

- above solution and stored at -80°C prior to isolation of the nuclei.
41. Nuclei were prepared at 4°C from frozen-thawed cells which were resuspended in 20 volumes of 10 mM tris-HCl buffer, pH 7.4, containing 40 mM NaF and 1 mM MgCl_2 . After 3 minutes of hypotonic lysis, 2M NaCl was added to a final concentration of 100 mM and the cell lysate was centrifuged at 1100g for 5 minutes. The nuclear pellets were suspended in 20 volumes of a solution of 50 mM NaCl, 50 mM NaHSO_3 , 40 mM NaF, 1 mM MgCl_2 , 0.5 percent (by volume) Triton X-100, and 40 mM tris-HCl, pH 8.3; a Teflon-glass, motor-driven homogenizer was used. The suspension was centrifuged and the nuclear pellet was washed three times with 20 volumes of a solution of 50 mM NaCl, 50 mM NaHSO_3 , 40 mM NaF, and 40 mM tris-HCl, pH 7.0, shearing in a Sorvall Omnimixer for 1-minute each time. The final pellet was extracted with 20 volumes of 140 mM NaCl prior to extraction of the histones. Sodium bisulfite was added as a protease inhibitor [S. Panyim, R. H. Jensen, R. Chalkley, *Biochim. Biophys. Acta* **160**, 252 (1968)].
 42. A total histone fraction was prepared from the isolated nuclei by two consecutive 1-hour extractions in ten volumes of 0.25N HCl. The combined extracts were clarified by filtration through 0.45- μm Millipore filters, dialyzed extensively against 0.9M acetic acid, and lyophilized. The histones were then separated from other proteins in the acid extract by ion-exchange chromatography on columns of Bio-Rex 70 [L. D. Nooden, H. W. J. van den Broek, S. J. Sevall, *FEBS (Fed. Eur. Biochem. Soc.) Lett.* **29**, 326 (1973)] that had been thoroughly washed and equilibrated with the starting buffer—0.36M NaCl, 40 mM NaF, 1 mM NaHSO_3 , and 10 mM tris-HCl, pH 7.0. The crude histone fraction, dissolved in water (50 mg/ml) and diluted with three volumes of the starting buffer, was applied to the column. After elution of the run-off peak, the column was washed extensively with the starting buffer and the histones were then eluted in a solution of 4M guanidine hydrochloride, 1 mM NaHSO_3 , and 10 mM tris-HCl, pH 7.0; 1-ml fractions were collected. The radioactivity in 25 μl of each fraction was measured by scintillation spectrometry in a Triton 114-based scintillator.
 43. The method of S. Panyim and R. Chalkley [*Arch. Biochem. Biophys.* **130**, 337 (1969)] was modified as described (20) with ethylene diacrylate as a cross-linking reagent [G. L. Choules and B. H. Zimm, *Anal. Biochem.* **13**, 336 (1965)].
 44. Histone samples (20 to 55 mg) were reduced [A. Ruiz-Carrillo and V. G. Allfrey, *Arch. Biochem. Biophys.* **154**, 185 (1973)]. They were dissolved in 2 ml of 10M urea and 4M acetic acid and applied to columns (2.5 by 175 cm) of Bio-Gel P-60 that had been equilibrated with the eluant (50 mM NaCl, 0.02N HCl, 0.02 percent NaN_3) [E. L. Bohm, W. N. Strickland, M. Strickland, P. H. Thwaites, D. R. van der Westhuizen, C. von Holt, *FEBS (Fed. Eur. Biochem. Soc.) Lett.* **34**, 217 (1973)]. Fractions (5 ml) were collected every 20 minutes and monitored for absorbance at 230 nm and for radioactivity. Fractions corresponding to different histone classes were pooled, dialyzed against 0.1M acetic acid, and lyophilized.
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- * Present address: MCR Laboratory of Molecular Biology, Hills Road, Cambridge CB2 2QH, England.

NEWS AND COMMENT

Solar Research Sweepstakes: States Vie for a Place in the Sun

From snowy New Hampshire in the north to American Samoa south of the equator, from Puerto Rico on the eastern approaches of the United States to Guam on the far western defense perimeter, from the urban centers of New York and California to the badlands of South Dakota, scientists and politicians are mobilizing to compete for the next big prize on the scientific horizon—the proposed Solar Energy Research Institute that is scheduled to get under way next year.

At this point it is a race without rules, for the federal Energy Research and Development Administration (ERDA), which will administer the institute, has not even decided what it will do, how big it will be (one guess is \$50 million a year in operating expenses), what sort of site it will require, or even whether it will be one installation or scattered installations. But state and local officials are already pounding on

ERDA's doors. Plagued with unemployment and bedeviled by rising fuel prices, they apparently believe a research center that might lead to an exotic new energy source and thriving spin-off industries is just the right antidote for their sagging economic fortunes. Not to mention the prestige and general intellectual uplift such centers are presumed to bring.

Even though the race has not yet officially begun, there are already dark hints that it might be rigged. These are based partly on the fact that President Ford, in off-the-cuff remarks at a 15 August energy symposium in Vail, Colorado, named only three states as possible sites, ignoring more than a score of other aspirants. Newspaper accounts said the President designated the three states as "front-runners," but the White House—edited transcript of the session indicates he was less emphatic. In answer to a question about the Administra-

tion's plans for solar energy, the President replied, according to the transcript:

I was talking to Bob Seamans [the head of ERDA] a few days ago, and they have made significant progress. There is, unfortunately, competition developing between Arizona, New Mexico and Florida where the Federal Government will establish a solar energy research center. I do not know what the decision is going to be on what state gets that facility, but I am only using it as an example to point out that we mean business in this area.

Still, the fact that three states and only three states had seeped into the presidential consciousness caused cries of anguish from several competing states. Some of the most vociferous complaints came from Colorado, which was not only the site for the President's remarks, but also has launched one of the most vigorous efforts to land the new institute.

Administration aides later tried to soothe the ruffled competitors by explaining that President Ford had simply tossed out three names that occurred to him (or to a presidential assistant); they said there was no implication that any of the three was predestined to win the competition. Meanwhile, ERDA officials insist that they will be the ones who choose the final site and that they will do so on the merits of the case, unhampered by political interference.

The Solar Energy Research Institute—

or SERI, as it is called by most of those who are laboring to snare it—was mandated by the Solar Energy Research, Development & Demonstration Act of 1974, which was signed into law last October. Section 10 of that act stipulated that there would be such an institute but gave no guidance as to what it should do except to say that it “shall perform such research, development and related functions” as are deemed “necessary or appropriate.” Many of those backing such an institute felt that solar energy needed an “advocacy” research center to counterbalance the sophisticated support given nuclear energy by the existing national laboratories.

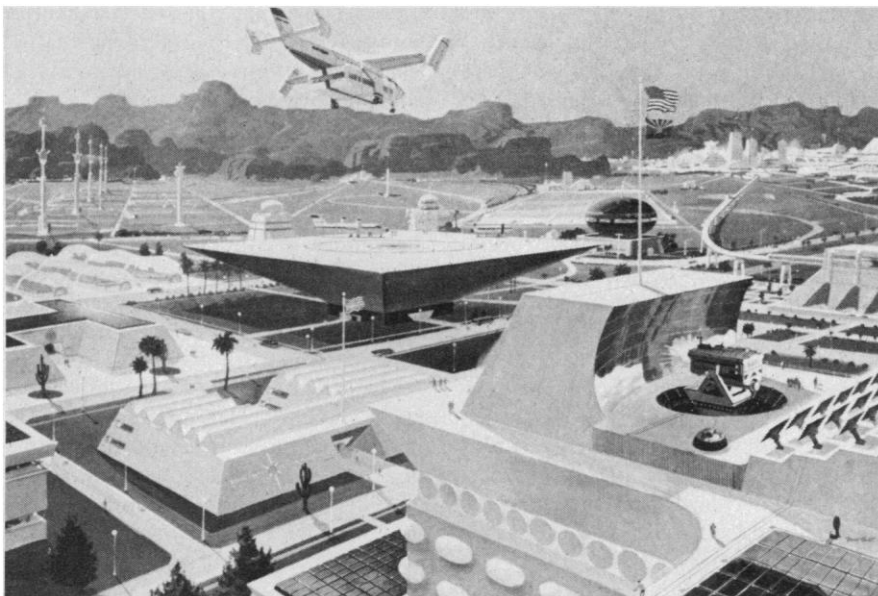
At first there was little progress toward setting up the new institute because the government’s far-flung energy programs were being reorganized into ERDA. But in the past several months the pace has picked up as ERDA readies itself to publish guidelines and criteria and invite formal proposals from interested competitors.

Earlier this year ERDA contracted with the National Academy of Sciences to help define the structure and scope of work of the proposed institute. The academy’s final recommendations—put together by a committee headed by physicist Richard L. Garwin of IBM—were due to be delivered to ERDA on 30 September. Meanwhile, a parallel survey of industrial opinions about the institute, conducted by the Mitre Corp., apparently to ward off possible fears that the science-oriented academy might give industrial views short shrift, is expected to be completed by mid-October. Then, on the basis of these inputs and its own in-house review, ERDA hopes to make a formal request for proposals by early November.

At this point it is unclear just how big and juicy this particular scientific plum will be. The academy, in an interim report, talked about a \$50 million annual operating budget by about 1980. But ERDA officials have been talking about spending 10 to 15 percent of their solar energy budget on the institute, a fraction that, barring an unanticipated upsurge in the budget, might result in annual operating expenditures of \$20 million to \$25 million.

Such uncertainty as to the nature of the plum has not inhibited the states from preparing for the harvest. The legislation had barely cleared the White House last fall before several states had appointed committees to quarterback their entries in the competition.

New Mexico was one of the first off the mark. A consortium made up of Sandia Laboratories, Los Alamos Scientific Laboratory, the University of New Mexico, New Mexico State University, and the



The glories of the proposed Solar Energy Research Institute as envisioned by artist Robert McCall in the August 1975 issue of Arizona Highways magazine.

New Mexico Institute of Mining and Technology actually submitted a formal proposal to ERDA early this year—well before the fledgling agency had begun to think seriously about how to organize the new institute. The consortium, backed by the state’s top political leadership, recommended Albuquerque as the site. Meanwhile, a splinter group of southern New Mexicans is joining forces with community leaders in nearby El Paso, Texas, to promote their own region.

Colorado also got away fast and appointed a statewide committee to prepare its case. The governor has already invited local governments to nominate sites, and U.S. Senator Gary Hart, just back from a swing through rural areas of the state, reports in amazement that landing the solar institute seemed to be the second most pressing subject on the minds of the citizenry. (The first was a series of bizarre mutilations that have destroyed more than 100 cattle and thoroughly baffled investigating authorities.)

Still another early entrant was Florida, where Governor Reubin Askew created a Governor’s Task Force on Solar Energy, composed of nine educators, industrialists, and community leaders, to analyze the state’s energy resources and prepare its proposal for SERI. The task force has a full-time staff of four, based at Cape Canaveral and headed by Robert C. Hock, who retired from the space center there last year.

Some sort of record for enthusiasm appears to have been set by Georgia, which already has a list of scores of potential sites even though no site criteria have yet been published. The state senate passed a resolution encouraging the governor to go after

SERI; the governor appointed an eight-member site selection commission which solicited proposals from governing bodies and private developers throughout the state; and 56 applications were sent in nominating 60 or more sites. Once ERDA gets around to publishing its site criteria, the Georgia commission will sift through these candidates and make a formal proposal.

The state which, more than any other, seems to spark fear in the breasts of its competitors is Arizona. This is not so much because Arizona has a sunny climate. Or because it has created a Solar Energy Research Commission of 17 members from banking, industry, the universities, and other sectors to mastermind its efforts to land SERI. That commission has a full-time staff of five, headed by Robert Handy, an executive on leave from Motorola, who has already made at least two trips to ERDA to talk up Arizona’s virtues.

Rather it is because Arizona probably has more political muscle of the type apt to influence the Ford Administration than virtually any other state deemed a likely site. Its two senators, Paul J. Fannin and Barry Goldwater, are senior conservative Republicans, and its most prominent representative, John J. Rhodes, is the House Republican leader. The scenario feared by competing states—especially those with Democratic, liberal, or junior political leaders—is that President Ford will face a severe challenge in the primaries next year from conservative Ronald Reagan; he may desperately need the backing of conservative Republicans such as dominate the Arizona delegation; and, he just might want to toss them a solar energy research

institute in return for support, or at least neutrality. Already the Arizona delegation has launched a political offensive on Capitol Hill. A fortnight ago it thoughtfully provided all members of Congress with the August 1975 issue of *Arizona Highways*, which was devoted almost entirely to Arizona's efforts in solar energy.

Two areas that are traditionally heavyweights in the competition for scientific installations have been slow to get started but are preparing to enter the fray. California's effort is being guided by Paul Craig, a former National Science Foundation official who is now director of the University of California's Council on Energy and Resources. Craig's group, which has been working closely with such institutions as the University of California at Berkeley, the Lawrence Berkeley Laboratory, the University of California at Los Angeles (UCLA), the Scripps Institution, Stanford University, California Institute of Technology, and the Jet Propulsion Laboratory to develop an "all-California" proposal, has already identified three tentative sites—the Stanford industrial park area, an engineering facility owned by UCLA, and the hills high above the Berkeley campus.

Meanwhile, that other heavyweight—Massachusetts—has expressed "strong interest" in SERI in a letter from the governor. And, in a move reminiscent of the *Arizona Highways* caper, the September issue of *Industry*, published by the Associated Industries of Massachusetts, is devoted almost entirely to solar energy, with a major article by Senator Edward M. Kennedy explaining why SERI should be in Massa-

chusetts. The magazine has thoughtfully been provided to Kennedy's senatorial colleagues, who almost certainly would not find it on their local newsstands.

The New England states, operating through the New England Council, a chamber-of-commerce-type group, and through the senatorial and congressional delegations, is trying to develop a regional effort to secure SERI, but this is expected to reinforce, not preclude, any efforts that individual states, such as Massachusetts, might launch.

The extent of interest in SERI won't be known until formal proposals are submitted. But government or private leaders in a surprising number of states have indicated they intend to bid for the institute, or at least for a field station or two. A not necessarily comprehensive list of other interested states or territories would include Alabama, Delaware, Hawaii, Michigan, Nebraska, New Hampshire, New Jersey (nominated by a utility based there), New York, Ohio, Pennsylvania, South Carolina, South Dakota, West Virginia, American Samoa, Guam, and Puerto Rico.

Although no contending state can really hone its arguments until the final criteria and guidelines for the institute are known, preliminary communications reveal no dearth of ingenuity among the proposal writers. States with lots of sun claim solar research is best conducted in their climate; states with less sun claim experiments will need to be conducted in a variety of conditions. States with lots of research installations claim the institute will need such backup support; states with few intellectual resources say the institute should

be used to spark new "centers of excellence." States with large supplies of gas, oil, or coal say they need to prepare for the disappearance of their fossil fuel resources; states without such deposits say they need solar energy to gain fuel self-sufficiency.

Guam, which considers itself the keystone of the American defense perimeter in the Pacific, even suggests that national security would be enhanced if it could be given SERI and the capacity to lessen its dependence on imported fuels. ("I've been on Guam," counters a rival from another state. "How are you going to persuade the scientists to relocate there?")

The sunny states were dismayed at a conclusion in the academy's interim report that the choice of a site "need not be linked to climate or weather" because much of SERI's work will involve analysis and simulation, while various outdoor experiments could be conducted at temporary field stations remote from the research institution. But Southern leaders believe the sun will still give them a practical political edge. As one expressed it, "I don't care what the scientists say. Close your eyes and ask yourself how ERDA is going to tell Congress and the American people that it wants to put the solar research institute where it's cloudy."

The latest schedule for picking the site—described as "iffy" and "mushy" by ERDA schedulers—anticipates that guidelines will be published in November, states will then have 45 to 90 days to get their proposals in, ERDA's staff will then evaluate them and conduct site visits, and a final selection would be made at the earliest by next April.—PHILIP M. BOFFEY

Aircraft Carriers: Pentagon Split on Issue That Will Shape Navy's Future

A major debate is now going on in the Pentagon, and soon will spill over into Congress, about how and whether to replace the 13 aircraft carriers that have been the centerpiece of the U.S. surface Navy since World War II. One issue is whether a new series of carriers will be militarily viable when completed in the 1980's and 1990's. Another is cost; the price tag for a new fleet of carriers could leave the Navy hard pressed to pay for anything else.

The Navy at present plans to replace its existing fleet with carriers which will be, in most major respects, similar to those of today. But a number of defense analysts are worried that this may be a poor plan. Such a fleet may make the Navy and the nation more vulnerable to attack than it is at present and may be technologically obsolete by the time it is built. As one analyst said of the plan, "I'm just wary of the Navy putting all its eggs in one basket."

A decision on the future of the carrier is

urgent because of the long lead times involved. A carrier takes 6 or 7 years to build; once commissioned, it has an active lifetime of 30 years. Since the current schedule calls for roughly half of the present carrier fleet to be retired from 1985 through 1991, the Navy will have to start building in 1977 or 1978 if it is to have new carriers ready to take the place of the old.

Carriers are the organizing factor around which the Navy plans its manpower levels, other ships, some of its submarines, its aircraft, and even research and development. Hence, decisions on the carrier, made in the next year or so, will shape the Navy itself in the next generation.

The Pentagon probably will unveil its plans for the fleet when it submits its fiscal 1977 budget to Congress next January. For some time, the Navy has urged the building of a new fleet of 12 nuclear-powered, 90,000-ton supercarriers, like the recently