Hayes Makes Sunshine at SERI

A nonscientist directs the nation's major effort in solar energy research; how well is he doing it?

The Solar Energy Research Institute (SERI) in Golden, Colorado, is the spearhead of the government's efforts to develop renewable forms of energy. In July 1979, the leadership of this critically important research agency was placed in the hands of a nonscientist, Denis Hayes. How has SERI fared under Hayes, and to what extent has Hayes been able to justify the confidence placed in him?

Hayes, now 35, directs a staff of 800 people and a research budget of more than $120 million. Before his appointment as head of SERI he was a leading light of the environmental movement, being the originator of Earth Day in 1970 and Sun Day in 1980. He has no formal training in science and engineering and few scientific credentials—certainly none to match those of his predecessor, the late Paul Rappaport, who before coming to SERI had directed the RCA laboratory at Princeton, New Jersey. Rappaport, who was perceived at DOE headquarters as a poor and uncooperative manager, was fired in July 1979.

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Hayes came to SERI with the strong personal support of James R. Schlesinger and John Deutch, then secretary and undersecretary, respectively, of DOE.

Rappaport's firing, especially its abruptness, went over badly at SERI. Hayes had to convince people of his own fitness for the job and build up staff morale, which had been sagging, in part because the work of the institute was subject to constant interference from DOE headquarters in Washington and the regional office in Chicago.

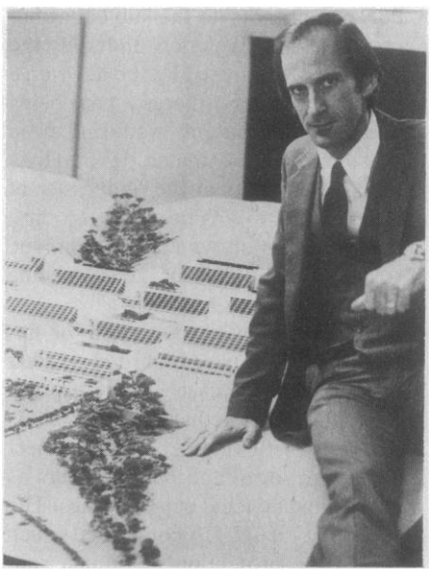
A recent visit to SERI and conversations with program leaders and others suggest that Hayes has won the confidence of the staff and that morale is at least better than a year ago. Hayes has made a practice of setting aside time each day for rap sessions with staff members. And this year he brought off a major reorganization of SERI designed to eliminate most turf battles and give the individuals responsible for particular projects the control of spending for those projects.

This, Hayes believes, has made not only for better morale at SERI but for greater confidence in SERI at DOE. Before, he says, it was hard to gain an overview of SERI activities or to know who was really accountable for what. The appointment of Mary Tuszka, formerly comptroller of DOE, as SERI's chief budget officer and director of operations, is regarded as an important step in bringing administrative order to the institute.

In terms of substance, SERI's strength from the outset has been in its research and development directorate. The analysis and applications group has been relatively weak but is improving under the direction of Henry Kelly, who came to SERI from the congressional Office of Technology Assessment, where he headed a major study of the potential of solar energy.

A scientist who knows SERI probably as well as any outsider is Theodore B. Taylor, a physicist and visiting professor at Princeton. Both as a member of SERI's advisory board and as a full time researcher on solar energy, Taylor has spent considerable time at the institute over the past year. In his view, SERI still suffers from overmanagement from Washington, even to the extent of being required to submit weekly technical progress reports for some programs. "It's virtually impossible to get long-term funding for work on promising new approaches," he says, adding that it is not easy, under any terms, to persuade DOE to bet money on technological long shots. "My main criticism of DOE," Taylor says, "is that it demands that research—but not demonstration projects—look economically attractive from the beginning. They've got the whole thing wrong, twisted around 180 degrees."

Taylor notes with approval that Hayes has set high standards for the individual who will head the R & D directorate, a position now filled in an acting capacity by Kenell Touryan, SERI's deputy director. "He is looking for someone who has had both a distinguished career in science and a strong record as manager of large and diverse technical programs," Taylor says.



Luther J. Carter Photo

A new place in the sun

SERI director Hayes beside a model of the institute's new building.

Hayes agrees that there is now an imbalance between basic research and technology development, with the latter favored by a ratio of perhaps 9 to 1 if one excepts SERI's $33 million program in photovoltaic research of which all but $7 million is let out on contract. He would redress the imbalance not by cutting back on the engineering programs but by having more resources go into research. "Five years from now, I would like for it to be close to 50-50."

At the moment, some $5 million goes to basic science. "By the mid-1980's I would like to have $40 to $50 million going to basic research in solid-state physics, molecular biology, biochemistry, and photochemistry," he remarks.

Hayes also wants to see SERI's in-house science and engineering work grow in relation to the work that is contracted out. Now upwards of 60 percent of SERI's money supports contract work, and he wants to turn this around. "The majority of the money should go for work done by the SERI staff," Hayes notes.

A matter of immediate concern has been to increase the director's discre-

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tionary fund, which this past year was $1 million and which may be twice that next year. The fund allows SERI to take advantage of attractive targets of opportunity. This year, for example, $150,000 was used to mount a demonstration of passive and active solar technologies by selected metropolitan Denver home builders—a project initiated more or less spontaneously after the president of the Denver Home Builders Association came to SERI seeking advice about how best to take advantage of land he owned on slopes facing south.

Officials at DOE headquarters, notably Robert San Martin and Bennett Miller (who has been DOE's deputy assistant secretary for solar energy but is now leaving), say Hayes is doing an excellent job.

As for complaints of DOE breathing over SERI managers' shoulders, San Martin says that new rules are now in force to prevent such interference. But Hayes claims that the new rules have not worked as well as San Martin suggests, and he hopes to see more improvement. In any case, he has said that gross interference by DOE program officials will not be tolerated.

Hayes seems to enjoy generally good relations with DOE officials. Secretary Charles Duncan gave in gracefully when a congressional committee recently supported Hayes rather than himself in approving a somewhat faster pace of funding for SERI's permanent facility and testing ground.—LUTHER J. CARTER

News and Comment reporter Luther J. Carter has taken a leave of absence to write a book about the politics of radioactive waste management. It will be published under the auspices of Resources for the Future.

Philosophers at the Pentagon

Academicians with a philosophical bent take on billion-dollar problems uncovered during a war game

Two years ago the Pentagon carried out a computerized war game called Nifty Nugget, a massive, secret, government-wide mobilization exercise, the first such exercise to be carried out in this country since World War II. For 1 month, more than 1000 players around the nation waged an all-out conventional war against the attacking forces of the Warsaw Pact in Europe.

Or that was the plan. Nifty Nugget was in fact plagued with computer foul-ups, logistical snarls, and what General Walter T. Kerwin, then vice chief of staff of the Army and official overseer of the game, later called "great gaps" in understanding among various players. "You wonder," he says, "whether they were playing the same exercise."

One very unmilitaristic upshot of this war-game muddle and a long history of such "command and control" breakdowns is that the Pentagon is turning to academia for answers, or, it would seem in some cases, for mind games.

Last year, some 30 academics with a philosophical bent, including microbiologist and Nobel laureate Joshua Lederberg, an expert on the subject of artificial intelligence, met with an equal number of top-ranking people from the Pentagon. These included Robert J. Hermann, then a Deputy Undersecretary of Defense for Research and Engineering, and Robert M. Brookman, Deputy Engineer for the World Wide Military Command and Control System (*Science*, 14 March, page 1183). Computerized and problem-ridden, the more than $1 billion WWMCCS system is relied on by the President and the Joint Chiefs of Staff to coordinate the global forces of the U.S. military.

The Pentagon-generated list of invited academics included anthropologists, control theorists, cyberneticians, mathematicians, psychologists, systems theorists, sociologists, and neurobiologists.

Putting philosophers and systems theorists onto the billion-dollar problems of the U.S. military may seem somewhat laughable on the surface, and indeed, the series of three meetings held around the country in 1979 produced their share of opaque pronouncements. "How we see things," opined one of the participants, quoting an oft-abused statement made by Albert Einstein, "determines much of what we see."

On another level, however, the meetings and the subsequent discussions in the corridors of the Pentagon and the follow-up studies are significant in several respects. For one thing, the meetings themselves were a tacit admission of the severity of the command and control problems facing the U.S. military, an admission not often forthcoming. For another, the meetings showed that segments of the military are actively searching for nontraditional solutions to command-control problems. This in itself is just short of astounding. In the past, the principal preoccupation of the U.S. military has been the acquisition of more and especially more expensive hardware such as computers, satellites, secure transmission circuits and the like. All this miraculous gadgetry and the formidable acronyms that go with it have consistently come up short on performance, however, and the search for a non-hardware integration of the systems is a healthy sign. Finally, the meetings produced a few proposals that have been taken to heart. In one case, a general systems theory derived from biological examples is being tried out on command and control problems at the battalion level in the Army.

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