Technological change

Worry about jobs

Washington

The new report on science and technology policy (see *Nature*, 10 July, page 96) published by the Organization for Economic Cooperation and Development (OECD) is being cold-shouldered in Washington largely because of its warning that undirected technological change may be contributing to the rising level of unemployment. The report, prepared by a group of outside experts, sets out to identify the main elements of the social and economic environment for science and technology which are likely to affect OECD countries during the 1980s.

The report emphasizes the need to revitalize technological innovation in order to help remedy many of the afflictions of the 1970s, especially sluggish economic growth and escalating inflation. To this uncontroversial conclusion, however, it adds that technological innovation must be guided so as to ensure that its potential benefits are not overshadowed by the destruction of jobs.

The extent to which technical change, in both manufacturing and service industries, may be contributing to growing unemployment, expected to reach 8.5 per cent next year, is receiving more and more attention, particularly at state and local levels. Pennsylvania's legislature, for example, is considering a bill intended to reduce unemployment by banning automatic petrol stations and toll collection booths, among other measures.

In Washington, by contrast, the government resists the notion that it must act to soften the impact of technical change on employment. Last year's domestic policy review of industrial innovation, for example, concluded merely that "the key to successful adjustment is warning time"; and the National Labor Technology Forecasting System subsequently promised by President Carter has yet to materialize. The dominant argument is that once rapid economic growth has been re-established, jobs lost through technical change in one sector of industry will be replaced elsewhere. In any case, there is growing antagonism towards government intervention in the regulation of innovation, so that the lack of enthusiasm for the OECD report is no surprise.

The report started as an internal study within OECD to examine the relationship of technical change to the problems of inflation, unemployment and long-term economic growth. In part, it was intended as a counter-analysis to the official OECD report "Towards full employment and price stability", produced by a committee chaired by Professor Paul McCracken and published in 1977.

The new report challenges the McCracken thesis at two related levels. First, it argues that the economic problems

faced by OECD countries in the early and mid-1970s were not, as McCracken suggested, merely a manifestation of cyclical economic changes that could be resolved through conventional policy instruments. Rather, the new report argues, they reflected deeper structural changes requiring a more radical approach.

More specifically, the report challenges the McCracken committee for underestimating the impact of technical change on social and economic policy, and for characterizing the declining rate of innovation as a problem that will resolve itself "naturally" with a revival in demand. Instead, the report argues that adequate policies for science and technology must be central to any attempt to tackle the joint problems of high inflation and unemployment. These problems, it argues, tend to depress the rate of innovation; but a slackening of innovation makes their solution more difficult.

Government action is therefore necessary, the report argues, to ensure both a faster and a "more balanced direction" for technical change. But in the United States, where most government economists accept the McCracken thesis, this has met with a certain scepticism. A particular source of irritation has been the report's warning that a general substitution of capital-intensive for labour-intensive techniques in manufacturing industry may be exacerbating unemployment.

Professor Richard Nelson of Yale University, a member of the OECD expert group, admits that the committee which prepared the report was "schizophrenic" on the employment issue. Thus it argues that "a significant acceleration of technical advance and productivity growth would make the unemployment problems easier to deal with" but also warns that more capital-intensive technology may further worsen the condition of the labour market.

The report adds that structural unemployment is now an "important feature of the economic landscape". The hypothesis is an increasingly familiar one in Europe, particularly in Britain where it has been argued forcefully by, among others, Professor Christopher Freeman of the Science Policy Research Unit at the University of Sussex, a member of the group which prepared the OECD report. Economists here prefer to point to similar concerns in the late 1950s and early 1960s that the automation of production might create serious unemployment; in the event, excess labour was absorbed into the rapidly-growing service sector.

Academic economists tend to be more agnostic than their government colleagues. Dr Robert Lund of the Massachusetts Institute of Technology, who has examined studies carried out at Sussex on the impact of microelectronics, says that "we did not find the kinds of employment impacts that seemed to be predicted". But he adds that "I do not know if we have enough data to

say that we have the right answers".

Government policy-makers are less equivocal. The OECD report came in for substantial criticism when a draft was circulated last year. Strenuous, and ultimately successful, efforts were subsequently made within OECD to ensure that the report was published as the opinion of a group of experts rather than with the organization's official backing.

The net result, however, is that the report's potential impact on policy has been blunted, which Professor Nelson for one regrets. "On the employment question, it may not be quite right, but it is more correct than some of the discussions now taking place."

David Dickson

Thermonuclear fusion

Soviets bid half

Brussels

The cost of the International Test Fusion Reactor (INTOR), estimated at \$1,000 million, would be more than halved if the machine were built in the Soviet Union. This is the opinion of Dr L G Golubchikov, head of the fusion division of the Soviet State Committee on the Utilization of Atomic Energy who has been seeking to stimulate a greater commitment to the project from the West during his participation in the eighth international conference on plasma physics which ended last week.

The project, which so far consists largely of a design study, is being planned by the International Atomic Energy Agency (IAEA). American reaction at the conference, however, was cool. It might cost half as much, but it would take twice as long, was one opinion.

INTOR, whose study by the IAEA was proposed by the USSR in May 1978, is nevertheless agreed to be a constructive exercise in one respect: by concentrating attention on the severe engineering difficulties of the tokamak fusion reactor, it is helping to define the experimental questions which must be tackled in the next generation of large tokamaks (JET in Europe, T-15 in the USSR, TFTR in the United States and JT-60 in Japan). However, it is also generally agreed (except by the USSR) that the INTOR design is unlikely to see the light of day as a piece of hardware, at least in the medium term.

What appears most likely is that the recent proposal (*Nature*, 10 July) for a Fusion Engineering Device (FED) in the United States at a hardware cost of \$1,000 million will capture (and double) the US fusion budget. FED, largely the work of the Princeton Plasma Physics Laboratory, is less ambitious than the Oak Ridge National Laboratory's proposal, the Engineering Test Facility (ETF), which in turn was less ambitious than INTOR. Moreover, it is felt in the US Department of Energy that collaboration with the USSR on a project of the scale of INTOR would be fraught with bureaucratic difficulties.

Japan would also consider collaborating with the United States on FED although it is a little early for formal approaches to have been made. Professor Husini, a Japanese representative on the IAEA's International Fusion Research Council, said last week that Japan would be "very interested" in such a joint venture, on the basis of sharing costs.

This leaves the European Community in the cold beyond JET, unless it also joins in FED, which is by no means out of the question. The European Commission has been considering the next European Torus (NET) in a small committee headed by the Italian physicist Professor R Toschi of Frascati; but, said one Italian, "the FED recommendation means NET will have to be completely rethought. Perhaps we can build a device a step beyond FED and five years later."

The USSR would clearly be disappointed if INTOR goes little further than the project definition, which is to be presented to the IAEA next year. "The West has the bigger energy problem" said Golubchikov. The Soviet authorities are thus less bullish about fusion. It would thus assist the Soviet fusion community greatly if the next steps could be international. And Golubchikov believes the technical problems that will face FED or INTOR will be so great that Soviet participation will be necessary if there is to be rapid progress. After all, the USSR invented the tokamak — which appears to be the only viable ignition device at present — and built the only working superconducting tokamak (T7).

Robert Walgate

Laboratory merger Harwell again

Several large research facilities in Britain will be completed late, and Britain's capacity to contribute to new international projects will be impaired, as a result of pressures on the budget of the Science Research Council. This is the view of Sir Geoffrey Allen, chairman of the SRC, speaking at an Open Day at the newly-merged Rutherford and Appleton Laboratories last week. Although the science budget has been let off relatively lightly in recent public expenditure cuts, he said, a 10–15 per cent increase of the budget would be needed to complete existing projects within the original timetables and to start new ventures.

One victim of these enforced delays is the Spallation Neutron Source, at present under construction at Chilton, across the fence from Harwell. It will now be completed in 1984, two years later than originally planned, largely because it has been necessary to spread out the funding of the £12 million project. Allen is also concerned that Britain may not be able to contribute fully to the building of a new European synchrotron radiation source (*Nature*, 20 May) or to the European Space Agency's plan to build an astrometry

satellite, Hipparcos.

The proposed European synchrotron radiation project, devised by the European Science Foundation, would require a new international agreement among the partners; Allen plainly fears that the SRC budget may be too tight to allow Britain to contribute. Hipparcos presents a different problem. It will be paid for out of ESA's mandatory science budget to which all member states, including Britain, contribute annually on the basis of GNP. Allen's

concern here is that British laboratories should recapture some of the cost by making viable bids for the ESA contracts.

The merging Appleton and Rutherford Laboratories are hoping to overcome this manpower problem by training and re-deploying people as their projects come to an end, or as timetables are extended. The laboratories claim some success in these directions, but acknowledge that there must be limits to the extent to which staffs with different, highly specialised backgrounds, for example in radio and space physics (Appleton) and high-energy physics (Rutherford), can be fully redeployed.

A major reason for the merger is to save costs, including some staff. The SRC hopes to shed about 40 administrative jobs by not replacing those who choose not to move to the new site. Most of the scientific staff are expected to move, however, and those who do not will be replaced. So far about a third of the 300 Appleton staff have moved. The rest will do so before the end of 1981.

The plan to close the site of the Appleton laboratory at Ditton Park cannot be implemented precisely as originally hoped, however. Some of its instruments will not be compatible with the Chilton site; some millimetre wave and radio equipment, for example, will be sited 60 miles away to avoid interference from the spallation neutron source and 70 MeV linac.

Judy Redfearn

Siberian science

Marchuk on top

Last month's meeting of the Supreme Soviet confirmed the appointment of Academician Guri I Marchuk as head of the State Committee for Science and Technology. The confirmation was a formality; Marchuk's appointment took effect last January, when the then head, Academician Vladimir A Kirillin, resigned (coincidentally on the day that Academician Andrei Sakharov was exiled to Gor'kii).

Marchuk came to the State Committee from the Siberian branch of the Academy of Sciences, of which he had been chairman since 1975. That branch, based on the science centre of Akademgorodok outside Novosibirsk, was originally set up, in 1957, as part of Khrushchev's overall plan to decentralize the economy. Its activities have always, therefore, been closely related, at least formally, to the needs of Siberia.

The Siberian branch would therefore share the blame if science failed to play a full part in the opening up of the Siberian heartland. In the autumn of 1976, criticism of the Siberian branch did in fact break out. The State Monitoring Committee at the outset criticized the Academy of Science's Far Eastern Science Centre for failing to make a proper practical contribution to the national economy. The campaign turned to more and more prestigious institutions, finally attacking the Siberian branch itself. At that point, Marchuk fought back, and with an impressive battery of arguments demonstrated that, so far from slacking, the branch was alive and flourishing and more than pulling its weight.

In his new job as head of the State Committee, Marchuk is responsible for the whole of Soviet science planning, the coordination of research and development and the subsequent implementation of research. Marchuk's Siberian experience will be invaluable, for Siberia remains the major area of Soviet capital investment.

Last April, a special conference of the Central Committee of the CPSU advocated increased investment in the fossil-fuel-bearing regions of West Siberia, apparently because a lack of amenities is making it hard to attract scientists and engineers to the area. The new Baikal-Amur Mainline railway was planned from the beginning as a joint exercise in engineering, ecology, demography and economics.

Plans to divert the major Siberian rivers south were, however, delayed during the last five-year plan, although, in response to complaints at the possible global environmental consequences, the Soviet government announced that no such changes would occur. It has however mounted a major environmental study of the region, with the result that Siberian