The Solar Institute: Hobbled by DOE?

Disgruntled staffers feel SERI's research mission is sinking under the weight of bureaucratic duties

The child prodigy of the federal solar energy program—the Solar Energy Research Institute (SERI) of Golden, Colorado—is in the grips of something the officials at the Department of Energy (DOE) headquarters in Washington, D.C., call "growing pains." But a number of SERI staffers see the trouble as something worse—a kind of dementia brought about by clumsy local management and increasing subservience to distant managers at DOE. Implicit in the staffers' view is the notion that folly runs riot at headquarters, and that the less supervision from DOE, the better SERI's work will be.

The struggle is important because SERI is meant to become the premier center for solar research in the world. The battle over SERI's independence is not purely an agency turf fight, as jaded officialdom is wont to see it, but a contest that will shape the working environment. It may determine the quality of the employees that SERI will be able to attract, and it could affect solar research for many years. In the broadest terms, the question is, to what extent will SERI be made to serve DOE higher-ups, grinding out studies, contracts, and press releases for use in Washington? Will it be given enough freedom to create and carry out major experimental projects on its own that may not interest the rest of DOE? Will it become an investigator-centered laboratory like the National Center for Atmospheric Research, one economist at SERI asked, or "will it just become DOE West?"

A hypothetical case helps illustrate what is at stake. Suppose SERI's senior staff were to decide that SERI should make a major commitment to the study of photosynthesis, the process by which plants use sunlight to create chemical forms of energy. Research on artificial photosynthesis, because of its obscurity, could be thrown together with agricultural "biomass" projects, and the item in this category that contributes the most to national energy supply right now is wood waste. This is a by-product of wood processing, used for many years by the wood industry as a source of fuel. If DOE were allowed to keep a tight grip on solar research, it could, through inertia and timidity, make SERI spend more of its experimental research money on trying to create the perfect tree rather than trying to develop an artificial form of photosynthesis. This has not happened, but it is the sort of nightmare that haunts SERI staffers.

Few people at SERI openly criticize DOE these days, even though SERI's director, Paul Rappaport, has pledged to insulate the staff from Washington. Rappaport does not want to offend his funding source, so he speaks carefully, walking a narrow line between his staff's demand that he campaign boldly for independence and the demand of DOE budget watchers that he assure them that the taxpayers' money is well spent.

DOE officials say that SERI researchers simply want to be financed in their pursuit of pure knowledge without having to account for its usefulness. They fear this will lead to waste (the deadliest sin in politics this year) and duplication of research. Rappaport's job is made difficult also by the fact, quite well understood at DOE, that many of his staffers have strong, unorthodox political views. As one DOE solar official put it, "They are the counterculture in its maturity . . . part of the revolution. . . . They still have that fire in their bellies." He claimed that SERI's management "can't even get these guys to write a weekly report, or a monthly report for that matter." In a department that manages the tightly disciplined business of nuclear weapons production, SERI's self-assertiveness seems a liability.

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Rappaport told *Science* that some of his staffers are "naïve" in thinking that he can get them greater freedom simply by demanding it. He believes SERI must have independence, but that it must earn it by doing solid work over the years. Past and present staffers told *Science* that, at the moment, SERI is steadily losing autonomy. They did not want to be quoted by name, for fear of losing their jobs or solar research grants.

SERI's problems are bound up in its struggle to build itself into a major national laboratory in a short time. The first federal funds were released to SERI in 1977, and in the months since then the staff has grown from 1 to 500. SERI's mission is to become the focal point of all federal solar research, but the congressional mandate creating the institute in 1974 preceded the creation of DOE by 3 years, making for a confused muddle of authority.

Here are some of the sounds of disillusion from SERI's staff, ranked in ascending order of importance. The first complaints are about the way SERI is managed. DOE pays a small think tank based in Kansas City, Missouri—the Midwest Research Institute (MRI)—to run the shop. It is a cost-plus contract, with MRI receiving each year a variable performance award fee determined unilaterally by a panel of DOE supervisors. The director of SERI, Rappaport, was formerly a laboratory physicist at RCA's research center in Princeton, New Jersey. SERI's deputy director, Michael Noland, was formerly engineering services chief for MRI in Kansas City. Staffers said that Rappaport has good ideas for SERI but has been unable to put them into practice because he is inexperienced in federal politicking. Noland was described as an able manager, but too closely tied to MRI—and thus to DOE's contract fee—to resist unreasonable demands made by headquarters.

One hears comments such as the following, made by a policy researcher now on the staff of SERI: "The place is pandemonium. Nobody on the left hand knows what the right hand is doing, the support services are unavailable, it takes forever to get anything out, and so on. If it were a private firm, it would have been broke ages ago." And a second person, no longer there, said, "At SERI the Pe-

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ter principle has become an epidemic. The great majority of people in management have no qualifications to hold the positions they hold. . . . SERI is thrashing around in a circle without any sense of direction." A third person, this one a member of the technical research branch, said that his major disappointment was that "I don't think that as an institution we have stood back from it all and established our own priorities." Too much emphasis has been put on using solar energy for electricity generation, he said, a mistake which reflects the subservience to DOE and DOE's fondness for electricity.

Another category of complaints touches on the confusion at DOE. Responsibility for solar energy in headquarters is split between two assistant secretaries, in accordance with Secretary James Schlesinger's theory of management. Basic research and demonstration projects come under the office of research and the office of the assistant secretary for energy technology—both of which are run at the moment by John Deutch. "Commercialization" projects, or experiments in the marketplace, come under the assistant secretary for conservation and solar energy—Omi Walden. The solar institute, since it deals with research, falls within Deutch's domain. But there is a complication.

Because influential Democrats in Congress could not stand to see only one state (Colorado) benefit from the boom in solar research, four regional solar centers were created in 1977, in Minnesota, Massachusetts, Georgia, and Oregon. (Greg O'Meara, formerly an aide to Speaker Tip O'Neill, now on the Democratic Steering Committee, said, "Rather than fight the selection of Colorado, which seemed not to be a good idea . . . we said, they got the central place, let's see if we can't get one of the regional places." Massachusetts did get one.) Politics dictated that the regional centers should not be subservient to SERI, so they were given a different task and told to "do commercialization." Thus the regional centers come within Omi Walden's domain; but to the extent that they carry out experimental research, they must report to SERI headquarters as well, making them partly responsible to Deutch. Confusion abounds.

The tension between SERI and the regional centers exhibits in microcosm the tension that exists in headquarters between the assistant secretaries. There are frequent and long-running debates over whether or not a particular solar technology deserves to go to market (Walden) or should undergo further research in the laboratory (Deutch). One close observer of the department's solar office described how an important letter on solar power intended for President Carter was rewritten several times by the two assistant secretaries, but could not be reduced to a final draft and mailed until Schlesinger himself intervened.

A DOE official who has seen three major reorganizations of the federal solar effort in 4 years lamented the repeated divisions and reshufflings. "We get a new leader every year," he said. And "Schlesinger's philosophy has split us up into little pieces." He asked: "Now is that 'growing pains' on our part, or is it. . . ." and here he lapsed into profanity.

A policy researcher at SERI said that DOE seems to run on crisis management, "from panic to panic to panic." He said, "Some of us think they [DOE officials] just want us to be a bunch of hey-boys. When they ring the alarm, we jump. We think that's crazy."

The third category of criticism deals with SERI's idea of itself and the degree to which it must conform to DOE's concept of what it should be. The legislation creating SERI was vague on this point, leaving critical questions of funding and accountability to be determined by the bureaucracy. It was clear, however, that SERI should be in some sense its own master, and that, in accordance with recommendations made by a committee of the National Academy of Sciences (NAS) in 1975, SERI should be able to initiate projects that depart from the program established in Washington.* The NAS also recommended that SERI be governed by an independent board of directors, a piece of advice never followed by DOE. SERI's independence is constrained by the fact that it is funded by an internal tax levied on solar programs in DOE, a practice that makes the program managers itchy to meddle in SERI's work. SERI's director reports to an assistant to the assistant secretary of DOE, fairly low in the ranks, and the operating contractor's fee for SERI is determined by a little-known committee of DOE managers.

At present, this means that in substantive matters, DOE calls the shots. A typical case is wind research, as the following comments illustrate. A member of the DOE headquarters staff said: "Wind is probably one of the best managed programs out of headquarters. . . . The only thing we were able to come up with for SERI to do was the innovative program piece, which we tasked them to follow through with." A scientist at SERI said: "The guy who runs the wind program at DOE is very much interested in preserving his program. . . . I'd say he's using SERI as a go-fer." Another researcher said that when differences such as this arise, DOE always wins. Headquarters has used the budget process to allocate manpower and money "even at sub-task levels to get us to toe their line," he said. Projects are started at SERI and stopped and revised repeatedly by headquarters. This has produced "terrible animosity" at times, with DOE and SERI officials swearing at one another in conferences.

Paul Rappaport

Rappaport, SERI's director, said, "The most diplomatic thing I can say is that DOE should not have to worry about solar on a day-to-day basis when they have an institute as powerful as SERI." DOE should recognize that SERI, like a growing child, is "getting close" to going off on its own. The institute will not follow the model of the "beltway bandit" contract research outfit, Rappaport said, but will be independent. He said he thought that 30 to 40 percent of SERI's budget should be financed as a block figure in the budget, not through an internal tax as at present. This money should be used for SERI's own ideas. The remainder of the budget should pay for work done for DOE.

Of the internal dissent, Rappaport said that much of it had been stirred up by "prima donnas" who would not be happy in any organization. He said that all of his managers had had experience in supervising people, that SERI's first year of life had been "traumatic," and that some free spirits thought that SERI should be accountable to no one, a view he did not share. He conceded that some of the "brilliant people" on his staff oc-

*See *Establishment of a Solar Energy Research Institute* (National Academy of Sciences, Washington, D.C., 1975), pp. 17–21.

casionally must kowtow to less brilliant counterparts at DOE.

Bennett Miller, who runs the solar and several other programs at DOE under John Deutch, said, "There is nothing in the budget that says, 'here's $35 million for SERI to do as it pleases.' " Miller is the one who manages the SERI budget at headquarters, and he emphasized that he must see that the money is spent as the law requires. He must be able to justify every penny to Congress. "The measure of SERI's performance," Miller said, "will be how well they deliver on the program milestones that we ask them to carry out." A typical milestone might be seeing that a university study of photovoltaic potential is completed by June, followed by a milestone requiring that the study be critiqued and published by September. Headquarters this year is turning over $70 million worth of solar contracts with private researchers for management by SERI. This sum is twice as large as the amount SERI receives for itself this year.

The link between headquarters and SERI is "a client-contractor relationship just as between you and a lawyer," Miller said. "I need some services and I'm willing to pay for them. They have the capability, and they negotiate with us." The trouble arose, he thought, when people with the "wrong talents were put in the wrong positions," meaning that investigators were hired to do administrative work.

The reason DOE cannot manage the programs in Washington, according to a DOE official, is that headquarters is desperately understaffed, and the White House has put a lid on hiring new federal employees. SERI, which is technically a private outfit, will be used to do the work that the DOE staff cannot handle. For this reason it is interesting that in the last week or so, SERI has decided to make a staff shuffle so that program managers will be organizationally removed from people involved in SERI's "own work." Presumably, this will allow SERI's research projects to simmer along undisturbed by the managerial work going on in the same institute.

Miller insisted that SERI is allowed "tremendous flexibility" in determining who actually does the research and in financing some of its own pet projects within the broad assignments given it by DOE. If only SERI would learn to play the game, he seemed to be saying, at least half of each assignment from DOE could be used to pursue ideas that SERI alone likes.

SERI's management seems to have accepted this peace treaty, as has much of the staff. The newer employees are said to be particularly amenable. But the willful and independent researchers call this madness, an infection caught from DOE, for which the only known cure is surgical removal. When he heard this, a DOE solar official burst into laughter. "Now that's a little unrealistic, isn't it," he said. "They are inexorably a part of us."—ELIOT MARSHALL

NAE Elects New Members

The National Academy of Engineering last month elected 99 new U.S. members and 18 foreign associates. They are:

M. Robert Aaron, Bell Telephone Laboratories, Inc.; Herbert Allen, Cameron Iron Works, Inc.; John G. Anderson, General Electric Co.; T. Louis Austin, Jr., Texas Utilities Company; James G. Baker, Harvard Observatory; Bernard B. Berger, University of Massachusetts; Donald C. Berkey, General Electric Co.; Franklin H. Blecher, Bell Telephone Laboratories, Inc.; W. Spencer Bloor, Leeds & Northrup Co.; Oliver C. Boileau, Boeing Aerospace Co.; Michel Boudart, Stanford University; A. Philip Bray, General Electric Co.; Boris Bresler, Wiss, Janney, Elstner & Asso., Inc.; John Cocke, T. J. Watson Research Center; J. Barry Cooke, J. Barry Cooke, Inc.; Seymour R. Cray, Cray Research, Inc.; Luigi Crocco, Paris, France; Coleman duPont Donaldson, Aeronautical Research Associates of Princeton, Inc.; Harry G. Drickamer, University of Illinois; Pol Duwez, California Institute of Technology; Peter Elias, Massachusetts Institute of Technology; Robert R. Everett, MITRE Corp.

Frank J. Feely, Jr., Exxon Research and Engineering Co.; Iain Finnie, University of California, Berkeley; Irene K. Fischer, Takoma Park, Md.; Ferdinand Freudenstein, Columbia University; Yuan-Cheng B. Fung, University of California, San Diego; Adolf P. Gagge, John B. Pierce Foundation Laboratory; Theodore V. Galambos, Washington University; Robert G. Gallager, Massachusetts Institute of Technology; William J. Galloway, Bolt Beranek and Newman, Inc.; Welko E. Gasich, Northrop Corp.; Edwin A. Gee, International Paper Co.; Eugene I. Gordon, Bell Telephone Laboratories, Inc.; Floyd L. Goss, Los Angeles, Calif.; Andrew S. Grove, Intel Corp.; Michel T. Halbouty, Halbouty Center; Gail A. Hathaway, Washington, D.C.; George H. Heilmeier, Texas Instruments Inc.; David G. Hoag, Charles Stark Draper Laboratory, Inc.; Kenneth F. Holtby, Boeing Commercial Airplane Co.; Frederick J. Hooven, Dartmouth College; Billy M. Horton, Case Western Reserve University; William J. Howard, Sandia Laboratories.

Kenneth E. Iverson, T. J. Watson Research Center; Frederick G. Jaicks, Inland Steel Co.; Noel Jarrett, Alcoa Laboratories; Bruce G. Johnston, University of Michigan; Edward E. Kane, E. I. du Pont de Nemours & Co., Inc.; Bernard H. Kear, United Technologies Research Center; Garbis H. Keulegan, USAE Waterways Experiment Station; Edward W. Kimbark, Bonneville Power Administration; Leon K. Kirchmayer, General Electric Co.; Harold B. Law, Hopewell, N.J.; Edwin N. Lightfoot, Jr., University of Wisconsin; William K. Linvill, Stanford University; Alexander L. London, Stanford University; Paul B. MacCready, Jr., AeroVironment, Inc.; Max V. Mathews, Bell Telephone Laboratories, Inc.; Robert D. Maurer, Corning Glass Works; John S. Mayo, Bell Telephone Laboratories, Inc.; Bramlette McClelland, McClelland Engineering, Inc.; William J. McCune, Jr., Polaroid Corp.; Arthur B. Metzner, University of Delaware; Alan S. Michaels, Stanford University; John W. Morris, U.S. Army; William R. Murden, Jr., U.S. Army.

Richard B. Neal, Stanford University; John K. Northrop, La Canada, Calif.; Eugene J. Peltier, Sverdrup & Parcel and Asso., Inc.; Milton S. Plesset, California Institute of Technology; John M. Prausnitz, University of California, Berkeley; W. Duncan Rannie, California Institute of Technology; Irving S. Reed, University of Southern California; William C. Reynolds, Stanford University; Thomas B. Robinson, Black & Veatch; Otto H. Schmitt, University of Minnesota; Manfred R. Schroeder, Bell Telephone Laboratories, Inc.; Ernest E. Sechler, California Institute of Technology; Oleg D. Sherby, Stanford University; Paul G. Shewmon, Ohio State University; Henry E. Singleton, Teledyne, Inc.; Elias Snitzer, United Technologies Research Center; J. Edward Snyder, Jr., U.S. Navy; Alexander Squire, Richland, Wash.; Francis M. Staszesky, Boston Edison Co.; Theodore Stern, Westinghouse Electric Corp.; Martin Summerfield, New York University; Charles E. Taylor, University of Illinois; Daniel M. Tellep, Lockheed Missiles and Space Co.

Marshall P. Tulin, Hydronautics Inc.; Anestis S. Veletsos, Rice University; Milton E. Wadsworth, University of Utah; Eugene W. Weber, Water Resources; Wilford F. Weeks, U.S. Army Cold Regions Research and Engineering Laboratory; Lloyd R. Welch, University of Southern California; Robert H. Wentorf, Jr., General Electric Research and Development Center; Jack H. Wernick, Bell Telephone Laboratories, Inc.; John M. West, Combustion Engineering, Inc.

New Foreign Associates: Harold E. M. Barlow, England; Per V. Bruel, Denmark; Arne S. Eklund, Austria; John S. Forrest, England; Tasuku Fuwa, Japan; Paul M. Germain, France; George W. Govier, Canada; Michel Hug, France; Jay Krishna, India; Maurice Magnien, France; Walter Marshall, England; Charles Oatley, England; Angus Paton, England; Owen Saunders, England; Robert S. Silver, Scotland; Itiro Tani, Japan; Frank Whittle, Maryland; Fumitake Yoshida, Japan.

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