

Calendar No. 738

108TH CONGRESS  
2D SESSION**H. R. 4516****[Report No. 108-379]**

---

IN THE SENATE OF THE UNITED STATES

JULY 8, 2004

Received; read twice and referred to the Committee on Energy and Natural  
Resources

SEPTEMBER 28, 2004

Reported by Mr. DOMENICI, with an amendment

[Strike out all after the enacting clause and insert the part printed in italic]

---

## AN ACT

To require the Secretary of Energy to carry out a program  
of research and development to advance high-end computing.

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 ~~High-End Computing Revitalization Act of 2004~~”.

1 **SEC. 2. DEFINITIONS.**

2 For purposes of this Act:

3 (1) **HIGH-END COMPUTING SYSTEM.**—The term  
4 “high-end computing system” means a computing  
5 system with performance that substantially exceeds  
6 that of systems that are commonly available for ad-  
7 vanced scientific and engineering applications.

8 (2) **LEADERSHIP SYSTEM.**—The term “Leader-  
9 ship System” means a high-end computing system  
10 that is among the most advanced in the world in  
11 terms of performance in solving scientific and engi-  
12 neering problems.

13 (3) **INSTITUTION OF HIGHER EDUCATION.**—The  
14 term “institution of higher education” has the  
15 meaning given the term in section 101(a) of the  
16 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

17 (4) **SECRETARY.**—The term “Secretary” means  
18 the Secretary of Energy.

19 **SEC. 3. DEPARTMENT OF ENERGY HIGH-END COMPUTING**  
20 **RESEARCH AND DEVELOPMENT PROGRAM.**

21 (a) **IN GENERAL.**—The Secretary shall carry out a  
22 program of research and development (involving software  
23 and hardware) to advance high-end computing systems,  
24 and shall develop and deploy such systems for advanced  
25 scientific and engineering applications.

26 (b) **PROGRAM.**—The program shall—

1           (1) support both individual investigators and  
2 multidisciplinary teams of investigators;

3           (2) conduct research in multiple architectures,  
4 which may include vector, reconfigurable logic,  
5 streaming, processor-in-memory, and multithreading  
6 architectures;

7           (3) conduct research on software for high-end  
8 computing systems, including research on algo-  
9 rithms, programming environments, tools, languages,  
10 and operating systems for high-end computing sys-  
11 tems, in collaboration with architecture development  
12 efforts;

13           (4) provide for sustained access by the research  
14 community in the United States to high-end com-  
15 puting systems and to Leadership Systems, includ-  
16 ing provision for technical support for users of such  
17 systems;

18           (5) support technology transfer to the private  
19 sector and others in accordance with applicable law;  
20 and

21           (6) ensure that the high-end computing activi-  
22 ties of the Department of Energy are coordinated  
23 with relevant activities in industry and with other  
24 Federal agencies, including the National Science  
25 Foundation, the Defense Advanced Research

1 Projects Agency, the National Security Agency, the  
2 National Institutes of Health, the National Aero-  
3 nautics and Space Administration, the National Oee-  
4 anic and Atmospheric Administration, the National  
5 Institute of Standards and Technology, and the En-  
6 vironmental Protection Agency.

7 (c) LEADERSHIP SYSTEMS FACILITIES.—

8 (1) IN GENERAL.—As part of the program ear-  
9 ried out under this Act, the Secretary shall establish  
10 and operate Leadership Systems facilities to—

11 (A) conduct advanced scientific and engi-  
12 neering research and development using Lead-  
13 ership Systems; and

14 (B) develop potential advancements in  
15 high-end computing system hardware and soft-  
16 ware.

17 (2) ADMINISTRATION.—In carrying out this  
18 subsection, the Secretary shall provide access to  
19 Leadership Systems on a competitive, merit-reviewed  
20 basis to researchers in United States industry, insti-  
21 tutions of higher education, national laboratories,  
22 and other Federal agencies.

1 **SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

2 In addition to amounts otherwise made available for  
3 high-end computing, there are authorized to be appro-  
4 priated to the Secretary to carry out this Act—

5 (1) \$50,000,000 for fiscal year 2005;

6 (2) \$55,000,000 for fiscal year 2006; and

7 (3) \$60,000,000 for fiscal year 2007.

8 **SEC. 5. SOCIETAL IMPLICATIONS OF INFORMATION TECH-**  
9 **NOLOGY.**

10 In carrying out its programs on the social, economic,  
11 legal, ethical, and cultural implications of information  
12 technology, the National Science Foundation shall support  
13 research into the implications of computers (including  
14 both hardware and software) that would be capable of  
15 mimicking human abilities to learn, reason, and make de-  
16 cisions.

17 **SEC. 6. ASTRONOMY AND ASTROPHYSICS ADVISORY COM-**  
18 **MITTEE.**

19 (a) AMENDMENTS.—Section 23 of the National  
20 Science Foundation Authorization Act of 2002 (42 U.S.C.  
21 1862n-9) is amended—

22 (1) by striking “and the National Aeronautics  
23 and Space Administration” each place it appears in  
24 subsections (a) and (b) and inserting “, the National  
25 Aeronautics and Space Administration, and the De-  
26 partment of Energy”;

1           (2) in subsection (b)(3), by inserting “the Sec-  
2           retary of Energy,” after “the Administrator of the  
3           National Aeronautics and Space Administration,”;

4           (3) in subsection (c)—

5           (A) by striking “5” in each of paragraphs  
6           (1) and (2) and inserting “4”;

7           (B) by striking “and” at the end of para-  
8           graph (2);

9           (C) by redesignating paragraph (3) as  
10          paragraph (4), and in that paragraph by strik-  
11          ing “3” and inserting “2”; and

12          (D) by inserting after paragraph (2) the  
13          following new paragraph:

14          “(3) 3 members selected by the Secretary of  
15          Energy; and”; and

16          (4) in subsection (f), by striking “the advisory  
17          bodies of other Federal agencies, such as the De-  
18          partment of Energy, which may engage in related  
19          research activities” and inserting “other Federal ad-  
20          visory committees that advise Federal agencies  
21          which engage in related research activities”.

22          (b) EFFECTIVE DATE.—The amendments made by  
23          subsection (a) shall take effect on March 15, 2005.

1 **SEC. 7. REMOVAL OF SUNSET PROVISION FROM SAVINGS**  
2 **IN CONSTRUCTION ACT OF 1996.**

3 Section 14(e) of the Metric Conversion Act of 1975  
4 (~~15 U.S.C. 2051(e)~~) is repealed.

5 **SECTION 1. SHORT TITLE.**

6 *This Act may be cited as the “Department of Energy*  
7 *High-End Computing Revitalization Act of 2004”.*

8 **SEC. 2. DEFINITIONS.**

9 *In this Act:*

10 (1) *CENTER.*—*The term “Center” means a High-*  
11 *End Software Development Center established under*  
12 *section 3(d).*

13 (2) *HIGH-END COMPUTING SYSTEM.*—*The term*  
14 *“high-end computing system” means a computing*  
15 *system with performance that substantially exceeds*  
16 *that of systems that are commonly available for ad-*  
17 *vanced scientific and engineering applications.*

18 (3) *INSTITUTION OF HIGHER EDUCATION.*—*The*  
19 *term “institution of higher education” has the mean-*  
20 *ing given the term in section 101(a) of the Higher*  
21 *Education Act of 1965 (20 U.S.C. 1001(a)).*

22 (4) *LEADERSHIP SYSTEM.*—*The term “Leader-*  
23 *ship System” means a high-end computing system*  
24 *that is among the most advanced in the world in*  
25 *terms of performance in solving scientific and engi-*  
26 *neering problems.*

1           (5) *SECRETARY.*—*The term “Secretary” means*  
2           *the Secretary of Energy, acting through the Director*  
3           *of the Office of Science of the Department of Energy.*

4 **SEC. 3. DEPARTMENT OF ENERGY HIGH-END COMPUTING**  
5           **RESEARCH AND DEVELOPMENT PROGRAM.**

6           (a) *IN GENERAL.*—*The Secretary shall—*

7                 (1) *carry out a program of research and develop-*  
8                 *ment (including development of software and hard-*  
9                 *ware) to advance high-end computing systems; and*

10                (2) *develop and deploy high-end computing sys-*  
11                *tems for advanced scientific and engineering applica-*  
12                *tions.*

13           (b) *PROGRAM.*—*The program shall—*

14                 (1) *support both individual investigators and*  
15                 *multidisciplinary teams of investigators;*

16                 (2) *conduct research in multiple architectures,*  
17                 *which may include vector, reconfigurable logic,*  
18                 *streaming, processor-in-memory, and multithreading*  
19                 *architectures;*

20                 (3) *conduct research on software for high-end*  
21                 *computing systems, including research on algorithms,*  
22                 *programming environments, tools, languages, and op-*  
23                 *erating systems for high-end computing systems, in*  
24                 *collaboration with architecture development efforts;*

1           (4) provide for sustained access by the research  
2           community in the United States to high-end com-  
3           puting systems and to Leadership Systems, including  
4           provision of technical support for users of such sys-  
5           tems;

6           (5) support technology transfer to the private  
7           sector and others in accordance with applicable law;  
8           and

9           (6) ensure that the high-end computing activities  
10          of the Department of Energy are coordinated with rel-  
11          evant activities in industry and with other Federal  
12          agencies, including the National Science Foundation,  
13          the Defense Advanced Research Projects Agency, the  
14          National Nuclear Security Administration, the Na-  
15          tional Security Agency, the National Institutes of  
16          Health, the National Aeronautics and Space Admin-  
17          istration, the National Oceanic and Atmospheric Ad-  
18          ministration, the National Institutes of Standards  
19          and Technology, and the Environmental Protection  
20          Agency.

21          (c) *LEADERSHIP SYSTEMS FACILITIES.*—

22                 (1) *IN GENERAL.*—As part of the program car-  
23                 ried out under this Act, the Secretary shall establish  
24                 and operate 1 or more Leadership Systems facilities  
25                 to—

1           (A) *conduct advanced scientific and engi-*  
2           *neering research and development using Leader-*  
3           *ship Systems; and*

4           (B) *develop potential advancements in high-*  
5           *end computing system hardware and software.*

6           (2) *ADMINISTRATION.—In carrying out this sub-*  
7           *section, the Secretary shall provide to Leadership Sys-*  
8           *tems, on a competitive, merit-reviewed basis, access to*  
9           *researchers in United States industry, institutions of*  
10           *higher education, national laboratories, and other*  
11           *Federal agencies.*

12           (d) *HIGH-END SOFTWARE DEVELOPMENT CENTER.—*

13           (1) *IN GENERAL.—As part of the program car-*  
14           *ried out under this Act, the Secretary shall establish*  
15           *at least 1 High-End Software Development Center.*

16           (2) *DUTIES.—A Center shall concentrate efforts*  
17           *to develop, test, maintain, and support optimal algo-*  
18           *rithms, programming environments, tools, languages,*  
19           *and operating systems for high-end computing sys-*  
20           *tems.*

21           (3) *STAFF.—A Center shall include—*

22           (A) *a full-time research staff, to create a*  
23           *centralized knowledge base for high-end software*  
24           *development; and*

1           (B) a rotating staff of researchers from  
2           other institutions and industry to assist in co-  
3           ordination of research efforts and promote tech-  
4           nology transfer to the private sector.

5           (4) *USE OF EXPERTISE.*—The Secretary shall  
6           use the expertise of a Center to assess research and de-  
7           velopment in high-end computing system architecture.

8           (5) *LOCATION.*—The location of a Center shall be  
9           determined by a competitive proposal process admin-  
10          istered by the Secretary.

11 **SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

12          In addition to amounts otherwise made available for  
13          high-end computing, there are authorized to be appro-  
14          priated to the Secretary to carry out this Act—

15               (1) \$50,000,000 for fiscal year 2005;

16               (2) \$55,000,000 for fiscal year 2006; and

17               (3) \$60,000,000 for fiscal year 2007.

18 **SEC. 5. ASTRONOMY AND ASTROPHYSICS ADVISORY COM-**

19                               **MITTEE.**

20          (a) *AMENDMENTS.*—Section 23 of the National Science  
21          Foundation Authorization Act of 2002 (42 U.S.C. 1862n-  
22          9) is amended—

23               (1) in subsection (a) and paragraphs (1) and (2)  
24          of subsection (b), by striking “and the National Aero-  
25          nautics and Space Administration” and inserting “,

1 *the National Aeronautics and Space Administration,*  
2 *and the Department of Energy”;*

3 (2) *in subsection (b)(3), by striking “Administra-*  
4 *tion, and” and inserting “Administration, the Sec-*  
5 *retary of Energy,”;*

6 (3) *in subsection (c)—*

7 (A) *in paragraphs (1) and (2), by striking*  
8 *“5” and inserting “4”;*

9 (B) *in paragraph (2), by striking “and” at*  
10 *the end;*

11 (C) *by redesignating paragraph (3) as*  
12 *paragraph (4), and in that paragraph by strik-*  
13 *ing “3” and inserting “2”; and*

14 (D) *by inserting after paragraph (2) the fol-*  
15 *lowing:*

16 “(3) *3 members selected by the Secretary of En-*  
17 *ergy; and”; and*

18 (4) *in subsection (f), by striking “the advisory*  
19 *bodies of other Federal agencies, such as the Depart-*  
20 *ment of Energy, which may engage in related re-*  
21 *search activities” and inserting “other Federal advi-*  
22 *sory committees that advise Federal agencies that en-*  
23 *gage in related research activities”.*

24 (b) *EFFECTIVE DATE.—The amendments made by sub-*  
25 *section (a) take effect on March 15, 2005.*

1 **SEC. 6. REMOVAL OF SUNSET PROVISION FROM SAVINGS IN**

2 **CONSTRUCTION ACT OF 1996.**

3 *Section 14 of the Metric Conversion Act of 1975 (15*

4 *U.S.C. 205l) is amended by striking subsection (e).*

Calendar No. 738

108<sup>TH</sup> CONGRESS  
2<sup>D</sup> SESSION

**H. R. 4516**

[Report No. 108-379]

---

---

**AN ACT**

To require the Secretary of Energy to carry out a program of research and development to advance high-end computing.

---

---

SEPTEMBER 28, 2004

Reported with an amendment