2017 NUCLEAR ENGINEERING STUDENT DELEGATION

WASHINGTON, D.C. JULY 9TH – 14TH

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POLICY STATEMENT

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2017 NESD Policy Statement

Investing in the Future - The Delegation recommends that funding for the Integrated University Program (IUP) be maintained at or above FY 2017 levels.

Maintaining federal funding for nuclear science and engineering education is essential to American security, safety, and prosperity. The continued success of our nuclear facilities and America's place as a global leader in nuclear technology depends on the preservation of a skilled workforce, supplied by colleges and universities. We propose continued funding of the Integrated University Program to support scientists and research infrastructure.

Sustainable Nuclear Energy - The Delegation recommends promoting clean energy by maintaining existing nuclear facilities and developing an off-site, consolidated used-fuel repository. Passing H.R. 474, H.R. 1320, and encouraging an initiative to maintain the current fleet of commercial nuclear reactors directly support this recommendation.

Nuclear energy is the most reliable clean energy option available to the United States. Preserving its current capacity encourages a diverse energy portfolio while providing nearly 100,000 jobs nationwide. There will be a greater need for a used fuel repository as retired nuclear facilities are being decommissioned. Utilities will be required to make major investments into on-site interim storage for used nuclear fuel in the absence of a central repository. The United States must address used fuel storage and the continued operations of existing nuclear reactors in order to attain a more sustainable nuclear industry.

Nuclear Innovation - The Delegation recommends the continued development of innovative nuclear technologies in the United States to promote economic growth and public well-being. Research and development of nuclear technologies requires federal support (S. 97 and H.R. 431) and the modernization of regulatory processes (S. 512 and H.R. 590).

Innovative nuclear technologies provide safer and more competitive nuclear reactor designs and also have a wide array of applications in medicine, industry, and national security. Combining the technical expertise of national labs with the innovative ideas of private companies through public-private partnerships can bring advanced nuclear technologies from concept to reality. Modernizing current nuclear regulations creates a clear pathway to safely develop, build, and operate these technologies.

International Leadership - The Delegation recommends continued funding at FY 2017 levels for international programs that enhance American leadership in nuclear technologies and security. We support the Export-Import Bank for enhancing American competitiveness. We oppose S. 332 and H.R. 903 which cut funding to the Comprehensive Test Ban Treaty Organization (CTBTO).

Supporting international programs and export activities boosts the domestic nuclear industry and advances American interests in safeguards and security. However, U.S. market share is declining as even NATO allies are turning to foreign reactor vendors for their nuclear energy needs. Strong support for the Export-Import Bank will help U.S. corporations regain international competitiveness. Continuing to support the International Atomic Energy Agency and the CTBTO also advance national interests. Congressional FY 2018 budget proposals and current bills threaten to cripple these agencies and reverse our leadership position abroad.

About the NESD

The Delegation represents the student population on nuclear science, policy, and education. The students independently organize and run this trip to Washington, D.C. The Delegation does not represent any organization or university; the views expressed in this policy document are strictly those of the delegates.

Investing in the Future

American innovation and leadership in nuclear energy stem from strategic funding efforts through federal sources. The Integrated University Program (IUP) provides this support for nuclear science and technology by issuing student scholarships and fellowships, faculty development assistance, and university infrastructure improvement grants. These investments are necessary to provide the next generation of nuclear scientists and engineers with the resources needed to preserve our nation's preeminence in nuclear research and technology.

Over one-third of workers in nuclear operations, maintenance, and engineering will be eligible for retirement by 2019 [1]. Qualified personnel must be trained now to ensure a successful transfer of knowledge. The foundation of this training starts with post-secondary education, where scholarships and fellowships attract top-tier students who become scientists, engineers, and technicians.

Effectively training the future workforce also requires investment in faculty. The most successful learning environments are created when educators are thoroughly devoted to their students. Supporting instructors enables them to concentrate on student education and provides them with the tools to excel as nuclear professionals. Faculty investment will translate into an advanced nuclear workforce capable of driving nuclear innovation.

Cutting-edge nuclear laboratories and reactor facilities are key to the research and educational missions of U.S. universities. Research reactors provide an indispensable opportunity for nuclear scientists and engineers to receive hands-on experience and essential industry skills. Crucial funding from the IUP has provided support for 24 out of 25 U.S. university research reactors. These facilities give both industry and universities the opportunity to conduct research vital to national interests, a partnership important to the advancement of nuclear technologies.

Continuing to fund the IUP at or above FY 2017 levels will ensure robust American nuclear science and engineering leadership.

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[1] "Gaps in the Energy Workforce Pipeline 2015 CEWD Survey Results", *cewd.org*, Center for Energy Workforce Development, 2015. http://www.cewd.org/surveyreport/CEWD2015SurveySummary.pdf

2017 NESD Additional Information

Sustainable Nuclear Energy

The Nuclear Waste Policy Act of 1982 established a comprehensive national strategy for the disposal of high-level radioactive waste and used nuclear fuel. Fees on electricity produced by nuclear power plants were collected to pay for a planned permanent geologic repository. Political realities have stymied progress on a repository, preventing the long-term storage of highly radioactive used fuel. This fuel is currently stored on-site at nuclear plants and will remain there barring federal action on a central repository. Meanwhile, the federal government remains liable for $20 billion collected from ratepayers since 1982 [1]. This is in addition to temporary storage costs incurred by utilities awaiting a permanent repository.

Nuclear power is the country's largest source of clean energy, providing a reliable base for a diverse U.S. energy portfolio. Maintaining America's current nuclear energy capacity is among the lowest-cost clean energy options available to the United States. At-risk reactors require subsidies on par with solar and wind, but they have the advantage of increased reliability [2]. Nuclear energy provides roughly one-fifth of the total electricity production in the United States and sixty percent of its carbon-free electricity. Prematurely shutting down reactors undermines any progress the U.S. has made in reducing emissions and leaves our country vulnerable to uncertainty in long-term natural gas prices. The Delegation recommends that Nuclear Utilization of Keynote Energy (H.R. 1320) act be passed into law and that an initiative for fully valuing America's operating reactors be considered.

Consolidated used fuel storage reduces environmental contamination risks while allowing for the sustainable operation of commercial nuclear plants. Long-term waste management plays a vital role in creating a more hospitable environment for the growth of the nuclear energy industry, which has been valued at $40 to $50 billion each year and provides 100,000 jobs across the United States [3]. Seven states prohibit construction of new nuclear plants until a long-term storage solution is implemented [4]. These moratoria prevent utilities across the country from considering clean, reliable nuclear energy as part of their electricity generating mix.

A Consolidated Interim Storage Facility (CISF) is a suitable option for the storage of used nuclear fuel in the U.S. until a permanent repository becomes available. A CISF can significantly reduce the total cost of used fuel management if construction of a final repository is delayed. Construction of a CISF by 2025 could save the United States $6.9 billion if a permanent repository were to be completed by 2050 and save $12.3 billion if a permanent repository were to be completed by 2060 [5]. The Delegation recommends that the Interim Consolidated Storage Act of 2017 (H.R. 474) be passed into law.

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[1] "Department of Energy Nuclear Waste Fund's Fiscal Year 2016 Financial Statement Audit", *energy.gov,* Department of Energy Office of Inspector General, 2016. https://energy.gov/sites/prod/files/2016/12/f34/OAI-FS-17-04.pdf

[2] "Preserving America's Clean Energy Foundation", *thirdway.org*, Third Way, 2016. http://www.thirdway.org/report/preserving-americas-clean-energy-foundation

[3] "Cost Benefit Analyses", *NEI.org,* Nuclear Energy Institute, 2017. https://www.nei.org/Issues-Policy/Economics/Cost-Benefits-Analyses

[4] "STATE RESTRICTIONS ON NEW NUCLEAR POWER FACILITY CONSTRUCTION", *NCSL.org,* National Conference of State Legislatures, 2017. http://www.ncsl.org/research/environment-and-natural-resources/states-restrictions-on-new-nuclear-power-facility.aspx

[5] "Cost Implications of an Interim Storage Facility in the Waste Management System", *ORNL.org,* Oak Ridge National Lab, 2016. https://curie.ornl.gov/content/cost-implications-interim-storage-facility-waste-management-system-0

2017 NESD Additional Information

Nuclear Innovation

Investment in innovative nuclear research improves the safety, security, and economic viability of a wide range of nuclear applications. Development and deployment of advanced nuclear reactors could provide these benefits while increasing energy independence and providing U.S. jobs. These advanced reactors could also be used to supply radioisotopes for a wide array of applications ranging from cancer treatment to space exploration. Achieving these and other nuclear innovations requires collaboration between public and private interests as well as modernization of the nuclear regulatory environment.

It is imperative that the U.S. maintains its position as the world leader in advanced nuclear technology to ensure that high standards for safeguards, security, and safety considerations are met. As energy markets and reactor technologies continue to evolve, the Department of Energy (DOE) must also evolve to maintain the country's leadership. Enabling private companies to utilize the DOE's technical expertise and world-class facilities will accelerate the development of new nuclear technologies. The Nuclear Energy Innovation Capabilities Act (S. 97) and the Energy Research and Innovation Act (H.R. 589) direct the DOE to increase support for innovative nuclear research and further utilize public-private partnerships. These partnerships allow U.S. companies to take full advantage of the unique technical resources of the DOE's national labs while reducing the high startup costs of developing new nuclear technologies.

These innovative technologies can extend far beyond advanced nuclear reactor designs. Enhanced radiation imaging technologies improve the identification and treatment of cancer [1]. Sophisticated radiation detection methods prevent nuclear material from being smuggled through our ports and borders [2]. Radioisotopes can power deep space probes and other spacecraft, allowing for longer operation [3]. Commercial irradiation in agriculture can help reduce crop spoilage and prevent the spread of disease [4,5].

Effective regulatory oversight is a cornerstone of America's safe and reliable reactor fleet. The Nuclear Regulatory Commission has decades of experience with the current generation of nuclear reactors. However, advanced reactor designs that may utilize new business models, like venture capital investment, may not be efficiently licensed using existing regulatory frameworks. The Nuclear Energy Innovation and Modernization Act (S. 512) and the Advanced Nuclear Technology Act of 2017 (H.R. 590) provide authorization and enable funding for the Nuclear Regulatory Commission to develop a more efficient and effective licensing process for advanced nuclear technologies. These bills will add new pathways for licensing advanced reactors and enable multi-stage licensing for start-up companies seeking to commercialize innovative reactor designs while still ensuring public health and safety.

Finally, updates to existing laws are needed to ensure that advanced nuclear plants under construction are eligible for production tax credits previously guaranteed under the 2005 Energy Policy Act. H.R. 1551 and S. 666 specifically address the extension of these credits until after 2021 to allow for the completion of advanced reactors currently under construction.

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[1] "First Demonstration of multi-colored 3-D in vivo imaging using ultra-compact Compton camera", *nature.com*, Scientific Reports, 2017. https://www.nature.com/articles/s41598-017-02377-w

[2] "Evaluating Testing, Costs, and Benefits of Advanced Spectroscopic Portals for Screening Cargo at Ports of Entry", *NAP.edu*, National Research Council, 2009. https://www.nap.edu/catalog/12699/evaluating-testing-costs-and-benefits-of-advanced-spectroscopic-portals-for-screening-cargo-at-ports-of-entry

[3] "Multi-Mission Radioisotope Thermoelectric Generator (MMRTG)", *NASA.org*, National Aeronautics and Space Administration, 2010. https://solarsystem.nasa.gov/rps/docs/MMRTG Fact Sheet update 10-2-13.pdf

[4] "Joint FAO/IAEA Programme, Nuclear Techniques in Food and Agriculture", *IAEA.org*, International Atomic Energy Agency, 2017. https://www.iaea.org/topics/food-and-agriculture

[5] "Topics: Zika", *IAEA.org*, International Atomic Energy Agency, 2017. https://www.iaea.org/topics/zika

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International Leadership

The international market for nuclear goods and services will amount to $740 billion over the next 10 years [1]. Between 5,000 and 10,000 jobs could be created for every $1 billion worth of United States exports [1]. However, U.S. market share is in decline and NATO allies are increasingly turning to non-U.S. reactor vendors for commercial nuclear facilities [2]. By increasing the strength of the domestic reactor export market, the U.S. can ensure that safeguards, security, and safety standards are met, help our allies meet energy needs, and influence international decision-making. Since the Export-Import Bank provides financing to increase the attractiveness of U.S. nuclear exports, it is essential that the Export-Import Bank remains authorized and obtains quorum to remain fully functional [3].

International nuclear cooperation efforts advance American interests by promoting international safeguards and best practices for safety and security. The International Atomic Energy Agency (IAEA) is a key player in this effort worldwide. The U.S. currently stands as its largest supporter in finances and personnel, but the FY 2018 proposed budget cuts pose a severe threat to the agency [4]. Contributions to International Organizations (CIO) is the main vehicle for funding the IAEA and is in danger of losing $447 million, nearly a third of its budget [5]. A strong IAEA helps to ensure that American goals are achieved through safeguards against illicit foreign nuclear weapons programs. Continuity of support for the IAEA and related international programs extends U.S. global leadership in security and safeguards.

The State Department's Bureau of International Security and Nonproliferation (ISN) is also at-risk in the FY 2018 budget. The ISN helps ensure the non-proliferation of WMDs and their delivery systems [5]. The Delegation recommends funding the CIO and ISN at or above FY 2017 levels to uphold national security.

The Comprehensive Test Ban Treaty Organization (CTBTO) provides a robust worldwide monitoring capability for detecting clandestine nuclear weapons tests. This multinational effort has successfully identified weapons tests in the past, providing trustworthy, unclassified information to supplement U.S. intelligence activities. Support for the CTBTO is critical, as 22% of its budget comes from the U.S. [6]. We strongly oppose S. 332 and H.R. 903, which propose cuts to U.S. funding from the CTBTO.

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[1] “Exports and Trade”, *NEI.org,* Nuclear Energy Institute, 2017. https://www.nei.org/Issues-Policy/Exports-Trade
[2] “Nuclear Power in Turkey” *World-Nuclear.org*, World Nuclear Association, 2017. http://www.world-nuclear.org/information-library/country-profiles/countries-t-z/turkey.aspx
[3] “Ex-Im” *NEI.org,* Nuclear Energy Institute, 2017. https://www.nei.org/Issues-Policy/Exports-Trade/Ex-Im-Bank
[4] “IAEA Budget and U.S. Contributions: In Brief”, *fas.org*, Federation of American Scientists, 2016. https://fas.org/sgp/crs/nuke/R44384.pdf
[5] “Congressional Budget Justification: Department of State, Foreign Operations, and Related Programs. Fiscal Year 2018”, *state.gov*, U.S. State Department, 2017. https://www.state.gov/documents/organization/271013.pdf
[6] “U.S. Support for the CTBTO Enhances U.S. and Global Security”, *armcontrol.org,* Arms Control Association, 2017. https://www.armscontrol.org/Issue-Briefs/2017-05/us-support-ctbto-enhances-us-global-security