

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.

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## 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

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## 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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