

the resuscitation of the Enrico Fermi reactor, which has been out of commission since the accident there in 1966 but which is now being reloaded with fuel. The AEC estimates that the cost of the liquid metal breeder reactor programme will increase from just over \$100 million a year in the current fiscal year to a maximum of \$175 million in 1972 and 1973, by which time the contribution of the construction companies to the cost of building reactors will be \$100 million a year or thereabouts. (Mr Shaw estimated last week that industrial companies are already providing \$25 million a year towards the cost of a broadly based programme of research and development.) The alternative designs being considered are based either on combinations of uranium oxide and plutonium oxide (General Electric and Babcock and Wilcox) or combinations of the carbides (Westinghouse). In testing programmes already carried out, mixed oxide fuels have been carried to more than 11 per cent burn-up, and the mixed carbide fuels are not far behind.

Like the molten salt reactor, the high temperature gas reactor will also trudge along at a comparatively modest level in the coming year—each project will get \$5 million under the proposed budget. Even so, the Peach Bottom reactor is now operating successfully, another high temperature demonstration plant should be critical in just over a year from now and Mr Shaw estimates that the first commercially viable plant should come into operation in 1977 or 1978, in time for this reactor type to make a contribution to the fuel economy of nuclear power stations by the eighties.

The concentration of interest in the liquid metal fast breeder reactor reflects the anxiety in the AEC to ensure the arrival of a second generation of nuclear reactors, chiefly so as to avoid the difficulty there will otherwise be with the supply of natural and enriched uranium. One calculation, described by Mr Shaw last week, is that if the fast breeder reactor can be introduced by 1984 into commercial service, it will be possible to live within a total uranium commitment of just under a million short tons of uranium oxide (chemical formula  $U_3O_8$ ), the amount of uranium ore which can be won for \$10 a pound or less. By the same test, if the introduction of the fast breeder reactor has to be postponed until 1994, it will be necessary to break into uranium reserves which cost up to \$15 a pound. The result will be permanently to increase the cost of uranium fuel.

This year's hearings before the Joint Committee on Atomic Energy are being held in circumstances a good deal more cheerful for the commercial operators than in 1969. Although there has now been a recovery, with something like 12,000 MW of capacity ordered in the past twelve months, the rush by the utility companies into nuclear power has not yet matched again the happy days of early 1967, when 9,000 MW were ordered in the second quarter, making a total of more than 25,000 MW for 1967 as a whole. A part of the difficulty is that the nuclear construction industry has tended frequently to fall behind its promised construction dates. Another is that public opposition to the construction of power stations, nuclear or conventional, has made it hard for utilities to push ahead as quickly as they would like with new plans. The classic example, no doubt, is the proposed pumped storage scheme at Cornwall, New York, which has been held up for eight years by local objections, most of them

on the grounds of amenity. Even so, it now looks as if additional nuclear generating capacity will be commissioned at a rate which averages or even exceeds 10,000 MW a year from 1971 on.

The relationship between nuclear power stations and their immediate environment has been for the past few weeks, as it was last year in October and November, a particular concern of the Joint Committee on Atomic Energy. Last year, the committee did much to uncover some of the anomalies in the regulations for the siting of nuclear plants—it turns out, for example, that the

## SPACE

### Vote of Affection

THE House of Representatives Committee on Science and Astronautics has made its customary declaration of faith in and affection for the National Aeronautics and Space Administration by voting that the Administration's request for a budget of \$3,333 million for the coming year should be increased to \$3,630 million. At this early stage of the budgetary process, it is unlikely that Dr Thomas Paine and his programme managers will be lulled into the belief that there will, after all, be an extra \$297 million to spend. Not merely has the Senate committee yet to have its say, but there is now what seems to be a well established tradition that the appropriations committee takes away what the authorization committee—the Science and Astronautics Committee—adds to the Administration's budget request. In these circumstances, the vote on the budget in the authorization committee is more a guide to sentiment than a promissory note.

Briefly, it seems that members of the House committee have been convinced of the rightness of most of the innovations in the new space budget and, at the same time, regret the running down of programmes with which they have become familiar. Thus the extra sums of money voted include \$145 million to prepare payloads for Apollo 18 and 19 and to make preparations for Apollo 20. The committee also suggests that \$100 million should be spent on potential bottlenecks in the Saturn V programme. Similarly, the committee asks that an extra \$75 million should be spent on the orbital workshop, not merely to extend the work that will be done on the three planned visits to the first of the orbiting stations, but also to begin work on the design of a second and better place to visit. The committee also asks that \$80 million should be spent on the space shuttle.

In a much more modest spirit, the committee has also made known its feelings by asking for modest sums of money to be spent on research into the reduction of noise caused by aircraft and the avoidance of collisions in the air. The committee's generosity does not, however, extend to that part of the programme which used to be called the University Sustaining Program and which is now due to be wound up—that is an unpopular cause this year.