

BRITAIN

View and review

The development of a comprehensive UK energy policy has come in for further analysis in the past week. Chris Sherwell reports

BRITAIN'S Energy Secretary, Mr Anthony Wedgwood Benn, who has already taken steps to broaden the basis of consultation on the country's energy policy by holding an energy conference and proposing an energy commission, is now considering the possibility of publishing a Green Paper (discussion document) later this year to widen the debate still further. The suggestion is contained in a memorandum from Mr Benn which accompanies the energy policy review document that the Department of Energy has produced for the National Economic Development

Council.

The document crisply summarises the country's prevailing energy policies. Short-term problems, arising from an excess of capacity, emphasise the difficulties of power plant manufacturers, the possibility of a coal surplus and the need for a gas gathering pipeline to harness the Northern North Sea. The suggested long-term strategy emphasises the Plan for Coal and coal conversion research, the need for a flexible oil depletion policy and a long-term gas policy, the need for access to necessary reactor technology including the fast breeder, and the benefits of conservation and renewable energy sources. The finances and pricing of the nationalised energy industries also need to be put on to a proper economic basis.

Last week the Royal Society released its long-awaited report on the government's discussion document published last year, *Energy R&D in the United Kingdom*. The Society also published a report on R&D strategy for offshore oil and gas technology. The most significant point to emerge concerned the fast breeder reactor. Coal could not alone satisfy future demand, it was argued, and the proposed demonstration commercial breeder (CFR-1) should be given sufficient approval to allow all planning and practical studies to start immediately; the country's lack of uranium sources meant that any credible nuclear policy had to be based on the breeder and did not imply the inevitability of a breeder programme.

Support for R&D on alternative sources was urged, particularly in power and solar power; wind and geothermal energy were less enthusiastically received. □

THE severe drought in the Western United States has led to widespread calls for rain- and snowmaking, and has even caused one state, Idaho, to threaten legal action if a neighbouring state, Washington, interferes with the weather. Is there, however, any reason to have much confidence in rainmaking activities? Many of those who work in or close to the field of weather modification are still sceptical of our ability to affect precipitation.

Most effort in weather modification has been devoted to adding to the population of natural ice nuclei. These are extremely rare particles (only about one in a billion atmospheric particles is an effective ice nucleus at warmer than -15°C), although these rare nuclei can sometimes generate many secondary particles. Silver iodide is still the main artificial nucleating material, although experimental evidence on the mechanism is ambiguous. Distinct from ice nucleation is the process of altering populations of cloud condensation nuclei, and some interesting work has been done in India using sodium chloride. There is still no strongly preferred method for launching nuclei—airborne and ground generators continue to be used.

An immense amount of cloud-seeding has been done in the past 25 years, but most has been by commercial enterprises for which little satisfactory documentation exists. Detailed studies by governmental organisations with attempts at statistical analysis have, however, been conducted in the

United States, Canada, India, Israel and Australia and are summarised in a valuable document, *Weather and Climate Modification* (US National Academy of Sciences, 1973).

Changing weather



BACKGROUND

Experiments have used amounts of silver iodide of up to 1 kg per hour. The major problem has always been that of data analysis, as ideally, trials should be fully randomised. Even when this has been done statistical tests, on which there is still much discussion, show occasions when results are inconclusive and even occasions of diminished precipitation. The above-mentioned report, however, was more optimistic about one experiment, Climax in Colorado, in

which cold orographic winter clouds were seeded; precipitation, it says, can be increased by substantial amounts (35%) and on a determinate basis.

Not all weather modification experiments have been specifically devoted to rainmaking. In Florida, a major experiment has been underway for several years in the field of 'cloud management'. Massive seedings of up to 1 kg per cumulus cloud are intended to release large amounts of latent heat as supercooled water is rapidly turned to ice. The latent heat increases the buoyancy of clouds and hence their lifetimes during which they may grow or merge.

Further, there has been extensive activity, centred on Colorado, to modify hail which accounts for \$700 million of damage in the United States every year. A strategy already adopted in the Soviet Union is to increase by a factor of up to a thousand the number of nuclei in the hail-producing part of a cumulonimbus cloud by launching shells or rockets packed with silver iodide which explode inside the cloud. The hope is that many small hailstones rather than a few large ones will fall. Soviet work has extended well beyond the research phase and annual savings running into tens of millions of roubles have been reported. Work in France, Switzerland and Kenya has yielded mixed results, again with problems of randomisation, but the National Hail Research Experiment initiated in 1971 in the United States has yet to bear fruit.