

**AMENDMENT IN THE NATURE OF A SUBSTITUTE**  
**TO H.R. \_\_\_\_\_**  
**OFFERED BY M. \_\_\_\_\_**

Strike all after the enacting clause and insert the following:

**1 SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

2 (a) SHORT TITLE.—This Act may be cited as the  
3 “Advanced Nuclear Energy Innovation Act of 2020”.

4 (b) TABLE OF CONTENTS.—The table of contents for  
5 this Act is as follows:

- Sec. 1. Short title; table of contents.
- Sec. 2. Nuclear Energy Research and Development.
- Sec. 3. Advanced fuels development.
- Sec. 4. Versatile neutron source.
- Sec. 5. High-performance computation collaborative research program.
- Sec. 6. Nuclear energy strategic plan.

**6 SEC. 2. NUCLEAR ENERGY RESEARCH AND DEVELOPMENT.**

7 Section 952 of the Energy Policy Act of 2005 (42  
8 U.S.C. 16272) is amended by adding at the end the fol-  
9 lowing:

10 “(e) ADVANCED REACTOR TECHNOLOGIES RE-  
11 SEARCH AND DEVELOPMENT PROGRAM.—

12 “(1) IN GENERAL.—The Secretary shall carry  
13 out a program under which the Secretary shall con-  
14 duct research relating to the development of ad-

1 vanced nuclear energy technologies that may offer  
2 improved safety, functionality, and affordability.

3 “(2) REQUIREMENTS.—The program under this  
4 subsection shall—

5 “(A) support efforts to reduce long-term  
6 technical barriers for advanced nuclear energy  
7 systems; and

8 “(B) be carried out in consultation with  
9 the Nuclear Regulatory Commission to ensure  
10 identification of any relevant concerns.

11 “(3) PUBLIC-PRIVATE PARTNERSHIPS.—

12 “(A) IN GENERAL.—In carrying out the  
13 program authorized in paragraph (1), the Sec-  
14 retary shall, to the maximum extent practicable  
15 and consistent with national security, make  
16 available nuclear energy research infrastructure  
17 to industry partners in order to achieve faster  
18 and cost-effective development of advanced nu-  
19 clear energy technologies toward commercial  
20 readiness. In carrying out this subsection, the  
21 Secretary shall make available—

22 “(i) experimental capabilities and test-  
23 ing facilities;

24 “(ii) computational capabilities, mod-  
25 eling, and simulation tools;

1                   “(iii) access to existing datasets and  
2                   data validation tools; and

3                   “(iv) land use and site information for  
4                   demonstration facilities.

5                   “(B) SELECTION.—

6                   “(i) IN GENERAL.—The Secretary  
7                   shall select industry partners for awards  
8                   on a competitive, merit-reviewed basis.

9                   “(ii) CONSIDERATIONS.—In selecting  
10                  industry stakeholders under clause (i), the  
11                  Secretary shall consider—

12                   “(I) the information disclosed by  
13                   the Department under this paragraph;  
14                   and

15                   “(II) any existing facilities the  
16                   Department will provide for public-  
17                   private partnership activities.

18                  “(C) TERM.—An award made to an indus-  
19                  try partner under this subsection shall be for a  
20                  period of not more than 5 years, subject to the  
21                  availability of appropriations, after which the  
22                  award may be renewed, subject to a rigorous  
23                  merit review.

1           “(4) DEFINITION OF ADVANCED NUCLEAR EN-  
2           ERGY.—In this subsection, the term ‘advanced nu-  
3           clear energy’ means energy provided by—

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

11                           “(i) additional inherent safety fea-  
12                           tures;

13                           “(ii) lower waste yields;

14                           “(iii) improved fuel performance;

15                           “(iv) increased tolerance to loss of  
16                           fuel cooling;

17                           “(v) enhanced reliability;

18                           “(vi) increased proliferation resist-  
19                           ance;

20                           “(vii) increased thermal efficiency;

21                           “(viii) reduced consumption of cooling  
22                           water;

23                           “(ix) the ability to integrate into elec-  
24                           tric applications and nonelectric applica-  
25                           tions;

1 “(x) modular sizes to allow for deploy-  
2 ment that corresponds with the demand  
3 for electricity; or

4 “(xi) operational flexibility to respond  
5 to changes in demand for electricity and to  
6 complement integration with intermittent  
7 renewable energy; or

8 “(B) a fusion reactor.”.

9 **SEC. 3. ADVANCED FUELS DEVELOPMENT.**

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

12 (1) by inserting before subsection (a) the fol-  
13 lowing:

14 “(a) MATERIAL RECOVERY AND WASTE FORM DE-  
15 VELOPMENT.—”; and

16 (2) by redesignating subsections (a) through (d)  
17 as paragraphs (1), (3), (4), and (5) of subsection  
18 (a), respectively;

19 (3) in paragraph (1) (as so redesignated)—

20 (A) by striking “this section” and inserting  
21 “this subsection”;

22 (B) by striking “minimize environmental”  
23 and inserting “improve fuel cycle performance  
24 while minimizing the cost and complexity of  
25 processing, environmental impacts,”; and

1 (C) by striking “the Generation IV”;

2 (4) by inserting after paragraph (1) (as so re-  
3 designated) the following:

4 “(2) CONSIDERATIONS.—In carrying out activi-  
5 ties under the program, the Secretary shall consider  
6 the potential benefits of those activities for civilian  
7 nuclear applications, environmental remediation, and  
8 national security.”;

9 (5) by adding at the end the following:

10 “(b) ADVANCED FUELS.—

11 “(1) IN GENERAL.—The Secretary shall carry  
12 out a program to conduct research relating to—

13 “(A) next-generation light water reactor  
14 fuels that demonstrate improved—

15 “(i) performance; and

16 “(ii) accident tolerance; and

17 “(B) advanced reactor fuels that dem-  
18 onstrate improved—

19 “(i) proliferation resistance; and

20 “(ii) use of resources.

21 “(2) REQUIREMENTS.—In carrying out the pro-  
22 gram under this subsection, the Secretary shall—

23 “(A) focus on the development of accident-  
24 tolerant fuel and cladding concepts that are ca-

1 pable of achieving initial commercialization by  
2 December 31, 2025;

3 “(B) conduct studies regarding the means  
4 by which those concepts would impact reactor  
5 economics, the fuel cycle, operations, safety,  
6 and the environment;

7 “(C) subject to paragraph (3), publish the  
8 results of the studies conducted under subpara-  
9 graph (B); and

10 “(D) cooperate with institutions of higher  
11 education through the Nuclear Energy Univer-  
12 sity and Integrated Research Projects programs  
13 of the Department.

14 “(3) SENSITIVE INFORMATION.—The Secretary  
15 shall not publish any information under paragraph  
16 (2)(C) that is detrimental to national security, as de-  
17 termined by the Secretary.”.

18 **SEC. 4. VERSATILE NEUTRON SOURCE.**

19 Section 955(c) of the Energy Policy Act of 2005 (42  
20 U.S.C. 16275(c)(1)) is amended to read as follows:

21 “(c) VERSATILE NEUTRON SOURCE.—

22 “(1) IN GENERAL.—In order to advance the re-  
23 search and development of domestic advanced, af-  
24 fordable, secure, and clean nuclear energy, the Sec-  
25 retary of Energy shall construct a versatile reactor-

1 based fast neutron source, which shall operate as a  
2 national user facility. The Secretary shall consult  
3 with the private sector, universities, National Lab-  
4 oratories, and relevant Federal agencies to ensure  
5 that the versatile neutron source is capable of meet-  
6 ing Federal research needs for neutron irradiation  
7 services.

8 “(2) FACILITY CAPABILITIES.—

9 “(A) CAPABILITIES.—The Secretary shall  
10 ensure that the facility described in paragraph  
11 (1) will provide, at a minimum, the following  
12 capabilities:

13 “(i) Fast neutron spectrum irradiation  
14 capability.

15 “(ii) Capacity for upgrades to accom-  
16 modate new or expanded research needs.

17 “(B) CONSIDERATIONS.—In carrying out  
18 subparagraph (A), the Secretary shall consider  
19 the following:

20 “(i) Capabilities that support experi-  
21 mental high-temperature testing.

22 “(ii) Providing a source of fast neu-  
23 trons at a neutron flux higher than that at  
24 which existing research facilities operate,



1 sufficient to enable research for an optimal  
2 base of prospective users.

3 “(iii) Maximizing irradiation flexibility  
4 and irradiation volume to accommodate as  
5 many concurrent users as possible.

6 “(iv) Capabilities for irradiation with  
7 neutrons of a lower energy spectrum.

8 “(v) Multiple loops for fuels and ma-  
9 terials testing of different coolants.

10 “(vi) Additional pre-irradiation and  
11 post-irradiation examination capabilities.

12 “(vii) Lifetime operating costs and  
13 lifecycle costs.

14 “(3) START OF OPERATIONS.—The Secretary  
15 shall, to the maximum extent practicable, ensure  
16 that the start of full operations of the facility under  
17 this subsection occurs before December 31, 2026.

18 “(4) REPORTING.—The Secretary shall include  
19 in the annual budget request of the Department an  
20 explanation for any delay in the process of the De-  
21 partment in completing the user facility under this  
22 subsection by the deadline described in paragraph  
23 (3).

24 “(5) COORDINATION.—The Secretary shall le-  
25 verage the best practices for management, construc-

1 tion, and operation of national user facilities from  
2 the Office of Science.

3 “(6) AUTHORIZATION OF APPROPRIATIONS.—

4 There are authorized to be appropriated to the Sec-  
5 retary for the Office of Nuclear Energy to carry out  
6 to completion the construction of the facility under  
7 this subsection—

8 “(A) \$300,000,000 for fiscal year 2021;

9 “(B) \$550,000,000 for fiscal year 2022;

10 “(C) \$638,000,000 for fiscal year 2023;

11 “(D) \$765,000,000 for fiscal year 2024;

12 and

13 “(E) \$763,000,000 for fiscal year 2025.”.

14 **SEC. 5. HIGH-PERFORMANCE COMPUTATION COLLABO-**  
15 **RATIVE RESEARCH PROGRAM.**

16 Section 957 of the Energy Policy Act of 2005 (42  
17 U.S.C. 16277) is amended by adding at the end the fol-  
18 lowing:

19 “(d) DUPLICATION.—The Secretary shall ensure the  
20 coordination of, and avoid unnecessary duplication of, the  
21 activities of this program with the activities of—

22 “(1) other research entities of the Department,  
23 including the National Laboratories, the Advanced  
24 Research Projects Agency–Energy, the Advanced  
25 Scientific Computing Research program; and

1 “(2) industry.”.

2 **SEC. 6. NUCLEAR ENERGY STRATEGIC PLAN.**

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. NUCLEAR ENERGY STRATEGIC PLAN.**

7 “(a) IN GENERAL.—Not later than 1 year after the  
8 date of enactment of this Act, the Secretary shall submit  
9 to the Committee on Energy and Natural Resources of  
10 the Senate and the Committees on Energy and Commerce  
11 and Science, Space, and Technology of the House of Rep-  
12 resentatives a 10-year strategic plan for the Office of Nu-  
13 clear Energy of the Department, in accordance with this  
14 section.

15 “(b) REQUIREMENTS.—In developing the strategic  
16 plan under this section, the Secretary shall specify ex-  
17 pected timelines for, as applicable—

18 “(1) the accomplishment of relevant objectives  
19 under current programs of the Department; or

20 “(2) the commencement of new programs to ac-  
21 complish those objectives.

22 “(c) UPDATES.—Not less frequently than once every  
23 2 years, the Secretary shall submit to the Committee on  
24 Energy and Natural Resources of the Senate and the  
25 Committees on Energy and Commerce and Science, Space,

1 and Technology of the House of Representatives an up-  
2 dated 10-year strategic plan in accordance with subsection  
3 (b), which shall identify, and provide a justification for,  
4 any major deviation from a previous strategic plan sub-  
5 mitted under this section.”.

6 (b) TABLE OF CONTENTS.—Section 1(b) of the En-  
7 ergy Policy Act of 2005 (42 U.S.C. 15801 note) is amend-  
8 ed in the table of contents by inserting after the item re-  
9 lating to section 959 the following:

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

Amend the title so as to read: “A bill to establish and support advanced nuclear energy research and development programs at the Department of Energy, and for other purposes.”.

