Electric Power Research Institute: A New Formula for Industry R&D

American power companies have never been noted for cooperating with each other or for putting a lot of money into research. But one sign that the energy crisis has convinced the utilities they must do more of both is their decision to establish an Electric Power Research Institute (EPRI) to carry on a major, coordinated research and development program.

EPRI, which is supported by both investor-owned and public-owned power companies, was chartered in 1972 and got off the ground in January with the naming as president of Chauncey Starr, then dean of the UCLA School of Engineering and Applied Science, and the selection of a site at Palo Alto, California, adjacent to the Stanford campus, for the institute's headquarters.

Until the last decade, power companies had, by and large, met the challenge of growth without conducting a notable research and development effort themselves. The pattern had been for equipment manufacturers, such as General Electric and Westinghouse, to conduct the R & D and to recoup the cost through prices paid for hardware by power companies.

There were exceptions. The American Electric Power Company in the Midwest, for example, helped pioneer the technology of large, high-temperature units in the postwar period. And the industry organized collaborative research projects through the Edison Electric Institute (the trade organization of the private power companies) and the Electric Research Council, which was a predecessor to EPRI. But the efforts never added up to a coherent whole.

The origins of EPRI are mixed. Public awareness that there were problems with power were crystallized in the middle 1960's, notably by the big blackout in New York City. The general tendency was to chalk the troubles up to industry ineptitude, and the reaction on Capitol Hill was that a substantial research effort was needed to ensure that this sort of thing wouldn't happen in the future.

Discussions on the creation of a federal agency to be responsible for research to provide adequate supplies of power gained some momentum in the Senate Commerce Committee. And an idea to have such research funded by a tax on the kilowatt hours of electricity generated, which was fostered in the Office of Science and Technology, found some backing.

The power industry was anxious not to have the federal government seize the reins. Industry spokesmen pointed out that the power companies were already supporting research to the tune of several million dollars a year and argued that the industry should be allowed to expand its effort.

Conditions on Growth

Starr and others think that a number of underlying factors combined to produce the EPRI solution. Demand for power was growing at the rate of 7 percent a year, which means a doubling time of a decade. The power industry was also facing unprecedented problems in acquiring the plant and fuel adequate to meet increasing demand at a time when environmentalists and other critics were imposing new conditions on growth.

The old approach to research of letting the manufacturers make incremental improvements in equipment was outmoded for several reasons. Some manufacturers had capital problems that limited their ability to undertake major new research efforts. This was particularly true of those manufacturers who had invested heavily to establish themselves in the nuclear power field. More important, the sort of research required was the kind that would produce major advances in technology from which the whole industry would benefit, not primarily one manufacturer. The rewards for the manufacturer, therefore, would probably not justify the risks of R & D.

The new circumstances seem to have encouraged industry support of EPRI to an extent that would have been impossible only a few years ago. So far, about 80 percent of American power companies have agreed to participate. The formula is for companies to be assessed a half percent of the charge for each kilowatt hour they sell. A progressive rise in the percentage to perhaps 1 percent is envisioned.

EPRI will spend an estimated $73 million in the current calendar year; next year the total is expected to rise to $100 million. In subsequent years, the budget is scheduled to increase at the rate of $25 million a year until it reaches "several hundred millions."

Particularly for the next few years, a large portion of EPRI funds will be committed to work already in progress. In 1972, before EPRI was established, the power industry agreed to participate in the project to build a liquid metal fast breeder reactor (LMFBR) demonstration plant at Oak Ridge. The industry committed itself to payments of $25 million a year for 10 years. The LMFBR installment amounts to about 28 percent of the EPRI budget this year. Another 20 percent is earmarked for "locally selected projects"; utilities may withhold 20 percent of their contributions to EPRI to finance their own research. Administrative costs are put at 2 percent of the budget, so that these three items total about half the EPRI budget.

Of the remaining half—amounting to some $35 million—about two-thirds will be used to continue projects taken over by EPRI from its predecessor, the Electric Research Council. This will leave $9 million to $12 million of discretionary funds.

Something of EPRI's R & D intentions can be deduced from its organizational structure. There are four operating divisions: (i) nuclear generation, (ii) nonnuclear generation, (iii) transmission and distribution, and (iv) energy systems. Also on the same line on the organization chart are an administrative division and a Washington office.

The effectiveness of EPRI will of course depend heavily on the competence of its staff. Most of the top policy posts have been filled, and the appointments, taken together, reveal something of a tilt toward university and government, rather than industry experience. The explanation for this may or may not be that the power industry in the past has been criticized for not establishing links with university researchers in the way most high-technology industry has done.

Directors of three of the operational divisions have been named, and the

fourth is said to have been picked but his name not yet made public. Head of the nuclear division is Milton Levenson, who was associate director for energy and environment at the Atomic Energy Commission's Argonne National Laboratory. Director of the nonnuclear division is Richard E. Balzhiser, most recently assistant director of the Office of Science and Technology and former chairman of the chemical engineering department at the University of Michigan. Research in Balzhiser's division is being grouped into two categories, fossil fuels and advanced systems, with an assistant director for each category. George R. Hill, former director of the office of coal research in the Interior Department, has been named assistant director-fossil fuels and will direct EPRI research dealing with fossil fuels and conversion technologies.

Director of EPRI's energy systems, environment, and conservation division is Sam H. Schurr, who came to EPRI from Resources for the Future, Inc., the nonprofit research organization in Washington. Schurr is an economist and worked previously for the RAND Corporation and the Federal Bureau of Mines.

EPRI officials say the institute will not have an institutional bias toward any particular fuels or systems. In a statement made at a news conference in February, Starr said, "In view of the variety of future technologies in the R & D pipeline (like fusion and solar power, for example), and the uncertain feasibility of a plurality of near term engineering concepts (such as pollution abatement, and coal gasification), it is now essential that the utility industry maintain an overview of, and participation in, all technical areas so as to keep its options open and to move flexibly in new untraditional areas. This is EPRI's broad purpose—which can serve both the utilities and the nation."

EPRI will do "analytical research" of its own, but no in-house physical research, says Starr. The expectation is that EPRI will have about 100 professionals on its permanent staff and perhaps another 100 from industry, government, and the universities working with EPRI on a temporary basis. The stress will be on management of research. EPRI hopes to stimulate "a tremendous amount of university participation," says Starr. "We need high caliber people and we need to bring new people into the industry." EPRI plans a sizable graduate fellowship program and other incentives to accomplish this.

The Palo Alto site was picked for EPRI only after a survey designed to identify the site most favored by prospective EPRI recruits. Starr says the best scientists and engineers were asked where they'd like to live, and the San Francisco Bay area won hands down. EPRI has moved into an office building owned by Itek Corporation in the Stanford industrial park.

EPRI is supported by both investor-owned and publicly owned companies, and the 15-member board of directors has 10 members representing the private utilities and 5 representing the public companies. Currently, the chairman is James E. Watson, manager of power of the TVA, and the vice chairman is Shearon Harris, chairman and president of the Carolina Power and Light Co.

There will also be an advisory council which is intended to reflect a "national cross section" of views and is to have access to all EPRI information, says Starr. The institute is also building a structure of technical advisory committees "comprised chiefly of experienced utility industry personnel." These committees are designed to mesh with the organization of the EPRI technical staff.

EPRI funding is to come only from operating utilities, and the institute is not seeking money from anybody else. EPRI, however, expects to undertake joint research efforts with manufacturers and government agencies.

Europe Joins in Shuttle Project

On 24 September, after 4 years of negotiations and the day before the successful return of the second Skylab crew, the United States and nine European countries signed an agreement for the latter to design and build a laboratory unit to be flown in the space shuttle. The agreement appears to commit the U.S. government irrevocably to going ahead with the shuttle, a project—controversial from the standpoint of scientific and other nationtal priorities—on which at least $8 billion will be spent by 1981.

The memorandum of understanding was signed by James C. Fletcher, administrator of the National Aeronautics and Space Administration (NASA), and Alexander Hocker, director general of the European Space Research Organization (ESRO). Originally, ESRO had toyed with the idea of building a space tug designed to boost payloads into orbits above the shuttle, but they settled on contributing a "spacelab," which would cost about half as much, or $300 to $400 million.

The spacelab will be comprised of a pressurized module, where scientists can work in a shirt-sleeve environment, and a platform for instruments, which will be directly exposed to space. The lab is for missions that would last from 7 to 30 days. Europeans will be included in the crews.

According to the memorandum, ESRO pays for the first spacelab; any subsequent ones NASA wants, it can order from ESRO and pay for itself. If all goes on schedule, the first spacelab will be delivered in late 1978, in time to be ready for their first shuttle flight a year later.

Of NASA's $3-billion budget for fiscal 1974, $475 million has been allocated to shuttle development; the amount is expected to go as high as $1 billion a year during the shuttle's 6-year development period.

Many scientists oppose shuttle development at this time because it will eat into NASA's budget for other space applications (the total budget is expected to remain level for the rest of the decade). But it appears that the arguments of critics have been seriously undermined by the completion of two Skylab missions—and as one NASA official said, "successful recovery from a very bad beginning helped an awful lot" in convincing the Europeans of the wisdom of their investment.

The nine participating European countries are Belgium, Denmark, France, Germany, Italy, the Netherlands, Spain, Switzerland, and the United Kingdom. More nations may join in the future.—C.H.

EPRI will have at its disposal funds comparable to the research budget of a middle-sized federal agency. Some observers wonder, however, if the institute will really have a free hand as a research organization. EPRI board members are power company executives, most of whom have legal or financial rather than technical backgrounds. How much pressure, for example, will be put on EPRI to continue existing research projects or to help solve the operating problems of particular power companies? Starr says he was recruited under the general understanding that EPRI would run its own show and that so far he has encountered no issue that raised a "philosophical difference" between him and the board.

EPRI will be operating in a rather neglected sector of research. R & D on military and space systems has been funded by an ample flow of federal money. In private industry, research programs such as those operated by IBM and Bell Laboratories have produced impressive and profitable new technology. But in fields such as transportation, housing, and power production, neither industry nor government has excelled in promoting R & D which would make it possible to use advanced technology to solve national problems.

EPRI's objectives are similar to those of the National Science Foundation's RANN (Research Applied to National Needs) program. But EPRI is a new sort of organization, and its backers think that the institute's close ties with the end users of its research will prove a special advantage. If EPRI does do well, it is likely to serve as an inspiration and a model to other industries which have been technological underachievers.—JOHN WALSH

Training Grants: Tied Up in Congress with Ethics Bills

Scientific activity cannot be turned on and off like a faucet. The withdrawal of support disperses highly trained research teams, closes vital facilities, loses spinoff benefits, and disrupts development momentum. The current [Johnson] Administration has even struck at the lifeline of our future progress—science education. . . . Especially hard hit in the reductions is aid for postdoctoral students who serve as graduate student instructors. The decline of science education is the most damaging indictment of present Administration policy; it threatens to cripple the national effort in science for years to come.—RICHARD M. NIXON, October 1968

If Richard Nixon were to say today what he said in defense of science education during the 1968 presidential campaign, he would doubtless please—and surprise—the scientific community. But in light of current fiscal realities, that is hardly likely to happen. After almost 5 years, it is apparent that the President does not favor the expenditure of millions of dollars of federal funds for the support of graduate education. Instead of generally increasing graduate student support, as many educators hoped would happen, the Administration has emphasized aid to the disadvantaged only, relying on various loan programs to help students who do not qualify as very poor. In all this, science graduates have been particularly hard hit.

The impact of the Administration's decision to curtail spending has been most conspicuous in the biological sciences, where support of young postdoctoral researchers through the National Institutes of Health (NIH) training grant program has been cut back dramatically (*Science*, 26 Jan.). All year, leaders in the biomedical community have been busy trying to persuade the Administration to change its mind or to persuade Congress to force it to do so. It is hard to say how they are doing. They have made some headway with both camps but have yet to actually get training money back.

The Administration has agreed to institute a new program in place of the old one it insists on phasing out, but the new program is quite limited and has yet to get off the ground. Both houses of Congress have agreed to legislation restoring money for the NIH training programs, but those House and Senate bills have been tied up by amendments dealing with medical ethics and are, at the moment, in congressional limbo.

The Administration program, which Health, Education, and Welfare Secretary Caspar Weinberger announced in July (*Science*, 27 July), provides $30 million a year (instead of approximately $130 million) for a program that will provide fellowships of $10,000 to individual trainees. Unlike the now-defunct training program, the new program will not pay large sums directly to institutions except in a very few situations in which there is a policy decision to encourage research in certain areas that are being neglected.

Originally, NIH officials hoped to be able to start accepting fellowship applications by 1 October. Now, they think they'll be lucky if they can begin in November. The problem is that, as yet, the new training program does not really exist—it has no money—and all anyone can do is wait for final approval from the White House Office of Management and Budget (OMB) which is still reviewing the matter. At OMB's request, NIH submitted a detailed spending plan that goes so far as to allot sums by discipline, with special emphasis on areas of "shortage" in which more manpower is presumably needed. Whether OMB will accept the NIH plan is uncertain. Some observers, who may be overly pessimistic, are betting the program will never get started. Others predict that when it does get OMB approval, it will be for less than the announced $30 million.

Meanwhile, on Capitol Hill Representative Paul G. Rogers (D–Fla.) and Senator Edward M. Kennedy (D–Mass.) have taken up the cause of restoring training grants. However, it is not clear whether they are working with or against each other.

Training grants and medical ethics, and even peer review, have become inextricably linked in the course of efforts to get a training bill passed. In May, Rogers introduced a bill to restore the NIH training program vir-