

years acquired an enviable reputation for model studies of hydraulic projects, many of them overseas (see *Nature* 9 April, p.438). Over the years, successive governments have expected different things of the laboratory. Sometimes the laboratory has acted as a hidden subsidy of the export trade. Now, with the doctrine that those who call the tune should pay the piper sweeping through Whitehall, it is natural enough that this laboratory should find itself one of the first on the edge of unfamiliar and apparently hostile territory. The laboratory will not, however, be the last to find itself in this position.

The most serious doubt about the government's intentions concerns the prospectus which the staff at the laboratory is being offered. The assumption seems to be that if the laboratory were established as a private company, it would be able to make its way in the world by selling its services to those who use them now. The most obvious difficulty is that the fees which have been charged to, say, construction companies looking for technical appraisals of proposed designs have not fully covered the overhead cost, and especially the cost of long-term research. Those working at the laboratory, and the Institute of Professional Civil Servants which represents the scientists among them, are naturally acutely aware of the risks they are being asked to run. The government seems so far to have failed to still their recalcitrance.

The underlying difficulty is that there is a genuine conflict of interest between the government and the staff at the laboratory. The government, in its role as employer, most probably adequately represents the national interest in holding that applied research laboratories providing a service for customers need not be a part of the public service. But those who work in these laboratories and who have become accustomed to the apparent but often illusory benefits of being civil servants cannot be expected spontaneously to subordinate their personal interests to the greater good. The most immediate fear, at the Hydraulics Research Station but also in other laboratories where privatization threatens, is that the private enterprise will not need, or will not be able to afford, all the staff now working for them. Another problem is that public servants, unlike employees in private concerns, know in advance what their financial prospects are. The government cannot hope without trouble to spin off this or any other laboratory without compensating those directly concerned for the risks they are expected to run. There should be a generous promise of support, over a period of some years, for the core of basic research essential to commercial success. To meet the proper fear of redundancy, the government should undertake that members of staff at the laboratory will not in, say, the next seven years be worse off than if they had remained in the public service. And, to sweeten the pill, arrangements should be made that, in the immediate future, members of the staff should actually be a little better off. For if the objective is to wean public servants to life in the commercial world, is it not in everybody's interest that they should be helped to appreciate the benefits of an equitable bargain?

## Supersonic scandal

Ironically, the successful landing of the United States shuttle in the Mojave Desert last week coincided with the publication in Britain of a powerful economic case against the supersonic Concorde aircraft. At this stage, the shuttle is far from being an economic proposition. The cost of development (nearly \$10,000 million) is already substantial, it is unlikely that the National Aeronautics and Space Administration will seek to recover any substantial part of this in the charges made to the ultimate users of the spacecraft and, of course, unforeseen snags may add still further to the cost of the whole development programme. But the shuttle has promise, and probably a future. Concorde, by contrast, is a technological project with a past but no future. The House of Commons Industry and Trade Committee last week published figures showing that Concorde is at present uneconomic and likely to become even more of a drain on the

financial resources of its operator, British Airways, as fuel costs increase. When the British government is skimping on public expenditure in all its works, Concorde's capacity to keep flying must be an open and urgent question.

Since its inception in 1962, the Concorde project has been an assault on economic reality. The then Mr Peter Thorneycroft (now Lord Thorneycroft and chairman of the British Conservative Party), as a member of a British government seeking entry to the European Community, seems to have persuaded himself that an Anglo-French collaboration on the development of a supersonic aircraft would have political advantages outweighing the economic costs of the enterprise. In the event, Concorde did not overcome General de Gaulle's objections to British membership, but it was left to a later British government to discover that the Anglo-French agreement about Concorde was legally indissoluble. Technically, the promise of the aircraft was always limited. Concorde was conceived of as a first modest venture into the supersonic regime for a passenger aircraft. As an economic proposition, it was too small and too slow. Optimists, two decades ago, brushed aside these faults by saying that the first Concorde would quickly be followed by other economic aircraft. In the event, there have been no successors — or even serious suggestions that there should be. The British and French governments have between them spent £1,200 million on the development of this first aircraft, and yet must continue to subsidize their nationalized airlines to keep Concorde in the air.

The cost of keeping the aircraft in the air is still substantial. Both airlines have been forgiven the cost of developing the aircraft, and British Airways has also been forgiven the £160 million cost of buying six aircraft (one of which is now out of service). Yet even though the cost of a seat on Concorde is 20 per cent more than the cost of a first-class fare on a conventional aircraft travelling the same route, British Airways is able to come within sight of breaking even only on the route between London and New York. On the whole of its Concorde operations, the airline reckons that it will have to spend £65 million more than it earns from them in the next five years. The airline told the committee that some advantages accrue to it from being seen to have a continuing interest in supersonic flight, a calculation of the intangible that does not apparently prevent British Airways asking the British government for an annual subsidy for its Concorde operations. The committee concludes that the case for Concorde is so shaky that there should be commissioned an independent financial investigation of the continued operation of the aircraft. The surprise is merely that the committee did not recommend, on the evidence that it had gathered, that the airline should turn its back on Concorde before more money has been wasted on the enterprise. Why should taxpayers, or other airline users, continue to subsidize an enterprise without financial or technological promise?

The issue is deeper than that of how a nationalized airline manages its internal affairs. To the extent that supersonic aircraft, Concorde in particular, have become identified in the public mind with the process of innovation, the continued operation of a tiny fleet of loss-making aircraft can only injure the reputation of technology as a whole. The figures assembled by the Commons committee show that the average cost of carrying a passenger from London to New York by Concorde (£543) is more than three times the corresponding cost by conventional wide-bodied aircraft. Although a substantial part of the extra cost is that of fuel — in a sense, bad luck — the poor utilization of the aircraft (on average, 2.6 hours a day) and the high cost of persuading people to buy tickets on the machine also help to make Concorde operate in the red. These extra costs will hang like an albatross around the neck of British Airways for as long as it persists in flying an uneconomic supersonic aircraft across the Atlantic. For as long, British taxpayers will be asking what the British government can intend by exhorting everybody in sight to productive industrial innovation when it chooses to spend part of its income from taxation on an unproductive innovation such as Concorde. The enterprise, wrongly conceived twenty years ago, should now be brought speedily to an end.