stage where science is process, not product and where, if scientists are forced to pass opinion, external factors play a part — matters of personality and cultural background, for example, and where is the next grant going to come from?

From the politician's point of view, this is mere detail: he or she is going to be provided with more or less biased advice, as usual. A decision in, say, the Council of Ministers of the European Community on sulphur dioxide emission controls will be like any other political decision, but should allow for one important fact. Where science is properly at work, doubt diminishes with time.

Diminishing doubt provides a genuine reason to accept an interim decision on, say, emission levels for airborne pollutants, in the knowledge that it can be corrected and improved as knowledge progresses. It is even possible to conceive of later compensation for early imbalances. Suppose, for example, West Germany managed to impose on France low sulphur dioxide levels at its factories, and that later it proved that oxides of nitrogen rather than of sulphur were the culprits. Why should West Germany not pay France a portion of the original costs of reducing emissions?

All of which might give the politicians pause for thought in their deliberations over a draft directive from the European Commission (COM(83) 173 of 8 April 1983). This proposes a uniform system for imposing emission limits on "stationary plant" (that is factories, not vehicles). Pushed by West Germany, the directive is moving fast. It was discussed by the Council of Ministers within what must be a record two months. The Council approved in principle that such a directive should exist. A small step but one that indicates that this environmental issue has reached the top of the European agenda. The next steps will be harder — particularly the ones that involve setting levels and hence costs. But they will be easier if it is understood that a maturing science, like the science of acid rain, enables later adjustment and so a sharing of risk as well as of costs. □

A cut too deep

Just as laser ranging proves its value to geophysicists, the British facility faces closure. It should be saved.

By coincidence this issue of *Nature* contains mixed blessings for those of its readers who take an interest in the solid body of our planet. The good news is that by using laser-ranging to track the minute changes in the orbit of the satellite Lageos, US scientists have been able to measure the rate at which the Earth's oblateness is decreasing (see p.757 and p.756). The decrease appears to be caused by the Earth's continuing internal readjustment following the end of the last ice age about 5,000 years ago; such measurements have wider ramifications because they enable the viscosity of material beneath the Earth's crust to be reduced, which in turn carries implications for convection in the mantle and for plate tectonics.

The bad news (see p.742) is that, in all likelihood, the UK Science and Engineering Research Council will have to stop supporting, among other worthwhile projects, the Satellite Laser Ranging unit at the Royal Greenwich Observatory in Sussex — the only facility in the country capable of carrying out such research. The Ranger seems set for extinction unless the council's expected budgetary problems for 1983/4 are alleviated from without, namely by the Treasury or the vagaries of the currency markets. As the facility has only recently been completed at a cost of £1 million or so, the situation seems farcical. But it is also informative, not only because it highlights a significant flaw in the current administration of British science but also because it promises to reveal something of the state of geophysics in the United Kingdom.

The flaw is that the Science and Engineering Research Council is subject to an accounting system which leaves forward planning, over the five- or even ten-year timescale needed for the development of a major project, at the mercy of short-term fluctuations in currency. As long as up to 20 per cent of its annual budget is spent on subscriptions to such international organizations as the European Space Agency and the European Organization for Nuclear Research, it is inevitable that the council will be subject to such vicissitudes.

The system of government finance to which the council is currently subjected does not take this factor into account. At best it forces the council and its dependants to shift uneasily within the straitjacket of yearly financial accountability. At worst, as is happening this year, it forces the council to drastic and sometimes ludicrous measures, such as the virtual halt in further grant payments by the council's Astronomy, Space, and Radio Board until next financial year and the pending closure of the Satellite Laser Ranger. The hope is that such drastic consequences will concentrate the minds of the Treasury's consultative committee that is pondering the problem and upon whose recommendations the council is relying to avert yet more serious problems.

The fate of the Satellite Laser Ranger hangs, however, not only on the financial health of the Science and Engineering Research Council but also on the degree of commitment and support shown on its behalf by a community which — given the geophysical scope of interpretations of geodetic data — extends outside the council's dependants. Here the Natural Environment Research Council have a role to play. During the last financial year for which figures are available, it spent £44 million or so on solid-Earth geoscience. Of this, £5 million went towards geophysics. It should, therefore, at least be able to share with the Science and Engineering Research Council the £85,000 annual running costs of the Laser Ranger and so prevent the premature closure of a world-class facility. But both councils are reactive, rather than directive, bodies. Is there a sufficiently cohesive body of geophysicists within the United Kingdom that is energetic enough to ensure the Laser Ranger's survival? So far, apparently, not. □

JET set fair

Europe's nuclear fusion project is off the ground but has far to go.

There is a stark contrast between the smooth passage of development that culminated in the start up of the Joint European Torus last weekend (see p.746) and the dangerously bumpy path, often veering towards a cliff-edge, that was followed before the project was given a home.

Too expensive to be built by any single European nation but too important, for the political and scientific prowess of Europe, to be left to the Americans, the Soviets and the Japanese, nuclear fusion was an ideal project for the European Community right from the start. The problem was that national pride could not be placed wholly aside for the sake of the European ideal. Therefore, even when the decision had been taken to build the Joint European Torus, a prolonged period of political haggling was necessary before the rival nations conceded that it should be built in the United Kingdom. Most of the arguments against placing it there, some fairer than others, have been proven false by the completion of the five-year construction programme on time and at only a few per cent over cost.

Nevertheless, Europe's gain of a working torus does not bring the days of commercial nuclear fusion perceptibly closer. Not surprisingly the conditions of the start-up operation were even officially described as very modest. The first plasma was produced with a 60 kA current and lasted for one tenth of a second. The aim is to increase the current to 5,000 kA and to create a plasma for 10 seconds at a temperature of 100 million degrees. Formidable technical problems stand in the way.

Even then, the Joint European Torus is only an ignition demonstration device. If successful, it will be followed by a more advanced prototype before a demonstration reactor can be built. Those responsible for getting the Joint European Torus off to a flying start deserve a pat on the back, not least from the tax payers of Europe. But it is a sobering thought that neither those who have achieved the first step nor those who have paid for it are likely to be around to reap the benefits. The ever-receding projected date for the first commercial nuclear fusion power station is currently put at around 2030. □

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