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(Original Signature of Member)

118TH CONGRESS
2D SESSION

H. R. _____

To provide guidance for and investment in the research and development activities of artificial intelligence at the Department of Energy, and for other purposes.

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IN THE HOUSE OF REPRESENTATIVES

Mr. WILLIAMS of New York introduced the following bill; which was referred to the Committee on _____

_____

A BILL

To provide guidance for and investment in the research and development activities of artificial intelligence at the Department of Energy, 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 "Department of Energy

5   Artificial Intelligence Act of 2024".

1 **SEC. 2. DEPARTMENT OF ENERGY ARTIFICIAL INTEL-**

2 **LIGENCE RESEARCH PROGRAM.**

3 (a) IN GENERAL.—Title LV of the William M. (Mac)

4 Thornberry National Defense Authorization Act of 2021

5 (Public Law 116–283) is amended to read as follows:

6 **"TITLE LV—DEPARTMENT OF**

7 **ENERGY ARTIFICIAL INTEL-**

8 **LIGENCE RESEARCH PRO-**

9 **GRAM**

"Sec. 5501. Department of Energy artificial intelligence research program.
"Sec. 5502. Ensuring energy security for data centers and computing resources.

10 **"SEC. 5501. DEPARTMENT OF ENERGY ARTIFICIAL INTEL-**

11 **LIGENCE RESEARCH PROGRAM.**

12 "(a) IN GENERAL.—The Secretary shall carry out a

13 cross-cutting research and development program to ad-

14 vance artificial intelligence tools, systems, capabilities, and

15 workforce needs and develop artificial intelligence capabili-

16 ties for the purposes of advancing the missions of the De-

17 partment (in this section referred to as the 'program').

18 In carrying out such program, the Secretary shall coordi-

19 nate across all relevant offices and programs of the De-

20 partment, including the Office of Science, the Office of

21 Energy Efficiency and Renewable Energy, the Office of

22 Nuclear Energy, the Office of Fossil Energy, the Office

23 of Electricity, the Office of Cybersecurity, Energy Secu-

1 rity, Emergency Response, and the Advanced Research

2 Projects Agency-Energy.

3   ''(b) RESEARCH AREAS.—In carrying out the pro-

4 gram, the Secretary shall award financial assistance to eli-

5 gible entities to carry out research projects on topics in-

6 cluding the following:

7   ''(1) The application of artificial intelligence

8   systems to improve large-scale simulations of natural

9   and other phenomena.

10   ''(2) The study of applied mathematics, com-

11   puter science, and statistics, including foundations

12   of methods and systems of artificial intelligence,

13   causal and statistical inference, and the development

14   of algorithms for artificial intelligence systems.

15   ''(3) The analysis of existing and new large-

16   scale datasets from science and engineering experi-

17   ments and simulations, including energy simulations

18   and sponsored research activities, and, as deter-

19   mined by the Secretary, other priorities of the De-

20   partment that utilize artificial intelligence tools and

21   techniques.

22   ''(4) The development of operation and control

23   systems that enhance automated, intelligent deci-

24   sion-making capabilities.

4

1 "(5) The development of advanced computing

2 hardware and computer architecture tailored to arti-

3 ficial intelligence systems, including the following:

4   "(A) The codesign of software and com-

5 putational hardware.

6   "(B) Energy-efficient computing hardware

7 and algorithms for artificial intelligence train-

8 ing and inference.

9   "(C) Mechanisms to improve the energy ef-

10 ficiency of data centers, including relevant en-

11 ergy efficiency benchmarks for such centers.

12 "(6) The aggregation, curation, and distribu-

13 tion of standardized datasets for emerging artificial

14 intelligence research fields and applications, includ-

15 ing methods for addressing data scarcity.

16 "(7) The development of advanced artificial in-

17 telligence systems for pressing scientific, energy, and

18 national security applications.

19 "(8) The development of trustworthy artificial

20 intelligence systems, including the following:

21   "(A) Algorithmic explainability.

22   "(B) Analytical methods for identifying

23 and mitigating bias in artificial intelligence sys-

24 tems.

5

1   "(C) Safety and robustness, including as-

2   surance, verification, validation, security, and

3   control.

4   "(c) TECHNOLOGY TRANSFER.—In carrying out the

5 program, the Secretary shall support technology transfer

6 of artificial intelligence systems for the benefit of society

7 and United States economic competitiveness.

8   "(d) FACILITY USE AND UPGRADES.—In carrying

9 out the program, the Secretary shall carry out the fol-

10 lowing:

11   "(1) Make available high-performance com-

12   puting infrastructure at National Laboratories for

13   the development and use of advanced artificial intel-

14   ligence systems.

15   "(2) Make any upgrades necessary to enhance

16   the use of existing computing facilities for artificial

17   intelligence systems, including upgrades to hardware

18   and other resources necessary for developing, train-

19   ing, and evaluating advanced artificial intelligence

20   technologies.

21   "(3) Establish new computing capabilities nec-

22   essary to manage data and conduct high perform-

23   ance computing that enables the development and

24   use of advanced artificial intelligence systems.

1   "(4) Maintain and improve, as needed, net-
2   working infrastructure, data input and output mech-
3   anisms, and data analysis, storage, and service capa-
4   bilities.

5   "(5) Facilitate the development of unclassified
6   and classified high-performance computing systems
7   and artificial intelligence platforms through Depart-
8   ment-owned infrastructure data and computing fa-
9   cilities.

10   "(6) Provide other resources necessary for the
11 Department to develop, train, and evaluate advanced
12 artificial intelligence systems and related tech-
13 nologies;

14 "(e) TESTBEDS FOR NEXT-GENERATION COMPUTING
15 PLATFORMS AND INFRASTRUCTURE.—

16   "(1) IN GENERAL.—In carrying out the pro-
17 gram, the Secretary shall establish at least one data
18 center testbed for the development and assessment
19 of hardware and algorithms for energy-efficient and
20 energy-flexible artificial intelligence training and in-
21 ference.

22   "(2) ACTIVITIES.—In carrying out the testbed
23 established under paragraph (1), the Secretary shall
24 carry out the following:

1 "(A) Test and evaluate new software,

2 hardware, codesign of hardware and software,

3 algorithms, networking, and other artificial in-

4 telligence-based technologies and applications to

5 improve energy efficiency across the artificial

6 intelligence ecosystem.

7 "(B) Carry out cooperative research

8 projects with industry, including end user com-

9 panies, hardware systems vendors, artificial in-

10 telligence developers, data center developers and

11 operators, energy utilities, and other appro-

12 priate stakeholders.

13 "(f) AGGREGATION, CURATION, AND DISTRIBUTION

14 OF ARTIFICIAL INTELLIGENCE TRAINING DATASETS.—In

15 carrying out activities described in subsection (b)(6), the

16 Secretary shall develop methods, platforms, protocols, and

17 other tools required for efficient, responsible, and effective

18 aggregation, generation, curation, and distribution of arti-

19 ficial intelligence training and inference datasets, includ-

20 ing the following:

21 "(1) Assembling, aggregating, and curating

22 large-scale training data for advanced artificial intel-

23 ligence systems, including outputs from research

24 programs of the Department and other open science

25 data, with the goal of developing comprehensive sci-

1 entific artificial intelligence training databases and

2 testing and validation data.

3   ''(2) Developing dataset documentation and

4 metadata protocols and visualization tools, taking

5 into account appropriate standards and guidelines to

6 promote interoperability and consistency in docu-

7 mentation.

8   ''(3) Developing and implementing appropriate

9 data management plans for the ethical, responsible,

10 and secure use of classified and unclassified sci-

11 entific data.

12   ''(4) Identifying, curating, and safely distrib-

13 uting, as appropriate based on the application, the

14 following:

15   ''(A) Scientific and experimental depart-

16 mental datasets.

17   ''(B) Sponsored research activities that are

18 needed for the training of foundational and

19 adapted downstream artificial intelligence sys-

20 tems.

21   ''(5) Partnering with stakeholders to curate

22 critical datasets that reside outside the Department

23 but are determined by the Secretary to be critical to

24 optimizing the capabilities of advanced artificial in-

1 telligence systems relevant to the missions of the De-

2 partment.

3 "(g) DEVELOPMENT OF ADVANCED ARTIFICIAL IN-

4 TELLIGENCE SYSTEMS FOR PRESSING SCIENTIFIC, EN-

5 ERGY, AND NATIONAL SECURITY APPLICATIONS.—In car-

6 rying out subsection (b)(7), the Secretary shall carry out

7 the following:

8 "(1) Develop innovative concepts in applied

9 mathematics, computer science, engineering, and

10 other science disciplines needed for advanced artifi-

11 cial intelligence systems.

12 "(2) Develop best-in-class advanced artificial in-

13 telligence systems, model derivatives that support

14 downstream use cases, and other technologies to

15 solve pressing scientific, energy, and national secu-

16 rity challenges.

17 "(3) Carry out cooperative research projects

18 with industry, including end user companies, hard-

19 ware systems vendors, and artificial intelligence soft-

20 ware companies, to advance artificial intelligence

21 technologies relevant to the missions of the Depart-

22 ment and mitigate risks associated with such tech-

23 nologies.

24 "(4) In coordination with the Secretary of Com-

25 merce and the Secretary of Homeland Security, re-

1 search counter-adversarial artificial intelligence solu-

2 tions to predict, prevent, mitigate, and respond to

3 threats to critical infrastructure, energy security,

4 and nuclear nonproliferation, and biological and

5 chemical threats.

6 ''(5) In coordination with energy utilities, State

7 energy offices, data center developers and operators,

8 and other key stakeholders the Secretary determines

9 appropriate, carry out research to examine how arti-

10 ficial intelligence technologies may be impacted by or

11 applied to energy supply bottlenecks, energy demand

12 projections, site reliability challenges, and data cen-

13 ter operational flexibilities.

14 ''(6) Establish crosscutting research efforts to

15 understand and mitigate artificial intelligence-related

16 risks, including the establishment of unclassified and

17 classified data platforms across the Department.

18 ''(h) SHARED RESOURCES FOR ARTIFICIAL INTEL-

19 LIGENCE.—

20 ''(1) IN GENERAL.—As part of the program,

21 the Secretary shall identify, support, and sustain

22 shared resources and enabling tools that have the

23 potential to accelerate the pace of scientific discovery

24 and technological innovation with respect to the mis-

1 sions of the Department relating to science, energy,

2 and national security.

3 "(2) CONSULTATION.—In carrying out para-

4 graph (1), the Secretary shall consult with relevant

5 experts in the Federal Government, industry, energy

6 utilities, academia, State energy offices, and the Na-

7 tional Laboratories.

8 "(3) FOCUS.—Shared resources and enabling

9 tools referred to in paragraph (1) shall include the

10 following:

11 "(A) Scientific data and knowledge bases

12 for training artificial intelligence systems.

13 "(B) Benchmarks and competitions for

14 evaluating advances in artificial intelligence sys-

15 tems.

16 "(C) Platform technologies that lower the

17 cost of generating training data or enable the

18 generation of training data.

19 "(D) High-performance computing, includ-

20 ing hybrid computing systems that integrate ar-

21 tificial intelligence and high-performance com-

22 puting.

23 "(E) The combination of artificial intel-

24 ligence and scientific automation, such as cloud

25 labs and self-driving labs.

12

1 ''(F) Tools that enable artificial intel-
2 ligence to solve inverse design problems.

3 ''(G) Testbeds for accelerating progress at
4 the intersection of artificial intelligence and
5 cyberphysical systems.

6 ''(H) Testbeds for testing and evaluating
7 artificial intelligence-based technologies and ap-
8 plications to improve energy efficiency across
9 artificial intelligence systems, in accordance
10 with subsection (e).

11 ''(4) INTERAGENCY COORDINATION.—The Sec-
12 retary shall ensure coordination with, and avoid un-
13 necessary duplication of, activities to provide shared
14 resources with the National Science Foundation, the
15 agencies participating in the Interagency Committee
16 established under section 5103 of this Act, and the
17 Networking and Information Technology Research
18 and Development Program authorized under section
19 101 of the High Performance Computing Act of
20 1991 (15 U.S.C. 5511).

21 ''(i) ARTIFICIAL INTELLIGENCE RESEARCH INSTI-
22 TUTES.—The Secretary shall support on a competitive,
23 merit-reviewed basis not fewer than two multidisciplinary
24 artificial intelligence research institutes pursuant to sec-
25 tion 5201 of this Act.

13

1 "(j) RESEARCH TO IMPROVE ENERGY PERMITTING

2 PROCESSES.—In consultation with the Federal Permitting

3 Improvement Steering Council established under section

4 41002(a) of the FAST Act (42 U.S.C. 4370m-1(a)), the

5 Secretary shall carry out research and development activi-

6 ties to evaluate the potential for utilizing artificial intel-

7 ligence to improve Federal permitting processes for en-

8 ergy-related projects, including critical materials (as such

9 term is defined in section 7002 of title VII of division Z

10 of the Consolidated Appropriations Act, 2021 (Public Law

11 116–260; 30 U.S.C. 1606)) projects, by building tools to

12 improve future reviews and analyzing data from past envi-

13 ronmental and other permitting reviews to inform more

14 flexible and effective categorical exclusions.

15 "(k) RISK MANAGEMENT.—

16 "(1) IN GENERAL.—The Secretary shall review

17 agency policies for risk management in artificial in-

18 telligence related projects and issue, as necessary,

19 policies and principles that are consistent with the

20 framework developed under section 22A of the Na-

21 tional Institute of Standards and Technology Act

22 (15 U.S.C. 278h–1(c)).

23 "(2) TAXONOMY.—The Secretary, in consulta-

24 tion with the Secretary of Homeland Security, the

25 Secretary of Defense, the Director of National Intel-

1 ligence, the Director of the National Security Agen-
2 cy, and the Director of the National Institute of
3 Standards and Technology, shall develop a taxonomy
4 of safety and security risks associated with artificial
5 intelligence systems relevant to the missions of the
6 Department.

7 "(l) STEM EDUCATION AND WORKFORCE DEVELOP-
8 MENT.—As part of the program, the Secretary, in coordi-
9 nation with the Director of the National Science Founda-
10 tion, may develop the required workforce, and hire and
11 train researchers to meet the rising demand for artificial
12 intelligence talent, including by carrying out the following:

13 "(1) Providing training, grants, and research
14 opportunities, including experiential learning experi-
15 ences for undergraduate and graduate students in
16 advanced artificial intelligence systems.

17 "(2) Carrying out public awareness campaigns
18 regarding artificial intelligence related career paths.

19 "(3) Assisting institutions of higher education
20 to establish new degree and certificate programs in
21 artificial intelligence-related disciplines.

22 "(m) ADMINISTRATION.—

23 "(1) RESEARCH SECURITY.—The activities au-
24 thorized under this section shall be applied in a
25 manner consistent with subtitle D of title VI of the

1 Research and Development, Competition, and Inno-
2 vation Act (42 U.S.C. 19231 et seq.).

3   ''(2) CYBERSECURITY.—The Secretary shall en-
4 sure the integration of robust cybersecurity meas-
5 ures into all artificial intelligence research-to-deploy-
6 ment efforts authorized under this section to protect
7 the integrity and confidentiality of collected and ana-
8 lyzed data.

9   ''(3) ETHICAL CONSIDERATIONS.—Taking into
10 account the guidance issued pursuant to section
11 10343(c) of the Research and Development, Com-
12 petition, and Innovation Act (42 U.S.C. 19052(c)),
13 the Secretary shall issue guidance governing the eth-
14 ical, safe, and responsible conduct of research activi-
15 ties funded by the Department and performed at
16 National Laboratories and user facilities.

17   ''(n) DATA PRIVACY AND SHARING.—The Secretary
18 shall review agency policies for data sharing with other
19 public and private sector organizations and issue, as nec-
20 essary, policies and principles that are consistent with the
21 standards and guidelines submitted under section 22A of
22 the National Institute of Standards and Technology Act
23 (15 U.S.C. 278h-1(e)). In addition, the Secretary shall es-
24 tablish a streamlined mechanism for approving research

1 projects or partnerships that require sharing sensitive

2 public or private data with the Department.

3   "(o) PARTNERSHIPS.—

4   "(1) FEDERAL PARTNERSHIPS.—The Secretary

5   may request, accept, and provide funds from other

6   Federal departments and agencies, State, United

7   States territory, local, or Tribal government agen-

8   cies, private sector for-profit entities, and nonprofit

9   entities, to be available to the extent provided by ap-

10   propriations Acts, to support a research project or

11   partnership carried out under this section. The Sec-

12   retary may not give any special consideration to any

13   agency or entity in return for a donation.

14   "(2) PARTNERSHIPS WITH PRIVATE ENTI-

15   TIES.—

16   "(A) IN GENERAL.—The Secretary shall

17   seek to establish partnerships with private com-

18   panies and nonprofit organizations in carrying

19   out this section.

20   "(B) REQUIREMENT.—In carrying out

21   subparagraph (A), the Secretary shall protect

22   any information submitted to or shared by the

23   Department consistent with applicable laws and

24   regulations.

1 ''(p) STAKEHOLDER ENGAGEMENT.—In carrying out

2 the activities authorized in this section, the Secretary shall

3 carry out the following:

4   ''(1) Collaborate with a range of stakeholders,

5   including small businesses, institutes of higher edu-

6   cation, industry, and the National Laboratories.

7   ''(2) Leverage the collective body of knowledge

8   from existing artificial intelligence and machine

9   learning research.

10   ''(3) Engage with other Federal departments

11   and agencies, research communities, and potential

12   users of information produced under this section.

13 ''(q) STRATEGIC PLAN.—

14   ''(1) IN GENERAL.—In carrying out the pro-

15   gram, the Secretary shall develop a strategic plan

16   with specific short-term and long-term goals and re-

17   source needs to advance applications in artificial in-

18   telligence for science, energy, and national security

19   to support the missions of the Department. The

20   strategic plan shall be consistent with the following:

21   ''(A) The 2023 National Laboratory work-

22   shop report entitled 'Advanced Research Direc-

23   tions on AI for Science, Energy, and Security'.

24   ''(B) The 2024 National Laboratory work-

25   shop report entitled 'AI for Energy'.

1   "(C) The strategic plan required under

2   section 5103 of division E of this Act (15

3   U.S.C. 9413).

4   "(2) REPORT TO CONGRESS.—Not later than

5 one year after the date of the enactment of this sec-

6 tion, the Director shall submit to the Committee on

7 Science, Space, and Technology of the House of

8 Representatives and the Committee of Energy and

9 Natural Resources of the Senate the strategic plan

10 required under paragraph (1), and shall notify such

11 committees of any substantial updates to such plan

12 in subsequent years.

13 "(r) DEFINITIONS.—In this section:

14   "(1) ARTIFICIAL INTELLIGENCE SYSTEM.—The

15 term 'artificial intelligence system' has the meaning

16 given such term in section 7223 of the Advancing

17 American AI Act (40 U.S.C. 11301 note; Public

18 Law 117–263).

19   "(2) DEPARTMENT.—The term 'Department'

20 means the Department of Energy.

21   "(3) ELIGIBLE ENTITIES.—The term 'eligible

22 entities' means any of the following:

23   "(A) An institution of higher education.

24   "(B) A National Laboratory.

25   "(C) A Federal research agency.

1   ''(D) A State research agency.

2   ''(E) A nonprofit research organization.

3   ''(F) A private sector entity.

4   ''(G) A consortium of two or more entities

5   described in subparagraphs (A) through (F).

6   ''(4) NATIONAL LABORATORY.—The term 'Na-

7 tional Laboratory' has the meaning given such term

8 in section 2 of the Energy Policy Act of 2005 (42

9 U.S.C. 15801).

10   ''(5) SECRETARY.—The term 'Secretary' means

11 the Secretary of Energy.

12   ''(6) TESTBED.—The term 'testbed' means any

13 platform, facility, or environment that enables the

14 testing and evaluation of scientific theories and new

15 technologies, including hardware, software, or field

16 environments in which structured frameworks can be

17 implemented to conduct tests to assess the perform-

18 ance, reliability, safety, and security of a wide range

19 of items, including prototypes, systems, applications,

20 artificial intelligence systems, instruments, computa-

21 tional tools, devices, and other technological innova-

22 tions.

23   ''(s) AUTHORIZATION OF APPROPRIATIONS.—There

24 are authorized to be appropriated to the Secretary to carry

1 out this section $300,000,000 for each of fiscal years 2025

2 through 2030.

3 **"SEC. 5502. ENSURING ENERGY SECURITY FOR DATA CEN-**

4 **TERS AND COMPUTING RESOURCES.**

5   "Not later than one year after the date of the enact-

6 ment of this section, the Secretary shall submit to Con-

7 gress a report that includes the following:

8   "(1) An assessment of the following:

9   "(A) The growth of computing data cen-

10   ters and advanced computing electrical power

11   load in the United States.

12   "(B) Potential risks of growth in com-

13   puting centers or growth in the required elec-

14   trical power to United States energy security

15   and national security.

16   "(C) The extent to which emerging tech-

17   nologies, such as artificial intelligence and ad-

18   vanced computing, may impact hardware and

19   software systems used at data and computing

20   centers.

21   "(D) Cost, performance, reliability, avail-

22   ability, space requirements, emissions, and sup-

23   ply chain issues for current technologies, includ-

24   ing renewable diesel, natural gas, renewable

25   natural gas, fuel cells, nuclear energy, battery

21

1 storage, enhanced geothermal, long-duration en-
2 ergy storage, and other potentially viable tech-
3 nologies available to support regional data cen-
4 ter expansion and for backup power.

5 ''(2) Recommendations for the following:

6 ''(A) Resources and capabilities that the
7 Department may provide to promote access to
8 energy resources by data centers, advanced
9 computing hardware and algorithms, and artifi-
10 cial intelligence systems.

11 ''(B) Policy changes to ensure domestic de-
12 ployment of data center and advanced com-
13 puting resources to prevent offshoring of
14 United States data and resources.

15 ''(C) Improving the energy efficiency of
16 data centers, advanced computing hardware
17 and algorithms, and artificial intelligence sys-
18 tems.''.

19 (b) CLERICAL AMENDMENT.—The table of contents
20 in section 2(b) of the William M. (Mac) Thornberry Na-
21 tional Defense Authorization Act of 2021 (Public Law
22 116–283) is amended by inserting after the item relating
23 to section 5501 the following new item:

''Sec. 5502. Ensuring energy security for data centers and computing re-
sources.''.