

116TH CONGRESS
1ST SESSION

S. 903

To direct the Secretary of Energy to establish advanced nuclear goals, provide for a versatile, reactor-based fast neutron source, make available high-assay, low-enriched uranium for research, development, and demonstration of advanced nuclear reactor concepts, and for other purposes.

IN THE SENATE OF THE UNITED STATES

MARCH 27, 2019

Ms. MURKOWSKI (for herself, Mr. BOOKER, Mr. ALEXANDER, Mr. MANCHIN, Mr. RISCH, Mr. WHITEHOUSE, Mr. CRAPO, Mr. COONS, Mrs. CAPITO, Ms. DUCKWORTH, Mr. SULLIVAN, Mr. BENNET, Mr. GRAHAM, Mr. PORTMAN, and Mr. GARDNER) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

A BILL

To direct the Secretary of Energy to establish advanced nuclear goals, provide for a versatile, reactor-based fast neutron source, make available high-assay, low-enriched uranium for research, development, and demonstration of advanced nuclear reactor concepts, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the “Nuclear Energy Lead-
3 ership Act”.

4 **SEC. 2. AUTHORIZATION OF LONG-TERM POWER PUR-
5 CHASE AGREEMENTS.**

6 Section 501(b)(1) of title 40, United States Code, is
7 amended by striking subparagraph (B) and inserting the
8 following:

9 “(B) PUBLIC UTILITY CONTRACTS.—

10 “(i) TERM.—

11 “(I) IN GENERAL.—A contract
12 under this paragraph to purchase
13 electricity from a public utility may be
14 for a period of not more than 40
15 years.

16 “(II) OTHER PUBLIC UTILITY
17 SERVICES.—A contract under this
18 paragraph for a public utility service
19 other than a service described in sub-
20 clause (I) may be for a period of not
21 more than 10 years.

22 “(ii) COSTS.—The cost of a contract
23 under this paragraph for any fiscal year
24 may be paid from the appropriations for
25 that fiscal year.”.

1 **SEC. 3. LONG-TERM NUCLEAR POWER PURCHASE AGREE-**
2 **MENT PILOT PROGRAM.**

3 (a) IN GENERAL.—Subtitle B of title VI of the En-
4 ergy Policy Act of 2005 (Public Law 109–58; 119 Stat.
5 782) is amended by adding at the end the following:

6 **“SEC. 640. LONG-TERM NUCLEAR POWER PURCHASE**
7 **AGREEMENT PILOT PROGRAM.**

8 “(a) ESTABLISHMENT.—The Secretary shall estab-
9 lish a pilot program for a long-term power purchase agree-
10 ment.

11 “(b) REQUIREMENTS.—In developing the pilot pro-
12 gram under this section, the Secretary shall—

13 “(1) consult and coordinate with the heads of
14 other Federal departments and agencies that may
15 benefit from purchasing nuclear power for a period
16 of longer than 10 years, including—

17 “(A) the Secretary of Defense; and

18 “(B) the Secretary of Homeland Security;

19 and

20 “(2) not later than December 31, 2023, enter
21 into at least 1 agreement to purchase power from a
22 commercial nuclear reactor that receives a license
23 from the Nuclear Regulatory Commission after Jan-
24 uary 1, 2019.

25 “(c) FACTORS FOR CONSIDERATION.—

1 “(1) IN GENERAL.—In carrying out this sec-
 2 tion, the Secretary shall give special consideration to
 3 power purchase agreements for first-of-a-kind or
 4 early deployment nuclear technologies that can pro-
 5 vide reliable and resilient power to high-value assets
 6 for national security purposes or other purposes as
 7 the Secretary determines to be in the national inter-
 8 est, especially in remote off-grid scenarios or grid-
 9 connected scenarios that can provide capabilities
 10 commonly known as ‘islanding power capabilities’
 11 during an emergency scenario.

12 “(2) EFFECT ON RATES.—An agreement to
 13 purchase power under this section may be at a rate
 14 that is higher than the average market rate, if the
 15 agreement fulfills an applicable consideration de-
 16 scribed in paragraph (1).”.

17 (b) TABLE OF CONTENTS.—The table of contents of
 18 the Energy Policy Act of 2005 (Public Law 109–58; 119
 19 Stat. 594) is amended by inserting after the item relating
 20 to section 639 the following:

“Sec. 640. Long-term nuclear power purchase agreement pilot program.”.

21 **SEC. 4. ADVANCED NUCLEAR REACTOR RESEARCH AND DE-**
 22 **VELOPMENT GOALS.**

23 (a) IN GENERAL.—Subtitle E of title IX of the En-
 24 ergy Policy Act of 2005 (42 U.S.C. 16271 et seq.) is
 25 amended by adding at the end the following:

1 **“SEC. 959A. ADVANCED NUCLEAR REACTOR RESEARCH**
2 **AND DEVELOPMENT GOALS.**

3 “(a) DEFINITIONS.—In this section:

4 “(1) ADVANCED NUCLEAR REACTOR.—The
5 term ‘advanced nuclear reactor’ means—

6 “(A) a nuclear fission reactor, including a
7 prototype plant (as defined in sections 50.2 and
8 52.1 of title 10, Code of Federal Regulations
9 (or successor regulations)), with significant im-
10 provements compared to the most recent gen-
11 eration of fission reactors, including improve-
12 ments such as—

13 “(i) additional inherent safety fea-
14 tures;

15 “(ii) lower waste yields;

16 “(iii) improved fuel performance;

17 “(iv) increased tolerance to loss of
18 fuel cooling;

19 “(v) enhanced reliability;

20 “(vi) increased proliferation resist-
21 ance;

22 “(vii) increased thermal efficiency;

23 “(viii) reduced consumption of cooling
24 water;

1 “(ix) the ability to integrate into elec-
 2 tric applications and nonelectric applica-
 3 tions;

4 “(x) modular sizes to allow for deploy-
 5 ment that corresponds with the demand
 6 for electricity; or

7 “(xi) operational flexibility to respond
 8 to changes in demand for electricity and to
 9 complement integration with intermittent
 10 renewable energy; and

11 “(B) a fusion reactor.

12 “(2) DEMONSTRATION PROJECT.—The term
 13 ‘demonstration project’ means an advanced nuclear
 14 reactor operated—

15 “(A) as part of the power generation facili-
 16 ties of an electric utility system; or

17 “(B) in any other manner for the purpose
 18 of demonstrating the suitability for commercial
 19 application of the advanced nuclear reactor.

20 “(b) PURPOSE.—The purpose of this section is to di-
 21 rect the Secretary, as soon as practicable after the date
 22 of enactment of this section, to advance the research and
 23 development of domestic advanced, affordable, and clean
 24 nuclear energy by—

1 “(1) demonstrating different advanced nuclear
2 reactor technologies that could be used by the pri-
3 vate sector to produce—

4 “(A) emission-free power at a levelized cost
5 of electricity of \$60 per megawatt-hour or less;

6 “(B) heat for community heating, indus-
7 trial purposes, or synthetic fuel production;

8 “(C) remote or off-grid energy supply; or

9 “(D) backup or mission-critical power sup-
10 plies;

11 “(2) developing subgoals for nuclear energy re-
12 search programs that would accomplish the goals of
13 the demonstration projects carried out under sub-
14 section (c);

15 “(3) identifying research areas that the private
16 sector is unable or unwilling to undertake due to the
17 cost of, or risks associated with, the research; and

18 “(4) facilitating the access of the private sec-
19 tor—

20 “(A) to Federal research facilities and per-
21 sonnel; and

22 “(B) to the results of research relating to
23 civil nuclear technology funded by the Federal
24 Government.

25 “(c) DEMONSTRATION PROJECTS.—

1 “(1) IN GENERAL.—The Secretary shall, to the
2 maximum extent practicable—

3 “(A) complete not fewer than 2 advanced
4 nuclear reactor demonstration projects by not
5 later than December 31, 2025; and

6 “(B) establish a program to demonstrate
7 not fewer than 2, and not more than 5, addi-
8 tional operational advanced reactor designs by
9 not later than December 31, 2035.

10 “(2) REQUIREMENTS.—In carrying out dem-
11 onstration projects under paragraph (1), the Sec-
12 retary shall—

13 “(A) include diversity in designs for the
14 advanced nuclear reactors demonstrated under
15 this section, including designs using various—

16 “(i) primary coolants;

17 “(ii) fuel types and compositions; and

18 “(iii) neutron spectra;

19 “(B) seek to ensure that—

20 “(i) the long-term cost of electricity or
21 heat for each design to be demonstrated
22 under this subsection is cost-competitive in
23 the applicable market;

24 “(ii) the selected projects can meet
25 the deadline established in paragraph (1)

1 to demonstrate first-of-a-kind advanced
2 nuclear reactor technologies, for which ad-
3 ditional information shall be considered, in-
4 cluding—

5 “(I) the technology readiness
6 level of a proposed advanced nuclear
7 reactor technology;

8 “(II) the technical abilities and
9 qualifications of teams desiring to
10 partner with the Department to dem-
11 onstrate a proposed advanced nuclear
12 reactor technology; and

13 “(III) the capacity to meet cost-
14 share requirements of the Depart-
15 ment;

16 “(C) ensure that each evaluation of can-
17 didate technologies for the demonstration
18 projects is completed through an external re-
19 view of proposed designs, which review shall—

20 “(i) be conducted by a panel that in-
21 cludes not fewer than 1 representative of
22 each of—

23 “(I) an electric utility; and

24 “(II) an entity that uses high-
25 temperature process heat for manu-

1 facturing or industrial processing,
2 such as a petrochemical company, a
3 manufacturer of metals, or a manu-
4 facturer of concrete; and

5 “(ii) include a review of cost-competi-
6 tiveness and other value streams, together
7 with the technology readiness level, of each
8 design to be demonstrated under this sub-
9 section;

10 “(D) enter into cost-sharing agreements
11 with partners in accordance with section 988
12 for the conduct of activities relating to the re-
13 search, development, and demonstration of pri-
14 vate-sector advanced nuclear reactor designs
15 under the program;

16 “(E) work with private sector partners to
17 identify potential sites, including Department-
18 owned sites, for demonstrations, as appropriate;
19 and

20 “(F) align specific activities carried out
21 under demonstration projects carried out under
22 this subsection with priorities identified through
23 direct consultations between—

24 “(i) the Department;

25 “(ii) National Laboratories;

1 “(iii) institutions of higher education;

2 “(iv) traditional end-users (such as
3 electric utilities);

4 “(v) potential end-users of new tech-
5 nologies (such as users of high-tempera-
6 ture process heat for manufacturing proc-
7 essing, including petrochemical companies,
8 manufacturers of metals, or manufacturers
9 of concrete); and

10 “(vi) developers of advanced nuclear
11 reactor technology.

12 “(3) ADDITIONAL REQUIREMENTS.—In car-
13 rying out demonstration projects under paragraph
14 (1), the Secretary shall—

15 “(A) identify candidate technologies that—

16 “(i) are not developed sufficiently for
17 demonstration within the initial required
18 timeframe described in paragraph (1)(A);
19 but

20 “(ii) could be demonstrated within the
21 timeframe described in paragraph (1)(B);

22 “(B) identify technical challenges to the
23 candidate technologies identified in subpara-
24 graph (A);

1 “(C) support near-term research and devel-
2 opment to address the highest-risk technical
3 challenges to the successful demonstration of a
4 selected advanced reactor technology, in accord-
5 ance with—

6 “(i) subparagraph (B); and

7 “(ii) the research and development ac-
8 tivities under section 958;

9 “(D) establish such technology advisory
10 working groups as the Secretary determines to
11 be appropriate to advise the Secretary regard-
12 ing the technical challenges identified under
13 subparagraph (B) and the scope of research
14 and development programs to address the chal-
15 lenges, in accordance with subparagraph (C), to
16 be comprised of—

17 “(i) private-sector advanced nuclear
18 reactor technology developers;

19 “(ii) technical experts with respect to
20 the relevant technologies at institutions of
21 higher education; and

22 “(iii) technical experts at the National
23 Laboratories.

24 “(d) GOALS.—

1 “(1) IN GENERAL.—The Secretary shall estab-
2 lish goals for research relating to advanced nuclear
3 reactors facilitated by the Department that support
4 the objectives of the program for demonstration
5 projects established under subsection (c).

6 “(2) COORDINATION.—In developing the goals
7 under paragraph (1), the Secretary shall coordinate,
8 on an ongoing basis, with members of private indus-
9 try to advance the demonstration of various designs
10 of advanced nuclear reactors.

11 “(3) REQUIREMENTS.—In developing the goals
12 under paragraph (1), the Secretary shall ensure
13 that—

14 “(A) research activities facilitated by the
15 Department to meet the goals developed under
16 this subsection are focused on key areas of nu-
17 clear research and deployment ranging from
18 basic science to full-design development, safety
19 evaluation, and licensing;

20 “(B) research programs designed to meet
21 the goals emphasize—

22 “(i) resolving materials challenges re-
23 lating to extreme environments, including
24 extremely high levels of—

25 “(I) radiation fluence;

1 “(II) temperature;

2 “(III) pressure; and

3 “(IV) corrosion; and

4 “(ii) qualification of advanced fuels;

5 “(C) activities are carried out that address
6 near-term challenges in modeling and simula-
7 tion to enable accelerated design and licensing;

8 “(D) related technologies, such as tech-
9 nologies to manage, reduce, or reuse nuclear
10 waste, are developed;

11 “(E) nuclear research infrastructure is
12 maintained or constructed, such as—

13 “(i) currently operational research re-
14 actors at the National Laboratories and in-
15 stitutions of higher education;

16 “(ii) hot cell research facilities;

17 “(iii) a versatile fast neutron source;

18 and

19 “(iv) a molten salt testing facility;

20 “(F) basic knowledge of non-light water
21 coolant physics and chemistry is improved;

22 “(G) advanced sensors and control systems
23 are developed; and

24 “(H) advanced manufacturing and ad-
25 vanced construction techniques and materials

1 are investigated to reduce the cost of advanced
2 nuclear reactors.”.

3 (b) TABLE OF CONTENTS.—The table of contents of
4 the Energy Policy Act of 2005 (Public Law 109–58; 119
5 Stat. 594) is amended—

6 (1) in the item relating to section 917, by strik-
7 ing “Efficiency”;

8 (2) in the items relating to sections 957, 958,
9 and 959, by inserting “Sec.” before “9” each place
10 it appears; and

11 (3) by inserting after the item relating to sec-
12 tion 959 the following:

“Sec. 959A. Advanced nuclear reactor research and development goals.”.

13 **SEC. 5. NUCLEAR ENERGY STRATEGIC PLAN.**

14 (a) IN GENERAL.—Subtitle E of title IX of the En-
15 ergy Policy Act of 2005 (42 U.S.C. 16271 et seq.) (as
16 amended by section 4(a)) is amended by adding at the
17 end the following:

18 **“SEC. 959B. NUCLEAR ENERGY STRATEGIC PLAN.**

19 “(a) IN GENERAL.—Not later than 180 days after
20 the date of enactment of this section, the Secretary shall
21 submit to the Committee on Energy and Natural Re-
22 sources of the Senate and the Committees on Energy and
23 Commerce and Science, Space, and Technology of the
24 House of Representatives a 10-year strategic plan for the

1 Office of Nuclear Energy of the Department, in accord-
2 ance with this section.

3 “(b) REQUIREMENTS.—

4 “(1) COMPONENTS.—The strategic plan under
5 this section shall designate—

6 “(A) programs that support the planned
7 accomplishment of—

8 “(i) the goals established under sec-
9 tion 959A; and

10 “(ii) the demonstration programs
11 identified under subsection (c) of that sec-
12 tion; and

13 “(B) programs that—

14 “(i) do not support the planned ac-
15 complishment of demonstration programs,
16 or the goals, referred to in subparagraph
17 (A); but

18 “(ii) are important to the mission of
19 the Office of Nuclear Energy, as deter-
20 mined by the Secretary.

21 “(2) PROGRAM PLANNING.—In developing the
22 strategic plan under this section, the Secretary shall
23 specify expected timelines for, as applicable—

1 “(A) the accomplishment of relevant objec-
2 tives under current programs of the Depart-
3 ment; or

4 “(B) the commencement of new programs
5 to accomplish those objectives.

6 “(c) UPDATES.—Not less frequently than once every
7 2 years, the Secretary shall submit to the Committee on
8 Energy and Natural Resources of the Senate and the
9 Committees on Energy and Commerce and Science, Space,
10 and Technology of the House of Representatives an up-
11 dated 10-year strategic plan in accordance with subsection
12 (b), which shall identify, and provide a justification for,
13 any major deviation from a previous strategic plan sub-
14 mitted under this section.”.

15 (b) TABLE OF CONTENTS.—The table of contents of
16 the Energy Policy Act of 2005 (Public Law 109–58; 119
17 Stat. 594) (as amended by section 4(b)(3)) is amended
18 by inserting after the item relating to section 959A the
19 following:

“Sec. 959B. Nuclear energy strategic plan.”.

20 **SEC. 6. VERSATILE, REACTOR-BASED FAST NEUTRON**
21 **SOURCE.**

22 Section 955(c)(1) of the Energy Policy Act of 2005
23 (42 U.S.C. 16275(c)(1)) is amended—

24 (1) in the paragraph heading, by striking “MIS-
25 SION NEED” and inserting “AUTHORIZATION”; and

1 (2) in subparagraph (A), by striking “determine
2 the mission need” and inserting “provide”.

3 **SEC. 7. ADVANCED NUCLEAR FUEL SECURITY PROGRAM.**

4 (a) FINDINGS.—Congress finds that—

5 (1) the national security nuclear enterprise,
6 which supports the nuclear weapons stockpile stew-
7 ardship and naval reactors functions of the National
8 Nuclear Security Administration, requires a domes-
9 tic source of low- and high-enriched uranium in ac-
10 cordance with legal restrictions regarding foreign ob-
11 ligations relating to the beginning stage of the nu-
12 clear fuel cycle;

13 (2) many domestic advanced nuclear power in-
14 dustry participants require access to high-assay, low-
15 enriched uranium fuel for—

16 (A) initial fuel testing;

17 (B) operation of demonstration reactors;

18 and

19 (C) commercial operation of advanced nu-
20 clear reactors;

21 (3) as of the date of enactment of this Act, no
22 domestic uranium enrichment or fuel fabrication ca-
23 pability exists for uranium fuel enriched to greater
24 than 5 weight percent of the uranium-235 isotope;

1 (4) a healthy commercial nuclear fuel cycle ca-
2 pable of providing higher levels of enriched uranium
3 would benefit—

4 (A) the relevant national security functions
5 of the National Nuclear Security Administra-
6 tion; and

7 (B) the domestic advanced nuclear indus-
8 try of the United States; and

9 (5) making limited quantities of high-assay,
10 low-enriched uranium available from Department of
11 Energy stockpiles of uranium would allow for initial
12 fuel testing and demonstration of advanced nuclear
13 reactor concepts, accelerating—

14 (A) the path to market of those concepts;

15 and

16 (B) the development of—

17 (i) a market for advanced nuclear re-
18 actors; and

19 (ii) a resulting growing commercial
20 nuclear fuel cycle capability.

21 (b) AMENDMENT.—

22 (1) IN GENERAL.—Subtitle E of title IX of the
23 Energy Policy Act of 2005 (42 U.S.C. 16271 et
24 seq.) (as amended by section 5(a)) is amended by
25 adding at the end the following:

1 **“SEC. 960. ADVANCED NUCLEAR FUEL SECURITY PRO-**
2 **GRAM.**

3 “(a) DEFINITIONS.—In this section:

4 “(1) HALEU TRANSPORTATION PACKAGE.—

5 The term ‘HALEU transportation package’ means a
6 transportation package that is suitable for trans-
7 porting high-assay, low-enriched uranium.

8 “(2) HIGH-ASSAY, LOW-ENRICHED URANIUM.—

9 The term ‘high-assay, low-enriched uranium’ means
10 uranium with an assay greater than 5 weight per-
11 cent, but less than 20 weight percent, of the ura-
12 nium-235 isotope.

13 “(3) HIGH-ENRICHED URANIUM.—The term

14 ‘high-enriched uranium’ means uranium with an
15 assay of 20 weight percent or more of the uranium-
16 235 isotope.

17 “(b) HIGH-ASSAY, LOW-ENRICHED URANIUM PRO-
18 GRAM FOR ADVANCED REACTORS.—

19 “(1) ESTABLISHMENT.—Not later than 1 year

20 after the date of enactment of this section, the Sec-
21 retary shall establish a program to make available
22 high-assay, low-enriched uranium, through contracts
23 for sale, resale, transfer, or lease, for use in com-
24 mercial or noncommercial advanced nuclear reactors.

25 “(2) NUCLEAR FUEL OWNERSHIP.—Each lease

26 under this subsection shall include a provision estab-

1 lishing that the nuclear fuel that is the subject of
2 the lease shall remain the property of the Depart-
3 ment, including with respect to responsibility for the
4 final disposition of all radioactive waste created by
5 the irradiation, processing, or purification of any
6 leased uranium.

7 “(3) QUANTITY.—In carrying out the program
8 under this subsection, the Secretary shall make
9 available—

10 “(A) by December 31, 2022, high-assay,
11 low-enriched uranium containing not less than
12 2 metric tons of the uranium-235 isotope; and

13 “(B) by December 31, 2025, high-assay,
14 low-enriched uranium containing not less than
15 10 metric tons of the uranium-235 isotope (as
16 determined including the quantities of the ura-
17 nium-235 isotope made available before Decem-
18 ber 31, 2022).

19 “(4) FACTORS FOR CONSIDERATION.—In car-
20 rying out the program under this subsection, the
21 Secretary shall take into consideration options for
22 providing the high-assay, low-enriched uranium
23 under this subsection from a stockpile of uranium
24 owned by the Department (including the National
25 Nuclear Security Administration), including—

1 “(A) fuel that—

2 “(i) directly meets the needs of an
3 end-user; but

4 “(ii) has been previously used or fab-
5 ricated for another purpose;

6 “(B) fuel that can meet the needs of an
7 end-user after removing radioactive or other
8 contaminants that resulted from a previous use
9 or fabrication of the fuel for research, develop-
10 ment, demonstration, or deployment activities
11 of the Department (including activities of the
12 National Nuclear Security Administration); and

13 “(C) fuel from a high-enriched uranium
14 stockpile, which can be blended with lower-
15 assay uranium to become high-assay, low-en-
16 riched uranium to meet the needs of an end-
17 user.

18 “(5) LIMITATION.—The Secretary shall not
19 barter or otherwise sell or transfer uranium in any
20 form in exchange for services relating to the final
21 disposition of radioactive waste from uranium that is
22 the subject of a lease under this subsection.

23 “(6) SUNSET.—The program under this sub-
24 section shall terminate on the earlier of—

25 “(A) January 1, 2035; and

1 “(B) the date on which uranium enriched
2 up to, but not equal to, 20 weight percent can
3 be obtained in the commercial market from do-
4 mestic suppliers.

5 “(c) REPORT.—

6 “(1) IN GENERAL.—Not later than 180 days
7 after the date of enactment of this section, the Sec-
8 retary shall submit to the appropriate committees of
9 Congress a report that describes actions proposed to
10 be carried out by the Secretary—

11 “(A) under the program under subsection
12 (b); or

13 “(B) otherwise to enable the commercial
14 use of high-assay, low-enriched uranium.

15 “(2) COORDINATION AND STAKEHOLDER
16 INPUT.—In developing the report under this sub-
17 section, the Secretary shall seek input from—

18 “(A) the Nuclear Regulatory Commission;

19 “(B) the National Laboratories;

20 “(C) institutions of higher education;

21 “(D) a diverse group of entities operating
22 in the nuclear energy industry; and

23 “(E) a diverse group of technology devel-
24 opers.

1 “(3) COST AND SCHEDULE ESTIMATES.—The
2 report under this subsection shall include estimated
3 costs, budgets, and timeframes for enabling the use
4 of high-assay, low-enriched uranium.

5 “(4) REQUIRED EVALUATIONS.—The report
6 under this subsection shall evaluate—

7 “(A) the costs and actions required to es-
8 tablish and carry out the program under sub-
9 section (b), including with respect to—

10 “(i) proposed preliminary terms for
11 the sale, resale, transfer, and leasing of
12 high-assay, low-enriched uranium (includ-
13 ing guidelines defining the roles and re-
14 sponsibilities between the Department and
15 the purchaser, transfer recipient, or les-
16 see); and

17 “(ii) the potential to coordinate with
18 purchasers, transfer recipients, and lessees
19 regarding—

20 “(I) fuel fabrication; and

21 “(II) fuel transport;

22 “(B) the potential sources and fuel forms
23 available to provide uranium for the program
24 under subsection (b);

1 “(C) options to coordinate the program
2 under subsection (b) with the operation of the
3 versatile, reactor-based fast neutron source
4 under section 959A;

5 “(D) the ability of the domestic uranium
6 market to provide materials for advanced nu-
7 clear reactor fuel; and

8 “(E) any associated legal, regulatory, and
9 policy issues that should be addressed to en-
10 able—

11 “(i) the program under subsection (b);
12 and

13 “(ii) the establishment of a domestic
14 industry capable of providing high-assay,
15 low-enriched uranium for commercial and
16 noncommercial purposes, including with re-
17 spect to the needs of—

18 “(I) the Department;

19 “(II) the Department of Defense;

20 and

21 “(III) the National Nuclear Se-
22 curity Administration.

23 “(d) HALEU TRANSPORTATION PACKAGE RE-
24 SEARCH PROGRAM.—

1 “(1) IN GENERAL.—As soon as practicable
2 after the date of enactment of this section, the Sec-
3 retary shall establish a research, development, and
4 demonstration program under which the Secretary
5 shall provide grants, on a competitive basis, to es-
6 tablish the capability to transport high-assay, low-
7 enriched uranium.

8 “(2) REQUIREMENT.—The focus of the pro-
9 gram under this subsection shall be to establish 1 or
10 more HALEU transportation packages that can be
11 certified by the Nuclear Regulatory Commission to
12 transport high-assay, low-enriched uranium to the
13 various facilities involved in producing or using nu-
14 clear fuel containing high-assay, low-enriched ura-
15 nium, such as—

16 “(A) enrichment facilities;

17 “(B) fuel processing facilities;

18 “(C) fuel fabrication facilities; and

19 “(D) nuclear reactors.”.

20 “(2) TABLE OF CONTENTS.—The table of con-
21 tents of the Energy Policy Act of 2005 (Public Law
22 109–58; 119 Stat. 594) (as amended by section
23 5(b)) is amended by inserting after the item relating
24 to section 959B the following:

“Sec. 960. Advanced nuclear fuel security program.”.

1 **SEC. 8. UNIVERSITY NUCLEAR LEADERSHIP PROGRAM.**

2 (a) FINDINGS.—Congress finds that—

3 (1) nuclear power plants—

4 (A) generate billions of dollars in national
5 economic activity through procurements
6 throughout the United States; and

7 (B) provide tens of thousands of people in
8 the United States with high-paying jobs, con-
9 tributing substantially to the local economies of
10 the communities in which the plants operate;

11 (2) the world market for the growth of commer-
12 cial nuclear power was estimated by the Department
13 of Commerce to be valued at up to
14 \$740,000,000,000 during the period of calendar
15 years 2018 through 2028;

16 (3) the participation and leadership of the
17 United States in the market described in paragraph
18 (2) will—

19 (A)(i) increase economic activity in the
20 United States through robust nuclear exports,
21 leading to the enhanced economic security of
22 the United States; and

23 (ii) preserve and enhance the ability of the
24 United States to positively influence inter-
25 national nuclear safety, security, and non-

1 proliferation standards through commercial en-
2 gagement with other nations; but

3 (B) require significant investment in
4 United States-origin advanced nuclear tech-
5 nologies;

6 (4) in order to lead the world in the next gen-
7 eration of commercial nuclear power, the advanced
8 nuclear industry in the United States should be posi-
9 tioned for accelerated growth, which requires public-
10 private partnerships between industry entities and
11 the Federal Government;

12 (5) success in achieving the goals described in
13 this subsection will require a whole-government Fed-
14 eral approach that focuses on the shared needs and
15 individual mission requirements of, at a minimum—

16 (A) the Department of Energy;

17 (B) the National Nuclear Security Admin-
18 istration; and

19 (C) the Nuclear Regulatory Commission;

20 (6) advanced reactors present new challenges
21 and opportunities in reactor design, safeguards, and
22 regulation;

23 (7) the challenges referred to in paragraph
24 (6)—

1 (A) are directly relevant to the missions
2 of—

3 (i) the Office of Nuclear Energy of
4 the Department of Energy;

5 (ii) the National Nuclear Security Ad-
6 ministration; and

7 (iii) the Nuclear Regulatory Commis-
8 sion; and

9 (B) require a highly skilled workforce in
10 order to be met; and

11 (8) nuclear science and engineering programs
12 at institutions of higher education in the United
13 States—

14 (A) annually award degrees in nuclear en-
15 gineering and related fields to more than 600
16 undergraduate students, and 500 graduate stu-
17 dents, who are critical to maintaining United
18 States leadership in the development of ad-
19 vanced nuclear systems;

20 (B) perform cutting-edge research and
21 technology development activities that have
22 made fundamental contributions to advancing
23 United States nuclear technology; and

24 (C) support workforce development critical
25 to maintaining United States leadership in nu-

1 clear detection, nonproliferation, nuclear medi-
2 cine, advanced manufacturing, and other non-
3 energy areas.

4 (b) AMENDMENT.—Section 313 of the Energy and
5 Water Development and Related Agencies Appropriations
6 Act, 2009 (42 U.S.C. 16274a), is amended to read as fol-
7 lows:

8 **“SEC. 313. UNIVERSITY NUCLEAR LEADERSHIP PROGRAM.**

9 “(a) DEFINITIONS.—In this section:

10 “(1) ADVANCED NUCLEAR REACTOR.—The
11 term ‘advanced nuclear reactor’ means—

12 “(A) a nuclear fission reactor, including a
13 prototype plant (as defined in sections 50.2 and
14 52.1 of title 10, Code of Federal Regulations
15 (or successor regulations)), with significant im-
16 provements compared to the most recent gen-
17 eration of fission reactors, including improve-
18 ments such as—

19 “(i) additional inherent safety fea-
20 tures;

21 “(ii) lower waste yields;

22 “(iii) improved fuel performance;

23 “(iv) increased tolerance to loss of
24 fuel cooling;

25 “(v) enhanced reliability;

1 “(vi) increased proliferation resist-
2 ance;

3 “(vii) increased thermal efficiency;

4 “(viii) reduced consumption of cooling
5 water;

6 “(ix) the ability to integrate into elec-
7 tric applications and nonelectric applica-
8 tions;

9 “(x) modular sizes to allow for deploy-
10 ment that corresponds with the demand
11 for electricity; or

12 “(xi) operational flexibility to respond
13 to changes in demand for electricity and to
14 complement integration with intermittent
15 renewable energy; and

16 “(B) a fusion reactor.

17 “(2) INSTITUTION OF HIGHER EDUCATION.—

18 The term ‘institution of higher education’ has the
19 meaning given the term in section 101(a) of the
20 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

21 “(3) PROGRAM.—The term ‘Program’ means
22 the University Nuclear Leadership Program estab-
23 lished under subsection (b).

24 “(b) ESTABLISHMENT.—The Secretary of Energy,
25 the Administrator of the National Nuclear Security Ad-

1 ministration, and the Chairman of the Nuclear Regulatory
2 Commission shall jointly establish a program, to be known
3 as the ‘University Nuclear Leadership Program’.

4 “(c) USE OF FUNDS.—

5 “(1) IN GENERAL.—Except as provided in para-
6 graph (2), amounts made available to carry out the
7 Program shall be used to provide financial assistance
8 for scholarships, fellowships, and research and devel-
9 opment projects at institutions of higher education
10 in areas relevant to the programmatic mission of the
11 applicable Federal agency providing the financial as-
12 sistance with respect to research, development, dem-
13 onstration, and deployment activities for technologies
14 relevant to advanced nuclear reactors, including rel-
15 evant fuel cycle technologies.

16 “(2) EXCEPTION.—Notwithstanding paragraph
17 (1), amounts made available to carry out the Pro-
18 gram may be used to provide financial assistance for
19 a scholarship, fellowship, or multiyear research and
20 development project that does not align directly with
21 a programmatic mission of the applicable Federal
22 agency providing the financial assistance, if the ac-
23 tivity for which assistance is provided would facili-
24 tate the maintenance of the discipline of nuclear
25 science or nuclear engineering.

1 “(d) AUTHORIZATION OF APPROPRIATIONS.—There
2 are authorized to be appropriated such sums as are nec-
3 essary to carry out the Program.”.

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