

AMENDMENT NO. _____ Calendar No. _____

Purpose: In the nature of a substitute.

IN THE SENATE OF THE UNITED STATES—116th Cong., 1st Sess.

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.

Referred to the Committee on _____ and
ordered to be printed

Ordered to lie on the table and to be printed

AMENDMENT IN THE NATURE OF A SUBSTITUTE intended
to be proposed by _____

Viz:

1 Strike all after the enacting clause and insert the fol-
2 lowing:

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Nuclear Energy Lead-
5 ership Act”.

6 **SEC. 2. AUTHORIZATION OF LONG-TERM POWER PUR-
7 CHASE AGREEMENTS.**

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

1 “(B) PUBLIC UTILITY CONTRACTS.—

2 “(i) TERM.—

3 “(I) IN GENERAL.—A contract
4 under this paragraph to purchase
5 electricity from a public utility may be
6 for a period of not more than 40
7 years.

8 “(II) OTHER PUBLIC UTILITY
9 SERVICES.—A contract under this
10 paragraph for a public utility service
11 other than a service described in sub-
12 clause (I) may be for a period of not
13 more than 10 years.

14 “(ii) COSTS.—The cost of a contract
15 under this paragraph for any fiscal year
16 may be paid from the appropriations for
17 that fiscal year.”.

18 **SEC. 3. LONG-TERM NUCLEAR POWER PURCHASE AGREE-**
19 **MENT PILOT PROGRAM.**

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

1 **“SEC. 640. LONG-TERM NUCLEAR POWER PURCHASE**
2 **AGREEMENT PILOT PROGRAM.**

3 “(a) ESTABLISHMENT.—The Secretary shall estab-
4 lish a pilot program for a long-term nuclear power pur-
5 chase agreement.

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

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

12 “(A) the Secretary of Defense; and

13 “(B) the Secretary of Homeland Security;

14 and

15 “(2) not later than December 31, 2023, enter
16 into at least 1 agreement to purchase power from a
17 commercial nuclear reactor that receives the first li-
18 cense for that reactor from the Nuclear Regulatory
19 Commission after January 1, 2019.

20 “(c) FACTORS FOR CONSIDERATION.—

21 “(1) IN GENERAL.—In carrying out this sec-
22 tion, the Secretary shall give special consideration to
23 power purchase agreements for first-of-a-kind or
24 early deployment nuclear technologies that can pro-
25 vide reliable and resilient power to high-value assets
26 for national security purposes or other purposes as

1 the Secretary determines to be in the national inter-
2 est, especially in remote off-grid scenarios or grid-
3 connected scenarios that can provide capabilities
4 commonly known as ‘islanding power capabilities’
5 during an emergency scenario.

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

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

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

15 **SEC. 4. ADVANCED NUCLEAR REACTOR RESEARCH AND DE-**
16 **VELOPMENT GOALS.**

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

20 **“SEC. 959A. ADVANCED NUCLEAR REACTOR RESEARCH**
21 **AND DEVELOPMENT GOALS.**

22 “(a) DEFINITIONS.—In this section:

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

1 “(A) a nuclear fission reactor, including a
2 prototype plant (as defined in sections 50.2 and
3 52.1 of title 10, Code of Federal Regulations
4 (or successor regulations)), with significant im-
5 provements compared to the most recent gen-
6 eration of fission reactors, including improve-
7 ments such as—

8 “(i) additional inherent safety fea-
9 tures;

10 “(ii) lower waste yields;

11 “(iii) improved fuel performance;

12 “(iv) increased tolerance to loss of
13 fuel cooling;

14 “(v) enhanced reliability;

15 “(vi) increased proliferation resist-
16 ance;

17 “(vii) increased thermal efficiency;

18 “(viii) reduced consumption of cooling
19 water;

20 “(ix) the ability to integrate into elec-
21 tric applications and nonelectric applica-
22 tions;

23 “(x) modular sizes to allow for deploy-
24 ment that corresponds with the demand
25 for electricity; or

1 “(xi) operational flexibility to respond
2 to changes in demand for electricity and to
3 complement integration with intermittent
4 renewable energy; and
5 “(B) a fusion reactor.

6 “(2) DEMONSTRATION PROJECT.—The term
7 ‘demonstration project’ means—

8 “(A) an advanced nuclear reactor oper-
9 ated—

10 “(i) as part of the power generation
11 facilities of an electric utility system; or

12 “(ii) in any other manner for the pur-
13 pose of demonstrating the suitability for
14 commercial application of the advanced nu-
15 clear reactor;

16 “(B) the demonstration of privately funded
17 experimental advanced nuclear reactors, funded
18 in whole or in part by the private sector, at Na-
19 tional Laboratories or other sites owned by the
20 Department of Energy; and

21 “(C) an advanced nuclear reactor dem-
22 onstrated by the Secretary of Defense in co-
23 operation with the Secretary of Energy.

24 “(b) PURPOSE.—The purpose of this section is to di-
25 rect the Secretary, as soon as practicable after the date

1 of enactment of this section, to advance the research and
2 development of domestic advanced, affordable, and clean
3 nuclear energy by—

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

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

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

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

12 “(D) backup or mission-critical power sup-
13 plies;

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

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

21 “(4) facilitating the access of the private sec-
22 tor—

23 “(A) to Federal research facilities and per-
24 sonnel; and

1 “(B) to the results of research relating to
2 civil nuclear technology funded by the Federal
3 Government.

4 “(c) DEMONSTRATION PROJECTS.—

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

7 “(A) enter into agreements to complete not
8 fewer than 2 demonstration projects by not
9 later than December 31, 2025; and

10 “(B) establish a program to enter into
11 agreements to demonstrate not fewer than 2,
12 and not more than 5, additional operational ad-
13 vanced reactor designs by not later than De-
14 cember 31, 2035.

15 “(2) REQUIREMENTS.—In carrying out dem-
16 onstration projects under paragraph (1), the Sec-
17 retary shall—

18 “(A) include diversity in designs for the
19 advanced nuclear reactors demonstrated under
20 this section, including designs using various—

21 “(i) primary coolants;

22 “(ii) fuel types and compositions; and

23 “(iii) neutron spectra;

24 “(B) seek to ensure that—

1 “(i) the long-term cost of electricity or
2 heat for each design to be demonstrated
3 under this subsection is cost-competitive in
4 the applicable market;

5 “(ii) the selected projects can meet
6 the deadline established in paragraph (1)
7 to demonstrate first-of-a-kind advanced
8 nuclear reactor technologies, for which ad-
9 ditional information shall be considered, in-
10 cluding—

11 “(I) the technology readiness
12 level of a proposed advanced nuclear
13 reactor technology;

14 “(II) the technical abilities and
15 qualifications of teams desiring to
16 demonstrate a proposed advanced nu-
17 clear reactor technology; and

18 “(III) the capacity to meet cost-
19 share requirements of the Depart-
20 ment;

21 “(C) ensure that each evaluation of can-
22 didate technologies for the demonstration
23 projects is completed through an external re-
24 view of proposed designs, which review shall—

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

4 “(I) an electric utility; and

5 “(II) an entity that uses high-
6 temperature process heat for manu-
7 facturing or industrial processing,
8 such as a petrochemical company, a
9 manufacturer of metals, or a manu-
10 facturer of concrete;

11 “(ii) include a review of cost-competi-
12 tiveness and other value streams, together
13 with the technology readiness level, of each
14 design to be demonstrated under this sub-
15 section; and

16 “(iii) not be required for a demonstra-
17 tion project that is not federally funded;

18 “(D) for federally funded demonstration
19 projects, enter into cost-sharing agreements
20 with private sector partners in accordance with
21 section 988 for the conduct of activities relating
22 to the research, development, and demonstra-
23 tion of private-sector advanced nuclear reactor
24 designs under the program;

1 “(E) work with private sector partners to
2 identify potential sites, including Department-
3 owned sites, for demonstrations, as appropriate;

4 “(F) align specific activities carried out
5 under demonstration projects carried out under
6 this subsection with priorities identified through
7 direct consultations between—

8 “(i) the Department;

9 “(ii) National Laboratories;

10 “(iii) institutions of higher education;

11 “(iv) traditional end-users (such as
12 electric utilities);

13 “(v) potential end-users of new tech-
14 nologies (such as users of high-tempera-
15 ture process heat for manufacturing proc-
16 essing, including petrochemical companies,
17 manufacturers of metals, or manufacturers
18 of concrete); and

19 “(vi) developers of advanced nuclear
20 reactor technology; and

21 “(G) seek to ensure that the demonstration
22 projects carried out under paragraph (1) do not
23 cause any delay in a deployment of an advanced
24 reactor by private industry and the Department

1 of Energy that is underway as of the date of
2 enactment of this section.

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

6 “(A) identify candidate technologies that—

7 “(i) are not developed sufficiently for
8 demonstration within the initial required
9 timeframe described in paragraph (1)(A);
10 but

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

13 “(B) identify technical challenges to the
14 candidate technologies identified in subpara-
15 graph (A);

16 “(C) support near-term research and devel-
17 opment to address the highest-risk technical
18 challenges to the successful demonstration of a
19 selected advanced reactor technology, in accord-
20 ance with—

21 “(i) subparagraph (B); and

22 “(ii) the research and development ac-
23 tivities under section 958;

24 “(D) establish such technology advisory
25 working groups as the Secretary determines to

1 be appropriate to advise the Secretary regard-
2 ing the technical challenges identified under
3 subparagraph (B) and the scope of research
4 and development programs to address the chal-
5 lenges, in accordance with subparagraph (C), to
6 be comprised of—

7 “(i) private-sector advanced nuclear
8 reactor technology developers;

9 “(ii) technical experts with respect to
10 the relevant technologies at institutions of
11 higher education; and

12 “(iii) technical experts at the National
13 Laboratories.

14 “(d) GOALS.—

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

20 “(2) COORDINATION.—In developing the goals
21 under paragraph (1), the Secretary shall coordinate,
22 on an ongoing basis, with members of private indus-
23 try to advance the demonstration of various designs
24 of advanced nuclear reactors.

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

4 “(A) research activities facilitated by the
5 Department to meet the goals developed under
6 this subsection are focused on key areas of nu-
7 clear research and deployment ranging from
8 basic science to full-design development, safety
9 evaluation, and licensing;

10 “(B) research programs designed to meet
11 the goals emphasize—

12 “(i) resolving materials challenges re-
13 lating to extreme environments, including
14 extremely high levels of—

15 “(I) radiation fluence;

16 “(II) temperature;

17 “(III) pressure; and

18 “(IV) corrosion; and

19 “(ii) qualification of advanced fuels;

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

23 “(D) related technologies, such as tech-
24 nologies to manage, reduce, or reuse nuclear
25 waste, are developed;

1 “(E) nuclear research infrastructure is
2 maintained or constructed, such as—

3 “(i) currently operational research re-
4 actors at the National Laboratories and in-
5 stitutions of higher education;

6 “(ii) hot cell research facilities;

7 “(iii) a versatile fast neutron source;

8 and

9 “(iv) a molten salt testing facility;

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

12 “(G) advanced sensors and control systems
13 are developed; and

14 “(H) advanced manufacturing and ad-
15 vanced construction techniques and materials
16 are investigated to reduce the cost of advanced
17 nuclear reactors.”.

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

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

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

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

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

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

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

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

9 “(a) IN GENERAL.—Not later than 180 days after
10 the date of enactment of this section, the Secretary shall
11 submit to the Committee on Energy and Natural Re-
12 sources of the Senate and the Committees on Energy and
13 Commerce and Science, Space, and Technology of the
14 House of Representatives a 10-year strategic plan for the
15 Office of Nuclear Energy of the Department, in accord-
16 ance with this section.

17 “(b) REQUIREMENTS.—

18 “(1) COMPONENTS.—The strategic plan under
19 this section shall designate—

20 “(A) programs that support the planned
21 accomplishment of—

22 “(i) the goals established under sec-
23 tion 959A; and

1 “(ii) the demonstration programs
2 identified under subsection (c) of that sec-
3 tion; and

4 “(B) programs that—

5 “(i) do not support the planned ac-
6 complishment of demonstration programs,
7 or the goals, referred to in subparagraph
8 (A); but

9 “(ii) are important to the mission of
10 the Office of Nuclear Energy, as deter-
11 mined by the Secretary.

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

15 “(A) the accomplishment of relevant objec-
16 tives under current programs of the Depart-
17 ment; or

18 “(B) the commencement of new programs
19 to accomplish those objectives.

20 “(c) UPDATES.—Not less frequently than once every
21 2 years, the Secretary shall submit to the Committee on
22 Energy and Natural Resources of the Senate and the
23 Committees on Energy and Commerce and Science, Space,
24 and Technology of the House of Representatives an up-
25 dated 10-year strategic plan in accordance with subsection

1 (b), which shall identify, and provide a justification for,
2 any major deviation from a previous strategic plan sub-
3 mitted under this section.”.

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

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

9 **SEC. 6. VERSATILE, REACTOR-BASED FAST NEUTRON**
10 **SOURCE.**

11 Section 955(c)(1) of the Energy Policy Act of 2005
12 (42 U.S.C. 16275(c)(1)) is amended—

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

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

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

18 (a) FINDINGS.—Congress finds that—

19 (1) the national security nuclear enterprise,
20 which supports the nuclear weapons stockpile stew-
21 ardship and naval reactors functions of the National
22 Nuclear Security Administration, requires a domes-
23 tic source of low- and high-enriched uranium in ac-
24 cordance with legal restrictions regarding foreign ob-

1 ligations relating to the beginning stage of the nu-
2 clear fuel cycle;

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

6 (A) initial fuel testing;

7 (B) operation of demonstration reactors;

8 and

9 (C) commercial operation of advanced nu-
10 clear reactors;

11 (3) nuclear fuel supply technology originating in
12 the United States is not required for use in civilian
13 advanced reactor applications;

14 (4) as of the date of enactment of this Act, no
15 domestic uranium enrichment or fuel fabrication ca-
16 pability is licensed for uranium fuel enriched to
17 greater than 5 weight percent of the uranium-235
18 isotope;

19 (5) a healthy commercial nuclear fuel cycle ca-
20 pable of providing higher levels of enriched uranium
21 would benefit—

22 (A) the relevant national security functions
23 of the National Nuclear Security Administra-
24 tion; and

1 (B) the domestic advanced nuclear indus-
2 try of the United States; and

3 (6) making limited quantities of high-assay,
4 low-enriched uranium available from Department of
5 Energy stockpiles of uranium would allow for initial
6 fuel testing and demonstration of advanced nuclear
7 reactor concepts, accelerating—

8 (A) the path to market of those concepts;
9 and

10 (B) the development of—

11 (i) a market for advanced nuclear re-
12 actors; and

13 (ii) a resulting growing commercial
14 nuclear fuel cycle capability.

15 (b) AMENDMENT.—

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

20 **“SEC. 960. ADVANCED NUCLEAR FUEL SECURITY PRO-**
21 **GRAM.**

22 **“(a) DEFINITIONS.—**In this section:

23 **“(1) HALEU TRANSPORTATION PACKAGE.—**
24 The term ‘HALEU transportation package’ means a

1 transportation package that is suitable for trans-
2 porting high-assay, low-enriched uranium.

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

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

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

9 ‘high-enriched uranium’ means uranium with an
10 assay of 20 weight percent or more of the uranium-
11 235 isotope.

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

14 “(1) ESTABLISHMENT.—Not later than 1 year
15 after the date of enactment of this section, the Sec-
16 retary shall establish a program to make available
17 high-assay, low-enriched uranium, through contracts
18 for sale, resale, transfer, or lease, for use in com-
19 mercial or noncommercial advanced nuclear reactors.

20 “(2) NUCLEAR FUEL OWNERSHIP.—Each lease
21 under this subsection shall include a provision estab-
22 lishing that the nuclear fuel that is the subject of
23 the lease shall remain the property of the Depart-
24 ment, including with respect to responsibility for the
25 final disposition of all radioactive waste created by

1 the irradiation, processing, or purification of any
2 leased uranium.

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

6 “(A) by December 31, 2022, high-assay,
7 low-enriched uranium containing not less than
8 2 metric tons of the uranium-235 isotope; and

9 “(B) by December 31, 2025, high-assay,
10 low-enriched uranium containing not less than
11 10 metric tons of the uranium-235 isotope (as
12 determined including the quantities of the ura-
13 nium-235 isotope made available before Decem-
14 ber 31, 2022).

15 “(4) FACTORS FOR CONSIDERATION.—In car-
16 rying out the program under this subsection, the
17 Secretary shall take into consideration—

18 “(A) options for providing the high-assay,
19 low-enriched uranium under this subsection
20 from a stockpile of uranium owned by the De-
21 partment (including the National Nuclear Secu-
22 rity Administration), including—

23 “(i) fuel that—

24 “(I) directly meets the needs of
25 an end-user; but

1 “(II) has been previously used or
2 fabricated for another purpose;

3 “(ii) fuel that can meet the needs of
4 an end-user after removing radioactive or
5 other contaminants that resulted from a
6 previous use or fabrication of the fuel for
7 research, development, demonstration, or
8 deployment activities of the Department
9 (including activities of the National Nu-
10 clear Security Administration); and

11 “(iii) fuel from a high-enriched ura-
12 nium stockpile, which can be blended with
13 lower-assay uranium to become high-assay,
14 low-enriched uranium to meet the needs of
15 an end-user; and

16 “(B) requirements to support molyb-
17 denum-99 production under the American Med-
18 ical Isotopes Production Act of 2012 (Public
19 Law 112–239; 126 Stat. 2211).

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

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

3 “(A) January 1, 2035; and

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

8 “(c) REPORT.—

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

14 “(A) under the program under subsection
15 (b); or

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

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

21 “(A) the Nuclear Regulatory Commission;

22 “(B) the National Laboratories;

23 “(C) institutions of higher education;

24 “(D) producers of medical isotopes;

1 “(E) a diverse group of entities operating
2 in the nuclear energy industry; and

3 “(F) a diverse group of technology devel-
4 opers.

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

9 “(4) REQUIRED EVALUATIONS.—The report
10 under this subsection shall evaluate—

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

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

21 “(ii) the potential to coordinate with
22 purchasers, transfer recipients, and lessees
23 regarding—

24 “(I) fuel fabrication; and

25 “(II) fuel transport;

1 “(B) the potential sources and fuel forms
2 available to provide uranium for the program
3 under subsection (b);

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

8 “(D) the ability of the domestic uranium
9 market to provide materials for advanced nu-
10 clear reactor fuel; and

11 “(E) any associated legal, regulatory, and
12 policy issues that should be addressed to en-
13 able—

14 “(i) the program under subsection (b);
15 and

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

21 “(I) the Department;

22 “(II) the Department of Defense;

23 and

24 “(III) the National Nuclear Se-
25 curity Administration.

1 “(d) HALEU TRANSPORTATION PACKAGE RE-
2 SEARCH PROGRAM.—

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

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

18 “(A) enrichment facilities;

19 “(B) fuel processing facilities;

20 “(C) fuel fabrication facilities; and

21 “(D) nuclear reactors.”.

22 “(2) TABLE OF CONTENTS.—The table of con-
23 tents of the Energy Policy Act of 2005 (Public Law
24 109–58; 119 Stat. 594) (as amended by section

1 5(b)) is amended by inserting after the item relating
2 to section 959B the following:

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

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

4 (a) FINDINGS.—Congress finds that—

5 (1) nuclear power plants—

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

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

13 (2) the world market for the growth of commer-
14 cial nuclear power was estimated by the Department
15 of Commerce to be valued at up to
16 \$740,000,000,000 during the period of calendar
17 years 2018 through 2028;

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

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

1 (ii) preserve and enhance the ability of the
2 United States to positively influence inter-
3 national nuclear safety, security, and non-
4 proliferation standards through commercial en-
5 gagement with other nations; but

6 (B) require significant investment in
7 United States-origin advanced nuclear tech-
8 nologies;

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

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

19 (A) the Department of Energy;

20 (B) the National Nuclear Security Admin-
21 istration; and

22 (C) the Nuclear Regulatory Commission;

23 (6) advanced reactors present new challenges
24 and opportunities in reactor design, safeguards, and
25 regulation;

1 (7) the challenges referred to in paragraph
2 (6)—

3 (A) are directly relevant to the missions
4 of—

5 (i) the Office of Nuclear Energy of
6 the Department of Energy;

7 (ii) the National Nuclear Security Ad-
8 ministration; and

9 (iii) the Nuclear Regulatory Commis-
10 sion; and

11 (B) require a highly skilled workforce in
12 order to be met; and

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

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

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

1 (C) support workforce development critical
2 to maintaining United States leadership in nu-
3 clear detection, nonproliferation, nuclear medi-
4 cine, advanced manufacturing, and other non-
5 energy areas.

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

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

11 “(a) DEFINITIONS.—In this section:

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

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

21 “(i) additional inherent safety fea-
22 tures;

23 “(ii) lower waste yields;

24 “(iii) improved fuel performance;

1 “(iv) increased tolerance to loss of
2 fuel cooling;

3 “(v) enhanced reliability;

4 “(vi) increased proliferation resist-
5 ance;

6 “(vii) increased thermal efficiency;

7 “(viii) reduced consumption of cooling
8 water;

9 “(ix) the ability to integrate into elec-
10 tric applications and nonelectric applica-
11 tions;

12 “(x) modular sizes to allow for deploy-
13 ment that corresponds with the demand
14 for electricity; or

15 “(xi) operational flexibility to respond
16 to changes in demand for electricity and to
17 complement integration with intermittent
18 renewable energy; and

19 “(B) a fusion reactor.

20 “(2) INSTITUTION OF HIGHER EDUCATION.—

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

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

4 “(b) ESTABLISHMENT.—The Secretary of Energy,
5 the Administrator of the National Nuclear Security Ad-
6 ministration, and the Chairman of the Nuclear Regulatory
7 Commission shall jointly establish a program, to be known
8 as the ‘University Nuclear Leadership Program’.

9 “(c) USE OF FUNDS.—

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

21 “(2) EXCEPTION.—Notwithstanding paragraph
22 (1), amounts made available to carry out the Pro-
23 gram may be used to provide financial assistance for
24 a scholarship, fellowship, or multiyear research and
25 development project that does not align directly with

1 a programmatic mission of the applicable Federal
2 agency providing the financial assistance, if the ac-
3 tivity for which assistance is provided would facili-
4 tate the maintenance of the discipline of nuclear
5 science or nuclear engineering.

6 “(d) AUTHORIZATION OF APPROPRIATIONS.—There
7 are authorized to be appropriated to carry out the Pro-
8 gram for fiscal year 2020 and each fiscal year thereafter—

9 “(1) \$30,000,000 to the Secretary of Energy,
10 of which \$15,000,000 shall be for use by the Admin-
11 istrator of the National Nuclear Security Adminis-
12 tration; and

13 “(2) \$15,000,000 to the Nuclear Regulatory
14 Commission.”.