

**AMENDMENT IN THE NATURE OF A SUBSTITUTE  
TO H.R. 4084  
OFFERED BY MR. SMITH OF TEXAS**

Strike all after the enacting clause and insert the following:

**1 SECTION 1. SHORT TITLE.**

2       This Act may be cited as the “Nuclear Energy Inno-  
3 vation Capabilities Act”.

**4 SEC. 2. NUCLEAR ENERGY.**

5       Section 951 of the Energy Policy Act of 2005 (42  
6 U.S.C. 16271) is amended to read as follows:

**7 “SEC. 951. NUCLEAR ENERGY.**

8       “(a) MISSION.—The Secretary shall conduct pro-  
9 grams of civilian nuclear research, development, dem-  
10 onstration, and commercial application, including activi-  
11 ties in this subtitle. Such programs shall take into consid-  
12 eration the following objectives:

13               “(1) Providing research infrastructure to pro-  
14 mote scientific progress and enable users from aca-  
15 demia, the National Laboratories, and the private  
16 sector to make scientific discoveries relevant for nu-  
17 clear, chemical, and materials science engineering.

1           “(2) Maintaining National Laboratory and uni-  
2           versity nuclear energy research and development  
3           programs, including their infrastructure.

4           “(3) Providing the technical means to reduce  
5           the likelihood of nuclear weapons proliferation and  
6           increasing confidence margins for public safety of  
7           nuclear energy systems.

8           “(4) Reducing the environmental impact of nu-  
9           clear energy related activities.

10          “(5) Supporting technology transfer from the  
11          National Laboratories to the private sector.

12          “(6) Enabling the private sector to partner with  
13          the National Laboratories to demonstrate novel reac-  
14          tor concepts for the purpose of resolving technical  
15          uncertainty associated with the aforementioned ob-  
16          jectives in this subsection.

17          “(b) DEFINITIONS.—In this subtitle:

18                 “(1) ADVANCED FISSION REACTOR.—The term  
19                 ‘advanced fission reactor’ means a nuclear fission re-  
20                 actor with significant improvements over the most  
21                 recent generation of nuclear reactors, which may in-  
22                 clude inherent safety features, lower waste yields,  
23                 greater fuel utilization, superior reliability, resist-  
24                 ance to proliferation, and increased thermal effi-  
25                 ciency.

1           “(2) FAST NEUTRON.—The term ‘fast neutron’  
2 means a neutron with kinetic energy above 100  
3 kiloelectron volts.

4           “(3) NATIONAL LABORATORY.—The term ‘Na-  
5 tional Laboratory’ has the meaning given that term  
6 in paragraph (3) of section 2, except that with re-  
7 spect to subparagraphs (G), (H), and (N) of such  
8 paragraph, for purposes of this subtitle the term in-  
9 cludes only the civilian activities thereof.

10           “(4) NEUTRON FLUX.—The term ‘neutron flux’  
11 means the intensity of neutron radiation measured  
12 as a rate of flow of neutrons applied over an area.

13           “(5) NEUTRON SOURCE.—The term ‘neutron  
14 source’ means a research machine that provides neu-  
15 tron irradiation services for research on materials  
16 sciences and nuclear physics as well as testing of ad-  
17 vanced materials, nuclear fuels, and other related  
18 components for reactor systems.

19           “(c) SENSE OF CONGRESS.—It is the sense of the  
20 Congress that nuclear energy, through fission or fusion,  
21 represents the highest energy density of any known attain-  
22 able source and yields zero air emissions. This energy  
23 source is of national importance to scientific progress, na-  
24 tional security, electricity generation, heat generation for  
25 industrial applications, and space exploration. Considering

1 the inherent complexity and regulatory burden associated  
2 with this area of science, the Department should focus its  
3 civilian nuclear research and development activities to-  
4 wards programs that enable the private sector, National  
5 Laboratories, and universities to carry out such experi-  
6 ments as are necessary to promote scientific progress and  
7 enhance practical knowledge of nuclear engineering.”.

8 **SEC. 3. NUCLEAR ENERGY RESEARCH PROGRAMS.**

9 Section 952 of the Energy Policy Act of 2005 (42  
10 U.S.C. 16272) is amended—

11 (1) by striking subsection (c); and

12 (2) by redesignating subsections (d) and (e) as  
13 subsections (c) and (d), respectively.

14 **SEC. 4. ADVANCED FUEL CYCLE INITIATIVE.**

15 Section 953(a) of the Energy Policy Act of 2005 (42  
16 U.S.C. 16273(a)) is amended by striking “, acting  
17 through the Director of the Office of Nuclear Energy,  
18 Science and Technology,”.

19 **SEC. 5. UNIVERSITY NUCLEAR SCIENCE AND ENGINEERING**  
20 **SUPPORT.**

21 Section 954(d)(4) of the Energy Policy Act of 2005  
22 (42 U.S.C. 16274(d)(4)) is amended by striking “as part  
23 of a taking into consideration effort that emphasizes” and  
24 inserting “that emphasize”.

1 **SEC. 6. DEPARTMENT OF ENERGY CIVILIAN NUCLEAR IN-**  
2 **FRASTRUCTURE AND FACILITIES.**

3 Section 955 of the Energy Policy Act of 2005 (42  
4 U.S.C. 16275) is amended—

5 (1) by striking subsections (c) and (d); and

6 (2) by adding at the end the following:

7 “(c) VERSATILE NEUTRON SOURCE.—

8 “(1) MISSION NEED.—Not later than December  
9 31, 2016, the Secretary shall determine the mission  
10 need for a versatile reactor-based fast neutron  
11 source, which shall operate as a national user facil-  
12 ity. During this process, the Secretary shall consult  
13 with the private sector, universities, National Lab-  
14 oratories, and relevant Federal agencies to ensure  
15 that this user facility will meet the research needs  
16 of the largest possible majority of prospective users.

17 “(2) ESTABLISHMENT.—Upon the determina-  
18 tion of mission need made under paragraph (1), the  
19 Secretary shall, as expeditiously as possible, provide  
20 to the Committee on Science, Space, and Technology  
21 of the House of Representatives and the Committee  
22 on Energy and Natural Resources of the Senate a  
23 detailed plan for the establishment of the user facil-  
24 ity.

25 “(3) FACILITY REQUIREMENTS.—

1           “(A) CAPABILITIES.—The Secretary shall  
2 ensure that this user facility will provide, at a  
3 minimum, the following capabilities:

4           “(i) Fast neutron spectrum irradiation  
5           capability.

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

8           “(B) CONSIDERATIONS.—In carrying out  
9 the plan provided under paragraph (2), the Sec-  
10 retary shall consider the following:

11           “(i) Capabilities that support experi-  
12 mental high-temperature testing.

13           “(ii) Providing a source of fast neu-  
14 trons at a neutron flux, higher than that  
15 at which current research facilities operate,  
16 sufficient to enable research for an optimal  
17 base of prospective users.

18           “(iii) Maximizing irradiation flexibility  
19 and irradiation volume to accommodate as  
20 many concurrent users as possible.

21           “(iv) Capabilities for irradiation with  
22 neutrons of a lower energy spectrum.

23           “(v) Multiple loops for fuels and ma-  
24 terials testing in different coolants.

1                   “(vi) Additional pre-irradiation and  
2                   post-irradiation examination capabilities.

3                   “(vii) Lifetime operating costs and  
4                   lifecycle costs.

5                   “(4) REPORTING PROGRESS.—The Department  
6                   shall, in its annual budget requests, provide an ex-  
7                   planation for any delay in its progress and otherwise  
8                   make every effort to complete construction and ap-  
9                   prove the start of operations for this facility by De-  
10                  cember 31, 2025.

11                  “(5) COORDINATION.—The Secretary shall le-  
12                  verage the best practices for management, construc-  
13                  tion, and operation of national user facilities from  
14                  the Office of Science.”.

15 **SEC. 7. SECURITY OF NUCLEAR FACILITIES.**

16                  Section 956 of the Energy Policy Act of 2005 (42  
17                  U.S.C. 16276) is amended by striking “, acting through  
18                  the Director of the Office of Nuclear Energy, Science and  
19                  Technology,”.

20 **SEC. 8. HIGH-PERFORMANCE COMPUTATION AND SUP-**  
21 **PORTIVE RESEARCH.**

22                  Section 957 of the Energy Policy Act of 2005 (42  
23                  U.S.C. 16277) is amended to read as follows:

1 **“SEC. 957. HIGH-PERFORMANCE COMPUTATION AND SUP-**  
2 **PORTIVE RESEARCH.**

3 “(a) MODELING AND SIMULATION.—The Secretary  
4 shall carry out a program to enhance the Nation’s capa-  
5 bilities to develop new reactor technologies through high-  
6 performance computation modeling and simulation tech-  
7 niques. This program shall coordinate with relevant Fed-  
8 eral agencies through the National Strategic Computing  
9 Initiative created under Executive Order 13702 (July 29,  
10 2015) while taking into account the following objectives:

11 “(1) Utilizing expertise from the private sector,  
12 universities, and National Laboratories to develop  
13 computational software and capabilities that pro-  
14 spective users may access to accelerate research and  
15 development of advanced fission reactor systems, nu-  
16 clear fusion systems, and reactor systems for space  
17 exploration.

18 “(2) Developing computational tools to simulate  
19 and predict nuclear phenomena that may be vali-  
20 dated through physical experimentation.

21 “(3) Increasing the utility of the Department’s  
22 research infrastructure by coordinating with the Ad-  
23 vanced Scientific Computing Research program  
24 within the Office of Science.

25 “(4) Leveraging experience from the Energy In-  
26 novation Hub for Modeling and Simulation.



1           “(5) Ensuring that new experimental and com-  
2           putational tools are accessible to relevant research  
3           communities.

4           “(b) SUPPORTIVE RESEARCH ACTIVITIES.—The Sec-  
5           retary shall consider support for additional research activi-  
6           ties to maximize the utility of its research facilities, includ-  
7           ing physical processes to simulate degradation of materials  
8           and behavior of fuel forms and for validation of computa-  
9           tional tools.”.

10 **SEC. 9. ENABLING NUCLEAR ENERGY INNOVATION.**

11           Subtitle E of title IX of the Energy Policy Act of  
12           2005 (42 U.S.C. 16271 et seq.) is amended by adding at  
13           the end the following:

14 **“SEC. 958. ENABLING NUCLEAR ENERGY INNOVATION.**

15           “(a) NATIONAL REACTOR INNOVATION CENTER.—  
16           The Secretary shall carry out a program to enable the  
17           testing and demonstration of reactor concepts to be pro-  
18           posed and funded by the private sector. The Secretary  
19           shall leverage the technical expertise of relevant Federal  
20           agencies and National Laboratories in order to minimize  
21           the time required to enable construction and operation of  
22           privately funded experimental reactors at National Lab-  
23           oratories or other Department-owned sites while ensuring  
24           reasonable safety for persons working within these sites.

1 Such reactors shall operate to meet the following objec-  
2 tives:

3           “(1) Enabling physical validation of novel reac-  
4 tor concepts.

5           “(2) Resolving technical uncertainty and in-  
6 creasing practical knowledge relevant to safety, resil-  
7 ience, security, and functionality of first-of-a-kind  
8 reactor concepts.

9           “(3) General research and development to im-  
10 prove nascent technologies.

11       “(b) REPORTING REQUIREMENT.—Not later than  
12 180 days after the date of enactment of the Nuclear En-  
13 ergy Innovation Capabilities Act, the Secretary, in con-  
14 sultation with the National Laboratories, relevant Federal  
15 agencies, and other stakeholders, shall transmit to the  
16 Committee on Science, Space, and Technology of the  
17 House of Representatives and the Committee on Energy  
18 and Natural Resources of the Senate a report assessing  
19 the Department’s capabilities to authorize, host, and over-  
20 see privately funded fusion and advanced fission experi-  
21 mental reactors as described under subsection (a). The re-  
22 port shall address the following:

23           “(1) The Department’s safety review and over-  
24 sight capabilities, including options to leverage ex-

1       pertise from the Nuclear Regulatory Commission  
2       and National Laboratories.

3               “(2) Potential sites capable of hosting activities  
4       described under subsection (a).

5               “(3) The efficacy of the Department’s available  
6       contractual mechanisms to partner with the private  
7       sector and Federal agencies, including cooperative  
8       research and development agreements, strategic  
9       partnership projects, and agreements for commer-  
10      cializing technology.

11              “(4) Potential cost structures related to phys-  
12      ical security, decommissioning, liability, and other  
13      long-term project costs.

14              “(5) Other challenges or considerations identi-  
15      fied by the Secretary.”.

16   **SEC. 10. BUDGET PLAN.**

17       Subtitle E of title IX of the Energy Policy Act of  
18   2005 (42 U.S.C. 16271 et seq.) is further amended by  
19   adding at the end the following:

20   **“SEC. 959. BUDGET PLAN.**

21       “Not later than 12 months after the date of enact-  
22   ment of the Nuclear Energy Innovation Capabilities Act,  
23   the Department shall transmit to the Committee on  
24   Science, Space, and Technology of the House of Rep-  
25   resentatives and the Committee on Energy and Natural

1 Resources of the Senate 3 alternative 10-year budget  
2 plans for civilian nuclear energy research and development  
3 by the Department. The first shall assume constant an-  
4 nual funding for 10 years at the appropriated level for  
5 the Department's civilian nuclear energy research and de-  
6 velopment for fiscal year 2016. The second shall assume  
7 2 percent annual increases to the appropriated level for  
8 the Department's nuclear energy research and develop-  
9 ment for fiscal year 2016. The third shall be an uncon-  
10 strained budget. The 3 plans shall include—

11           “(1) a prioritized list of the Department's pro-  
12           grams, projects, and activities to best support the  
13           development of next generation nuclear energy tech-  
14           nology;

15           “(2) realistic budget requirements for the De-  
16           partment to implement sections 955(c), 957, and  
17           958 of this Act; and

18           “(3) the Department's justification for con-  
19           tinuing or terminating existing civilian nuclear en-  
20           ergy research and development programs.”.

21 **SEC. 11. CONFORMING AMENDMENTS.**

22           The table of contents for the Energy Policy Act of  
23 2005 is amended by striking the item relating to section  
24 957 and inserting the following:

“957. High-performance computation and supportive research.

“958. Enabling nuclear energy innovation.  
“959. Budget plan.”.

