

MEMORANDUM

TO: Fawwaz Ulaby, Vice President for Research

FROM: James J. Duderstadt, Chair, Ad Hoc Committee on Hydrogen Initiatives

SUBJECT: Next Steps

This memorandum is intended to suggest a series of next steps that should be considered by the University of Michigan in its efforts to build significant research programs addressing alternative energy supplies with a particular focus on hydrogen. In an earlier report we suggested the exploration of a series of initiatives at the national, regional, state, and university level:

- At the national level, a major Department of Energy initiative to fund 8 to 10 “Energy Research Centers” on university campuses, organized much along the lines of the NSF Engineering Research Center Program.
- At the regional level, a consortium of university energy research centers focused on the energy needs of the Great Lakes states (e.g., manufacturing and transportation).
- At the state level, the establishment of several major energy research centers with a focus on transportation fuels, along the lines of the major initiatives in California (\$300 million supporting R&D centers at UC campuses), Texas (Texas Energy Center) and Ohio (\$20 million for its Fuel Cell Consortium), closely coordinated with existing efforts such as NextEnergy and the needs of Michigan industry.
- At the university level, establishing a major Energy Research Institute, aimed at building the University’s capacity and presence in a range of scientific, technological, and policy issues involving transportation energy resources.

In April we presented a specific proposal to the Department of Energy to build a “Strategy University-Based Hydrogen Energy Research Coalition”, proposing to begin with a three-state coalition (Michigan, Texas, and California) and then expanding later into a national network of such energy research centers along the lines of the HEURI proposal. Although there was considerable interest in this concept among DOE staff, there was also a great concern that in the current budget climate, it would take specific action by Congress or the participation of other federal agencies such the Department of Transportation to secure the \$30 million to \$100 million per year it would take to fund such a program. Although they did not rule out this effort, they also suggested considerable work would be required to build the necessary level of support both within the administration and Congress.

It is our intent to continue this effort to build a national coalition. But in the meantime, we believe it imperative that the University of Michigan take

actions to better organize and enhance ongoing energy research activities to position itself both to compete more effectively for federal and industrial support. As we noted in our first report, the University of Michigan already has substantial activity and capability in a range of scientific, technological, and policy investigations important to future energy options. Yet, in part because these activities are dispersed across the University, and in part because of the dominance of other priorities both at the level of academic units and the university (e.g., the “bio-nano-info” initiatives), the University’s energy research efforts are currently subcritical, receiving neither the institutional attention nor the external visibility they deserve. It is the committee’s view that the staggering impact of energy issues for future generations compels the University to take a far more strategic approach to organizing, supporting, and building its energy research programs.

Here it is essential to maintain a strong interdisciplinary character to these efforts, distributed as they are among many of Michigan’s academic programs. While it is likely that certain academic units, notably the College of Engineering, will play an important leadership role, it is also essential that energy research be seen as a University-wide effort and not concentrated in one (or even several) schools and colleges.

To this end, the Hydrogen Initiatives Committee suggests that some consideration be given to using an existing structure mechanism such as the Michigan Memorial Phoenix Project to achieve this University-wide character. Although the Phoenix Project is generally thought of as a particular physical facility, i.e., the Ford Nuclear Reactor and associated laboratories (soon to be decommissioned), in reality it is a research organization created to serve as the University’s memorial to those students, faculty, and staff who lost their lives defending the nation during World War II. The concept for the Phoenix Project was developed by students themselves, many of them veterans, who urged the Regents to approve a perpetual research project as a war memorial rather than “a mound of stone the purpose of which might soon be forgotten”. Since atomic energy had both ended the war and posed significant challenges and opportunities (“ and they shall beat their swords into plowshares”), this became the focal point for the Phoenix Project.

It strikes us that now might be the appropriate time to reincarnate the Michigan Memorial Phoenix Project (rising once again from the ashes, this time resulting from the decommissioning of the Ford Nuclear Reactor), but with a new and somewhat broader theme that would continue it in perpetuity because of its war memorial character. This theme would be energy research, perhaps associated with global change. One could well make the case that there is no issue more critical to the future of our civilization than its capacity to meet future energy needs without destroying Planet Earth, either through permanently damaging our environment through energy production, or triggering massive geopolitical instability over energy resources. The Phoenix Project could then serve as the device to draw together dispersed university activities across multiple schools and colleges (e.g., LS&A, Engineering, Business Administration, Natural Resources and Environment, ISR, the health sciences). The current

organizational structure of the Phoenix Project, including its reporting line to the Vice President for Research, would appear to accommodate well this expanded role, although it would likely require a somewhat broader management and governance that reflects a better balance among the physical sciences and engineering, the social sciences, policy, and the professional schools.

We believe the seed funding necessary to repurpose the Phoenix Project toward a far broader energy research mission would be modest. Clearly this broader mission would accommodate existing activities involving nuclear energy as well as the proposed hydrogen initiative efforts, while providing the University with a mechanism for making far broader contributions to one of the most challenging issues facing our world today. It would also position the University well for significant external funding, as the recent success of Stanford University in achieving \$250 million of industrial support for its energy and global change research effort demonstrates.

For your information, we have included as an appendix a brief history of the creation of the Michigan Memorial Phoenix Project that suggests the appropriateness of this broader role.

In summary, while the Hydrogen Initiatives Committee believes that we should continue to explore opportunities for national, regional, and state-based research efforts, it is important for the University itself to act now to better organize and support its own efforts in energy research.

The Michigan Memorial Phoenix Project

One of the most significant initiatives of the University following WWII was the Michigan Memorial Phoenix Project, a major nuclear research laboratory established by the University and funded by private gifts as a memorial to the 579 members of the Michigan family who had lost their lives in the war. Interestingly enough, it was a student committee that pressed the University to action on the matter and urged the Regents to accept the idea of the Phoenix Project after it was first developed and approved by student government. The students sought to commemorate the memory of those who made the supreme sacrifice by attempting to develop a project that would aid all mankind in living in a war-free world rather than to attempt to build “a mound of stone the purpose of which might soon be forgotten.”

In May, 1948, the Regents adopted a resolution that “the University of Michigan create a War Memorial Center to explore the ways and means by which the potentialities of atomic energy may become a beneficent influence in the life of man, to be known as the Phoenix Project of the University of Michigan.” Under the leadership of University President Alexander Ruthven and Albert Lang, president of the General Electric Company, the Phoenix Campaign quickly grew into a well-organized national effort that raised \$6.5 million for a research building, a research endowment, and thanks to a one-million-dollar gift from the Ford Motor Company, a nuclear reactor (called the Ford Nuclear Reactor). It is noteworthy that the membership of the fund-raising committee included three students who were all veterans of World War II.

President Ruthven called the Phoenix project “the most important undertaking in the University’s history.” The University was paying tribute to the sacrifices of its men and women during the war by accepting the momentous responsibility of studying the peaceful applications of atomic energy. Even President Eisenhower highlighted the importance of the Phoenix Project: “Few causes are more urgent today and more noteworthy of your support. In war or in peace, the atomic research being done at the University of Michigan will strengthen America.”

The Phoenix Project Laboratory was constructed as one of the first buildings on the North Campus of the University. Although all programs in the University were involved in the Michigan Memorial Phoenix Project, the College of Engineering had a particular responsibility to develop both instructional and research programs in nuclear energy. A professor of electrical engineering, Henry Gomberg, was named as the first director of the Phoenix Project. It is interesting that the actual plans for the nuclear reactor in the Phoenix Laboratory were classified during the early phases of its construction, and the associated Department of Nuclear Engineering that would utilize the facility was the first such program in the United States. It is also important to note that some 50 years later, the Phoenix Laboratory, the Ford Nuclear Reactor, and the Department of Nuclear Engineering all continue to make significant contributions to nuclear energy research and application, including the first observation of gravitationally induced quantum interference, seminal experiments involving neutron

scattering, and the first demonstration of low-enrichment (non-weapons-grade) uranium fuel for research reactors, a major contribution to anti-proliferation efforts. The Phoenix Project enriched University life through the visits of distinguished scientists such as Robert Oppenheimer and Hans Bethe. It also provided support and facilities for the hundreds of nuclear engineers and scientists who have studied and trained in the Phoenix Laboratory. The Michigan Memorial Phoenix Project was recognized in 2001 by the American Nuclear Society as “a unique and pioneering atomic research program, as a permanent memorial to the University’s soldiers who fought and died in World War II, and as a symbol of the University of Michigan’s commitment to the peaceful and socially responsible use of science and technology.