

114TH CONGRESS  
1ST SESSION

# S. 454

To amend the Department of Energy High-End Computing Revitalization Act of 2004 to improve the high-end computing research and development program of the Department of Energy, and for other purposes.

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## IN THE SENATE OF THE UNITED STATES

FEBRUARY 11, 2015

Mr. ALEXANDER (for himself and Ms. BALDWIN) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

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## A BILL

To amend the Department of Energy High-End Computing Revitalization Act of 2004 to improve the high-end computing research and development program of 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 “Exascale Computing  
5 for Science, Competitiveness, Advanced Manufacturing,  
6 Leadership, and the Economy Act of 2015” or the  
7 “ExaSCALE Computing Leadership Act of 2015”.

1 **SEC. 2. RENAMING OF ACT.**

2 (a) IN GENERAL.—Section 1 of the Department of  
3 Energy High-End Computing Revitalization Act of 2004  
4 (15 U.S.C. 5501 note; Public Law 108–423) is amended  
5 by striking “Department of Energy High-End Computing  
6 Revitalization Act of 2004” and inserting “Exascale Com-  
7 puting for Science, Competitiveness, Advanced Manufac-  
8 turing, Leadership, and the Economy Act of 2015”.

9 (b) CONFORMING AMENDMENT.—Section 976(a)(1)  
10 of the Energy Policy Act of 2005 (42 U.S.C. 16316(1))  
11 is amended by striking “Department of Energy High-End  
12 Computing Revitalization Act of 2004” and inserting  
13 “Exascale Computing for Science, Competitiveness, Ad-  
14 vanced Manufacturing, Leadership, and the Economy Act  
15 of 2015”.

16 **SEC. 3. DEFINITIONS.**

17 Section 2 of the Exascale Computing for Science,  
18 Competitiveness, Advanced Manufacturing, Leadership,  
19 and the Economy Act of 2015 (15 U.S.C. 5541) is amend-  
20 ed—

21 (1) by redesignating paragraphs (2) through  
22 (5) as paragraphs (3) through (6), respectively;

23 (2) by striking paragraph (1) and inserting the  
24 following:

25 “(1) DEPARTMENT.—The term ‘Department’  
26 means the Department of Energy.

1           “(2) EXASCALE COMPUTING.—The term  
2           ‘exascale computing’ means computing through the  
3           use of a computing machine that performs near or  
4           above 10 to the 18th power floating point operations  
5           per second.”; and

6           (3) in paragraph (6) (as redesignated by para-  
7           graph (1)), by striking “, acting through the Direc-  
8           tor of the Office of Science of the Department of  
9           Energy”.

10 **SEC. 4. DEPARTMENT OF ENERGY HIGH-END COMPUTING**  
11 **RESEARCH AND DEVELOPMENT PROGRAM.**

12           Section 3 of the Exascale Computing for Science,  
13           Competitiveness, Advanced Manufacturing, Leadership,  
14           and the Economy Act of 2015 (15 U.S.C. 5542) is amend-  
15           ed—

16           (1) in subsection (a)(1), by striking “program”  
17           and inserting “coordinated program across the De-  
18           partment”;

19           (2) in subsection (b)(2), by striking “, which  
20           may” and all that follows through “architectures”;  
21           and

22           (3) by striking subsection (d) and inserting the  
23           following:

24           “(d) EXASCALE COMPUTING PROGRAM.—

1           “(1) IN GENERAL.—The Secretary shall con-  
2           duct a research program (referred to in this sub-  
3           section as the ‘Program’) to develop 2 or more  
4           exascale computing machine architectures to pro-  
5           mote the missions of the Department.

6           “(2) IMPLEMENTATION.—

7           “(A) IN GENERAL.—In carrying out the  
8           Program, the Secretary shall—

9           “(i) establish 2 or more National Lab-  
10           oratory partnerships with industry part-  
11           ners and institutions of higher education  
12           for the research and development of 2 or  
13           more exascale computing systems across all  
14           applicable organizations of the Depart-  
15           ment; and

16           “(ii) provide, as appropriate, on a  
17           competitive, merit-reviewed basis, access  
18           for researchers in industries in the United  
19           States, institutions of higher education,  
20           National Laboratories, and other Federal  
21           agencies to the exascale computing systems  
22           developed pursuant to clause (i).

23           “(B) SELECTION OF PARTNERS.—The Sec-  
24           retary shall select members for the partnerships

1 under subparagraph (A) through a competitive,  
2 peer-review process.

3 “(3) CODESIGN AND APPLICATION DEVELOP-  
4 MENT.—

5 “(A) IN GENERAL.—The Secretary shall  
6 carry out the Program through an integration  
7 of application, computer science, and computer  
8 hardware architecture using the partnerships  
9 established pursuant to paragraph (2) to ensure  
10 that, to the maximum extent practicable, 2 or  
11 more exascale computing machine architectures  
12 are capable of solving Department target appli-  
13 cations and broader scientific problems.

14 “(B) REPORT.—The Secretary shall sub-  
15 mit to Congress a report on how the integration  
16 under subparagraph (A) is furthering applica-  
17 tion science data and computational workloads  
18 across application interests, including national  
19 security, material science, physical science,  
20 cyber security, biological science, the Materials  
21 Genome and BRAIN Initiatives of the Presi-  
22 dent, advanced manufacturing, and the national  
23 electric grid.

24 “(4) PROJECT REVIEW.—

1           “(A) IN GENERAL.—The exascale architec-  
2           tures systems developed pursuant to partner-  
3           ships established pursuant to paragraph (2)  
4           shall be reviewed through a project review proc-  
5           ess.

6           “(B) REPORT.—Not later than 90 days  
7           after the date of enactment of this subsection,  
8           the Secretary shall submit to Congress a report  
9           on—

10                   “(i) the results of the review con-  
11                   ducted under subparagraph (A); and

12                   “(ii) the coordination and manage-  
13                   ment of the Program to ensure an inte-  
14                   grated research program across the De-  
15                   partment.

16           “(5) ANNUAL REPORTS.—At the time of the  
17           budget submission of the Department for each fiscal  
18           year, the Secretary, in consultation with the mem-  
19           bers of the partnerships established pursuant to  
20           paragraph (2), shall submit to Congress a report  
21           that describes funding for the Program as a whole  
22           by functional element of the Department and critical  
23           milestones.”.

1 **SEC. 5. AUTHORIZATION OF APPROPRIATIONS.**

2 Section 4 of the Exascale Computing for Science,  
3 Competitiveness, Advanced Manufacturing, Leadership,  
4 and the Economy Act of 2015 (15 U.S.C. 5543) is amend-  
5 ed—

6 (1) by striking “this Act” and inserting “sec-  
7 tion 3(d)”;

8 (2) by striking paragraphs (1) through (3) and  
9 inserting the following:

10 “(1) \$272,000,000 for fiscal year 2016;

11 “(2) \$340,000,000 for fiscal year 2017; and

12 “(3) \$360,000,000 for fiscal year 2018.”.

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