Solar Activist, Denis Hayes, Heads SERI

In surprise appointment, the young organizer of Sun Day replaces Paul Rappaport, veteran researcher, administrator

The morning of 26 July, Denis Hayes, the young activist who organized Earth Day and Sun Day and created the Solar Lobby, borrowed a necktie from a friend and went over to the Department of Energy (DOE) to hear Secretary James R. Schlesinger announce his appointment as director of the Solar Energy Research Institute (SERI) at Golden, Colorado.

It was a remarkable happening. At only 34, Hayes, who once had a fling at graduate studies but forsook them in favor of environmental activism, was taking over the leadership of a national laboratory with a staff of about 600 and a budget that will probably exceed $110 million next year. Moreover, he was replacing a senior scientist and science administrator, Paul Rappaport, who 2 years ago became SERI's first director after a long career in photovoltaic research and heading an RCA laboratory at Princeton, New Jersey.

The decision to replace Rappaport with Hayes was made by John Deutch, formerly DOE's assistant secretary for energy technology and now the acting undersecretary, and John McKelvey, president of the Midwest Research Institute (MRI), which exercises general managerial oversight of SERI under a DOE contract. A spokesman for McKelvey told *Science* it was decided that, with the President now looking to solar energy to meet 20 percent of the nation's total energy needs by the year 2000, a "more aggressive and activist leadership" is needed at SERI.

Rappaport feels badly treated and suggests that important principles bearing upon the scientific independence of a national laboratory have been violated. But among advocates of solar energy the reaction to the Hayes appointment seems generally positive.

Jeremy Stone, director of the Federation of American Scientists, called the appointment "creative." "Hayes has the dedication, the energy, the feeling for science, and the political shrewdness to make SERI . . . the guardian of the nuclear age," Stone said. He described Hayes as the "leading environmentalist of his generation." He said that Hayes, who has been a senior researcher with the Worldwatch Institute, was the first non-Ph.D. ever elected to the federation's national council.

Henry C. Kelly, who directed the solar energy study issued by the congressional Office of Technology Assessment last year, said the Hayes appointment was an "interesting gamble." "I think it's very exciting," Kelly said. "SERI has enormous potential but has never lived up to it. Hayes is a talented guy—very intelligent and very honest. He has a charm, a capability to make people pick up his own enthusiasm."

Kelly said that, for reasons never clear to him, "an incredible amount of internal discontent" prevailed at SERI. Also, he observed that the institute started out by taking such a conservative view of the solar potential as to alienate some of its natural allies. Hayes, on the other hand, comes to SERI with a very strong pro-solar position, and, in Kelly's view, this can be an advantage rather than a drawback if Hayes now "builds the credibility" of that position.

Gus Speth, acting chairman of the Council on Environmental Quality and a leader in convincing the President that solar energy could make a major near-term contribution to total energy supplies, said he had no part in the Hayes appointment but that he regarded it as "marvelous." "I can't think of a better person," he said.

An irony in the situation is that Rappaport himself recently chose Hayes to be the chairman of SERI's advisory board—and says now he had thought that, if he ever stepped down as director, Hayes could be a worthy successor. In an interview with *Science*, he cited Hayes' leadership ability and his entrée in all of the circles concerned with development of solar energy, including those on Capitol Hill and at the White House. "You might say he is the common denominator for solar energy," Rappaport said.

Rappaport has been in ill health, and this was cited by the spokesman for McKelvey as a "major consideration" leading to his replacement. But Rappaport, who has been offered a research position as "distinguished scientist" at SERI, did not ask to be relieved of the directorship and was not told of the Hayes appointment until 3 days before it was announced.

For many months there has been dissatisfaction at DOE and MRI over conditions at the institute and Rappaport's leadership. Problems of mismanagement were cited in two reports by DOE's Inspector General. A number of the problems cited seemed to have involved only auditing mistakes of a kind that might turn up in any fast-growing new organi-

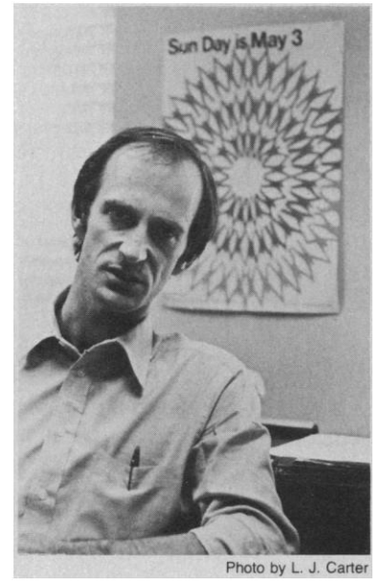

Photo by L. J. Carter

Denis Hayes

zation; others were more substantive, including one alleging that a contract for a research project had been renewed at a cost of $242,000 despite highly adverse evaluations by some SERI reviewers.

In addition, Rappaport was not regarded as a team player. "He went out of his way to emphasize his independence from DOE," according to a spokesman for Deutch, who did not wish to discuss the change of directors at SERI with *Science*.

One specific case in point was that shortly after attending the White House ceremony in June at which President Carter announced his big goal for solar energy, Rappaport returned to Colorado and, to the "chagrin" of DOE officials, told reporters there that the money committed to solar was not adequate for attainment of the President's goal. Another

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complaint has been that Rappaport has lobbied privately on Capital Hill for more money for some SERI programs than called for in the DOE budget.

But Rappaport told *Science* that he was "yanked out [of his job] without notice" and was never advised that his performance as director had been found seriously wanting. "Nobody has informed me what the problems were," he said. "I've only been told I've done an excellent job."

In Rappaport's view, MRI is a small organization without political clout, and McKelvey was in no position to protect him from those at DOE who wanted him out. "Basically, he was told to change directors," Rappaport said, adding that a larger and more powerful organization such as Union Carbide, the contractor that runs the Oak Ridge National Laboratory, could have resisted such demands.

McKelvey, giving his version of what happened through a spokesman, says Rappaport's interpretation of what happened is wrong. He does give Rappaport credit for organizing SERI and building its staff, but says, as does Deutch's spokesman, that Rappaport had been told on a number of occasions during the past several months that the problems at SERI were being viewed with concern.

As for the suggestion that he caved in under pressure from on high, McKelvey says that the decision to replace Rappaport came several weeks ago at the culmination of discussions between him and DOE officials about what kind of person should be leading SERI. According to McKelvey, once it was agreed that an activist was needed in the job, it was he himself who was the first to say, "It sounds like we are talking about Denis Hayes."

Hayes' appointment was effective immediately. "I don't know yet what has to be done," Hayes told *Science* shortly before he left Washington for Colorado. "I do know there is sagging morale, a lack of esprit de corps, and an uneven quality of work."

He added that he had been promised "unlimited discretion" to hire and fire, do such reorganizing as may be necessary, and run the institute generally. His understanding is that DOE, which has been said to keep SERI on a frustratingly short tether (*Science*, 23 March), will leave the management of the institute to him and judge him on the basis of the results achieved. The overall quality of the present staff is high, he says, adding: "I'm not going out there with an unsheathed hatchet."

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U.S. Rubber Shrub May Have Hidden Thorn

A scruffy-looking desert plant with steel-gray branches and leaves, the guayule bush (*Parthenium argentatum*) appears to be a weed. But not to Congress, which last November decided to sink $35 million into the development of the shrub (*Science*, 27 October). Guayule, after all, has a remarkable talent. It makes rubber.

It may also make life miserable for the workers who end up harvesting it, according to scientists at the Academy of Natural Sciences (ANS) in Philadelphia. To be a commercial success, guayule must be hybridized to increase its total yield, stature, and disease resistance—a task that scientists at the U.S. Department of Agriculture have already started on. Two scientists at ANS, however, say that careless hybridization of guayule with any of the plant's relatives is likely to introduce plant toxins that cause a severe skin rash in humans. Near-epidemics of the rash have been reported in some parts of India where a guayule relative was introduced several years ago.

"The problem," says ANS botanist James Mears, "is that people have been looking only at the rubber these plants can produce, not at their potentially toxic side effects when hybridized." Different species of *Parthenium*, says Mears, have different attractions for plant breeders. Guayule plants produce up to 22 percent of their weight in rubber and inhabit very arid regions where there are few predators. Relatives of guayule grow in more hospitable areas, turn only about 2 percent of their total weight into rubber, and produce complex terpenes that deter feeding by microbes, insects, and animals. Some of these terpenes also inhibit the growth of plant tumors.

In seeking the best combination of disease resistance and rubber production, some hybridizers have overlooked the fact that terpenes can also be harmful to humans. Others say that such potential harm will not create a problem because guayule can be harvested mechanically, in contrast in *Hevea* rubber trees in the tropics, which are one of the most labor-intensive crops in the world. This reliance on machines is especially favored by the tire giants, such as Goodyear, which are already planting trial stands of guayule.

Mears sees problems, however. The U.S. Bureau of Indian Affairs, for instance, thinks guayule can promise Indians in the southwest an economic base for their poverty-stricken reservations. And the United States and Mexico have an agreement to share the results of guayule research. Some of the guayule, says Mears, is bound to be harvested by hand. "This is one of the rare cases in which evidence of a hazard in hybridization exists before a plant has been commercially developed. It would be a shame to overlook the danger."

No Move for Weapons Labs

The University of California board of regents on 20 July voted down the motion of one of its members, California Governor Edmund G. Brown, Jr., calling for termination of the university's management of the Lawrence Livermore Laboratory (LLL) in California, and the Los Alamos Scientific Laboratory (LASL) in New Mexico. The vote was 15 to 7. The two labs are the nation's only nuclear weapons design facilities.

The outcome was not unexpected. The board, most of whose members were appointed by former Governor Ronald Reagan, is regarded as conservative on such issues. In addition, the university has managed LASL since its inception in 1943 and LLL since 1951. The university receives an annual fee of $3.8 million to run the facilities; the budgets of the laboratories total about $600 million annually.

The board's vote was its first ever on the question of the university management of the weapons labs. It came in the wake of increasing criticism by faculty, students, and outside activists during the past decade over the university's role in weapons research. To settle the issue, Brown last 18 May asked that all weapons-related research be removed from LLL and that the university sever all ties with LASL (*Science*, 29 June). The day before the regents voted on the issue, four California congressmen released a statement urging the regents to sever ties with both facilities. A petition

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As head of the Solar Lobby, Hayes, like Rappaport, was present at the ceremony on the White House roof when the President displayed his new solar water heater and announced his big commitment to solar. And, again like Rappaport, he thought the level of that commitment was inadequate, and said as much to reporters even before the ceremony was over. Hayes is aware that some people suspect that the Carter Administration has hired him as one way of neutralizing or silencing an effective critic. "I intend to maintain a ferocious integrity and independence," he said.

Hayes thinks SERI can become "the most intellectually exciting and effective energy institute in the world," and that its analyses of energy issues, instead of collecting dust and going unread by policy-makers (the fate of most past SERI analyses, he suspects), can become influential action papers. He intends to continue in his activist role, only now to play that role not with the modest resources of the Solar Lobby but with the far grander resources of SERI.

Rappaport thinks that Hayes will be disappointed by the results of some of the SERI analyses of the solar potential. The potential, he says, is there—Rappaport subscribes to the new national goal for solar—but "it's not nearly as possible as he [Hayes] thinks it is right now." Only with the rising prices of alternative energy sources will some solar technologies become attractive economically, Rappaport believes.

Hayes says that, while he has been a solar advocate, he has never been a "promoter in the sense of a hired gun." Instead, his role has been "first and foremost that of a synthesizer and analyst." He will, he says, decide technical issues on the basis of the best information he can get from SERI staff scientists and outside experts.

Many solar advocates would no doubt object if a prominent lobbyist for nuclear power were appointed head of the Oak Ridge laboratory or one of the other national labs with a major R & D role in nuclear energy. But to some degree the people put in charge of these various other laboratories have invariably, and perhaps necessarily, been proponents of the technologies with which their laboratories have been concerned, whether it be development of better reactors or better nuclear weapons.

"Solar energy is an okay thing," Jeremy Stone observes. "It's like being kind to animals. Hayes won't become a controversial figure by being appointed director of SERI. Congressmen know Hayes and like him. It will help SERI."

On this latter point, Rappaport agrees. "One of my problems has been an inability to sell SERI in the right fashion. Denis has an audience that will listen." He now expects to see some "goodies" for SERI, including quicker and more favorable action on its capital and operating budgets.—LUTHER J. CARTER

Pentagon Plans Boost for Basic Research

Secretary Brown's memo should help clear the confusion on criterion of relevance left by Mansfield Amendment

Defense Secretary Harold Brown has sent his top lieutenants a message which should encourage increased Department of Defense support of basic research and, therefore, further repair DOD relations with university science.

The military has been a major patron of R & D since World War II, but in the past decade has damped down spending on basic research. This deemphasis, combined with the effects of inflation, has resulted in a 50 percent decline in the purchasing power of DOD funding of basic research. Universities have done much basic research for DOD and the cuts had a heavy impact on academic science.

In recent years, efforts have been made by defense officials to reverse the trend, but money has not been readily available and, in an organization as big and complex as DOD, a policy once established is hard to change.

Brown's policy memorandum on support of research, dated 30 May, is low key enough. His main message is as follows:

> I would like each Service and Defense Agency to review its research programs to ensure that they are meeting the objectives of the Consolidated Guidance, have sufficient emphasis on the long-term aspect of the research program, and are applied to broad science and engineering areas with potential relationships to a military function or operation. The result of your review should be reflected in the FY 1981 budget submission and in subsequent management of the Research Program.

But the memo is addressed to the service secretaries, chairman of the Joint Chiefs of Staff, and others at the top of the chain of command, and is couched in the kind of Pentagonese calculated to overcome inertia.

The decline in funding of basic research in the universities in part reflects the strains of the Vietnam war era when university campuses were hotbeds of antiwar and, therefore, antimilitary sentiment.

Congress exerted perhaps the most restrictive influence through the so-called Mansfield Amendment, first enacted in 1969. In its original form the amendment limited DOD funding to research projects with a "direct and apparent relationship to a specific military function or operation."

The effect of the Mansfield Amendment continues to be a subject of debate. The issue is whether application of the criterion of relevance or the heavy budgetary squeeze of the past decade has been the principal cause of the decline in basic research support. Not in dispute, however, is that the basic research budget slumped.

The low point in the last decade in DOD support for basic research came in fiscal years 1974 and 1975 when expenditures were $303 million and $305 million, respectively, in current or what inflation-conscious DOD officials call "then" dollars. In terms of 1980 dollars, that comes to the equivalent of less than $430 million in each of the two low years compared with a figure of $728 million in 1969 ($353 million in then dollars) and an estimated $573 million for the prospective 1980 fiscal year.

Basic research funding made a partial recovery under the Ford and Carter administrations, edging up to $328 million in 1976 and rising to $477 million for the 1979 fiscal year (all in current dollars). The Carter Administration has also worked at increasing the percentage of

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