111TH CONGRESS
2D SESSION

H. R. 5866

IN THE SENATE OF THE UNITED STATES

DECEMBER 1, 2010

Received; read twice and referred to the Committee on Energy and Natural Resources

AN ACT

To amend the Energy Policy Act of 2005 requiring the Secretary of Energy to carry out initiatives to advance innovation in nuclear energy technologies, to make nuclear energy systems more competitive, to increase efficiency and safety of civilian nuclear power, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Nuclear Energy Research and Development Act of 2010''.

SEC. 2. OBJECTIVES.

Section 951(a) of the Energy Policy Act of 2005 (42 U.S.C. 16271(a)) is amended—

(1) by redesignating paragraphs (2) through (8) as paragraphs (5) through (11), respectively;

(2) by inserting after paragraph (1) the following new paragraphs:

''(2) Reducing the costs of nuclear reactor systems.

''(3) Reducing used nuclear fuel and nuclear waste products generated by civilian nuclear energy.

''(4) Supporting technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty.''; and

(3) by inserting after paragraph (11), as so redesignated, the following new paragraph:

''(12) Researching and developing technologies and processes so as to improve and streamline the process by which nuclear power systems meet Federal and State requirements and standards.''.

SEC. 3. FUNDING.

Section 951 of the Energy Policy Act of 2005 (42 U.S.C. 16271) is further amended—

(1) in subsection (b), by striking paragraphs (1) through (3) and inserting the following:

''(1) $419,000,000 for fiscal year 2011;

''(2) $429,000,000 for fiscal year 2012; and

''(3) $439,000,000 for fiscal year 2013.''; and

(2) in subsection (d)—

(A) by striking ''under subsection (a)'' and inserting ''under subsection (b)'';

(B) by amending paragraph (1) to read as follows:

''(1) For activities under section 953—

''(A) $201,000,000 for fiscal year 2011;

''(B) $201,000,000 for fiscal year 2012; and

''(C) $201,000,000 for fiscal year 2013.''; and

(C) by inserting after paragraph (3) the following new paragraphs:

''(4) For activities under section 952, other than those described in section 952(d)—

''(A) $64,000,000 for fiscal year 2011;

''(B) $64,000,000 for fiscal year 2012; and

''(C) $64,000,000 for fiscal year 2013.

''(5) For activities under section 952(d)—

''(A) $55,000,000 for fiscal year 2011;

''(B) $65,000,000 for fiscal year 2012; and

''(C) $75,000,000 for fiscal year 2013.

''(6) For activities under section 958—

''(A) $99,000,000 for fiscal year 2011;

''(B) $99,000,000 for fiscal year 2012; and

''(C) $99,000,000 for fiscal year 2013.''.

SEC. 4. PROGRAM OBJECTIVES STUDY.

Section 951 of the Energy Policy Act of 2005 (42 U.S.C. 16271) is amended by adding at the end the following new subsection:

''(f) PROGRAM OBJECTIVES STUDY.—In furtherance of the program objectives listed in subsection (a) of this section, the Secretary shall, within one year after the date of enactment of this subsection, transmit to the Congress a report on the results of a study on the scientific and technical merit of major State requirements and standards, including moratoria, that delay or impede the further development and commercialization of nuclear power, and how the Department in implementing the programs can assist in overcoming such delays or impediments.''.

SEC. 5. NUCLEAR ENERGY RESEARCH AND DEVELOPMENT PROGRAMS.

Section 952 of the Energy Policy Act of 2005 (42 U.S.C. 16272) is amended by striking subsections (c) through (e) and inserting the following:

''(c) REACTOR CONCEPTS.—

''(1) IN GENERAL.—The Secretary shall carry out a program of research, development, demonstration, and commercial application to advance nuclear power systems as well as technologies to sustain currently deployed systems.

''(2) DESIGNS AND TECHNOLOGIES.—In conducting the program under this subsection, the Secretary shall examine advanced reactor designs and nuclear technologies, including those that—

''(A) are economically competitive with other electric power generation plants;

''(B) have higher efficiency, lower cost, and improved safety compared to reactors in operation as of the date of enactment of the Nuclear Energy Research and Development Act of 2010;

''(C) utilize passive safety features;

''(D) minimize proliferation risks;

''(E) substantially reduce production of high-level waste per unit of output;

''(F) increase the life and sustainability of reactor systems currently deployed;

''(G) use improved instrumentation;

''(H) are capable of producing large-scale quantities of hydrogen or process heat; or

''(I) minimize water usage or use alternatives to water as a cooling mechanism.

''(3) INTERNATIONAL COOPERATION.—In carrying out the program under this subsection, the Secretary shall seek opportunities to enhance the progress of the program through international cooperation through such organizations as the Generation IV International Forum, or any other international collaboration the Secretary considers appropriate.

''(4) EXCEPTIONS.—No funds authorized to be appropriated to carry out the activities described in this subsection shall be used to fund the activities authorized under sections 641 through 645.''.

SEC. 6. SMALL MODULAR REACTOR PROGRAM.

Section 952 of the Energy Policy Act of 2005 (42 U.S.C. 16272) is further amended by adding at the end the following new subsection:

''(d) SMALL MODULAR REACTOR PROGRAM.—

''(1) IN GENERAL.—

''(A) The Secretary shall carry out a small modular reactor program to promote research, development, demonstration, and commercial application of small modular reactors, including through cost-shared projects for commercial application of reactor systems designs.

''(B) The Secretary shall consult with and utilize the expertise of the Secretary of the Navy in establishing and carrying out such program.

''(C) Activities may also include development of advanced computer modeling and simulation tools, by Federal and non-Federal entities, which demonstrate and validate new design capabilities of innovative small modular reactor designs.

''(2) DEFINITION.—For the purposes of this subsection, the term 'small modular reactor' means a nuclear reactor—

''(A) with a rated capacity of less than 300 electrical megawatts;

''(B) with respect to which most parts can be factory assembled and shipped as modules to a reactor plant site for assembly; and

''(C) that can be constructed and operated in combination with similar reactors at a single site.

''(3) LIMITATION.—Demonstration activities carried out under this section shall be limited to individual technologies and systems, and shall not include demonstration of full reactor systems or full plant operations.

''(4) ADMINISTRATION.—In conducting the small modular reactor program, the Secretary may enter into cooperative agreements to support small modular reactor designs that enable—

''(A) lower capital costs or increased access to private financing in comparison to current large reactor designs;

''(B) reduced long-term radiotoxicity, mass, or decay heat of the nuclear waste produced by generation;

''(C) increased operating safety of nuclear facilities;

''(D) reduced dependence of reactor systems on water resources;

''(E) increased seismic resistance of nuclear generation;

"(F) reduced proliferation risks through integrated safeguards and security proliferation controls; and

"(G) increased efficiency in reactor manufacturing and construction.

"(5) APPLICATION.—To be eligible to enter into a cooperative agreement with the Secretary under this subsection, an applicant shall submit to the Secretary a proposal for the small modular reactor project to be undertaken. The proposal shall document—

"(A) all partners and suppliers that will be active in the small modular reactor project, including a description of each partner or supplier's anticipated domestic and international activities;

"(B) measures to be undertaken to enable cost-effective implementation of the small modular reactor project;

"(C) an accounting structure approved by the Secretary;

"(D) all known assets that shall be contributed to satisfy the cost-sharing requirement under paragraph (6); and

''(E) the extent to which the proposal will increase domestic manufacturing activity, exports, or employment.

''(6) COST SHARING.—Notwithstanding section 988, the Secretary shall require the parties to a cooperative agreement under this subsection to be responsible for not less than 50 percent of the costs of the small modular reactor project.

''(7) CALCULATION OF COST SHARING AMOUNT.—A recipient of financial assistance under this section may not satisfy the cost sharing requirement under paragraph (6) by using funds received from the Federal Government through appropriation Acts.

''(8) PROJECT SELECTION CRITERIA.—The Secretary shall consider the following factors in entering into a cooperative agreement under this subsection:

''(A) The domestic manufacturing capabilities of the parties to the cooperative agreement and their partners and suppliers.

''(B) The viability of the reactor design and the business plan or plans of the parties to the cooperative agreement.

''(C) The parties to the cooperative agreement's potential to continue the development of

small modular reactors without Federal subsidies or loan guarantees.

''(D) The cost share to be provided.

''(E) The degree to which the following goals will be advanced:

''(i) Lower capital costs or increased access to private financing in comparison to current large reactor designs.

''(ii) Reduced long-term radiotoxicity, mass, or decay heat of the nuclear waste produced by generation.

''(iii) Increased operating safety of nuclear facilities.

''(iv) Reduced dependence of reactor systems on water resources.

''(v) Increased seismic resistance of nuclear generation.

''(vi) Reduced proliferation risks through integrated safeguards and security proliferation controls.

''(vii) Increased efficiency in reactor manufacturing and construction.''.

SEC. 7. CONVENTIONAL IMPROVEMENTS TO NUCLEAR POWER PLANTS.

Section 952 of the Energy Policy Act of 2005 (42 U.S.C. 16272) is further amended by adding at the end the following new subsection:

''(e) CONVENTIONAL IMPROVEMENTS TO NUCLEAR POWER PLANTS.—

''(1) IN GENERAL.—The Secretary may carry out a Nuclear Energy Research Initiative for research and development related to steam-side improvements to nuclear power plants to promote the research, development, demonstration, and commercial application of—

''(A) cooling systems;

''(B) turbine technologies;

''(C) heat exchangers and pump design;

''(D) special coatings to improve lifetime of components and performance of heat exchangers; and

''(E) advanced power conversion systems for advanced reactor technologies.

''(2) ADMINISTRATION.—The Secretary may undertake initiatives under this subsection only when the goals are relevant and proper to enhance the performance of technologies developed under subsection (c). Not more than $10,000,000 of funds au-

thorized for this section may be used for carrying out this subsection.''.

SEC. 8. FUEL CYCLE RESEARCH AND DEVELOPMENT.

(a) AMENDMENTS.—Section 953 of the Energy Policy Act of 2005 (42 U.S.C. 16273) is amended—

(1) in the section heading by striking ''**ADVANCED FUEL CYCLE INITIATIVE**'' and inserting ''**FUEL CYCLE RESEARCH AND DEVELOPMENT**'';

(2) by striking subsection (a);

(3) by redesignating subsections (b) through (d) as subsections (e) through (g), respectively; and

(4) by inserting before subsection (e), as so redesignated by paragraph (3) of this subsection, the following new subsections:

''(a) IN GENERAL.—The Secretary shall conduct a fuel cycle research, development, demonstration, and commercial application program (referred to in this section as the 'program') on fuel cycle options that improve uranium resource utilization, maximize energy generation, minimize nuclear waste creation, improve safety, mitigate risk of proliferation, and improve waste management in support of a national strategy for spent nuclear fuel and the reactor concepts research, development, demonstration, and commercial application program under section 952(c).

''(b) FUEL CYCLE OPTIONS.—Under this section the Secretary may consider implementing the following initiatives:

''(1) OPEN CYCLE.—Developing fuels, including the use of nonuranium materials, for use in reactors that increase energy generation and minimize the amount of nuclear waste produced in an open fuel cycle.

''(2) MODIFIED OPEN CYCLE.—Developing fuel forms, reactors, and limited separation and transmutation methods that increase fuel utilization and reduce nuclear waste in a modified open fuel cycle.

''(3) FULL RECYCLE.—Developing advanced recycling technologies, including Generation IV Reactors, to reduce the risk of proliferation, radiotoxicity, mass, and decay heat to the greatest extent possible.

''(4) ADVANCED STORAGE METHODS.—Developing advanced storage technologies for both onsite and long-term storage that substantially prolong the effective life of current storage devices or that substantially improve upon existing nuclear waste storage technologies and methods, including repositories.

''(5) ALTERNATIVE AND DEEP BOREHOLE STORAGE METHODS.—Developing alternative storage methods for long-term storage, including deep

boreholes into stable crystalline rock formations and mined repositories in a range of geologic media.

''(6) OTHER TECHNOLOGIES.—Developing any other technology or initiative that the Secretary determines is likely to advance the objectives of the program established under subsection (a).

''(c) ADDITIONAL ADVANCED RECYCLING AND CROSSCUTTING ACTIVITIES.—In addition to and in support of the specific initiatives described in paragraphs (1) through (6), the Secretary may support the following activities:

''(1) Development and testing of integrated process flow sheets for advanced nuclear fuel recycling processes.

''(2) Research to characterize the byproducts and waste streams resulting from fuel recycling processes.

''(3) Research and development on reactor concepts or transmutation technologies that improve resource utilization or reduce the radiotoxicity of waste streams.

''(4) Research and development on waste treatment processes and separations technologies, advanced waste forms, and quantification of proliferation risks.

''(5) Identification and evaluation of test and experimental facilities necessary to successfully implement the advanced fuel cycle initiative.

''(6) Advancement of fuel cycle-related modeling and simulation capabilities.

''(d) BLUE RIBBON COMMISSION REPORT.—

''(1) In carrying out this section, the Secretary shall give consideration to the final report on a long-term nuclear waste solution produced by the Blue Ribbon Commission on America's Nuclear Future.

''(2) Not later than 180 days after the release of the Blue Ribbon Commission on America's Nuclear Future final report, the Secretary shall transmit to Congress a report, which shall include—

''(A) any plans the Department may have to incorporate any relevant recommendations from this report into the program; and

''(B) how those recommendations for long-term nuclear waste solutions that will be incorporated into the plan compare with plans for a long-term nuclear waste solution of a repository at Yucca Mountain, that may or may not be incorporated into the plan, with regard to the safety, security, legal, cost, and technological and site readiness factors associated with any

recommendations related to final disposition pathways for spent nuclear fuel and high-level radioactive waste to the same factors associated with permanent deep geological disposal at the Yucca Mountain waste repository.

''(3) The analysis described in paragraph (2)(B) shall be conducted using scientific and technical materials and information used to support policy actions related to the Yucca Mountain project.''.

(b) CONFORMING AMENDMENT.—The item relating to section 953 in the table of contents of the Energy Policy Act of 2005 is amended to read as follows:

''Sec. 953. Fuel cycle research and development.''.

SEC. 9. NUCLEAR ENERGY ENABLING TECHNOLOGIES PROGRAM.

(a) AMENDMENT.—Subtitle E of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16271 et seq.) is amended by adding at the following new section:

''SEC. 958. NUCLEAR ENERGY ENABLING TECHNOLOGIES.

''(a) IN GENERAL.—The Secretary shall conduct a program to support the integration of activities undertaken through the reactor concepts research, development, demonstration, and commercial application program under section 952(c) and the fuel cycle research and development program under section 953, and support crosscutting nuclear energy concepts. Activities commenced under this

section shall be concentrated on broadly applicable research and development focus areas.

''(b) ACTIVITIES.—Activities conducted under this section may include research involving—

''(1) advanced reactor materials;

''(2) advanced radiation mitigation methods;

''(3) advanced proliferation and security risk assessment methods;

''(4) advanced sensors and instrumentation;

''(5) advanced nuclear manufacturing methods; or

''(6) any crosscutting technology or transformative concept aimed at establishing substantial and revolutionary enhancements in the performance of future nuclear energy systems that the Secretary considers relevant and appropriate to the purpose of this section.

''(c) REPORT.—The Secretary shall submit, as part of the annual budget submission of the Department, a report on the activities of the program conducted under this section, which shall include a brief evaluation of each activity's progress.''.

(b) CONFORMING AMENDMENT.—The table of contents of the Energy Policy Act of 2005 is amended by

adding at the end of the items for subtitle E of title IX the following new item:

''Sec. 958. Nuclear energy enabling technologies.''.

SEC. 10. EMERGENCY RISK ASSESSMENT AND PREPAREDNESS REPORT.

Not later than 180 days after the date of enactment of this Act, the Secretary shall transmit to the Congress a report summarizing quantitative risks associated with the potential of a severe accident arising from the use of civilian nuclear energy technology, including reactor technology deployed or likely to be deployed as of the date of enactment of this Act, and outlining the technologies currently available to mitigate the consequences of such an accident. The report shall include recommendations of areas of technological development that should be pursued to reduce the potential public harm arising from such an incident.

SEC. 11. NEXT GENERATION NUCLEAR PLANT.

(a) PROTOTYPE PLANT LOCATION.—Section 642(b)(3) of the Energy Policy Act of 2005 (42 U.S.C. 16022(b)(3)) is amended to read as follows:

''(3) PROTOTYPE PLANT LOCATION.—The prototype nuclear reactor and associated plant shall be constructed at a location determined by the consortium through an open and transparent competitive selection process.''.

(b) REPORT.—

(1) REQUIREMENT.—Not later than 1 year after the date of enactment of this Act, the Comptroller General shall transmit to the Congress a report providing a status update of the Next Generation Nuclear Plant program that provides analysis of—

(A) its progress;

(B) how Federal funds appropriated for the project have been distributed and spent; and

(C) the current and expected participation by non-Federal entities.

(2) CONTENTS.—The report shall include—

(A) an analysis of the proposed facility's technical capabilities and remaining technological development challenges, and a cost estimate and construction schedule;

(B) an assessment of the advantages and disadvantages of funding a pilot-scale research reactor project in lieu of a full-scale commercial power reactor;

(C) an assessment of alternative construction sites proposed by private industry;

(D) an assessment of the extent to which the Department of Energy is working with industry and the Nuclear Regulatory Commission to ensure that the Next Generation Nuclear Plant program meets industry expectations for long-term application of technologies and addresses potential licensing procedures for deployment;

(E) an assessment of the known or anticipated challenges to securing private non-Federal cost share funds and any measures to overcome these challenges, including any alternative funding approaches such as front loading the Federal share;

(F) an assessment of project risks, including those related to—

(i) project scope, schedule, and resources;

(ii) the formation of partnerships or agreements between the Department and the private sector necessary for the project's success; and

(iii) the Department's capabilities to identify and manage such risks; and

(G) an assessment of what is known about the potential impact of natural gas and other fossil fuel prices on private entity participation in the project.

SEC. 12. TECHNICAL STANDARDS COLLABORATION.

(a) IN GENERAL.—The Director of the National Institute of Standards and Technology shall establish a nuclear energy standards committee (in this section referred to as the ''technical standards committee'') to facilitate and support, consistent with the National Technology Transfer and Advancement Act of 1995, the development or revision of technical standards for new and existing nuclear power plants and advanced nuclear technologies.

(b) MEMBERSHIP.—

(1) IN GENERAL.—The technical standards committee shall include representatives from appropriate Federal agencies and the private sector, and be open to materially affected organizations involved in the development or application of nuclear energy-related standards.

(2) CO-CHAIRS.—The technical standards committee shall be co-chaired by a representative from the National Institute of Standards and Technology and a representative from a private sector standards organization.

(c) DUTIES.—The technical standards committee shall, in cooperation with appropriate Federal agencies—

(1) perform a needs assessment to identify and evaluate the technical standards that are needed to support nuclear energy, including those needed to support new and existing nuclear power plants and advanced nuclear technologies;

(2) formulate, coordinate, and recommend priorities for the development of new technical standards and the revision of existing technical standards to address the needs identified under paragraph (1);

(3) facilitate and support collaboration and cooperation among standards developers to address the needs and priorities identified under paragraphs (1) and (2);

(4) as appropriate, coordinate with other national, regional, or international efforts on nuclear energy-related technical standards in order to avoid conflict and duplication and to ensure global compatibility; and

(5) promote the establishment and maintenance of a database of nuclear energy-related technical standards.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated $1,000,000 for each of

fiscal years 2011 through 2013 to the Director of the National Institute for Standards and Technology for activities under this section.

SEC. 13. EVALUATION OF LONG-TERM OPERATING NEEDS.

(a) IN GENERAL.—The Secretary of Energy shall enter into an arrangement with the National Academies to conduct an evaluation of the scientific and technological challenges to the long-term maintenance and safe operation of currently deployed nuclear power reactors up to and beyond the specified design-life of reactor systems.

(b) REPORT.—Not later than 1 year after the date of enactment of this Act, the Secretary shall transmit to the Congress, and make publically available, the results of the evaluation undertaken by the Academies pursuant to subsection (a).

SEC. 14. AVAILABLE FACILITIES DATABASE.

The Secretary of Energy shall prepare a database of non-Federal user facilities receiving Federal funds that may be used for unclassified nuclear energy research. The Secretary shall make this database accessible on the Department of Energy's website.

SEC. 15. NUCLEAR WASTE DISPOSAL.

To the extent consistent with the requirements of current law, the Department of Energy shall be responsible for disposal of high-level radioactive waste or spent

nuclear fuel generated by reactors under the programs authorized in this Act, or the amendments made by this Act.

Passed the House of Representatives November 30, 2010.

Attest: LORRAINE C. MILLER,

Clerk.