Britain and Energy Policy: Problems of Interdependence

In the years after World War II the British lived intimately with what is now called an energy crisis. There were fuel shortages and power cuts, and long-term prospects for improvement seemed bleak. Today, to their surprise, the British are being told that the country may well be self-sufficient in all forms of energy by the last decade of the century.

The turnabout is largely due to the discovery first of natural gas and then of oil under the North Sea. Estimates of the size of these energy reserves have gone steadily upward, but those familiar with the almost unbroken series of surprises dealt the British energy planners over the past two decades may wonder whether what is seen ahead on the energy horizon is an oasis or a mirage.

Knowledgeable observers agree that in the years since the war the British have been guided not by an energy policy but by a series of fuel policies. Now, as in other industrialized countries, a rapidly increasing demand for energy, rising fuel costs, and uncertainties in the world oil market are moving Britain toward more comprehensive planning. The effort is complicated by British entry into the European Community, which requires British cooperation in regional energy policy, and also by new initiatives from the United States and Japan which have a major influence on the international oil market.

In formulating and implementing energy policy, Britain would seem to have an advantage over the United States because Britain's power industries, as well as its fuel industries, except for oil, are nationalized. In some respects this has helped the government exert leverage; in other respects its seems actually to have hindered. The latter seem most obviously true of the coal industry. At the end of World War II, coal was the major source of fuel for producing electricity and gas in Britain, and domestic heating depended largely on coal. British mines, however, had suffered heavily from the effects of the Depression and the war. In many pits, the coal lay very deep in narrow seams. Few of the mines were mechanized and almost all were overmanned. Nationalization was a destabilizing factor, and strikes threatened coal supplies. During a particularly bad winter in the late 1940's an acute shortage of coal occurred.

In those days the practical choice was between two fuels—coal and imported oil. The use of oil as an alternative fuel was attractive particularly to industry, but several social and economic factors weighed in favor of coal. A shift away from coal would have meant serious unemployment in areas of Wales, the North of England, and Scotland, where either mining was the sole industry or other traditional industries were in decline. A heavy increase in the purchase of oil from Britain's traditional sources in the Middle East would have worsened an already deteriorating balance of payments situation.

Social and Economic Factors

In even a rudimentary fuel policy, it is clear, social and economic factors are influential, and with Britain, which was entirely dependent on overseas sources for oil, security of supply as well as cost had to be taken into account.

Britain was accustomed to importing all of its oil, and British and British-Dutch oil companies pioneered the international oil business and made a good thing of it. But the experience of nationalization of British oil holdings in Iran in the early 1950's, the Suez crisis in 1956, and the general effects of the rise of Arab nationalism after the Egyptian revolution made the British understandably apprehensive.

These fears influenced British decisions on both coal and nuclear power in the 1950's, but events ran counter to calculations as the decade developed. A fall in trans-Atlantic shipping rates and a surplus of American coal resulted in U.S. coal being available in massive quantities at prices the British could afford. At the same time, fears that the sheikhs would withhold their oil did not materialize, and by the end of the 1950's fuel was actually relatively cheaper than at the beginning of the decade.

In the early 1960's, the actual practice of preceding years became policy with the British decision to conduct a controlled "rundown" of the coal mines coupled with a program of mechanization for the mines and phased reduction of the work force.

As late as 1958 oil met only about 20 percent of the country's energy needs, but by 1970 this had risen to 45 percent. However, coal-fired power plants still provide as much as 75 percent of all electricity generated.

A big impetus to the shift to oil was the outcry against air pollution in the 1950's. Documentation of the degree to which disease and death were related to dirty air and the reaction to "killer fogs" in London in the late 1940's and early 1950's led to effective clean-air legislation. Even in 1960 about 60 percent of domestic heating was provided by bituminous coal; but the succeeding decade saw soft coal virtually dropped for domestic purposes and the traditional British grate fire replaced by central heating, usually oil-fired, or by electric space heaters. Industry adopted oil almost exclusively as a fuel for processing.

At the beginning of the 1960's, however, Britain had not solved its power problem. Power generating capacity was still inadequate, and the Central Electricity Generating Board was still in the process of unifying its national power grid. Britons were inured to power cuts, and in the memorably severe winter of 1962–63 there were widespread fuel shortages and power problems.

Government reaction to this was to order a bumper crop of new power plants. The aim was to solve the problem of chronic power shortages by creating power generating capacity adequate to meet a predicted rapid rise in demand. The new plants were mostly to be very large, coal-fired plants designed to take advantage of new technology also being exploited in the United States. By the late 1960's Britain actually found itself in the novel position of being able to generate more power than it could use. Two major factors accounted for this. Natural gas had been found under the North Sea, and in 1967 the first North Sea gas went into use. At the same time, the demand for electric power grew at a rate below that projected. In adjusting

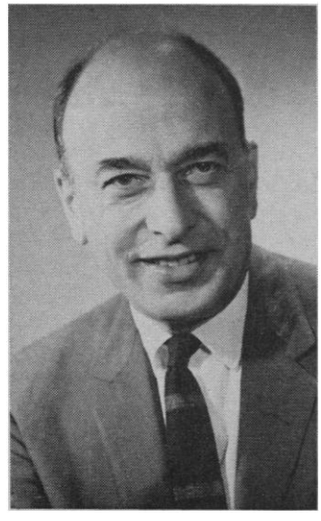
to the situation the government virtually stopped ordering new power plants.

The implications of this cutback were greater for nuclear industry than for the coal industry. From the middle 1950's onward British nuclear industry could rely on a steady if modest flow of domestic orders for nuclear power plants. Participation in the atom bomb project gave the British an early start in developing civil nuclear energy. At the beginning of the nuclear power era a half-dozen consortia were formed by private industry to construct nuclear plants. Research and design work was first handled by government scientists, but the design responsibility later shifted from the Atomic Energy Authority (AEA) to the private companies. In 1955, the government had announced a 10-year program aimed at producing 1500 megawatts of "nuclear" electricity by 1965. Partly as a result of coal shortages and of the Suez crisis, the target for the program was increased to 5000 megawatts. In 1964 approval was given to a second program designed to bring total nuclear power capacity to 13,000 megawatts by 1975. The reactors in the first program were the so-called Magnox type, cooled by carbon dioxide and fueled by natural uranium. The reactor of choice for the second program is the native British advanced gas-cooled reactor (AGR), which uses slightly enriched uranium.

Britain's nuclear enterprise has a star-crossed history. Critics say that the government settled prematurely on a single reactor type for development in the 1950's and that the result was the Magnox plant which was safe and re-

Berliner Resigns from NIH

In the months that followed Robert Marston's firing last December as director of the National Institutes of Health (NIH), one of the things that NIH scientists and their colleagues around the country wanted very much to know was what Robert Berliner would do. As deputy director for science at NIH, Berliner, because of his own reputation and his position, came to be regarded as the symbol of all that is excellent about NIH. And, in the atmosphere of uncertainty that existed as people waited for a new director, Berliner represented stability. Particularly among persons on the NIH campus, there was a feeling that, as long as Berliner was there, things would be all right, but if he were to leave —well, one could not be so sure.



Berliner has decided to leave.

The immediate reaction to his decision to become dean of the Yale Medical School is as expected. "Isn't the news about Berliner terribly sad," said one of his colleagues. "It is hard to believe," said another. "I guess right up to the last minute we were hoping he would not go." There is an element of grief in many of his associates' feelings.

Having been at NIH for 23 years—he came in the early days with James Shannon—Berliner did not find the decision to leave an easy one, as has been apparent to those who have seen him during the last few months and as he made clear in a farewell letter to friends. He did not really want to move, but circumstances kept pressing him in that direction.

Almost immediately after Marston's dismissal, Berliner began receiving job offers. At the same time, he received numerous letters and calls urging him to stay. The trouble was that the people urging him to stay at NIH had absolutely no authority to guarantee that he could keep his position after a new director was named. The people who offered him the Yale deanship and other posts were under no such constraints. As the months passed and Marston's office remained vacant, the pressure to accept one of those offers grew.

Finally, Robert Stone was appointed director of NIH, but word of his appointment was out well before Berliner or other NIH leaders were informed of it officially. And even then, days went by before Stone and the NIH brass ever met. The whole thing was disconcerting.

Stone arrived at NIH during the last week in May and, after getting to know Berliner, said he was thoroughly impressed. He asked him to stay. Apparently it was too late.

Berliner's reasons for going to Yale, from which he received his undergraduate degree in 1936, are professional and personal. "I would be less than candid if I were to claim that the Administration's attitude toward the conduct and support of biomedical research played no part in my decision," he said in his letter. "However, I want to express my wholehearted support for Bob Stone." But he emphasizes the personal side of his decision. "The major factors in my present decision are not the uncertainties of our time and place or the vagaries of politics and history, but rather personal ones. I have been made an offer by an institution that shares with NIH an important claim upon my loyalties and affections. The years are not likely to provide me another such opportunity to try my hand at the challenge of new professional activities, and I feel impelled to accept this offer."

Berliner, who is an M.D., is among the more widely respected research scientists in the United States. His work in renal physiology has earned him membership in the National Academy of Sciences and numerous other honors. His colleagues respect him not only for his contributions to science, but for his strict—some would say rigid—insistence on high quality. He is, therefore, exactly the kind of person that the biomedical community wants at the top. Needless to say, the hope is that his successor will be someone like him in these respects.—BARBARA J. CULLITON

liable, but proved more expensive to build and operate than coal-fired plants, particularly in later years when corrosion problems forced a reduction in reactor operating temperatures and, therefore, in efficiency.

Sterling qualities are also claimed for the AGR, but scaling up this type from a pilot reactor to commercial dimensions has brought serious technical setbacks and now corrosion problems are cropping up again. The first big AGR plant will be at least 4 years late in going into operation, and lesser delays may afflict three others now under construction.

The crucial point, however, is that so far not a single contract for construction of a British power reactor abroad has been landed. Now with the hiatus in domestic orders there is danger of the British nuclear power industry dying on the vine. This pressure seems to have forced the government decision early this year to complete the step-by-step consolidation of the industry which has occurred over two decades by merging the two surviving consortia into one. This new entity will be presided over by the head of the British General Electric Company; the obvious hope is that infusion of big-industry management and marketing expertise will make the nuclear business a viable commercial enterprise at home and, particularly, abroad.

The government also must make a long-promised but still-delayed decision on the choice of a next series of reactors. The original understanding was that the choice would be made after consideration of all available reactor types. In practice this meant that light water reactors developed in the United States would be considered along with the AGR and other British reactors. This understanding is formally still in effect, but in recent weeks statements from government officials have indicated that a decision will be announced by early next year and that the AGR, at this point, is the front-runner in the race. Questions about emergency core cooling systems in the American boiling water reactor have been picked up in Britain, and insiders suspect that the reactor safety issue may be used to reinforce an existing predisposition to buy British.

A major question for the British as for the Americans is when the next generation of reactors—the breeders—will go on line. The British have had high expectations for their own breeder reactor now under development. The British hoped that they might break the stymie on overseas business by being the first to get a salable breeder into operation—1976 was the target date. It now appears that the French may be the first Western nation to get its breeder on line, but this is far from certain.

What action should the government take to fill the gap between the AGR's and the breeder? Some observers suspect a decision has been delayed to see how the AGR's work out. It is possible to take the view that there will be no real gap because of North Sea gas and oil, and that a few more fossil-fuel burning stations and perhaps a few more AGR's will see the country through. This view appears to depend on optimistic assumption about the price and availability of oil and pessimistic assumptions about the growth of demand for power. Some hint of how things will go should come from the outcome of a current controversy over Central Electricity Generating Board plans to build two big new oil-burning power stations worth about $1 billion. Pressure is already building to make one of the stations use coal or nuclear energy.

North Sea Gas and Oil

Too much ado about nuclear energy at this point, however, would be misguided. Britain depends on imported oil for about 46 percent of current energy consumption and on coal for about 43 percent. Natural gas accounts for some 8 percent and nuclear energy and hydroelectricity for a fragmentary 3 percent. The long-term importance of nuclear energy, of course, is enormous, but in the plannable future, North Sea oil and gas are dominating factors.

There is a live debate about the extent of oil and gas reserves in the North Sea, but the consensus is that North Sea oil could provide half of British energy requirements by the 1980's. Many questions still remain about how to get this oil and gas and how to use it. Drilling operations in the deep and savagely stormy waters of the North Sea are difficult, dangerous, and expensive, and negotiations with oil companies, about licensing of tracts for exploration, pricing of oil and gas, and taxation are likely to continue to raise vexing questions. (The Labour party seems likely to adopt a policy of nationalization for North Sea oil and gas and that would further complicate matters.)

It would be difficult enough for Britain to fashion an energy policy if the policy stopped at the water's edge, but British membership in the European Community (EC) compounds the problem. Britain's European partners are even more dependent on Middle Eastern oil than Britain is. The Common Market countries closed down their coal mines more rapidly than Britain has, and none of the major continental countries have prospects of North Sea energy largesse to match Britain's. It is not too much to say that Western European prosperity has depended on cheap and readily available Middle Eastern oil. The specter of political instability in the Middle East or rising oil costs understandably upsets the Europeans.

Energy policy in the EC, therefore, means oil policy first of all. At an EC summit conference last October, Britain took the lead in identifying energy policy as a prime issue. At a meeting in late May, the Council of Ministers of the Nine agreed on guidelines and a package of "priority actions" aimed at ensuring reliable supplies on satisfactory economic terms.

The measures recommended range across the energy spectrum. The community's demand for enriched uranium is expected to outrun supplies provided by existing plants after 1980, and EC nations are unwilling to rely on American facilities. Increasing enrichment capacity within the EC, in effect, requires a choice between development of gaseous-diffusion and centrifuge processes, and this choice is likely to strain energy diplomacy.

Some hard decisions on coal production also face the community. Britain now produces about half the coal mined by the Nine and will not want to see coal slighted in overall community policy for hydrocarbons.

An important ancillary question in making community energy policy will be deciding on an energy research program for the Nine. In Britain, nationalized industries have each had a research program guided by the responsible ministry—now the Department of Trade and Industry. The quality of these research programs is said to have been more than respectable, but critics say that research has tended to be too narrowly focused, in the sense of being directed at helping with immediate marketing or environmental problems, without enough balancing, long-range research. The obvious field for EC research continues to be nuclear energy. Nearly two decades of disappointing experience with the European atomic energy

agency, Euratom, indicates that this is easier said than done, but some informed onlookers feel that the incentives for hanging together are greater these days.

The main issue, however, remains oil—oil from the Middle East and oil from beneath the North Sea. The spectacle of the United States importing increasing quantities of Middle Eastern oil and the prospect of the United States and Japan bidding up the price of oil makes the Europeans worry.

If the oil-producing countries should withhold oil from the United States for political reasons or simply decide to keep their oil in the ground, the effect on the world market would be profound. The task for the Europeans, as one British official expressed it, is "to get as harmonious a European view as possible as quickly as possible and then to immediately bring in Japan and the U.S." There is a precedent for cooperation in the practice of European oil companies sharing supplies at times of shortage, and there is also an OECD (Organization for Economic Cooperation and Development) agreement to share oil stocks at times of interruption of supplies.

For the British, obviously, the handling of their North Sea gas and oil becomes a delicate matter. They are "viewed as a national asset," says one British official, "but we do not say we won't share. As we evolve a U.K. energy policy, it will be a U.K. aspect of a European energy policy."

The major unknowns facing energy policymakers in Britain and elsewhere seem to be the future price and availability of Middle Eastern oil and the rate at which nuclear power plants—particularly the breeders—will be ready to supply a substantial part of power demands. If the British experience of the past two decades is any criterion, however, the watchword for the planners should be to expect the unexpected.—JOHN WALSH

Weather Modification: Colorado Heeds Voters in Valley Dispute

What the public thinks about weather modification, rather than what the scientists know about it, will play the dominant role in the future of this science. —From a 1971 report of the Interdepartmental Committee for Atmospheric Sciences, Washington, D.C.

The above words were written in a sympathetic spirit, and not in the spirit of scientists railing in frustration against an uninformed and potentially meddlesome public. Well that they were sympathetic, for, given the uncertainties about the effects of weather modification, there would be no justification whatever for scientists in this field to talk down to anyone. Yet public regulation of the "rainmakers" is in as undeveloped a state as weather modification itself, and only in the last few years have a few states such as Texas and Colorado enacted potentially strong and workable regulatory laws. Since the enactment of the new Colorado law early last year, decisions reached in a controversy over a hail suppression project in the San Luis Valley point up some of the subtle policy issues involved in weather modification regulation.

Weather modification as a contemporary technology goes back to the discovery, made in the 1940's, that precipitation can be induced from supercooled clouds by seeding them with Dry Ice (later, silver iodide particles would be preferred). The possibility of rainmaking through cloud seeding aroused early interest in the arid West, including Colorado and other states of the High Plains region that extends from Montana and the Dakotas down to Oklahoma and Texas.

Indeed, with the onset of the severe High Plains drought of the 1950's, many farmers in this parched region welcomed commercial cloud seeders with enthusiasm. Although skepticism set in when the results of the cloud seeding proved uncertain and often disappointing, some interest in weather modification remained even after the drought eased. The San Luis Valley of southern Colorado is one place where this was true. This valley, flanked by the La Garita Mountains and Cochetopa Hills on the west, and the Sangre de Cristo and Culebra mountains on the east and north, is a region more arid even than the High Plains. Precipitation in the valley averages 6.5 inches a year, compared to Denver's 14 inches.

Moreover, in summer when there is precipitation in the valley, it may come in a most unwelcome form—big hailstones that leave crops severely damaged or ruined. And, for growers of Moravian barley, an important cash crop in the valley, there is a 6-week ripening and harvest period in late summer when even a heavy rain may represent hard luck. If too much dampened, the barley is rendered unfit for malting with rice to make beer and is thus unacceptable to the Adolph Coors Company of Golden, Colorado, the brewery that has been buying all of the Moravian barley crop.

Some 7 years ago, William K. Coors, president of the Coors Company, initiated a program of weather modification for the valley aimed at suppressing hail and diverting rainfall during the critical late-summer period. As it happens, however, the 380 barley growers in the five-county San Luis Valley area are outnumbered by people in other agricultural pursuits, especially ranchers, who are less concerned about hail than they are about drought. It is therefore not surprising that the weather modification project was to become controversial. In 1969, when the project was in its third year, the valley received more rainfall than usual. But 1970 turned out to be unusually dry, and many farmers suspected the cloud seeding of causing the lack of summer rain. In August of that year, some 400 ranchers and farmers formed a group called the San Luis Citizens Concerned about Weather Modification (later to call itself the Citizens for the Preservation of Natural Resources).

By 1971, although it was far from clear what effect the cloud seeding project had produced, many valley people were demanding that the project be stopped. The fact that some of the allegations giving rise to this de-