OSTP Faults Energy Research Quality: Fossil and Solar Found Wanting

Energy research in the United States has been reorganized repeatedly, criticized often, and been subject to surprisingly little government review.

Specific questions receive attention, but the larger questions about energy research—such as whether the government is finding and pursuing the best new ideas, whether it is striking the proper balance between near-term and long-term results, and whether it is making the best use of the country's industrial and academic scientists—have been largely ignored.

Over the summer, a succinct and comprehensive review of the larger questions about government energy research was issued by White House Science Adviser Frank Press through his Office of Science and Technology Policy. The report* is one of the few reviews of energy research strategy that have been carried out, either inside or outside the energy research bureaucracy.

The review found that there is a "dearth of research" in the fossil and solar programs of the Department of Energy (DOE), that the amount of basic research done in the biological, environmental, social, and systems sciences is not adequate, and that the quality of research from a number of the department's large laboratories is declining. Mincing no words, the review found that the research deficiencies were due to misguided program emphasis, excessive sensitivity to perceived political pressures, and a state of near-continual reorganization. Since 1973, the energy research apparatus has been reorganized approximately biennially, progressing from the Atomic Energy Commission to the Energy Research and Development Administration to the Department of Energy (DOE).

Throughout the department, the review found that there was a preoccupation with near-term programs and a neglect of longer-term fundamental work. All the technical development programs, which are under four assistant secretaries in the DOE, were found to be much too isolated from the department's basic research programs, which are under the Office of Energy Research. Only nuclear power development—which has a research base that goes back to the creation of the department's national laboratories soon after World War II—and certain mathematical and physical sciences, exemplified by high-energy physics, were given passing marks for having healthy research enterprises.

The reviewers were particularly critical of the performance of line-program managers. Many of them, said the committee, headed by Sol Buchsbaum of Bell Laboratories, do not appreciate the relevance of basic research to their long-range goals and tend to overmanage the research they do support. At the program-directors' level, the committee found that revolutionary or innovative research is being given little support, one of the reasons being that it cannot be incorporated into fixed schedules and, in fact, tends to upset them. The reviewers noted that the practice of managing research programs in a manner analogous to the demonstration programs, with short-term goals and rigid timetables, was hurting research in the DOE laboratories, the universities, and industry. The reviewing group found that the support for long-term research is deficient and that the situation is made worse by the common practice of labeling the efforts associated with certain demonstrations as basic research.

What was found lacking so badly was not only basic research in the narrow sense, but the variety of endeavors—including many types of basic research, applied research, and technical innovation—that precede the development of an energy demonstration facility. "We meant all the knowledge required to evaluate new energy sources," says Buchsbaum, who is himself a plasma physicist who has served as unofficial adviser for the fusion program and is now a vice president for network planning at Bell Labs. The solution proposed is that assistant secretaries with technical development programs should include a category for basic research in their budgets and acquire additional competent research managers as members of their own staffs. The recommendation was presented to DOE during July and has been accepted in principle, according to Buchsbaum, although it may take more than one budget cycle to effect the complete rerouting of research responsibilities. The director of the Office of Energy Research, John Deutch, was sufficiently enthusiastic to recommend that the Buchsbaum committee return at the end of 1 year to evaluate how much progress has been made.

The Buchsbaum committee had pithy criticisms of most of the major energy programs.

- Fossil fuel has been utilized by "an industry of ancient origins," which has devoted almost no effort to refining the product. So many types of science are needed for coal research that few areas of research can be excluded a priori. The report implied that the success or failure of energy research will be judged on the record for coal research, and recommended the formation of a National Program for Fossil Fuels Research.
- Solar programs should stress innovative research over the present programs for large-scale solar power stations, which are economically unpromising. Dispersed technologies and the basic sciences related to biomass—such as fundamental genetics, bacteriology, enzymology, and plant physiology—should be stressed.
- In fusion research, the heavy competition between magnetic and laser fusion is having the effect that both programs are moving ahead too rapidly, trying to leapfrog the normal stages of evolution. Fusion deserves strong continued support, but the DOE should conduct a broadly based program and more attention should be paid to extracting maximum scientific value from each of the large expensive experiments now under way.
- Small-scale technology is an area in which much more effective use of the systems sciences can be achieved.
- Environmental and life sciences is a crucial field because so many energy technologies have environmental and health-related problems. Such programs are hard to manage well because many research projects are difficult to structure and require long periods for execution.
- Social sciences should be set up with a separate program and research budget under the Office of Energy Research. The Energy Department tends to see obstacles to new energy systems as purely technological, whereas social, political, and economic impacts can be just as important. Difficulties with nuclear waste disposal and oil shale development are cited as cases in point.

**Report of the OSTP Working Group on Basic Research in the Department of Energy* was produced by a group of 14 members from industry, academia, and government organized in December 1977.

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Among the various field laboratories operated by DOE, the reviewers found that the quality of research could be improved in a number of institutions. Many of the multipurpose DOE laboratories have lost their original well-defined purpose, which was in most cases the development of nuclear power, and as a result the "crispness of their mission has slowly eroded," said the reviewers. The laboratories have diversified to try to cope with the changes in mission of their sponsoring agencies and in the process have been losing their effectiveness. The result of this is that basic research becomes isolated from the rest of the laboratory and quality control becomes more difficult as research loses its motivation. The reviewers found that several national laboratories require a new definition of their roles in order to be as effective as they have been in the past.

Sparing no aspect of energy research from a probing eye, the reviewers also had some hard conclusions for the way the Energy Department uses university talent and industrial expertise. Whereas the Defense Department spends about 40 percent of its basic research funds at universities, only about 20 percent of DOE's basic research is university-based. The reviewers found that the universities not only have less research support, but also have inadequate opportunities to compete for such support. "Existing research is not properly distributed among DOE labs, the Energy Research Centers, industries and universities," said the Buchsbaum group. The group recommended that the budget for basic energy research at the universities should be increased, even at the expense of development activities.

Criticizing almost every aspect of the Energy Department's activities, the reviewers might have been expected to raise many hackles. But the language is so diplomatic that it apparently was found palatable. Although no individual in the department has been given the responsibility for implementing the review's recommendations, the top echelon has reportedly accepted the overall message. That message appears to be that in the rush to expand alternative energy sources, the sort of research that can be counted on to spark new directions and provide the data needed for long-term gains has been unaccountably overlooked.—WILLIAM D. METZ

Briefing

Handler Scores Soviet Anti-Semitism

The President of the National Academy of Sciences, Philip Handler, had sharp words for the increase in anti-Semitism in Soviet science when he testified before a subcommittee of the House Science and Technology Committee on 4 October.

In "present circumstances" Handler said in an official statement, "anti-Semitism seems to have become almost official, resulting in reduced access to higher education, to the political system, and to academic research and administrative posts. . . . For example, papers in Soviet mathematical journals by Jewish mathematicians, for years about one-third the total, have essentially disappeared from the current Soviet mathematical literature."

Handler had still harsher language for those non-Jewish Soviet mathematicians who participate in or condone the repression of their colleagues. He called it "appalling" that "seemingly highly cultured individuals at home in the abstract reaches of modern mathematics can be party to such practices. One cannot help but recall the obscenity of Nazi leaders reciting the words of Goethe."

Handler also testified that the scientific exchange program between the American and Soviet academies of science, which began in 1959 after the death of Stalin, should continue. Through it Americans can influence Soviet scientists, Handler said, and these as a general group "comprise perhaps the most liberal, independently thoughtful group in their closed society. Perhaps one day they may convince those in political power that . . . repression must inevitably breed rebellion."

Handler's remarks on the recent rise in anti-Semitism echoed the concerns of others, including Handler's onetime critic, Jeremy J. Stone of the Federation of American Scientists. Stone, who also testified before recent House hearings evaluating the Soviet-American science exchanges, later explained to *Science* that the vigorous foreign campaign to help certain Soviet Jews emigrate has a dark side in the form of the backlash against those Soviet Jews who remain. "Russian anti-Semitism, always prevalent, seems to have seized upon the fact that some educated Jews are permitted to leave the country in order to discourage the education and employment of the Jews who remain. It is rumored that now even half-Jews are banned from entry to Moscow University. Russians cannot even apply to emigrate; the possibility that some Jews can leave must surely antagonize Russian anti-Semites. What to do about this backlash is not clear."

The recent backlash is a new twist in a 50-year trend. Soviet sources have said that possibly 20 percent of the scientists who got their Ph.D.'s at the time of the 1917 revolution were Jewish. In the intervening years, this fraction has decreased; now only 10 percent of young scientists are Jewish, they say.

The information on anti-Semitic trends in Soviet mathematics that Handler cited is based on a white paper, written by two anonymous Soviet mathematicians who have fled the country, and which is being circulated among some people in Washington.

Endangered Species Office Now Extinct

Snail darters arm yourselves! Grizzly bears growl and take your battle stations! Those species lucky enough to be kept alive under the Endangered Species Act may have to fight for themselves for awhile, for the Office of Endangered Species, which the act created to protect them, itself has been killed.

Some members of Congress who like big dams were very angry that the tiny snail darter and its champions in the Office of Endangered Species of the Fish and Wildlife Service, and others, stopped the mammoth Tellico Dam in Tennessee. So, in the true spirit of politics ("Don't get mad—get even") they have been loading up legislation that would authorize the office for another 3 years with amendments to prevent another Tellico–snail darter fracas. What with one controversy and another, the new authorization had not passed by the time the old one expired on 30 September, and so the office now has no mandate to continue this work.

So the 35 staffers are working on other things for awhile, until the authorization passes, and leaving the mollusks, timber wolves, and red kangaroos on their own.—Deborah Shapley

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