Geothermal energy in California

Colin Norman, Washington

LATER this month the US Department of the Interior will take a large step towards opening up a new source of energy in the United States. On January 22 some 50,000 acres of federal land in California will be leased to private industry so that a start can be made on producing electricity from steam and superheated water trapped in deposits relatively close to the surface. Such deposits of geothermal energy have long been touted as potential sources of power, and the energy crisis has provided the necessary incentive for the federal government to set aside environmental and other concerns and open up large areas of the western United States for drilling to tap the resources.

The potential impact of geothermal energy on power supplies in the United States is a matter of some debate, for estimates range from 1% of energy supplies by the year 2000 to a staggering 20%. A report put together by the University of Alaska under the direction of Walter J. Hickel, former Secretary of the Interior, came up with the prediction earlier this year, for example, that geothermal energy could provide 1,000 million megawatt hours (MWh) of electricity by 1985, and 3,100 million MWh by the end of the century—more than five times the present power demand of the whole of New England. The Department of the Interior, on the other hand, reckons that by the year 2000, geothermal energy may be supplying a modest (but important) 2% of the United States national electricity generating capacity.

In any case, commercially exploitable geothermal resources are regions where the great heat of the Earth's interior is close to the surface. Essentially, that means along the edges of plates and near recent volcanic formations. Since two plates meet at the San Andreas fault in California, and since much of the Western United States consists of volcanic rocks, the potential geothermal resources could be large.

The idea behind production of electricity from geothermal resources is simple enough—in fact, a geothermal power plant has been operating at Larderello in Italy since 1904 and another plant has recently been built in northern California. The easiest deposits to exploit are entrapments of hot, dry steam, which can be tapped simply by sinking a pipe into the deposit and using the steam directly to drive turbines. Deposits of superheated water at about 200° C are also relatively easy to tap, since the water can be flashed to steam by relieving some of the pressure.

Unfortunately, however, such deposits are relatively few and far between, and geothermal energy will have a large impact on power supplies only if methods can be found for exploiting cooler water deposits and hot rock reservoirs. As far as the former is concerned, it may be possible to transfer heat from the water to a more volatile liquid and use the vapour from the second liquid to drive a turbine in a closed system. Hot rock reservoirs are by far the most abundant geothermal resources but they are also the most difficult to exploit. Research is under way on methods which involve fracturing the rock underground with explosives and circulating a liquid through the fractured rock to pick up some of the heat. But commercial application of such techniques is considered to be a long way off.

Map showing locations of areas to be leased.

The areas which the Department of the Interior will lease this month all contain steam and superheated water deposits and thus can be used to generate electricity fairly quickly. Three areas will be leased. One, the Clear Lake–Geysers area in northern California, is already producing some 400 MW of electricity and is reckoned to be capable of producing between 1,000 and 5,000 MW. The second area is in the Mono Lake–Long Valley region east of San Francisco; this is expected to produce about 1,750 MW. And the third area is the Imperial Valley, in southern California, along the Mexican border. This field has the largest potential, for it has been estimated that it could produce between 3,000 and 30,000 MW of electricity, and it also lies close to Los Angeles and other large urban centres.

In addition to opening up those areas for geothermal power production, the Department of the Interior has announced that it will accept bids from private industry for other federal lands which may be potential geothermal resource areas. This should stimulate the search for other areas of geothermal energy which can be easily exploited. And, for the longer term, the federal government is preparing to step up spending on research and development on production of power from less accessible geothermal resources. The five-year plan put together by Dr Dixie Lee Ray, Chairman of the Atomic Energy Commission, envisages an expenditure of some $185 million before 1980, for example.

Agreement on budget for HEW

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CONGRESS and the Administration have at last managed to reach agreement on the size of the budget for the Department of Health, Education and Welfare (HEW). The agreement will give the research institutes of the National Institutes of Health at least $1,723 million this fiscal year—nearly $200 million more than the Administration had wanted to spend. A number of recent court decisions have also sharply reduced the Administration's ability to hold back money appropriated by Congress and thus it seems unlikely that the Administration will be able to follow its usual tactics of simply refusing to spend extra money voted by Congress.

The compromise budget was passed by Congress early last month and it was signed into law by President Nixon just before Christmas. The fact that a budget has at least been agreed upon is a landmark, for HEW has been operating for more than 18 months on a complicated budgetary formula because Congress and the Administration have repeatedly failed to see eye to eye on spending priorities. Last year, President Nixon vetoed two HEW appropriations bills passed by Congress because he considered them to be inflationary and this year he threatened to veto an earlier version of the bill for the same reason.

Congress has now worked out a formula for the HEW budget which President Nixon still believes to be excessive but which he found politically acceptable. Essentially, Congress added some $1,100 million to the Administration's budget request but it has also given President Nixon power to withhold up to $400 million of the appropriate funds. An important aspect of the bill is that Nixon can lop no more than 5% off the funds allocated to any given programme. Thus congressionally determined priorities cannot be upset by the White House.

As far as the National Institutes of Health are concerned, even assuming that President Nixon exercises his authority to reduce the total HEW budget by $400 million (as he almost