

116TH CONGRESS
1ST SESSION

H. R. 3358

To amend the Energy Policy Act of 2005 to direct the Secretary of Energy to carry out demonstration projects relating to advanced nuclear reactor technologies to support domestic energy needs, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

JUNE 19, 2019

Mr. HIGGINS of Louisiana introduced the following bill; which was referred to the Committee on Science, Space, and Technology

A BILL

To amend the Energy Policy Act of 2005 to direct the Secretary of Energy to carry out demonstration projects relating to advanced nuclear reactor technologies to support domestic energy needs, 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,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Advanced Nuclear En-
5 ergy Technologies Act”.

1 **SEC. 2. ADVANCED NUCLEAR REACTOR RESEARCH AND DE-**
2 **VELOPMENT GOALS.**

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

6 **“SEC. 959A. ADVANCED NUCLEAR REACTOR RESEARCH**
7 **AND DEVELOPMENT GOALS.**

8 “(a) DEFINITIONS.—In this section:

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

11 “(A) nuclear fission or fusion reactor, in-
12 cluding a prototype plant (as defined in sections
13 50.2 and 52.1 of title 10, Code of Federal Reg-
14 ulations (or successor regulations)), with sig-
15 nificant improvements compared to commercial
16 nuclear reactors under construction as of the
17 date of enactment of this section, including im-
18 provements 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) DEMONSTRATION PROJECT.—The term
18 ‘demonstration project’ means an advanced nuclear
19 reactor operated—

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

22 “(B) in any other manner for the purpose
23 of demonstrating the suitability for commercial
24 application of the advanced nuclear reactor.

1 “(b) PURPOSE.—The purpose of this section is to di-
2 rect the Secretary, as soon as practicable after the date
3 of enactment of this section, to advance the research and
4 development of domestic advanced, affordable, and clean
5 nuclear energy by—

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

9 “(A) emission-free power at a cost of \$60
10 per mWh or less;

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

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

14 “(D) backup or mission-critical power sup-
15 plies;

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

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

23 “(4) facilitating the access of the private sec-
24 tor—

1 “(A) to Federal research facilities and per-
2 sonnel; and

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

6 “(c) DEMONSTRATION PROJECTS.—

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

9 “(A) complete not fewer than 2 advanced
10 nuclear reactor demonstration projects by not
11 later than December 31, 2025; and

12 “(B) establish a program to demonstrate
13 not fewer than 2, and not more than 4 addi-
14 tional operational advanced reactor designs by
15 not later than December 31, 2035.

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

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

22 “(i) primary coolants;

23 “(ii) fuel types and compositions; and

24 “(iii) neutron spectra;

25 “(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; and

5 “(ii) selected projects can meet the
6 deadline established in paragraph (1) to
7 demonstrate first-of-a-kind advanced nu-
8 clear reactor technologies, for which addi-
9 tional 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 a team desiring to
16 partner with the Department to dem-
17 onstrate a proposed advanced nuclear
18 reactor technology; and

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

22 “(C) ensure that each evaluation of can-
23 didate technologies for the demonstration
24 project is completed through an external review
25 of the proposed design, which shall be con-

1 ducted by a panel that includes not fewer than
2 1 representative of each of—

3 “(i) an electric utility relevant to the
4 intended initial deployment market;

5 “(ii) the local government of the in-
6 tended initial deployment market; and

7 “(iii) an entity that uses high-tem-
8 perature process heat for manufacturing or
9 industrial processing, such as a petro-
10 chemical company, a manufacturer of met-
11 als, or a manufacturer of concrete, if appli-
12 cable;

13 “(D) when applicable, enter into cost-shar-
14 ing agreements with partners in accordance
15 with section 988 for the conduct of activities re-
16 lating to the research, development, and dem-
17 onstration of private sector advanced nuclear
18 reactor designs under the program;

19 “(E) work with private sector partners to
20 identify potential sites, including Department
21 owned sites, for demonstrations, as appropriate;
22 and

23 “(F) align specific activities carried out
24 under demonstration projects carried out under

1 this subsection with priorities identified through
2 direct consultations between—

3 “(i) the Department;

4 “(ii) the National Laboratories;

5 “(iii) institutions of higher education;

6 “(iv) traditional end-users (such as
7 electric utilities);

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

14 “(vi) developers of advanced nuclear
15 reactor technology.

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

19 “(A) identify candidate technologies that—

20 “(i) are not developed sufficiently for
21 demonstration within the initial required
22 timeframe described in paragraph (1)(A);
23 but

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

1 “(B) identify technical challenges to the
2 candidate technologies identified in subpara-
3 graph (A);

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

9 “(i) subparagraph (B); and

10 “(ii) the research and development ac-
11 tivities under section 958; and

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

20 “(i) private sector advanced nuclear
21 reactor technology developers;

22 “(ii) technical experts with respect to
23 the relevant technologies at institutions of
24 higher education; and

1 “(iii) technical experts at the National
2 Laboratories.

3 “(d) GOALS.—

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

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

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

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

23 “(B) research programs designed to meet
24 the goals emphasize—

1 “(i) resolving materials challenges re-
2 relating to extreme environments, including
3 extremely high levels of—

4 “(I) radiation fluence;

5 “(II) temperature;

6 “(III) pressure; and

7 “(IV) corrosion; and

8 “(ii) qualification of advanced fuels;

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

12 “(D) related technologies, such as tech-
13 nologies to manage, reduce, or reuse nuclear
14 waste, are developed;

15 “(E) nuclear research infrastructure is
16 maintained or constructed, such as—

17 “(i) currently operational research re-
18 actors at the National Laboratories and in-
19 stitutions of higher education;

20 “(ii) hot cell research facilities;

21 “(iii) a versatile fast neutron source;

22 and

23 “(iv) a molten salt testing facility;

24 “(F) basic knowledge of nonlight water
25 coolant physics and chemistry is improved;

1 “(G) advanced sensors and control systems
2 are developed; and

3 “(H) advanced manufacturing and ad-
4 vanced construction techniques and materials
5 are investigated to reduce the cost of advanced
6 nuclear reactors.”.

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

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

12 (2) by amending the items relating to sections
13 957, 958, and 959 to read as follows:

“Sec. 957. High-performance computation and supportive research.

“Sec. 958. Enabling nuclear energy innovation.

“Sec. 959. Budget plan.”;

14 and

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

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

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

18 (a) IN GENERAL.—Subtitle E of title IX of the En-
19 ergy Policy Act of 2005 (42 U.S.C. 16271 et seq.) (as
20 amended by section 2(a)) is further amended by adding
21 at the end the following:

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

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

10 “(b) REQUIREMENTS.—

11 “(1) COMPONENTS.—The strategic plan under
12 this section shall designate—

13 “(A) programs that support the planned
14 accomplishment of—

15 “(i) the goals established under sec-
16 tion 959A; and

17 “(ii) the demonstration programs
18 identified under subsection (c) of that sec-
19 tion; and

20 “(B) programs that—

21 “(i) do not support the planned ac-
22 complishment of demonstration programs,
23 or the goals, referred to in subparagraph
24 (A); but

1 “(ii) are important to the mission of
2 the Office of Nuclear Energy, as deter-
3 mined by the Secretary.

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

7 “(A) the accomplishment of relevant objec-
8 tives under current programs of the Depart-
9 ment; or

10 “(B) the commencement of new programs
11 to accomplish those objectives.

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

21 (b) TABLE OF CONTENTS.—The table of contents of
22 the Energy Policy Act of 2005 (Public Law 109–58; 119
23 Stat. 594) is further amended by inserting after the item
24 relating to section 959A the following:

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

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