

codes of practice for traditional buildings, and a team of experts to vet other designs before construction started. Sir Alfred Pugsley said in his opening address that, although there had been great refinements in the design of engineering structures, there had been a decline in the independent checking of design calculations, and he referred particularly to the need for independent criticism of the codes of practice issued by the British Standards Institution.

One speaker implied that it was high time that engineers were put in charge of professional teams instead of architects, and it was further suggested that there ought to be better supervision of young graduates doing site work. After one consulting engineer had said that he wondered whether the extra cost of making tall blocks safe against gas explosions was worth "the marginal benefit of cooking with gas", a representative of the Gas Council defended gas by saying that if buildings could not be designed to be fit for gas, they were "not fit for human beings".

The measures taken by local authorities with blocks of flats of the Ronan Point type may have shaken the confidence of some structural engineers, but they should be pleased at the news that engineers at the Greater London Council have devised a new method of strengthening tall blocks that may be both easy to do and comparatively cheap. The GLC is not releasing details for about 10 days, but the technique is now being developed after vetting by the Ministry of Housing's technical panel. No hint has been given as to the reliability of the new technique, or whether the GLC will now consider restoring gas to its blocks and removing the bollards hastily erected around the bottom of some of the blocks to stop uncontrollable vehicles from crashing into one of the structural members.

## INVESTMENT

### Economic Benefits

THE value of overseas investment is something about which no British Government has quite made up its mind. In general, the attitude of the present Government is that foreign investment in Britain is gently to be encouraged, while the investment abroad by British firms is a much more dubious activity. To judge by a study just published by PEP (*The Role of American Investment in the British Economy*, by John H. Dunning, 10s), the Government has got at least the first part of its policy right. Professor Dunning concludes that the effects of American investment in Britain "have almost certainly been beneficial to the British economy", and produces detailed evidence to justify the claim. American companies manage better, export more, do more research and contribute more to development areas than their British counterparts. So long as this situation holds, the net effect of the investment is beneficial.

Professor Dunning traces the growth of American investment in Britain since the war and predicts that, by 1981, between a fifth and a quarter of British industry will be American owned. If Britain had been in Europe since 1963, it is a fair bet that the proportion would have been higher. Between 1957 and 1966, American investment in Britain increased by two and a half times, but in Europe over the same period it went up by a factor of eight. Much of this new invest-

ment, in Britain at least, was self-financed; about 45 per cent of the \$4,500 million invested in Britain by American firms in Britain since 1950 came out of profits reinvested by established American companies. In the early years after the war, the profits earned by American companies in Britain were very high—88 per cent more on every pound invested than their British competitors—but since then the gap has narrowed. In the period 1961–66, American companies in Britain were 44 per cent more profitable than their counterparts. Between 1950 and 1966, the average rate of return on capital of British companies was 8.7 per cent, while the American companies managed 14.9 per cent.

American companies in Britain have also exported more vigorously than their native counterparts. Their share of British manufacturing exports is about 75 per cent larger than their share of manufacturing output; in 1965, they exported 25 per cent of total sales, compared with a national average of 14 per cent. In 1965, the net balance of payments contribution of American firms operating in Britain was £284 million, which is probably around £150 million more than would have been achieved if their place had been taken by British firms. American companies also seem to find the bait of the development areas more compelling than do British companies, and by the end of 1966, 100,000 people were employed by American firms in the less prosperous areas of the UK. But Professor Dunning says that the main way in which American investment has aided the British economy is by improving the efficiency of resource allocation. This has been done in two ways: by causing resources to be moved from less productive sectors to more productive ones, and by raising the productivity of the resources in their present uses. In almost all areas of industry, the American firms had better records of productivity than the British ones (see table).

	Productivity	
	(UK)	(US)
Chemicals	100	158
Metal manufacture	100	125
Electrical engineering	100	108
Non-electrical engineering	100	103
Metal goods not elsewhere specified	100	95
Food, drink, tobacco	100	125
Textiles, footwear, clothing	100	107
Vehicles	100	137
Other manufacturing	100	109
Total manufacturing	100	118

There are, of course, problems raised by the large scale investment of foreign funds in any country, and Professor Dunning does not shirk them. Possibly the most important of these is the fear that American companies, once they have gained substantial control of the British economy, can thwart national sovereignty and government policy. The occasions on which this has happened are comparatively few, but they exist—and the Canadian experience, particularly with the vehicle manufacturers, shows that this is a real danger. Professor Dunning's recommendations are modest enough, and are indeed based on the line taken by the Canadian Government; he suggests, for instance, that the Government issue some "guidelines for good corporate behaviour" and set up a special body to

review the activities of foreign firms in Britain. Apart from that, he suggests that the Government should simply encourage British industry to become more competitive.

## ENVIRONMENT

### Power Station Pollution

FEARS of creeping contamination of the environment by waste products from nuclear power stations have so far proved to be unfounded. According to a handbook published recently by the International Atomic Energy Agency (*Management of Radioactive Wastes at Nuclear Power Plants*, IAEA, £2 10s), the performance of the waste management facilities has been "excellent". "In no case has there occurred any exposure in the plant environs which has even approached, let alone exceeded, the recommendations of the International Committee on Radiological Protection", the report claims. It should be possible, given the same care in future plant design, to maintain this good record. The report does not, however, envisage any radical change in waste management, apart from relatively minor engineering modifications of existing systems, and it unfortunately does not attempt to guess how wastes from breeder reactors may be handled. These will present new problems, like learning how to deal with contaminated liquid metal coolants.

Apart from these anodyne conclusions, the IAEA report publishes four reviews, of waste management in Canada, France, the United Kingdom and the United States. These echo the general air of cheerful confidence, though the United States report by Morton J. Goldman of NUS Corporation of Washington does point to two areas which may pose problems in the future—the release of tritium from light water cooled reactors, and the possible contamination of the secondary water in pressurized water reactors by leaking steam generator tubes. The difficulty with tritium, which is a long half-life nucleide, is that it is hard to separate from other waste materials. But it is only likely to be a problem on "dry" sites where the cooling water is recirculated through cooling towers. In these circumstances, Mr Goldman says, it is conceivable that the tritium concentration could reach unacceptable levels. Finally, he says that steam generator leaks have occurred in most, if not all, operating PWRs, releasing contaminants into the secondary water, which is supposed to be perfectly clean. This could impose a shut-down of the station, "because of an otherwise relatively minor leak", according to Mr Goldman, unless there were facilities for decontaminating the secondary water. Such facilities, he says, may well be included in future designs.

Meanwhile, two American engineers have published an equally soothing report on the subject of so-called "thermal pollution" from thermal or nuclear stations. Wesley O. Pipes, professor of civil engineering at Northwestern University, and L. P. Beer, previously a senior staff engineer with Consolidated Edison, writing in *Electrical World* (February 10, 1969), say that concern about thermal pollution has been exaggerated. This conclusion is derived from a study of a thermal power station at Waukegan, Illinois, which has been discharging 760,000 gallons of warm water into Lake Michigan every minute for the last forty years.

Con Ed hopes to build a nuclear plant at Zion, seven miles from Waukegan, which would treble the amount of warm water being pumped into this part of the lake, which is probably why the survey was undertaken. The water from the thermal plant was at 57° F, 11° F above the ambient, but Pipes and Beer could find no evidence of environmental damage. No temperature difference could be detected 3,000 ft from shore, and the hot water had not affected the water chemistry in any significant way. Bottom living organisms vital in the food chain of fish had not been eliminated, and trout and Cobo salmon, even near the outlet, had suffered no apparent shock. Professor Pipes said that the combined heat inputs from the two power stations would raise the average water temperature by less than 0.1° F during one summer. "This increase", he added rather surprisingly, "would be nullified during the following winter". The Lake Michigan survey produced results similar to those reached by the Tennessee Valley Authority, which undertook surveys in lakes and rivers near TVA power stations. "Personally I am much more alarmed over organic pollution from sewage and from oil pollution", added Professor Pipes. "Oil pumped into Lake Michigan with the bilge from lake boats does a great deal more damage to lake life than any possible thermal damage." With that, even the most ardent conservationists would probably agree.

## COMMUNICATIONS

### Discussing INTELSTAT

It is interesting, and perhaps significant, that the Soviet Union has sent a delegation with observer status to the current Washington conference directed to drawing up a permanent agreement on INTELSTAT, the international telecommunications satellite network. A total of sixty-three nations round the world have joined in the 5-year interim phase of INTELSTAT which ends this year, but the Soviet Union is not one of them. All members of the ITU (International Telecommunications Union) are entitled to attend as observers, however. In the Soviet communiqué announcing the attendance of its delegation at the Washington meeting, it was stressed that the country had offered to provide an international system "open to all nations" (*Inter-spunik*) at the Vienna conference on the peaceful uses of space last August. Is more going to be heard of this proposal at Washington? There is plenty of time for such developments. The meeting opened on February 24 and the first session is due to run for a month. Only the Americans show any genuine confidence that all the business can be concluded in one session. It is more generally anticipated that a second session will be necessary, preceded by a pause for delegations to return home and confer with their governments. So far the official head of the British delegation, Mr P. F. Hancock of the Foreign Office, has not put in an appearance at the Washington meeting but is being held in reserve for the more crucial stages ahead. So far the official opening speeches have been disposed of, and a series of working parties set up for detailed consideration of specific points.

The main points at issue are:

(1) Should the international network be "governed" in the same manner as at present under the Interim Agreement, which provides the US with more than