

## SCIENCE

(dollars in thousands)

	FY 2022 Enacted	FY 2023 Enacted	FY 2024 Request	FY 2024 Request vs FY 2023 Enacted	
				\$	%
<b>Office of Science</b>					
Advanced Scientific Computing Research	1,035,000	1,068,000	1,125,973	+57,973	+5.43%
Basic Energy Sciences	2,308,000	2,534,000	2,692,858	+158,858	+6.27%
Biological and Environmental Research	815,000	908,685	931,700	+23,015	+2.53%
Fusion Energy Sciences	713,000	763,222	1,010,496	+247,274	+32.40%
High Energy Physics	1,078,000	1,166,000	1,226,334	+60,334	+5.17%
Nuclear Physics	728,000	805,196	811,418	+6,222	+0.77%
Isotope R&D and Production	82,000	109,451	173,051	+63,600	+58.11%
Accelerator R&D and Production	18,000	27,436	34,270	+6,834	+24.91%
Workforce Development for Teachers and Scientists	35,000	42,000	46,100	+4,100	+9.76%
Science Laboratories Infrastructure	291,000	280,700	322,000	+41,300	+14.71%
Safeguards and Security	170,000	184,099	200,000	+15,901	+8.64%
Program Direction	202,000	211,211	226,200	+14,989	+7.10%
<b>Total, Office of Science</b>	<b>7,475,000</b>	<b>8,100,000</b>	<b>8,800,400</b>	<b>+700,400</b>	<b>+8.65%</b>

### Appropriation Overview

The Office of Science (SC) is the nation's largest Federal supporter of basic research in the physical sciences and funds programs in physics, chemistry, materials science, biology, environmental science, applied mathematics, isotope research and production, accelerator research and production, and computer and computational science. The SC portfolio has two principal thrusts: direct support of scientific research and direct support of the design, development, construction, and operation of unique, open-access scientific user facilities. The SC basic research portfolio includes extramural grants and contracts supporting nearly 32,000 researchers located at over 300 institutions and the 17 DOE national laboratories, spanning all fifty states and the District of Columbia. The portfolio of 28 scientific user facilities serve nearly 37,000 users per year. SC programs invest in foundational science, including basic research for the advancement of clean energy, to transform our understanding of nature and strengthen the connection between advances in fundamental science and technology innovation.

The SC Request increases investments in Administration priorities including basic research on climate change and clean energy, including additional funding for the SC Energy Earthshots and accelerating fusion development in support of the Bold Decadal Vision for Commercial Fusion Energy initiative. The SC Request establishes new Microelectronics Science Research Centers as authorized under the CHIPS and Science Act, focusing on a multi-disciplinary co-design innovation ecosystem in which materials, chemistries, devices, systems, architectures, algorithms, and software are developed in a closely integrated fashion. The SC Request also promotes the domestic establishment of critical isotope supply chains to reduce U.S. dependency on foreign supply and increase U.S. resilience. SC increases efforts to support underserved communities through the Reaching a New Energy Sciences Workforce (RENEW) and Funding for Accelerated, Inclusive Research (FAIR) initiatives. The request continues support for the National Quantum Information Science (QIS) Research Centers for basic research and early-stage development to accelerate the advancement of QIS through vertical integration between systems, theory, hardware, and software. Additional quantum-related R&D support will focus on early-stage research associated with the first steps to establish a dedicated Quantum Network as well as research in quantum algorithms, applications, testbeds, and technology development of QIS isotopes of interest. The Request also supports ongoing investments in priority areas including microelectronics, biopreparedness, artificial intelligence (AI) and machine learning (ML), critical materials, exascale computing, fundamental science to transform manufacturing, accelerate

innovations in emerging technologies (Accelerate), and accelerator science and technology. These initiatives position SC to address new research opportunities through more collaborative, cross-program efforts.

In FY 2024, the RENEW initiative expands targeted efforts to increase participation and retention of individuals from underrepresented groups in SC research activities. As part of this increase, a RENEW graduate fellowship will increase participation of students in fields aligned with SC programs. The fellowship will focus on students who received their bachelor's degree from non-R1 minority serving institutions or emerging research institutions. The goal is to advance belonging, accessibility, justice, equity, diversity, and inclusion in SC-sponsored research.

The SC Energy Earthshots initiative will expand support for small group awards and continue larger center awards through the Energy Earthshot Research Centers (EERCs). The EERCs will support underlying fundamental research to realize the stretch goals for individual Energy Earthshots, bringing multi-investigator, multi-disciplinary teams to address key basic research challenges facing the Energy Earthshots, with relevance to applied research and development activities. In addition, teams of researchers will address research that crosses multiple Energy Earthshots, providing innovation for the scientific challenges that are key to the technology challenges. This initiative fosters collaboration within the team awards involving academic, national laboratory, and industrial researchers by SC with strong coordination with the Energy Technology Offices, establishing a new era of cross-office research cooperation.

The FY 2024 Request includes increase investment to support SC scientific user facilities. The 28 SC scientific user facilities are unique resources stewarded by DOE for the nation and made available to the scientific community free of charge, based on merit review to support the best scientific ideas. Annually, over 38,500 researchers access these cutting-edge tools to push the frontiers of science and technology, with nearly half doing research supported by other funding agencies, from the National Science Foundation, the National Institutes of Health, and the Department of Defense and others, as well as from industry. These facilities have delivered extraordinary breakthroughs, such as powering our nation's response to COVID by supporting rapid development of vaccines and helping usher new battery technologies to the marketplace. Further, these facilities are often the portal through which the next generation of researchers begin their engagement with the DOE and its national laboratories, providing invaluable opportunities for developing the diverse, equitable, and inclusive workforce our country needs to meet the major economic and national security challenges ahead.

### **Program Highlights**

#### **▪ Advanced Scientific Computing Research**

Advanced Scientific Computing Research (ASCR) advances science and U.S. competitiveness through investments in computational research, applied mathematics, and computer science, as well as development and operation of multiple, large, high performance and leadership computing user facilities and high performance networking. The efforts prioritize basic research in applied mathematics and computer science with emphasis on the challenges of data intensive science, including AI and ML, and future computing technologies. The Request funds:

- New Microelectronics Science Research Centers as authorized under the CHIPS and Science Act.
- Increased support for ASCR's Computational Partnerships with a focus on developing partnerships with the Applied Energy offices and data intensive applications, and new partnerships that broaden the impact of both exascale and data infrastructure investments.
- Final research and development activities within the Exascale Computing Project (ECP) and full scale runs to deliver project performance targets on the nation's second exascale system, Aurora, which is projected to achieve exascale-capable systems with a five-fold improvement in true application performance over the Summit system at the Oak Ridge Leadership Computing Facility (OLCF). During FY 2024, Aurora will primarily support ECP and early science applications, as well as debugging and system stabilization efforts. Frontier, the OLCF's exascale system will begin operations and support projects selected through the Innovative and Novel Computational Impact on Theory & Experiment (INCITE) and ASCR Leadership Computing Challenge programs.
- Foundational research to improve the robustness, reliability, and transparency of Big Data and AI technologies, uncertainty quantification, and development of software and data visualization tools and continuation of an activity to deploy AI software and technologies to create an integrated computational and data infrastructure across the SC programs, scientific user facilities, and laboratories.

- Core research in applied mathematics and computer science, the Scientific Discovery through Advanced Computing (SciDAC) program, and strategic partnerships aimed at understanding the challenges and opportunities that emerging technologies such as artificial Intelligence, quantum information science, and neuromorphic processors pose to DOE mission applications.
- Support for new data and partnerships with the National Institutes of Health (NIH), as well as engagements with other agencies to improve our ability to assist in times of national emergencies.
- Ongoing activities including the FAIR initiative to expand clean energy research and capabilities at MSIs and Accelerate initiative to support fundamental research that accelerates transition from discovery science to technological innovations. Activities also continue to support the Department's Earthshot initiatives, which includes the Energy Earthshot Research Centers.
- Operate the ASCR's four scientific user facilities and the design of the National Energy Research Scientific Computing Center (NERSC-10) upgrade while planning for the High Performance Data Facility.
- Increase efforts to broaden participation and retention in ASCR's programs and workforce by underrepresented groups, institutions, and regions through RENEW, CSGF, and the DOE Established Program to Stimulate Competitive Research (EPSCoR).

#### ▪ **Basic Energy Sciences**

Basic Energy Sciences (BES) supports fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels to provide the foundations for new energy technologies, to mitigate the environmental impacts of energy use, and to support DOE missions in energy, environment, and national security. The Request funds:

- New Microelectronics Science Research Centers as authorized under the CHIPS and Science Act.
- Core research activities to support discovery science and Administration Priorities on clean energy (e.g., carbon capture, hydrogen, solar, and batteries); related topics such as manufacturing and critical materials/minerals; and cross-cutting priorities for biopreparedness, QIS, data science including AI/ML and accelerator science and technology.
- Expanded support for national laboratory training opportunities for MSI students as part of the RENEW initiative; and continued support for the FAIR initiative to expand clean energy research and capabilities at underrepresented and emerging research institutions and for universities in underrepresented regions through the EPSCoR program. Managed by BES, the funding for the EPSCoR program is distributed among the six major research programs within the Office of Science per direction from the FY 2023 appropriation.
- Continued support for the Accelerate initiative, focused on fundamental research that accelerates the transition of science to technologies and expands support for the SC Energy Earthshots initiative and Energy Earthshot Research Centers, in partnership with other SC programs and the DOE technology offices.
- Continued support for the Energy Frontier Research Centers, the Batteries and Energy Storage and the Fuels from Sunlight Energy Innovation Hub programs, and the computational materials and chemical sciences programs.
- Continued operation of BES scientific user facilities: five x-ray light sources, two neutron scattering sources, and five research centers for nanoscale science. At 90 percent of the optimal funding levels, the support in the FY 2024 Request will balance high priority activities required for safe and reliable user facility operations while maintaining a strong user community.
- Continued support for the Biopreparedness Research Virtual Environment (BRaVE) initiative to provide the tools and expertise for response to future pandemics and other national emergencies.
- Three ongoing construction projects: the Linac Coherent Light Source-II High Energy (LCLS-II-HE), the Second Target Station (STS), and the Cryomodule Repair and Maintenance Facility (CRMF).
- Final funding for two construction projects: the Advanced Light Source Upgrade (ALS-U) and the Proton Power Upgrade (PPU).
- Initial construction support for two line-item construction projects: the NSLS-II Experimental Tools-III (NEXT-III) and the High Flux Isotope Reactor Pressure Vessel Replacement (HFIR-PVR) projects.
- Final funding for two Major Item of Equipment (MIE) projects: the NSLS-II Experimental Tools-II (NEXT-II) for beamlines at NSLS-II, and the Nanoscale Science Research Centers Recapitalization project. Initiates planning for two new MIEs for beamlines at the ALS and Advanced Photon Source.

▪ **Biological and Environmental Research**

Biological and Environmental Research (BER) supports fundamental research to understand complex biological, biogeochemical, and physical principles of natural systems at scales extending from the genome of microbes and plants to the environmental, climate, and human processes at the scale of the planet Earth. BER's support of basic research will contribute to a future of stable, reliable, and resilient energy sources and infrastructure, that will lead to climate solutions, strengthen economic prosperity, and assure environmental justice. The Request funds:

- Core research in biological systems science using genome-enabled approaches in addition to proteomics, metabolomics, structural biology, and high-resolution imaging and characterization to achieve a fundamental understanding of the biology of plants and microorganisms for a variety of DOE clean energy mission needs.
- Enhanced Bioenergy Research Centers provide new research through individual efforts and inter-BRC shared-theme research underpinning production of clean energy and chemicals from sustainable biomass.
- FAIR expands clean energy research and capabilities at Minority Serving Institutions (MSIs) across BER.
- RENEW expands with targeted efforts to broaden participation and belonging, accessibility, justice, equity, diversity, and inclusion across BER activities.
- EPSCoR broadens support for universities in underrepresented regions.
- Expand efforts within the Energy EarthShot Research Centers portfolio and related research to remove barriers to implementation of basic science innovations into potential solutions to technological challenges.
- Enhanced biotechnology innovations will be pursued to assist development of advanced manufacturing techniques.
- Expand the scope of BRaVE to include Low Dose Radiation research.
- Core research in Earth and environmental systems science, with activities focused on scientific analysis and modeling of the sensitivity and uncertainty of Earth system predictions to atmospheric, cryospheric, oceanic, and biogeochemical processes, with continued support of the Energy Exascale Earth System Model (E3SM).
- Continue the Integrated Artificial Intelligence for Earth System Predictability (AI4ESP) to add AI/unsupervised learning approaches to modeling capabilities, including E3SM version 2.
- Expand Urban Integrated Field Laboratories (Urban IFLs) and the network of climate resilience centers, affiliated with Historically Black Colleges and Universities (HBCUs) and other MSIs.
- The National Virtual Climate Laboratory will continue to provide information to underserved academic institutions and external stakeholders concerning climate research capabilities across the DOE national laboratories.
- Joint Genome Institute (JGI) will explore new capabilities in plant transformation capability to accelerate the ability to understand and design new beneficial functions into plants.
- Atmospheric Radiation Measurement Research Facility (ARM) will initiate full operations of its long-term mobile facility deployment in Alabama, and a cloud chamber research effort will be initiated to complement ARM's field observations of cloud-aerosol interactions.
- Environmental Molecular Sciences Laboratory (EMSL) will focus on biological and environmental molecular science and new technologies for molecular microbial phenotyping.
- Construction: EMSL will initiate the Molecular Microbial Phenotyping Capability (M2PC) project.

▪ **Fusion Energy Sciences**

Fusion Energy Sciences (FES) supports research to understand matter at very high temperatures and densities and to build the scientific foundation needed to develop a fusion energy source. The Request is aligned with the recommendations of the recent Long-Range Plan (LRP) developed by the Fusion Energy Sciences Advisory Committee and the Administration's Bold Decadal Vision for commercial fusion development, and funds:

- New Microelectronics Science Research Centers as authorized under the CHIPS and Science Act.
- Partnerships with the private fusion sector through the Fusion Development Milestone Program and INFUSE.
- The development of four new integrated Fusion Energy R&D Centers in the areas of enabling technologies, fusion blanket/fuel cycle, advanced simulations, and structural/plasma facing materials.
- Research and facility operations at the DIII-D national fusion facility at 90 percent of the optimal funding level.
- Recovery of the National Spherical Torus Experiment-Upgrade (NSTX-U) as well as machine assembly and hardware commissioning.
- Collaborations by U.S. scientists at international facilities with unique capabilities.
- Continued support for fusion-relevant QIS and AI/ML initiatives.

- Research activities in materials, fusion nuclear science, advanced manufacturing, and enabling R&D.
  - Research activities in theory and SciDAC in partnership with ASCR, and the Advanced Computing initiative.
  - Research in High-Energy-Density Laboratory Plasma science including LaserNetUS, and General Plasma Science including low-temperature plasmas.
  - U.S. Contributions to ITER project focusing on the design, fabrication, and delivery of in-kind hardware components; construction cash contributions to support the ITER Organization assembly and installation of the hardware contributions from all the ITER Members; and an ITER Research program to prepare the U.S. to take full advantage of ITER Operations.
  - Matter in Extreme Conditions Petawatt upgrade project at the Linac Coherent Light Source.
  - Materials-Plasma Exposure eXperiment MIE project.
  - Research on inertial fusion energy addressing the priority research opportunities identified in the recent Basic Research Needs workshop.
  - Increased support for the RENEW and FAIR initiatives and continued participation in the Accelerate initiative and EPSCoR program.
- **High Energy Physics**
- High Energy Physics (HEP) supports research to understand how the universe works at its most fundamental level, enabling the discovery of the most elementary constituents of matter and energy, the probing of the interactions among them, and the exploration of the basic nature of space and time. The Request provides support to foster a diverse, highly skilled, American workforce, to build R&D capacity, to spur technology innovation, and to conduct world-leading R&D. The Request funds:
- Core research activities, with emphasis on the physics of the Higgs boson, neutrinos, dark matter, and dark energy; exploring the unknown; and enabling early and visible scientific results from HEP project investments.
  - RENEW to expand targeted efforts, including a graduate fellowship, to broaden participation and advance belonging, accessibility, justice, equity, diversity, and inclusion in SC-sponsored research.
  - FAIR to improve the capability of MSIs to propose and perform competitive research; and build beneficial relationships between MSIs and DOE national laboratories and facilities.
  - EPSCoR to support universities in underrepresented regions.
  - Accelerate initiative to promote scientific research to accelerate the transition of science advances to energy technologies.
  - QIS co-development of quantum information, theory, and technology with the science drivers and exploring new capabilities in networking, sensing, and computing and will continue support of the Superconducting Quantum Materials and Systems Center.
  - AI/ML to tackle the challenges of extracting signals of signature particle physics from HEP experimental and simulated data with increasingly high volumes and complexity; seek solutions for operating accelerators and detectors in real-time and extremely high data rate environments; and address cross-cutting challenges in coordination with DOE investments in AI/ML efforts.
  - Accelerator Science and Technology Initiative support for mid- to long-term R&D to maintain a leading position in key accelerator technologies that define SC's competitive advantage.
  - Microelectronics to accelerate the advancement of sensor materials, devices, and front-end electronics.
  - Advanced Computing to ensure broad access to exascale computing resources.
  - The Fermilab Accelerator Complex and the Facility for Advanced Accelerator Experimental Tests II (FACET-II) to operate 5,200 and 3,300 hours, respectively, while addressing critical upgrades, improvements, and deferred maintenance.
  - Continuing support for the Fermi National Accelerator Laboratory (FNAL)-hosted line-item construction projects: Long Baseline Neutrino Facility/Deep Underground Neutrino Experiment (LBNF/DUNE) and Proton Improvement Plan II (PIP-II); and four Major Item of Equipment (MIE) projects: Accelerator Controls Operations Research Network (ACORN), Cosmic Microwave Background Stage 4 (CMB-S4), and the High Luminosity Large Hadron Collider ATLAS and CMS Detector Upgrade Projects.

▪ **Nuclear Physics**

Nuclear Physics (NP) supports research to discover, explore, and understand all forms of nuclear matter. The Request funds:

- High priority world-class nuclear physics research and core competencies in quantum chromodynamics, nuclei and nuclear structure and astrophysics, and fundamental symmetries at universities and laboratories.
- Operations of all NP user facilities at nearly 90 percent optimal funding including: the Relativistic Heavy Ion Collider; the 12 GeV Continuous Electron Beam Accelerator Facility (CEBAF); the Argonne Tandem Linac Accelerator System; and the newly constructed Facility for Rare Isotope Beams (FRIB).
- Support for QIS research efforts to enable precision NP measurements, development of quantum sensors based on atomic-nuclear interactions, and development of quantum computing algorithms, in support of the National Quantum Initiative.
- Expanded support of the RENEW initiative to attract and retain a future nuclear physics workforce that is creative, innovative, and capable of meeting the nation's needs via proactive stewardship of talent with diverse ideas and backgrounds.
- Initiatives in microelectronics and AI/ML to achieve groundbreaking advances in these fields related to nuclear physics.
- Continued participation in two initiatives to broaden participation in NP research: FAIR to expand nuclear physics research and capabilities at MSIs and Accelerate, to research how imaging advances within nuclear physics can apply to other fields.
- Continued support for R&D and design activities for the Electron-Ion Collider, which will be America's only collider for scientific research and will play a critical role in maintaining U.S. leadership in nuclear science and accelerator R&D.
- Continued support for fabrication of new NP scientific equipment: the High Resolution Spectrometer (HRS) to study fast neutron beams at FRIB and the Ton-scale Neutrinoless Double Beta Decay MIE to determine whether the neutrino is its own antiparticle.

▪ **Isotope R&D and Production**

Isotope R&D and Production (DOE IP) produces high priority radioactive and stable isotopes in short supply for the nation that no domestic entity has the capability to meet market demand; a priority is to reduce U.S. dependence on foreign isotope supply chains. Isotopes are high-priority and enabling commodities of strategic importance for the nation and essential in medical diagnosis and treatment, discovery science, national security, advanced manufacturing, space exploration, communications, biology, QIS, clean energy, and other fields. The Request funds:

- Continued focus on mitigating disruptions in isotope supply chains to promote U.S. economic resilience, prosperity, and competitiveness. Mission readiness of facilities to produce isotopes in short supply or otherwise not available increases to approximately 92 percent.
- High impact core and competitive R&D activities at universities and national laboratories to develop innovative, cutting-edge isotope production, processing and enrichment technologies.
- Two additional university sites with unique isotope production capabilities as partners in the University Isotope Network. The implementation of isotope harvesting capabilities at FRIB nears completion.
- RENEW to promote diversity, equity, and inclusion in SC-sponsored research, and FAIR provides opportunities for research, bolstered with investments in equipment and infrastructure at minority serving institutions. Continued support for Horizon Broadening Isotope Production Pipeline Opportunities (HIPPO), the DOE IP traineeship.
- Start of DOE Isotope Initiative to reduce the nation's dependence on foreign isotope supply chains. These dependencies threaten the nation's technical and scientific strength and add risk to the nation's prosperity. This initiative supports R&D to develop new and or increased domestic supply chains of key isotopes.
- Continued support in the QIS initiative to develop production approaches for isotopes for quantum computing; Advanced Manufacturing to promote the translation of cutting edge developments in target manufacturing, materials preparation, robotics and automation; Accelerate to advance key aspects of industrially relevant research and technology in isotope production; BRaVE to promote bio-preparedness with increased availability of isotopes for medicine and bio-technology and reductions of single point failures in reactor isotope supply chains.
- Research in the Microelectronics initiative to develop separations technology and chemistry for producing isotopes needed for semi-conductor manufacturing.

- Design and construction for the Stable Isotope Production and Research Center to develop domestic capabilities for the enrichment of stable isotopes for discovery research and applications, mitigating U.S. dependence on foreign sources.
  - Engineering design for the Radioisotope Processing Facility (RPF) at ORNL for increased chemical separation infrastructure for reactor-irradiated targets to chemically process and make available critical radioisotopes.
  - Engineering design and long-lead procurement of the Clinical Alpha Radionuclide Producer (CARP) at Brookhaven National Laboratory (BNL) to address disruptions in global isotope supply chains and produce isotopes to diagnose and treat cancer.
  - Increased support for National Isotope Development Center activities to interface with the fast-growing stakeholder community.
- **Accelerator R&D and Production**
- Accelerator R&D and Production (ARDAP) supports cross-cutting basic R&D in accelerator science and technology, access to unique SC accelerator R&D infrastructure, workforce development, and public-private partnerships to advance new technologies for use in SC's scientific facilities and in commercial products. The Request supports:
- Innovative research, development, and deployment of accelerator technology, the implementation of the first consortium-based approach to accelerator R&D, and workforce development;
  - Public-private partnerships to develop technologies that include advanced superconducting wire and cable, superconducting accelerators, and advanced radiofrequency power sources for accelerators.
  - An increase in the FAIR initiative which will provide focused investment on enhancing research on clean energy, climate, and related topics at minority serving institutions, including attention to underserved and environmental justice regions;
  - An increase in the RENEW initiative, which will expand targeted efforts, including a RENEW graduate fellowship, to broaden participation and advance belonging, accessibility, justice, equity, diversity, and inclusion in SC-sponsored research; and
  - Operation of the BNL Accelerator Test Facility (ATF) for 2,100 hours (the maximum possible in FY 2024) and provides funding to address significant remedial maintenance and deferred maintenance items, resulting in increased facility reliability and availability.
- **Workforce Development for Teachers and Scientists**
- Workforce Development for Teachers and Scientists (WDTS) helps ensure that DOE has a sustained and diverse pipeline of science, technology, engineering, and mathematics (STEM) workforce. Accomplishing this goal depends on continued support for discovery learning and hands-on research experiences at DOE national laboratories and intentional efforts for diversifying the STEM pipeline. The request funds:
- Sustained growth for undergraduate internships on DOE science and technology, graduate thesis research in SC mission areas, and visiting faculty appointments for research collaboration at DOE national laboratories.
  - Signature pre-college STEM programs to engage K-12 students and teachers nationwide in DOE and SC mission, including National Science Bowl and Albert Einstein Distinguished Educator Fellowship program.
  - WDTS RENEW pathway programs for students and educators from underrepresented and underserved groups and communities, as part of the SC RENEW initiative.
  - Critical infrastructure to sustain all the WDTS programs and activities, including IT modernization, intelligent data management, and comprehensive evaluation portfolio, aligned with OMB's evidence-based management practice.
  - Amplified outreach and engagement efforts with inclusive approaches to enable equitable access to WDTS programs and DOE/SC training opportunities by those from underrepresented and underserved groups and communities, including targeted outreach to attract and recruit more diverse applicant pools.
- **Science Laboratories Infrastructure**
- Science Laboratories Infrastructure (SLI) supports scientific and technological innovation at the SC laboratories by sustaining and modernizing general purpose infrastructure and fostering safe, efficient, reliable, resilient, and environmentally responsible operations. The SLI Program is focused on both replacing obsolete and failing core infrastructure at the SC national laboratories in support of the Science Mission, and upgrading core infrastructure that supports the critical needs of future science initiatives and world class user facilities. A principal element of the SLI

Program is to provide for a renewal of utilities at all SC national laboratories to address the extraordinary challenges to SC laboratory operations and to enable emerging scientific breakthroughs. The SLI utility projects address climate resilience in three important ways: (1) improvements in operational efficiency that will significantly reduce the energy usage of the laboratory operations; (2) reduction of the release of greenhouse gases; and (3) direct investments needed to support the success of the science initiatives that will help the country address the challenges of climate change. The Request funds:

- Ten ongoing construction projects: (1) the Princeton Plasma Innovation Center and (2) Critical Infrastructure Recovery & Renewal project at Princeton Plasma Physics Laboratory (PPPL); (3) the Ames Infrastructure Modernization at Ames National Laboratory (Ames); (4) the Seismic and Safety Modernization project, (5) Linear Assets Modernization Project, and (6) Biological and Environmental Program Integration Center (BioEPIC) at Lawrence Berkeley National Laboratory (LBNL); (7) the CEBAF Renovation and Expansion at Thomas Jefferson National Accelerator Facility (TJNAF); (8) the Argonne Utilities Upgrade at Argonne National Laboratory (ANL); (9) the Critical Utilities Infrastructure Revitalization project at SLAC National Accelerator Laboratory (SLAC); and (10) the Utilities Infrastructure Project and the Integrated Engineering Research Center at Fermi National Accelerator Laboratory (FNAL.)
- Two early-stage projects are being paused as SLI focuses on supporting the large number of ongoing projects: the Critical Infrastructure Modernization Project at Oak Ridge National Laboratory (ORNL) and the Thomas Jefferson Infrastructure Improvements project at TJNAF. These projects will resume in future years.
- A new Laboratory Operations Apprentice Program.
- General purpose infrastructure projects that will upgrade critical core infrastructure and utility needs.
- Payment in Lieu of Taxes, nuclear facilities at ORNL, and landlord responsibilities at the Oak Ridge Reservation.

▪ **Safeguards and Security**

Safeguards and Security (S&S) program maintains security measures to protect personnel and assets in an environment of open scientific research. The Request funds:

- Increased funding for implementation of the Department's Design Based Threat to address modernization of physical access control systems at site entry points, buildings, and select internal facility locations.
- Continued security operations for all remaining S&S elements.

▪ **Program Direction**

Program Direction (PD) supports the skilled and motivated Federal workforce that plans, develops, and oversees SC investments in world-leading basic research and scientific user facilities, and provides critical oversight to 10 of DOE's national laboratories. The Request funds Salaries and Benefits, Travel, Support Services, Other Related Expenses, and Working Capital Fund requirements.