

(b) Artificial photosynthesis**(1) In general**

The Secretary shall carry out under the Initiative a program to support research needed to bridge scientific barriers to, and discover knowledge relevant to, artificial photosynthetic systems.

(2) Activities

As part of the program described in paragraph (1)—

(A) the Director of the Office of Basic Energy Sciences shall support basic research to pursue distinct lines of scientific inquiry, including—

(i) photoinduced production of hydrogen and oxygen from water; and

(ii) the sustainable photoinduced reduction of carbon dioxide to fuel products including hydrocarbons, alcohols, carbon monoxide, and natural gas; and

(B) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

(3) Standard of review

The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

(4) Funds

Of the funds authorized to be appropriated for basic energy sciences in a fiscal year, there is authorized to be appropriated to the Secretary to carry out activities under this subsection \$50,000,000 for each of fiscal years 2023 through 2027.

(c) Biochemistry, replication of natural photosynthesis, and related processes**(1) In general**

The Secretary shall carry out under the Initiative a program to support research needed to replicate natural photosynthetic processes by use of artificial photosynthetic components and materials.

(2) Activities

As part of the program described in paragraph (1)—

(A) the Director of the Office of Basic Energy Sciences shall support basic research to expand fundamental knowledge to replicate natural synthesis processes, including—

(i) the photoinduced reduction of dinitrogen to ammonia;

(ii) the absorption of carbon dioxide from ambient air;

(iii) molecular-based charge separation and storage;

(iv) photoinitiated electron transfer; and

(v) catalysis in biological or biomimetic systems;

(B) the Associate Director of Biological and Environmental Research shall support systems biology and genomics approaches to understand genetic and physiological pathways connected to photosynthetic mechanisms; and

(C) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

(3) Standard of review

The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

(4) Funds

Of the funds authorized to be appropriated for basic energy sciences in a fiscal year, there is authorized to be appropriated to the Secretary to carry out activities under this subsection \$50,000,000 for each of fiscal years 2023 through 2027.

(Pub. L. 109–58, title IX, §973, Aug. 8, 2005, 119 Stat. 902; Pub. L. 115–246, title III, §303(f)(1), formerly §303(d)(1), Sept. 28, 2018, 132 Stat. 3141, renumbered §303(f)(1), Pub. L. 117–167, div. B, title I, §10102(a)(1), Aug. 9, 2022, 136 Stat. 1409; Pub. L. 117–167, div. B, title I, §10102(b), Aug. 9, 2022, 136 Stat. 1414.)

Editorial Notes**AMENDMENTS**

2022—Subsec. (b)(4). Pub. L. 117–167, §10102(b)(1), added par. (4) and struck out former par. (4). Prior to amendment, text read as follows: “No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.”

Subsec. (c)(4). Pub. L. 117–167, §10102(b)(2), added par. (4) and struck out former par. (4). Prior to amendment, text read as follows: “No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.”

2018—Pub. L. 115–246 amended section generally. Prior to amendment, section related to catalysis research program.

§ 16314. Hydrogen**(a) In general**

The Secretary shall conduct a program of fundamental research and development in support of programs authorized under subchapter VIII.

(b) Methods

The program shall include support for methods of generating hydrogen without the use of natural gas.

(Pub. L. 109–58, title IX, §974, Aug. 8, 2005, 119 Stat. 903.)

§ 16315. Electricity Storage Research Initiative**(a) Initiative****(1) In general**

The Secretary shall carry out a research initiative, to be known as the “Electricity Storage Research Initiative” (referred to in this section as the “Initiative”)—

(A) to expand theoretical and fundamental knowledge to control, store, and convert—

(i) electrical energy to chemical energy; and

(ii) chemical energy to electrical energy;

(B) to support scientific inquiry into the practical understanding of chemical and physical processes that occur within systems involving crystalline and amorphous solids, polymers, and organic and aqueous liquids; and

(C) to ensure the competitiveness of the United States in energy storage by fostering an ecosystem linking fundamental research and development to deployment of storage solutions while minimizing the environmental impacts of energy storage technologies.

(2) Leveraging

In carrying out programs and activities under the Initiative, the Secretary shall leverage expertise and resources from—

(A) the Basic Energy Sciences Program, the Advanced Scientific Computing Research Program, and the Biological and Environmental Research Program of the Office of Science;

(B) the Office of Energy Efficiency and Renewable Energy; and

(C) any other relevant office of the Department.

(3) Teams

(A) In general

In carrying out the Initiative, the Secretary shall organize activities among multidisciplinary teams to leverage, to the maximum extent practicable, expertise from the National Laboratories, institutions of higher education, and the private sector.

(B) Goals

The multidisciplinary teams described in subparagraph (A) shall pursue aggressive, milestone-driven, basic research goals.

(C) Resources

The Secretary shall provide sufficient resources to the multidisciplinary teams described in subparagraph (A) to achieve the goals described in subparagraph (B) over a period of time to be determined by the Secretary.

(4) Additional activities

The Secretary may organize additional activities under this subsection through Energy Frontier Research Centers, Energy Innovation Hubs, or other organizational structures.

(b) Multivalent systems

(1) In general

The Secretary shall carry out under the Initiative a program to support research needed to bridge scientific barriers to, and discover knowledge relevant to, multivalent ion materials in electric energy storage systems.

(2) Activities

As part of the program described in paragraph (1)—

(A) the Director of the Office of Basic Energy Sciences shall investigate electrochemical properties and the dynamics of materials, including charge transfer phenomena and mass transport in materials; and

(B) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support

translational research, development, and validation of physical concepts developed under the program.

(3) Standard of review

The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

(4) Funding

Of the funds authorized to be appropriated for basic energy sciences in a fiscal year, there is authorized to be appropriated to the Secretary to carry out activities under this subsection \$50,000,000 for each of fiscal years 2023 through 2027.

(c) Electrochemistry modeling and simulation

(1) In general

The Secretary shall carry out under the Initiative a program to support research to model and simulate organic electrolytes, including the static and dynamic electrochemical behavior and phenomena of organic electrolytes at the molecular and atomic level in monovalent and multivalent systems.

(2) Activities

As part of the program described in paragraph (1)—

(A) the Director of the Office of Basic Energy Sciences, in coordination with the Associate Director of Advanced Scientific Computing Research, shall support the development of high performance computational tools through a joint development process to maximize the effectiveness of current and projected high performance computing systems; and

(B) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

(3) Standard of review

The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

(4) Funding

Of the funds authorized to be appropriated for basic energy sciences in a fiscal year, there is authorized to be appropriated to the Secretary to carry out activities under this subsection \$50,000,000 for each of fiscal years 2023 through 2027.

(d) Mesoscale electrochemistry

(1) In general

The Secretary shall carry out under the Initiative a program to support research needed to reveal electrochemistry in confined mesoscale spaces, including scientific discoveries relevant to—

(A) bio-electrochemistry and electrochemical energy conversion and storage in confined spaces; and

(B) the dynamics of the phenomena described in subparagraph (A).

(2) Activities

As part of the program described in paragraph (1)—

(A) the Director of the Office of Basic Energy Sciences and the Associate Director of Biological and Environmental Research shall investigate phenomena of mesoscale electrochemical confinement for the purpose of replicating and controlling new electrochemical behavior; and

(B) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

(3) Standard of review

The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

(4) Funding

Of the funds authorized to be appropriated for basic energy sciences in a fiscal year, there is authorized to be appropriated to the Secretary to carry out activities under this subsection \$20,000,000 for each of fiscal years 2023 through 2027.

(Pub. L. 109–58, title IX, §975, Aug. 8, 2005, 119 Stat. 903; Pub. L. 115–246, title III, §303(g)(1), formerly §303(e)(1), Sept. 28, 2018, 132 Stat. 3143, renumbered §303(g)(1), Pub. L. 117–167, div. B, title I, §10102(a)(1), Aug. 9, 2022, 136 Stat. 1409; Pub. L. 117–167, div. B, title I, §10102(c), Aug. 9, 2022, 136 Stat. 1415.)

Editorial Notes

AMENDMENTS

2022—Subsec. (a)(1)(C). Pub. L. 117–167, §10102(c)(1)(A), added subpar. (C).

Subsec. (a)(2)(C). Pub. L. 117–167, §10102(c)(1)(B), added subpar. (C).

Subsec. (b)(4). Pub. L. 117–167, §10102(c)(2), added par. (4) and struck out former par. (4). Prior to amendment, text read as follows: “No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.”

Subsec. (c)(4). Pub. L. 117–167, §10102(c)(3), added par. (4) and struck out former par. (4). Prior to amendment, text read as follows: “No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.”

Subsec. (d)(4). Pub. L. 117–167, §10102(c)(4), added par. (4) and struck out former par. (4). Prior to amendment, text read as follows: “No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.”

2018—Pub. L. 115–246 amended section generally. Prior to amendment, text read as follows: “The Secretary shall conduct a program of fundamental research on solid state lighting in support of the Next Generation Lighting Initiative carried out under section 16192 of this title.”

§ 16316. Advanced scientific computing research and development program

(1) In general

The Secretary shall conduct an advanced scientific computing research and development program that includes activities related to applied mathematics and activities authorized by the American Super Computing Leadership Act of 2017 (15 U.S.C. 5541 et seq.).

(2) Goal

The Secretary shall carry out the program with the goal of supporting departmental missions, and providing the high-performance computational, networking, advanced visualization technologies, and workforce resources, that are required for world leadership in science.

(Pub. L. 109–58, title IX, §976(a), Aug. 8, 2005, 119 Stat. 903; Pub. L. 115–246, title III, §304(b)(1)(B), formerly §304(a)(1)(B), Sept. 28, 2018, 132 Stat. 3145, renumbered §304(b)(1)(B), Pub. L. 117–167, div. B, title I, §10104(a)(1), Aug. 9, 2022, 136 Stat. 1433.)

Editorial Notes

REFERENCES IN TEXT

The American Super Computing Leadership Act of 2017, referred to in par. (1), is Pub. L. 108–423, Nov. 30, 2004, 118 Stat. 2400, which is classified principally to subchapter III (§5541 et seq.) of chapter 81 of Title 15, Commerce and Trade. For complete classification of this Act to the Code, see Short Title note set out under section 5501 of Title 15 and Tables.

AMENDMENTS

2018—Par. (1). Pub. L. 115–246 substituted “American Super Computing Leadership Act of 2017” for “Department of Energy High-End Computing Revitalization Act of 2004”.

§ 16317. Systems biology program

(a) Program

(1) Establishment

The Secretary shall establish a research, development, and demonstration program in microbial and plant systems biology, protein science, computational biology, and environmental science to support the energy, national security, and environmental missions of the Department.

(2) Grants

The program shall support individual researchers and multidisciplinary teams of researchers through competitive, merit-reviewed grants.

(3) Consultation

In carrying out the program, the Secretary shall consult with other Federal agencies that conduct genetic and protein research.

(b) Goals

The program shall have the goal of developing technologies and methods based on the biological functions of genomes, microbes, and plants that—

- (1) can facilitate the production of fuels, including hydrogen in sustainable production systems that reduce greenhouse gas emissions;
- (2) convert carbon dioxide to organic carbon;
- (3) detoxify soils and water, including at facilities of the Department, contaminated with heavy metals and radiological materials;
- (4) develop cellulosic and other feedstocks that are less resource and land intensive and that promote sustainable use of resources, including soil, water, energy, forests, and land, and ensure protection of air, water, and soil quality; and