiations.

The government gave no reason why guarantees to Oskarshamn had been refused, but a spokesman for the company said that there were two probable reasons. One is that, whereas the Forsmark reactors are 75% state-owned, Oskarshamn is a private company. In order to continue building their reactor without state financial guarantees, the management of Oskarshamn will probably have to approach ASEA-Atom—which is 50% state-owned—for help. The state could therefore gain some indirect control over the project.

The other reason is that the State Power Board, the largest owner of Forsmark's reactors, employs 2,000 workers who have been building Forsmark 2 and who would be unemployed if they could not now build Forsmark 3. The Oskarshamn practice, on the other hand, is to contract out its work. The government could therefore have been hoping to avoid visible unemployment.

Unemployment is very much on the minds of the industrial workers dependent on the reactors for their jobs. Six trade unions have sent a joint letter to the energy minister demanding an immediate, clear decision on the short and long term prospects for the construction of reactors. It is highly unlikely that they will get it. All they can hope for is clearer guidance in autumn 1978, when the government plans to present proposals for a new energy policy up to 1990.

The management of Oskarshamn is planning to go ahead with the construction of the third reactor, even

though it will be delayed now by up to two years. They reason that, if they can arrange their own finances, there is no reason why they should not in future be treated differently from Forsmark 3. The owners of each reactor will, under the law stating the conditions on which new reactors may be built, have to present the government with concrete proposals for the 'completely safe' storage of unprocessed fuel or of highly radio-active waste if the spent fuel is to be reprocessed; and reprocessing agreements will also have to be presented.

Although the Centre Party was elected to the government largely on its promises that it would stop nuclear power in Sweden, it has so far shown no particular hurry to do so. And if it is prepared to entertain the possibility of contributing to Forsmark 3, the Oskarshamn management evidently doubts that it will put in jeopardy the \$330 million-worth of orders placed last year with different sections of local industry for the components of Oskarshamn 3.

There is no more certainty about the reprocessing and storage of spent nuclear fuel than there is about the building of the reactors themselves. If the Ringhals 3 reactor produces any spent fuel before the end of 1979, it will be sent to La Hague in France for reprocessing. Otherwise, according to the technical director of the State Power Board, it will have to be stored without reprocessing. This solution may also have to be adopted for the Forsmark 1 reactor, which so far has no reprocessing agreement for the spent fuel it should begin to produce next year. The State Power Board envisages waste being stored in a central depot until 1995, by which time it evidently hopes that other solutions will have become available.

A second round of test drilling, designed to examine the quality of rock near Forsmark, is now being started by the Swedish Geological Survey on behalf of the companies building reactors. Preliminary results from the first tests, near Oskarshamn, were in general good, showing hard rock with low permeability—the sort of rock that would be suitable for storing nuclear waste. According to a spokesman for the nuclear companies, storage of processed, vitrified waste and the direct deposition of encapsulated fuel elements will be considered. The main geological reports are expected to be ready by 1 October this year, but supplementary reports will be issued during 1978. □