

Legislative Framework: Securing American Leadership in Science and Technology Act

A strategy to ensure American competitiveness

The U.S. is facing two fundamental challenges to our competitiveness and growth as a nation:

First, foreign countries, especially China, are threatening to outpace us in the science and technology that has paid dividends to our country's economy and national security for decades.

Second, we must respond to a changing climate and develop next-generation technologies to understand it, address it, and mitigate it.

The Securing American Leadership in Science and Technology Act creates a long-term strategy for investment in basic research and infrastructure to protect the economic and national security of the United States.

The U.S. Must Preserve Our Global Leadership in Science and Technology

- The United States has the most dynamic private sector in the world, with entrepreneurs, investors, big companies, and capital markets all eager to license technologies and launch start-ups. Those ventures, however, are often driven by technologies that come from basic research funded by the federal government.
- The “Made in China 2025” initiative is a bold plan by China, which outlines its intent to surpass the U.S. and become the global leader in areas like quantum, artificial intelligence and biotechnology.
- China is also pushing a strategy of promoting foreign acquisitions, forced technology transfer agreements, and, in many cases, commercial cyber espionage to gain cutting-edge technologies and know-how.
- At the same time, U.S. investment in basic civilian research has stagnated. China increased public R&D by 56 percent between 2011 and 2016, but U.S. investment in the same period fell by 12 percent in absolute terms. That is a recipe for decline, economically and strategically.

The U.S. Must Innovate to Adapt to a Changing Climate

- Global industrial activity is contributing to climate change and we must adapt and respond to this so Americans continue to thrive.
- Our challenge is to address climate change without drastically raising energy prices and devastating our economy. We do that by incentivizing American innovation so we can produce and export clean and affordable technology, ensuring the U.S. remains the global leader in energy.
- We also need to know more about the real-world, Main St. effects of a changing climate so we can mitigate storm damage, grow our economy, and provide certainty for businesses that depend on accurate forecasts.
- It is vital we accelerate our investments in basic research and the tools and facilities needed to support that research to meet these two generational challenges.

Our Solutions

- **Create a National S&T Strategy.** Directs a more strategic whole-of-government planning process to establish national priorities with better coordination between agencies and a large focus on securing research from China.
- **Prioritize Investment in Federal Basic Research.** Authorizes a doubling of basic research funding over the next 10 years at the Department of Energy, the National Science Foundation, the National Institute of Standards and Technology, and the National Oceanic and Atmospheric Administration.
- **Invest in American Research Facilities.** Authorizes the infrastructure needed to maintain world-class research facilities.
- **Develop a STEM Workforce.** Supports an increase in key programs to grow the American pipeline of STEM-capable workers, including cybersecurity and other areas of national need.
- **Reform Regulation.** Improves the effectiveness of Federal R&D investments through technology transfer reform and promotes better collaboration between the federal government and private industry.

Legislative Outline

Title I – National Science and Technology Strategy – Office of Science and Technology Policy (OSTP)

Given the importance of the U.S. R&D enterprise, it is critical that we approach it strategically and holistically. By developing a cross-cutting strategy for Science & Technology, as is already done for national defense, homeland security, and energy, the U.S. can address emerging challenges and set priorities.

- Authorizes a National Science and Technology Strategy every 4 years.
- Authorizes a quadrennial review for U.S. Science and Technology.

Title II – Department of Energy

The Department of Energy ensures America's security and prosperity by addressing its energy, environmental, and nuclear challenges through transformative science and technology solutions. DOE sponsors basic research at more than 300 institutions across the country, including universities, national laboratories, nonprofits, and private sector institutions. This legislation advances research on cutting-edge science and supercomputing, improves infrastructure to give researchers and industry access to best-in-class facilities, and prioritizes clean energy technologies.

- Authorizes full funding for construction of key basic energy sciences (BES) user facilities and upgrades.
- Authorizes research and development programs in artificial photosynthesis, multivalent systems, and electrochemistry modeling,
- Establishes a program for computational materials and chemistry sciences including a materials science database.
- Improves advanced scientific computing research by authorizing full funding for upgrades to the Energy Sciences Network (ESnet).
- Establishes a quantum science network user facility.

- Prioritizes beyond-exascale computing initiatives in energy-efficient computing architectures and algorithms.
- Supports a balanced portfolio of applied math and software development and workforce development.
- Authorizes full funding for the construction of key high-energy physics user facilities and upgrades.
- Authorizes Bioenergy Research Centers and a program for the development, construction, operation, and maintenance of biological and environmental research user facilities.
- Provides direction for the Office of Science Low-Dose Radiation Research Program.
- Enables collaboration with NOAA to use DOE's advanced computing capabilities to conduct climate and atmospheric science modeling and research.
- Authorizes full funding for the construction of key fusion energy facilities including U.S. commitments to the ITER project.
- Establishes a mechanism for public-private partnerships with U.S. fusion industry and a fusion energy high-performance computing program.
- Authorizes full funding for the construction of key nuclear physics user facilities.
- Prioritizes mid-scale instrumentation activities at the DOE national labs.
- Makes reforms and improvements to the Advanced Research Projects Agency – Energy (ARPA-E), reauthorizing the program with sustained growth over 10 years.
- Authorizes full funding for other critical DOE user facilities that provide key capabilities to industry in order to develop new clean energy technologies. This includes full funding for the Advanced Energy Storage Initiative, Versatile Test Reactor, Carbon Utilization Research and Development Infrastructure, Frontier Observatory for Research in Geothermal Energy, and Critical Infrastructure Research and Construction.
- Establishes Regional Energy Innovation Centers to take advantage of energy industry expertise around the country and better direct the use-inspired basic research needed to develop next-generation energy technologies.

Title III – National Institute of Standards and Technologies

NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology. Almost every federal agency and U.S. industry sector uses the standards, measurements, and certification services that NIST labs provide. NIST also engages in international standards development, which can determine how technology & products are measured and evaluated. This has consequences for international trade and for the competitiveness of American industry. Lately, China has been far more successful than the U.S. in influencing global standards. This legislation improves NIST facilities and addresses the need for U.S. leadership in international standards development.

- Prioritizes critical research for the industries of the future, including quantum information science, cybersecurity, artificial intelligence and data science, the internet of things, engineering biology, and materials research.
- Prioritizes engagement in international standards development.
- Supports new research facilities and addresses maintenance backlog to improve existing facilities.

- Encourages public-private partnerships.

Title IV – National Oceanic and Atmospheric Administration (NOAA)

The work done by the National Oceanic and Atmospheric Administration supports economic vitality and affects more than one-third of our GDP. Within NOAA, the National Weather Service provides weather, water, and climate data, forecasts, and warnings. Improving NSF forecasts not only helps people, businesses, and farmers plan for productive days, but also enhances our ability to protect property and save lives in severe weather events.

- Directs National Weather Service to accelerate the research of next-generation phased array radar system to replace current system.
- Commissions study on NOAA's satellite replacement strategy and how to ensure better coordination with other elements of weather enterprise.
- Directs examination of how NOAA can collaborate with other federal agencies on utilizing supercomputing resources.
- Creates severe weather extramural research testbeds to improve weather forecasting and modeling.
- Authorizes National Mesonet Program to better integrate data into forecast models and meet the NWS goal of 30-minute warning time for severe weather.

Title V – National Science Foundation (NSF)

NSF supports all fields of fundamental science and engineering, except for medical sciences. NSF-funded research at universities and academic facilities keeps the U.S. at the leading edge of discovery in areas from astronomy to biology, to computer science. This legislation supports basic research, promotes scientific integrity, and prioritizes the security of U.S. intellectual property.

- Directs an external review of NSF's research directorate structure for improving support for cross-disciplinary research and building a Foundation for the 21st Century.
- Supports research security through the development of a new policy for plans to manage security and ethical implications of research, and the authorization of secure computing enclaves.
- Prioritizes investment in mid-scale research infrastructure, valued between \$20 million and \$70 million.
- Supports reproducibility in science.
- Prioritizes investment in certain U.S. STEM talent pipeline programs.

Title VI- STEM Workforce for the 21st Century

The global economy is changing. To remain competitive in this evolving market, the U.S. needs a workforce skilled in science, technology, engineering, and math (STEM). Knowledge and technology-intensive industries make up one-third of global GDP. STEM careers are growing faster than any other sector and employers are struggling to fill open jobs. Over the next decade, the STEM shortage is anticipated to reach one million professionals, according to the Bureau of Labor Statistics. This legislation improves U.S. competitiveness by improving the STEM workforce pipeline.

- Promotes growing NSF Graduate Research Fellowships to over 2,500 students annually with new fellowships in areas of national need over the next 10 years.
- Promotes the Noyce Teacher Scholarship Program, reaching the goal of doubling science teachers funded per year.
- Supports the expansion of Cybercorps, a scholarship for federal service program.
- Supports the Advanced Technical Education program to grow a skilled technical workforce.
- Requires improved STEM data collection for greater accountability.

Title VII – Antarctic Science and Conservation Modernization

As we adapt to a changing climate, we must proactively evaluate the importance of the Antarctic. This legislation addresses the strategic and scientific importance of the Antarctic and addresses the rise in tourism and commercial activity in the area.

- Addresses increased tourism in the Antarctic and its impact on U.S. operations in the region under the leadership of the National Science Foundation.
- Requires non-governmental expeditions to the Antarctic to have adequate insurance or other financial arrangements to cover their activities and to have appropriate contingency plans or other arrangements for health, safety, search and rescue, medical care, and evacuation.

Title VIII – Technology Transfer and Innovation

Securely and efficiently sharing federal research with public and private organizations facilitates the commercialization of new technologies.

- Updates federal technology transfer law (Stevenson-Wydler Act) to improve federal return on investment, including updates to copyright protections and royalty payments for federal employees and improvements to the CRADA authority to support collaborations between federal laboratories and the private sector.
- Updates reporting and metrics requirements to improve data on intellectual property (IP) resulting from Federal laboratory R&D.
- Establishes an interagency working group for technology transfer.
- Authorizes DOE lab signature authority to remove red tape and improve industry access to the national labs and the establishment of public-private partnerships.
- Allows agencies to set aside a portion of Small Business Technology Transfer funds to create "proof of concept" grant programs and other innovative technology transfer programs to address the "valley of death."