The Michigan Memorial Phoenix Project

Remarks at the Michigan Energy Institute Symposium

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October 14, 2013

One of the most significant initiatives of the University of Michigan following World War II was the Michigan Memorial Phoenix Project, a major nuclear research program established by the University and funded by private gifts as a memorial to the 579 members of the Michigan family who gave their lives to the nation during WWII.

Interestingly enough, the University had long been unusual as a public university in frequently seeking and receiving strong private support for important facilities. In the 1850s, donors from the city of Detroit provided President Tappan with the funds to build the third largest observatory in the world, named appropriately the Detroit Observatory, which enabled Michigan to become one of the nation’s first true research universities.

In 1909, the alumni of the University contributed funds to build a major building, Alumni Memorial Hall, to honor those who had given their lives for the nation in the Civil War, the Spanish-American War, and later World War I. Although that building still remains, it has since been transformed into our Museum of Art, and its original significance as a war memorial today is tragically indicated only by a small plaque in a corridor to the elevator.

In the years following WWII, the University’s enrollment grew rapidly with the returning veterans from the war (particularly the Pacific theater) taking advantage of the G. I. Bill. These students were determined that the memorial to honor Michigan’s WWII dead must be something that would not be forgotten or ignored, but instead that the University should commemorate the memory of those who made the supreme sacrifice for their country by creating 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.”

Through their influence on student government, they persuaded the Regents to do something quite unique and lasting. The University sent out letters to many of the great leaders (Winston Churchill, Bertrand Russell, President Truman, etc.) of our times, seeking advice. (It is interesting to read these responses, which are archived in the Bentley Library.) But, once again, the veterans in student leadership came up with the key concept.

Since the extraordinary destructive power of the atomic bomb had ended the war with Japan, where many of our veterans had served, the students recommended that the University create a permanent institute that would both conduct research and teaching in the peaceful uses of atomic energy. They selected as a symbol the Phoenix bird of Egyptian mythology, which was consumed by fire every 500 years and arose revitalized from the ashes. The Michigan Memorial Phoenix Project thus would symbolize the growth of the benevolent atom out of the flames of war.
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.” President Ruthven gave a particular moving address on Memorial Day of that year:

*It is traditional with the people of our nation to pay eternal tribute to their hero dead. Through countless communities the monuments of five major wars stand as reminders of their sacrifice and heroism. But it has been one of the frustrations of man that no monument of his making can ever match the courage and conviction of those who made the supreme sacrifice. Can there be a fitting memorial for the war dead? Can there be a fitting memorial for the heroes of the war that produced the atom bomb?*

*There is only one appropriate kind of war memorial — a memorial that will eliminate future war memorials.*

*We at the University of Michigan believe this is possible. Our students, alumni and faculty members have conceived, under the name Michigan Memorial-Phoenix Project, a war monument that may well point the way to the elimination of wars.*

*The Phoenix Project proposes to turn a weapon of war into a potent instrumentality of peace. It proposes to do research with atomic tools solely in the interest of man’s well-being. Through it a leading American university will send forth great scientists, engineers and other scholars, and will open vast physical resources in an effort to turn the atom into pathways of peace. Here doctors, chemists, biologists and others will seek cures for “incurable” diseases; engineers will convert new knowledge into methods of better living; social scientists will attempt to evaluate and chart the social, economic and cultural implications of the atomic age.*

*Here, like the Phoenix bird of ancient legend, the atom’s force will rise from the ashes of its own destruction and point the way to a better, fuller, happier life than man has ever known.*

*The monument proposed by Michigan transcends the conventional “living” memorial. It will be a dynamic, working, life-serving memorial, it provides a rare opportunity to answer the challenge of our hero dead: “To you, from failing hands, we throw the torch; be yours to hold it high.”*

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 went critical in 1957 and operated 24 hours a day for the next 50 years!) Eventually the Phoenix Project would obtain over $20 million (amounting to over $200 million in today’s dollars) from private, corporate, and foundation support—over 30,000 alumni and 350 firms—that
represented the largest fund-raising effort in Michigan history until the $55 million campaign for the University’s sesquicentennial celebration in 1963. It is noteworthy that the membership of the fund-raising committee included three students who were all veterans of World War II.

It is important to recognize just how bold this effort was. At the time, the program’s goals sounded highly idealistic. Atomic energy was under government monopoly, and appeared to be an extremely dangerous force with which to work on a college campus. This was the first university attempt in the world to explore the peaceful uses of atomic energy, at a time when much of the technology was still highly classified. It is interesting that the actual plans for the nuclear reactor in the Phoenix Laboratory were classified during the early phases of its construction. Early courses in the science and technology of nuclear energy were frequently classified and required a Q-Clearance from the Atomic Energy Commission.

But few could debate the point, however, that if the undertaking succeeded, the program would be an unusually fitting memorial to those who gave their lives for their country during War II. As a living productive effort, the Michigan Memorial Phoenix Project would find ways over the years to employ the atom to aid mankind, rather than to destroy it.

Through the determination of student leaders, the generosity of donors, and the leadership of the University’s faculty, administration, and Regents, not only did the Phoenix Project develop into the world’s leading campus-based research program in atomic energy, but it soon spawned the first courses and later degree programs in nuclear science and engineering, taught by the nation’s first Department of Nuclear Engineering formed in the 1950s. Ralph Sawyer, a University physicist who worked on the Manhattan project, was the first director until he became Dean of the Graduate School and Vice-President for Research. He was succeeded by a professor of electrical engineering, Henry Gomberg, and later by his colleague, William Kerr, also from electrical engineering.

The impact of the Michigan Memorial Phoenix Project can be demonstrated by considering several of the early research projects supported by the Project:

- In 1950, Professor Donald Glaser’s work to develop the bubble chamber for nuclear particle detection was first supported by a $1,500 Phoenix Project grant when he could get no other support. This effort would later earn him the Nobel Prize.

- In 1949, Dr. William Beierwaltes received a $2,000 grant to develop the use of I-131 in medical diagnostics, a grant that led to the field of nuclear medicine (and which was honored last week at the centennial celebration of our Department of Radiology).

- In 1949, Professor Lloyd Brownell conducted the experiments on use of radiation to preserve foods and its effects on plant life (which explains the greenhouse that long stood adjacent to the Phoenix Memorial Laboratory...where the addition for the Michigan Energy Institute now stands).
• Research by U-M faculty has also been spurred by the proximity of the Phoenix Memorial Laboratory and the reactor to the University campus and has contributed greatly to a broad range of fields including nuclear power, nuclear medicine, radiological sciences, and fundamental nuclear physics.

• Therapy units have been established that use Cobalt-60, x-rays, and radioisotopes for the diagnosis and treatment of cancer.

• A Radio-Carbon Dating Laboratory has been established for the determination of the age of archaeological and geological material.

• More accurate techniques for locating brain tumors have been perfected.

• Methods for the preservation of food by irradiation have been demonstrated.

• A vaccine from irradiated larvae has been tested that may prove effective in eradicating the world's number one health problem, a disease known as Schistosomiasis.

• Radiation effects on materials have been studied and have led to plastics with greater strength, to heat-resistant metals.

• Codes of law have been devised to regulate the use of nuclear energy and radiation by industry and to provide compensation for radiation injuries in those situations not adequately covered by existing laws.

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 spectroscopy, and,

• The first demonstration of low enrichment (non-weapons-grade) uranium fuel for research reactors, a major contribution to anti-proliferation

The Phoenix Project enriched University life through the visits of distinguished scientists such as Robert Oppenheimer and Hans Bethe. Its summer conference on nuclear science and engineering produced some of the most important early papers on this subject.

It is interesting to note that in the early years, the Phoenix Project stands practically alone among such major research enterprises in that it did not seek funds from government agencies. All of its support came from private sources. Two reasons were advanced for this. First, the Project was a memorial to University of
Michigan faculty and alumni who died in World War II, and is therefore appropriately supported by members of the University family. Second was the belief that independently-financed research is a necessity if freedom of investigation is to be maintained. The managers of the Project pointed out that "the young research man, the unusual idea, the initiative of the individual goes wanting in an atmosphere of group research, of central government laboratories."

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.”

Little wonder that the project received world-wide attention during those early years (including even a special half-time performance by the Michigan Marching Band!)

The UM Department of Nuclear Engineering

Students, naturally, have been the primary beneficiaries of the Phoenix Project, both on the graduate and undergraduate level and in a number of disciplines such as nuclear engineering, chemistry, environmental health and physics. 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.

During the late 1940s and early 1950s, UM taught courses courses in nuclear energy. In 1952, the College of Engineering created a graduate program in nuclear engineering with a M.S. degree and Ph.D. in Nuclear Science and Nuclear Engineering. In 1958, a Department of Nuclear Engineering was formed (with Henry Gomberg as its first chair) to offer graduate degrees. The Department utilized the facilities of the Phoenix Laboratory and Ford Nuclear Reactor.

In 1965, undergraduate courses in both nuclear engineering and science engineering (later engineering physics) were introduced. The Department’s early focus was nuclear reactors, nuclear fusion, and nuclear materials but later broadened to include nuclear measurements, radiological health, and medical physics. In 1995, the name was changed to the Department of Nuclear Engineering and Radiological Science.

Michigan’s nuclear engineering program (and associated Michigan Memorial Phoenix Project) where the first such university programs in the world. Throughout its history, the Department has ranked #1 or #2 in the world (with MIT). Its faculty have produced several of the classic textbooks in the field including Glenn F. Knoll’s Radiations Detection and Measurement, John C. Lee and Norman J. McCormick’s Risk and Safety Analysis of Nuclear Systems, Gary S. Was’s Fundamentals of Radiation Materials Science, and James J. Duderstadt and Louis J. Hamilton’s Nuclear Reactor Analysis. During its 50 year history, it has produced 694 B.S. degrees, 488 M.S. degrees, and 490 Ph.D. degrees. On a per faculty level, the Department has long led both the College of Engineering and the
University in Ph.D. production. Its graduates have gone on to leadership positions in all aspects of nuclear energy: industry, government, and even higher education.

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”.

Of course, times and challenges change. Although the Ford Nuclear Reactor, with its 2 MW power level and 24-hour operation, was widely regarded as the nation’s leading university research reactor, the University made a decision to shut down and decommission the reactor several years ago. The U.S. Department of Energy strongly opposed this decision, and the Secretary of Energy offered to provide further support for its operation if the University would reverse its decision. But the University administration was adamant in its insistence that the facility would be dismantled, albeit at the cost of $12 million. Unfortunately, this stands today as yet another example of the public misunderstanding that frequently swirls about nuclear energy, apparently infected a University leadership that failed to appreciate not only the important history of the Phoenix Project but as well the contemporary application of its unique facilities to new challenges.

Fortunately, both the Michigan Memorial Phoenix Project and its associated Department of Nuclear Engineering and Radiological Science still are regarded as global leaders in nuclear research and education and are providing important contributions in contemporary areas such as:

• preventing the proliferation of nuclear weapons technology,
• developing new methods of radiation in diagnosing and treating disease,
• developing advanced forms of nuclear energy such as next generation fission reactors and thermonuclear fusion reactors, and, of course,
• in helping to train future generations of nuclear scientists and engineers to serve the nation and the world.

Although nuclear power faces serious challenges today in terms of public perceptions (particularly in the wake of the tsunami damage to the Fukushima Daiichi power plants and the rapidly changing financial environment driven by the development of shale gas hydraulic fracturing), it nevertheless provides 70% of the carbon free electricity generated in the United States and is projected to double in capacity at the global level to over 500 GW by 2030. This is particularly important in view of the belief by over 90% of the scientific community that the global climate driven by human activities, such as the burning of fossil fuels, is not only a certainty but is likely the greatest challenge facing our world. This demands mitigation by the development and deployment of carbon-free energy sources such as nuclear power and renewable energy technologies (e.g., wind and solar power).

In fact, in much the same way that nuclear war was the great challenge facing human kind when the University of Michigan launched the Michigan Memorial Phoenix Project, today developing sustainable and environmental benign energy sources is the great challenge and deserving once again of an extraordinary leadership effort on the part of the University of Michigan.