collaboration with the United States remains. Negotiations are being carried on by governments, but the authority is hoping for a decision by the end of the year.

For the time being at least, the UKAEA takes the view that several countries (the United Kingdom included) have carried through the development of liquid-sodium fast reactors to the point at which commercial exploitation is possible. The objective of joining the Super-Phénix construction project (in which West Germany and Italy are already collaborating) would be to obtain the benefits that would flow from a joint plan for the exploitation of fast reactor technology in Europe, no doubt with agreements on "who builds what" as in the European collaborative aircraft projects.

Collaboration on Super-Phénix seems to have been made attractive by (among other things) a realistic appraisal of when it would be possible to build a commercial fast reactor in the United Kingdom. With the commitment (by the British government) to a public inquiry on the building of a first pressurized water reactor (PWR) by the Central Electricity Generating Board, and the shortage of qualified staff to carry out the necessary safety studies, the promised public inquiry on a commercial fast reactor could not begin until early 1985. Although a favourable outcome would allow construction to start towards the end of that year, the authority's fast reactor engineers will plainly have to kick their heels for quite a while if plans for collaboration come to nothing.

What does happen is for the British government to decide. Sir John Hill, chairman of the UKAEA, said this week that he looked for a commitment to the principle that fast reactors would be a primary source of energy in the next century, for a commitment (by the government) to a programme of fast reactor construction in the United Kingdom and for a decision about whether fast reactor development should be carried out in collaboration or otherwise. These questions, on the British government's plate since last December, may be settled by the end of the year.

One stumbling block will clearly be the cost to the British government of joining the European collaboration. According to Sir John, the French asking price is cal-

culated as 10 per cent of the estimated extra cost of Super-Phénix compared with a PWR of the same generating capacity, and works out as roughly £50 million. Sir John was, however, at pains to emphasize that negotiations with the French are still under way. No doubt the prospect of collaboration with the United States is being used as a counter in these negotiations, given the uncertainty about the American fast reactor programme.

For the rest, the UKAEA appears to be in robust, almost rude, health. The pilot-scale version of the advanced gas cooled reactor, which has been operating at Windscale since 1962, will cease to generate electricity next March and will afterwards be used for a series of tests of the safety of the design before being decommissioned. The AEA is plainly pleased with its new rapport with the British government — Sir John Hill this week contrasted its performance with that of other governments (mentioning Austria in particular).

The authority is also more aggressive about its safety record. Sir John says that he has written to the BBC to protest that the "public was badly misled" by the *Panorama* television programme on Windscale (*Nature*, 11 September), but acknowledges that, at Windscale, the authority might with advantage have started replacing some of its outmoded plant ten years ago (*Nature*, 7 August). Earlier this week, he was also regretting that "opposition by determined groups of people . . . exploiting ignorance and fear" has retarded the development and exploitation of nuclear power in many of the countries in which it is needed.

Pakistan uranium

Going ahead alone

Karachi

Pakistan seems to have taken a big step towards meeting its most urgent needs in the field of nuclear power production. After a closure of more than a year, the Karachi Nuclear Power Plant (KANUPP) has once again started producing nuclear electricity. KANUPP had to close down in mid-1979 after Canada — the supplier — unilaterally stopped supply of fuel and essential parts as a result of a dispute over Pakistan's bid to acquire a nuclear reprocessing plant from France.

The re-starting of KANUPP, a heavy-water reactor with a gross output of 137 MW, has been made possible by the fabrication of fuel bundles and some essential spare parts in Pakistan. The uranium has been mined locally, in the northern Dera Ghazi Khan District. There are believed to be ample reserves of uranium in Dera Ghazi Khan; preliminary investigations in the late 1960s revealed a reserve of at least 100,000 tons. The chairman of the Pakistan Atomic Energy Commission (PAEC), Mr Munir Ahmad Khan, is categorical in emphasizing that the

fuel bundles for KANUPP had been fabricated from locally mined ore.

Indigenous fuel fabrication has been on the cards since 1973, when Canada undertook to build a fabrication plant. Since the dispute with Canada in 1976, PAEC has designed and built a fuel fabrication plant at Chashma where the fuel bundles for KANUPP were fabricated.

Although the development of nuclear power has been in the melting pot for the past couple of years, the country now appears to be out of the woods. KANUPP, the only nuclear power plant in the country, has re-started. Another nuclear power plant of 600 MW output, to be installed at Chashma in the early 1980s, has once again been approved.

The chairman of PAEC says that consultants for the Chashma reactor project are to be appointed soon, after which bids for building the reactor will be invited. The cost of the reactor, he says, will be about \$800 million, compared with the original estimate of \$600 million.

The Chashma reactor, unlike KANUPP, is likely to use slightly enriched uranium fuel. The chairman of the commission, at a recent press conference, declined to comment on the development of enrichment facilities in Pakistan, saying that any utterance would be misinterpreted.

The President of Pakistan, General Zia-ul-Haq, is not, however, so diffident. He has declared that Pakistan has embarked on research on enrichment of uranium for peaceful purposes and to attain self-reliance.

Questions of the so-called "Islamic bomb" apart, there are good reasons to believe that Pakistan has been influenced on enrichment policy by the KANUPP troubles, and that it is now determined to be self-sufficient in whatever nuclear fuel its reactors need.

The search for self-sufficiency in enrichment may also be influenced by what is happening in the Middle East. The planners in Pakistan may have their eyes on the lucrative market for enriched fuel that may exist if Middle Eastern states install enriched uranium reactors of the types now being offered for sale. The planners seem chiefly interested in the centrifuge technology, which is less capital-intensive than the diffusion technology and which consumes less power. **Azim Kidwai**

US science policy

Press under pressure

Washington

The Office of Science and Technology Policy (OSTP, prop Dr Frank Press) has been sharply criticized in a report from the General Accounting Office (GAO). The essence of the criticism, resisted by Dr Press, is well expressed by the subtitle of the report, "Adaptation to a President's operating styles may conflict with con-

Uranium enrichment by centrifuges