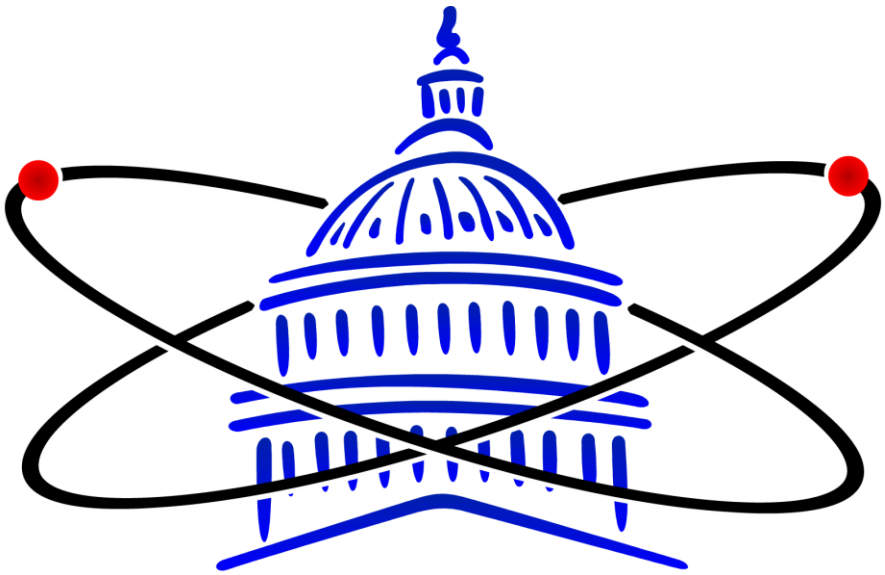

2008 NUCLEAR ENGINEERING STUDENT DELEGATION
WASHINGTON, D.C. JULY 12TH – 16TH

POLICY STATEMENT

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EXECUTIVE SUMMARY

The Delegation strongly recommends that the Nuclear Science and Engineering Grant Program be housed in the Nuclear Regulatory Commission. Ensuring a well-trained and well-educated workforce is certainly within the purview of the NRC's mission statement. We further recommend that an advisory council be formed including representatives from NE, NRC, DNN, academia (e.g. Professors Emeritus), and industry. This advisory council will be charged with both maintaining awareness of current programmatic initiatives within the nuclear industry (so as to prevent redundancy) as well as reviewing requests for proposals submitted to the Nuclear Science and Engineering Grant Program. The advisory council should ensure that the money does not go towards initiatives already covered by other projects and act in the spirit of expanding the horizons of the field.

By 2012, projections by the Clean and Safe Energy Coalition (CASEnergy Coalition) indicate that approximately 19,600 to 25,900 employees in nuclear utilities will be lost to retirement and other sources of attrition. Further projections of the growth of the industry indicate the utility workforce will need 12,000 to 21,000 additional jobs by 2024. In 2006, 630 students graduated from nuclear engineering programs. Of those that went to work at utilities, 46% had advanced degrees. Based on this snapshot of the needs of nuclear utilities almost half of the projected demand for the future workforce will be composed of employees with graduate degrees. **Assuming that 11.5% of the utility workforce requires nuclear fellowship support, the federal government must invest between $60M to $100M each year just to support future utility demands.** Nuclear vendors, NRC, DOE, and national laboratories are also expected to face similar losses and needs. Therefore, DOE needs to characterize the demand of emerging fields in nuclear technology as well as the nascent growth of all nuclear-related entities to demonstrate the need for further investment in America's nuclear infrastructure. Additional research grants and fellowships, not subject to yearly appropriations, that are guaranteed for the minimum duration of typical MS/PhD programs are the best solution.

The Delegation calls for increased attention to the aging fleet of university research reactors. Critical to all scientific disciplines, research reactors are particularly important because they provide a hands-on learning experience for nuclear engineering students. The Delegation applauds the addition of $2.3M to the FY09 budget for research reactors, but note that the $6M appropriated for reactor infrastructure and upgrades must be sustained. Overhauls to digital instrumentation and controls, as well as mechanical upgrades, are vital for modernizing our country's nuclear engineering education. As new reactors are built with fully digital controls, the importance of a digitally-trained workforce will become even greater. **Although new research reactors will eventually be needed, near-term emphasis should be on updating and supporting existing reactors.**

2008 NESD Policy Statement

Fourteen years ago, the first Nuclear Engineering Student Delegation to Washington, D.C. was formed to reinstate funding for research reactors. Today, the Delegation to Washington, D.C. continues to express the views of the student population on nuclear science, policy, and education. Every year, the Delegation is made up of a diverse group of students from the nation's most prestigious nuclear engineering programs, representing various disciplines within the nuclear sciences. The students independently organize and run this three-day trip to Washington, D.C. The Delegation is not representing any organization or university, as the attending students are expressing views that they themselves support.

For any further information regarding any of these issues, please contact Tyler Ellis at Tyler.Ellis@nesd.org or visit our website at http://www.nesd.org/. Thank you for your consideration.

The Integrated University Program

The Senate has appropriated $45M for the creation of an Integrated University Program to be distributed equally among NE, NRC and DNN. Senate Appropriations has tasked the Office of Nuclear Energy with providing a report to both the House and Senate Appropriations Committees on how the three agencies will coordinate a sustainable and predictable source of funding for nuclear engineering university programs. Of the $15M provided to each of the three agencies, $5M will be used by each organization to support a Nuclear Science and Engineering Grant Program. The program will enable nuclear science and engineering education to reach greater potential by providing money to foster multi-year research projects which do not align with typical agency missions. This initiative will only be successful if faculty are given the freedom to pursue research interests without the constraints of funding agency programmatic missions. The United States is no longer the leader in a field we originally invented and in order to reclaim that position, we must support areas which have atrophied as well as emerging fields with high potential. Examples of such under-funded or emerging areas which could strengthen our national position in the global arena of nuclear science and engineering include:

- Nonproliferation
- Advanced Recycling Technologies
- Multi-scale Modeling of Nuclear Systems
- Actinide Chemistry
- Nuclear Forensics
- Nuclear Systems for Space Applications
- Medical Imaging Technologies and Procedures

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further recommend that an advisory council be formed including representatives from NE, NRC, DNN, academia (e.g. Professors Emeritus), and industry. This advisory council will be charged with both maintaining awareness of current programmatic initiatives within the nuclear industry (so as to prevent redundancy) as well as reviewing requests for proposals submitted to the Nuclear Science and Engineering Grant Program. The advisory council should ensure that the money does not go towards initiatives already covered by other projects and act in the spirit of expanding the horizons of the field.

Required Federal Support for Nuclear Science and Engineering Programs

America currently obtains approximately 20% of its electricity from nuclear energy. According to recent estimates, the U.S. Department of Energy (DOE) projects America's demand for electricity will grow 25% by 2030. The intrinsic benefits of nuclear energy and its growing public appeal suggest that nuclear energy holds the most promise as a future baseload power source.

By 2012, the Clean and Safe Energy Coalition (CASEnergy Coalition) estimates that 39% of the nuclear utility workforce will be lost; 27% to retirement and 12% to miscellaneous workforce attrition. This equates to a loss of approximately 19,600 to 25,900 employees. Further projections on the growth of the nuclear industry assuming construction of 30 nuclear plants by 2024 show the nuclear utility workforce will need 12,000 to 21,000 new jobs. Therefore, to meet the growing demand for electricity in America, the utilities will need 31,600 to 46,900 new employees. In 2006, 630 students graduated from nuclear engineering programs; 346 with BS degrees, 214 with Masters, and 70 with PhDs. **Assuming that 11.5% of the utility workforce requires nuclear fellowship support, the federal government must invest between $60M to $100M each year just to support future utility demands.** Clearly, there is a dramatic shortfall between the supply of students and the demand for employees. The nuclear workforce infrastructure critically needs additional support.

In 2006, 46% of the nuclear engineering graduates hired by utilities had advanced degrees. Based on this snapshot, almost half of the projected demand for the future workforce will be composed of employees with graduate degrees. Nuclear vendors are expected to lose 25% of their workforce within 5 years. The NRC, DOE, and national laboratories are expected to face similar losses, although these numbers have yet to be fully characterized. These losses are solely attributed to workforce attrition through retirement and other miscellaneous losses. They do not include projected needs to accommodate the nascent expansion of the nuclear industry. Additionally, predictions have not been made for workforce growth in emerging fields such as nuclear nonproliferation, nuclear forensics, international safeguards, and advanced recycling technologies.

DOE needs to further characterize needs of these emerging fields as well as those of their own agencies and all other nuclear-related entities. DOE should include a breakdown of education by discipline and degree earned so they can quantify demand for graduate students. With this information Congress can more appropriately invest in the future of America's national nuclear infrastructure by way of research grants and fellowships. This investment is critical to reestablishing America's competitive advantage and must be executed immediately to assure the nation's infrastructure can supply the needs of our commercial economy. Implementing new

fellowship programs this fiscal year will facilitate this expansion. To ensure sustainability and predictability, these programs must not be subject to yearly appropriations, but rather be guaranteed for minimum durations of a typical Masters degree (1.5 years) or a typical PhD (4 years).

Research Reactors

Research reactors supply a unique experimental environment for physicists, biologists, material scientists, and engineers alike; they represent a shared and critical resource for the entire scientific community. In particular, they provide nuclear engineering students with an invaluable hands-on experience that better prepares them to join the nuclear workforce upon graduation. Students are excited by the prospect of participating in real experiments and interacting with high-tech hardware. Research reactors thus provide an incentive to study nuclear engineering and contribute to high-quality education.

Twenty-seven university-based research reactors remain in operation in the U.S. All were constructed over 30 years ago and reflect the operating environment of the nation's oldest power stations. Though universities have adequately maintained their reactors, none have completely converted to updated digital equipment. Further opportunities exist in modernizing control rods and other mechanical systems.

Partnerships with industry are a promising way to help research reactors move into the modern age. For example, the University of Florida has partnered with nuclear vendors and utilities to fully overhaul its research reactor and convert to digital instrumentation and controls. The total cost of the project will be on the order of $1M. Unfortunately reactor vendors and utilities are unlikely to repeat this sort of agreement to update all 27 university reactors.

Similarly, operation and maintenance budgets are improbable sources of upgrade funding. Most operating budgets for research reactors are covered by production of precious materials and these production goals sometimes detract from the experimental mission of the facilities. The companies financing daily operations therefore have little incentive to support purely education-based upgrade initiatives.

The 2008 NESD applauds the Congressional appropriation of an additional $2.3M in FY09 to the research reactor program for a total of $6M in reactor infrastructure and upgrades. To be effective, commitment to this funding must be sustained and strengthened over the next few decades.

The most pressing need for research reactors is in modernizing control systems. Digital instrumentation and controls will become increasingly crucial as the new generation of reactors, fully outfitted with digital equipment, comes online. Industry already fears that the available nuclear workforce will not satisfy the demand so digitally-trained, highly-motivated, and well-educated nuclear engineering graduates will be vital to the nuclear renaissance. Furthermore, safe and modern research reactor operation relies on proper mechanical upgrades for which universities rely on federal funding.

The Delegation recognizes new research reactors will be needed throughout the U.S. in order to train nuclear students. However, near-term deployment is not a high priority. Instead, emphasis should be on updating and supporting existing reactors.