

AMENDMENT NO. _____ Calendar No. _____

Purpose: In the nature of a substitute.

IN THE SENATE OF THE UNITED STATES—111th Cong., 1st Sess.

S. 1397

To authorize the Administrator of the Environmental Protection Agency to provide grants for electronic device recycling research, development, and demonstration projects, and for other purposes.

Referred to the Committee on _____ and
ordered to be printed

Ordered to lie on the table and to be printed

AMENDMENT IN THE NATURE OF A SUBSTITUTE intended
to be proposed by Ms. KLOBUCHAR

Viz:

- 1 Strike all after the enacting clause and insert the fol-
- 2 lowing:
- 3 **SECTION 1. SHORT TITLE.**
- 4 This Act may be cited as the “Electronic Device Re-
- 5 cycling Research and Development Act”.
- 6 **SEC. 2. FINDINGS.**
- 7 Congress finds that—

1 (1) the volume of electronic devices in the
2 United States is substantial and will continue to in-
3 crease;

4 (2) the Environmental Protection Agency esti-
5 mates that more than 2,000,000,000 computers,
6 televisions, wireless devices, printers, gaming sys-
7 tems, and other devices have been sold since 1980,
8 generating 2,000,000 tons of unwanted electronic
9 devices in 2005 alone;

10 (3) electronic devices can be recycled or refur-
11 bished to recover and conserve valuable materials,
12 such as gold, copper, and platinum, but, according
13 to the Environmental Protection Agency, only 15 to
14 20 percent of electronic devices discarded from
15 households reach recyclers;

16 (4) the electronic device recycling industry in
17 the United States is growing, but challenges remain
18 for the recycling of electronic devices by households
19 and other small generators;

20 (5) collection of those electronic devices is ex-
21 pensive, and separation and proper recycling of some
22 of the materials recovered, such as lead from cath-
23 ode-ray tube televisions, is costly;

1 (6) the export of unwanted electronic devices to
2 developing countries also presents a serious chal-
3 lenge;

4 (7) the crude methods of many of the recycling
5 operations in those countries can expose workers to
6 harmful chemicals, jeopardizing the health of the
7 workers and polluting the environment;

8 (8) some of the challenges to increasing the
9 recyclability of electronic devices can be addressed
10 by—

11 (A) improving the logistics and technology
12 of the collection and recycling process;

13 (B) designing electronic devices to avoid
14 the use of hazardous materials and to be more
15 easily recycled; and

16 (C) encouraging the use of recycled mate-
17 rials in more applications;

18 (9) the public currently does not take full ad-
19 vantage of existing electronic device recycling oppor-
20 tunities;

21 (10) studying factors that influence behavior
22 and educating consumers about responsible elec-
23 tronic device recycling could help communities and
24 private industry develop recycling programs that
25 draw more participation;

1 (11) the development of tools and technologies
2 to increase the lifespan of electronic devices and to
3 promote the safe reuse of those devices would de-
4 crease the impact of the production of electronic de-
5 vices on the environment and likely increase the
6 recyclability of those devices;

7 (12) accurately assessing the environmental im-
8 pacts of the production of electronic devices and the
9 recycling of those devices is a complex task; and

10 (13) data, tools, and methods to better quantify
11 those impacts would help policymakers and others
12 determine the best end-of-life management options
13 for electronic devices.

14 **SEC. 3. DEFINITIONS.**

15 In this Act:

16 (1) **ACADEMY.**—The term “Academy” means
17 the National Academy of Sciences.

18 (2) **ADMINISTRATOR.**—The term “Adminis-
19 trator” means the Administrator of the Environ-
20 mental Protection Agency.

21 (3) **CONSORTIUM.**—The term “consortium”
22 means a grant applicant or recipient under section
23 4(a) that includes—

1 (A) at least 1 institution of higher edu-
2 cation, nonprofit research institution, or govern-
3 ment laboratory; and

4 (B) at least 1 for-profit entity, including a
5 manufacturer, designer, refurbisher, or recycler
6 of electronic devices or the components of those
7 devices.

8 (4) DIRECTOR.—The term “Director” means
9 the Director of the National Institute of Standards
10 and Technology.

11 (5) ELECTRONIC DEVICE.—The term “elec-
12 tronic device” includes computers, computer mon-
13 itors, televisions, laptops, printers, wireless devices,
14 copiers, fax machines, stereos, video gaming sys-
15 tems, and the components of those devices.

16 (6) INSTITUTION OF HIGHER EDUCATION.—The
17 term “institution of higher education”—

18 (A) has the meaning given the term in sec-
19 tion 101(a) of the Higher Education Act of
20 1965 (20 U.S.C. 1001(a)); and

21 (B) for the purpose of section 7(a)(2), in-
22 cludes any institution of higher education under
23 section 101(b) of that Act (20 U.S.C. 1001(b)).

24 (7) MINORITY SERVING INSTITUTION.—The
25 term “minority serving institution” means an insti-

1 tution that is an eligible institution under section
2 371(a) of the Higher Education Act of 1965 (20
3 U.S.C. 1067q(a)).

4 **SEC. 4. ELECTRONIC DEVICE ENGINEERING RESEARCH,**
5 **DEVELOPMENT, AND DEMONSTRATION**
6 **PROJECTS GRANT PROGRAM.**

7 (a) GRANT PROGRAM.—

8 (1) IN GENERAL.—The Administrator shall pro-
9 vide multiyear grants to consortia—

10 (A) to conduct research to create innova-
11 tive and practical approaches to manage the en-
12 vironmental impacts of electronic devices; and

13 (B) through the conduct of that research,
14 to contribute to the professional development of
15 scientists, engineers, and technicians in the
16 fields of electronic device manufacturing, de-
17 sign, refurbishing, and recycling.

18 (2) TYPES OF RESEARCH.—The grants pro-
19 vided under this section shall support research—

20 (A) to provide data and information on—

21 (i) effects, human exposures, environ-
22 mental releases, and recycling and disposal
23 processes; and

1 (ii) changes to manufacturing and
2 other processes, such as refurbishing and
3 recycling, to reduce—

4 (I) adverse human health and en-
5 vironmental impacts; and

6 (II) the volume of unwanted elec-
7 tronic devices;

8 (B) to increase the efficiency of and im-
9 prove electronic device collection and recycling;

10 (C) to expand the uses and applications for
11 materials recovered from electronic devices;

12 (D) to develop and demonstrate environ-
13 mentally preferable alternatives to the use of
14 toxic, hazardous, potentially hazardous, or
15 scarce materials in electronic devices and the
16 production of those devices;

17 (E) to develop methods to identify, sepa-
18 rate, and remove hazardous and potentially haz-
19 ardous materials from electronic devices and to
20 reuse, recycle, or dispose of those materials in
21 a safe manner;

22 (F) to modify product design and assembly
23 to facilitate and improve refurbishment, reuse,
24 and recycling of electronic devices, including an
25 emphasis on design for recycling;

1 (G) to conduct lifecycle analyses of elec-
2 tronic devices, including developing tools and
3 methods to assess the environmental impacts of
4 the production, use, and end-of-life manage-
5 ment of electronic devices and electronic device
6 components;

7 (H) to develop product design, tools, and
8 techniques to extend the lifecycle of electronic
9 devices, including methods to promote the up-
10 grade and safe reuse of those devices;

11 (I) to identify the social, behavioral, and
12 economic barriers to recycling and reuse for
13 electronic devices and develop strategies to in-
14 crease awareness, consumer acceptance, and the
15 practice of responsible recycling and reuse for
16 those devices;

17 (J) to characterize environmental releases
18 from electronic device recycling processes, in-
19 cluding—

20 (i) evaluating dermal or inhalation ex-
21 posure to dusts or fumes from shredding,
22 disassembly, or thermal processes; and

23 (ii) investigating appropriate control
24 or mitigation processes;

1 (K) to assess exposure risks, and develop
2 control and strategies to mitigate contaminant
3 releases, from disposal of electronic devices and
4 recycling residuals, such as landfill leachate,
5 smelter emissions, and smelter residues that
6 pose human health and environmental risks;

7 (L) to evaluate alternative materials and
8 management processes that would reduce toxics
9 use, extend product life, and enhance recycling
10 of electronic devices over disposal;

11 (M) to quantify the environmental benefits
12 of making the purchase, use, and end-of-life
13 management of electronic devices more environ-
14 mentally preferable, including improved designs
15 to enhance the reuse and recyclability of new
16 electronic devices through research on materials
17 and life cycle impacts;

18 (N) to characterize the flow of unwanted
19 electronic devices in global commerce, including
20 identifying—

21 (i) specific hazardous materials and
22 the products that contain the materials;
23 and

1 (ii) the ultimate destinations of those
2 materials through reuse, disposal, or incor-
3 poration in new products;

4 (O) to develop methods to discourage ex-
5 ports to countries with unsafe recycling prac-
6 tices of recyclable materials from electronic de-
7 vices that could be processed into usable com-
8 modities in the United States or in North
9 America, including identifying—

10 (i) what kind of additional, specialized
11 capacity is needed;

12 (ii) existing barriers to the develop-
13 ment of that capacity; and

14 (iii) options for overcoming those bar-
15 riers;

16 (P) to assess—

17 (i) current recovery rates for precious
18 and critical metals in various processing
19 regimes, such as manual disassembly,
20 shredding of whole or partially dismantled
21 electronic devices, and smelting; and

22 (ii) how to optimize the recovery of
23 precious metals and critical metals in the
24 recycling of discarded electronic devices;

1 (Q) to track quantities of specific elements
2 and substances used in electronic devices over
3 time; and

4 (R) to determine current and predicted
5 quantities and types of electronic devices used,
6 stored, generated, collected for recycling, ex-
7 ported, and disposed to quantify and analyze
8 the flow of electronic devices from the point of
9 sale to the end of life of the devices.

10 (b) MERIT REVIEW; COMPETITION.—Grants shall be
11 provided under this section on a merit-reviewed, competi-
12 tive basis.

13 (c) APPLICATIONS.—

14 (1) IN GENERAL.—To be eligible to receive a
15 grant under this section, a consortium shall submit
16 an application for the grant to the Administrator at
17 such time, in such manner, and containing such in-
18 formation and assurances as the Administrator may
19 require.

20 (2) REQUIREMENTS.—The application shall in-
21 clude a description of—

22 (A) the research project that will be under-
23 taken by the consortium and the contributions
24 of each of the participating entities, including
25 the for-profit entity;

1 (B) the applicability of the project to re-
2 duce impediments to electronic device recycling
3 in the electronic device design, manufacturing,
4 refurbishing, or recycling industries;

5 (C) the potential for and feasibility of in-
6 corporating the research results into industry
7 practice; and

8 (D) how the project will promote collabora-
9 tion among scientists and engineers from dif-
10 ferent disciplines, such as electrical engineering,
11 materials science, and social science.

12 (d) DISSEMINATION OF RESEARCH RESULTS.—Re-
13 search results shall be made publicly available through—

14 (1) publication on the website of the Environ-
15 mental Protection Agency;

16 (2) the development of best practices or train-
17 ing materials for use in the electronic device manu-
18 facturing, design, refurbishing, or recycling indus-
19 tries;

20 (3) the dissemination at conferences affiliated
21 with those industries;

22 (4) demonstration projects; or

23 (5) educational materials for the public pro-
24 duced in conjunction with State governments, local
25 governments, or nonprofit organizations on problems

1 and solutions relating to electronic device recycling
2 and reuse.

3 (e) FUNDING CONTRIBUTION FROM FOR-PROFIT
4 MEMBER OF CONSORTIUM.—To be eligible for a grant
5 under this section, the for-profit entity participating in the
6 consortium shall contribute at least 10 percent of the total
7 research project cost, either directly or through the provi-
8 sion of in-kind contributions.

9 (f) PROTECTION OF PROPRIETARY INFORMATION.—
10 The Administrator—

11 (1) shall not disclose any proprietary informa-
12 tion or trade secrets provided by any person or enti-
13 ty pursuant to this section;

14 (2) shall ensure that, as a condition of receipt
15 of a grant under this section, each member of the
16 consortium has in place proper protections to main-
17 tain proprietary information or trade secrets contrib-
18 uted by other members of the consortium; and

19 (3) if any member of the consortium breaches
20 the conditions under paragraph (2) or discloses pro-
21 prietary information or trade secrets, may require
22 the return of any funds received under this section
23 by the member.

24 (g) BIENNIAL REPORT.—Not later than 2 years after
25 the date of enactment of this Act and every 2 years there-

1 after until Congress does not provide funds to carry out
2 this Act, the Administrator shall submit to Congress a re-
3 port that provides—

4 (1) a list of the grants provided under this sec-
5 tion;

6 (2) a list of the entities participating in each
7 consortium receiving a grant;

8 (3) a description of the research projects car-
9 ried out in whole or in part with funds made avail-
10 able under such a grant;

11 (4) the results of those research projects; and

12 (5) a description of the rate and success of the
13 adoption or integration of such research results into
14 the manufacturing processes, management practices,
15 and products of the electronics industry.

16 (h) AUTHORIZATION OF APPROPRIATIONS.—There
17 are authorized to be appropriated to the Administrator to
18 carry out this section—

19 (1) \$18,000,000 for fiscal year 2011;

20 (2) \$20,000,000 for fiscal year 2012; and

21 (3) \$22,000,000 for fiscal year 2013.

1 **SEC. 5. ELECTRONIC DEVICE ENGINEERING RESEARCH,**
2 **DEVELOPMENT, AND DEMONSTRATION**
3 **PROJECTS OF ENVIRONMENTAL PROTEC-**
4 **TION AGENCY.**

5 (a) IN GENERAL.—The Administrator, through an
6 applied research program of the Office of Research and
7 Development of the Environmental Protection Agency,
8 shall conduct research for the purposes described in and
9 on the topics listed in section 4(a).

10 (b) AUTHORIZATION OF APPROPRIATIONS.—There
11 are authorized to be appropriated to the Administrator to
12 carry out this section \$10,000,000 for each of fiscal years
13 2011 through 2013.

14 **SEC. 6. NATIONAL ACADEMY OF SCIENCES REPORT ON**
15 **ELECTRONIC DEVICE RECYCLING.**

16 (a) IN GENERAL.—In order to better identify gaps
17 and opportunities in the research and training programs
18 established under this Act, the Administrator shall enter
19 into an arrangement with the Academy under which the
20 Academy shall, not later than 1 year after the date of en-
21 actment of this Act, complete and submit to Congress a
22 report on—

23 (1) opportunities for and barriers to—

24 (A) increasing the recyclability of elec-
25 tronic devices, specifically addressing—

1 (i) recycling or safe disposal of elec-
2 tronic devices and low-value materials re-
3 covered from those devices;

4 (ii) designing electronic devices to fa-
5 cilitate reuse and recycling; and

6 (iii) the reuse of electronic devices;

7 and

8 (B) making electronic devices safer and
9 more environmentally preferable, specifically ad-
10 dressing reducing the use of hazardous mate-
11 rials and potentially hazardous materials in
12 electronic devices;

13 (2) the environmental and human health risks
14 posed by the storage, transport, recycling, and dis-
15 posal of unwanted electronic devices;

16 (3) the current status of research and training
17 programs to promote the environmental design of
18 electronic devices to increase the recyclability of
19 those devices;

20 (4) any regulatory or statutory barriers that
21 may prevent the adoption or implementation of best
22 management practices or technological innovations
23 that may arise from the research and training pro-
24 grams established under this Act; and

1 (5) the direct and indirect economic and domes-
2 tic employment impacts associated with recycling
3 and harvesting materials from unwanted electronic
4 devices in lieu of the disposal of those devices di-
5 rectly in landfills.

6 (b) RECOMMENDATIONS.—The report under sub-
7 section (a) shall—

8 (1) identify gaps in the research and training
9 programs in addressing the opportunities, barriers,
10 and risks relating to electronic device recycling; and

11 (2) recommend areas in which additional re-
12 search and development resources are needed to re-
13 duce the impact of unwanted electronic devices on
14 the environment.

15 **SEC. 7. ENGINEERING CURRICULUM DEVELOPMENT**
16 **GRANTS.**

17 (a) GRANT PROGRAM.—The Administrator, in con-
18 sultation with the Director of the National Science Foun-
19 dation, shall provide grants to institutions of higher edu-
20 cation to develop curricula that incorporates the principles
21 of environmental design into the development of electronic
22 devices—

23 (1) for the training of electrical, mechanical, in-
24 dustrial, manufacturing, materials, and software en-

1 gineers and other students at the undergraduate and
2 graduate levels; and

3 (2) to support the continuing education of pro-
4 fessionals in the electronic device manufacturing, de-
5 sign, refurbishing, or recycling industries.

6 (b) OUTREACH TO MINORITY SERVING INSTITU-
7 TIONS.—The Administrator shall conduct outreach to mi-
8 nority serving institutions for the purposes of providing
9 information on—

10 (1) the grants available under this section; and

11 (2) the application process for those grants.

12 (c) MERIT REVIEW; COMPETITION.—Grants shall be
13 provided under this section on a merit-reviewed, competi-
14 tive basis.

15 (d) USE OF FUNDS.—

16 (1) IN GENERAL.—Grants provided under this
17 section shall be used for activities that enhance the
18 ability of an institution of higher education to broad-
19 en the undergraduate and graduate-level engineering
20 curriculum or professional continuing education cur-
21 riculum—

22 (A) to include environmental engineering
23 design principles and consideration of product
24 lifecycles relating to electronic devices; and

1 (B) to increase the recyclability of those
2 devices.

3 (2) INCLUDED ACTIVITIES.—Activities carried
4 out using funds from a grant may include—

5 (A) developing and revising curriculum to
6 include multidisciplinary elements;

7 (B) creating research and internship op-
8 portunities for students through partnerships
9 with industry, nonprofit organizations, or gov-
10 ernment agencies;

11 (C) creating and establishing certificate
12 programs; and

13 (D) developing curricula for short courses
14 and continuing education for professionals in
15 the environmental design of electronic devices to
16 increase the recyclability of those devices.

17 (e) APPLICATION.—An institution of higher edu-
18 cation seeking a grant under this section shall submit an
19 application to the Administrator at such time, in such
20 manner, and with such information and assurances as the
21 Administrator may require.

22 (f) AUTHORIZATION OF APPROPRIATIONS.—There
23 are authorized to be appropriated to the Administrator to
24 carry out this section—

25 (1) \$5,000,000 for fiscal year 2011;

1 (2) \$5,150,000 for fiscal year 2012; and

2 (3) \$5,304,000 for fiscal year 2013.

3 **SEC. 8. ENVIRONMENTALLY PREFERABLE ALTERNATIVE**

4 **MATERIALS PHYSICAL PROPERTY DATABASE.**

5 (a) ESTABLISHMENT.—

6 (1) IN GENERAL.—The Director shall develop a
7 comprehensive physical property database for envi-
8 ronmentally preferable alternative materials, design
9 features, and manufacturing practices for use in
10 electronic devices.

11 (2) CONSULTATION.—In developing the data-
12 base under this section, the Director shall consult
13 with the Administrator regarding the environmental
14 preferability of the materials, design features, and
15 manufacturing processes to be contained in the data-
16 base.

17 (b) PRIORITIES.—The Director, working with the
18 electronic device design, manufacturing, or recycling in-
19 dustries, shall develop a strategic plan to establish prior-
20 ities and the physical property characterization require-
21 ments for the database described in subsection (a).

22 (c) OTHER MATTERS.—The Director may expand the
23 database to include information on the environmental im-
24 pacts of various materials, design features, and manufac-

1 turing practices used in electronic devices from a lifecycle
2 standpoint.

3 (d) ANNUAL UPDATES.—The Director shall update
4 the database not less than annually.

5 (e) AUTHORIZATION OF APPROPRIATIONS.—There
6 are authorized to be appropriated to the Director to carry
7 out this section—

8 (1) \$3,000,000 for fiscal year 2011;

9 (2) \$3,000,000 for fiscal year 2012; and

10 (3) \$3,000,000 for fiscal year 2013.