

The Department of Energy Science for the Future Act

The Department of Energy Science for the Future Act of 2022 is Chairman Joe Manchin's, Ranking Member John Barrasso's, Senator Dick Durbin's, and Senator Marsha Blackburn's authorization bill for the DOE Office of Science, which leads the agency's basic research programs.

This bipartisan bill would provide the first-ever comprehensive authorization for the Department of Energy's Office of Science, totaling \$50 billion over five years. The Office of Science accounts for over half of DOE's non-defense research and development budget and is the nation's largest supporter of research in the physical sciences.

The Office supports research in core areas including advanced computing, biological and environmental research, basic energy and materials science, fusion, high energy physics, and nuclear physics. It also administers DOE's Established Program to Stimulate Competitive Research (EPSCoR), oversees ten of the Department's national laboratories, and manages 29 national scientific user facilities, representing some of the most advanced tools of modern science.

The Office of Science and its National Labs are uncovering the secrets of the atom, ecosystems, and the universe, including discoveries such as:

- Mapping the human genome;
- Developing quantum computers and artificial intelligence;
- Neutron scattering techniques that unlock the understanding of molecular structures and have led to new materials;
- Virus characterization to understand COVID-19 and assist the development of vaccines;
- The chemistry behind the development of lithium batteries; and more.

The bill is a companion to bipartisan legislation passed out of the House Committee on Science, Space, and Technology (H.R. 3593) and led by Chairwoman Eddie Bernice Johnson and Ranking Member Frank Lucas. In June 2021, the House passed H.R. 3593 by a bipartisan vote of 351 to 68.

Bill Summary

Basic Energy Sciences

- Authorizes a research and development program in basic energy sciences, including materials science and engineering, chemical sciences, and prioritizes research and development in sustainable chemistry.
- Reauthorizes research and development activities related to artificial photosynthesis and electricity storage.
- Directs research in foundational nuclear science, establishes a carbon materials science initiative, and establishes a carbon oxide sequestration research and geologic computing initiative.

Biological and Environmental Research

- Expands the biological systems science, environmental, and climate science programs relevant to developing new energy technologies and supporting the Department's energy, environment, and national security missions.
- Authorizes up to six bioenergy research centers focused on fundamental research in plant and microbial systems biology, biological imaging and analysis, and genomics to accelerate bioenergy sources' research, development, and commercial application.
- Directs research in low-dose radiation exposure on Earth, low-Earth orbit, and the space environment.
- Authorizes climate and Earth modeling research.

Advanced Scientific Computing Research

- Authorizes a program to support advanced computing and networking technologies and expands the Computational Science Graduate Fellowship.
- Supports quantum network infrastructure research and development and broadens access to quantum computing resources.

Fusion Energy Research

- Directs the construction of a Material Plasma Exposure Experiment Facility capable of meeting the research needs for testing of fusion materials.
- Provides for upgrades to meet research needs for understanding physical and chemical changes to plasmas at fundamental timescales, and explore new regimes of dense material physics, astrophysics, planetary physics, and short-pulse laser-plasma interactions.

High Energy Physics Program

- Establishes a program in elementary particle physics and associated advanced technology research and development, including using high energy accelerators and advanced detectors to create and study the interaction.

Nuclear Physics

- Directs a program in nuclear physics and provides guidance and authorization levels for the construction of the Facility for Rare Isotope Beams and the Electron-Ion Collider.

Accelerator Research and Development

- Fosters private-public partnerships to develop, demonstrate, and enable the commercial application of such technologies, supports associated workforce development activities, and provides access to accelerator design and engineering resources.

Isotope Development and Production

- Establishes a program to produce isotopes for research, medical, industrial, and related purposes, advance isotope production methods and techniques, and ensures that production activities do not compete with private industry.
- Establishes an isotope demonstration subprogram to support the development and commercial demonstration of critical stable or radioactive isotope production at existing commercial nuclear power plants.

Science Laboratories Infrastructure Program

- Authorizes the Director of the Office of Science to employ all available approaches and funding mechanisms to address Office of Science National Laboratory infrastructure needs, including deferred maintenance, critical infrastructure needs, and modernization.

Increased Collaboration with Teachers and Scientists

- Directs the Office to support the development of a scientific workforce through programs that foster collaboration between K-12 students, university students, early-career researchers, faculty, and national laboratories.

High-Intensity Laser Research Initiative and Helium Conservation

- Authorizes the establishment of a high-intensity laser research initiative to advance laser technologies relevant to future facility needs in discovery science and to support a user network of academic and national laboratory high-intensity laser facilities.
- Establishes a program to reduce the use of helium among the Department's grantees and facilities by encouraging recycling and reuse.

Emerging Biological Threat Preparedness Research Initiative

- Establishes a Department-led program, in coordination with the Administrator of the National Aeronautics and Space Administration and the Director of the National Science Foundation, to carry out a crosscutting initiative that leverages user facilities' advanced computational and networking capabilities to prevent, prepare for, and respond to emerging infectious diseases, including COVID-19.

Midscale Instrumentation and Research Equipment Program

- Establishes a midscale instrumentation and research equipment program to develop, acquire, and commercialize research instrumentation and equipment needed to meet the Department's missions and to provide platform technologies for the broader scientific community.

Established Program to Stimulate Competitive Research (EPSCoR)

- Expands the authorized scope and funding for the Department's EPSCoR program over 5 years; increases transparency and accountability of the program; and expands the ways the Department can support research capabilities in eligible states including with undergraduate scholarships, grants to support early career faculty and staff, and funding to expand research capacity in key technology areas and partnerships with National Labs and industry.

Research Security

- Directs the Secretary to develop and maintain tools and processes to manage and mitigate security risks to facilitate determinations of the risk of loss of United States intellectual property or threat to the national security of the United States.