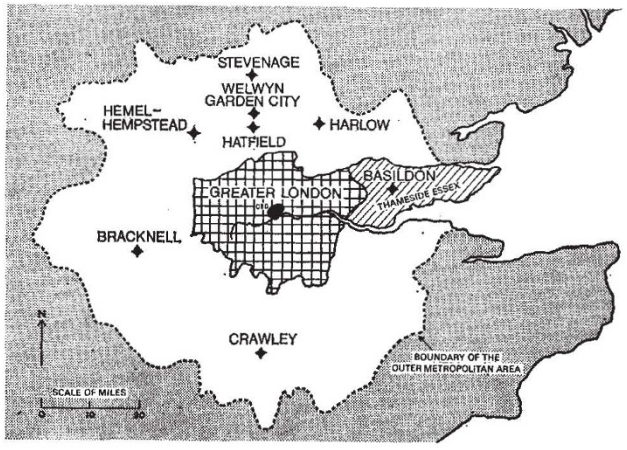
three years' leave from the planning department of the Greater London Council, would like to see half a million jobs moved out of central London in the next decade, and he suggests that employers could be given more encouragement to move out by enlarging the scope of the Location of Offices Bureau, by tightening up the Office Development Permit System and by special taxes and incentives. With London's resident labour force declining steadily, the imbalance between the levels of employment and population will increase dramatically unless large scale decentralization takes place. There could in fact be an employment surplus of 700,000 by 1981, the broadsheet says. If this happened, there would need to be heavy investment in improving the railway systems and road networks. The idea of preserving a green belt around London would seem utopian and London would sprawl as it never sprawled before.

The crux of the problem is the concentration of 1,300,000 jobs in the centre. This concentration is inherited from the days of barges and ships, carriages, stage coaches and steam trains, servants and messenger boys, quill pens and inkstands. The usual means of communication involved a visit or a letter in the penny post. These means of communication have been replaced by delivery vans, containers and articulated




London's new towns.

lorries, motor cars, jet planes, subscriber trunk dialling, computers and xerox machines. Unfortunately, the central business district of London has stagnated during this revolution, the broadsheet says, and little has been done to improve people's journeys to work. The situation could be eased, however, if the lessons from London's new towns were taken to heart. These towns (Basildon, Bracknell, Crawley, Harlow, Hemel Hempstead, Stevenage and Welwyn Garden City), the product of the policy proposed in Abercrombie's Greater London Plan in 1944, have shown the way to a solution of London's journey to work and housing problems. Mr Thomas shows that they have acted as countermagnets to London's growth because they have provided nearly 200,000 jobs in the Outer Metropolitan Area. Contrary to many reports, he has found the new towns self-contained and balanced communities for living and working.

As a case study, the broadsheet takes the impact of the development of Basildon on its hinterland of Thameside Essex. The new town has helped to remedy a massive deficit in employment in this area by gaining 30,000 jobs, but only 20,000 residents in employment. One in seven of the resident employed population in Basildon travels to London to work (a higher proportion than any of the other new towns), but the proportion travelling from Basildon is much smaller than from any other parts of Thameside Essex. More than one in five commute to London from the Southend area. There is a deficit of 40,000 jobs there, and unemployment rates justify development area status. Southend, together with its neighbours, Benfleet, Canvey Island, Rayleigh and Rochford, probably has the largest employment deficit and the longest journey to work in the country. The broadsheet says that if London's third airport were sited at Foulness—a few miles to the east—the situation in the area would be changed rapidly as it was in Basildon, and there would probably be a substantial drop in the numbers commuting to London.

POWER

## New Method of Combustion

THE National Coal Board is determined to convince both the Central Electricity Generating Board and the British Government that its new efficient method of burning coal known as fluidized combustion has a rightful place in the power stations of the next decade. Mr L. Grainger, member for research at the coal board, revealed the advanced stage of research on this technique at the NCB research station at Stoke Orchard, Gloucestershire, last week. He said that if all of several hurdles were successfully jumped in the months ahead, there could be a 660 Megawatt power station using fluidized combustion in operation by 1976.

The benefits of using fluidized combustion instead of conventional plants for producing steam are quite substantial, and the CEGB may well be regretting its decision to opt out of the fluidized combustion programme a few years ago. The special feature of the process is that, by blowing air through finely ground coal, it is possible to increase the rate of transfer of heat in the furnace by a factor of three. Furthermore, the operating temperature can be lowered from the normal 1,200°–1,600° C to the much less corrosive 800° C, and the size of the combustion chamber itself can be considerably reduced. The coal fragments can also be relatively coarse. It is the fluidizing effect of the air on the coal that allows these considerable benefits to be achieved.

The saving of capital costs by building a fluidized combustion plant rather than a conventional power station is estimated at about 10 per cent, with a reduction of running costs of between 5 and 10 per cent. Why, then, is the implementation of fluidized combustion in power stations in question?

The answer is tied up with the future of the coal industry. The CEGB estimates that nuclear power will increase its share of electricity production in Britain from the present 10 per cent to about 25 per cent by 1975. At the same time, the coal industry reckons that after 1975, about two-thirds of the coal produced in Britain will be for power generation. There is clearly a delicate balancing act ahead for the NCB. Nuclear power stations cost considerably more to build than coal power stations, of course, but Mr Grainger con-

ceded last week that if, by some chance, nuclear generating costs were reduced to, say, 0·35*d* per unit, the 0·5*d* foreseen for the fluidized combustion power station would look rather sick. But present forecasts of nuclear generating costs are still about 0·5*d*, and Mr Grainger was optimistic about the viability of fluidized combustion stations for the late 1970s. Nuclear power stations are also most economical on base–load operation, so that Mr Grainger says that there is bound to be a considerable demand for coal-produced power for peak usage.

Design and feasibility studies are at present under way for the construction of a prototype 20 MW fluidized combustion generator using a 20 foot by 40 foot bed. A decision on whether to proceed with this prototype is expected later this year, and the NCB hopes then to embark on its plans for a full scale 660 MW station, probably at Grimethorpe in Yorkshire, for completion in 1976.

A test section 3 foot square has been built at Stoke Orchard, and the trials are considered encouraging. Research is also going on at the British Coal Utilization Research Association at Leatherhead on the possibility of using pressurized air to increase further the rate of heat flow in the furnace. About 80 per cent of the heat is extracted by water tubes in the bed, and 20 per cent by means of a gas turbine, and if the problem of excess waste material in the turbine can be overcome the pressurized process could bolster the economic saving in fluidized combustion still more.

An extra benefit of fluidized combustion is the reduction in sulphur dioxide emission which is already attracting American companies worried by the recent anti-pollution legislation. The sulphur dioxide is removed by the addition of a fine limestone to the furnace. It appears that the US National Air Pollution Control Administration has already allocated $20 million for research on fluidized combustion. The NCB is devoting about £0·5 million to this project.

FRUIT RESEARCH

## Progress at East Malling

from our Botany Correspondent

When the Agricultural Research Council's Ditton Laboratory, once an outstation of the now defunct Low Temperature Research Station at Cambridge, ceased to exist on March 31, its staff and equipment were redeployed to other ARC institutes, principally the nearby East Malling Research Station. At the end of July, Dr H. C. Pereira takes over as director of the new merged organization, which has been formed as part of the ARC's efforts to end some of the duplication of activities in different research stations.

East Malling's contribution to the merger is a flourishing programme of research concerned with most aspects of fruit production. The latest annual report (price 21*s*, from East Malling Research Station) tells of some particularly important advances in the control of wilt disease in hops, which is caused by the fungus *Verticillium albo-atrum*. As well as the new resistant varieties of hops, 'Alliance' and 'Progress', there are signs that the disease could be controlled if farmers used less nitrogen fertilizer. Hops grown on experimental plots at East Malling were less infected with *Verticillium*, with no loss of yield, when the soil was treated with 60 and 120 units/acre of nitrogenous fertilizer rather than 180 units/acre. Hop farmers often put down between 180 and 240 units/acre of this fertilizer, and it looks as if they would be better advised to use less.

Another of the important activities at East Malling recently has been the screening of crops for viruses that produce no noticeable symptoms, although they may be having some adverse effect on growth and development. A survey of cherry trees in Kent, Berkshire and the West Midlands has revealed that British production of cherries is at least 30 per cent less than it could be if the trees were not so heavily infected with viruses.

With hops, too, the situation seems to be similar. Plants free from viruses can be grown from cultures of the stem tips, or meristems, and, compared with infected plants, they grow better in every respect. Healthy clones have also been produced from meristem cultures of strawberries, blackcurrants and gooseberries. The strawberries will be cropped for another year before they are released to the growers and the other two clones are ready for fruiting trials. Other work, with apples and cherries, has been so successful that after heat treatment both rootstocks and scions can be supplied free of viruses.

POLICY

## National Biology for Australia

Australia's unique flora and fauna will be neglected no longer if the latest recommendation of the Australian Academy of Sciences is taken up by the Australian Government. A report made by the Academy's Flora and Fauna Committee last October—*Proposal to Establish a Biological Survey of Australia*—has just been published. It is the fruit of many visits to state museums and herbaria, which are at present responsible for the scientific study of local animals and plants.

The museums and herbaria are apparently doing valiant work, but they have meagre resources and are largely concerned with the situation in their own states, although flora and fauna do not recognize state boundaries. The proposed biological survey is envisaged as a national body, situated in Canberra, which will work closely with the state organizations, systematically to collect and describe animals and plants. There would be two divisions, zoological and botanical, and one of the objects of the botanical division would be to produce a new flora of Australia. The only comprehensive descriptive list of the plants of the continent now available was completed more than a hundred years ago, and deals with only a fraction of the plants now known in Australia.

The Academy of Sciences is hoping that the Government will act quickly to implement the recommendation, and remedy the present situation whereby Australia is the only advanced country in the world that has no national biological survey or equivalent institution. Australia, the committee's report says, is deplorably lacking in properly trained taxonomists, although adequate taxonomy is essential for advances in economically important subjects such as horticulture, pest control and the chemistry of natural products as well as pure biological research. The biological survey would be the solution to this lack of taxonomists.