Union Calendar No.

114TH CONGRESS
1ST SESSION

H. R. 874

[Report No. 114–]

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 HOUSE OF REPRESENTATIVES

FEBRUARY 11, 2015

Mr. HULTGREN (for himself, Mr. SMITH of Texas, Mr. FATTAH, Mr. KINZINGER of Illinois, Mr. SWALWELL of California, and Mr. LIPINSKI) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

MARCH --, 2015

Committed to the Committee of the Whole House on the State of the Union, and ordered to be printed

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 "American Super Com-

5   puting Leadership Act".

6   **SEC. 2. DEFINITIONS.**

7   Section 2 of the Department of Energy High-End

8   Computing Revitalization Act of 2004 (15 U.S.C. 5541)

9   is amended by striking paragraphs (1) through (5) and

10   inserting the following:

11   "(1) CO-DESIGN.—The term 'co-design' means

12   the joint development of application algorithms,

13   models, and codes with computer technology archi-

14   tectures and operating systems to maximize effective

15   use of high-end computing systems.

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

17   means the Department of Energy.

18   "(3) EXASCALE.—The term 'exascale' means

19   computing system performance at or near 10 to the

20   18th power floating point operations per second.

21   "(4) HIGH-END COMPUTING SYSTEM.—The

22   term 'high-end computing system' means a com-

23   puting system with performance that substantially

24   exceeds that of systems that are commonly available

25   for advanced scientific and engineering applications.

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1   "(5) INSTITUTION OF HIGHER EDUCATION.—

2 The term 'institution of higher education' has the

3 meaning given the term in section 2 of the Energy

4 Policy Act of 2005 (42 U.S.C. 15801).

5   "(6) LEADERSHIP SYSTEM.—The term 'leader-

6 ship system' means a high-end computing system

7 that is among the most advanced in the world in

8 terms of performance in solving scientific and engi-

9 neering problems.

10   "(7) NATIONAL LABORATORY.—The term 'Na-

11 tional Laboratory' means any one of the seventeen

12 laboratories owned by the Department.

13   "(8) SECRETARY.—The term 'Secretary' means

14 the Secretary of Energy.

15   "(9) SOFTWARE TECHNOLOGY.—The term

16 'software technology' includes optimal algorithms,

17 programming environments, tools, languages, and

18 operating systems for high-end computing systems.".

19 **SEC. 3. DEPARTMENT OF ENERGY HIGH-END COMPUTING**

20   **RESEARCH AND DEVELOPMENT PROGRAM.**

21   Section 3 of the Department of Energy High-End

22 Computing Revitalization Act of 2004 (15 U.S.C. 5542)

23 is amended—

24   (1) in subsection (a)—

1   (A) in paragraph (1), by striking "pro-
2 gram" and inserting "coordinated program
3 across the Department";

4   (B) by striking "and" at the end of para-
5 graph (1);

6   (C) by striking the period at the end of
7 paragraph (2) and inserting "; and"; and

8   (D) by adding at the end the following new
9 paragraph:

10 "(3) partner with universities, National Labora-
11 tories, and industry to ensure the broadest possible
12 application of the technology developed in this pro-
13 gram to other challenges in science, engineering,
14 medicine, and industry.";

15   (2) in subsection (b)(2), by striking "vector"
16 and all that follows through "architectures" and in-
17 serting "computer technologies that show promise of
18 substantial reductions in power requirements and
19 substantial gains in parallelism of multicore proc-
20 essors, concurrency, memory and storage, band-
21 width, and reliability"; and

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

24 "(d) EXASCALE COMPUTING PROGRAM.—

6

1 "(1) IN GENERAL.—The Secretary shall con-

2 duct a coordinated research program to develop

3 exascale computing systems to advance the missions

4 of the Department.

5 "(2) EXECUTION.—The Secretary shall,

6 through competitive merit review, establish two or

7 more National Laboratory-industry-university part-

8 nerships to conduct integrated research, develop-

9 ment, and engineering of multiple exascale architec-

10 tures, and—

11 "(A) conduct mission-related co-design ac-

12 tivities in developing such exascale platforms;

13 "(B) develop those advancements in hard-

14 ware and software technology required to fully

15 realize the potential of an exascale production

16 system in addressing Department target appli-

17 cations and solving scientific problems involving

18 predictive modeling and simulation and large-

19 scale data analytics and management; and

20 "(C) explore the use of exascale computing

21 technologies to advance a broad range of

22 science and engineering.

23 "(3) ADMINISTRATION.—In carrying out this

24 program, the Secretary shall—

1   ''(A) provide, on a competitive, merit-re-
2 viewed basis, access for researchers in United
3 States industry, institutions of higher edu-
4 cation, National Laboratories, and other Fed-
5 eral agencies to these exascale systems, as ap-
6 propriate; and

7   ''(B) conduct outreach programs to in-
8 crease the readiness for the use of such plat-
9 forms by domestic industries, including manu-
10 facturers.

11   ''(4) REPORTS.—

12   ''(A) INTEGRATED STRATEGY AND PRO-
13 GRAM MANAGEMENT PLAN.—The Secretary
14 shall submit to Congress, not later than 90
15 days after the date of enactment of the Amer-
16 ican Super Computing Leadership Act, a report
17 outlining an integrated strategy and program
18 management plan, including target dates for
19 prototypical and production exascale platforms,
20 interim milestones to reaching these targets,
21 functional requirements, roles and responsibil-
22 ities of National Laboratories and industry, ac-
23 quisition strategy, and estimated resources re-
24 quired, to achieve this exascale system capa-
25 bility. The report shall include the Secretary's

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1 plan for Departmental organization to manage
2 and execute the Exascale Computing Program,
3 including definition of the roles and responsibil-
4 ities within the Department to ensure an inte-
5 grated program across the Department. The re-
6 port shall also include a plan for ensuring bal-
7 ance and prioritizing across ASCR subprograms
8 in a flat or slow-growth budget environment.

9 "(B) STATUS REPORTS.—At the time of
10 the budget submission of the Department for
11 each fiscal year, the Secretary shall submit a
12 report to Congress that describes the status of
13 milestones and costs in achieving the objectives
14 of the exascale computing program.

15 "(C) EXASCALE MERIT REPORT.—At least
16 18 months prior to the initiation of construction
17 or installation of any exascale-class computing
18 facility, the Secretary shall transmit a plan to
19 the Congress detailing—

20 "(i) the proposed facility's cost projec-
21 tions and capabilities to significantly accel-
22 erate the development of new energy tech-
23 nologies;

24 "(ii) technical risks and challenges
25 that must be overcome to achieve success-

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1   ful completion and operation of the facility;

2   and

3   ''(iii) an independent assessment of

4   the scientific and technological advances

5   expected from such a facility relative to

6   those expected from a comparable invest-

7   ment in expanded research and applica-

8   tions at terascale-class and petascale-class

9   computing facilities, including an evalua-

10   tion of where investments should be made

11   in the system software and algorithms to

12   enable these advances.''.