

106TH CONGRESS  
1ST SESSION

# S. 935

To amend the National Agricultural Research, Extension, and Teaching Policy Act of 1977 to authorize research to promote the conversion of biomass into biobased industrial products, and for other purposes.

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## IN THE SENATE OF THE UNITED STATES

APRIL 30, 1999

Mr. LUGAR introduced the following bill; which was read twice and referred to the Committee on Agriculture, Nutrition, and Forestry

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## A BILL

To amend the National Agricultural Research, Extension, and Teaching Policy Act of 1977 to authorize research to promote the conversion of biomass into biobased industrial products, 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 “National Sustainable  
5 Fuels and Chemicals Act of 1999”.

6 **SEC. 2. FINDINGS.**

7 Congress finds that—

1           (1) conversion of biomass into biobased indus-  
2           trial products offers outstanding potential for benefit  
3           to the national interest through improved strategic  
4           security and balance of payments, healthier rural  
5           economies, improved environmental quality, near-  
6           zero net greenhouse gas emissions, technology ex-  
7           port, and sustainable resource supply;

8           (2)(A) biomass is widely available at prices that  
9           are competitive with low cost petroleum; and

10          (B) the key technical challenge to be overcome  
11          in order for biobased industrial products to be cost  
12          competitive is reducing the cost of technology for  
13          converting biomass into desired biobased industrial  
14          products;

15          (3) biobased fuels, such as ethanol, have the  
16          clear potential to be sustainable, low cost, and high  
17          performance fuels that are compatible with both cur-  
18          rent and future transportation systems and provide  
19          near zero net greenhouse gas emissions;

20          (4) biobased chemicals—

21                (A) can provide functional replacements  
22                for essentially all organic chemicals that are  
23                currently derived from petroleum; and

24                (B) have the clear potential for environ-  
25                mentally benign product life cycles;

1           (5) many biomass feedstocks suitable for indus-  
2           trial processing show the clear potential for sustain-  
3           able production, in some cases resulting in improved  
4           soil fertility and carbon sequestration;

5           (6)(A) grain processing mills are biorefineries  
6           that produce a diversity of useful food, chemical,  
7           feed, and fuel products; and

8           (B) technologies that result in further diver-  
9           sification of the range of value-added biobased in-  
10          dustrial products can meet a key need for the grain  
11          processing industry;

12          (7)(A) cellulosic feedstocks are attractive be-  
13          cause of their low cost and widespread availability;  
14          and

15          (B) research resulting in cost-effective tech-  
16          nology to overcome the recalcitrance of cellulosic bio-  
17          mass would allow biorefineries to produce fuels and  
18          bulk chemicals on a very large scale, with a commen-  
19          surately large realization of the benefit described in  
20          paragraph (1);

21          (8) research into the fundamentals to under-  
22          stand important mechanisms of biomass conversion  
23          processes can be expected to accelerate the applica-  
24          tion and advancement of biomass processing tech-  
25          nology by—

1 (A) increasing the confidence and speed  
2 with which new technologies can be scaled up;  
3 and

4 (B) giving rise to processing innovations  
5 based on new knowledge;

6 (9) the utility of biotechnology allows the design  
7 of feedstocks that will meet future needs more effec-  
8 tively;

9 (10)(A) because of the relatively short-term  
10 time horizon characteristic of private sector invest-  
11 ments, and because many benefits of biomass proc-  
12 essing are in the national interest, it is appropriate  
13 for the Federal Government to provide  
14 precommercial investment in fundamental and re-  
15 search-driven innovation in the biomass processing  
16 area; and

17 (B) such an investment would provide a valu-  
18 able complement to ongoing and past governmental  
19 support in the biomass processing area; and

20 (11) several prominent studies, including stud-  
21 ies by the President's Council of Advisors on Science  
22 and Technology and the National Research Council,  
23 support the potential for large research-driven ad-  
24 vances in technologies for production of biobased in-  
25 dustrial products as well as associated benefits.

1 **SEC. 3. CONVERSION OF BIOMASS INTO BIOBASED INDUS-**  
2 **TRIAL PRODUCTS.**

3 Title XIV of the National Agricultural Research, Ex-  
4 tension, and Teaching Policy Act of 1977 (7 U.S.C. 3101  
5 et seq.) is amended by adding at the end the following:

6 **“Subtitle N—Conversion of Bio-**  
7 **mass Into Biobased Industrial**  
8 **Products**

9 **“SEC. 1490. DEFINITIONS.**

10 “In this subtitle:

11 “(1) **ADVISORY COMMITTEE.**—The term ‘Advi-  
12 sory Committee’ means the Sustainable Fuels and  
13 Chemicals Technical Advisory Committee established  
14 by section 1490C.

15 “(2) **BIOBASED INDUSTRIAL PRODUCT.**—The  
16 term ‘biobased industrial product’ means any power,  
17 fuel, feed, chemical product, or other consumer good  
18 derived from biomass.

19 “(3) **BIOMASS.**—The term ‘biomass’ means any  
20 organic matter that is available on a renewable or  
21 recurring basis, including plants, trees, grasses, agri-  
22 cultural crops and residues, wood and wood residues,  
23 municipal waste, animal waste and residues, and  
24 aquatic plants.

1           “(4) BOARD.—The term ‘Board’ means the  
2           Sustainable Fuels and Chemicals Board established  
3           by section 1490B.

4           “(5) INITIATIVE.—The term ‘Initiative’ means  
5           the Sustainable Fuels and Chemicals Research Ini-  
6           tiative established under section 1490D.

7           “(6) POINT OF CONTACT.—The term ‘point of  
8           contact’ means a point of contact designated under  
9           section 1490A(d).

10 **“SEC. 1490A. COOPERATION AND COORDINATION IN SUS-**  
11 **TAINABLE FUELS AND CHEMICALS RE-**  
12 **SEARCH.**

13           “(a) IN GENERAL.—The Secretary of Agriculture  
14 and the Secretary of Energy shall cooperate with respect  
15 to, and coordinate, policies and procedures that promote  
16 research and development leading to the production of  
17 biobased industrial products.

18           “(b) PURPOSE.—The purpose of the cooperation and  
19 coordination shall be to promote research and development  
20 related to—

21           “(1) understanding the key mechanisms under-  
22 lying the recalcitrance of biomass for conversion into  
23 biobased industrial products, including the use of ag-  
24 ricultural crops for conversion into biobased indus-  
25 trial products; and

1           “(2) advanced technologies that will result in  
2           large-scale commercial production of low cost  
3           biobased industrial products.

4           “(c) AREAS.—In carrying out this subtitle, the Sec-  
5           retary of Agriculture and the Secretary of Energy shall  
6           promote research and development to—

7           “(1) advance the availability and widespread  
8           use of energy efficient, economically competitive, and  
9           environmentally sound biobased industrial products  
10          in a manner that is consistent with the goals of the  
11          United States relating to sustainable and secure  
12          supplies of food, chemicals, and fuel;

13          “(2) ensure full consideration of Federal land  
14          and land management programs as potential feed-  
15          stock resources for biobased industrial products; and

16          “(3) assess the environmental, economic, and  
17          social impact of production of biobased industrial  
18          products from biomass on a large scale.

19          “(d) POINTS OF CONTACT.—

20          “(1) IN GENERAL.—To coordinate research and  
21          development programs and activities relating to  
22          biobased industrial products that are carried out by  
23          their respective Departments—

24                  “(A) the Secretary of Agriculture shall  
25                  designate, as the point of contact for the De-

1 department of Agriculture, an officer of the De-  
2 partment of Agriculture appointed by the Presi-  
3 dent to a position in the Department before the  
4 date of the designation, by and with the advice  
5 and consent of the Senate; and

6 “(B) the Secretary of Energy shall des-  
7 ignate, as the point of contact for the Depart-  
8 ment of Energy, an officer of the Department  
9 of Energy appointed by the President to a posi-  
10 tion in the Department before the date of the  
11 designation, by and with the advice and consent  
12 of the Senate.

13 “(2) DUTIES.—The points of contact shall  
14 jointly—

15 “(A) assist in arranging interlaboratory  
16 and site-specific supplemental agreements for  
17 research, development, and demonstration  
18 projects relating to biobased industrial prod-  
19 ucts;

20 “(B) serve as cochairpersons of the Board;

21 “(C) administer the Initiative; and

22 “(D) respond in writing to each rec-  
23 ommendation of the Advisory Committee made  
24 under section 1490C(c)(2).

1 **“SEC. 1490B. SUSTAINABLE FUELS AND CHEMICALS BOARD.**

2 “(a) ESTABLISHMENT.—There is established the  
3 Sustainable Fuels and Chemicals Board to coordinate pro-  
4 grams within and among departments and agencies of the  
5 Federal Government for the purpose of promoting the use  
6 of biobased industrial products by—

7 “(1) maximizing the benefits deriving from  
8 Federal grants and assistance; and

9 “(2) bringing coherence to Federal planning.

10 “(b) MEMBERSHIP.—The Board shall consist of:

11 “(1) The point of contact of the Department of  
12 Agriculture designated under section  
13 1490A(d)(1)(A), who shall serve as cochairperson of  
14 the Board.

15 “(2) The point of contact of the Department of  
16 Energy designated under section 1490A(d)(1)(B),  
17 who shall serve as cochairperson of the Board.

18 “(3) A senior officer of each of the following  
19 agencies who is appointed by the head of the agency  
20 and who has a rank that is equivalent to the points  
21 of contact:

22 “(A) The Department of the Interior.

23 “(B) The Environmental Protection Agen-  
24 cy.

25 “(C) The National Science Foundation.

1           “(D) The Office of Science and Technology  
2           Policy.

3           “(4) At the option of the Secretary of Agri-  
4           culture and the Secretary of Energy, other members  
5           appointed by the Secretaries (after consultation with  
6           members described in paragraphs (1) through (3)).

7           “(c) DUTIES.—The Board shall—

8           “(1) coordinate research, development, and  
9           demonstration activities relating to biobased indus-  
10          trial products—

11           “(A) between the Department of Agri-  
12          culture and the Department of Energy; and

13           “(B) with other departments and agencies  
14          of the Federal Government; and

15           “(2) provide recommendations to the points of  
16          contact concerning administration of this subtitle.

17          “(d) FUNDING.—Each agency represented on the  
18          Board is encouraged to provide funds for any purpose  
19          under this subtitle.

20          “(e) MEETINGS.—The Board shall meet at least  
21          quarterly to enable the Board to carry out the duties of  
22          the Board under subsection (c).

1 **“SEC. 1490C. SUSTAINABLE FUELS AND CHEMICALS TECH-**  
2 **NICAL ADVISORY COMMITTEE.**

3 “(a) ESTABLISHMENT.—There is established the  
4 Sustainable Fuels and Chemicals Technical Advisory  
5 Committee to—

6 “(1) advise the Secretary of Agriculture and the  
7 Secretary of Energy concerning—

8 “(A) the technical focus and direction of  
9 requests for proposals issued under the Initia-  
10 tive; and

11 “(B) procedures for reviewing the pro-  
12 posals;

13 “(2) facilitate consultations and partnerships  
14 among Federal agencies, agricultural producers, in-  
15 dustry, consumers, the research community, and  
16 other interested groups to carry out program activi-  
17 ties relating to the Initiative; and

18 “(3) evaluate and perform strategic planning on  
19 program activities relating to the Initiative.

20 “(b) MEMBERSHIP.—The Committee shall consist of  
21 the following members appointed by the points of contact:

22 “(1) An individual affiliated with the biobased  
23 industrial products industry.

24 “(2) An individual affiliated with a college or  
25 university who has expertise in biobased industrial  
26 products.

1           “(3) 2 prominent engineers or scientists who  
2 have expertise in biobased industrial products.

3           “(4) An individual affiliated with a commodity  
4 trade association.

5           “(5) An individual affiliated with an environ-  
6 mental or conservation organization.

7           “(6) At the option of the points of contact,  
8 other members.

9           “(c) DUTIES.—The Advisory Committee shall—

10           “(1) advise the points of contact with respect to  
11 the Initiative; and

12           “(2) evaluate whether, and make recommenda-  
13 tions in writing to the Board to ensure that—

14           “(A) funds authorized for the Initiative are  
15 distributed and used in a manner that is con-  
16 sistent with the goals of the Initiative;

17           “(B) the points of contact are funding pro-  
18 posals under this subtitle that are selected on  
19 the basis of merit, as determined by an inde-  
20 pendent panel of scientific and technical peers;  
21 and

22           “(C) activities under this subtitle are car-  
23 ried out in accordance with this subtitle.

24           “(d) MEETINGS.—The Advisory Committee shall  
25 meet at least quarterly to enable the Advisory Committee

1 to carry out the duties of the Advisory Committee under  
2 subsection (c).

3 **“SEC. 1490D. SUSTAINABLE FUELS AND CHEMICALS RE-**  
4 **SEARCH INITIATIVE.**

5 “(a) IN GENERAL.—The Secretary of Agriculture  
6 and the Secretary of Energy, acting through their respec-  
7 tive points of contact and in consultation with the Board,  
8 shall establish and carry out a Sustainable Fuels and  
9 Chemicals Research Initiative under which competitively-  
10 awarded grants, contracts, and financial assistance are  
11 provided to, or entered into with, eligible entities to carry  
12 out research on biobased industrial products.

13 “(b) PURPOSES.—The purposes of grants, contracts,  
14 and assistance under this section shall be to—

15 “(1) stimulate collaborative activities by a di-  
16 verse range of experts in all aspects of biomass proc-  
17 essing for the purpose of conducting fundamental  
18 and innovation-targeted research and technology de-  
19 velopment;

20 “(2) enhance creative and imaginative ap-  
21 proaches toward biomass processing that will serve  
22 to develop the next generation of advanced tech-  
23 nologies making possible low cost biobased industrial  
24 products;

1           “(3) strengthen the intellectual resources of the  
2 United States through the training and education of  
3 future scientists, engineers, managers, and business  
4 leaders in the field of biomass processing; and

5           “(4) promote integrated research partnerships  
6 among colleges, universities, national laboratories,  
7 Federal research agencies, and the private sector as  
8 the best means of overcoming technical challenges  
9 that span multiple academic disciplines and  
10 leveraging scarce Federal research funds.

11       “(c) ELIGIBLE ENTITIES.—

12           “(1) IN GENERAL.—To be eligible for a grant,  
13 contract, or assistance under this section, an appli-  
14 cant shall be—

15                   “(A) a college or university;

16                   “(B) a national laboratory;

17                   “(C) a Federal research agency;

18                   “(D) a State research agency;

19                   “(E) a private sector entity; or

20                   “(F) a consortium of 2 or more entities de-  
21 scribed in subparagraphs (A) through (E).

22           “(2) ADMINISTRATION.—After consultation  
23 with the Board, the points of contact shall—

1           “(A) publish annually a joint request for  
2 proposals for grants, contracts, and assistance  
3 under this section;

4           “(B) provide a preference in grants, con-  
5 tracts, and assistance under this section to con-  
6 sortia involving experts from multiple institu-  
7 tions and multiple academic disciplines working  
8 on cross-cutting or integrative research, devel-  
9 opment, and demonstration challenges; and

10           “(C) require that grants, contracts, and  
11 assistance under this section be awarded com-  
12 petitively after the establishment of procedures  
13 that provide for scientific peer review by an  
14 independent panel of scientific and technical  
15 peers.

16           “(d) USES OF GRANTS, CONTRACTS, AND ASSIST-  
17 ANCE.—A grant, contract, or assistance under this section  
18 shall be used to conduct—

19           “(1) research on process technology for over-  
20 coming the recalcitrance of biomass, including re-  
21 search on key mechanisms, advanced technologies,  
22 and demonstration test beds for—

23           “(A) feedstock pretreatment and hydrolysis  
24 of cellulose and hemicellulose, including new  
25 technologies for—

- 1 “(i) enhanced sugar yields;  
2 “(ii) lower overall chemical use;  
3 “(iii) less costly materials; and  
4 “(iv) cost reduction;

5 “(B) novel organism development and cel-  
6 lulose production, including consolidated bio-  
7 processing techniques; and

8 “(C) approaches other than enzymatic hy-  
9 drolysis for overcoming the recalcitrance of cel-  
10 lulosic biomass;

11 “(2) research on technologies for diversifying  
12 the range of products than can be efficiently and  
13 cost-competitively produced from biomass, including  
14 research on—

15 “(A) metabolic engineering of biological  
16 systems (including genetically modified crops)  
17 to produce novel products, especially commodity  
18 products, or to increase product selectivity and  
19 tolerance, with a research priority on the devel-  
20 opment of biobased products that can compete  
21 in performance and cost with fossil-based prod-  
22 ucts;

23 “(B) catalytic processing to convert inter-  
24 mediates of biomass processing into products of  
25 interest;

1           “(C) separation technologies for cost-effective  
2           product recovery and purification;

3           “(D) approaches other than metabolic engineering and catalytic conversion of intermediates of biomass processing; and

6           “(E) advanced technologies for biomass gasification and related research in turbine and stationary fuel cell technology for production of electricity from biomass and related research in advanced turbine and stationary fuel cell technology; and

12          “(3) research aimed at evaluating the sustainability and economic viability of biobased industrial products and their raw material input of biomass, including research on—

16           “(A) the evaluation of, and strategies to enhance, the sustainability of biomass-based production of fuels and commodity chemicals, including research on—

20           “(i) accurate measurement and analysis of carbon sequestration and carbon cycling in relation to biobased industrial products and feedstocks;

24           “(ii) crops that provide a sustainable resource for conversion to industrial prod-

1           ucts while also serving as a source for  
2           other needs such as food or animal feed;

3                   “(iii) development and analysis of best  
4           land management practices that enhance  
5           the environmental sustainability of the pro-  
6           duction and harvesting of biomass;

7                   “(iv) development of biomass cropping  
8           systems that improve the conservation and  
9           use of marginal land; and

10                   “(v) biomass gasification and combus-  
11           tion to produce electricity; and

12                   “(B) the evaluation of, and strategies to  
13           enhance, the economic viability of fuels and  
14           commodity chemicals produced from biomass,  
15           including research on—

16                           “(i) the evaluation of the energy bal-  
17           ances for biorefineries;

18                           “(ii) the cost of the required process  
19           technology; and

20                           “(iii) the impact of coproduction on  
21           product price and large-scale economic via-  
22           bility.

23           “(e) AUTHORIZATION OF APPROPRIATIONS.—

24                   “(1) IN GENERAL.—In addition to any other  
25           amounts that are authorized to be appropriated,

1       there are authorized to be appropriated to carry out  
2       this section \$49,000,000 for each of fiscal years  
3       2000 through 2005.

4               “(2) RESEARCH ON CELLULOSIC BIOMASS.—  
5       For each fiscal year, of the amounts that are made  
6       available under paragraph (1), not less than 30 per-  
7       cent shall be used to conduct research described in  
8       subsection (d)(1).

9       **“SEC. 1490E. ADMINISTRATIVE SUPPORT AND FUNDS.**

10       “(a) IN GENERAL.—To the extent administrative  
11       support and funds are not provided by other agencies  
12       under subsection (b), the Secretary of Energy shall pro-  
13       vide such administrative support and funds of the Depart-  
14       ment of Energy to the Board and the Advisory Committee  
15       as are necessary to enable the Board and the Advisory  
16       Committee to carry out this subtitle.

17       “(b) OTHER AGENCIES.—The Secretary of Agri-  
18       culture and the heads of the agencies referred to in section  
19       1490B(a)(3) may, and are encouraged to, provide admin-  
20       istrative support and funds of their respective agencies to  
21       the Board and the Advisory Committee.

22       **“SEC. 1490F. REPORTS.**

23       “For each fiscal year that funds are made available  
24       to carry out this subtitle, the Secretary of Agriculture and

1 the Secretary of Energy shall jointly transmit to Congress  
2 a detailed report on—

3           “(1) the status and progress of the Initiative,  
4 including a certification from the Board that funds  
5 authorized for the Initiative are distributed and used  
6 in a manner that is consistent with the goals of the  
7 Initiative; and

8           “(2) the general status of cooperation and re-  
9 search efforts carried out by each Secretary with re-  
10 spect to sustainable fuels, chemicals, and electricity  
11 derived from biomass, including a certification from  
12 the Board that the points of contact are funding  
13 proposals that are selected on the basis of merit, as  
14 determined by an independent panel of scientific and  
15 technical peers.”.

○