Moreover, civil governments can't just throw out old subway systems and antiquated school buildings the way the Defense Department junks an obsolete weapons system. They generally have to incorporate existing systems into any new system, and this lessens the opportunity for radically new approaches. Further constraints arise because civil governments can't order their constituents to use a new system (say, a mass transit system) the way the Defense Department can—thus the system must have market acceptability.

The resources for systems analysis and design are primarily found in government agencies concerned with defense and space, in the defense industry, and in the not-for-profit "think tanks." Focusing primarily on the defense industry, the DRI report concludes that defense firms lack many of the skills needed to succeed in the civilian market. Specifically, the defense firms lack "substantive knowledge of and experience with" most civil problems; they lack the "innovative marketing skills" needed to sell their services to a variety of customers; they rely on heavy support from their customers; and they are high-cost producers who may find it difficult to produce much of the hardware needed for civil systems at competitive prices. "Defense industry is not broadly experienced at operating in a market system, nor is its management," the DRI report concludes.

To reduce these obstacles, the report suggests action by both government and industry. It also proposes criteria for identifying the civil problems most amenable to systems analysis. In the short run, civil problems which approximate defense problems, or which deal with technological equipment and well-understood operations, offer the best possibilities, the authors feel. Thus a national oceanographic program patterned after the space program holds great potential for systems analysis, as do the operations of the Post Office and the collection and processing of weather data. However, in areas such as social welfare or education, "the systems approach should be applied—but cautiously, and without expectations of quick and easy results."

The authors lament that widespread civil use of systems approaches may take "years or even decades, unless there is either strong leadership to push it, or near-breakdown in existing government mechanisms." But they note that "with strong leadership" systems analysis improved the administration of national defense, and they predict that "the same would probably be true with the problem of generating innovation and efficiency in the civil sector of government."

Is there another Robert S. McNamara in the house?—PHILIP M. BOFFEY

British Science Policy: The Case for Growth

London. The second report of Britain's Science Policy Council reflects the rigors of making science policy in a cold economic climate. As in the United States, an era has apparently ended during which the science budget was boosted annually almost as an act of faith. What Vietnam has meant to science in the United States, a limping economy means to British science. A major theme of the new report* is an economic justification for a continued adequate growth rate in expenditures on science.

The Council on Science Policy was created by Britain's Science and Technology Act of 1965, which was intended to usher in a sort of technocratic New Deal in Britain. Members of the Science Policy Council are distinguished nongovernment scientists and science administrators. The chairman is Sir Harry Massey, professor of physics at University College, London, and P. M. S. Blackett, president of the Royal Society, is a member. The council advises the Secretary of State for Education and Science, who presides over the Department of Education and Science. DES holds the reins of the Science Research Council, Medical Research Council, Agricultural Research Council and Natural Environment Research Council, whose programs represent a major sector of civil science.

There is no comparable advisory group in the United States. Any such group would operate across bureacratic boundaries to advise on the activities of NSF and on the research programs of HEW-NIH and the Department of Agriculture. Considering the breadth of its purview and the prestige of its members the council would appear to qualify as a major force in making science policy and science budgets. But who makes science policy and how in Britain remains a matter of speculation for outsiders. The report throws little light on the process. It does, however, give an ample idea of the questions that concern British policymakers these days.

Significantly, the council devoted a major section of the report to making a case for investment in science. (Expenditures on civil science rose from £6.5 million in 1945–46 to £295 million for 1967–68 and the council notes that this "has attracted inevitable questioning.") Instances such as the first production of ethylene polymers in Britain, made possible by the development of transition state theory by Polanyi in the early 1930's, and the genesis of microwave radar are cited as benefits to society gained from applied research.

The council also espouses the cause of basic research, not only because of the great, if long-term, economic dividends to be gained from new discoveries, but also because of the importance of such research in producing new generations of scientists and technologists and because "The stimulus to improved understanding and control of the external world has distinguished all progressive societies and is one of the main driving forces of civilization."

If an emotional note is struck anywhere in the report it is in rejecting suggestion that a wholesale deployment

**Second Report on Science Policy* (Her Majesty's Stationery Office, Cmnd. 3420, London), 4s. 3d.

of scientific manpower should be made away from research activities and into efforts to use the results of science in productive technology. "To withdraw from the line of advance in basic science now," says the council, "is, we believe, to accept the future position of an economic and technological satellite."

A main concern of the council is long-range planning. Much of its energy has gone into studies designed to inform such planning efforts, and here the council seems not to be whistling in the dark. The report announces fund allocations for the research councils for 1967–68 and the following 2 years. These budgets are provisional since Parliament must provide funds with annual votes, but the figures in these "forward programs" are firmer than similar projections would be in the United States. The appropriations process in the United States is based on an annual confrontation between the agency and Congress which assures budgetary uncertainty. In Britain, the cabinet system of government means that the majority party controls both legislature and executive and that proposal of a budget virtually guarantees acceptance by Parliament.

The portion of the civil science budget in the council's province will rise from £72.6 million in the current year to £87 million in 1969–70. This represents increases of 11 percent this year and 10 percent and 9 percent in the succeeding 2 years. How the growth rates were established is a matter on which the report is entirely vague.

The council does complain that in recent years the rate of spending on civil science in Britain has increased at a slower rate than in the United States, but on present form, the planned British rate for the 3 years would compare favorably if the United States curve continues on its recently flattened course.

The major "big science" decision facing the British is on participation in construction of the proposed European 300-Bev proton synchrotron. The council report carries a recommendation that Britain join other members of the European Organization for Nuclear Research (CERN) in the project, but the recommendation is not made by the council as such but by a working group headed by M. M. Swann, principal of the University of Edinburgh. The working group's advice is heavy with qualifications. Britain should only participate, the group recommends, if guarantees are obtained against escalation of costs in building and operating the big accelerator and only if there are assurances that additional resources are available from the British government for proper development of other fields of science.

Participation in the building of the 300-Bev machine and other CERN projects would increase U.K. spending on nuclear physics—national and international programs—from a present level of about £18 million a year to £34 million in 1977, a rate of increase of 7 percent a year.

Nuclear physics now absorbs more than 40 percent of the Science Research Council's £34-million annual budget, and, since the Science Policy Council wishes to see the proportion of funds available for other scientific fields increase at a faster rate than funds for nuclear physics, the council seems to be asking the government to consider the decision on the accelerator as part of a science policy package deal covering the next decade.

The council would like to see even longer term planning of science. The report points out that where costly capital developments are involved—often in the "Big Science" sector—a lack of planning latitude causes unnecessary delays and "underspending."

The British verdict on the big machine is expected soon since CERN is scheduled to reach a conclusion on the project before the end of the year. University partisans of British participation have been fairly sanguine recently, but the matter is now being deliberated at the upper levels of government from which no progress reports emanate. The council acknowledges in its report that the decision depends ultimately on political and economic factors. And the state of the British economy has been having a dampening effect on expansionary policy in education and science. But the 300-Bev machine is the most expensive and conspicuous issue in science policy to have risen in Britain outside the realm of defense. It has acquired significance not only as a symbol of Britain's intentions, both scientific and "European," but also as a test of the science advisory apparatus that has been hopefully constructed over the past several years.—JOHN WALSH

Dow Chemical Company: Sales and Worries Are Up

New York. By all conventional measures, the Dow Chemical Company is prospering. Its sales are climbing steadily and will soon pass an annual rate of $1.4 billion. Yet its image is suffering. Next to LBJ, Dean Rusk, and Hubert Humphrey, Dow, the manufacturer of napalm, has become the most popular target for campus antiwar protests.

Clearly, Dow does not like its new role one bit. "We cannot evaluate accurately how much these general efforts to tarnish our good name have hurt us. But we know that they have and will hurt us and have the potential to hurt us greatly," Carl A. Gerstacker, Dow's chairman of the board, said in a recent statement.

So far, however, the bad publicity seems not to have affected profits. Company officials have not been able to detect any sales falloffs from the demonstrations, despite some scattered attempts to boycott Dow products. Even a successful consumer boycott would not necessarily cripple the company; only 8 percent of total sales come from consumer products (the most famous is Saran Wrap) and packaging.

The company's recruiting campaign may be more vulnerable, but damage from the demonstrations still seems to be superficial. As of 13 November, the company had visited 153 schools; at 27 there were demonstrations. But not all the demonstrations were disruptive, and not all the disruptive demonstrations prevented Dow officials from seeing job candidates. At Harvard, for example, the company representative was trapped in the chemistry building for an afternoon, but he had been scheduled to talk with fewer than ten students and had seen all but one of them in the morning.

The very prospect of trouble has led