

Department of Energy

FY 2023 Congressional

Budget Request



Budget in Brief

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March 2022

Office of Chief Financial Officer



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Investing in Domestic Clean Energy Manufacturing; Advancing Environmental Justice; Tackling the Climate Crisis; and Modernizing and Ensuring the Safety and Security of the Nuclear Stockpile

The mission of the Department of Energy (DOE) is to support the Nation's prosperity by addressing its climate, energy, environmental, and nuclear security challenges through transformative science and technology solutions. DOE's Fiscal Year (FY) 2023 Budget Request (Request) of \$48.2 billion in discretionary funding, is a \$6.3 billion or 15.1 percent increase from the 2021 Enacted Level. This Request reflects the February 9, 2022, Departmental realignment to set DOE up for success in carrying out all of its missions.

The FY 2023 Request is another important opportunity for the Biden Administration to continue laying a stronger foundation for the future of the Nation. This Request provides investments for America to make substantial strides forward, not only returning to the way things were before the COVID-19 pandemic, but building a better, stronger, more secure, and more inclusive America. The FY 2023 Request continues to advance our core science and security missions and creates jobs through investments in clean energy innovation and infrastructure and to drive down the costs of clean energy. The Request supports over \$11 billion in investments in clean energy research, development, demonstration, and deployment, which are central to maintaining U.S. competitiveness and enabling achievement of the Administration's goals of 50-52 percent reduction from 2005 levels in economy-wide net greenhouse gas pollution in 2030 and zero emissions economy-wide by no later than 2050.

The FY 2023 Request continues support for the National Laboratories and deployment of the critical technologies invented and developed by lab research and development (R&D). The National Laboratories have served as the Nation's leading institutions for scientific innovation for more than 75 years and in recent years have continued working toward groundbreaking discoveries, including in the fight against COVID-19. These investments are a down payment on the solutions to the Nation's most pressing challenges. The FY 2023 Request will take us further in building an economy that positions American families and American communities to thrive.

The FY 2023 Request will strengthen domestic clean energy manufacturing, developing key energy industries and supply chains here at home to improve U.S. energy security and create good-paying jobs in communities across the country. Tackling the climate crisis requires a dramatic scale-up in domestic manufacturing of key climate and clean energy equipment, providing opportunities for U.S. workers. The Request reflects the importance of strategically supporting the U.S. domestic manufacturing base through innovation, technical assistance, and training. Specifically, the Request includes \$200 million for a new Solar Manufacturing Accelerator that will help create a robust domestic manufacturing sector capable of meeting the Administration's solar deployment goals without relying on imported goods manufactured using unacceptable labor practices. The Request also funds a new Manufacturing USA institute and increases support for Industrial Assessment Centers, giving students valuable experience conducting energy audits for small and medium-sized manufacturers. The Request also proposes a \$1 billion mandatory investment to launch a Global Clean Energy Manufacturing effort that would build resilient supply chains for climate and clean energy equipment through engagement with allies, enabling an effective global response to the climate crisis while creating economic opportunities for the U.S. to increase its share of the global clean technology market. These domestic manufacturing and resilient supply chain investments would help shield the United States from supply chain disruptions to key industries and ensure the availability of low-cost materials for the energy sector.

The FY 2023 Request invests more than \$1 billion to create jobs by building and improving clean energy infrastructure through newly established offices led by the Under Secretary for Infrastructure. The Request provides \$727 million for the new office of State and Community Energy Programs, which includes \$502 million to weatherize at least 50,000 homes through the Weatherization Assistance Program, including \$30 million for the Weatherization Readiness Fund to support health and safety upgrades necessary for weatherization and efficiency retrofits and \$100 million for the Low-Income Home Energy Assistance Program (LIHEAP) Advantage pilot to retrofit and decarbonize low-income households through energy efficient electric appliances and systems that reduce energy bills; \$105 million for the Energy Future Grants program to support state, local, and Tribal governments in novel approaches to deploying clean energy and meeting energy needs at the local level. The Request also supports \$170 million for the Federal Energy Management Program, which includes \$58 million to launch the Net-Zero Labs Initiative to competitively select decarbonization

projects across the National Laboratories facilities and infrastructure. Additionally, \$90 million is requested for a new Grid Deployment Office to build a grid that is more reliable and resilient and that integrates accelerating levels of renewable energy. These investments will create good-paying jobs while cutting pollution from the energy system and driving progress toward combatting the climate crisis.

DOE is committed to securing and advancing environmental justice and equity and spurring economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and experience underinvestment in essential services. The Request will allow DOE to provide historic support for underserved communities, including \$34 million for the Office of Economic Impact and Diversity to play a critical role in implementing the Department's Justice40 efforts and equity action plan, \$40 million in new resources for capacity building assistance in areas of persistent poverty around the Department's cleanup sites, \$150 million to electrify Tribal homes and transition Tribal colleges and universities to renewable energy, and \$13 million for the Office of Legacy Management to strengthen its environmental justice mission. New programs, including Funding for Accelerated, Inclusive Research in the Office of Science, will train and support a diverse and inclusive scientific workforce for the future. In addition, the newly established Office of State and Community Energy Programs will launch LIHEAP Advantage with a \$100 million pilot to retrofit and decarbonize low-income households through energy efficient electric appliances and systems that reduce energy bills. The Office of Energy Efficiency and Renewable Energy will lead a \$31 million Equitable Clean Energy Transition effort to build capacity and provide technical assistance to help energy and environmental justice communities navigate and benefit from the transition to a clean energy economy. These investments will build healthy, culturally vibrant, sustainable, and resilient communities and empower local decisionmakers, including women and people of color.

The Request invests \$62 million through the Office of International Affairs to accelerate international climate progress, deploy American innovation, and support economic prosperity at home and abroad. The Request includes \$18 million for the Net Zero World initiative and \$4 million to increase multilateral engagement. The Net Zero World initiative provides comprehensive technology and investment roadmaps to help other key countries with high emissions achieve net zero emissions by 2050, harnesses DOE's world class research complex to support energy system analysis, and leverages inter-agency efforts to decarbonize the energy systems in strategically critical countries – growing the market for U.S. clean energy goods and services, creating jobs, and expanding U.S. influence.

The FY 2023 Request invests more than \$11 billion in clean energy research, development, and demonstration within DOE. The Request will make progress toward tackling the climate crisis through clean energy innovation, enabling DOE to develop, demonstrate, and deploy the technologies needed to transform our energy system and save families and businesses money while doing so. The Request supports U.S. preeminence in developing innovative technologies that accelerate the clean energy transition. These investments will leverage the tremendous innovation capacity of our 17 National Laboratories, American universities, and entrepreneurs to transform our power, transportation, buildings, and industrial sectors to achieve a net-zero emissions economy by 2050. These investments strengthen clean-energy-enabling transmission and distribution systems, decarbonize transportation, advance carbon management technologies, improve energy efficiency in industry and buildings, and, secure the availability of high-assay low-enriched uranium. The FY 2023 Request builds on basic science breakthroughs at our National Laboratories by turning transformational technological advances into deployable technologies like those supported by the Advanced Research Projects Agency-Energy (ARPA-E). The Request provides \$700 million for ARPA-E for investment in high-potential, high-impact R&D that will help remove the technological barriers to advance economic, climate, and energy security of the U.S. In addition, DOE is proposing an expansion of the authority for ARPA-E to include R&D on climate adaptation and resilience innovations. This will enable work beyond the energy technology-focused projects necessary to achieve net zero emissions by 2050, including coordination across agencies, to meet the Administration's goals to adapt and strengthen resilience from the most devastating impacts of climate change.

In FY 2023, the Department of Energy will increase its emphasis on technology crosscutting efforts to accelerate progress on climate and energy goals through fully integrated science and applied energy research, development, demonstration, and deployment (RDD&D). DOE's crosscuts enhance collaboration across its science, applied energy and the new infrastructure programs to ensure that available resources are focused on achieving the nation's most critical energy and climate challenges. Priority crosscuts in FY 2023 are a combination of existing and new topics including: Advanced Manufacturing, Biotechnology, Carbon Dioxide Removal, Critical Minerals and Materials, Energy Storage, Energy-Water Nexus, Grid Modernization, Industrial Decarbonization, Hydrogen, and Subsurface Clean Energy Applications. These crosscuts enable the Department to align major DOE wide activities like the Energy Earthshots Initiative to the

implementation of BIL funding. Last year, DOE announced three Energy Earthshots – Hydrogen Shot, Long Duration Storage Shot, and Carbon Negative Shot. In FY 2023, DOE anticipates launching new decadal goals to address the hardest remaining RD&D challenges.

The FY 2023 Request provides over \$4 billion for DOE's Office of Energy Efficiency and Renewable Energy (EERE) to accelerate the RDD&D of technologies and solutions to cut energy costs through low-cost clean energy resources, equitably transition America to net-zero greenhouse gas emissions economy-wide by no later than 2050, create good paying jobs, and ensure the clean energy economy benefits all Americans, especially workers and communities impacted by the energy transition and those historically underserved by the energy system and overburdened by pollution. This includes focused investments in battery and electrification technologies and transportation integration and deployment; offshore and land-based wind technologies; the new Solar Manufacturing Accelerator; enhanced geothermal systems; clean energy manufacturing; commercial and residential building integration; and technology to market investments.

The FY 2023 Request supports energy communities by providing \$893 million for DOE's Office of Fossil Energy and Carbon Management (FECM) to advance technologies that can provide economic revitalization opportunities in energy communities. This includes dedicated funding for the Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization to coordinate interagency efforts and stakeholder engagement to expand the delivery of Federal resources to those communities affected by the energy transition.

The FY 2023 Request invests in research and innovation by providing a historic investment of \$7.8 billion for the Office of Science (SC) to support cutting-edge research at the National Laboratories and universities to; advance the Nation's understanding of climate change; identify and accelerate novel technologies for clean energy solutions; provide new computing insight through quantum information science and artificial intelligence that will address scientific and environmental challenges, leveraging data, analytics, and computational infrastructure to strengthen pandemic preparedness in support of the American Pandemic Preparedness plan objectives; and support the Nation's leading scientific user facilities. New programs will promote U.S. leadership in the industries of the future, including biotechnology and biomanufacturing, and support the Cancer Moonshot.

The FY 2023 SC Request increases investments in Administration priorities including basic research on climate change and clean energy, artificial intelligence (AI) and machine learning (ML), and bio preparedness. SC's Reaching a New Energy Sciences Workforce (RENEW) initiative doubles to expand targeted efforts to increase participation and retention of underrepresented groups in SC research activities, and to ensure a future science workforce that is creative, innovative, and capable of meeting the Nation's needs via proactive stewardship of talent with diverse ideas and background. In FY 2023, SC initiates three new research initiatives to include Energy Earthshots; Funding for Accelerated, Inclusive Research (FAIR); and Accelerate Innovations in Emerging Technologies. The FAIR initiative will support a directed effort to fund clean energy, climate, and related activities at Minority Serving Institutions (MSIs), including Historically Black Colleges and Universities (HBCUs).

The President's FY 2023 Request is \$21.4 billion for the National Nuclear Security Administration (NNSA) and \$7.6 billion for Environmental Management (EM). The Request will strengthen the Nation's nuclear security by supporting a safe, secure, and effective nuclear stockpile by robustly funding investments in the recapitalization of the National Nuclear Security Administration's physical infrastructure and essential facilities to modernize the U.S. nuclear deterrent. The Request also increases funding for key arms control, nuclear nonproliferation and counterterrorism programs; the Naval Nuclear Propulsion Program, which designs, builds, operates, maintains, and manages the reactor systems of the naval nuclear fleet; and highly skilled staff capacity to carry out these missions. Additionally, the Request reduces health and environmental hazards for at-risk communities by including \$7.6 billion for the Environmental Management program to support the cleanup of communities used during the Manhattan Project and Cold War for nuclear weapons production. The Administration will ensure investments in the remediation of legacy soil and groundwater contamination provide benefits to disadvantaged communities.

The FY 2023 Request proposes to invest \$488 million in cybersecurity activities, an increase of \$31 million, or 7%, over the FY 2021 Enacted level. This will enable the Department to make significant contributions toward modernizing cybersecurity defenses by protecting federal networks and strengthening the United States' ability to respond to incidents when they occur. The Department will be guided by the key areas, as identified in Executive Order (EO) 14028, which are to; remove barriers to

threat information sharing between government and the private sector; modernize and implement stronger cybersecurity standards; improve software supply chain security; improve investigative and remediation capabilities; and improve cybersecurity threat hunting and response through improved logging and data analytics.

OVERVIEW

The President's Budget for FY 2023 requests \$48.2 billion for the Department of Energy to meet current and future challenges by investing in domestic clean energy manufacturing; advancing environmental justice; tackling the climate crisis; and modernizing and ensuring the safety and security of the nuclear stockpile. A key component of the Request is the Secretarial crosscuts, which include a summary of the Request as well as any associated BIL funding. These crosscuts highlight major multi-office initiatives and demonstrate to Congress that activities are not duplicative; they are coordinated and integrated across the Department. The FY 2023 Request maintains

global leadership in scientific and technological innovation in part through DOE's 17 National Laboratories. Funding will also leverage the tremendous innovation capacity of the National Laboratories, universities, and entrepreneurs to transform America's power, transportation, buildings, and industrial sectors to achieve a net-zero emissions economy by 2050. In this Request, DOE also emphasizes sustaining the Nation's investment in cleanup of World War II and Cold War nuclear sites. The Request also supports a safe, secure, and effective nuclear stockpile and a continued modernization program that includes the recapitalization of physical infrastructure and essential facilities.

Department of Energy	FY 2023	\$B
Undersecretary for Infrastructure	2.1	
Undersecretary for Science & Innovation	14.7	
Undersecretary for Nuclear Security & Administrator, NNSA	21.4	
Assistant Secretary for Environmental Management	7.6	
Other Departmental Elements	DOE Total	48.2

As referenced earlier in the introduction, to implement the BIL, effective February 9, 2022, the Department conducted a realignment which created an Under Secretary for Infrastructure (S3) and an Under Secretary for Science and Innovation (S4), creating offices under S3, and realigning some existing offices and components to better execute the Department's mission, among other changes. The strategic realignment optimizes DOE's expertise and bolsters the Department's ability to tackle climate change, build the clean energy economy, bolster American competitiveness, modernize America's infrastructure, and empower communities. There has been a historic under investment in taking promising technologies out of the lab, into the field, and to market at scale so they can make a real-world impact. DOE will now be able to propel the entire innovation and commercialization lifecycle, from the discovery science that underpins our work to the market proliferation of clean energy solutions. This FY 2023 Request fully implements the February 9, 2022, realignment, changing which offices implement portions of the budget and introducing four new appropriation accounts (Grid Deployment Office, State and Community Energy Programs, Manufacturing and Energy Supply Chains, Federal Energy Management Program).

The FY 2023 Request provides:

- \$2.1 billion for the new Under Secretary for Infrastructure focused on clean energy infrastructure — large-scale demonstration and deployment. The new Under Secretary will centralize existing offices focused on major demonstration and deployment with new offices. The existing offices moving to the new Under Secretary include DOE's Loan Programs Office, Office of Indian Energy, Office of Clean Energy Demonstrations, Office of Cybersecurity, Energy Security, and Emergency Response (CESER), and the Federal Energy Management Program. Three new offices to support clean energy infrastructure deployment include: (1) Grid Deployment Office to execute DOE's Building a Better Grid initiative to modernize and upgrade the nation's electric transmission lines and deploy cheaper, cleaner electricity across the country; (2) State and Community Energy Program to work more closely with states, localities, and communities to in the planning and deployment of decarbonization solutions; and (3) Manufacturing and Energy Supply Chains to ensure the energy industrial base is supported by a clean, resilient, domestic supply chain.
- \$14.7 billion for the Under Secretary for Science and Innovation focused on fundamental science, clean energy innovation and our core research, development, and demonstration (RD&D) missions across existing programs and our National Labs, including \$7.8 billion for the Office of Science (SC) for increased investments in Administration priorities including basic research on climate change and clean energy, artificial intelligence (AI) and machine learning (ML), and bio preparedness. For FY 2023, SC will initiate three new research initiatives to include Energy Earthshots; Funding for Accelerated, Inclusive

Research (FAIR); and Accelerate Innovations in Emerging Technologies (Accelerate) and will continue to support ongoing investments in priority areas including microelectronics, critical materials, quantum information science (QIS), exascale computing, fundamental science to transform manufacturing, and accelerator science and technology. The \$14.7 billion also includes \$4 billion for the Office of Energy Efficiency and Renewable Energy to accelerate innovation in clean energy solutions, including to support the bulk of the Department's RD&D to improve energy efficiency and clean energy technologies for industrial facilities, clean vehicles and fuels, and buildings.

- \$21.4 billion for the Under Secretary for Nuclear Security and Administrator, National Nuclear Security Administration to pursue five major national security endeavors: maintain a safe, secure, and effective nuclear weapons stockpile; reduce global nuclear threats and keep materials out of the hands of terrorists; strengthen key science, technology and engineering capabilities in support of certification, assessment, and current and weapon modernization programs; provide safe and effective integrated nuclear propulsion systems for the U.S. Navy; and modernize the Nuclear Security infrastructure.
- \$7.6 billion for the Assistant Secretary for Environmental Management to continue cleanup of sites resulting from six decades of nuclear weapons development and production and Government-sponsored nuclear energy research. This sustains our investment in the EM mission to clean up World War II and Cold War nuclear sites.
- \$2.4 billion for other offices that report directly to the Office of the Secretary and are not identified above as well as Departmental Administration, Other Defense Activities, and oversight activities. These programs include \$978 million for Other Defense Activities for Environment, Health, Safety and Security, Enterprise Assessments, Specialized Security Activities, Hearings and Appeals, and Defense Related Administrative Support (DRAS). For the Office of Technology Transitions (OTT), \$22 million is requested as well as \$196 million for the Office of Legacy Management (LM). A total of \$144 million is requested for the Energy Information Administration and \$775 million for Administration and Oversight activities, including Departmental Administration (DA) and the Office of the Inspector General.

In FY 2023, the Request will support 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 2023, 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 Advanced Scientific Computing Research (ASCR) Leadership Computing Challenge programs. Funding requested for FY 2023 supports the continued implementation of NNSA's Enhanced Capabilities for Subcritical Experiments (ECSE) and various activities to prepare for NNSA's first Exascale high performance computing system.

Under Secretary for Infrastructure

The FY 2023 Request provides \$2.1 billion for the new realigned Under Secretary for Infrastructure to build specialized capabilities managing large-scale demonstration and deployment programs aimed at bringing technologies to the market. As the new offices in the Under Secretary for Infrastructure staff up, they will continue to work closely with the applied energy offices – which continue their roles as DOE's experts on energy technologies – to design BIL programs and funding opportunities and select projects.

Highlights include:

- \$214 million for the Office of Clean Energy Demonstrations (OCED) to initiate a new \$150 million competition to support demonstrations that address integration issues of renewable energy into the U.S. transmission and distribution grids. OCED will also provide \$25 million for the Advanced Reactor Demonstration Program, which focuses on the construction of demonstration reactors in the near- and mid-term that are safe and affordable to build and operate. OCED is a technology-neutral office that serves as a project management center of excellence supporting the applied programs and other offices as needed to ensure a consistent approach to implementing capital intensive late-stage technology demonstrations across DOE. OCED investments are part of a clear progression and transition

between the research, development, and demonstration projects within the DOE technology offices and initial deployments supported by the private sector or DOE Loan Programs Office, ensuring continuity of DOE support for clean energy technologies and systems.

- \$202 million for the Office of Cybersecurity, Energy Security, and Emergency Response (CESER), which leads the Department's efforts to secure U.S. energy infrastructure against all hazards, reduce the risks of and impacts from cyber events and other disruptive events, and assist with restoration activities. Due to the critical role the energy sector plays across Federal, State, and local jurisdictions, CESER programs work in an integrated manner in partnership with industry and other stakeholders, as well as other DOE offices and other Federal agencies, to enhance the resilience and security of the U.S. energy infrastructure for all consumers, in line with energy justice principles. The Request supports the development of risk management tools to strengthen the energy sector against cyber threats, information sharing and partnerships, and response and restoration activities. As in FY 2022 the Budget Request includes restructuring of CESER's existing programs and proposes to place the Office of Petroleum Reserves under the Assistant Secretary for CESER.
- \$101 million for the four Power Marketing Administrations (PMA) to sell electricity primarily generated by federally owned hydropower projects to public entities and electric cooperatives. Preference in the sale of power is given to public entities and electric cooperatives. Revenues from the sale of Federal power and transmission services are used to repay all related power and transmission costs.
- \$242 million for the Office of Petroleum Reserves, which reports to the Director for CESER, with \$214 million for the Strategic Petroleum Reserve (SPR). The SPR provides strategic and economic security against potential interruptions in U.S. petroleum supplies. The FY 2023 Request supports the programs operational readiness and drawdown capabilities.
- \$170 million for the Federal Energy Management Program (FEMP) to fund Federal energy management activities, and Program Direction that supports them. These activities were previously funded under the Energy Efficiency and Renewable Energy (EERE) appropriation account and the portion of Program Direction under EERE will also be allocated to FEMP. In addition to the FEMP annual appropriations funding, FEMP will continue implementing the funding appropriated for the Assisting Federal Facilities with Energy Conservation Technologies (AFFECT) program in the Bipartisan Infrastructure Law (BIL).
- \$150 million for the Office of Indian Energy Policy and Programs for financial and technical assistance to promote energy development, efficiency, and use, reducing or stabilize energy costs, strengthening energy and economic infrastructure, and bringing electrical power and service to Indian land and homes, Alaskan Native Villages, with the ancillary benefit of providing employment on Tribal Lands/Alaskan Native communities. This assistance is intended to overcome barriers to deploying energy generation (used for heat and electric power) and energy efficiency projects to reduced or stabilized energy costs and address energy poverty, as well as to provide power to unelectrified homes.
- \$90 million for the Grid Deployment Office (GDO) to fund Transmission Permitting and Technical Assistance (PTA) activities, and Program Direction that supports them. These activities were previously funded under the Office of Electricity appropriation account. In addition to the PTA annual appropriations funding, the GDO will continue implementing the grid-related provisions appropriated in the BIL under the Office of Electricity appropriation; the Civil Nuclear Credit Program appropriated in the BIL under the Nuclear Energy appropriation; and the three hydroelectric incentives programs funded in the BIL under the Energy Efficiency and Renewable Energy (EERE) appropriation. GDO will be allocated the Program Direction funds provided in the BIL under the Nuclear Energy and Electricity appropriations. It will also be allocated the portion of Program Direction funds provided in the BIL under EERE to manage the three hydroelectric incentive programs.
- Loan Programs Office (LPO):
 - Title 17 Innovative Technology Loan Guarantee Program (Title 17)
The FY 2023 Request supports \$150 million for Title 17 credit subsidy costs, associated with an additional \$5 billion of loan guarantee authority open to a range of eligible projects. The Request will increase available Title 17 loan authority by \$5 billion from \$22.4 billion to \$27.4 billion. The Department expects to obligate approximately \$6 billion of loan authority in FY 2022 and \$4.5 billion of loan authority in FY 2023. The Request

helps LPO meet the Administration's objectives of a carbon- pollution free electric sector by 2035 and net-zero emissions economy-wide by 2050, while supporting placed-based initiatives including energy community and Justice40 investments. The FY 2023 Request also supports implementation of newly expanded authority under the Bipartisan Infrastructure Law, including (1) supporting eligible projects that bolster the domestic critical minerals supply chain and (2) financing to support State, Tribal, and Alaska Native corporation-backed energy projects. The Title 17 Loan Guarantee Program is ideally positioned to accelerate the deployment of innovative projects to help launch new clean energy markets, reduce greenhouse gas emissions, and drive American economic growth by providing flexible, custom financing and access to debt capital that helps to meet the specific needs of individual borrowers.

- Advanced Technology Vehicles Manufacturing (ATVM)

The FY 2023 Request supports \$9.8 million for Administrative Expenses for the ATVM direct loan program. The Request will allow LPO to continue propelling the resurgence of the American auto manufacturing industry and accelerating U.S. electric vehicle (EV) manufacturing. This Request allows LPO to help achieve the Administration's efforts of reaching net-zero emissions, economy-wide, by 2050. This includes providing access to capital for domestic manufacturers revitalizing U.S. manufacturing, creating good-quality jobs electrifying vehicles, securing domestic supply chains from raw materials to parts, and retooling factories to compete globally. This effort is directly responsive to the need to address critical advanced technology vehicle supply chain vulnerabilities as identified in Executive Order 14017, America's Supply Chains, and the subsequent 100-Day Reviews, both of which call for investment in advanced technology vehicle components including EV batteries and critical minerals manufacturing and processing. LPO will ensure that ATVM is encouraging projects that support the transition to zero-emission vehicles by excluding projects that manufacture gas-only light duty vehicles. Under the expanded definition of advanced technology vehicle, highly efficient fossil fueled medium- and heavy-duty vehicle manufacturing projects would be permitted to pursue a loan, though zero-emission vehicles would be encouraged.

- Tribal Energy Loan Guarantee Program (TELGP)

The Loan Programs Office (LPO) requests \$1.9 million to continue origination and monitoring related activities for TELGP to invigorate economic opportunities in Tribal communities through the development of energy projects. The \$1.9 million in Administrative Expenses is for continuing outreach and originating activities and to monitor the expected portfolio of the TELGP. This funding level allows LPO to help achieve the Administration's objectives of a carbon-pollution free electric sector by 2035 and net-zero emissions, economy-wide, by 2050, supporting placed-based initiatives including energy community and Justice40 investments. Specifically, the TELGP provides and encourages commercial lenders to provide debt capital to Tribal borrowers and organizations installing robust energy projects that lead to economic development or modernizing power generation and distribution in the Nation's most vulnerable communities. The FY 2023 Request proposes utilizing approximately \$0.7 million in unobligated balances carried forward from prior year appropriations in addition to the requested \$1.9 million to support increased loan origination and related administrative expenses.

- \$27 million for the newly established Office of Manufacturing and Energy Supply Chains (MESC) to fund Industrial Assessment Center (IAC) activities, and Program Direction that supports them. IAC activities were previously funded under Advanced Manufacturing program in the Energy Efficiency and Renewable Energy (EERE) appropriation account and the portion of Program Direction under EERE used to administer the IAC activities will also be allocated to MESC. In addition to the IAC annual appropriations funding, MESC will continue implementing the deployment activities appropriated in the Bipartisan Infrastructure Law (BIL) under EERE related to manufacturing and supply chain of clean energy industries.
- \$727 million for the newly established Office of State and Community Energy Programs (SCEP) to fund Weatherization and Intergovernmental Programs (WIP) activities, and Program Direction that supports them. WIP activities were previously funded under the Energy Efficiency and Renewable Energy (EERE) appropriation account, and the portion of Program Direction under EERE used to administer the WIP activities will also be allocated to SCEP. In addition to the WIP annual appropriations funding, SCEP will continue implementing the state, local government, and community-related provisions appropriated in the Bipartisan Infrastructure Law (BIL).

PROGRESSING SCIENTIFIC RESEARCH

The FY 2023 Request includes \$7.8 billion to increase investments in Administration priorities including basic research on climate change and clean energy, fundamental science to transform manufacturing, bio preparedness, and participation and retention of underrepresented groups in research activities. The Request also supports ongoing investments in priority areas including clean energy, microelectronics, critical materials, quantum information science (QIS), artificial intelligence (AI) and machine learning (ML), and exascale computing.

Highlights include:

- \$1.1 billion for Advanced Scientific Computing Research (ASCR) to advance 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 increased support for ASCR's Computational Partnerships with a focus on developing partnerships with the Applied Energy offices and data intensive applications; 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; foundational research to improve the robustness, reliability, and transparency of Big Data and AI technologies; core research in applied mathematics and computer science; the Scientific Discovery through Advanced Computing (SciDAC) program; support for partnerships with Basic Energy Sciences, Fusion Energy Sciences, High Energy Physics, and Nuclear Physics; new activities including the FAIR initiative to expand clean energy research and capabilities at MSIs and the Accelerate initiative to support fundamental research that accelerates transition from discovery science to technological innovations.
- \$2.4 billion for Basic Energy Sciences (BES) to support 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. Core BES research activities support Administration priorities on clean energy (carbon capture, hydrogen, solar, etc.); related topics such as critical materials and transformative manufacturing (including polymer upcycling and next-generation microelectronics); and cross-cutting priorities for national preparedness, quantum information science (QIS), data analytics/machine learning and integrated infrastructure for data-driven science (AI/ML), exascale computing, and accelerator science and technology. Funding will support new activities that include the FAIR initiative to expand clean energy research and capabilities at MSIs, the Accelerate initiative to support fundamental research that accelerates the transition of science to technologies, and the Energy Earthshots initiative in partnership with other SC programs and the DOE technology offices. New Energy Earthshot Research Centers aim to support the achievement of the stretch goals of the Energy Earthshots.
- \$904 million for Biological and Environmental Research (BER) to support 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 and ecological processes at the scale of the planet Earth. BER's support of basic

Science FY 2023	
Office of Science Programs	\$M
• Advanced Scientific Computing Research	1,069
• Basic Energy Sciences	2,421
• Biological and Environmental Research	904
• Fusion Energy Sciences	723
• High Energy Physics	1,122
• Nuclear Physics	739
• Isotope R&D and Production	97
• Accelerator R&D and Production	27
• Workforce Development for Teachers & Scientists	41
• Science Laboratory Infrastructure	255
• Safeguards and Security	190
• Program Direction	211
Office of Science Program Total	7,799

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 research in biological systems and integration of biological information into computational models for iterative testing and validation as well as support in Bio preparedness Research Virtual Environment (BRaVE), a distributed framework to rapidly activate, integrate, and coordinate the expertise and research capabilities (experimental and computational) across the whole DOE National Laboratory complex. The Request also supports increased investments for the Urban Integrated Field Laboratories, the National Virtual Climate Laboratory (NVCL) serving as a one stop portal to advance access to climate science from the DOE National Laboratories, and the Climate Resilience Centers at HBCUs and MSIs. The NVCL engagement with the science community will focus on Minority Serving Institutions and Historically Black Colleges or Universities for local to regional climate science. Funding requested will be for foundational climate research into actionable solutions for impacted communities and addressing the Administration priorities involving climate solutions and environmental justice and new efforts in advanced manufacturing for novel polymer upcycling approaches. The FY 2023 Request continues operation of three BER scientific user facilities: the Joint Genome Institute, the Atmospheric Radiation Measurement Research Facility, and the Environmental Molecular Sciences Laboratory.

- \$723 million for the Office of Fusion Energy Sciences (FES) to support 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 continues to support research and facility operations at the DIII-D national fusion facility at 90 percent of the optimal run time to optimize the tokamak approach to magnetic confinement fusion. The National Spherical Torus Experiment-Upgrade (NSTX-U) recovery continues to implement repairs and corrective actions required to obtain robust, reliable research operations at the facility as well as enhanced collaborative research at other facilities to support NSTX-U research program priorities. The Request supports two new research activities: FAIR expands clean energy research and capabilities at MSIs and Accelerate supports fundamental research that accelerates transition from discovery science to technological innovations. The Request also supports partnerships with the private sector through the Innovation Network for Fusion Energy (INFUSE) program and a new milestone-based cost-share fusion enterprise program. In addition, FES will initiate an inertial fusion energy science and technology program. The Request provides a cash contribution for the ITER international research project and an ITER Research program to start preparing the U.S. fusion community to take full advantage of ITER Operations after First Plasma.
- \$1.1 billion for High Energy Physics (HEP) for 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 supports the highest priority elements identified in the 2014 High Energy Physics Advisory Panel Particle Physics Project Prioritization Panel (P5) Report. High priority areas for core research include theoretical and experimental activities in pursuit of discovery science; fostering a diverse, highly skilled workforce through the RENEW and FAIR research initiatives; building R&D capacity; and conducting world-leading advanced technology R&D. HEP coordinates with the Accelerator R&D and Production program on accelerator science and technology to maintain a leading position in key accelerator technologies, and to accelerate innovations in emerging technologies to develop new focus areas of research. The Request funds core research activities, including QIS, AI/ML, and multi-disciplinary microelectronics. HEP supports two particle accelerator scientific user facilities. The Fermilab Accelerator Complex and the Facility for Advanced Accelerator Experimental Tests II (FACET-II) will continue operations at 90 percent of optimal. The Request will continue support for the Long Baseline Neutrino Facility/Deep Underground Neutrino Experiment (LBNF/DUNE), Proton Improvement Plan II (PIP-II), and Muon to Electron Conversion Experiment (Mu2e) projects. The Request will also continue five Major Item of Equipment (MIE) projects: Accelerator Controls Operations Research Network (ACORN), Cosmic Microwave Background Stage 4 (CMB-S4), High-Luminosity Large Hadron Collider (HL-LHC) Accelerator, and A Toroidal LHC Apparatus (ATLAS) and Compact Muon Solenoid (CMS) Detector Upgrade Projects.
- \$739 million for Nuclear Physics (NP) to support experimental and theoretical research to discover, explore, and understand all forms of nuclear matter. The Request funds high priority world-class nuclear physics research and core competencies and operations of four NP scientific user facilities, to include Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory, the Continuous Electron Beam Accelerator Facility (CEBAF) at Thomas Jefferson National Accelerator Facility (JLab), the Argonne Tandem Linear Accelerator System (ATLAS), and the Facility for Rare Isotope Beams (FRIB), which began operations in FY 2022. The Request also supports research for QIS, AI/ML, RENEW, and FAIR research initiatives to foster a future of diverse and highly skilled workforce, and microelectronics.

The Request continues to support the construction of world-leading instrumentation, including the Gamma-Ray Energy Tracking Array (GRETA), a ton-scale detector for neutrino-less double beta decay to determine if the neutrino is its own antiparticle, the High Rigidity Spectrometer (HRS) to realize the full scientific potential of FRIB, and the Measurement of a Lepton-Lepton Electroweak Reaction (MOLLER) MIE at JLab, and R&D and Preliminary Engineering Design for the Electron-Ion Collider (EIC) project.

- \$97 million for Isotope R&D and Production (DOE IP) ensures robust supply chains of critical radioactive and stable isotopes for the Nation that no domestic entity has the infrastructure or core competency to produce. This new control point splits off funding for isotopes that underpin emerging technology, innovation, and a suite of research and applications that are fundamental to the Nation's prosperity and scientific and technical leadership. The Request funds research activities to support Administration and national priorities on advanced manufacturing; clean energy; transformative technology for producing pure isotopes for QIS; the use of AI/ML for effective operations of transformative approaches to isotope production; the promotion of national preparedness by mitigating single point failures in domestic supply chains; and the strengthening of synergies between the DOE Isotope R&D and Production (IRP) and the National Institutes of Health with the targeted support of translational research to advance clinical trials for cancer and infectious disease. The Request also supports two new initiatives: the FAIR initiative, which will support investments at specific institutions in disadvantaged areas in order to promote environmental justice through place-based science and the provision of technical jobs and capabilities associated with isotope research and production and the Accelerate initiative to advance the readiness of novel medical isotopes that have shown great promise for cancer and disease diagnosis and treatment for use in innovative radiopharmaceutical therapeutics through the support of translational research in coordination with the NIH.
- \$27 million for Accelerator R&D and Production 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 funds innovative R&D and deployment of accelerator technology, formation of topically focused multi-institutional collaborations for accelerator R&D, and workforce development. The Request supports participation in the FAIR and Accelerate initiatives and operation of the Brookhaven National Laboratory Accelerator Test Facility at 94 percent of optimal operations.
- \$41 million for Workforce Development for Teachers and Scientists to provide for a sustained pipeline of science, technology, engineering, and mathematics (STEM) workers to meet national goals and objectives, now and in the future. The Request supports the RENEW initiative to increase outreach and provide workforce training opportunities at DOE laboratories for underrepresented and under-served groups.
- \$255 million for Science Laboratories Infrastructure to sustain mission-ready infrastructure and safe and environmentally responsible operations by providing the infrastructure necessary to support leading edge research at ten SC national laboratories and the Science mission, and to assure the new infrastructure provides for the critical needs of the future science initiatives and world class user facilities (i.e., the Labs of the Future). The Request supports eleven ongoing construction projects.
- \$190 million for Safeguards and Security to maintain security measures to protect personnel and assets in an environment of open scientific research. The Request provides additional funding for cybersecurity to address long standing gaps in infrastructure, operations, governance, and compliance to ensure adequate detection, mitigation, and recovery from cyber intrusions and attacks against DOE laboratories and continued security operations at flat levels of effort for all remaining S&S elements.
- \$211 million for Program Direction to support 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 ten of DOE's National Laboratories. The Request funds Salaries and Benefits, Travel, Support Services, Other Related Expenses, and Working Capital Fund requirements.

INNOVATION OFFICES

\$4.0 billion for the Office of Energy Efficiency and Renewable Energy (EERE) to accelerate the RDD&D of technologies and solutions to equitably transition America to net-zero greenhouse gas emissions economy-wide by no later than 2050 through investments in five programmatic priority areas, through the lens of four key emphasis areas. The Request prioritizes increased investments to reduce emissions in the near term drastically, while investing in research to ensure American leadership and competitiveness in advanced clean energy technology. In FY 2023, EERE will also focus on ensuring this transition creates good paying jobs, and ensures the clean energy economy benefits all Americans, especially workers and communities impacted by the energy transition and those historically underserved by the energy system and overburdened by pollution. EERE will also continue to streamline and enhance its operations, conduct rigorous analysis and evaluations of its portfolio, and achieve the greatest possible impact in each of its technical pillars designed to advance cross-technology solutions, and a Corporate Program pillar that serves as the central organization for all EERE products, services, processes, and systems. To achieve this mission, EERE invests in the integration of clean energy technologies that are ready to be demonstrated and deployed, as well as R&D activities that advance early-stage technologies with a clear path to deployment. EERE supports science and energy crosscutting work in many topic areas and is a major contributor to the Energy Earthshots Initiative with a leadership role in the Hydrogen Shot and Long Duration Storage Shot. EERE's FY 2023 investment strategy focuses on the following five programmatic priority areas that are central pillars to reducing the GHG profile:

- Decarbonizing the electricity sector: To transition to a carbon-free electricity sector, invest in activities critical to reduce the cost of renewables, as well as to make major strides in renewables integration to ensure reliability, security, and resiliency as the grid evolves.
- Decarbonizing transportation across all modes: To develop and enable the commercial deployment of net-zero GHG technologies for all modes of transportation (road, rail, sea, and air) while ensuring affordable mobility solutions for people and goods across all economic and social groups, reducing the impact on local air quality and using sustainable water and land practices.
- Decarbonizing the industrial sector: To support approaches that rely on renewable energy and fuels such as hydrogen to power industrial processes, capture and use carbon emissions, and vastly improve efficiency.
- Reducing the carbon footprint of buildings: To support critical deployment activities needed to transform the energy economy at the state and local levels as well as investments in high priority research, development, and demonstration (RD&D) needed for new affordable housing and advanced energy efficient retrofits for buildings.
- Decarbonizing agriculture: To expand EERE's work related to reducing GHG emissions in the agricultural sector through the development of biofuels, the greater efficiency of off-road agricultural vehicles, on-site production of animal waste to clean energy, and better understanding and predicting water flow to design more water and energy efficient irrigation systems.
- \$297 million for the Office of Electricity (OE) to lead the Department's efforts to strengthen, transform, and improve electricity delivery infrastructure so consumers have access to resilient, secure, and clean sources of electricity. OE provides solutions to technical, market, institutional, and operational failures that go beyond any one utility's ability to solve. To accomplish this critical mission, OE engages stakeholders throughout the sector on a variety of initiatives to modernize the electric grid. OE is a core partner in DOE crosscutting work to align and coordinate activities to modernize the grid and is a primary leader in the Long Duration Storage Energy Earthshot. OE works to ensure that Nation's electricity delivery system can accommodate all the changes at generation and load sides of the grid and ensure reliable, resilient, and secure operations of the decarbonized electric grid. A dramatic structural transformation of the electricity delivery system is needed to ensure reliability is maintained considering the rapid integration of renewable generation and customer-based technologies, including the electrification of transportation and building infrastructure. The future grid will be a more dynamic and structurally complex system, with bidirectional power flows. Managing this transition will require significant reengineering, involving advancements in grid technology, system architecture, and infrastructure investment strategies

- \$1.7 billion for the Office of Nuclear Energy (NE) supports the diverse civilian nuclear energy programs of the U.S. Government and Federal efforts to research and develop nuclear energy technologies, including generation, safety, and security technologies, assisting to unleash an era of energy dominance through strategic support for innovation. The Request consolidates and focuses nuclear energy related research and development (R&D) activities conducted by small businesses and supports university level engineering and science through competitively awarded, university led research and development and infrastructure, universities' research reactor fuel services and scholarships and fellowships. The Request supports Light Water Reactor Sustainability through cost-shared efforts to extend the life and improve the economic competitiveness of the existing commercial nuclear reactor fleet through research in the areas of materials aging and degradation, safety margin characterization, safety technologies, and instrumentation and controls. The Request also supports R&D on advanced fuel cycle technologies that have the potential to accelerate progress on managing and disposing of the Nation's spent fuel and high-level waste including efforts to establish an interim storage option for commercial spent fuel, improve resource utilization and energy generation, reduce waste generation, and limit proliferation risk. It funds R&D and strategic investments in research capabilities to develop innovative and crosscutting nuclear energy technologies. The Request supports the development of commercial reactor technologies that may be ready for demonstration and deployment in the mid-term. It provides the U.S. with a fast neutron testing capability to support the development of advanced nuclear reactor technologies, and the availability of the Idaho National Laboratory to support nuclear energy and other DOE and U.S. Government research requirements.
- \$10.2 million from the Nuclear Waste Fund (NWF) to fund the Department's responsibilities for managing the NWF, administering the Standard Contract, and maintaining the security of the Yucca Mountainsite.
- \$893.2 million for the Fossil Energy and Carbon Management (FECM) office to conduct research, development, demonstration and deployment (RDD&D) that focuses on technologies to reduce carbon emissions and other environmental impacts of fossil fuel production and use, particularly the hardest-to-decarbonize applications in the electricity and industrial sectors. Further, the program advances technologies on carbon dioxide (CO₂) removal (CDR) to remove atmospheric and legacy emissions of CO₂, and technologies that convert and durably store CO₂ into value-added products. FECM directly supports and enables the Carbon Negative Shot and crosscutting CDR work. The Request funds technology priority areas of point-source carbon capture, carbon transport and storage, carbon dioxide conversion, hydrogen with carbon management, methane emissions reduction, critical mineral production, and carbondioxide removal. The FY 2023 Request for FECM will extend the impact of the Department of Energy's (DOE) RDD&D funding by leveraging creative funding mechanisms - such as prizes, competitions, technical assistance, and programs targeted to small businesses. The goal is to enable the commercialization of climate change mitigation and clean energy innovations that will activate job creation, expand other public impact outcomes, and yield a more geographically diverse and impactful research portfolio. The Request also includes funding for the basic operating costs of FECM and investment at the National Energy Technology Laboratory (NETL).
- \$700 million for the Advanced Research Projects Agency – Energy (ARPA-E) to identify and promote revolutionary advances in energy and climate-related applied sciences, translating scientific discoveries and cutting-edge inventions into technological innovations. ARPA-E will support development of advanced technologies that reduce imports of energy from foreign sources; reduce energy-related emissions, including greenhouse gases; improve the energy efficiency of all economic sectors; provide transformative solutions to improve the management, clean-up, and disposal of radioactive waste and spent nuclear fuel; improve the resilience, reliability, and security of infrastructure to produce, deliver, and store energy; mitigate the causes of, reverse the impact of, adapt to, or increase resilience against climate change; and monitor, analyze, and utilize climate emissions data. ARPA-E will ensure that the United States maintains a technological lead in developing and deploying advanced technologies. The Administration proposes to expand ARPA-E's scope to include R&D on the climate adaptation, resilience, and mitigation innovations necessary to achieve net zero emissions by 2050. This expanded scope complements ARPA-E's advanced energy mission and reflects the need to address additional climate change-related initiatives. ARPA-E will work with the other agencies to develop transformative solutions for the climate crisis, including adaptation, and resilience, and lay the foundation for future improvements in R&D across the Federal Government. In FY 2023, ARPA-E plans to release up to 22 new funding opportunity announcements (FOAs).

SUSTAINING INVESTMENT IN ENVIRONMENTAL CLEAN-UP

Environmental Management

The Office of Environmental Management (EM) supports DOE to meet the challenges of the Nation's Manhattan Project and Cold War legacy responsibilities. The FY 2023 Request includes \$7.6 billion for EM to cleanup millions of gallons of liquid radioactive waste, thousands of tons of spent (used) nuclear fuel and nuclear materials, disposition of large volumes of transuranic and mixed/low- level waste, huge quantities of contaminated soil and water, and deactivation and decommissioning of thousands of excess facilities. This environmental cleanup program results from six decades of nuclear weapons development and production and Government-sponsored nuclear energy research. It involves some of the most dangerous materials known to mankind. To date, EM has completed cleanup activities at 92 sites in 30 states and in the Commonwealth of Puerto Rico. EM is currently responsible for cleaning up the remaining 15 sites in 11 states. Cleaning up these remaining sites will support the Justice40 Initiative and advance the Administration's equity goals.

Highlights include:

- **Savannah River**

\$1,724 million to support the Liquid Waste Program, to achieve additional risk reduction by stabilization and immobilization of high activity radionuclides through vitrification into canisters at the Defense Waste Processing Facility and disposition of decontaminated salt solution in Saltstone Disposal Units. The FY 2023 Request also supports continued risk reduction of the Nuclear Materials Program missions to store, stabilize, and disposition EM-owned nuclear materials and spent nuclear fuel, as well as support the mission for maintaining the safe and environmentally compliant state of excess nuclear processing facilities until their decommissioning. The Nuclear Materials

Program missions at SRS includes funds for operations of H-Canyon, L-Basin, K-Area Facilities, and the surveillance and maintenance of excess nuclear facilities in F-Area.

- **Office of River Protection**

\$1.6 billion for continued progress toward important cleanup required by the Amended Consent Decree and Tri-Party Agreement. The request is designed to maintain safe operations of the tank farms to protect workers, the public, and the environment; enable the development and maintenance of infrastructure necessary to enable waste treatment operations; and progress single shell tank retrievals. The Request also focuses on the Waste Treatment on Immobilization Plant High-Level Waste Facility to advance facility engineering and design. The mission of the Waste Treatment Plant Project is to construct a treatment facility to blend waste from the tank farms with molten glass, which is placed into stainless steel canisters suitable for long-term storage of high-level waste and disposal of low-level waste.

- **Richland**

\$917 million for continued achievement of important cleanup progress required by the Tri-Party Agreement. It will maintain safe operations; perform Hanford site-wide services; support Direct Feed Low-Activity Waste

ENVIRONMENTAL MANAGEMENT FY 2023	
Environmental Management Sites	\$M
• Carlsbad/Waste Isolation Plant (WIPP)	463
• Idaho	391
• Oak Ridge	612
• Paducah	282
• Portsmouth	560
• Richland	917
• River Protection	1,604
• Savannah River	1,724
• Lawrence Livermore National Laboratory	14
• Los Alamos National Laboratory	332
• Nevada	63
• Sandia Site Office	4
• Separations Process Research Unit	15
• West Valley Demonstration Project	94
• Energy Technology Engineering Center	26
• Moab	67
• Other Sites	4
• Program Direction	317
• D&D Fund Deposit	417
• Mission Support	<u>154</u>
Environmental Management Total (net offset)	7,643

startup and commissioning; and conduct critical site infrastructure projects. The Request also supports progress in modifications to the Waste Encapsulation and Storage Facility for transfer of the cesium-strontium capsules to dry storage by August 2025, continued groundwater treatment progress, and completion of 105KW Fuel Storage Basin above and below water debris disposition and deactivation activities.

- **Oak Ridge**

\$612 million for continued cleanup activities at the Oak Ridge site, including slab and soil remediation at the East Tennessee Technology Park; addressing high-risk excess contaminated facilities at ORNL and Y-12, disposition of U-233 material and transuranic waste; design for the On-Site Waste Disposal Facility to support cleanup of ORNL and Y12; and continued investment in mercury characterization and remediation technologies. The Request also continues characterization and slab and soil remediation of the East Tennessee Technology Park main plant area, Zone 2 and other activities required to close the site.

- **Idaho**

\$391 million for continued progress in characterizing, packaging, and shipping stored contact-handled and remote-handled transuranic waste. The request also continues processing, characterizing, packaging, and shipping mixed low-level radioactive waste and remote-handled mixed low-level radioactive waste to off-site disposal facilities. The Request completes treatment of contact handled sludge waste and buried waste exhumations from within the final of nine retrieval enclosures, ending a decades-long effort to treat legacy waste in Idaho. The Request also continues Ft. St. Vrain and Three Mile Island Spent nuclear fuel monitoring activities.

- **Carlsbad**

\$463 million for support of disposal facility operations, regulatory and environmental compliance actions, the Central Characterization Project to perform transuranic waste characterization/certification activities to maintain progress toward legacy transuranic waste related milestones at generator sites, transuranic waste transportation capabilities, continued progress on repairing or replacing infrastructure, modernizing underground equipment to zero-emission battery-electric vehicles or, where full electrification is not currently feasible, very low emission Tier IV Final diesel powered equipment as a transitional step in our conversion to zero-emissions operations, the new Safety Significant Confinement Ventilation System (15-D-411), and Utility Shaft (15-D-412).

- **Paducah**

\$282 million for supporting activities to continue environmental remediation and to further stabilize the gaseous diffusion plant. The stabilization activities include non-destructive assay characterization, activities to remove hazardous materials, and surveillance and maintenance. This Request also supports the safe operation of the Depleted Uranium Hexafluoride Conversion facility.

- **Portsmouth**

\$560 million for continued decontamination and decommissioning activities. This Request also supports the safe operation of the Depleted Uranium Hexafluoride Conversion facility. The FY 2023 Request includes funding to construct an on-site facility for the disposal of debris generated from the demolition of the Portsmouth Gaseous Diffusion Plant and associated facilities.

- **Los Alamos National Laboratory**

\$332 million to continue to focus on the removal of legacy waste, soil and groundwater cleanup, and protection of surface water at the Los Alamos National Laboratory. The Chromium Plume Control Interim Measure to control migration of a hexavalent chromium plume beneath Mortandad and Sandia Canyons will continue. Additionally, Plume-Center Characterization activities will continue to investigate and develop corrective measures for remediation of the hexavalent chromium plume, and design will be initiated for the proposed remedies. Investigation and characterization of groundwater for the Royal Demolition Explosives plume in Cañon de Valle will continue. Implementation of the individual storm water permit will continue, and investigation and cleanup of several aggregate areas will be completed. Characterization and cleanup at Technical Area 21 will continue as well as retrieval and repackaging of the below-grade transuranic waste to include readiness activities and infrastructure needs to manage the processing and packaging of the waste at Area G. Also, Deactivation and Decommissioning of the National Nuclear Security Administration's Ion Beam excess facility will continue.

ENSURING THE NATION'S NUCLEAR SECURITY

The National Nuclear Security Administration (NNSA) request is \$21.4 billion to support the security and safety of our Nation. NNSA's FY 2023 Request pursues five major national security endeavors: (1) maintain a safe, secure, and effective nuclear weapons stockpile; (2) reduce global nuclear threats and keep materials out of the hands of terrorists; (3) strengthen key science, technology and engineering capabilities in support of certification, assessment, and current and future stockpile modernization programs; (4) provide safe and militarily-effective integrated nuclear propulsion systems for the U.S. Navy; and (5) modernize the nuclear security infrastructure and provide necessary federal oversight for growing mission requirements. NNSA has pursued a disciplined process to meet nuclear security and nonproliferation policy goals and requirements, support the Navy, and support a diverse, highly skilled federal workforce. The Request continues to modernize America's nuclear stockpile and infrastructure, and the underlying science that supports strategic decisions and certification of the stockpile. The Request supports the U.S. Navy's nuclear fleet through safe and militarily effective integrated nuclear propulsion systems and supports the nonproliferation goals outlined in the President's *Interim National Security Strategic Guidance*.

Highlights include:

- \$16.5 billion for Weapons Activities for the maintenance and refurbishment of nuclear weapons to continue sustained confidence in their safety, reliability, and performance; continued investment in scientific, engineering, and manufacturing capabilities to enable production and certification of the enduring nuclear weapons stockpile; and manufacture of nuclear weapon components. Weapons Activities also provides for continued maintenance and investment in the NNSA Nuclear Security Enterprise to be more responsive and resilient. A key priority is rebuilding the production capability and capacity to produce necessary warhead components.
 - \$4.9 billion for Stockpile Management to support stockpile sustainment, dismantlement, and modernization of the nuclear weapons program. The Request funds major stockpile modernization programs, including life extension programs; required stockpile sustainment activities to include maintenance, surveillance, assessment, development, and program planning; safe and secure dismantlement of nuclear weapons and components in accordance with the Nuclear Weapons Stockpile Plan; and sustainment of manufacturing capabilities and capacities, including process improvements and investments focused on increased efficiency of production operations. The FY 2023 Request also includes a new Stockpile Management subprogram, Nuclear Enterprise Assurance (NEA), to prevent, detect, and mitigate subversion risks to the nuclear weapons stockpile and associated design, production, and testing capabilities.
 - \$4.6 billion for Production Modernization to support the production capabilities of nuclear weapons components critical to weapon performance, including primaries, secondaries, radiation cases, and non-nuclear components. The Request funds work supporting site preparation, long-lead procurements, and preliminary design for the Savannah River Plutonium Processing Facility and the Los Alamos Plutonium Pit Production Project.
 - \$2.9 billion for Stockpile Research, Technology, and Engineering to provide the knowledge and expertise needed to maintain confidence in the nuclear stockpile without additional nuclear explosive testing. The Request funds the continued implementation of the Enhanced Capabilities for Subcritical Experiments and preparations for NNSA's first exascale high performance computing system. Additionally, the Request supports the necessary development of the design, engineering, and adaptation of physics and engineering codes needed to support stockpile decisions to operate on this new platform. Funding also supports the development of new materials, technologies, and processes to evolve nuclear systems and production complex.
 - \$2.6 billion for Infrastructure and Operations to continue the long-term effort to modernize NNSA infrastructure. This includes funding to support activities to enable plutonium pit production; Life Extension Program (LEP) schedules at the Kansas City Nuclear Security Complex; increased resources at Tritium facilities to meet LEP production needs at the Savannah River Site; and funds to strategically target essential real property and programmatic equipment recapitalization requirements.
- \$2.3 billion for Defense Nuclear Nonproliferation funds programs that provide policy and technical leadership to prevent or limit the spread of weapons of mass destruction-related materials, technology, and expertise; develop technologies to detect nuclear proliferation; secure or eliminate inventories of nuclear weapons-related materials and infrastructure; and ensure technically trained emergency management personnel are available to respond to nuclear and radiological incidents and accidents domestically and overseas. This appropriation also provides funds to establish

a national security R&D program to anticipate and detect threats and broaden DOE's role in national biodefense.

- \$2.1 billion for Naval Reactors (NR) to continue NR's core objective of supporting the daily safe and reliable operation of the Nation's nuclear fleet. The Program's development work consists of refining and improving existing technology to ensure that the U.S. Navy's nuclear propulsion plants are increasingly efficient and effective and will be capable of meeting future threats to national security. NR supports the existing nuclear fleet and three major DOE initiatives—the Columbia-Class Reactor System Development, the Land-based S8G Prototype Refueling Overhaul, and the Spent Fuel Handling Recapitalization Project.

Other Defense Activities

The FY 2023 Request provides \$978 million to support defense activities conducted by the Department including Legacy Management, Environment, Health, Safety and Security, Enterprise Assessments, Specialized Security Activities, Hearings and Appeals, and Defense Related Administrative Support (DRAS). DRAS offsets administrative expenses for work supporting defense-oriented activities in Departmental Administration.

- \$196 million for Legacy Management (LM) to continue its mission of serving communities that have experienced disproportionately high human health and environmental impacts. The request also supports increasing LM's foundational Environmental Justice program activities, enabling the program to reach a larger number of affected communities. LM's mission activities include: Long-Term Surveillance and Maintenance at more than 100 World War II and Cold War era sites; evaluating the condition and addressing physical safety hazards at Defense-Related Uranium Mines; Archiving and Information Management at LM's sites and field offices; post-retirement benefits to former contract workers; asset management, environmental justice, education, communication, history, and outreach. By the end of FY 2023, LM will be responsible for long-term stewardship at 106 sites in 29 States and Puerto Rico.

ADMINISTRATION AND OVERSIGHT

Energy Information Administration

- \$144.5 million for the U.S. Energy Information Administration (EIA) to continue supporting the collection, analysis, and dissemination of independent and impartial energy information and analysis to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. The Request will enable EIA to continue delivering the critical data, analysis, forecasts, and long-term energy outlooks that deliver valuable information to key stakeholders. This funding level will also enable EIA to advance its program on multiple fronts to address key emerging energy issues, including information needs identified in BIL.

Additional Administration and Oversight Activities

The FY 2023 Request includes \$510 million for Administration and Oversight activities, including Departmental Administration (DA), the Office of the Inspector General, and offsets. In FY 2023, the Office of Technology Transitions (\$22 million) is requested as a separate appropriation outside of Departmental Administration (DA). The Office of Strategic Planning and Policy (formerly the Office of Policy) is expanding in size and mission scope, to include energy jobs and arctic energy functions. The Office of Economic Impact and Diversity is consolidating Equal Employment Opportunity functions and staff across DOE and expanding its mission to include energy justice activities and programs across the complex. Additionally, the Office of Management is requesting \$16 million to facilitate the government-wide transition from GSA-leased gas-powered vehicles to GSA-leased Zero Emission Vehicles; this funding also includes related charging infrastructure and program management costs. To address vulnerabilities identified after the December 2020 SolarWinds intrusion, the Department is requesting approximately \$93 million for cyber response and recovery management through the Office of the Chief Information Officer for the DOE enterprise.

Highlights include:

- \$397 million for DA to fund management and mission support organizations that have enterprise-wide responsibility for international engagement and promotion of global market opportunities, administration, accounting, budgeting, contract and project management, human resources, congressional and intergovernmental liaison, energy policy, information management, life-cycle asset management, legal services, workforce diversity and equal employment opportunity, ombudsman services, small business advocacy, sustainability, and public affairs.
- \$106.8 million for Office of the Inspector General to review the integrity, economy, and efficiency of DOE programs

and operations, including NNSA and the Federal Energy Regulatory Commission. Beginning in FY 2022, the OIG will begin conducting, or arranging for, independent incurred cost audits of the Department's Management and Operating Contracts, valued at over \$17 billion, as opposed to relying on the Cooperative Audit Strategy that has been in place since 1994. The OIG has budgeted \$18.75 million to assume responsibility for the incurred cost audits work.

- The FY 2023 Request provides \$22 million to increase transparency and reflect the need for multi-year funding for programmatic activities, including: Technology Commercialization Fund; Energy I-Corps; Lab Partnering Service; Market Analysis; Energy Tech University Prize; and Energy Program for Innovation Clusters (EPIC). The level of requested funding will allow OTT to meet its statutory requirements under the Energy Act of 2020, including increases for strategic mission areas including market and supply chain analysis and staffing increases to support an expanded program and outreach portfolio.
- -\$16 million in receipts from the Federal Energy Regulatory Commission fees (-\$9 million) and Title XVII Loan Guarantee Negative Credit Subsidies (-\$7 million).
- \$1.5 million for operations of the Artificial Intelligence Technology Office (AITO), funded within Departmental Administration. AI is a foundational technology that will drive decades of innovation. AITO leads Department-wide coordination efforts to evaluate the scope and effectiveness of DOE's AI programs and identify gaps not addressed by programs, functional offices, sites, or associated National Laboratories.

Bipartisan Infrastructure Law

The Bipartisan Infrastructure Law (BIL), which was enacted on November 15, 2021, provided more than \$62 billion for the Department over a five-year period to deliver a more equitable clean energy future for the American people by doing the following:

- Investing in American manufacturing and workers. BIL investments in clean energy technology supply chains will complement this budget and allow America to make the energy technologies of the future right here at home, boosting competitiveness within a global clean energy market. These investments will create jobs up and down the supply chain—especially manufacturing jobs and skills-matched opportunities for fossil fuel workers.
- Delivering reliable, clean, and affordable power to more Americans. BIL funding will turbo-charge clean energy deployment by funding several highly effective state and local programs that will spur projects that increase access to energy efficiency to save money for American families, businesses and communities, help achieve our clean energy goals and accelerate job growth. BIL funding also expands existing DOE grant and loan programs to help states weatherize homes, increase energy efficiency, and expand clean generation.
- Preserving clean energy solutions for a carbon-free future. Our nation already receives 27% of its power from decades-old nuclear and hydropower facilities. These are critical sources of clean power, but as they get older and more expensive to maintain, we risk losing these major sources of pollution-free energy and good-paying jobs. BIL provides funding to ensure that we can keep these clean energy sources viable as we continue to build the technologies of tomorrow.

Conclusion

The Department of Energy FY 2023 Request provides for America's future by Advancing Clean Energy Innovation, Tackling the Climate Crisis, Ensuring the Nation's Nuclear Security and Sustaining Investment in Environmental Clean-Up and creating good paying jobs that provide the free and fair chance to join a union and collectively bargain. The Request demonstrates fiscal discipline and commitment to an efficient and effective Federal government. To that end, DOE will focus spending in areas with the highest return on investment of taxpayer dollars. Achieving goals established in the Request requires an exceptional workforce. The Department will invest in the workforce by attracting, training, and retaining the Nation's best talent. The FY 2023 Request supports the critical role the Department of Energy has in supporting the Nations' prosperity by addressing its energy, environmental, and nuclear security challenges through transformative science and technology solutions. The FY 2023 Request creates jobs through clean energy projects, brings American to the forefront of clean energy innovation; tackles the climate crisis with the urgency science demands; invests in communities that have been left behind; and ensures the safety and security of the nuclear stockpile. The Department appreciates the support of Congress and is eager to get to work.

DEPARTMENT OF ENERGY
Appropriation Summary
(dollars in thousands)

Department of Energy	FY 2021 Enacted	FY 2022 Annualized CR	FY2023 Request	FY 2023 vs. FY 21 Enacted	
				\$	%
Department of Energy					
Energy Efficiency and Renewable Energy	2,861,760	2,861,760	4,018,885	1,157,125	40.4%
Electricity	211,720	211,720	297,386	85,666	40.5%
Cybersecurity, Energy Security, and Emergency Response	156,000	156,000	202,143	46,143	29.6%
Petroleum Reserves					
Strategic Petroleum Reserves	188,000	188,000	214,175	26,175	13.9%
Naval Petroleum & Oil Shale Reserves	13,006	13,006	13,004	-2	0.0%
SPR - Petroleum Account	1,000	1,000	8,000	7,000	700.0%
Northeast Home Heating Oil Reserves	6,500	6,500	7,000	500	7.7%
Subtotal, Petroleum Reserves	208,506	208,506	242,179	33,673	16.1%
Subtotal, Cybersecurity, Energy Security, and Emergency Response	364,506	156,000	202,143	46,143	12.7%
Grid Deployment Office	-	-	90,221	90,221	N/A
Federal Energy Management Program (FEMP)	-	-	169,661	169,661	N/A
Office of Manufacturing & Energy Supply Chains (MESC)	-	-	27,424	27,424	N/A
Office of State and Community Energy Programs (SCEP)	-	-	726,897	726,897	N/A
Nuclear Energy	1,357,800	1,357,800	1,518,460	160,660	11.8%
Nuclear Waste Disposal	27,500	27,500	10,205	-17,295	-62.9%
Fossil Energy and Carbon Management	750,000	750,000	893,160	143,160	19.1%
Uranium Enrichment Decontamination and Decommissioning Fund (UED&D)	841,000	841,000	822,421	-18,579	-2.2%
Energy Information Administration	126,800	126,800	144,480	17,680	13.9%
Non-Defense Environmental Cleanup	319,200	319,200	323,249	4,049	1.3%
Science	7,026,000	7,026,000	7,799,211	773,211	11.0%
Office of Technology Transitions	-	-	21,558	21,558	N/A
Office of Clean Energy Demonstrations	-	-	214,052	214,052	N/A
Advanced Research Project Agency-Energy	427,000	427,000	700,150	273,150	64.0%
Departmental Administration	166,000	166,000	397,203	231,203	139.3%
Indian Energy Policy and Programs	22,000	22,000	150,039	128,039	582.0%
Office of Inspector General	57,739	57,739	106,808	49,069	85.0%
Credit Programs					
Title 17 - Innovative Technology Loan Guarantee Program (1)	29,000	29,000	168,206	139,206	480.0%
Advanced Technology Vehicles Manufacturing Loan Program	5,000	5,000	9,800	4,800	96.0%
Tribal Energy Loan Guarantee Program	2,000	2,000	1,860	-140	-7.0%
Subtotal, Credit Programs	36,000	36,000	179,866	143,866	399.6%
Subtotal, Energy Programs	14,595,025	14,595,025	19,055,658	4,460,633	30.6%
National Nuclear Security Administration					
Federal Salaries and Expenses	443,200	443,200	496,400	53,200	12.0%
Weapons Activities	15,345,000	15,345,000	16,486,298	1,141,298	7.4%
Defense Nuclear Nonproliferation	2,260,000	2,260,000	2,346,257	86,257	3.8%
Naval Reactors	1,684,000	1,684,000	2,081,445	397,445	23.6%
National Nuclear Security Administration	19,732,200	19,732,200	21,410,400	1,678,200	8.5%
Defense Environmental Cleanup	6,426,000	6,426,000	6,914,532	488,532	7.6%
Defense UED&D Fund (2)	-	-	-	-	N/A
Other Defense Activities	920,000	920,000	978,351	58,351	6.3%
Subtotal, Environmental and Other Defense Activities	7,346,000	7,346,000	7,892,883	546,883	7.4%
Nuclear Energy (050)	149,800	149,800	156,600	6,800	4.5%
Subtotal, Atomic Energy Defense Activities	27,228,000	27,228,000	29,459,883	2,231,883	8.2%
Power Marketing Administrations					
Southeastern Power Administration (SEPA)	-	-	-	-	N/A
Southwestern Power Administration (SWPA)	10,400	10,400	10,608	208	2.0%
Western Area Power Administration	89,372	89,372	98,732	9,360	10.5%
Falcon and Amistad Operating and Maintenance Fund	228	228	228	0	0.0%
Colorado River Basins Marketing Fund	-21,400	-21,400	-8,568	12,832	-60.0%
Subtotal, Power Marketing Administrations	78,600	78,600	101,000	22,400	28.5%
Subtotal, Department of Energy	41,901,625		48,616,541	6,714,916	16.0%
Federal Energy Regulatory Commission	-	-	-	-	N/A
Receipts and Offsets					
Excess Fees and Recoveries, FERC	-9,000	-9,000	-9,000	-	0.0%
Title XVII Loan Guar. Prog Section 1703 Negative Credit Subsidy Receipts	-	-	-7,000	-7,000	N/A
UED&D Fund Discretionary Payments	-	-	-417,000	-417,000	N/A
Sale of Northeast Home Heating Oil Reserve	-	0	-	-	N/A
Defense Nuclear Nonproliferation Recission - MOX	-	0	-	-	N/A
Naval Reactors Recission	-	0	-	-	N/A
Receipts and offsets	-9,000	-9,000	-433,000	-424,000	4711.1%
Department of Energy	41,892,625	41,892,625	48,183,541	6,290,916	15.0%

DEPARTMENT OF ENERGY
Appropriation Summary
(dollars in thousands)

DOE Budget Function

<i>NNSA Defense (050) Total</i>	19,732,200	19,732,200	21,410,400	1,678,200	8.5%
<i>Non-NNSA Defense Total</i>	7,495,800	7,495,800	8,049,483	553,683	7.4%
Defense (050)	27,228,000	27,228,000	29,459,883	2,231,883	8.2%
<i>Science (250)</i>	7,026,000	7,026,000	7,799,211	773,211	11.0%
<i>Energy (270)</i>	7,638,625	7,638,625	10,924,447	3,285,822	43.0%
<i>Non-Defense (Non-050)</i>	14,664,625	14,664,625	18,723,658	4,059,033	27.7%

(1) The FY 2021 and FY 2022 Continuing Resolution entries for Title 17 and ATVM do not reflect rescissions of prior year emergency balances enacted in Public Law 116-260. Including the rescissions, the final amounts for Title 17 and ATVM would be -\$363 million and -\$1,903 million, respectively.

(2) In the FY 2023 Request, Defense Uranium Decontamination and Decommissioning is requested within the Defense Environmental Cleanup Appropriation.

DEPARTMENT OF ENERGY
Summary by Organization

Department of Energy	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 vs. FY 21 Enacted	
				\$	%
Undersecretary for Nuclear Security and National Nuclear Security Administration					
National Nuclear Security Administration					
Federal Salaries and Expenses	443,200	443,200	496,400	+53,200	+12.0%
Weapons Activities	15,345,000	15,345,000	16,486,298	+1,141,298	+7.4%
Defense Nuclear Nonproliferation	2,260,000	2,260,000	2,346,257	+86,257	+3.8%
Naval Reactors	1,684,000	1,684,000	2,081,445	+397,445	+23.6%
Total, National Nuclear Security Administration	19,732,200	19,732,200	21,410,400	+1,678,200	+8.5%
Undersecretary for Science & Innovation					
Science	7,026,000	7,026,000	7,799,211	+773,211	+11.0%
Energy Efficiency and Renewable Energy	2,861,760	2,861,760	4,018,885	+1,157,125	+40.4%
Fossil Energy and Carbon Management	750,000	750,000	893,160	+143,160	+19.1%
Nuclear Energy	1,507,600	1,507,600	1,675,060	+167,460	+11.1%
Nuclear Waste Disposal	27,500	27,500	10,205	-17,295	-62.9%
Electricity	211,720	211,720	297,386	+85,666	+40.5%
Artificial Intelligence & Technology Office	2,500	2,500	2,608	+108	+4.3%
Total, Undersecretary for Science & Innovation	12,387,080	12,387,080	14,696,515	+2,309,435	+18.6%
Undersecretary for Infrastructure (S3)					
Office of Clean Energy Demonstrations	-	-	214,052	+214,052	N/A
Cybersecurity, Energy Security, and Emergency Response	156,000	156,000	202,143	+46,143	+29.6%
Strategic Petroleum Reserves	188,000	188,000	214,175	+26,175	+13.9%
Naval Petroleum & Oil Shale Reserves	13,006	13,006	13,004	-2	-0.0%
SPR - Petroleum Account	1,000	1,000	8,000	+7,000	+700.0%
Northeast Home Heating Oil Reserves	6,500	6,500	7,000	+500	+7.7%
Total, Petroleum Reserves	208,506	208,506	242,179	+33,673	+16.1%
CESER & Petroleum Reserves	364,506	364,506	444,322	+79,816	+21.9%
Indian Energy Policy & Programs	22,000	22,000	150,039	+128,039	+582.0%
Title 17 - Innovative Technology Loan Guarantee Program (1)	29,000	29,000	168,206	+139,206	+480.0%
Advanced Technology Vehicles Manufacturing Loan Program	5,000	5,000	9,800	+4,800	+96.0%
Tribal Energy Loan Guarantee Program	2,000	2,000	1,860	-140	-7.0%
Total, Loan Program Offices	36,000	36,000	179,866	+143,866	+399.6%
Southeastern Power Administration (SEPA)	-	-	-	-	N/A
Southwestern Power Administration (SWPA)	10,400	10,400	10,608	+208	+2.0%
Western Area Power Administration	89,372	89,372	98,732	+9,360	+10.5%
Falcon and Amistad Operating and Maintenance Fund	228	228	228	-	+0.0%
Colorado River Basins Marketing Fund	-21,400	-21,400	-8,568	+12,832	-60.0%
Power Marketing Administrations (PMAs)	78,600	78,600	101,000	+22,400	+28.5%
Federal Energy Management Program (FEMP)	-	-	169,661	+169,661	N/A
Grid Deployment Office	-	-	90,221	+90,221	N/A
Office of Manufacturing & Energy Supply Chains (MESC)	-	-	27,424	+27,424	N/A
Office of State and Community Energy Programs (SCEP)	-	-	726,897	+726,897	N/A
Total, Undersecretary for Infrastructure (S3)	501,106	501,106	2,103,482	+1,602,376	+319.8%
Direct Reports					
Environmental Management	7,586,200	7,586,200	8,060,202	+474,002	+6.2%
Non-Defense Environmental Cleanup	319,200	319,200	323,249	+4,049	+1.3%
Uranium Enrichment Decontamination and Decommissioning Fu	841,000	841,000	822,421	-18,579	-2.2%
Defense Environmental Cleanup	6,426,000	6,426,000	6,914,532	+488,532	+7.6%
Defense UED&D Fund (2)	-	-	-	-	N/A

DEPARTMENT OF ENERGY
Summary by Organization

Department of Energy	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 vs. FY 21 Enacted	
				\$	%
Legacy Management	163,059	163,059	196,146	+33,087	+20.3%
Enterprise Assessments	79,070	79,070	85,427	+6,357	+8.0%
Environment, Health, Safety and Security	206,320	206,320	215,539	+9,219	+4.5%
Specialized Security Activities	283,500	283,500	306,067	+22,567	+8.0%
Office of Hearings And Appeals	4,262	4,262	4,477	+215	+5.0%
Advanced Research Projects Agency- Energy	427,000	427,000	700,150	+273,150	+64.0%
Advanced Research Projects Agency- Climate	-	-	-	-	N/A
Energy Information Administration	126,800	126,800	144,480	+17,680	+13.9%
Office of the Secretary	5,582	5,582	6,642	+1,060	+19.0%
Congressional & Intergovernmental Affairs	5,000	5,000	7,142	+2,142	+42.8%
Office of the Chief Financial Officer	53,590	53,590	62,283	+8,693	+16.2%
Economic Impact & Diversity	10,169	10,169	34,140	+23,971	+235.7%
Office of International Affairs	26,825	26,825	62,141	+35,316	+131.7%
Chief Information Officer	140,200	140,200	233,731	+93,531	+66.7%
Office of Management	54,358	54,358	86,317	+31,959	+58.8%
Office of Human Capital Management	24,918	24,918	35,366	+10,448	+41.9%
Office of Small & Disadvantaged Business Utilization	3,386	3,386	3,825	+439	+13.0%
General Counsel	35,000	35,000	43,722	+8,722	+24.9%
Project Management Oversight & Assessments	13,000	13,000	13,550	+550	+4.2%
Office of Policy	7,000	7,000	31,073	+24,073	+343.9%
Public Affairs	4,000	4,000	5,936	+1,936	+48.4%
Undistributed Other Departmental Administration	-	-	-	-	N/A
Strategic Partnership Programs	40,000	40,000	40,000	-	+0.0%
Office of Technology Transitions	17,639	17,639	21,558	+3,919	+22.2%
Office of Inspector General	57,739	57,739	106,808	+49,069	+85.0%
Total, Direct Reports	9,374,617	9,374,617	10,506,722	+1,132,105	+12.1%
Miscellaneous Revenues	-93,378	-93,378	-100,578	-7,200	+7.7%
Federal Energy Regulatory Commission	-	-	-	-	N/A
Receipts and offsets					
Excess Fees and Recoveries, FERC	-9,000	-9,000	-9,000	-	+0.0%
Title XVII Loan Guar. Prog Section 1703 Negative Credit Subsidy Rece	-	-	-7,000	-7,000	N/A
UED&D Fund Discretionary Payments	-	-	-417,000	-417,000	N/A
Defense Nuclear Nonproliferation Rescission - MOX	-	-	-	-	N/A
Naval Reactors Rescission	-	-	-	-	N/A
Total, Receipts and offsets	-9,000	-9,000	-433,000	-424,000	+4711.1%
Total, Department of Energy	41,892,625	41,892,625	48,183,541	+6,290,916	+15.0%
Funding Summary					
NNSA Defense (050) Total	19,732,200	19,732,200	21,410,400	+1,678,200	+8.5%
Non-NNSA Defense Total	7,495,800	7,495,800	8,049,483	+553,683	+7.4%
Defense (050)	27,228,000	27,228,000	29,459,883	+2,231,883	+8.2%
Science (250)	7,026,000	7,026,000	7,799,211	+773,211	+11.0%
Energy (270)	7,638,625	7,638,625	10,924,447	+3,285,822	+43.0%
Non-Defense (Non-050)	14,664,625	14,664,625	18,723,658	+4,059,033	+27.7%
Total, Department of Energy	41,892,625	41,892,625	48,183,541	+6,290,916	+15.0%

(1) The FY 2021 Enacted and FY 2022 Continuing Resolution entries for Title 17 and ATVM do not reflect rescissions of prior year emergency balances enacted in Public Law 116-260. Including the rescissions, the final amounts for Title 17 and ATVM would be -\$363 million and -\$1,903 million, respectively.

DEPARTMENT OF ENERGY
Summary by Organization

Department of Energy	FY 2021	FY 2022	FY 2023	FY 2023 vs. FY 21 Enacted	
	Enacted	Annualized CR	Request	\$	%

(2) In the FY 2023 Request, Defense Uranium Decontamination and Decommissioning is requested within the Defense Environmental Cleanup Appropriation.

DEPARTMENT OF ENERGY
Appropriation Summary Including Outyears
(dollars in thousands)

Department of Energy	FY2023 Request	FY 2024	FY 2025	FY 2026	FY 2027
Department of Energy					
Energy Efficiency and Renewable Energy	4,018,885	4,111,000	4,206,000	4,303,000	4,402,000
Electricity	297,386	304,000	311,000	318,000	325,000
Cybersecurity, Energy Security, and Emergency Response	202,143	207,000	212,000	217,000	222,000
Strategic Petroleum Reserves	214,175	219,000	224,000	229,000	234,000
Naval Petroleum & Oil Shale Reserves	13,004	13,000	14,000	14,000	14,000
SPR - Petroleum Account	8,000	8,000	8,000	9,000	9,000
Northeast Home Heating Oil Reserves	7,000	7,000	7,000	7,000	8,000
Petroleum Reserves	242,179	247,000	253,000	259,000	265,000
Cybersecurity, Energy Security, and Emergency Response	444,322	454,000	465,000	476,000	487,000
Grid Deployment Office	90,221	92,000	94,000	96,000	99,000
Federal Energy Management Program (FEMP)	169,661	174,000	178,000	182,000	186,000
Office of Manufacturing & Energy Supply Chains (MESC)	27,424	28,000	28,000	29,000	30,000
Office of State and Community Programs (SCEP)	726,897	744,000	761,000	778,000	796,000
Nuclear Energy	1,518,460	1,553,000	1,589,000	1,625,000	1,663,000
Fossil Energy and Carbon Management	893,160	914,000	935,000	956,000	978,000
Uranium Enrichment Decontamination and Decommissioning Fund (UED&D)	822,421	841,000	860,000	880,000	900,000
Energy Information Administration	144,480	147,000	151,000	154,000	158,000
Non-Defense Environmental Cleanup	323,249	331,000	339,000	347,000	355,000
Science	7,799,211	7,977,000	8,162,000	8,350,000	8,542,000
Office of Technology Transitions	21,558	22,000	23,000	24,000	25,000
Office of Clean Energy Demonstrations	214,052	219,000	224,000	229,000	234,000
Advanced Research Project Agency-Energy	700,150	715,000	733,000	749,000	767,000
Nuclear Waste Disposal	10,205	10,000	10,000	11,000	11,000
Departmental Administration	397,203	406,000	415,000	425,000	435,000
Indian Energy Policy and Programs	150,039	153,000	157,000	161,000	164,000
Office of the Inspector General	106,808	119,000	123,000	124,000	117,000
Loan Programs					
Title 17 - Innovative Technology Loan Guarantee Program	168,206	172,000	176,000	180,000	184,000
Advanced Technology Vehicles Manufacturing Loan Program	9,800	10,000	10,000	10,000	10,000
Tribal Energy Loan Guarantee Program	1,860	2,000	2,000	2,000	2,000
Subtotal, Loan Programs	179,866	184,000	188,000	192,000	196,000
Energy Programs	19,055,658	19,498,000	19,952,000	20,409,000	20,870,000
Federal Salaries and Expenses	496,400	514,000	538,000	558,000	567,000
Weapons Activities	16,486,298	17,816,000	17,897,000	17,586,000	17,633,000
Defense Nuclear Nonproliferation	2,346,257	2,495,000	2,559,000	2,568,000	2,563,000
Naval Reactors	2,081,445	1,903,000	1,868,000	1,914,000	1,898,000
NNSA Cancellation of Prior Year Balances					
National Nuclear Security Administration	21,410,400	22,728,000	22,862,000	22,626,000	22,661,000
Defense Environmental Cleanup	6,914,532	7,074,000	7,237,000	7,403,000	7,573,000
Defense UED&D Fund*					
Other Defense Activities	978,351	1,000,000	1,024,000	1,047,000	1,070,000
Environmental and Other Defense Activities	7,892,883	8,074,000	8,261,000	8,450,000	8,643,000
Nuclear Energy (050)	156,600	161,000	164,000	168,000	172,000
Atomic Energy Defense Activities	29,459,883	30,963,000	31,287,000	31,244,000	31,476,000
Southeastern Power Administration (SEPA)	-	-	-	-	-
Southwestern Power Administration (SWPA)	10,608	11,000	11,000	11,000	11,000
Western Area Power Administration	98,732	101,000	103,000	105,000	107,000
Falcon and Amistad Operating and Maintenance Fund	228	-	-	-	-
Colorado River Basins Marketing Fund	-8,568	-	-	-	-
Power Marketing Administrations	101,000	112,000	114,000	116,000	118,000
Federal Energy Regulatory Commission					
Excess Fees and Recoveries, FERC	-9,000	-	-	-	-
Title XVII Loan Guar. Prog Section 1703 Negative Credit Subsidy Receipts	-7,000	-	-	-	-
UED&D Fund Offset	-417,000	-	-	-	-
Receipts and offsets	-433,000	-	-	-	-
Department of Energy	48,183,541	50,573,000	51,353,000	51,769,000	52,464,000

DEPARTMENT OF ENERGY
Appropriation Summary Including Outyears
(dollars in thousands)

Department of Energy	FY2023 Request	FY 2024	FY 2025	FY 2026	FY 2027
DOE Budget Function					
<i>NNNSA Defense (050) Total</i>	21,410,400	22,728,000	22,862,000	22,626,000	22,661,000
<i>Non-NNSA Defense Total</i>	8,049,483	8,235,000	8,425,000	8,618,000	8,815,000
<i>Defense (050)</i>	29,459,883	30,963,000	31,287,000	31,244,000	31,476,000
<i>Science (250)</i>	7,799,211	7,977,000	8,162,000	8,350,000	8,542,000
<i>Energy (270)</i>	10,924,447	11,633,000	11,904,000	12,175,000	12,446,000
<i>Non-Defense (Non-050)</i>	18,723,658	19,610,000	20,066,000	20,525,000	20,988,000

*In the FY 2023 Request the Defense UED&D Fund is requested within the Defense Environmental Cleanup Appropriation.

Program and Functional Office Details

NATIONAL NUCLEAR SECURITY ADMINISTRATION

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
			\$	%	
National Nuclear Security Administration					
Federal Salaries and Expenses	443,200	443,200	496,400	+53,200	+12.0%
Weapons Activities	15,345,000	15,345,000	16,486,298	+1,141,298	+7.4%
Defense Nuclear Nonproliferation	2,260,000	2,260,000	2,346,257	+86,257	+3.8%
Naval Reactors ^a	1,684,000	1,684,000	2,081,445	+397,445	+23.6%
Total, National Nuclear Security Administration	19,732,200	19,732,200	21,410,400	+1,678,200	+8.5%

Appropriation Overview

The **National Nuclear Security Administration (NNSA)** FY 2023 Budget Request is \$21,410,400,000 to fund NNSA's mission to support the security and safety of our nation. NNSA's FY 2023 Budget Request pursues five major national security endeavors:

- Maintain a safe, secure, and effective nuclear weapons stockpile;
- Reduce global nuclear threats and keep materials out of the hands of terrorists;
- Strengthen key science, technology and engineering capabilities in support of certification, assessment, and current and weapon modernization programs;
- Provide safe and effective integrated nuclear propulsion systems for the U.S. Navy; and,
- Modernize the Nuclear Security infrastructure.

Key to all of these efforts is providing the necessary federal oversight for growing mission requirements.

Program Highlights

The **Weapons Activities** FY 2023 Budget Request is \$16,486,298,000, a \$1,141,298,000 (7.4 percent) increase above FY 2021 Enacted.

The **Defense Nuclear Nonproliferation (DNN)** FY 2023 Budget Request is \$2,346,257,000, a \$86,257,000 (3.8 percent) increase from FY 2021 Enacted.

The **NNSA Federal Salaries and Expenses (FSE)** FY 2023 Budget Request is \$496,400,000, a \$53,200,000 (12.0 percent) increase above FY 2021 Enacted.

The **Naval Reactors (NR)** FY 2023 Budget Request is for \$2,081,445,000, a \$397,445,000 (23.6 percent) increase from FY 2021 Enacted.

Major Out-year Priorities and Assumptions

NNSA's FYNSP topline for FY 2024 – FY 2027 is \$90.9 billion. The Request continues to modernize America's nuclear stockpile and infrastructure, and the underlying science that supports strategic decisions and certification of the stockpile, as detailed in the annual *Stockpile Stewardship and Management Plan (SSMP)*. The Request supports the U.S Navy's nuclear fleet through safe and effective integrated nuclear propulsion systems. The Request also supports the nonproliferation goals outlined in NNSA's *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (NPCR)*.

^a Funding does not reflect the mandated transfer of \$91.0 million in FY 2021 and FY 2022 to the Office of Nuclear Energy for operation of the Advanced Test Reactor.

FEDERAL SALARIES AND EXPENSES – NNSA

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\\$K)	
				FY 2023 Request vs FY 2021 Enacted	
				\$	%
Federal Salaries and Expenses					
Federal Salaries and Expenses	443,200	443,200	513,200	+70,000	+15.8%
Use of Prior Year Balances			-16,800	-16,800	
Total, Federal Salaries and Expenses	443,200	443,200	496,400	+53,200	+12.0%

Appropriation Overview

The **National Nuclear Security Administration (NNSA) Federal Salaries and Expense (FSE)** funds recruiting, training, and retention of federal staff who perform program and project management for Weapons Activities (WA) and Defense Nuclear Nonproliferation (DNN). The growth in the FSE account will support 1,958 Federal Full-time Equivalents (FTEs) which is approximately 194 above the FY 2021 Enacted and 132 above the FY 2022 projected. The request includes 1,934 FTEs paid from FSE and 24 paid through the Working Capital Fund. FSE also provides space and occupancy needs, travel costs, support service contractors, training, and other related expenses. Eighty-one percent of FY 2023 FSE funds are for federal salaries and benefits.

The NNSA workforce consists of a diverse team of scientists, engineers, project and program managers, foreign affairs specialists, and support staff that perform program and project management and appropriate oversight of the national security missions related to the WA and DNN accounts.

NNSA federal staff are located throughout the United States, reflecting NNSA's work with the nuclear security enterprise. NNSA's federal workforce is in Washington, DC; Germantown, Maryland; Albuquerque, New Mexico; and at seven federal field offices: Kansas City Field Office (Missouri); Lawrence Livermore Field Office (California); Los Alamos Field Office (New Mexico); Nevada Field Office (Nevada); NNSA Production Office (Texas and Tennessee); Sandia Field Office (New Mexico); and Savannah River Field Office (South Carolina).

NNSA also manages the Department of Energy's (DOE) Overseas Presence business line in the DOE Working Capital Fund, including 22 DOE/NNSA staff in 21 foreign countries. NNSA supervises both federal employees and locally employed staff overseas and reimburses the Department of State for International Cooperative Administrative Support Services and Capital Security Cost Sharing charges.

Program Highlights

The \$496,400,000 request supports 1,958 FTEs and associated support expenses.

The NNSA workforce is critical to the success of the Nation's nuclear security enterprise. The right number of people, with the right skills, in the right positions is key to the growing mission including modernizing the nuclear deterrent, recapitalizing the aging infrastructure, and continuing to meet the requirements of nonproliferation and counterterrorism programs.

NNSA will use a variety of innovative methods to grow and shape the professional staff including recruitment events and expanded excepted service hiring authority. The NNSA will also continue to monitor the evolving need for federal oversight in support of the nuclear modernization missions and adjust future staffing plans accordingly. NNSA will also use partnerships with academic alliances to grow the workforce with early identification and recruitment of top science, technology, engineering, and math talent. NNSA's recruitment and hiring actions will continue to support the Administration goals of promoting racial and economic equity while promoting science and research and development.

	FY 2021 Enacted ^a	FY 2022 Annualized CR ^a	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	\$ %
Weapons Activities					
Stockpile Management	4,290,244	4,290,244	4,929,073	+638,829	14.9%
Production Modernization	3,903,533	3,903,533	4,640,594	+737,061	18.9%
Stockpile Research, Technology, and Engineering	3,003,489	3,003,489	2,894,658	-108,831	-3.6%
Infrastructure and Operations	2,542,071	2,542,071	2,630,963	+88,892	3.5%
Secure Transportation Asset	348,684	348,684	344,437	-4,247	-1.2%
Defense Nuclear Security	789,078	789,078	882,291	+93,213	11.8%
Information Technology and Cybersecurity	366,233	366,233	445,654	+79,421	21.7%
Legacy Contractor Pensions and Settlement Payments	101,668	101,668	114,632	+12,964	12.8%
Subtotal, Weapons Activities	15,345,000	15,345,000	16,882,302	+1,537,302	10.0%
Use of Prior Year Balances	0	0	-396,004	-396,004	0.0%
Total, Weapons Activities	15,345,000	15,345,000	16,486,298	+1,141,298	7.4%

^a The FY 2021 and FY 2022 amounts are comparable with FY 2023 proposed structure. NNSA restructured the Weapons Activities budget in FY 2021 to enable better alignment of portfolios with resources. This allowed improved prioritization within portfolios that have multiple programs and interdependencies. Further refinements are proposed in FY 2023 to align programmatic construction with the portfolio each project supports.

Appropriation Overview

Programs funded within the Weapons Activities appropriation support the Nation's nuclear stockpile and its attendant nationwide infrastructure of science, technology, engineering, and production capabilities. Weapons Activities provides for the maintenance and refurbishment of nuclear weapons to continue sustained confidence in their safety, reliability, and military effectiveness without resuming nuclear explosive testing; continued investment in scientific, engineering, and manufacturing capabilities to enable production and certification of the enduring nuclear weapons stockpile; and manufacture of nuclear weapon components. Weapons Activities also provides for continued maintenance and investment in the National Nuclear Security Administration (NNSA) nuclear complex to be more responsive and resilient.

NNSA's laboratories, plants, and sites employ approximately 57,000 people across the Enterprise, primarily at eight geographical sites, to execute these programs managed by a Federal workforce composed of civilian staff supplemented with a small number of military assignees. Additional details about these programs will be included in the FY 2023 Stockpile Stewardship and Management Plan (SSMP).

The FY 2023 Request supports the current nuclear stockpile, warhead modernization programs to include life extension programs (LEP) and modifications, production facilities and capabilities modernization efforts, the scientific tools necessary to execute these efforts, and recapitalization of physical infrastructure and essential facilities to ensure the deterrent remains viable.

Program Highlights

Stockpile Management

The Stockpile Management program maintains a safe, secure, and effective nuclear weapons stockpile. The Stockpile Management program encompasses five areas that directly support the nation's nuclear weapons stockpile. **Stockpile Major Modernization** will continue Phase 6.6 (Full-Scale Production) activities for the B61-12 LEP and W88 ALT 370; continue Phase 6.4 (Production Engineering) activities for the W80-4 LEP; continue Phase 6.3 (Development Engineering) activities for the W87-1 Modification Program; and continue Phase 2 (Feasibility Study and Design Options) for the W93 Program. **Stockpile Sustainment** will provide activities to include maintenance, limited life component exchanges, minor alterations, surveillance, assessment, surety studies and capability development, and management activities for each Stockpile System and Multi-Weapon Systems and will continue Phase 6.3 (Development Engineering) activities for the W76-

1/2 Mk4B. **Weapons Dismantlement and Disposition (WDD)** will provide safe and secure dismantlement of nuclear weapons and components in accordance with the Nuclear Weapons Stockpile Plan, and **Production Operations (PO)** will sustain manufacturing capabilities and capacities, including process improvements and investments focused on increased efficiency of production performance. FY 2023 includes a new Stockpile Management area, **Nuclear Enterprise Assurance (NEA)** formulated to prevent, detect, and mitigate potential consequences of subversion to the stockpile and associated capabilities to design, produce, and test nuclear weapons.

Production Modernization

The Production Modernization portfolio focuses on the production capabilities for nuclear weapons components critical to weapon performance, including primaries, secondaries, radiation cases, and non-nuclear components. Production Modernization funds the equipment, facilities, and personnel required to reestablish the Nation's capability to produce 80 pits per year (ppy). FY 2023 funding will support process development and qualification activities to produce the first War Reserve (WR) pit at Los Alamos National Laboratories in FY 2023 and the Plutonium Modernization activities at the Savannah River Site. Production Modernization also supports qualification of explosive, pyrotechnic, and propellant materials for supplying the NNSA's nuclear security enterprise across five sites; implements the program necessary to produce tritium in support of the nuclear weapons stockpile and other national programs; funds modernization of uranium operations, delivery of canned subassemblies and components needed to maintain the stockpile, as well as support to the U.S. Navy's nuclear propulsion program, and Nonproliferation programs; supports the restart and modernization of lapsed depleted uranium (DU) alloying and component manufacturing capabilities for meeting short- and long-term mission requirements; maintains production of the Nation's enriched lithium supply; and provides funding to modernize production of non-nuclear components required for both the active stockpile and warhead modernization programs.

Stockpile Research, Technology, and Engineering (SRT&E)

The SRT&E portfolio provides the scientific foundation for science-based stockpile decisions and actions, including the capabilities, tools, and components needed to enable assessment of the active stockpile and certification of warhead modernization programs without the need for nuclear explosive testing. Funding requested for FY 2023 supports the continued implementation of the Enhanced Capabilities for Subcritical Experiments (ECSE) and preparations for NNSA's first Exascale high-performance computing system. These two capabilities are required to meet W80-4 LEP confirmation experiment and W87-1 Modification certification requirements. In addition to the procurement and implementation of NNSA's first Exascale machine, the funding supports the development and deployment of improved physics and engineering codes needed to support stockpile decisions to operate on this new platform. Funding in this area also supports the development of new materials, technologies, and processes to modernize our nuclear systems and production complex, as well as supporting several experimental testbed capabilities. This is accomplished through warhead component and production technology development and maturation. Academic Programs supports the Administration's Executive Order on Advancing Racial Equity and Support for Underserved Communities through the Federal Government and through partnerships with Minority Serving Institutions (MSI). Internship opportunities within NNSA are one tool used through the MSI programs to engage students. NNSA's Management and Budget office manages these programs and tracks the hiring of underrepresented students who have matriculated through various STEM consortium pipelines into the Nuclear Security Enterprise (NSE). Academic Programs also supports academic institutions of experimental and computational programs through consortium-based grants such as the Minority Serving Institution Partnership Program to develop the future generation of the highly-trained technical and specialized workforce.

Infrastructure and Operations (I&O)

I&O maintains, operates, and modernizes the NNSA infrastructure in a safe and secure manner to support program execution while seeking to maximize return on investment and reduce enterprise risk. The program plans, prioritizes, and constructs state-of-the-art facilities and infrastructure to support all NNSA programs, with the exception of new complex-construction projects, which are funded by the capability sponsor. The FY 2023 Request provides funding for activities to enable plutonium pit production, meet LEP schedules at Kansas City National Security Campus (KCNSC), and address infrastructure modernization throughout the complex. Furthermore, the funding allows NNSA to execute Recapitalization projects to improve the condition and extend the design life of structures, capabilities, and systems to meet program demands; reduce future operating costs by replacing older facilities with new, more efficient facilities; and reduce safety, security, environment, and program risk.

Secure Transportation Asset (STA)

STA supports safe, secure transport of the Nation's nuclear weapons, weapon components, and special nuclear material throughout the NSE. Nuclear weapon life-extension programs, limited-life component exchanges, surveillance, dismantlement, nonproliferation activities, and experimental programs rely on STA activities to ensure safe, secure, and on-schedule transport. The FY 2023 Request supports modernizing and sustaining STA transportation assets, including life extension of the Safeguards Transporter until it is replaced by the Mobile Guardian Transporter; vehicle sustainment; replacement armored tractors, escort, and support vehicles; upgrades of the Tractor Control Unit to accommodate for communications and security; and continued development and testing of the Mobile Guardian Transporter. The first Mobile Guardian Transporter production unit is planned for completion in FY 2026 and will begin a phased in approach beginning in FY 2027. Program Direction resources in this account provide salaries and expenses for the secure transportation workforce, including Federal agents. Funding also supports STA's commitment to a stable human resources strategy to maintain the staff of Federal Agents.

Defense Nuclear Security (DNS)

DNS provides protection for NNSA personnel, facilities, nuclear weapons, and materials from a full spectrum of threats, ranging from minor security threats to acts of terrorism, at its national laboratories, production plants, processing facilities, and the Nevada National Security Site (NNSS). Employing more than 1,700 Protective Force officers, DNS secures more than 5,000 buildings and protects more than 57,000 personnel. The FY 2023 request includes funding to fill positions in key security program areas required to implement a risk-based, layered protection strategy at the sites. The request also supports some increased security needs associated with known mission growth in weapons programs across the NSE, including Pit Production at Los Alamos National Laboratory (LANL), and efforts to support the Uranium Processing Facility (UPF). The FY 2023 request also reflects support for development and implementation of the Caerus security system, Security Infrastructure Revitalization Program (SIRP) projects, the Physical Security Center of Excellence (PSCOE), and the Center for Security Technology, Analysis, Response, and Testing (CSTART), as well as funding for the WEPAR project, which will install a new Perimeter Intrusion Detection and Assessment System (PIDAS) section, thus reducing the Y-12 National Security Complex (Y-12) Protected Area by approximately 50% while integrating with the UPF.

Information Technology (IT) and Cybersecurity

The NNSA Office of the Associate Administrator for Information Management and Chief Information Officer (OCIO) is responsible for information sharing and information safeguarding that support the execution of NNSA mission activities and implementation of the President's Executive Order on Improving the Nation's Cybersecurity. The OCIO supports Information Technology (IT) and Cybersecurity services and solutions, which include continuous monitoring, cloud-based technologies, and enterprise security technologies (i.e., identity, credential, and access management) to meet security challenges. The IT and Cybersecurity Program is based on practical principles that provide superior information management support to current operations while implementing unclassified and classified cloud-based technologies and infrastructure to support the NSE. The program collaborates and coordinates with the DOE Office of the Chief Information Officer (DOE OCIO) on the development and deployment of IT and Cybersecurity solutions protecting DOE information and information assets. The FY 2023 Request enables the development and execution of integrated IT initiatives that provide an effective and secure technology infrastructure across the enterprise. These initiatives will fundamentally redesign the NNSA IT environments to provide a more modern and secure set of capabilities including unified communication, agile cloud infrastructure, and next-generation collaboration services. Additionally, the NNSA IT and Cybersecurity Program will deploy emerging technology, leading-edge operational technology, and artificial intelligence/machine learning to provide tools and capabilities to the NNSA workforce and that secure NNSA operations.

DEFENSE NUCLEAR NONPROLIFERATION - NNSA

	(\$K)				
	FY 2021 Enacted ^a	FY 2022 Annualized CR ^a	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
	\$	%			
Defense Nuclear Nonproliferation Programs					
Material Management and Minimization	400,711	400,711	450,885	+50,174	+12.5%
Global Material Security	528,939	528,939	504,077	-24,862	-4.7%
Nonproliferation and Arms Control	148,000	148,000	207,656	+59,656	+40.3%
Defense Nuclear Nonproliferation R&D	641,900	641,900	720,245	+78,345	+12.2%
NNSA Bioassurance Program	0	0	20,000	+20,000	0%
Nonproliferation Construction	148,589	148,589	71,764	-76,825	-51.7%
Total, Defense Nuclear Nonproliferation Programs	1,868,139	1,868,139	1,974,627	+106,488	+5.7%
Nuclear Counterterrorism and Incident Response	377,513	377,513	438,970	+61,457	+16.3%
Legacy Contractor Pensions and Settlement Payments	14,348	14,348	55,708	+41,360	+288.3%
Use of Prior Year Balances	0	0	-123,048	-123,048	0%
Total, Defense Nuclear Nonproliferation	2,260,000	2,260,000	2,346,257	+86,257	+3.8%

^a The FY 2021 and FY 2022 amounts are presented comparable to the structure proposed for FY 2023 with Forensics R&D (formerly NTNF R&D) under DNN R&D and not as a separate line.

Appropriation Overview

The National Nuclear Security Administration's (NNSA) nonproliferation, counterproliferation, and counterterrorism activities are critical to implementing the President's Interim National Security Strategic Guidance and demonstrating "renewed American nonproliferation leadership." NNSA's programs help reduce the dangers posed by nuclear weapons by extending the United States' defenses against nuclear threats far beyond its borders. These programs help prevent adversaries from acquiring nuclear weapons or weapons-usable materials, technology, and expertise; countering efforts to acquire such weapons or materials; and responding to nuclear or radiological incidents and accidents domestically and abroad. NNSA shares knowledge, accrued through the United States' long experience in managing special nuclear materials, with partners around the world to achieve international nonproliferation and nuclear security goals. NNSA uses the unique technical and scientific knowledge that underpins the Stockpile Stewardship Program for a range of nonproliferation missions, from assessing foreign weapons programs and potential terrorist devices to managing the proliferation risks posed by civil nuclear applications. By limiting the number of nuclear-capable states and preventing terrorist access to materials and technology that can threaten the United States and allies, NNSA plays a critical role in enhancing global stability and constrains the range of potential threats facing the nation, our allies, and partners.

This appropriation funds seven programs that, as part of a whole-of-government approach, provide policy and technical leadership to prevent or limit the spread of weapons of mass destruction (WMD)-related materials, technology, and expertise; develop technologies to detect nuclear proliferation and steward foundational nonproliferation competencies; secure or eliminate inventories of nuclear weapons-related materials and infrastructure; and ensure that technically trained emergency management personnel are available to respond to nuclear and radiological incidents and accidents domestically and abroad. This appropriation also provides funds to establish a national security R&D program to anticipate and detect threats and broaden DOE's role in national biodefense.

DNN's mission is complementary to Defense Programs' Stockpile Stewardship Program at NNSA. Together, the programs form the basis of providing a strong nuclear defense. DNN's activities are carried out within a dynamic global security environment, as described in NNSA's annual report *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats*^a.

^a <https://www.energy.gov/nnsa/downloads/prevent-counter-and-respond-strategic-plan-reduce-global-nuclear-threats-npcr>.

This environment is characterized by the persistent threat of state and non-state actors seeking to obtain nuclear and radioactive materials, state actors potentially undermining arms control agreements to which the United States is adherent, and nonproliferation regimes. There is also an increased risk of the availability of nuclear and radioactive materials as a result of the global expansion of commercial nuclear power and possible spread of fuel cycle technology, increased opportunities for illicit nuclear material trafficking and sophisticated procurement networks, and technology advances (including cyber-related tools) that may shorten nuclear weapon development timelines and complicate nuclear safeguards and security missions.

Program Highlights

- **Material Management and Minimization (M3)**

M3 programs reduce and, when possible, eliminate weapons-usable nuclear material around the world to achieve permanent threat reduction. The FY 2023 Budget Request supports the conversion or shutdown of research reactors and isotope production facilities that use highly enriched uranium (HEU), the continued support of non-HEU-based Molybdenum-99 (Mo-99) production facilities in the United States, the recovery of limited amounts of high-assay low enriched uranium, the removal and disposal of weapons-usable nuclear material, the removal of plutonium from the State of South Carolina and implementation of the dilute and dispose strategy for plutonium disposition, and costs to downblend HEU.

- **Global Material Security (GMS)**

GMS directly contributes to national security efforts to reduce global nuclear security threats. The FY 2023 Budget Request supports program efforts to prevent terrorists and other actors from obtaining nuclear and radioactive material to use in an improvised nuclear device (IND) or a radiological dispersal device (RDD) by working domestically and with partner countries to improve the security of vulnerable materials and facilities, and to build partners' sustainable capacity to detect, disrupt, and investigate illicit trafficking of these materials through critical pathways. GMS works with countries in bilateral partnerships and with multilateral partners such as the International Atomic Energy Agency (IAEA) and International Criminal Police Organization (INTERPOL). As part of an ongoing strategic analysis process, GMS is also exploring innovative approaches, technologies, and tools to adapt to emerging threats. GMS supports national security priorities to reduce global nuclear security threats, and is a key component of NNSA's integrated nonproliferation, counterterrorism, and emergency response strategies.

- **Nonproliferation and Arms Control (NPAC)**

NPAC programs strengthen nonproliferation and arms control regimes through innovative policy development and implementation to prevent proliferation, ensure peaceful nuclear uses, and enable verifiable nuclear reductions. To advance this mission, NPAC builds the capacity of the IAEA and partner countries to implement international safeguards obligations, builds domestic and international capacity to implement export control obligations, supports the negotiation and implementation of agreements and associated monitoring regimes to verifiably reduce nuclear weapons and nuclear programs, and develops approaches and strategies to address emerging nonproliferation and arms control challenges and opportunities.

- **Defense Nuclear Nonproliferation Research and Development (DNN R&D)**

DNN R&D is the key component for the innovation of United States' technical capabilities to detect nuclear detonations; foreign nuclear weapons programs' activities; and the presence, movement, or diversion of special nuclear materials. The program also sustains and develops foundational nonproliferation technical competencies that ensure the technical agility needed to support a broad spectrum of U.S. nonproliferation missions and anticipate threats. Finally, the program funds technical nuclear analysis capabilities at the National Laboratories that can support time-critical decisions in the event of a nuclear or radiological incident and assist in determining the origin of interdicted materials or nuclear devices. DNN R&D uses the unique facilities and scientific skills of DOE, academia, and industry to perform research, conduct technology demonstrations, develop prototypes, and produce and deliver sensors for integration into operational systems. The FY 2023 Budget Request supports planned activities for early detection of proliferation-related R&D and continued production of nuclear detonation detection satellite payloads. The FY 2023 Budget Request also

supports continued efforts to sustain and develop foundational nonproliferation technical competencies by providing targeted, long-term support for enabling infrastructure, science and technology, and an expert workforce.

- **NNSA Bioassurance Program**

The NNSA Bioassurance Program establishes a national security R&D program to anticipate and detect threats and broaden DOE's role in national biodefense. The NNSA Bioassurance Program complements DOE's support of other departments and agencies and U.S. biodefense strategies and plans. The Program works in close coordination with the Office of Science (DOE/SC) integrating NNSA's high-security work with DOE/SC's supported "open" science and provides the full spectrum of capabilities essential for a bioassurance program informed by national security expertise that is drawn from parallel and analogue work on nuclear threats, risks, export controls and licensing, non-proliferation, detection, and verification.

- **Nonproliferation Construction (supports Material Management and Minimization)**

Nonproliferation Construction consolidates construction costs for DNN projects. The FY 2023 Budget Request supports the implementation of the dilute and dispose strategy with the continuation of the Surplus Plutonium Disposition (SPD) project, which will add additional glovebox capacity at the Savannah River Site to accelerate plutonium dilution and aid in the removal of plutonium from the state of South Carolina.

- **Nuclear Counterterrorism and Incident Response Program (NCTIR)**

The NCTIR program sustains the United States' nuclear counterterrorism and counterproliferation activities, maintains critical nuclear incident and accident response and technical reachback capabilities, and supports DOE's all-hazards emergency management system. The Counterterrorism and Counterproliferation (CTCP) subprogram provides the nation's technical capability to understand and defeat nuclear devices, including improvised nuclear devices and lost or stolen foreign nuclear weapons. This knowledge in turn informs U.S. Government policies, regulations, agencies, and key Department of Defense mission partners on terrorist and proliferant state nuclear threats and related contingency planning. In support of this mission, the FY 2023 Request for NCTIR supports programs to manage and deploy the DOE/NNSA Nuclear Emergency Support Team (NEST), comprised of expert scientific teams and equipment to respond rapidly to nuclear or radiological incidents and accidents worldwide; maintain a nuclear forensics capability to attribute the source of nuclear material outside of regulatory control or used in a nuclear attack; and to educate, through training and exercises, domestic and international partners to respond effectively to nuclear or radiological incidents. CTCP also integrates DOE/NNSA policy, planning, and operations on counterproliferation priorities, supporting urgent needs and proactively pursuing opportunities to prevent nuclear threats and develop technologies to apply to the counterterrorism and counterproliferation mission.

Additionally, NCTIR operates the DOE/NNSA's Emergency Operations (EO) subprogram. The EO subprogram provides both the structure and processes to ensure a comprehensive and integrated approach to all-hazards emergency management, thus improving readiness and effectiveness of the DOE Emergency Management System on a programmatic and performance level regardless of the nature of the emergency impacting the DOE/NNSA enterprise or its equities anywhere in the world. This promotes unity of effort and a culture of continuous improvement to safeguard the health and safety of workers and the public, protect the environment, and enhance the resilience of the Department and the Nation. The EO subprogram develops plans and procedures for prevention, protection, mitigation, response to, and recovery from, all hazards emergency accidents, incidents, and events. In addition, the FY 2023 Budget Request supports Continuity of Operations, Continuity of Government, and Enduring Constitutional Government programs to advance the National Continuity Policy and ensure the continued performance and delivery of essential services under any circumstances. The FY 2023 Budget Request also provides for 24/7/365 Consolidated Emergency Operations Center communications and coordination support to the DOE/NNSA Emergency Management Enterprise and Departmental Senior Leadership.

NAVAL REACTORS – NNSA

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
			\$	%	
Naval Reactors					
Naval Reactors Operations and Infrastructure	530,600	530,600	695,165	+164,565	+31.0%
Naval Reactors Development	568,000	568,000	798,590	+230,590	+40.6%
S8G Prototype Refueling	135,000	135,000	20,000	-115,000	-85.2%
<i>Columbia</i> -Class Reactor Systems Development	64,700	64,700	53,900	-10,800	-16.7%
Program Direction	51,700	51,700	58,525	+6,825	+13.2%
Construction	334,000	334,000	455,265	+121,265	+36.3%
Subtotal, Naval Reactors^a	1,684,000	1,684,000	2,081,445	+397,445	+23.6%

Appropriation Overview

The Naval Reactors (NR) appropriation includes funding for U.S. Navy nuclear propulsion work, beginning with reactor plant technology development and design, continuing through reactor plant operation and maintenance, and ending with final disposition of naval spent nuclear fuel.

Program Highlights

Funding for the program supports continued safe and reliable operation of the Navy's nuclear-powered fleet (68 submarines, 11 aircraft carriers, and 5 research, development, and training platforms). The Program's development work consists of refining and improving existing technology to ensure that the U.S. Navy's nuclear propulsion plants are increasingly efficient and effective and will be capable of meeting future threats to national security.

In addition to supporting the existing nuclear fleet, NR has three major DOE initiatives—the *Columbia*-Class Reactor System Development, the Land-based S8G Prototype Refueling Overhaul, and the Spent Fuel Handling Recapitalization Project.

NR supports national security with the continued development of the reactor plant system for the *Columbia*-Class submarine and stewardship of naval nuclear infrastructure. Ensuring the continuity of a sea-based strategic deterrent, the President's FY 2023 Budget provides for the research, design, and development of the reactor plant system for the *Columbia*-Class submarine, to include the development of a life-of-ship reactor core. The budget further provides funding to complete the overhaul of the Land-based S8G Prototype reactor, a critical training and research and development asset for the next two decades. The Spent Fuel Handling Recapitalization Project will also support the capability to refuel and defuel aircraft carriers and submarines, which is critical to maintaining the nuclear fleet's operational availability for national security missions.

- **Naval Reactors Operations and Infrastructure**

The FY 2023 Request supports facility and systems maintenance and regulatory requirements across the Program's four DOE sites, environmental remediation, and necessary minor construction projects to recapitalize deteriorating infrastructure and equipment.

- **Naval Reactors Development**

The FY 2023 Request supports the unique technologies used in naval reactors that are crucial to delivering superior navy fleet operations and dominance in the maritime domain.

- **S8G Prototype Refueling**

The FY 2023 Request is consistent with the project's revised funding profile and supports refueling overhaul execution and completion in FY 2023.

^a Funding does not reflect the mandated transfer of \$91.0 million in FY 2021 and FY 2022 to the Office of Nuclear Energy for operation of the Advanced Test Reactor.

- ***Columbia-Class Reactor Systems Development***

The FY 2023 Request is consistent with the planned project profile and supports production, analysis, and testing execution.

- **Construction**

The increase in FY 2023 includes additional resources required for the Spent Fuel Handling Recapitalization Project, in addition to a new start major construction project at the Bettis site.

- **Program Direction**

The FY 2023 Request increase supports staffing plans to meet authorized FTE levels, personnel and pay related costs, and places NR in a position to execute its mission and provide federal oversight of the program's DOE laboratories.

SCIENCE

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				\$	%
Office of Science					
Advanced Scientific Computing Research	1,015,000	1,015,000	1,068,741	+53,741	+5.29%
Basic Energy Sciences	2,245,000	2,245,000	2,420,439	+175,439	+7.81%
Biological and Environmental Research	753,000	753,000	903,685	+150,685	+20.01%
Fusion Energy Sciences	672,000	672,000	723,222	+51,222	+7.62%
High Energy Physics	1,046,000	1,029,065	1,122,020	+76,020	+7.27%
Nuclear Physics	713,000	629,000	739,196	+26,196	+3.67%
Isotope R&D and Production	—	84,000	97,451	+97,451	—
Accelerator R&D and Production	—	16,935	27,436	+27,436	—
Workforce Development for Teachers and Scientists	29,000	29,000	41,300	+12,300	+42.41%
Science Laboratories Infrastructure	240,000	240,000	255,000	+15,000	+6.25%
Safeguards and Security	121,000	121,000	189,510	+68,510	+56.62%
Program Direction	192,000	192,000	211,211	+19,211	+10.01%
Total, Office of Science	7,026,000	7,026,000	7,799,211	+773,211	+11.00%

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 29,000 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 serves nearly 34,000 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, artificial intelligence (AI) and machine learning (ML), and biopreparedness. SC's Reaching a New Energy Sciences Workforce (RENEW) initiative doubles to expand targeted efforts to increase participation and retention of underrepresented groups in SC research activities. Expanded support of the RENEW initiative aims to ensure a future science workforce that is creative, innovative, and capable of meeting the nation's needs via proactive stewardship of talent with diverse ideas and backgrounds. Also, the Request will continue support for the quantum information science (QIS) Research Centers for basic research and early-stage development in order 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, and testbeds. In FY 2023, SC initiates three new research initiatives to include Energy Earthshots; Funding for Accelerated, Inclusive Research (FAIR); and Accelerate Innovations in Emerging Technologies (Accelerate). The Request also supports ongoing investments in priority areas including microelectronics, critical materials, exascale computing, fundamental science to transform manufacturing, and accelerator science and technology. These initiatives position SC to address new research opportunities through more collaborative, cross-program efforts.

The Energy Earthshots initiative will support small group awards and larger center awards through the Energy Earthshot Research Centers (EERCs). The new EERCs will support underlying fundamental research to realize the stretch goals of the Energy Earthshots. EERCs will bring together multi-investigator, multi-disciplinary teams to address key research challenges

at the interface between basic research and applied research and development activities. EERCs will entail collaboration within the team awards involving academic, national laboratory, and industrial researchers by SC and Energy Technology Offices, establishing a new era of cross-office research cooperation.

The FAIR initiative will support a directed effort to fund clean energy, climate, and related activities at minority serving institutions (MSIs), including historically black colleges and universities (HBCUs). The goal of FAIR is to increase research capacity and support faculty at HBCUs and other MSIs by funding core research relevant to the SC mission at these institutions.

The Accelerate initiative aims to drive scientific discovery for sustainable production of new technologies across the innovation continuum, to train a STEM workforce to support industries of the future, and to meet the nation's needs for abundant clean energy, a sustainable environment, and national security. The initiative will accelerate the discovery, creation, production, and commercialization of new technologies to form the basis of future industries with public and economic impact.

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:

- 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 2023, 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 that emerging technologies such as artificial Intelligence, quantum information science, and neuromorphic processors pose to DOE mission applications.
- Support for partnerships with Basic Energy Sciences, Fusion Energy Sciences, High Energy Physics, and Nuclear Physics in microelectronics, and 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.
- New 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 are also initiated to support the Department's Earthshot initiatives, which includes the establishment of Energy Earthshot Research Centers.
- Continue operations at ASCR's four scientific user facilities and continued efforts on the design of the National Energy Research Scientific Computing Center (NERSC-10) upgrade.

▪ **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 in order 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:

- Core research activities to support Administration Priorities on clean energy (carbon capture, hydrogen, solar, and batteries); related topics such as critical materials/minerals and manufacturing including next-generation microelectronics; and cross-cutting priorities for biopreparedness, QIS, data science including AI/ML and related infrastructure, exascale computing, and accelerator science and technology.
- Support for universities in underrepresented regions through the DOE Established Program to Stimulate Competitive Research (EPSCoR) program, and expanded support for students at MSIs as part of the RENEW initiative.
- New activities include the FAIR initiative to expand clean energy research and capabilities at MSIs, the Accelerate initiative to support fundamental research that accelerates the transition of science to technologies, and the SC Energy Earthshot initiative in partnership with other SC programs and the DOE technology offices. New Energy Earthshot Research Centers aim to realize the stretch goals of the Energy Earthshots.
- 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 at 90 percent of optimal run time: five x-ray light sources, two neutron scattering sources, and five research centers for nanoscale science. 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.
- Six ongoing construction projects: the Advanced Photon Source Upgrade (APS-U), the Advanced Light Source Upgrade (ALS-U), the Linac Coherent Light Source-II High Energy (LCLS-II-HE), the Proton Power Upgrade (PPU), the Second Target Station (STS), and the Cryomodule Repair and Maintenance Facility (CRMF).
- Continued support for two Major Item of Equipment (MIE) projects: the NSLS-II Experimental Tools-II (NEXT-II) for phased build-out of beamlines at NSLS-II, and the Nanoscale Science Research Centers Recapitalization project.
- Other Project Costs (OPC) to begin the planning for the NSLS-II Experimental Tools-III (NEXT-III) and the High Flux Isotope Reactor Pressure Vessel Replacement (HFIR-PVR) projects.

▪ **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 and ecological 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 approaches such as genome sequencing, secure biodesign, proteomics, metabolomics, structural biology, high-resolution imaging and characterization, including full support of the Bioenergy Research Centers. Integration of this experimental biological information into computational models for iterative testing and validation to advance a predictive understanding of biological systems for use in secure, clean, affordable, and reliable energy for adaptation to industry, as well as contributing to QIS.
- New activities including the Accelerate initiative for emerging technologies to develop sensor capabilities that scale from laboratory fabricated ecosystems to field ecosystems, research efforts on AI approaches to decrease uncertainty of climate and Earth system predictions, and FAIR initiative to expand clean energy research and capabilities at MSIs.
- Contributions to the Energy Earthshots initiative through foundational research on plant/microbiome/soil interfaces to inform enhanced soil carbon sequestration, as well as basic research on algal systems biology for removal of gaseous CO₂ from waste streams.
- Expansion of the new Urban Integrated Field Laboratories that combine modeling and observations of emerging energy technologies in urban regions, enabling the evaluation of the societal and environmental impacts of current and future energy policies.

- Full implementation of the National Virtual Climate Laboratory (NVCL) serving as a one stop portal to advance access to climate science from the DOE National Laboratories. The NVCL engagement with the science community will focus on MSIs, including HBCUs, for local to regional climate science.
- Continued planning for a network of climate centers, affiliated with an HBCU or MSI, facilitating translation of BER investments in foundational climate research into actionable solutions for impacted communities and addressing the Administration priorities involving climate solutions and environmental justice.
- Expanded efforts for BRaVE, a distributed framework to rapidly activate, integrate, and coordinate the expertise and research capabilities (experimental and computational) across the whole DOE National Laboratory Complex to address urgent research needs in an emerging national or international crisis.
- 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 and in support of emerging Earthshot topics.
- Continuing operation and equipment refresh of the three BER scientific user facilities: the Joint Genome Institute, the Atmospheric Radiation Measurement (ARM) Research Facility, and the Environmental Molecular Sciences Laboratory. Initiate operations of the ARM aerial capability.

▪ **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 funds:

- Research and facility operations at the DIII-D national fusion facility at 90% of the optimal run time to optimize the tokamak approach to magnetic confinement fusion.
- The National Spherical Torus Experiment-Upgrade (NSTX-U) recovery to implement repairs and corrective actions required to obtain robust, reliable research operations at the facility as well as enhanced collaborative research at other facilities to support NSTX-U research program priorities.
- Research opportunities for U.S. scientists at overseas superconducting tokamaks and stellarators and other international facilities with unique capabilities, enabled by U.S. hardware and intellectual contributions.
- Continuing support for a core research portfolio to advance developments in fusion-relevant QIS and related technology.
- Two new research activities: FAIR expands clean energy research and capabilities at MSIs and Accelerate supports fundamental research that accelerates transition from discovery science to technological innovations.
- Following the community recommendations in the LRP, research activities in Materials, Fusion Nuclear Science, and Fusion Facilities Studies, which is focused on the design of a Fusion Pilot Plant, are enhanced.
- Support for SciDAC in partnership with the ASCR program, research in High-Energy-Density Laboratory Plasma science including LaserNetUS, and General Plasma Science including low-temperature plasmas and microelectronics.
- Partnerships with the private sector through the Innovation Network for Fusion Energy (INFUSE) program and initiation of a new milestone-based cost-share program.
- The U.S. Contributions to ITER project, focusing on the highest-priority First Plasma hardware components, including the continued fabrication of the central solenoid superconducting magnet modules. Along with providing SC's share of the hardware contribution as part of Subproject 1, FES is also providing a cash contribution which supports the ITER Organization in the installation and assembling of the device.
- An ITER Research program to continue preparations for the U.S. fusion community to take full advantage of ITER Operations after First Plasma.
- Support for the Matter in Extreme Conditions Petawatt upgrade project at the Linac Coherent Light Source.
- Support for the Materials-Plasma Exposure eXperiment project, which will be a world-leading facility for dedicated studies of reactor-relevant heat and particle loads on fusion materials, as it moves towards completion.
- Initiation of research activities in inertial fusion energy.

▪ **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.
- QIS co-development of quantum information, theory, and technology with core research activities, and pursuit of new capabilities in sensing, simulation, and computing.
- Two new research activities: FAIR to expand high energy physics research and capabilities at MSIs and Accelerate to support fundamental research that accelerates transition from discovery science to technological innovations.
- AI/ML to tackle the challenges of managing increasingly high volumes and complexity of HEP data.
- Advanced computing to ensure broad access to exascale computing resources to HEP researchers via the internet and remote virtual platforms.
- Multi-disciplinary microelectronics research, including sensor materials, devices, and advances in front-end electronics.
- In coordination with the Accelerator R&D and Production program, mid- to long-term accelerator science and technology to maintain a world-leading position in key accelerator technologies, including high-field magnets, superconducting radiofrequency cavities, and high-power lasers; and new focus areas of scientific research to accelerate innovations in emerging technologies.
- The Fermilab Accelerator Complex and the Facility for Advanced Accelerator Experimental Tests II (FACET-II) continue operations at 87 and 91 percent of optimal, respectively.
- Continuing support for the Fermi National Accelerator Laboratory (FNAL)-hosted line-item construction projects: Long Baseline Neutrino Facility/Deep Underground Neutrino Experiment (LBNF/DUNE), Proton Improvement Plan II (PIP-II), and Muon to Electron Conversion Experiment (Mu2e); and five Major Item of Equipment (MIE) projects: Accelerator Controls Operations Research Network (ACORN), Cosmic Microwave Background Stage 4 (CMB-S4), High Luminosity Large Hadron Collider (HL-LHC) Accelerator Upgrade Project, and the HL-LHC 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 90% optimal including: the Relativistic Heavy Ion Collider; the 12 GeV Continuous Electron Beam Accelerator Facility (CEBAF); the Argonne Tandem Linac Accelerator System; and the first full year of operations at 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 ensure 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.
- Two new initiatives: 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 Gamma-Ray Energy Tracking Array MIE, which will enable the provisioning of advanced, high resolution gamma ray detection capabilities for FRIB; the High Resolution Spectrometer (HRS) to study fast neutron beams at FRIB; the Ton-scale Neutrinoless Double Beta Decay

MIE to determine whether the neutrino is its own antiparticle; and the Measurement of a Lepton-Lepton Electroweak Reaction (MOLLER), which will measure the parity-violating asymmetry in electron-electron scattering with the 12 GeV CEBAF machine.

▪ **Isotope R&D and Production**

Isotope R&D and Production ensures robust supply chains of critical radioactive and stable isotopes for the Nation that no domestic entity has the infrastructure or core competency to produce. Isotopes underpin emerging technology, innovation, and a suite of research and applications that are fundamental to the Nation's prosperity, and scientific and technical leadership. The DOE Isotope Program (DOE IP) reduces the Nation's dependence on foreign supplies of key isotopes. The Request funds:

- Research activities to support Administration and national priorities on advanced manufacturing (innovative targetry, robotics, automation, and enrichment technologies); clean energy (isotopes for environmental research, low activation materials for reactors, and enriched isotopes for more economical reactor operations); transformative technology for producing pure isotopes for QIS; the use of AI/ML for effective operations of transformative approaches to isotope production; the promotion of National Preparedness by mitigating single point failures in domestic supply chains (radioisotope processing); the strengthening of synergies between the DOE IP and the NIH with the targeted support of translational research for development and production of necessary isotopes to advance clinical trials for cancer and infectious disease; and support for investments at specific institutions in disadvantaged areas in order to promote environmental justice through place-based science and the provision of technical jobs and capabilities associated with isotope research and production.
- High impact R&D activities at universities and national laboratories to develop innovative, cutting-edge isotope production and processing technologies for novel isotopes, and research to advance isotope harvesting capabilities and expertise at FRIB, and advanced processing capabilities at the University of Missouri Research Reactor (MURR).
- The Isotope Traineeship Program, as part of RENEW, to train the next generation of researchers in innovative isotope production and processing technology.
- Mission readiness of the growing portfolio of stable and radio-isotope production and processing sites at national laboratories and universities. Capabilities include accelerators, reactors, gas centrifuge, electromagnetic ion separation, and extraction of isotopes from waste streams and legacy materials. Collections from stakeholders support the actual production costs of the isotope.
- Support for National Isotope Development Center activities to interface with the fast-growing stakeholder community and rapidly expanding isotope portfolio.
- Continuing design and long-lead activities for the Stable Isotope Production and Research Center to mitigate U.S. dependence on foreign sources of enriched stable isotopes for research and applications. Commissioning and fabrication activities for the Stable Isotope Production Facility MIE.
- Continuing research and design for the proposed next generation Radioisotope Processing Facility (RPF) at ORNL to make available novel isotopes and mitigate single point failures in domestic supply chains.

▪ **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 funds:

- Innovative R&D and deployment of accelerator technology, formation of topically-focused multi-institutional collaborations for accelerator R&D, and workforce development.
- Operation of the Brookhaven National Laboratory Accelerator Test Facility (ATF) at 94 percent of optimal.
- Accelerator market sector analysis and R&D partnerships to develop advanced superconducting wire and cable, superconducting accelerators, and advanced radiofrequency power sources for accelerators.
- The FAIR initiative to expand research and capabilities in accelerator R&D and production at MSIs.

▪ **Workforce Development for Teachers and Scientists**

Workforce Development for Teachers and Scientists (WSTS) ensures that DOE has a sustained pipeline of science, technology, engineering, and mathematics (STEM) workforce. Accomplishing this goal depends on continued support for hands-on research and workforce training opportunities via undergraduate internships, graduate thesis research, and visiting faculty research appointments at DOE national laboratories and strengthening the connection to a STEM

identity. As part of the RENEW initiative, WDTS expands outreach and training opportunities to students and faculty from MSIs and individuals from underrepresented, underserved groups.

▪ **Science Laboratories Infrastructure**

Science Laboratories Infrastructure (SLI) sustains mission-ready infrastructure and safe and environmentally responsible operations by providing the infrastructure necessary to support leading edge research at the ten SC DOE national laboratories. The SLI Program is focused on both replacing the over 50 year old basic infrastructure at the SC national laboratories in support of the Science Mission, and assuring that new infrastructure provides for 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, particularly as they relate to climate resilience. 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:

- Eleven ongoing construction projects: the Critical Utilities Rehabilitation Project at Brookhaven National Laboratory (BNL); the Seismic and Safety Modernization project, the Linear Assets Modernization Project, and the Biological and Environmental Program Integration Center (BioEPIC) at Lawrence Berkeley National Laboratory (LBNL); the CEBAF Renovation and Expansion at TJNAF; the Critical Utilities Infrastructure Revitalization project and Large Scale Collaboration Center at SLAC National Accelerator Laboratory (SLAC); the Argonne Utilities Upgrade at Argonne National Laboratory (ANL); the Utilities Infrastructure Project and the Integrated Engineering Research Center at Fermi National Accelerator Laboratory (FNAL); and the Princeton Plasma Innovation Center and Critical Infrastructure Recovery & Renewal project at Princeton Plasma Physics Laboratory (PPPL).
- Three projects are being paused as SC focuses on supporting the large number of ongoing projects: the Ames Infrastructure Modernization project at Ames Laboratory, the Critical Infrastructure Modernization Project at ORNL, and the Thomas Jefferson Infrastructure Improvements project at TJNAF. These projects will resume in future years.
- General purpose infrastructure projects that will upgrade critical core infrastructure and utility needs; and support for 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 ten of DOE's national laboratories. The Request funds Salaries and Benefits, Travel, Support Services, Other Related Expenses, and Working Capital Fund requirements.

ENERGY EFFICIENCY AND RENEWABLE ENERGY

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	\$ %
Sustainable Transportation					
Vehicle Technologies	400,000	400,000	602,731	+202,731	+50.7%
Bioenergy Technologies	255,000	255,000	340,000	+85,000	+33.3%
Hydrogen and Fuel Cell Technologies	150,000	150,000	186,000	+36,000	+24.0%
Renewable Power					
Renewable Energy Grid Integration	0	0	57,730	+57,730	+100.0%
Solar Energy Technologies	280,000	280,000	534,575	+254,575	+90.9%
Wind Energy Technologies	110,000	110,000	345,390	+235,390	+214.0%
Water Power Technologies	150,000	150,000	190,500	+40,500	+27.0%
Geothermal Technologies	106,000	106,000	202,000	+96,000	+90.6%
Energy Efficiency					
Advanced Manufacturing	396,000	396,000	582,500	+186,500	+47.1%
Federal Energy Management Program	40,000	40,000	0	-40,000	-100.0%
Building Technologies	290,000	290,000	392,000	+102,000	+35.2%
Weatherization and Intergovernmental Programs					
Weatherization Assistance Program	310,000	310,000	0	-310,000	-100.0%
Training and Technical Assistance	5,000	5,000	0	-5,000	-100.0%
State Energy Program	62,500	62,500	0	-62,500	-100.0%
Total, Weatherization and Intergovernmental Programs	377,500	377,500	0	-377,500	-100.0%
Corporate Support Programs					
Facilities and Infrastructure (NREL)	130,000	130,000	241,600	+111,600	+85.8%
21-EE-001-Energy Materials and Processing at Scale (EMAPS)	0	0	60,000	+60,000	+100.0%
Total, Facilities and Infrastructure	130,000	130,000	301,600	+171,600	+72.3%
Program Direction	165,000	165,000	224,474	+59,474	+36.0%
Strategic Programs	14,500	14,500	59,385	+44,885	+309.6%
Subtotal, EERE	2,864,000	2,864,000	4,018,885	+1,157,125	+40.4%
<i>P.L. 116-94: Unobligated Balance Rescission</i>					
<i>P.L. 116-94 Section 308: Energy Program Rescission</i>					
<i>P.L. 116-260: Unobligated Balance Rescission</i>					
Total, EERE	-2,240	-2,240			
	2,861,760	2,861,760	4,018,885	+1,154,885	+40.3%

Appropriation Overview

The Office of **Energy Efficiency and Renewable Energy (EERE)** accelerates the research, development, demonstration, and deployment (RDD&D) of technologies and solutions to equitably transition America to net-zero greenhouse gas emissions economy-wide by no later than 2050, creating good paying jobs, and ensuring the clean energy economy benefits all Americans, especially workers and communities impacted by the energy transition and those historically underserved by the energy system and overburdened by pollution.

EERE invests in clean energy technologies that are ready to be demonstrated and deployed, as well as R&D activities that advance early-stage technologies with a clear path to deployment. EERE's FY 2023 investment strategy focuses on making investments in five programmatic priority areas:

- *Decarbonizing the electricity sector.* To initiate a path to achieve a carbon pollution-free electricity sector no later than 2035, our focus will support technologies that will allow the U.S. to generate its electricity from clean, renewable sources. To transition to a carbon-free power sector, we will need to continue to make major strides to integrate more renewable energy generation onto the grid, while ensuring it is reliable, secure, and resilient, even as it evolves.

- *Decarbonizing transportation across all modes: air, sea, rail, and road.* The transportation sector has historically relied heavily on petroleum, which supports over 90 percent of the sector's energy needs today.¹ This investment aims to develop, demonstrate, and deploy technologies that can affordably decarbonize all modes of transportation, including electrification of on-road vehicles, sustainable aviation fuel, and hydrogen fuel cells for long-haul heavy-duty trucks.
- *Decarbonizing energy-intensive industries.* Industrial processes contribute significantly to the Nation's carbon emissions. To phase out these emissions, EERE supports approaches that substantially improve material and energy efficiency, electrify processes to take advantage of a decarbonizing electricity grid, switch to clean fuels and feedstocks, and capture and use carbon emissions. EERE's Industrial Decarbonization Roadmap will guide RDD&D activities across the Department to reduce greenhouse gas (GHG) emissions across the industrial sector, with an emphasis on the highest emitting sectors (e.g., iron/steel, cement/concrete, chemicals, food production).
- *Reducing the carbon footprint of buildings.* EERE supports efforts to reduce the carbon footprint of the U.S. building stock by 50 percent by 2035 while maintaining or improving affordability, comfort, and performance. This priority will be accomplished through three routes. First, by decarbonizing the power grid, which, in turn, decarbonizes the electricity that serves buildings. Second, by electrifying a significant share of building end uses that currently use fossil fuels, such as space and water heating. Third, by significantly improving the energy efficiency of buildings and equipment, including heating and lighting systems, as well as the entire building envelope.
- *Decarbonizing the agriculture sector, specifically focused on the nexus between energy and water.* Agriculture represents nearly 10 percent of the Nation's carbon emissions, and EERE prioritizes RDD&D investments to help drive a cleaner agriculture sector while achieving our decarbonization goals. This focus includes expanding EERE's work related to reducing GHG emissions in the agricultural sector through development of biofuels, greater efficiency of off-road agricultural vehicles, on-site production of animal waste to clean energy, and better understanding and prediction of water flow to design more water and energy efficient irrigation systems. The work will be additive and complementary to the Department of Agriculture's work.

To accomplish these five programmatic priorities, EERE has identified four key emphasis areas that are inherent to all its work:

- Energy justice. It is essential that EERE's work ensures clean energy economy benefits for all Americans. EERE recognizes that marginalized and low-income communities have been disproportionately impacted by pollution to the air, water, and soil. EERE is fully committed to aligning programs and policies with the Administration's Justice40 Initiative, focused on delivering 40 percent of the benefits of Federal clean energy and climate investments to historically disadvantaged communities.
- Workforce. EERE is committed to an office-wide approach to workforce development, which includes identifying vocational opportunities across technologies and industry sectors, and working with labor unions, trade associations, and educational institutions to enable the training programs and career pathways needed to prepare the American workforce for millions of good-paying jobs with the free and fair chance to join a union and bargain collectively in the clean energy economy.
- Diversity in STEM. The Request increases outreach and raises awareness of clean energy research and job opportunities at minority-serving institutions and minority professional organizations, ensuring that organizations that receive EERE funding are prioritizing diversity and equity in their work.
- State and Local. EERE recognizes the essential role that state and local governments play in the transition to a clean energy economy; EERE works in a unified and coordinated way with its state and local partners to accelerate an equitable transition to a clean energy economy and ensure that EERE's investments benefit everyone.

The FY 2023 Request reflects the realignment within DOE. The following programs functionally transfer from the Energy Efficiency and Renewable Energy (EERE) appropriation account to the Under Secretary for Infrastructure:

- the Advanced Manufacturing program's Industrial Assessment Centers (IACs) functionally transfers to the new Office of Manufacturing and Energy Supply Chains (MESC)
- the Federal Energy Management Programs (FEMP) functionally transfers to the new Office of Federal Energy Management Programs (FEMP)
- the Weatherization and Intergovernmental Programs (WIP) functionally transfers to the Office of State and Community Energy Programs (SCEP)

In FY 2023, the proposed new appropriation accounts above will align DOE's appropriations with the new organizational structure.

¹ Transportation Energy Data Book 39th Edition, ORNL, 2021. Table 2.3 Distribution of Energy Consumption by Source and Sector, 1973 and 2019.

Program Highlights

Sustainable Transportation supports RDD&D efforts to decarbonize transportation across all modes, including: vehicle electrification; commercially viable hydrogen fuel cell trucks; sustainable aviation fuel from biomass; and waste carbon resources and low-GHG options for off-road vehicles, rail, and maritime transport.

Many newly proposed investments in this pillar are directly focused on the deployment or demonstration of technology to show viable commercial paths, including several programmatic performance milestones by 2030 related to decarbonizing transportation across all modes. The Request in this pillar also supports hydrogen use for industrial decarbonization and energy storage as well as sustainable biomass to achieve reduced GHG from the agricultural sector and to decarbonize chemicals in the industrial sector.

Vehicle Technologies supports RDD&D of new, efficient, and clean mobility options that are affordable for all Americans. The Request supports increased investments to develop new innovations in vehicle technologies, leveraging the unique capabilities and world-class expertise of the National Laboratory system while deemphasizing RDD&D designed to expand the use of fossil-fueled internal combustion engines, consistent with industry's deemphasis of this sector.

These efforts include a continued, strong focus on funding for battery technologies research and development (R&D) to achieve programmatic performance milestones by 2030 that are critical to decarbonize transportation, as well as a carbon pollution-free electricity sector by 2035:

- Decreasing vehicle battery cell cost to achieve cost parity with internal combustion engines.
- Eliminating or dramatically reducing dependence on critical materials such as cobalt, nickel, and graphite.
- Mitigating battery supply chain risks.
- Establishing a lithium battery recycling ecosystem to recover and reintroduce spent lithium battery materials into the supply chain.

In partnership with state and local partners, the Vehicle Technologies program will leverage results from prior year activities to: (1) deploy systems-level tools for mobility design/planning, (2) advance cooperative driving automation to reduce traffic congestion and energy consumption, and (3) improve the efficiency of public transportation. The Request prioritizes maintaining programmatic alignment to the Communities to Clean Energy (C2C) initiative for Transportation and the Integrated Heavy Duty Zero Emissions Vehicle (ZEV) Fueling and Connected Grid Demonstration project, while ensuring program activities will not subsidize fossil fuels. This Request also prioritizes expanding demonstration and deployment projects to accelerate the nationwide adoption and deployment of electric vehicles (EVs) and charging infrastructure, especially to benefit underserved communities. Increased funding continues research for next generation lithium-ion batteries, develops new recycling processing technologies, and scales up lithium battery recycling.

Bioenergy Technologies advances technologies that convert domestic biomass and other waste resources into affordable, low-carbon biofuels and bioproducts. These technologies hold the promise of enabling a transition to a clean energy economy, creating high-quality jobs, supporting rural economies, and spurring innovation in renewable energy and chemicals production as part of the bioeconomy.

The funding increase in this Request reflects the critical need to integrate and scale-up advanced bioenergy technologies to decarbonize all modes of transportation. In support of EERE's objective to decarbonize all modes of transportation, the Request supports RD&D to produce "drop-in" biofuels that are compatible with existing fueling infrastructure and vehicles across a range of transportation modes, including diesel, jet, and marine fuels. This Request includes increased support for a Sustainable Aviation Fuel (SAF) Initiative that will support RDD&D to enable the U.S. production of the airline industry's demand for SAF. The major focus of the effort is to construct and operate integrated biorefineries at demonstration scale that are capable of producing SAF. Efforts include a new initiative to use "traditional" biofuel facilities to reduce CO₂, and a new program to study establishes new public-private partnerships to target environmental issues from operations that produce manure and other wet wastes. The program's top line increase is partially offset by a funding decrease attributed to the completion of a successful funding campaign in Municipal Solid Waste (MSW), which was focused on addressing challenges in solid waste utilization for conversion into fuels and products.

Hydrogen and Fuel Cell Technologies supports efforts to enable widespread adoption of hydrogen and fuel cell technologies. Producing affordable clean hydrogen is a key priority for EERE in conjunction with enabling diverse end uses, includes but is not limited to grid integration and stationary energy storage; transportation (e.g., trucks, marine, rail, aviation); chemicals (e.g., ammonia, synthetic fuels); industry (e.g., iron and steel making); and backup power (e.g., emergency power, data centers).

The Request represents a continued focus on accelerating RD&D to enable more affordable and durable fuel cell system costs, which are nearly \$200/kW today. This R&D is also applicable to fuel cells for stationary markets, enabling resilience and potential future deployment in disadvantaged communities and in poor air quality regions to address environmental justice priorities. The Request also includes an increased focus on systems design and integration to accelerate progress towards deployable systems. This includes increased support for the Million Mile Fuel Cell Truck consortium (M2FCT), in which National Laboratories partner with universities and industry to accelerate RD&D that will enable a fuel cell durability of a million miles—a market requirement for long haul trucks. Likewise, the Request also represents a focus on accelerated target-driven RD&D in Hydrogen Technologies with an emphasis on significantly reducing the cost of hydrogen generated by electrolysis over a greatly accelerated timeline compared to prior years. To support the Hydrogen Energy Earthshot and the H2@Scale initiative, the Request supports RD&D activities on clean hydrogen production, delivery, and storage, including materials development, and integration with diverse net-zero emissions generation sources. This includes increased funding to demonstrate the use of low GHG hydrogen as a feedstock or direct reducing agent to decarbonize ammonia and steel production, in support of H2@Scale.

Additionally, the Request reflects the prioritization of enabling fuels for heavy duty applications, particularly long-haul, heavy-duty trucks. In FY 2023, Fuel Cell Technology efforts will primarily include scale-up and demonstration activities focused on durability protocols and real-world validation of performance. For Hydrogen Technology, the main shift in FY 2023 will be emphasizing R&D and accelerating the timeline for electrolyzer cost reductions to meet the Hydrogen Shot goal. This Request reflects the program's increased focus on applied materials and systems for RD&D for hydrogen production, storage, and infrastructure.

Renewable Power supports RDD&D efforts to reduce the costs and accelerate the integration and utilization of renewable energy technologies as part of a reliable, secure, and resilient, fully decarbonized electricity system by 2035 and a net zero energy system by 2050. This Request drives critical cost reductions and technical improvements in wind, solar, geothermal, and water power technologies to increase the options for cost-competitive, non-emitting energy generation resources across the country, provides new research and technologies to facilitate the siting and integration of the high levels of renewable power generation needed to fully decarbonize the power system, and supports the development of diversified, resilient supply chains for all renewable energy technologies to help ensure the long-lasting security of the U.S. energy supply and provide thousands of good-paying jobs to American workers.

Renewable Energy Integration enables the reliable and affordable integration of high levels of renewable energy into the grid. This work builds on technology-specific RD&D in offices across EERE to support system wide planning and operation for grids with high levels of variable renewable energy, and includes improved technologies, tools, data, and operational practices as well as system-level simulations and demonstrations to validate the safety, reliability, and affordability of up to 100% decarbonized power systems.

- Power system planning: ensuring grid planning tools accurately represent the characteristics of wind and solar, and the flexibility of dispatchable resources at relevant time scales to ensure resource adequacy and plan reserves, as well as incorporate evolving load projections as the transportation and industrial sectors electrify.
- Power system operations: developing new hardware and operational practices to operate a power system where frequency is established safely and reliably by power electronics rather than rotating turbines, to accommodate increased generation from distributed resources, and to ensure new generation is resilient to evolving natural and anthropomorphic threats.
- Interdependent infrastructures: creating new models, operational practices, and institutional relationships that account for the changing interdependencies between the power system and supporting resources and infrastructures, including water, natural gas, electronic communication systems, and transportation and site access.

The FY 2023 Request maintains Renewable Energy Grid Integration as a critical program for EERE. This is a newly proposed Congressional control point that will emphasize system-level challenges to the reliable integration of renewable energy into the power system across generation modalities. Investments in FY 2023 will focus on work that directly supports decision-makers responsible for the planning, operation, regulation, and policies of the grid as a whole.

Solar Energy accelerates the development and deployment of solar technologies – creating many thousands of good-paying jobs in the process – while supporting the reliability, resilience, and security of the U.S. electric grid.

Developing the domestic solar manufacturing value chain is a priority for SETO. To that end, the Request includes efforts targeting innovative approaches in emerging market segments, including building-integrated photovoltaics in coordination with the Building Technologies Office. The Request also supports new rounds of the American-Made Solar Prize to incentivize and transition new solar technologies into prototypes ready for real world validation, and other prize competitions to spur U.S. business innovation in solar and create good paying jobs with the free and fair chance to join a union and bargain collectively.

Within this Request, \$150 million is allocated for a Solar Manufacturing Accelerator, a new initiative in partnership with EERE's Advanced Manufacturing Office. This initiative will seek to diversify and strengthen the supply chain for solar energy technologies. It will work to enhance the domestic capability to produce technologically advanced solar energy components that avoid supply chains that may be reliant in whole or in part on unethically sourced materials or vulnerable foreign supply chains. The Solar Manufacturing Accelerator will include technology and manufacturing demonstration across the solar supply chain.

Reflecting the significant impact photovoltaic (PV) deployment is having both on the bulk power and distribution systems, the Request includes funding to advance confidence in the ability of PV and PV plus storage to contribute to the reliability, resilience, and security of the grid and avoid barriers to accelerated deployment. The request includes new tools for grid planning and grid operation to understand and control a power system with increasing amounts of variable renewables, electric vehicles, and smart loads, as well as continued research, development, demonstration, and deployment of new cybersecurity technologies to keep up with a rapidly evolving threat landscape. Furthermore, the Request includes support to establish an assistance program to address barriers to interconnecting variable renewable energy to the electric grid, in collaboration with the Wind Energy Technologies Office.

The Request also supports a new, cross-cutting initiative to grow a skilled and diverse solar and clean energy workforce and connect trainees with the industry. Funding will also support a new national platform available to states, industry, and other stakeholders to manage the enrollment of community solar subscriptions for low-income customers. This National Platform for Low-income Solar Access will spur direct adoption of rooftop solar, particularly in low-income communities.

While the cost of solar PV has decreased dramatically in recent years, further cost reductions are critical to drive large-scale, nationwide solar deployment; therefore, the Request includes increased funding for RD&D activities needed to accelerate cost reductions in PV energy toward the 2030 goal of \$0.02/kWh electricity without subsidies with systems lasting 50 years or more while maximizing use of domestically-produced components. This includes funding for work needed to ensure photovoltaics can operate over a long lifetime in the face of extreme weather conditions including heat, cold, hail, and wind.

This Request supports EERE's priority to decarbonize industry through increased funding for RD&D to use concentrated solar thermal energy to replace fossil fuels in industrial processes, with a particular focus on high-temperature processes like steel manufacturing, cement production, and chemical/fuels production.

Wind Energy supports an updated and expanded portfolio of research and innovation designed to accelerate the advancement and deployment of offshore, land-based, and distributed wind energy technologies and their integration with the electric grid. Progress on these fronts, arising from continued innovation in technology, grid systems integration, and unique solutions to deployment challenges, will drive an increase in American-made wind and create good paying jobs with the free and fair chance to join a union and bargain collectively.

Critical near-term efforts to accelerate deployment include significantly increased support for R&D of technologies to

reduce environmental and siting barriers to land-based and offshore wind, as well as efforts to partner with industry, communities, utilities, and other stakeholders to remove barriers to distributed wind deployment. To realize wind energy's full potential to the U.S. power system, Wind Energy Technologies will aggressively pursue continued innovation and cost-reduction by capturing economies of scale. Additionally, we will expand efforts to develop larger, lighter-weight turbines that allow operation at greater heights, platforms, and turbine designs to enable ultra-large floating wind turbines to access the 58 percent of U.S. offshore wind resources that are in deep water. The Request will also support research to maximize production and efficiency from individual turbine siting and operation within a wind facility. The Request also includes critical R&D to support the expansion of U.S. manufacturing capacity and domestic job creation, including manufacturing innovations to enable highly flexible, rail-transportable blades, and support to domestic offshore wind advanced manufacturing, supply chain development, and recycling.

The Request includes substantially increased funding to support the integration of wind into a cost-effective, reliable, secure, and resilient power grid, as wind power is now the largest source of variable renewable electricity in the U.S. (more than 8 percent U.S. power production) and primed to grow dramatically. It is critical to develop technologies and operating practices to increase wind energy's smooth integration with the grid and its contribution to grid reliability and resiliency. The Request will strengthen the wind grid integration program to demonstrate the capability of wind plants to provide grid services; improve grid infrastructure investment to ensure access and use for wind deployment; improve electrical hardware performance and reduce wind energy system costs; address wind-specific cybersecurity needs; integrate wind power with storage and other technologies; and improve the understanding of electricity market operation with high penetrations of wind energy.

In addition, the Request includes increased support for cross-technology investments that leverage wind energy technologies, including a new effort to integrate and demonstrate a multi-megawatt water electrolyzer coupled with wind power generation to produce low-cost, emissions-free hydrogen, and to demonstrate the robustness of grid services, such as frequency regulation, load following, and contingency reserves.

Water Power supports a broad portfolio of research activities to strengthen the body of scientific and engineering knowledge, and support industry efforts to develop, maintain, and deploy hydropower and marine energy technologies at all scales.

The Request builds on efforts to optimize the existing hydropower fleet by increasing funding of the HydroWIRES (Water Innovation for a Resilient Electricity System) initiative to demonstrate hybrid systems of hydropower with other resources, improve valuation tools to fully capture power and non-power value provided by pumped storage hydropower (PSH), and quantify emission benefits associated with new PSH and expanded hydropower flexibility. With respect to climate change effects on watersheds and hydropower, the Request builds on current efforts to develop a suite of climate and hydrologic models, advanced hydrologic sensors, and decision-making tools to provide accurate state-of-the-art climate information and diagnostic capabilities for predicting and managing water and power systems. The Request also expands the scope of work in new, low-impact hydropower by investing in demonstration of technologies to power nonpowered dams or infrastructure, including demonstrating and deploying irrigation modernization to serve agricultural end-users. And to advance environmentally, EERE will continue its effort to develop technologies to ensure safe and effective fish passage for migratory species.

The Request sustains support for marine energy and provides funding to support the design, fabrication, and testing of marine energy conversion devices at a range of sizes. This includes demonstrations of current and tidal power technologies, rather than wave, to complement FY 2023 increased funding for wave energy technology in-water testing. To advance understanding of marine energy in both foundational research and testing access, the Request includes dedicated resources for controls, advancements in materials and manufacturing. To address the key challenge of testing for validation of all scales of marine energy, the Request also continues support of the Testing Expertise and Access for Marine Energy Research (TEAMER) initiative, a rolling test campaign developed in collaboration with U.S. universities and National Laboratories to provide technology developers with quick and economical access to marine energy testing facilities and capabilities across the U.S.

The Request expands the Powering the Blue Economy initiative, which focuses on applications beyond grid-scale serving devices. This includes sustaining funding for desalination technologies and systems on multiple application and scales, ranging from disaster relief to small communities, as well as increasing funding for at-sea applications – like aquaculture, carbon dioxide removal monitoring – and building systems tested through the Ocean Observing Prize. Funding continues

to support the Energy Transition Initiative Partnership Project (ETIPP), including supporting device design and fabrication to serve remote coastal and islanded communities based on outcomes of the ETIPP cohorts.

To support a more diverse and robust workforce in the marine and hydropower industries, the Request expands on work conducted to date in developing effective strategies to support STEM and workforce gaps in water power. This includes relevant water power educational materials and programs, holding collegiate competitions in both marine energy and hydropower, and supporting teacher-training workshops. Additionally, the Water Power Program seeks to build a portfolio that supports entrepreneurs and researchers from diverse backgrounds, including those from underrepresented and underserved communities. Building on a commercialization roadmap in 2022, the Request includes support for crosscutting entrepreneurial support, including activities that support incubators and accelerators in partnership with other renewable power offices.

Geothermal Technologies supports the deployment of geothermal energy in both the electric and non-electric sectors to help reach a carbon pollution-free electricity sector by 2035 and a net-zero economy by 2050.

The Request prioritizes support for the Frontier Observatory in Research in Geothermal Energy (FORGE) research and development. This flagship initiative, started in FY 2014, has drilled several major wells on the Utah site, including the first-ever highly deviated geothermal well, drilled at 8000+ foot depth at a rate twice the industry standard. In FY 2023, GTO will drill a third, long-reach horizontal well, providing an opportunity to further advance drilling improvements and enable additional simulation and zonal isolation testing. In addition, the Request will provide increased support for the next FORGE R&D solicitation, enabling technological progress toward ensuring the commercial viability of enhanced geothermal systems and contributing to Administration goals for a carbon pollution-free electric sector.

The Request continues support for the Geothermal Energy from Oil and Gas Demonstrated Engineering (GODE) consortium designed to leverage oil and gas subsurface assets, technologies, and expertise to help solve geothermal energy's toughest challenges.

The Request also continues activities to assist Federal agencies to deploy geothermal energy, with a focus on powering installations with large electricity demands in partnership with DOE's Federal Energy Management Program (FEMP) a separate office stood up outside of EERE in FY 2023. In addition, the Request will build on successes of the FY2022 Community Geothermal Heating & Cooling initiative with a new focus on the use of direct use heating and cooling for both community and industrial agriculture to address local energy scarcity and/or food security needs in underserved areas of the U.S.

With respect to energy storage, the Request will facilitate pilot demonstrations of promising Reservoir Thermal Energy Storage (RTES), that have the potential to unlock terawatt-scale thermal energy storage using the Earth as our battery.

Energy Efficiency supports RDD&D to decarbonize America's homes, buildings, and industrial facilities while also strengthening U.S. manufacturing competitiveness and producing thousands of good-paying jobs. The Request includes increased support for demonstration and deployment as well as high impact R&D of technologies to increase energy efficiency, improve demand flexibility, and reduce on-site emissions from our nation's 125 million homes and commercial buildings to reduce total emissions by 50% by 2030 and net-zero by 2050. It also increases investment in RDD&D across the multiple decarbonization technologies and approaches necessary to achieve net-zero emissions by 2050, including industry-specific decarbonization investments focused on the chemicals, iron and steel, cement, and food products industries. In addition, the Request includes significant funding increases for public investment in federal, state and community programs to accelerate investments in decarbonizing all sectors of the U.S. economy.

Advanced Manufacturing invests in energy-related advanced manufacturing technologies and practices to drive U.S. economic competitiveness and an equitable transition to a net zero carbon economy by 2050. As industrial processes contribute significantly to the nation's carbon emissions, the FY 2023 Request includes a substantial increase for industrial decarbonization efforts, including RD&D of emerging zero-carbon technologies for steel, cement, and chemical manufacturing. AMO strives to execute its mission while emphasizing the Justice40 initiative, which promises to deliver 40 percent of relevant federal investment benefits to disadvantaged communities. In the FY 2023 Request, the manufacturing and energy supply chains functions are transferred from EERE's Advanced Manufacturing program to a new office in the Under Secretary for Infrastructure, the Office of Manufacturing and Energy Supply Chains (MESC), The

function of this office and the funding appropriated for it will advance technologies for clean energy manufacturing, work to realize secure and sustainable material supply chains, and provide technical assistance and workforce development for the U.S. manufacturing sector.

The FY 2023 Request supports industry-specific decarbonization RD&D with initiatives focusing on the chemicals, iron and steel, concrete and cement, and food products industries. It includes advancement of crosscutting, platform technologies to reduce carbon emissions within existing manufacturing processes and promote the development and growth of manufacturing in multiple emerging energy fields. The Request also prioritizes the development of manufacturing innovations to achieve lower manufacturing cost, higher performance, and accelerated demonstration and deployment of clean energy technologies, such as energy storage systems, hydrogen, and wide bandgap semiconductors. To ensure the U.S. manufacturing sector is competitive, the Request also includes a new emphasis on infrastructure for agile manufacturing, continued utilization of high-performance computing resources, and support for workforce development activities.

Additional highlights include:

- Pursuit of priority cross-cutting technologies for decarbonization based on the industrial decarbonization roadmap, including electrification of process heat, electrochemical processes, innovative separations, circular economy approaches, and CO₂ reuse.
- Increasing the impact of existing workforce related programs, including within energy communities, underserved communities, and tribal communities.
- Continued support of an integrated and coordinated RD&D program for high priority critical materials.
- Lower cost, lower energy intensive water treatment technologies to create a more modern, equitable, climate-adaptive, and sustainable water infrastructure from both freshwater and non-traditional water sources

Within this Request, \$50 million is allocated for a Solar Manufacturing Accelerator, a new initiative in partnership with the Solar Energy Technologies Office. This initiative will seek to diversify and strengthen the supply chain for solar energy technologies. It will work to enhance the domestic capability to produce technologically-advanced solar energy components that avoid supply chains that may be reliant in part on unethically sourced materials or vulnerable foreign supply chains. The Accelerator will include technology and manufacturing demonstration across the solar supply chain.

Building Technologies reduces the energy intensity and related carbon emissions resulting from homes and commercial buildings through the application of cost-effective technologies and practices. Throughout the building lifecycle there are multiple opportunities to work towards emission reductions, increasing energy efficiency, and encouraging demand flexibility, including: new building design and construction; ongoing management, maintenance, and appliance replacements; and building shell renovation and improvements. The Request focuses on maximizing impact in each of these stages through strategic investment in RDD&D, adoption, acceleration, and regulatory mechanisms. Acceleration of building sector technology innovation and deployment of these high impact technologies play an essential role towards a U.S. net-zero emission economy by 2050. Energy reductions across building electric end uses (e.g., cooling, commercial ventilation, lighting, and refrigeration) are an important part of the transition to a net-zero emission economy.

The Request increases support for climate and clean energy goals by focusing broadly on three crosscutting initiatives that allow for strategic implementation of these priorities, including the E3 Heat Pump Initiative for Better Energy, Emissions, and Equity, the Advanced Building Construction Initiative, and the Better Buildings Carbon Challenge. The Request supports workforce development activities to 1) expand interest in careers that will enable a low-carbon, modernized U.S. building stock among underrepresented groups; and 2) improve the skills of existing trades and professionals, as well as streamline pathways from education and training to viable careers. This Request increases support to develop new and amended test procedures and energy conservation standards to decrease energy and water use and help support emissions reductions in appliances, lighting, and equipment used in buildings. In addition, the Request shows a renewed emphasis on supporting activities that will maximize the impact of building energy codes at the Federal, State, and local level, including supporting energy code updates, localized technical assistance, and innovative building energy code approaches such as building performance standards and stretch codes.

Corporate Support Programs support a range of activities to make EERE more efficient and effective. This effort includes support to strengthen EERE's overall performance, organization, budget, laboratory management, operations, human capital, and project management. This investment includes support for program direction and facilities and infrastructure as part of EERE's stewardship of the National Renewable Energy Laboratory (NREL) in Golden, Colorado.

Facilities and Infrastructure ensures EERE fulfills its role as the steward of NREL and that existing research and support infrastructure are maintained and upgraded in key areas to attract world-class research scientists and to develop innovative solutions to the most challenging technology issues. NREL serves as the Nation's preeminent institution for delivering impactful scientific knowledge and technology innovations that transform renewable energy technologies, systems, and markets.

The Request prioritizes increased investments in the Advanced Research in Integrated Energy Systems (ARIES) initiative. The goal of these investments is to address the challenges of designing and constructing future energy systems using the basic principles of operating large-scale hybrid energy systems that interconnect multiple generation and storage technologies. FY 2023 investments will focus on solving the complex problem of controlling interactions between millions of distributed assets.

The Request also supports the Energy Materials and Processing at Scale (EMAPS) line-item construction project, a planned design and construction of a multi-disciplinary research capability in process integration that draws on bench-scale innovations from multiple institutions and transforms them into integrated and scalable hybrid technology processes needed to ready DOE innovations for commercial development.

Program Direction enables EERE to maintain and support a world-class Federal workforce. The Request provides additional resources for program and project management, oversight activities, contract administration, workforce management, IT support, and Headquarters (HQ) and field site non-laboratory facilities and infrastructure. This includes increased staffing and contract support for areas such as appliance standards development and building codes development, FEMP technical assistance to assist agencies in transitioning to carbon-free electricity and fleet electrification, and to support EERE's programmatic priorities.

In addition, the Request includes increased funding for information technology systems development to ensure EERE can collect and analyze data on its investments to make sure every dollar is contributing to mission.

Office of Strategic Programs supports high-impact, crosscutting, integrative activities most efficiently executed by a single crosscutting organization in coordination with EERE technology programs and other DOE offices. This includes support for a core portfolio of energy and environmental justice-focused activities to provide resources to capacity-constrained communities, support to inform key EERE audiences and stakeholders about the work that EERE is doing to transition the Nation to a clean energy economy and fight the global climate crisis, and funding to address high energy costs, reliability, and inadequate infrastructure challenges faced by islands and remote communities as part of the Energy Transitions Initiative, in partnership with other EERE Technology Offices and other DOE offices. The Request also includes additional funding to expand international collaboration and coordination.

Support for Bipartisan Infrastructure Law (BIL) Programs

In FY 2023, DOE will continue to execute BIL programs according to the implementation plan, specifically:

- Battery Technology and Manufacturing
- Buildings, Training, and Workforce Programs
- Clean Hydrogen Manufacturing Recycling RD&D
- Energy Efficiency Programs
- Marine, Hydropower, and Hydroelectric Technology
- Solar Energy Technology and Manufacturing
- Wind Energy Technology

Certain functional areas of these programs will be coordinated and managed by the offices established and/or realigned to the Office of the Under Secretary for Infrastructure (S3), to include Clean Energy Demonstrations, State and Community Energy Programs, Manufacturing and Energy Supply Chains, and Federal Emergency Management Program.

FOSSIL ENERGY AND CARBON MANAGEMENT (FECM)

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				\$	%
Carbon Management Technologies					
Hydrogen with Carbon Management	122,300	122,300	74,000	-48,300	-39.5%
Carbon Transport and Storage	79,000	79,000	122,000	+43,000	+54.4%
Carbon Dioxide Removal	40,000	40,000	65,000	+25,000	+62.5%
Carbon Dioxide Conversion	23,000	23,000	50,000	+27,000	+117.4%
Point-Source Carbon Capture	86,300	86,300	162,905	+76,605	+88.8%
Carbon Management - Policy and Analysis	500	500	4,000	+3,500	+700.0%
Carbon Management - Justice and Engagement	650	650	1,000	+350	+53.8%
Transformational Coal Pilots	10,000	10,000	0	-10,000	-100.0%
Supercritical Transformational Electric Power (STEP)	14,500	14,500	0	-14,500	-100.0%
Subtotal, Carbon Management Technologies	376,250	376,250	478,905	+102,655	+27.3%
Resource Sustainability					
Advanced Remediation Technologies	44,500	44,500	12,964	-31,536	-70.9%
Methane Mitigation Technologies	20,000	20,000	100,000	+80,000	+400.0%
Natural Gas Decarbonization and Hydrogen Technologies	0	0	26,000	+26,000	N/A
Mineral Sustainability	53,000	53,000	44,000	-9,000	-17.0%
Subtotal, Resource Sustainability	117,500	117,500	182,964	+65,464	+55.7%
Unconventional Fossil Energy Technologies from Petroleum - Oil Technologies					
Repurposing Fossil Energy Assets	46,000	46,000	0	-46,000	-100.0%
University Training and Research	5,000	5,000	6,000	+1,000	+20.0%
Special Recruitment	5,050	5,050	13,000	+7,950	+157.4%
Program Direction	700	700	1,000	+300	+42.9%
NETL Infrastructure	61,500	61,500	70,291	+8,791	+14.3%
NETL Research and Operations	55,000	55,000	55,000	0	0%
NETL Interagency Working Group	83,000	83,000	83,000	0	0%
Total, Fossil Energy and Carbon Management	750,000	750,000	893,160	+ 143,160	+19.1%

Appropriation Overview

The Fossil Energy and Carbon Management (FECM) office conducts research, development, demonstration and deployment (RDD&D) that focuses on technologies to reduce carbon emissions and other environmental impacts of fossil fuel production and use, particularly the hardest-to-decarbonize applications in the electricity and industrial sectors. Further, the program advances technologies on carbon dioxide (CO₂) removal (CDR) to remove atmospheric and legacy emissions of CO₂, and technologies that convert and durably store CO₂ into value-added products.

To meet these challenges, the Budget focuses funding on technology priority areas of point-source carbon capture, carbon transport and storage, carbon dioxide conversion, hydrogen with carbon management, methane emissions reduction, critical mineral production, and carbon dioxide removal. FECM recognizes that global decarbonization is essential to meeting climate goals -- 100% carbon pollution free electricity by 2035 and net-zero greenhouse gas emissions economy-wide by 2050 -- and works to engage with international colleagues to leverage expertise in these areas. FECM is also committed to improving the conditions of communities impacted by the legacy of fossil fuel use and to supporting a healthy economic transition that accelerates the growth of good-paying jobs.

FECM is dedicated to implementing the principles of climate and clean energy and environmental justice in the planning, processes and outcomes of its work in alignment with Executive Orders 14008 and 13985. FECM prioritizes the meaningful participation of communities, with special focus on disadvantaged communities; a just distribution of benefits; and emphasis on remediating legacy

harms while also mitigating new impacts. These principles will be at the center of funding decisions, including implementation of the Justice40 Initiative, and partnership development.

The FY 2023 Budget Request for FECM will extend the impact of the Department of Energy's (DOE) RDD&D funding by leveraging creative funding mechanisms - such as prizes, competitions, technical assistance, and programs targeted to small businesses. The goal is to enable the commercialization of climate change and clean energy innovations that will activate job creation, expand other public impact outcomes, and yield a more geographically diverse and impactful research portfolio. This request also includes funding for the basic operating costs of FECM and investment at the National Energy Technology Laboratory (NETL).

FECM's FY 2023 RDD&D priorities follow:

- **Demonstrate and Deploy Point Source Carbon Capture:** RDD&D for carbon capture and storage (CCS) in the power and industrial sectors to enable wider, strategic commercial deployment to meet net-zero emissions goals by 2050.
- **Reduce Methane Emissions:** Develop technologies and deploy regional initiatives to monitor and reduce methane emissions from fossil fuel infrastructure including coal, oil, and gas.
- **Advance Carbon Dioxide Removal (CDR) & Low Carbon Supply Chains for Industry:** Advance direct air capture and mineral carbonation projects and develop novel approaches to recycle carbon emissions.
- **Advance Critical Minerals, Rare Earth Elements (REE), and Mine Remediation:** Improving REE separation/recovery technologies to manufacture products from CO₂ and carbon ores and to address current market and process economics. Advancing research and development (R&D) to address abandoned mines.
- **Low-Carbon Industrial Supply Chains:** Develop novel approaches to recycle carbon emissions into value-added products such as concrete, steel, chemicals, and fuels using systems-based carbon management approaches consistent with realizing a net-zero carbon economy by 2050.
- **Increase Efficient Use of Big Data and Artificial Intelligence (AI):** Use AI, machine learning, and data analysis to create learning algorithms within large dataset to help discover new material, optimize processes, and run autonomous systems.
- **Accelerate Carbon-Neutral Hydrogen (H₂):** Develop technologies that leverage the natural gas infrastructure for H₂ production, transport, storage, & use, coupled to carbon management.
- **Invest in Thoughtful Transition Strategies:** Invest in technologies and approaches and deploy regional initiatives to help create an equitable and just transition to a net-zero carbon economy in disadvantaged energy communities.

Program Highlights

Carbon Management Technologies

The Office of Carbon Management (OCM) facilitates a just and environmentally sustainable transition toward a net-zero carbon economy by focusing on CO₂ – its storage, permanent containment, and capture. OCM addresses emissions associated with the power and industrial sectors, as well as legacy emissions in the atmosphere, and seeks to permanently store CO₂ in geologic formations and/or convert CO₂ to reduce negative climate impacts.

Descriptions of major funding and programmatic changes and highlights within the Carbon Management Technologies program for the FY 2023 Budget Request are as follows:

Hydrogen with Carbon Management

The Hydrogen with Carbon Management subprogram invests in RD&D to evaluate carbon-based clean H₂ (i.e., coupled to CCS) as a fuel and support development of technologies to use clean H₂ from any source. The subprogram's efforts are an integral part of DOE's recently launched Hydrogen Shot, with a goal of clean H₂ costs of \$1/kg within one decade (1-1-1) while expanding employment of the U.S. energy workforce. Seeking a cost-competitive decarbonized alternative to traditional fossil fuels, the subprogram has an R&D portfolio consisting of a new generation of carbon neutral or net-negative greenhouse gas (GHG) emissions technologies. Gasification, reversible solid oxide fuel cells, technologies in H₂ turbines, and advanced materials, sensors and controls all support this goal.

The \$74 million FY 2023 Budget Request for Hydrogen with Carbon Management will provide research, development, and a platform for developing the advanced systems of the future, while reducing emissions. In FY 2023, the subprogram will not fund RDD&D specific to traditional fossil power generation, but rather, will narrow the focus to work on H₂-fueled turbines, fuel cells, CCS-relevant technologies, and production of clean H₂ through gasification. Improvements to these technologies are also applicable to other energy systems. These improvements to new and existing plants will also make them less carbon intensive and allow these assets to provide continued low-cost baseload power and resilient flexible grid services. This subprogram aligns with the Administration's priority to reduce the environmental impact of the power sector, especially regarding disadvantaged communities.

Carbon Transport and Storage

The Carbon Transport and Storage subprogram is uniquely positioned to support the U.S. as it develops a carbon transport and storage industry at the scale necessary to decarbonize the economy while considering the environmental and social benefits and associated impacts these efforts may have. This RD&D subprogram is making key investments in advanced technology RD&D, large-scale transport scenarios, commercial-scale storage facilities, and regional hubs, all to support a foundation for carbon storage in support of both carbon mitigation and removal. Critical components that will help catalyze the growth of carbon capture and storage deployment at-scale include, but are not limited to, strategies to develop the infrastructure for reliable carbon storage, RD&D to improve performance and reduce costs, educational partnerships to grow the workforce, technology transfer, and technical assistance to stakeholders.

The FY 2023 Budget Request provides \$122 million for the Carbon Transport and Storage subprogram and RDD&D activities that address the performance challenges of operating and monitoring commercial scale CO₂ storage sites. The RDD&D supported by the Carbon Transport and Storage subprogram will aim to improve storage and operational efficiency, improve understanding of overall cost and de-risking strategies to reduce it. Achieving each of these elements through site characterization and developing advanced monitoring and modeling tools is critical for enabling a carbon capture, utilization and storage (CCS) industry that is safe, economically viable, and environmentally benign.

Carbon Dioxide Removal and Carbon Dioxide Conversion

The Carbon Dioxide Removal (CDR) subprogram advances a diverse set of CDR approaches in service of facilitating gigatonne-scale removal by mid-century. It emphasizes rigorous analysis of life cycle impacts and has a deep commitment to justice. The subprogram invests in CDR technologies, such as direct air capture (DAC) and direct ocean capture (DOC) with durable storage; biomass with carbon removal and storage (BiCRS); and mineralization concepts to remove legacy emissions and address emissions from hard-to-abate sectors.

The Carbon Dioxide Conversion (CDC) subprogram invests in research, development, and demonstration (RD&D). It supports the ecosystem to deploy technologies that recycle CO₂ into value-added products. To create products such as CO₂-based building

materials, fuels, and chemicals, the subprogram focuses on mineralization, catalytic conversion, and biological approaches. Through these investments, the CDC subprogram can help the United States (U.S.) achieve the goals of a net-zero carbon economy by 2050, while simultaneously developing the industries of the future in equitable and just ways.

In FY 2023, the Budget Request provides \$65 million for CDR and \$50 million in the Carbon Dioxide Conversion subprograms. CDR funding will support continued development of novel DAC and DOC materials and processes to help optimize and reduce the cost, R&D and Front End Engineering and Design (FEED) studies for BiCRS, and novel approaches that can leverage industrial waste minerals and naturally occurring minerals that can capture atmospheric CO₂.

CO₂ conversion technologies have the potential to develop additional markets for CO₂-based products. Areas of research include, but are not limited to, new projects focused on the catalytic conversion to higher value products such as fuels, chemicals, polymers, and nutraceuticals; mineralization to building products; generation of solid carbon products; and algal systems designed to integrate CO₂. Specific focus on catalysts made from low-cost materials and improved reactor designs will be pursued to lower the energy penalty and capital cost of the conversion process.

Point-Source Carbon Capture

The Point-Source Carbon Capture R&D subprogram focuses on committed emissions associated with infrastructure that are expected to persist through mid-century. Natural gas power generation and CO₂-emitting industrial sectors, such as cement, steel, and H₂ production are particular priorities. FY 2023 activities represent a focus on new capture technologies in addition to the demonstration of more proven capture approaches. The FY 2023 Budget Request provides \$162.905 million in the Point-Source Carbon Capture subprogram for pre- and post-combustion capture RDD&D on transformational gas separation technologies that can help achieve decarbonization goals.

Additionally, the Point-Source Carbon Capture subprogram will leverage its prior and current RDD&D experience on carbon capture technology development for application to industrial applications, specifically, cement, steel and H₂ production. RDD&D will focus on optimization of technologies for these applications to reduce cost and improve performance. A continued focus will be for decarbonization of natural-gas based systems for power generation.

Carbon Management – Policy and Analysis

The Office of Carbon Management conducts systems, economic, and environmental analysis that is primarily focused on: cost and performance for carbon management technologies; the role of carbon management in energy markets; life cycle analysis; energy markets assessments; integration of carbon management technologies with the U.S. Power Grid; and effects of carbon management deployment in local communities.

A variety of analysis methodologies are used in combination to provide a robust understanding of the cost, performance, and barriers to the deployment of carbon management technologies. Through a system of coordinated efforts and thoughtfully engaging with stakeholders, realistic scenarios can be crafted using market and technology-based information. The FY 2023 Budget Request for Policy and Analysis is \$4 million.

Carbon Management – Justice and Engagement

The FY 2023 Request of \$1 million supports social science and socioeconomic research to understand impacts of carbon management on communities and provide technical assistance to communities considering carbon management through DOE's Communities Local Energy Action Program (LEAP). LEAP is an initiative designed to help environmental justice communities with historical ties to fossil fuel industries take direct control of their clean energy future. Activities will aid in proactive, place-based community engagement and planning processes that include consideration of CCS and CDR development, in the context of broader energy options, to both ensure that carbon management projects work for communities and to increase siting certainty for future development.

Resource Sustainability

The Resource Sustainability Office addresses critical issues associated with reducing the environmental impacts of the historical and continued use of fossil fuels. This includes conducting RDD&D that reduces the environmental impact from the extraction, development, transportation, distribution, and storage of fossil fuel and reducing emissions throughout the supply chain. Descriptions of major programmatic changes and highlights within the Resource Sustainability program for the FY 2023 Budget Request, which totals \$182.694 million, are as follows:

Advanced Remediation Technologies (New Control Point)

The Advanced Remediation Technologies program will focus on technologies that can be applied to the remediation and prevention of environmental impacts from fossil fuel extraction activities. This will include research to address wellbore integrity, induced seismicity, water use, produced water treatment, water management, and offshore safety and spill prevention. The program will leverage previous research, to include field laboratory efforts, to assess the viability of converting expended unconventional oil and gas wells to carbon storage sites.

Methane Mitigation Technologies (New Control Point)

The Methane Mitigation Technologies program will develop technologies to reduce emissions from fossil fuel production, transmission, distribution, processing, and storage infrastructure. This program will also focus on developing technologies to detect, locate, and measure emissions, including the development and validation of measurement sensor technologies for the collection, dissemination, and analysis of emissions data which will inform efforts such as the Environmental Protection Agency's (EPA) Greenhouse Gas Inventory, Life Cycle Analysis, and other remediation programs. The program will develop advanced modular technologies, capable of being deployed near wellheads and natural gas processing and transportation infrastructure, for the purpose of beneficially utilizing otherwise flared, vented, or stranded natural gas. It will also conduct research to develop advanced materials, sensors, data management systems, and more efficient and flexible compressors.

Natural Gas Decarbonization and Hydrogen Technologies (New Control Point)

The new Natural Gas Decarbonization and Hydrogen Technologies program will focus on technologies for carbon-neutral H₂ production as well as hydrogen (and ammonia) transportation, and geologic storage technologies that leverage existing natural gas infrastructure as well as supporting analytical tools and models. Hydrogen research will focus on improving natural gas steam methane reforming (SMR), blending H₂ with natural gas, and leveraging existing transportation and storage infrastructure. The program will also develop analytical tools and models that are able to evaluate potential advanced technologies, technology performance metrics, technoeconomic and lifecycle analyses, and resource evaluations.

Mineral Sustainability

The Mineral Sustainability program will support the sustainable production of Critical Minerals (CM), considering economic, environmental, and geopolitical risks to the supply chain. Carbon ore extraction is a natural part of the upstream process; therefore, the integration of the CM and Carbon Ore Processing activities will result in more efficient and economic technology development and deployment. This mission will be accomplished by prioritizing the use of unconventional resources such as coal waste and by-products from industry feedstocks for domestic CM, REE and carbon ore to products production.

The Carbon Ore Processing activity (formerly Advanced Coal Processing) is focused on utilizing materials to be recycled from previously mined resources outside of traditional thermal and metallurgical markets that can contribute to the U.S. gross domestic product. The activity is focused on developing transformational technologies to enable domestic manufacturing of strategic materials and superior building products from carbon ore at competitive market prices. These transformational technologies have minimal emissions, superior product performance, and better lifecycle for new and existing products in the market.

Resource Sustainability – Policy and Analysis

No funding is requested in FY 2023. The Policy and Analysis Division supports all program areas in the Office of Resource Sustainability through the drafting of studies and reports, conducting economic and environmental analysis, and reviewing legislation, regulations, and executive orders.

Resource Sustainability – Justice and Engagement

No funding is requested in FY 2023. This Justice and Engagement Division conducts and provides support to leadership's engagement with a wide set of domestic and international stakeholders, to include frontline and disadvantaged communities, government agencies, non-government entities, non-profit, academia, and foreign governments.

Other FECM Program Activities

Repurposing Fossil Energy Assets

The Repurposing Fossil Assets program will support leveraging and transforming fossil assets that include coal power plants, coal mines, and abandoned oil & gas wells, through repurposing for clean energy and manufacturing, is one of the best ways to unite private sector and energy community interests in places where employment and opportunity is on the decline. Many fossil asset sites can offer private sector actors looking to repurpose with access to a skilled workforce with knowledge of industrial operations, community relationships, access to rail lines, ports, and waterways, highway transportation, transmission and distribution infrastructure, electrical interconnect equipment and direct grid connections, industrial land, facilities, and potentially even site and permitting licenses among other things. As innovative clean energy and manufacturing companies fan out across the country, it increasingly makes sense for them to choose to locate in energy communities. In turn, repurposing considerably addresses the potential resistance to the decommissioning of coal plants and ensures that historic energy communities have a path forward. For energy communities, repurposing fossil assets can provide a variety of both short-term and permanent family-wage jobs, opportunities for worker retraining programs, access to local work that does not require relocation, and opportunities to work in cutting-edge technology sectors. Importantly, repurposing allows communities to claim control of their own narratives and become active participants in the energy transition.

The FY 2023 Budget Request for \$6 million will be to develop case studies of fossil assets across the U.S. that are being repurposed (or may be in the near future). The program will fund concept development followed by pre-FEED studies where the assets can be transformed to use other sources of clean energy such as solar, geothermal, wind, and nuclear sources and repurpose the existing fossil asset. The case studies and the pre-FEED work will serve as powerful examples for other communities to emulate and transition in a phased and methodical manner to achieve the clean energy goals.

University Training and Research

The request of \$13 million provides funding for University Training and Research (UTR), which comprises funding for University Carbon Research (UCR), Historically Black Colleges and Universities (HBCU) and other Minority Serving Institutions (MSI).

National Energy Technology Laboratory

NETL and HQ Program Direction and Special Recruitment Programs

The Request of \$70.291 million for NETL/HQ PD and \$1 million for Special Recruitment provides for the FECM organization's headquarters federal workforce and contractor support including salaries and benefits, support service contracts, travel, training, the working capital fund, and other employee costs. These staff are responsible for the oversight and administration of the FECM Programs and natural gas regulatory activities. In addition, funding for NETL federal technical staff and contractor support that provide Acquisition, Finance and Legal functions is supported.

NETL Infrastructure

The FY 2023 Budget Request of \$55 million supports the fixed costs of maintaining NETL's lab footprint in three geographic locations: Morgantown, WV; Pittsburgh, PA; and Albany, OR. The footprint of these sites is approximately 240 acres, including 165 research laboratories. The Request provides funding for general plant projects to maintain research capabilities and combat deferred maintenance, the lease of NETL's high performance computer and for information technology development, modernization, and enhancement.

NETL Research and Operations

The Request of \$83 million supports the salaries, benefits, travel, and other employee costs for the NETL staff of scientists, engineers and technical professionals who conduct onsite research and project management activities for FECM programs. The Request also funds partnership, technology transfer, and other collaborative research activities and supports the variable operating costs of NETL's research sites.

NETL Interagency Working Group

The FY 2023 Budget Request of \$3 million for the NETL-led Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, which was established through EO 14008, will promote job-creating investments in communities already impacted by coal mine and power plant closures and will also be pro-active, investing now in the communities likely to be impacted by additional, near-term declines in coal production and generation from coal-fired power plants.

NUCLEAR ENERGY

(\$K)					
FY 2021 Enacted ^{1,2}	FY 2022 Annualized CR ^{1,3}	FY 2023 Request ⁴	FY 2023 Request vs FY 2021 Enacted		
			\$	%	

Nuclear Energy

Directed R&D and University Programs		161,029	+161,029	+100%
Integrated University Program	5,000	5,000	-	-5,000
STEP R&D	5,000	5,000	-	-5,000
Reactor Concepts RD&D	208,000	208,000	135,000	-73,000
Fuel Cycle Research and Development	309,300	309,300	421,775	+ 112,475
Nuclear Energy Enabling Technologies	122,869	122,869	102,737	-20,132
Advanced Reactor Demonstration Program	250,000	250,000	230,238	-19,762
Versatile Test Reactor Project	45,000	45,000	45,000	-
Infrastructure	337,500	337,500	334,224	-3,276
Idaho Sitewide Safeguards and Security	149,800	149,800	156,600	+ 6,800
International Nuclear Energy Cooperation	-	-	3,000	+3,000
Program Direction	75,131	75,131	85,457	+10,326
Total, Nuclear Energy	1,507,600	1,507,600	1,675,060	+167,460
				+11%

Appropriation Overview

Nuclear Energy (NE) supports the diverse civilian nuclear energy programs of the U.S. Government. Federal efforts to research and develop nuclear energy technologies, including generation, safety, and security technologies, to assist in unleashing an era of energy dominance through strategic support for innovation.

Program Highlights

- Directed R&D and University Programs**
The Request consolidates and focuses nuclear energy related research and development activities conducted by small businesses and supports university level engineering and science through competitively awarded – university led research and development and infrastructure, universities’ research reactor fuel services and scholarships and fellowships. These efforts include NE’s full participation in the Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR) programs and the Nuclear Energy University Program (NEUP).
- Reactor Concepts Research, Development and Demonstration**
Activities will include cost-shared research under Advanced Small Modular Reactor Research, Development and Demonstration (RD&D); support for Light Water Reactor Sustainability through cost-shared efforts to extend the life and improve the economic competitiveness of the existing commercial nuclear reactor fleet through research in the areas of materials aging and degradation, safety margin characterization, safety technologies, and instrumentation and controls; and research into other Advanced Reactor Technologies, such as fast reactor technologies and high temperature reactor technologies for the production of electricity and high temperature process heat to improve the

¹ Funding does not reflect the transfer of SBIR/STTR to the Office of Science.

² Funding does not reflect the mandatory transfer of \$91.0M from Naval Reactors for operation of the Advanced Test Reactor.

³ Funding does not reflect the mandatory transfer of \$91.0M from Naval Reactors for operation of the Advanced Test Reactor.

⁴ FY 2023 Request reflects the consolidation of the Integrated University Program and the Research Reactor Infrastructure subprogram within the new Directed R&D and University Programs.

economic competitiveness and safety of nuclear energy as a resource capable of meeting the Nation's energy, environmental and energy security goals.

- **Fuel Cycle Research and Development**

The Request supports R&D on advanced fuel cycle technologies that have the potential to accelerate progress on managing and disposing of the nation's spent fuel and high-level waste including efforts to establish an interim storage option for commercial spent fuel, improve resource utilization and energy generation, reduce waste generation, and limit proliferation risk. Advancements in fuel cycle technologies support the enhanced availability, economics, and security of nuclear-generated electricity in the United States (U.S.), further enhancing U.S. energy independence and economic competitiveness. This program also contributes to the Department's policies and programs for ensuring a reliable and economic nuclear fuel supply including the availability of High-Assay Low-Enriched Uranium (HALEU).

- **Nuclear Energy Enabling Technologies**

The Request supports R&D and strategic investments in research capabilities to develop innovative and crosscutting nuclear energy technologies. This program funds high-priority R&D on advanced manufacturing methods, fabrication, and instrumentation technologies that includes strong investments in modeling and simulation tools, and provides access to unique nuclear energy research capabilities through its Nuclear Science User Facilities. Collectively, Nuclear Energy Enabling Technologies-sponsored activities support the goals, objectives, and activities of the Gateway for Accelerated Innovation in Nuclear (GAIN) initiative to make these technology advancements accessible to U.S. industry through private-public partnerships.

- **Advanced Reactor Demonstration Program (ARDP - R&D)**

The Advanced Reactor Demonstration Program (ARDP – R&D) focuses Departmental and non-federal resources on the development of commercial reactor technologies that may be ready for demonstration and deployment in the mid-term. The program partners with U.S. based teams to address technical, operational, and regulatory challenges to enable development of a diverse set of advanced nuclear reactor designs.

Funding for the two advanced reactor demonstration awards, previously included in this program, is now provided through the Office of Clean Energy Demonstrations, consistent with the Bipartisan Infrastructure Law (BIL) (Infrastructure Investment and Jobs Act, P.L. 117-58, November 15, 2021).

- **Infrastructure and Idaho National Laboratory Sitewide Safeguards and Security**

The Request supports the secure and effective availability of the Idaho National Laboratory to support nuclear energy, other DOE and U.S. government research requirements. The Idaho National Laboratory Facilities Operations and Management subprogram continues investments at the Advanced Test Reactor (ATR) and Advanced Test Reactor Critical Facility (ATRC) to improve reliability and availability of the ATR, and continue operations at the Transient Reactor Test Facility (TREAT). The Idaho Sitewide Safeguards and Security program will increase the workforce and focus on continued implementation of infrastructure investments, capital improvements, emerging technology investments, and enhanced cybersecurity program capabilities to adequately secure site assets.

Bipartisan Infrastructure Law

- In FY 2023, NE will continue to support the Civil Nuclear Credit Program, a \$6 billion strategic investment (\$1.2 billion for each of five years) through the Bipartisan Infrastructure Bill (BIL) to help preserve the existing U.S. reactor fleet and save thousands of high-paying jobs across the country. These activities will be implemented by the Grid Deployment Office in the FY 2023 Request. Under the new program, owners or operators of commercial U.S. reactors can apply for certification to bid on credits to support their continued operations. An application must demonstrate the reactor is projected to close for economic reasons and that closure will lead to a rise in air pollutants and carbon emissions. The program is available for plants that are certified as safe to continue operations and prioritizes plants that use domestically produced fuel.

NUCLEAR WASTE FUND OVERSIGHT

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				\$	%
Nuclear Waste Fund Oversight					
Nuclear Waste Fund Oversight	7,500	7,500	10,205	+2,705	+36%
Interim Storage ¹	20,000	20,000	0	-20,000	-100%
Total	27,500	27,500	10,205	-17,295	-63%

Appropriation Overview

The Nuclear Waste Fund Oversight program supports the Department's responsibilities for managing the Nuclear Waste Fund (NWF), administering the Standard Contract, and maintaining the security of the Yucca Mountain site.

Program Highlights

The Nuclear Waste Fund Oversight program's FY 2023 Budget Request activities include:

- Implementation of an appropriate investment strategy and the prudent management of the NWF investment portfolio,
- Administration of the Standard Contract for the disposal of spent nuclear fuel and high-level radioactive waste, between nuclear utilities and the government,
- Maintain physical security requirements, under DOE Order 473.3A for the Yucca Mountain site, as well as maintenance and environmental requirements.

These funds are inclusive of program direction activities and management and technical costs necessary to carry out the program's mission.

The Interim Storage program's FY 2023 Budget Request is included in Nuclear Energy Research and Development.

¹ Interim Storage is funded in FY 2023 in the Integrated Waste Management System of the Fuel Cycle Research and Development program.

ELECTRICITY

	(\$K)				
	FY 2021 Enacted ^a	FY 2022 Annualized CR ^{ab}	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
				\$	%
Electricity					
Grid Controls and Communications					
Transmission Reliability and Resilience	48,220	48,220	37,300	-10,920	-22.6%
Energy Delivery Grid Operations Technology	0	0	39,000	+39,000	N/A
Resilient Distribution Systems	50,000	50,000	50,000	0	0.0%
Cyber Resilient and Secure Utility Communications Networks	0	0	20,000	+20,000	N/A
Total, Grid Controls and Communications	98,220	98,220	146,300	+48,080	+49.0%
Grid Hardware, Components, and Systems					
Energy Storage					
Research	57,000	57,000	81,000	+24,000	+42.1%
20-OE-100 Grid Storage Launchpad construction	23,000	23,000	0	-23,000	-100.0%
Total, Energy Storage	80,000	80,000	81,000	+1,000	+1.3%
Transformer Resilience and Advanced Components	7,500	7,500	22,500	+15,000	+200.0%
Applied Grid Transformation Solutions	0	0	30,000	+30,000	N/A
Total, Grid Hardware, Components, and Systems	87,500	87,500	133,500	+46,000	+52.6%
DCEI Energy Mission Assurance	1,000	1,000	0	-1,000	-100.0%
Transmission Permitting and Technical Assistance	0 ^a	0 ^a	0	0	0.0%
Program Direction	15,000^a	15,000^a	17,586	+2,586	+17.2%
Total, Electricity	201,720^a	201,720^a	297,386	+95,666	+47.4%

Appropriation Overview

The Office of Electricity (OE) leads the Department's efforts in developing new technologies to strengthen, transform, and improve electricity delivery infrastructure so all consumers have equitable access to resilient, secure, and clean sources of electricity. OE provides solutions to technical, market, institutional, and operational failures that go beyond any one utility's ability to solve.^c To accomplish this critical mission, OE engages stakeholders throughout the sector on a variety of innovative technology solutions to modernize the electric grid. OE works to ensure that our Nation's electricity delivery system can accommodate changes at generation and load sides of the grid and ensure reliable, resilient, and secure operations of the decarbonized electric grid.

A dramatic structural transformation of the electricity delivery system is needed to ensure reliability is maintained in light of the rapid integration of renewable generation and customer-based technologies, including the electrification of transportation and building infrastructure. The future grid will be a more dynamic and structurally complex system, with bidirectional power flows. Managing this transition will require significant reengineering, involving advancements in grid technology, and system architecture.

^a The FY 2023 Budget Request to Congress proposes to split the Electricity appropriation account into two accounts: Electricity and Grid Deployment Office (GDO). \$7,000,000 for the Transmission Permitting and Technical Assistance (TPTA) program and \$3,000,000 for the estimated share of Electricity PD associated with TPTA are shown under the Electricity account in the GDO section of this document, reflecting the portion of FY 2021 and FY 2022 funding that would have been in GDO had the proposed FY 2023 structure been in place in FY 2021 and FY 2022.

^b FY 2022 amounts shown reflect the P.L. 117-95 continuing resolution level annualized to a full year.

^c Examples include wide-area visibility, identified from the 2003 Northeast blackout, and faster modeling and analysis, identified in the 2011 Southwest blackout.

Proactive, coordinated, and innovative steps are needed to lay the foundation for economic growth, workforce development, and the creation of good-paying jobs and to ensure benefits accrue to marginalized and overburdened communities while addressing four critical challenges:

- Increasing threats and risks to the security of energy infrastructure
- Changes in demand driven by population growth, adoption of more energy efficient technologies, dynamic economic conditions, and broader electrification
- Changes in the supply mix and location (centralized, distributed, and offshore) of the Nation's generation portfolio
- Increasing variability and uncertainty from both supply and demand, including integration of variable renewables, more active consumer participation, and accommodating new technologies and techniques

Due to the critical role the electric grid plays across Federal, State, Tribal, territorial, and regional jurisdictions, OE programs work in an integrated manner in partnership with industry and other stakeholders, as well as other DOE offices, to enhance key characteristics of the U.S. electric transmission and distribution systems:

- Resilience—the ability to withstand and quickly recover from disruptions and maintain critical function
- Security—the ability to protect system assets and critical functions from unauthorized and undesirable actors
- Reliability—consistent and dependable delivery of high-quality power
- Flexibility—the ability to accommodate changing supply and demand patterns and new technologies
- Affordability—more optimal deployment of assets to meet system needs and minimize costs
- Efficiency—low losses in electricity delivery and more optimal use of system assets
- Energy Justice—investing in research and development that addresses equity in both the social and economic participation in the energy system and improves energy resilience in disadvantaged and energy-burdened communities

Within the Request, OE funds:

- Research, Development, and Demonstration (RD&D)—pursuing research and demonstrations for technologies to improve grid reliability, resilience, efficiency, flexibility, and functionality
- Power Grid Modeling and Analytics—developing core analytic, assessment, and engineering capabilities that can evolve as the technology and policy needs mature to support decision making within the Department and for stakeholders; analyses explore complex interdependencies among energy infrastructure systems, such as between electricity and natural gas systems
- Data Platforms and Advanced Control and Communications designs—pursuing national-scale sensor, data, and secure communication architecture platforms to mitigate risk and improve the economic efficiency of grid operations such as improved asset management
- Cyber Resilience—designing next-generation systems that are built from inception to automatically detect, reject, and withstand cyber incidents, regardless of the threat to the electricity delivery system
- Coordination with the Power Marketing Administrations to develop relevant RD&D solutions

The proposed investment continues to support OE's mission of security and resilience through six key priorities:

- Grid flexibility through Megawatt-Scale Grid Storage—driving megawatt-scale storage capable of supporting voltage and frequency regulation, ramping, and energy management for bulk and distribution power systems
- Improved Observability and Deep Learning via Sensing Technology Utilization—driving integration of high-fidelity sensing technology for predictive and correlation modeling for electricity and interdependencies with oil and natural gas (ONG) systems
- Expanding Transmission Capacity and Advanced Grid Architectures—developing the vision for the future grid and pursuing electricity-related policy issues by carrying out statutory and executive requirements, while also providing policy design and analysis expertise to Federal, State, Tribal, territorial, and regional entities
- North American Energy Resilience Model—using the integrated North American Energy Resilience Model (NAERM), developed from 2019–2021 in partnership with the national laboratories and relevant stakeholders, to aid in energy planning, transmission planning, and contingency analyses to drive infrastructure investment in the North American energy system
- Building in Cybersecurity—accelerating and expanding cybersecurity and secure communications for electricity infrastructure and mitigating vulnerabilities
- Integrated Grid Planning to Ensure Coherence—formulating coherent grid strategies that apply advanced technologies for meeting reliability, resilience, decarbonization, efficiency, equity, and flexibility objectives through the advancement of integrated planning practices in concert with the electric industry.

OE's FY 2023 Budget Request will extend the impact of our research, development, and demonstration (RD&D) funding by leveraging creative funding mechanisms—such as prizes, competitions, and programs targeted to small businesses. The goal is to enable the commercialization of climate change and clean energy innovations that will stimulate job creation, expand other public impact outcomes, and yield a more geographically diverse and impactful research portfolio.

Program Highlights

- **Transmission Reliability and Resilience (TRR)** is focused on ensuring the reliability and resilience of the U.S. electric grid through R&D on measurement and control of the electricity system, including mitigation of widespread, cascading blackouts. The program is also assessing evolving system needs, identifying pathways to achieve an equitable transition to decarbonization and electrification, and risk assessment to address challenges across integrated energy systems. Funding decreases due to the FY 2021 completion of funding for NAERM Phase II development, as well as for fully funded FY 2021 congressionally directed projects for sensors and analytics technologies, a composite utility pole assessment, and the Grid Research Integration and Demo Center. The overall funding decrease in FY 2023 offsets growth in other TRR activities. NAERM operations and maintenance are funded in the Energy Delivery Grid Operations Technology (EDGOT) program in FY 2023.
- **Energy Delivery Grid Operations Technology (EDGOT)**, starting in FY 2022, supports operations, further development, and maintenance for NAERM. EDGOT develops national-scale planning models for energy and interdependent infrastructure and real-time situational awareness capabilities that rely on large-scale networked communication and data infrastructures across multiple utility boundaries. NAERM will help us transition from the current reactive state-of-practice to a new energy planning, investment, and operations paradigm that is capable of proactively informing infrastructure investment strategies. The EDGOT technology portfolio will enable assessment of risks and uncertainty, evaluation and identification of effective mitigation strategies, and support of more informed infrastructure planning and investment decisions by both public and private sectors, thereby enhancing U.S. energy and economic security.
- **Resilient Distribution Systems (RDS)** develops transformative technologies, tools, and techniques to enable industry to modernize the distribution system, supports transformation of the electric grid through the growing convergence of transmission and distribution portions of the electricity delivery system, and develops solutions that enable all consumers to participate in the clean energy economy. RD&D addresses equity in both the social and economic

participation in the energy system and improves energy resilience in disadvantaged and energy-burdened communities. The FY 2023 Request supports a competitive award process to harness emerging sources of energy for balance, reliability, and control such as EVs, connected homes and buildings, increasing distributed solar, and energy storage. Activities include research in microgrids, transactive controls, distribution management systems, and resilience tools, as well as working with States, regional planners, and the electric industry to advance integrated planning approaches to ensure the formulation and implementation of coherent grid strategies to enable grid modernization.

- **Cyber Resilient and Secure Utility Communications Networks (SecureNet)** was called Cyber R&D in the FY 2022 Request to Congress. SecureNet addresses R&D for energy sector cybersecurity associated with electricity delivery systems and will focus on developing security-by-design solutions based on data and physics to address vulnerabilities of the grid and critical operational data processing, management, and communications systems that could expose the electricity system to cyber threats. SecureNet will pursue coordinated engagement with DOE's other cyber-related activities, including in CESER and the Office of Intelligence and Counterintelligence. An important part of the SecureNet portfolio will be academic R&D for technology-focused activities that, in combination with industry guidance, result in impactful real-world solutions while helping train and develop the next generation of cybersecurity specialists.
- **Energy Storage** is designed to develop new and advanced technologies that will ensure the stability, reliability, and resilience of electricity infrastructure. The Request supports a new emerging technology FOA focused on ultra-low-cost chemistries, a new Grid Storage Launchpad (GSL) fellowship program, and continued development of the Rapid Operational Validation Initiative. The GSL construction project, which will accelerate materials development, testing, and independent evaluation of battery materials and battery systems for grid applications, was fully funded in the FY 2022 Request through the completion of construction and commissioning of the facility, and no funding is requested in FY 2023, offsetting increases in Energy Storage R&D.
- **Transformer Resilience and Advanced Components (TRAC)** develops innovations for grid hardware that carries, controls, and converts electricity, helping achieve decarbonization goals, ensure reliability and resilience of electric infrastructure, adapt the electricity delivery system to the evolution of the electric power grid, and provide the foundation to invigorate domestic transformer manufacturing and grid-related supply chains. TRAC develops hardware solutions in coordination with TRR and RDS. The FY 2023 Request supports the testing and field validation of Grid Enhancing Technologies (GETs), such as dynamic line rating and power flow controls, to accelerate deployment for optimal transmission asset utilization and to facilitate renewable energy and carbon-neutral technology system integration. GETs have been shown to improve the energy transfer capabilities of existing transmission paths and are able to be deployed more quickly than building new lines at costs significantly below traditional upgrades. TRAC will also address critical research needs for solid-state power substations (SSPS) with an emphasis on advanced materials, embedded intelligence for equipment monitoring, and validation of prototype converter building blocks.
- **Applied Grid Transformation Solutions (AGTS)** is a new program in FY 2023 to address the pressing need for rapidly validating and deploying new systems by integrating technology suites in controlled pilot environments to drive new technology adoption. Applied integrated pilots are needed to validate how new technologies for transmission and distribution will achieve community, state, and national objectives. AGTS will initiate 3–4 integrated pilots to show how new technologies can help achieve stakeholder objectives. For each applied demonstration area, AGTS will consult stakeholders ensure that the project scope and outputs will be immediately useful to targeted decisionmakers.
- **Defense Critical Electric Infrastructure (DCEI) Energy Mission Assurance** was established in FY 2021 to identify, evaluate, prioritize, and assist in developing executable strategies to ensure that critical national defense and security missions have reliable access to power as energy supply disruptions threaten the civilian grid due to intensifying cybersecurity threats as well as other hazards. In the FY 2022 Request, DOE proposed to integrate the functions of the DCEI Energy Mission Assurance program into CESER's suite of activities partnering with, supporting, and sharing information with the electric utility industry to enhance energy resilience through its energy assurance planning efforts. No FY 2023 funding is requested in OE for DCEI Energy Mission Assurance.
- **Transmission Permitting and Technical Assistance** activities are transferred to the Grid Deployment Office in the FY 2023 Request.

Bipartisan Infrastructure Law and Programmatic Realignment

In FY 2023, DOE will continue to support the various grid provisions of the Bipartisan Infrastructure Law (BIL), to help develop, strengthen, and improve the flexibility of our Nation's electric grid. BIL activities appropriated in the Electricity account will be implemented by the Grid Deployment Office (GDO) as part of the Department's efforts to best execute the BIL mission.

DOE created new offices for the Under Secretary for Infrastructure and realigned some existing offices and components to better execute the BIL appropriation and the overall DOE mission. For OE, activities under the Transmission Permitting and Technical Assistance program, as well as a corresponding portion of the Program Direction program, were realigned under the newly formed GDO, which reports to the Under Secretary for Infrastructure. The remaining OE programs report to the Under Secretary for Science and Innovation and will continue to fulfill their current roles and responsibilities.

CLEAN ENERGY DEMONSTRATIONS

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	
				\$	%
Clean Energy Demonstrations					
Clean Energy Demonstrations	0	0	189,052	+189,052	N/A
Program Direction	0	0	25,000	+25,000	N/A
Total, Clean Energy Demonstrations	0	0	214,052	+214,052	N/A

Appropriation Overview

The mission of the Office of Clean Energy Demonstrations (OCED) is to deliver clean energy and industrial decarbonization demonstration projects at scale in partnership with the private sector to launch or accelerate market adoption and deployment of technologies, as part of an equitable transition to a decarbonized energy system and economy. OCED was established in December 2021 and first authorized and funded through the Bipartisan Infrastructure Law (BIL). The founding of OCED builds on the Department of Energy's (DOE) expertise in clean energy research and development and expands DOE's scope to fill a critical innovation gap on the path to net-zero emissions by 2050.

OCED is a technology-neutral office that serves as a project management oversight center of excellence, implementing key multi-billion-dollar demonstration projects funded via the BIL, as well as supporting the applied programs and other offices to ensure a consistent approach to implementing capital intensive late-stage technology demonstrations. OCED supports demonstration projects that have viability at-scale and an expectation of achieving cost competitiveness and bankability in the market over time. OCED investments are part of a clear progression and transition between the research, development, and demonstration projects within DOE technology offices and initial deployments supported by the private sector or DOE Loan Programs Office, ensuring continuity of support for clean energy technologies and systems. Funding decisions are made to support scalable outcomes that lead to commercialization and deployment.

In FY 2023, OCED will continue to support demonstration projects in support of the goals of the BIL along with demonstration and program management activities supported through annual appropriations. While the BIL provided significant funding for OCED, there are still gaps in DOE's major demonstration portfolio that must be filled to reduce the costs of critical clean energy technologies and support U.S. technology leadership. The Request invests in clean energy demonstrations to complement BIL funding and fill gaps in the portfolio.

Program Highlights

Clean Energy Demonstrations (\$189,052,000): OCED funds activities to accelerate and prove the design, construction, and operation of high-impact demonstration projects, at or near a commercial-scale, with the purpose of generating publicly available technical, economic, and environmental performance data essential to developers, financiers, regulators, policymakers, utilities, manufacturers, end users and other stakeholders. FY 2023 planned investments include the following:

- **Energy Demonstrations (\$150,052,000):** OCED will initiate a new competition in FY 2023 to support commercial-scale projects that demonstrate technologies, or the manufacturing of technologies that integrate renewable and distributed energy systems with broader energy networks. The goal of this new investment area is to support demonstrations that de-risk technologies needed to manage variable generation; control flexible loads; and integrate energy storage electric vehicle (EV) charging, and other facilities into the U.S. transmission and distribution grids. This may include support for demonstrations of innovative hybrid generation systems, as well as the utilization of energy storage technologies, EV charging, controllable loads from buildings and industrial facilities, and other approaches for cost effective integration of renewable energy, as well as the demonstration of operational flexibility, consumer behavior changes, and grid services provision. These investments may also support demonstrations of next-generation manufacturing technologies, process efficiency improvements, and improved supply chain reliability and resiliency in consultation with the new DOE Office of Manufacturing and Energy Supply Chains.

- **Advanced Reactor Demonstrations (\$25,000,000):** In addition to funding provided via the BIL, OCED will support the Advanced Reactor Demonstration Program. This activity focuses Departmental and non-federal resources on the construction of demonstration reactors in the near- and mid-term that are safe and affordable to build and operate. As part of DOE's consolidation of support for these demonstration projects into OCED from the Office of Nuclear Energy, DOE requests funding for the ARDP demonstrations in OCED. FY 2023 funding will enable OCED to provide additional project management and technical oversight. While BIL provided significant funding that will support the two cost-shared awards, annual appropriations are necessary for DOE to fully fund the likely federal contribution for later phases of the two projects.
- **Demonstration Planning and Analysis (\$14,000,000):** As part of OCED's implementation of IIJA, the Request includes funding for technical and analysis support including funding for NEPA support and implementation costs. This funding will be used to ensure OCED has the proper support needed to expedite the demonstration activities supported through IIJA and other demonstrations supported by OCED in FY 2023.

Program Direction (\$25,000,000): Program Direction funds Federal salaries and benefits, including staff training and performance awards, travel, Working Capital Fund expenses, associated support services contracts, and administrative expenses to execute the OCED mission. FY 2023 funding will enable a focus on developing business practices and systems to ensure effective oversight of OCED's portfolio.

CYBERSECURITY, ENERGY SECURITY, AND EMERGENCY RESPONSE

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
			\$	%	
Cybersecurity, Energy Security, and Emergency Response					
Cybersecurity for Energy Delivery Systems	96,000	96,000	0	-96,000	-100.0%
Infrastructure Security and Energy Restoration	48,000	48,000	0	-48,000	-100.0%
Information Sharing, Partnerships and Exercises	0	0	28,000	+28,000	+100.0%
Risk Management Tools & Technologies	0	0	125,020	+125,020	+100.0%
Response and Restoration	0	0	24,000	+24,000	+100.0%
Program Direction	12,000	12,000	25,123	+13,123	+109.4%
Total, Cybersecurity, Energy Security, and Emergency Response	156,000	156,000	202,143	+46,143	+29.6%

Appropriation Overview

The **Office of Cybersecurity, Energy Security, and Emergency Response (CESER)** leads the Department's efforts to secure U.S. energy infrastructure against all hazards, reduce the risks of and impacts from cyber and other disruptive events, and leads response and restoration activities. CESER is the designated head Office for DOE's responsibilities as lead agency for Emergency Support Function #12 (Energy), or ESF #12, under the National Response Framework. CESER is also the Sector Risk Management Agency (SRMA) for national efforts to enhance preparedness, resiliency, and recovery of the U.S. energy infrastructure.

The U.S. energy sector powers and fuels the economy, national security, and the daily lives of Americans. It also serves an enabling function for all other sectors. With critical energy infrastructure facing evolving threats and hazards, especially from significant climate-related incidents and rapidly evolving cyber threats, CESER divisions and programs coordinate with electricity and oil and natural gas infrastructure owners and operators; State, Local, Tribal, and Territory governments (SLTT) (in particular, energy officials, public utility commissioners, governors and energy advisors, state legislators, emergency managers); and Federal agencies to understand and mitigate risk, develop guidance and tools to mitigate risk and enhance resilience and security, and respond when an incidents do occur. CESER will prioritize its technical assistance and training opportunities to support disadvantaged communities and ensure equitable energy and cybersecurity research, development, and deployment within the DOE.

CESER leads, coordinates, and provides technical expertise across DOE in implementing its cybersecurity-by-design strategy, in which cybersecurity considerations are incorporated into new clean energy technologies as they are developed by the applied energy offices.

Program Highlights

- Information Sharing Partnerships and Exercises (ISPE) manages the Department's SRMA responsibilities and partnerships with government, industry, and SLTT community in assessing risk, sharing actionable and informed threat information, and engaging in capacity building activities such as exercises, trainings, and cyber workforce development. This includes overseeing the Energy Government Coordinating Council (EGCC), whose members include Federal agencies and SLTT partners with energy sector security and resilience equities. The EGCC coordinates with private-sector counterparts at the Electricity and Oil and Natural Gas Subsector Coordinating Councils to facilitate critical infrastructure protection and inform the development of tools and technologies developed in CESER and in other parts of the Department. ISPE focuses on developing a shared understanding and prioritization of risks to the sector from all hazards (cyber, physical, and natural) and deliver mitigation measures to buy down risk. On-going training and exercises with the sector will test and identify improvements to response plans and procedures. Following near-term response and restoration activities after a disruption or disaster, ISPE will leverage long term recovery authorities to integrate response and recovery in coordination with CESER's Response and Restoration division and other DOE offices (e.g.,

EERE, OE, NE) as well as support/investment from other agencies (e.g., FEMA's Building Resilient Infrastructure and Communities or "BRIC" Program). Through the SLTT energy security program, ISPE helps energy officials, public utility commissioners, and governors' energy advisors with capacity-building activities to mitigate and manage the risks and response to numerous threats they face. ISPE's Defense Critical Electric Infrastructure efforts, as codified by the 2015 Fixing America's Surface Transportation Act, will develop executable strategies to strengthen the energy systems that supply critical defense facilities. The CyberForce Competition will expand its work with universities, colleges, and technical schools across the country to advance cybersecurity in the operational technology / industrial controls systems environment and train the next generation of energy security cybersecurity experts.

- **Risk Management Tools and Technologies (RMT)** programs focus on research, development, demonstration, and deployment of tools and technologies to address all threats and risks in the U.S. energy sector. The control point includes both 1) cyber tools and technologies and 2) natural hazard, physical, and electromagnetic pulse/geomagnetic (EMP/GMD) tools and technologies. RMT will enable real-time sector-wide situational awareness combined with time-sensitive analysis, visualization, and dissemination of actionable threat and vulnerability information in support of key DOE, federal government, and energy sector stakeholders. These tools will incorporate rapid dissemination and processing of energy sector data for identification and characterization of threats for intelligence analysis, assessments, products, and services in unclassified and classified environments required to support CESER's operational cyber and energy security responsibilities. These specialized tools will use analytics to understand, enrich, and fuse data and enable intelligence-driven action to improve resilience for the energy sector. Working closely with the energy sector and our government partners, the request focuses on enhancing the speed and effectiveness of threat and vulnerability information sharing, including bi-directional machine-to-machine information sharing, and accelerating game-changing tools to mitigate cyber incidents in today's systems and to develop next-generation resilient energy delivery systems while developing analyses to quantify the resulting relative risk reduction. In particular, RMT will lead supply chain security efforts as part of the Energy Cyber Sense program. The program will include expanding initiatives such as the Cyber Testing of Resilient Industrial Control Systems (CyTRICS) program and supply chain security in next generation clean energy systems. RMT will also include research, development, and demonstration (RD&D) for innovative tools and their transition to commercialization. The programs will lead integration of cybersecurity into the energy delivery system research and development across the DOE enterprise ensuring that emerging tools and technologies used in the U.S. grid of the future are secure and resilient. The request also supports continuing our efforts in support of tools and capabilities designed specifically to address threats such as extreme weather, physical threats, and EMP/GMD investments. Specifically, RMT will be focused on addressing wildfire threats through innovative sensor technologies, leveraging unmanned aerial systems, and satellite imagery, in addition to artificial intelligence and machine analytics. Finally, RMT will partner with other parts of DOE to ensure that investments in new technologies are informed by existing and future risks.
- **Response and Restoration (R&R)** coordinates a national effort to secure U.S. energy infrastructure against all hazards, reduce impacts from disruptive events, and assist the industry in restoring energy infrastructure. During incidents requiring a coordinated federal response the R&R program activates the Energy Response Organization to manage Emergency Support Function (ESF) #12 to include deployment of responders and sector engagement. As the lead for ESF #12 CESER works with partners to assess the impacts of disasters on local and regional energy infrastructure. This includes providing situational awareness updates to Federal, state, and private sector partners; facilitating legal and regulatory waivers to accelerate restoration of damaged energy systems; and providing technical expertise on energy damage assessment, restoration, and logistical assistance. To fulfill the Department's ESF #12 responsibilities, CESER trains and leads coordination activities among a cadre of volunteer ESF #12 responders across DOE. When activated, ESF #12 DOE deploys responders to FEMA National and Regional Response Coordination Centers, FEMA Joint Field Offices and/or State Emergency Operations Centers. Each FEMA Region is represented by an ESF #12 Regional Coordinator who maintains regular contact to support planning efforts with regional and state counterparts. Catastrophic and incidents in remote locations are managed by the ESF #12 Catastrophic Incident Response Team (CIRT), a subset of ESF #12 responders. CIRT delivers critical capabilities including energy sector emergency response and recovery; near-real-time situational awareness and information sharing about the status of the energy systems to improve risk management; analysis of evolving threats and hazards to energy infrastructure; and technical assistance that incorporates exercises in order to strengthen Federal, Regional, State, Local, Tribal, and Territorial abilities to work together to mitigate the effects of an energy sector emergency. CESER's R&R team will also strengthen its cyber response capabilities, as required by Presidential Policy Directive (PPD)-41 and the National Cyber Incident Response Plan, to ensure DOE is fully prepared to respond the growing risks from cyber threats to energy infrastructure from

nation-states and cyber criminal groups. Further, CESER will ensure it is able to respond to cyber-physical threats, which include cyber-attacks that lead to physical or operational impacts to energy supply (i.e., the 2021 Colonial Pipeline ransomware attack). CESER's R&R will also work with DOE's Office of Intelligence and Counterintelligence, the Cybersecurity and Infrastructure Security Agency's Joint Cyber Defense Collaborative, and other agencies to conduct pilot activities related to the Energy Threat Analysis Center (ETAC) Pilot concept. The ETAC Pilot activities will initially include joint analysis by industry and government on cyber threats specific to energy systems. Concurrently, a feasibility study will be completed on the long-term approach for an ETAC facility. The long-term goal is to enable joint collaboration on risks and threats to the energy sector and be able to quickly develop mitigation measures and/or implement defensive actions.

Bipartisan Infrastructure Law

In FY 2023, CESER will continue to support the cyber provisions of the Bipartisan Infrastructure Law (BIL) including the Rural and Municipal Utility Advanced Cyber Grant and Technical Assistance Program and Cybersecurity for the Energy Sector Research, Development, and Demonstration. CESER will also support the development of State Energy Security Plans through technical support.

CYBERSECURITY, ENERGY SECURITY, AND EMERGENCY RESPONSE PETROLEUM ACCOUNTS

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)				
				\$	%			
Cybersecurity, Energy Security, and Emergency Response Petroleum Accounts								
Naval Petroleum and Oil Shale Reserves								
Production Operations	11,000	11,000	11,004	+4	0.0%			
Management	2,006	2,006	2,000	-6	-0.3%			
Total, Naval Petroleum and Oil Shale Reserves	13,006	13,006	13,004	-2	0.0%			
Strategic Petroleum Reserve								
Facilities Development and Operations	160,949	160,949	164,818	+3,869	+2.4%			
Management for SPR Operations	27,051	27,051	27,642	+591	+2.2%			
Northeast Gasoline Supply Reserve	0	0	21,715	+21,715	+100%			
Total, Strategic Petroleum Reserve	188,000	188,000	214,175	+26,175	+13.9%			
Northeast Home Heating Oil Reserve								
Northeast Home Heating Oil Reserve	6,500	6,500	7,000	+500	+7.7%			
Total, Northeast Home Heating Oil Reserve	6,500	6,500	7,000	+500	+7.7%			
SPR Petroleum Account								
SPR Petroleum Account	1,000	1,000	8,000	+7,000	+700.0%			
Total, SPR Petroleum Account	1,000	1,000	8,000	+7,000	+700.0%			
Total, CESER Petroleum Accounts	208,506	208,506	242,179	+33,673	+16.1%			
Energy Security & Infrastructure Modernization Fund	0	0	0	0	0			

Appropriation Overview

The Office of Cybersecurity, Energy Security, and Emergency Response (CESER) Petroleum Accounts consist of emergency petroleum security/supply programs, a Strategic Petroleum (SPR) modernization program, and post-sale remediation activities at the Naval Petroleum Reserve Oil Shale Reserves (NPOSRR) Nos. 1 and 3. The SPR storage sites are located at four government-owned Gulf Coast locations with oversight from the Project Management Office in Harahan, Louisiana, and Headquarters in Washington, D.C. Both the Northeast Home Heating Oil Reserve (NEHHOR) and the Northeast Gasoline Supply Reserve (NGSR) consist of Government-owned refined petroleum products stored in leased commercial storage in terminals in the Northeast. Legacy environmental clean-up/remediation continues at the previously sold NPOSRR No. 1 (Elk Hills, CA), and landfill monitoring and closure continues as part of post-sale activities at NPOSRR No. 3 (Casper, WY).

Program Highlights

- **Strategic Petroleum Reserve**

The Strategic Petroleum Reserve (SPR) Program provides strategic and economic security against foreign and domestic disruptions in oil supplies via an emergency stockpile of crude oil. The program fulfills United States' obligations under the International Energy Program, which avails the U.S. of International Energy Agency assistance through its coordinated energy emergency response plans and provides a deterrent against energy supply disruptions. The SPR Program will perform sustainment and construction activities, as well as cavern wellbore testing and remediation activities to ensure the availability of the SPR's crude oil inventory. As a subprogram within the SPR account, the Northeast Gasoline Supply Reserve (NGSR) was administratively established in 2014 as part of the SPR to ease regional shortages resulting from sudden/unexpected supply interruptions (e.g., Superstorm Sandy). The NGSR consists of 1

million barrels of gasoline blendstock stored in leased commercial storage terminals located in Maine, Massachusetts, and New Jersey. To continue ongoing commercial storage leases and oversight an annual cost of \$21,715,000 is expected.

- **SPR Petroleum Account**

The SPR Petroleum Account Program funds SPR petroleum acquisition, transportation, and drawdown activities. The funds will be used as a source of funding for drawdown costs related to crude oil movements from the SPR.

- **Naval Petroleum and Oil Shale Reserves**

Following the 1998 sale of the Government's interests in the NPOSRR-1 (Elk Hills, CA), environmental cleanup/remediation activities under the Corrective Action Consent Agreement with the State of California Department of Toxic Substances Control (DTSC) began. Of the 131 areas of concern (AOCs) for which DOE is responsible for environmental cleanup, as of March 2021, 111 AOCs have received no further action (NFA) certification from California's DTSC. The remaining 20 AOCs require remediation.

- **Northeast Home Heating Oil Reserve**

The Northeast Home Heating Oil Reserve (NEHHOR) FY 2023 budget continues to maintain a 1-million-barrel inventory of government-owned ultra-low sulfur distillate (ULSD), which is stored in three Northeast commercial storage terminals, as a short-term supplement to the Northeast systems' commercial supply of heating oil for deployment in the event of an emergency supply disruption. Commercial storage contracts went into effect on April 1, 2020, with the final option year extending through March 31, 2024. The Program will continue to focus its oversight and management on product quality analysis of the Reserve, as well as information technology support for the sales system.

- **Energy Security and Infrastructure Modernization Fund**

The FY 2023 President's Budget requests no appropriation for the Energy Security and Infrastructure Modernization Fund (ESIM or the Fund). The ESIM fund was established in Section 404 of the Bipartisan Budget Act of 2015 to finance modernization of the SPR. Sales of SPR crude oil will be used to fund the completion of the Life Extension Phase II (LE2) project needed to ensure the SPR can maintain its operational readiness capability, meet its mission requirements, and operate in an environmentally responsible manner. The CARES Act (Pub. L. 116-136, Section 14002) provided the Department flexibility to conduct the final sale into FY 2022 to raise funding for the SPR Modernization Program, in accordance with Section 404 of the Bipartisan Budget Act of 2015 (Pub. L. 114-74). As a result, Section 404 sales of SPR oil were concluded in FY 2021.

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				\$	%
Indian Energy Policy and Programs					
Indian Energy Policy and Programs	17,000	17,000	129,736	+112,736	+663.2%
Program Direction	5,000	5,000	20,303	+15,303	+306.1%
Total	22,000	22,000	150,039	+128,039	+582.0%

Appropriation Overview

The Office of Indian Energy Policy and Program's (IE) financial and technical assistance are offered to Indian tribes, including Alaska Native villages, and eligible tribal entities for advancing electrification and clean energy development and deployment on Indian lands, reducing energy costs, and assisting economic development in tribal communities where unemployment and poverty rates far exceed national averages. This assistance is intended to overcome barriers to deploying energy generation (used for heat and electric power) and energy efficiency projects to reduce or stabilize energy costs and address energy poverty, as well as to provide power to unelectrified homes. IE's program aligns with the Justice40 initiative by demonstrating 100% of its financial and technical assistance benefitting Tribes and disadvantaged tribal communities with clean energy deployment.

Financial assistance will support funding opportunities toward energy development and electrification in Indian Country and technical assistance will assist in overcoming barriers to project development and support American Indians and Alaska Natives in planning to transition to clean energy and seven-generation planning. The FY 2023 Budget increases Program Direction funds and reflects an overall increase to continue two multi-year initiatives begun in FY 2022: 1) transition all of the nation's tribal colleges and universities to renewable energy; and 2) electrify the roughly 30,000 tribal homes that currently lack electricity. Both efforts will include supporting a substantial interagency coordinated tribal energy job training component. DOE will work together with U.S. Department of Agriculture and the Department of Interior to ensure that tribal energy policy, regulation, and incentives are properly aligned, the right mix of loans, grants, and technical assistance is deployed to achieve the objectives as cost-effectively as possible, while fully respecting tribal sovereignty and self-determination. In addition to the two initiatives, the current program to assist Native community's transition to clean energy will be continued.

Program Highlights

IE is beneficial in promoting energy development, efficiency, and use, reducing or stabilizing energy costs, strengthening energy and economic infrastructure, and bringing electrical power and service to Indian land and homes, with the ancillary benefit of providing employment on tribal lands and in Alaska Native communities. This assistance is intended to overcome barriers to energy development, increase energy reliability and resiliency, and electrify tribal lands and homes.

Technical assistance facilitates expeditious energy planning and deployment. By building internal IE technical capability, and subject matter experts from DOE laboratories and partner organizations, technical assistance is being provided to support energy planning and the transition to clean energy. Specifically, through increased on-site staff and a local technical assistance network IE can deliver local solutions to American Indian and Alaska Native communities with a network that understand the local challenges. During FY 2023, IE will continue to expand its network of subject matter experts and partner organizations to provide local technical assistance.

Financial assistance provides funding opportunities for energy infrastructure deployment to American Indian and Alaska Native communities across the Nation in the form of grant awards. From 2010-2021, DOE's Office of Indian Energy has invested over \$114 million in more than 200 tribal energy projects in American Indian and Alaska Native communities across the Nation. These projects, valued at nearly \$200 million, are leveraged by over \$80 million in recipient cost share.

In FY 2021 the Office of Indian Energy selected 13 tribal energy infrastructure projects for \$12 million in funding. Those selected projects are estimated to result in nearly 3.5 megawatts of clean energy generation and over 3.5 megawatt-hours of battery storage, serving over 1,300 tribal buildings and saving those communities a combined \$1.8 million annually.

TITLE 17 INNOVATIVE TECHNOLOGY LOAN GUARANTEE PROGRAM

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	
				\$	%
Administrative Expenses	32,000	32,000	66,206	+34,206	+106.3%
Title XVII Credit Subsidy	0	0	150,000	+ 150,000	N/A
Offsetting Collections	-3,000	-3,000	-48,000	-45,000	+15,000%
Total	29,000	29,000	168,206	+139,206	+480.0%

Appropriation Overview

The Title 17 Innovative Technology (Title 17) Loan Guarantee Program, as authorized under Title XVII of the Energy Policy Act of 2005 (EPAct of 2005), as amended, allows the Department of Energy (DOE) to provide loan guarantees for innovative energy projects that include energy efficient and renewable energy systems, advanced nuclear facilities, advanced fossil and carbon capture, sequestration, utilization and storage systems, energy storage, virtual power plants, and various other types of projects. Through the Title 17 loan guarantee program, the Loan Programs Office (LPO) provides access to debt capital for high-impact and large-scale energy infrastructure projects and first-time commercial deployments in the United States. These projects must avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; employ new or significantly improved technologies compared to commercial technologies in service in the United States at the time the guarantee is issued; and offer a reasonable prospect of repayment of the principal and interest on the guaranteed obligation. The FY 2023 Budget provides \$168 million (net of collections) to for LPO to leverage Title 17 authorities in support of the Administration goal of a carbon-pollution free electric sector by 2035 and net-zero emissions economy-wide by 2050, while supporting placed-based initiatives including energy community and Environmental Justice 40 investments, and Building Back Better.

The Title 17 Loan Guarantee Program is ideally positioned to accelerate the deployment of innovative projects to help launch new clean energy markets, reduce greenhouse gas emissions, and drive American economic growth by providing flexible, custom financing and access to debt capital that helps to meet the specific needs of individual borrowers. LPO can provide access to capital for innovative technologies along all milestones to reaching full market acceptance, overcoming key barriers to bankability. This budget will allow LPO to continue to actively monitor its Title 17 Loan Guarantee Program portfolio, and engage resources to help support the achievement of project milestones, overcome issues that may arise, and provide guidance and risk mitigation for the long-term success of projects.

The FY 2023 Budget supports the Administration's objectives by bolstering deployment of domestic clean energy projects through newly expanded authorities in the Bipartisan Infrastructure Law (BIL). This includes (1) supporting eligible projects that bolster the domestic critical minerals supply chain and (2) financing to support State, Tribal, and Alaska Native corporation-backed energy projects. While BIL authorities expanded the types of projects that could be considered for financing, it prohibited LPO from using existing loan authority to finance such projects. The FY 2023 Budget requests authority to use the existing funds to support these expanded activities. The Budget proposes, in the Department of Energy General Provisions language, to amend and contravene the BIL provisions that prohibit using existing Title 17 loan authority for projects eligible under the expanded authority. LPO believes the expanded authorities provided through BIL can be leveraged by the Title 17 program to reduce emissions and create good paying jobs that provide the free and fair choice to join a union.

Program Highlights

The FY 2023 Budget requests \$150 million for Title 17 credit subsidy costs, associated with an additional \$5 billion of loan guarantee authority open to a range of eligible projects. The Budget would increase available Title 17 loan authority by \$5 billion from \$22.4 billion to \$27.4 billion. The Department expects to obligate approximately \$6 billion of loan authority in FY 2022 and \$4.5 billion of loan authority in FY 2023.

In FY 2023, the Department also requests \$66 million, offset by an estimated \$48 million in offsetting collections, for administrative expenses to continue originating loans for the Title 17 Loan Guarantee Program, as well as to effectively monitor the existing portfolio.

In addition:

- In FY2022, LPO will use approximately \$27 million in available balances carried forward from prior-year appropriations to cover administrative expenses related to loan origination and loan portfolio monitoring activity.
- The Budget includes \$19 million to cover costs for Third-Party Advisors as required by the Energy Act of 2020. These expenses will be recouped through fees assessed at financial closure of loan guarantees.
- The FY 2023 Request supports ongoing implementation of investments authorized under the Bipartisan Infrastructure Law, including projects to finance domestic critical minerals supply chain, State energy financing institution-backed projects.

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
				\$	%
Administrative Expenses	5,000	5,000	9,800	+4,800	+96.0%
Total	5,000	5,000	9,800	+4,800	+96.0%

Appropriation Overview

The Advanced Technology Vehicles Manufacturing (ATVM) Direct Loan Program supports the manufacturing of advanced technology vehicles and associated components in the United States. ATVM provides loans to advanced technology vehicle and part manufacturers for the cost of re-equipping, expanding, or establishing manufacturing facilities in the United States to produce advanced technology vehicles or qualified components and for associated engineering integration costs.

In FY 2023, the Loan Program Office (LPO) requests \$9.8 million for Administrative Expenses to originate ATVM direct loans and monitor the program's growing portfolio. While the FY 2023 Budget Request does not request new loan authority, LPO anticipates utilizing all remaining ATVM loan authority by the end of FY 2023 -- closing approximately \$5 billion in loans in FY 2022, and \$13 billion in FY 2023 – which this increased request for Administrative Expenses would support.

Program Highlights

The FY 2023 Budget requests \$9.8 million for Administrative Expenses for the ATVM direct loan program. The program has been key in propelling the resurgence of the American auto manufacturing industry and accelerating U.S. electric vehicle (EV) manufacturing. The Budget will allow LPO to continue growing the portfolio of this crucial program, and achieve the Administration's goal of reaching net-zero emissions, economy-wide, by 2050. This includes providing access to capital for domestic manufacturers revitalizing U.S. manufacturing, creating good-quality jobs, electrifying vehicles, securing domestic supply chains from raw materials to parts, and retooling factories to compete globally. This effort is directly responsive to the need to address critical advanced technology vehicle supply chain vulnerabilities as identified in Executive Order 14017, America's Supply Chains, and the subsequent 100-Day Reviews, both of which call for investment in advanced technology vehicle components including EV batteries and critical minerals manufacturing and processing.

The FY 2023 Budget supports the Administration's objectives by bolstering domestic advanced technology vehicle supply chains through newly expanded advanced technology vehicle modes authorized in the Bipartisan Infrastructure Law (BIL). These include advanced medium- and heavy-duty vehicles, locomotives, maritime vessels, aircraft, and hyperloop technology. Prior to the passage of the BIL, ATVM authorities were limited to supporting manufacturing of light-duty vehicles and components. While BIL authorities expanded the types of advanced technology vehicles that could be considered for financing, it prohibited LPO from using existing loan authority to finance such projects. The FY 2023 Budget requests authority to use the existing funds to support these expanded activities. The Budget proposes, in the Department of Energy General Provisions language, to amend and contravene the BIL provisions that prohibit using existing ATVM loan authority for the expanded technology areas. LPO believes the expanded authorities provided through BIL can be leveraged by the ATVM program to reduce transportation emissions and create good paying jobs that provide the free and fair choice to join a union.

Through ATVM, LPO will focus on projects that support the transition to zero-emission vehicles by excluding projects that manufacture gas-only light duty vehicles. Under the expanded definition of advanced technology vehicle, highly efficient fossil fueled medium- and heavy-duty vehicle manufacturing projects would be permitted to pursue a loan, though zero-emission vehicles would be encouraged.

- FY 2023 Budget Request will allow LPO to continue managing existing asset portfolio and originating activities on behalf of the ATVM direct loan program.
- In FY 2022 approximately \$4 million in unobligated balances carried forward from prior-year appropriations will be utilized in addition to the annualized CR amount of \$5 million for a total of \$9 million.

TRIBAL ENERGY LOAN GUARANTEE PROGRAM

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
			\$	%	
Administrative Expenses	2,000	2,000	1,860	-140	-7.0%
Total	2,000	2,000	1,860	-140	-7.0%

Appropriation Overview

Tribal Energy Loan Guarantee Program (TELGP)

Section 2602 of the Energy Policy Act of 1992, as amended by the Energy Policy Act of 2005, authorizes a loan guarantee program at the Department of Energy (DOE) to support energy development by Indian tribes. The TELGP is managed by the Loan Programs Office (LPO). The FY 2023 Budget requests \$1.9 million in addition to approximately \$0.7 million in unobligated carry over, for a total of \$2.6 million to continue origination and monitoring related activities for TELGP to invigorate economic opportunities in tribal communities through the development of energy projects.

Program Highlights

The FY 2023 Budget request allows TELGP to continue outreach and originating activities and to monitor its expected portfolio. The \$1.9 million funding plus approximately \$0.7 million in unobligated carryover, will support achieving the Administration's objectives of a carbon-pollution free electric sector by 2035 and net-zero emissions, economy-wide, by 2050. It also supports place-based initiatives including energy community and Environmental Justice 40 investments. Specifically, TELGP provides and encourages commercial lenders to provide debt capital to Tribal borrowers and organizations installing robust energy projects that lead to economic development or modernizing power generation and distribution in the Nation's most vulnerable communities.

To better serve that mission, DOE supports the FY 2022 Omnibus language to allow TELGP applicants access to direct loans via the United States Treasury Federal Financing Bank, guaranteed by the DOE, obviating the need for a partial guarantee of a commercial lender. This change – in addition to planned changes in FY 2022 to the TELGP solicitation to clarify ownership requirements, lending obligations, and fees – is expected to increase interest in and accessibility to TELGP loans.

The Request also supports LPO's ongoing close collaboration with the Department's Office of Indian Energy Policy and Programs and outreach to tribal members, including ongoing communication with tribal leaders to solicit feedback about the proposed design of TELGP, one-on-one meetings with tribal leaders, participating in tribal energy annual summits and events, and organizing a virtual listening session in April 2021 to discuss funding and financing of tribal energy projects. The listening session welcomed more than 350 participants, who provided valuable feedback on making Department programs more effective for Indian Country to meet tribal economic development and energy resilience needs. The engagement of potential TELGP lenders and borrowers by DOE's newly organized Outreach and Business Development Division has resulted in receiving the program's first application 2017. LPO will continue to solicit feedback as appropriate to better serve tribes' needs, consistent with LPO's authority.

- The FY 2023 Budget proposes \$1.9 million in Administrative Expenses to continue outreach and originating activities and to monitor the expected portfolio of the Tribal Energy Loan Guarantee program.
- LPO will utilize approximately \$0.7 million in unobligated balances carried forward from prior year

appropriations in addition to the requested \$1.9 million to support the anticipated increase in loan origination and related administrative expenses.

POWER MARKETING ADMINISTRATIONS

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
			\$	%	
Power Marketing Administrations					
Southeastern Power Administration					
Southeastern Power Administration	77,409	77,409	100,960	+23,551	+30.0%
Less Alternative Financing/Offsetting Collections	-77,409	-77,409	-100,960	-23,551	-30.0%
Total, Southeastern Power Administration	0	0	0	0	N/A
Southwestern Power Administration					
Southwestern Power Administration	116,194	116,194	162,802	+46,608	+40.0%
Less Alternative Financing/Offsetting Collections	-105,794	-105,794	-152,194	-46,400	-44.0%
Total, Southwestern Power Administration	10,400	10,400	10,608	+208	+2%
Western Area Power Administration					
Western Area Power Administration (CROM)					
Western Area Power Administration (CROM)	843,590	843,590	1,035,110	+191,520	+23%
Less Alternative Financing/Offsetting Collections (CROM)	-739,218	-739,218	-936,378	-197,160	+27%
Rescission of Prior Year Balances	0	0	0	0	0%
Use of Prior Year Balances	-15,000	-15,000	0	+15,000	-100.0%
Total, Western Area Power Administration (CROM)	89,372	89,372	98,732	+9,360	+10%
Falcon and Amistad O&M Fund					
Operation and Maintenance	7,302	7,302	7,928	+626	+9%
Less Alternative Financing/Offsetting Collections	-7,074	-7,074	-7,700	-626	+9%
Use of Prior Year Balances	0	0	0	0	0%
Total, Falcon and Amistad O&M Fund	228	228	228	0	0%
Colorado River Basins Power Marketing Fund					
Spending Authority from Offsetting Collections	245,047	245,047	258,466	+13,419	+5%
Offsetting Collections	-266,447	-266,447	-267,034	-587	0%
Total, Colorado River Basins Power Marketing Fund	-21,400	-21,400	-8,568	+12,832	-60%
Total, Western Area Power Administration	68,200	68,200	90,392	+22,192	+33%
Total, Power Marketing Administrations	78,600	78,600	101,000	+22,400	+28%

Appropriations Overview

The four **Power Marketing Administrations (PMAs)** sell electricity primarily generated by federally owned hydropower projects. Preference in the sale of power is given to public entities and electric cooperatives. Revenues from the sale of Federal power and transmission services are used to repay all related power and transmission costs.

Program Highlights

- **Southeastern Power Administration**

Southeastern markets and delivers all available Federal hydroelectric power from 22 U.S. Army Corps of Engineers (Corps) multipurpose projects to preference customers in an eleven-state area in the southeastern United States. Southeastern does not own or operate any transmission facilities, and contracts with regional utilities that own electric transmission systems to deliver the Federal hydropower to Southeastern's customers. Southeastern's use of receipts and alternative financing offsets its appropriations resulting in a net-zero balance for the program.

- **Southwestern Power Administration**

Southwestern markets and delivers Federal hydroelectric power from 24 Corps multipurpose projects to preference customers in a six-state area and participates with other water resource users in an effort to balance diverse interests with power needs. To deliver power to its customers, Southwestern maintains 1,381 miles of high-voltage transmission lines, 26 substations/switching stations, and 51 microwave and VHF radio sites. To maintain the infrastructure and modernize systems to increase the reliability, efficiency, and use of Federal assets, Southwestern utilizes appropriations, Federal power receipts, and alternative financing. Of these, 93.0% is derived from use of receipts and alternative financing, resulting in a net appropriation of only 7.0%.

- **Western Area Power Administration**

Western Area Power Administration (WAPA) markets and transmits Federal power to a 1.3-million-square-mile service area in 15 central and western states from 57 Federally-owned hydroelectric power plants operated by the Bureau of Reclamation (the Bureau), the Army Corps of Engineers (the Corps), and the International Boundary and Water Commission. WAPA's capital program, conducted in close coordination with preference customers, continues to emphasize replacement, upgrade, and modernization of the electric system infrastructure to bring continued reliability, improved connectivity, and increased flexibility and capability to the power grid. Through extensive partnering efforts, WAPA has obtained significant stakeholder and customer participation in financing much of the capital program. Through transparency WAPA demonstrates the value of its efficient operations that preference customers enjoy. WAPA will continue to make significant efforts to be open, transparent, and inclusive of customers and stakeholders in its operational choices and capital planning efforts. WAPA is strengthening its Asset and Risk Management to further ensure capital investments are sufficient and wisely deployed for our Nation and for our customers. The Infrastructure Investment and Jobs Act (IIJA) included a \$500M reimbursable appropriation for WAPA's purchase power and wheeling programs.

- **Bonneville Power Administration**

Bonneville operates under a business-type budget under the Government Corporation Control Act, 31 U.S.C 9101-10 and on the basis of the self-financing authority provided by the Federal Columbia River Transmission System Act of 1974 (Transmission Act) (Public Law 93-454). Authority to borrow from the U.S. Treasury is available to Bonneville on a permanent, indefinite basis.

Section 40110 of the Infrastructure Investment and Jobs Act (Public Law 117-58), enacted by the President on November 15, 2021, provides Bonneville \$10 billion in additional permanent borrowing authority "... to assist in the financing of construction, acquisition and replacement of the Federal Columbia River Power System and to implement the authority of the Administrator of the Bonneville Power Administration." The amount of Bonneville U.S. Treasury borrowing authority outstanding at any one time cannot exceed \$17.7 billion.

Bonneville is responsible for meeting the net firm power requirements of requesting customers through a variety of means, including energy conservation programs, acquisition of renewable and other resources, and power exchanges with utilities both in and outside the region.

Bonneville provides electric power, transmission, and energy services to a 300,000-square-mile service area in eight states in the Pacific Northwest. Bonneville wholesales the power produced at 31 Federal projects operated by the Corps and the Bureau and from certain non-Federal generating facilities. Bonneville operates and maintains over 15,100 circuit-miles of high voltage transmission lines and 262 substations. From these revenues, Bonneville funds the expense portion of its budget and the power operations and maintenance costs of the Bureau and the Corps in the

Federal Columbia River Power System (FCRPS). The capital portion of the budget is funded primarily through borrowing from the U.S. Treasury at market rates for similar projects and with some non-Federal financing.

Bonneville is self-financed and receives no direct annual appropriations from Congress. In FY 2023, estimated total requirements of all Bonneville programs of \$4,394 million include estimated budget obligations of \$3,660 million and estimated capital transfers of \$734 million. Estimated obligations include operating expenses of \$2,756 million, capital investments of \$843 million, and \$61 million in projects funded in advance. These investments provide electric utility and general plant requirements associated with the FCRPS's transmission services, capital equipment, hydroelectric projects, conservation, and capital investments to mitigate impacts on the environment, fish, and wildlife.

FEDERAL ENERGY MANAGEMENT PROGRAM

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
			\$	%	
Energy Efficiency and Renewable Energy					
Federal Energy Management Program	40,000	40,000	0	-40,000	N/A
Federal Energy Management	27,000	27,000	0	-27,000	N/A
Federal Energy Efficiency Fund	13,000	13,000	0	-13,000	N/A
Program Direction ¹	13,635	13,635	0	-13,635	N/A
Total, Federal Energy Management Program	53,635	53,635	0	-53,635	N/A
 Federal Energy Management Program					
Federal Energy Management	0	0	38,150	+38,150	N/A
Federal Energy Efficiency Fund	0	0	60,000	+60,000	N/A
Net-Zero Laboratory (NZL) Initiative	0	0	57,000	+57,000	N/A
Program Direction ²	0	0	14,511	+14,511	N/A
Total, Federal Energy Management Program	53,635	53,635	169,661	+116,026	+216.3%

Appropriation Overview

The Office of Federal Energy Management Program (FEMP) within the Office of the Under Secretary for Infrastructure helps federal agencies meet federal sustainability goals by accelerating the implementation of energy and water conservation measures, implementing deep retrofits, improving energy resilience, and transitioning to zero-emission fleets. The program provides technical assistance and financial assistance to agencies and works with its stakeholders to enable federal agencies to identify affordable solutions, facilitate public-private partnerships, and provide energy leadership to the country by identifying and leveraging government best practices. These activities were previously funded within the Office of Energy Efficiency and Renewable Energy (EERE).

Federal agencies have a tremendous opportunity and responsibility to lead by example, both in sharing practices and approaches that state, local and private sector actors can adopt and by deploying technologies at scale to drive market transformation. FEMP builds federal agencies' capacity to meet those goals by supplying agencies with the information, tools, and assistance they need to meet and track their energy-related requirements and goals, and by administering the Assisting Federal Facilities with Energy Conservation Technologies (AFFECT) Grant Program.

In FY 2023, the program will launch the Net-Zero Labs Initiative competitively selecting decarbonization projects across the National Laboratories. These investments will create good paying jobs.

Program Realignment

¹ PD was prorated based on the EERE Program Direction line, so the funding is non-comparable.

² PD Request for FY23 includes \$500K to support NZL, \$300K for National Environmental Policy Act (NEPA), and \$76K for pay raise assumption.

On February 9, 2022, Secretary Granholm announced a realignment to allow the Department to more effectively accelerate the transition to a clean-energy economy by pulling all levers along the commercialization spectrum—research, development, demonstration, and deployment. The Office of the Undersecretary for Infrastructure (S3) focuses on deploying clean energy infrastructure in pursuit of national goals for affordable and reliable energy, creating high quality jobs, enhancing U.S. manufacturing, and addressing the climate crisis. Its efforts support achieving carbon-free electricity in the U.S. by 2035 and a net zero economy by 2050 and delivering substantial benefits to the communities that are frequently left behind.

The Office provides skilled teams in energy planning; energy security; infrastructure financing; project development; project management; clean energy supply chains; state, community, and tribal engagement; and other key areas, critical to the success of demonstration and deployment efforts as appropriated through the historic Bipartisan Infrastructure Law and annual appropriations. The Office engages and works in partnership with a diverse set of stakeholders as it stewards and seeks the greatest benefits from federal funding.

Program Highlights

- FEMP works with Federal agencies to ensure the Federal government's energy and water management infrastructure is efficient, resilient, and secure in support of continuous mission operations. FEMP's activities are focused on developing resources and tools, providing technical assistance and replicable solution sets, issuing guidance, facilitating public-private partnerships for project financing, tracking agency performance, and collaborating with agencies to implement required training. There is a significant opportunity and responsibility for the Federal Government to reduce its carbon footprint, cut its energy costs, ensure resilient and reliable operations, and lead by example to drive electrification and decarbonization. FEMP will use its resources to turn the threat of climate change into an opportunity by catalyzing our partners across the Federal Government to achieve the goal of building a 100 percent clean energy economy with net-zero emissions.
- The Federal Energy Efficiency Fund (FEEF), authorized by 42 U.S. Code § 8253, will assist multiple agencies in applying energy conservation measures and improving the design and construction of Federal buildings so that the energy consumption, and associated carbon emissions, per gross square foot of the Federal buildings of the agency is reduced.
- In FY 2023, the program will launch the Net-Zero Labs Initiative competitively selecting innovative decarbonization projects across the National Laboratories. These investments will create good paying jobs.
- Program Direction enables FEMP to maintain and support a world-class Federal workforce that supports research, development, demonstration, and deployment of innovative technologies that will transition to a clean energy economy that benefits all Americans. The FY 2023 Budget provides resources for program and project management, oversight activities, contract administration, workforce management, IT support, and Headquarters (HQ) and field site non-laboratory facilities and infrastructure.

GRID DEPLOYMENT OFFICE

	FY 2021 Enacted^a	FY 2022 Annualized CR^{ab}	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	\$
Electricity appropriation account					
Transmission Permitting and Technical Assistance	7,000	7,000	0	-7,000	-100.0%
Program Direction	3,000	3,000	0	-3,000	-100.0%
Total, Electricity appropriation account	10,000	10,000	0	-10,000	-100.0%
Grid Deployment Office appropriation account					
Grid Planning and Development	0	0	16,200	+16,200	N/A
Grid Technical Assistance	0	0	29,500	+29,500	N/A
Wholesale Electricity Market Technical Assistance and Grants	0	0	19,000	+19,000	N/A
Interregional and Offshore Transmission Planning Program Direction	0	0	20,000	+20,000	N/A
			5,521	+5,521	N/A
Total, Grid Deployment Office appropriation account	0	0	90,221	+90,221	N/A
Total, Grid Deployment Office	10,000^a	10,000^a	90,221	+80,221	+802.2%

Appropriation Overview

The Grid Deployment Office (GDO) serves as the catalyst for the development of new and upgraded high-capacity electric transmission lines nationwide and deploying transmission and distribution technologies to improve the resilience of our Nation's electric infrastructure. A robust transmission system is the backbone of the Nation's economic, energy, and national security and a strong distribution system is critical for consumer resilience. To combat climate change, massive deployment of renewable energy and build-out of transmission infrastructure is necessary for 100% clean electricity by 2035 and net zero emissions economy-wide by 2050. GDO works in strong partnership with energy sector stakeholders on a variety of grid initiatives to achieve a clean, reliable, resilient, and equitable grid. Within the Department, GDO takes a holistic view of the electricity system by closely collaborating with the Offices of Electricity, Energy Efficiency and Renewable Energy, Clean Energy Demonstrations, and Cybersecurity Energy Security and Emergency Response, the Power Marketing Administrations, and other relevant DOE offices.

GDO fully utilizes its unique tools and authorities for coordination, planning, financing, and permitting to drive transmission investment and increase system resilience. These tools and authorities are critical to overcoming transmission challenges and addressing potential opportunities including, but not limited to:

- Insufficient transmission capacity—especially transmission that facilitates transfer of power across regions
- Increasingly vulnerable aging and poorly maintained transmission infrastructure
- Energy supply disruptions due to physical and cyber-attacks or climate-induced extreme weather
- Long permitting and review times for transmission projects

^a The FY 2023 Budget Request to Congress proposes to split the Electricity appropriation account into two accounts: Electricity and Grid Deployment Office (GDO). Had the proposed FY 2023 structure been in place in FY 2021 and FY 2022, the \$7,000,000 shown under the Electricity account's Transmission Permitting and Technical Assistance (PTPA) program would have appeared under Grid Technical Assistance in GDO and the \$3,000,000 shown under Program Direction in the Electricity account represents the estimated share of Electricity PD funding associated with PTPA and would have appeared under Program Direction in GDO.

^b FY 2022 amounts shown reflect the P.L. 117–95 continuing resolution level annualized to a full year.

- Cost-allocation issues
- Transmission interconnection-specific challenges, such as with offshore wind
- Integration of grid-scale renewable energy resources
- Increasing electrification of transportation and other sectors
- Analyzing the implications of energy interdependencies to improve the alignment and integration of generation, distribution, and transmission planning, with appropriate consideration for flexibility-providing resources including energy storage
- Climate and extreme weather impacts to infrastructure investments
- Load growth and infrastructure needs for electric vehicle deployments
- Market failures for grid investments
- Addressing affordability, evolving customer expectations and behaviors, and electricity access and equity issues, all with a focus on energy justice

Investments in the distribution system must accompany transmission deployment to modernize, harden, and expand the grid. GDO provides technical assistance to inform the formulation and implementation of policies, programs, and strategies for electricity system planning, design, and operation for all levels of a decarbonized grid. In addition, GDO will carry out the provisions provided from the Infrastructure Investment and Jobs Act (IIJA)/Bipartisan Infrastructure Legislation (BIL). Through these lines of effort, GDO will make the U.S. power grid more resilient to the impacts of climate change, increase access to affordable and reliable clean energy, and create American jobs across industry sectors.

Within the Request, GDO funds activities that supports 4 key priorities:

- Coordination – early, frequent, and collaborative engagement with government entities, including States, American Indian Tribes, and Alaska Natives, and other stakeholders throughout the process of evaluating and deploying the Department's tools and authorities to accelerate transmission deployment
- Planning – modernize distribution and transmission planning processes to drive the development of highest-need grid projects that provide largest long-term benefits to consumers
- Financing – deploy BIL authorities and coordinate existing financial tools within the Department to help reduce financing challenges project sponsors may face and catalyze private investment transmission
- Permitting – coordinate with states and federal permitting agencies to help facilitate and streamline siting and permitting processes

A February 2021 report from the National Academies of Sciences, Engineering, and Medicine provides comprehensive recommendations for improving the U.S. electric power system so that it can adequately provide electricity to the Nation in a safe, reliable, clean, resilient, and equitable way, especially as the U.S. pursues decarbonization of the energy supply. The report also recommends ways to accelerate innovations in technology, policy, and business models as global supply chains shift.^a Among the recommendations of the report, there is an urgency to reform the lengthy electrical transmission planning and siting process. The report recommends that Congress and States support the evolution of planning for and siting of regional transmission facilities. This support should take the form of a national transmission policy, to ensure energy

^a <https://nap.nationalacademies.org/catalog/25968/the-future-of-electric-power-in-the-united-states>

diversity and security as well as an equitable transition to a lower carbon energy economy. The report had several major recommendations:

- **Improve our understanding of how the system is evolving.** Forecasting tools need to be capable of adaptation to account for the different ways that the grid will evolve in different regions. The report calls for research on changes in demand for electricity, grid modernization to support decarbonization, and building analytic tools and running simulations of evolving grid systems.
- **Ensure that electricity service remains clean and sustainable, and reliable and resilient.** Reducing CO₂ emissions and increasing sustainability, in part through renewable resources, will remain a focus in the coming decades.
- **Improve understanding of how people use electricity and sustain the “social compact” to keep electricity affordable and equitable in the face of technological changes.** Potential changes in the grid may have a disproportionate effect on users with lower incomes, exposing the need to devise regulatory responses in light of changing circumstances. The report calls for increased utility regulator attention to and assessment of how changes in the electrical system affect energy access, equity, and affordability. The Federal Government should increase investment in understanding the impacts of energy transitions on workers and for workforce education and training in the changing electrical system.
- **Facilitate innovations in technology, policy, and business models relevant to the power system.** New technologies such as clean generation and energy storage can enable large changes in the way the power system is organized and operated. Understanding how electricity consumers behave and how such trends affect system loads is emerging as an important challenge. The report recommends federal and state support for social science research and analysis related to technology, policy, and business models. It also calls for enhanced experimentation and information sharing on innovations in those areas.

The development of the Grid Deployment Office is to address some of the crucial transformational efforts required to build the next generation transmission and distribution system.

Program Highlights

- **Grid Planning and Development** accelerates the planning and development of transmission infrastructure to achieve a clean, reliable, resilient, and equitable grid. In FY 2023, the Request supports the National Transmission Planning Study, a long-term transmission planning analysis done in concert with the industry to identify transmission that will provide broad-scale benefits to electric customers; inform regional and interregional transmission planning processes; and identify interregional and national strategies to accelerate decarbonization while maintaining system reliability.
- **Grid Technical Assistance** provides data, tools, analyses, and other solutions to address the challenges and opportunities driven and impacted by the modernization of the North American grid. In FY 2023, the Request greatly increases grid technical assistance activities, focusing on transmission, energy justice, and rural electric utilities, enabling stakeholders to make catalyzing electricity system decisions in support of Federal and state clean energy goals.
- **Wholesale Electricity Market Technical Assistance and Grants** provides technical assistance to States and regions to establish and improve centrally organized market components and bilateral market arrangements to ensure a clean, reliable, resilient, and equitable grid. In FY 2023, the program will provide grants to investigate market improvements, specifically to evaluate wholesale market opportunities such as expansion of energy imbalance markets.
- **Interregional and Offshore Transmission Planning** addresses the development of electricity transmission and offshore wind transmission planning through convening relevant stakeholders and conducting planning, modeling, and analysis. The Request focuses on transmission planning and financial mechanisms that help identify forward-looking transmission development for offshore wind integration on the Atlantic coast and other locations.

Bipartisan Infrastructure Law and Programmatic Realignment

In FY 2023, GDO will continue to implement the authorities provided in the BIL:

- Preventing Outages and Enhancing the Resilience of the Electric Grid (Section 40101)
- Transmission Facilitation Fund (Section 40106)
- Deployment of Technologies to Enhance Grid Flexibility (Section 40107)
- Maintaining and Enhancing Hydroelectricity Incentives (Section 40333)
- Civil Nuclear Credit Program (Section 40323)

GDO will also continue execution during FY 2023 for BIL appropriations provided in FY 2022 only:

- Advanced Energy Security Program to Secure Energy Networks, Modeling and Assessing Energy Infrastructure Risk (Section 40125(d))
- Hydroelectric Production Incentives (Section 40331)
- Hydroelectric Efficiency Improvement Incentives (Section 40332)

The new Office of Under Secretary for Infrastructure (S-3) focuses on deploying clean energy infrastructure in pursuit of national goals for affordable and reliable energy, creating high quality jobs, enhancing U.S. manufacturing, and addressing the climate crisis. Its efforts support achieving carbon-free electricity in the U.S. by 2035 and a net zero economy by 2050 and delivering substantial benefits to the communities that are frequently left behind. DOE created new offices under the Under Secretary for Infrastructure and realigned other existing offices and components to better execute the BIL appropriation and the overall DOE mission. As part of this realignment, the Grid Deployment Office was created, shifting activities from the Office of Electricity's Transmission Permitting and Technical Assistance program, as well as a corresponding portion of the Program Direction program.

Manufacturing and Energy Supply Chains

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Requests FY 2021 Enacted	
	\$	%			
Energy Efficiency and Renewable Energy					
Advanced Manufacturing Office					
Industrial Decarbonization & Manufacturing Innovations	18,000	18,000	0	-18,000	N/A
Strategic Programs					
Deployment Program Planning	3,000	3,000	0	-3000	N/A
Program Direction	909	909	0	-909	N/A
Total, Energy Efficiency and Renewable Energy¹	21,909	21,909	0	-21,909	N/A
Manufacturing and Energy Supply Chains					
Facility and Workforce Assistance	0	0	18,000	+18,000	N/A
Energy Sector Industrial Base Technical Assistance	0	0	3,000	+3,000	N/A
Program Direction ²	0	0	6,424	+6,424	N/A
Total, Manufacturing and Energy Supply Chains	21,909	21,909	27,424	+5,515	-25.2%

Appropriation Overview

The Office of Manufacturing and Energy Supply Chains (MESC), within the Office of the Under Secretary for Infrastructure, is responsible for strengthening and securing manufacturing and energy supply chains needed to modernize the nation's energy infrastructure and support a clean and equitable energy transition. MESC catalyzes the development of an energy sector industrial base through targeted investments that establish and secure domestic clean energy supply chains and manufacturing, and by engaging with private-sector companies, other Federal agencies, and key stakeholders to collect, analyze, respond to, and share data about energy supply chains to inform future decision making and investment.

The office manages programs that develop clean domestic manufacturing and workforce capabilities, with an emphasis on opportunities for small and medium enterprises and communities in energy transition. MESC coordinates across all of DOE's programs on manufacturing and supply chain issues, including the Office of Clean Energy Demonstrations and the Advanced Manufacturing Office and new Solar Manufacturing Accelerator funded in the Office of Energy Efficiency and Renewable Energy (EERE).

DOE's Industrial Assessment Centers provide a no-cost assessment, including in-depth evaluations of a facility, conducted by engineering faculty with upper class and graduate students from a participating university. This detailed process analysis will generate specific recommendations with estimates of costs, performance, and payback times. These activities were previously funded within EERE.

Program Direction enables MESC to maintain and support a world-class Federal workforce that supports research, development, demonstration, and deployment of innovative technologies that will transition Americans to net-zero

¹ Amount provided in FY 21 Enacted for Program Direction, Strategic Programs, and Advanced Manufacturing are prorated based on the activities being realigned to the new Manufacturing and Energy Supply Chains office in FY 22. All funding levels provided are pro-rated and are non-comparable.

² PD Request for FY23 includes \$5.5M for National Environmental Policy Act (NEPA) and \$15K for pay raise assumption.

greenhouse gas emission, economy-wide, by no later than 2050 and ensure the clean energy economy benefits all Americans. The FY 2023 Program Direction Request provides resources for program and project management, oversight activities, contract administration, workforce management, IT support, and Headquarters (HQ) and field site non-laboratory facilities and infrastructure.

Programmatic Realignment

On February 9, 2022, Secretary Granholm announced a realignment to allow the Department to accelerate the transition more effectively to a clean-energy economy by pulling all levers along the commercialization spectrum—research, development, demonstration, and deployment. The Office of the Undersecretary for Infrastructure (S3) focuses on deploying clean energy infrastructure in pursuit of national goals for affordable and reliable energy, creating high quality jobs, enhancing U.S. manufacturing, and addressing the climate crisis. Its efforts support achievement of carbon-free electricity in the U.S. by 2035 and a net zero economy by 2050 and delivering substantial benefits to the communities that are frequently left behind.

Support for BIL Programs

MESC provides skilled teams in energy planning; energy security; infrastructure financing; project development; project management; clean energy supply chains; state, community, and tribal engagement; and other key areas critical to the success of demonstration and deployment efforts as appropriated through BIL and annual appropriations. The Office engages and works in partnership with a diverse set of stakeholders as it stewards and seeks the greatest benefits from federal funding.

State and Community Energy Programs

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
			\$	%	
Energy Efficiency and Renewable Energy					
Weatherization and Intergovernmental Programs	377,500	377,500	0	-377,500	N/A
Weatherization Assistance Program	315,000	315,000	0	-315,000	N/A
State Energy Program	62,500	62,500	0	-62,500	N/A
Program Direction ¹	22,725	22,725	0	-22,725	N/A
Total, Energy Efficiency and Renewable Energy	400,225	400,225	0	-400,225	N/A
State and Community Energy Programs					
Weatherization Assistance Program ²	0	0	502,170	+502,170	N/A
State Energy Program	0	0	70,000	+70,000	N/A
Community Programs	0	0	25,000	+25,000	N/A
Energy Future Grants ³	0	0	105,000	+105,000	N/A
Program Direction ⁴	0	0	24,727	+24,727	N/A
Total, State and Community Energy Programs	400,225	400,225	726,897	+326,672	+81.6%

Appropriation Overview

The Office of State and Community Energy Programs (SCEP) within the Office of the Under Secretary for Infrastructure, as authorized by the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), will implement efforts under the Weatherization Assistance Program, State Energy Program, Community Programs, and Energy Future Grants to increase energy affordability and transform the energy economy by working with community-level implementation partners and State Energy Offices. This includes funding to weatherize at least 50,000 homes and launch a new Low-Income Home Energy Assistance Program Advantage Pilot (LIHEAP Advantage) to invest in home energy efficiency and emissions reduction retrofits that save energy-burdened, low-income households money and better align existing programs.

SCEP is responsible for significantly accelerating, in partnership with state, tribal, local, and other organizations, the deployment of clean energy technologies and practices and the improvement of the nation's energy infrastructure. SCEP manages activities supporting state and community energy infrastructure, programs and policies, including weatherization and technical assistance. The office supports key relationships with the state and local governments and community-based stakeholders, enabling strategic investments in clean energy technologies. SCEP serves as the primary gateway into DOE for states, tribes, and communities interested in greater energy affordability, security and resilience, and connects these important stakeholders to other programs, funding, and technical assistance opportunities across the DOE.

Program Direction enables SCEP to maintain and support a world-class Federal workforce that supports the deployment of technologies that will transition Americans to net-zero greenhouse gas emission, economy-wide, by no later than 2050 and ensure the clean energy economy benefits all Americans. The FY 2023 Budget provides resources for program and project management, oversight activities, contract administration, workforce management, IT support, and Headquarters (HQ) and field site non-laboratory facilities and infrastructure.

¹ PD was previously reported under the PD request for EERE so is non-comparable.

² FY 2023 Weatherization Assistance Program total includes funding for LIHEAP Advantage (\$100M), Weatherization Readiness (\$30M), Training and Technical Assistance (\$10M), and Weatherization Assistance Program (\$362.170M)

³ Energy Future Grants is referred to Build Back Better Challenge Grants in the President's Budget Appendix

⁴ PD Request for FY 2023 includes \$1.875M for National Environmental Policy Act (NEPA) and \$127K pay raise assumption

SCEP is working expeditiously to execute funding received in the Bipartisan Infrastructure Law (BIL). The FY23 Request complements the BIL investments and provides SCEP with additional resources to address high energy prices, reduce costs for families and businesses, and cut pollution through energy efficiency and other clean energy measures.

Programmatic Realignment

On February 9, 2022, Secretary Granholm announced a realignment to allow the Department to more effectively accelerate the transition to a clean-energy economy by pulling all levers along the commercialization spectrum—research, development, demonstration, and deployment. The newly established Office of the Undersecretary for Infrastructure (S3) focuses on deploying clean energy infrastructure in pursuit of national goals for affordable and reliable energy, creating high quality jobs, enhancing U.S. manufacturing, and addressing the climate crisis. Its efforts support achieving carbon-free electricity in the U.S. by 2035 and a net zero economy by 2050 and delivering substantial benefits to the communities that are frequently left behind.

Program Highlights

- The mission of the Office is to partner with state and local organizations to significantly accelerate the deployment of cost-saving clean energy technologies and practices through place-based strategies involving a wide range of government, community, and business stakeholders. These activities contribute to energy cost reduction and decarbonization efforts, especially for the buildings sector, provide good-paying jobs with a fair and free choice to join a union and collectively bargain, and secure clean energy economy benefits for all Americans, especially marginalized and low-income communities that have long borne the brunt of pollution.
- The Weatherization Assistance Program (WAP) supports the largest network of residential energy retrofit providers in the country, providing a foundation for related services funded by other Federal and non-Federal sources. Funds are allocated on a statutory formula basis and awarded to a single agency within each recipient's jurisdiction that manages the deployment of services to increase the energy efficiency of homes occupied by low-income households. These agencies, in turn, contract with approximately 700 local service provider organizations to deliver weatherization services to low-income families in every geographic area of the country. WAP is one of the federal government's best tools to reduce energy costs for the American people. The FY 2023 Budget enables DOE to reach more households that face high energy costs and that will not receive federal support even with funding provided in the BIL, which DOE estimates will enable services for approximately 500,000 of the 33 million eligible households.

To build on WAP's strengths, the FY 2023 Budget proposes LIHEAP Advantage to pilot an initiative to invest in home energy efficiency and emissions reduction retrofits to save households money and better align existing programs. The pilot will strategically combine energy efficiency measures, electrification, and renewable energy to maximize the reduction of both household energy bills and emissions for the most energy-burdened households. It will also explore strategic approaches to increasing program accessibility, such as braiding program funds with state, local, and private-sector funding to enable deeper services to more households and including measures that otherwise prohibit the neediest households from receiving for more households. The program will increase coordination between HHS and DOE and with both programs' state partners

- The State Energy Program strategically engages the leadership of states in deploying clean energy technologies across the U.S. SEP funding transforms the energy economy state by state, establishing and implementing clean energy policies, plans, and programs to reduce energy costs, enhance economic competitiveness, improve emergency planning, and improve the environment. States have purview over many of the policy and program levers that can catalyze greater investment in clean energy and help the country realize the suite of economic and environmental benefits (including reduced greenhouse gas emissions) associated with clean energy. SEP provides states with capacity building resources, technical assistance, and best practice sharing networks to facilitate the adoption of plans, policies, and programs appropriate to state and regional circumstances.
- Community Programs will partner with local governments in the areas of decarbonization, climate and economic justice, and workforce transitions, creating a need to establish plans and programming that balance the needs of local public agencies, private enterprises, non-governmental organizations, community members, and utilities that serve these jurisdictions. Implementing lasting changes requires inclusive planning that incorporates a cross-sector approach. Local governments are uniquely positioned to develop programs that extend beyond isolated, short-

term initiatives, and target long-range, community-based goals that connect clean energy, environmental justice, and workforce development priorities through a coordinated strategy.

- Energy Future Grants will support technical assistance to scale best practices across a broad base of local entities beyond competitive awardees. This will leverage technical assistance implementation models to establish and utilize local expertise as part of its technical assistance strategy. The subprogram will also explore existing technical assistance delivery models, including a voucher program, in designing this aspect of the program. Examples of technical assistance areas include community engagement with a focus on environmental justice, goal-setting, energy data management, financing, strategic planning, and implementation of clean energy technologies.

Support for BIL Programs

SCEP will continue implementing the state, local government, and community-related provisions appropriated in BIL. The Office provides skilled teams in energy planning; energy security; infrastructure financing; project development; project management; clean energy supply chains; state, community, and tribal engagement; and other key areas, critical to the success of demonstration and deployment efforts authorized and appropriated by the Energy Act of 2020, the BIL, and annual appropriations. The Office engages and works in partnership with a diverse set of stakeholders as it stewards and seeks the greatest benefits from federal funding.

ENVIRONMENTAL MANAGEMENT

Environmental Management by Site	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				\$	%
Carlsbad/Waste Isolation Pilot Plant (WIPP)	420,066	420,066	462,822	+42,756	+10.2%
Idaho National Laboratory	444,500	444,500	390,583	-53,917	-12.1%
Oak Ridge	644,344	644,344	612,095	-32,249	-5.0%
Paducah	315,885	315,885	281,678	-34,207	-10.8%
Portsmouth	508,864	508,864	559,731	+50,867	+10.0%
Richland	1,024,900	1,024,900	917,103	-107,797	-10.5%
River Protection	1,645,000	1,645,000	1,604,408	-40,592	-2.5%
Savannah River	1,702,870	1,702,870	1,723,670	+20,800	+1.2%
Lawrence Berkeley National Laboratory	30,100	30,100	0	-30,100	-100.0%
Lawrence Livermore National Laboratory	36,764	36,764	13,846	-22,918	-62.3%
Los Alamos National Laboratory	226,000	226,000	331,835	+105,835	+46.8%
Nevada	60,737	60,737	62,652	+1,915	+3.2%
Sandia National Laboratories	4,860	4,860	4,003	-857	-17.6%
Separation Process Research Unit (SPRU)	15,000	15,000	15,300	+300	+2.0%
West Valley Demonstration Project	92,411	92,411	94,259	+1,848	+2.00%
Energy Technology Engineering Center	12,000	12,000	26,409	+14,409	+120.1%
Moab	47,833	47,833	67,000	+19,167	+40.1%
Other Sites	14,987	14,987	4,067	-10,920	-72.9%
Headquarters Operations	12,979	12,979	103,239	+90,165	+694.7%
Technology Development	30,000	30,000	25,000	-5,000	-16.7%
Uranium/Thorium Reimbursement Program	5,000	5,000	24,400	+19,400	+388.0%
Program Direction	289,000	289,000	317,002	+28,002	+9.7%
Management of Elemental Mercury	2,100	2,100	2,100	+95	+4.5%
Mercury Receipts	3,000	3,000	3,000	0	0.0%
UE D&D Fund Deposit	0	0	417,000	+417,000	+100.0%
Subtotal, Environmental Management by Site					
Adjustments	7,589,200	7,589,200	8,063,202	+474,002	+6.3%
UE D&D Fund Offset	0	0	-417,000	-417,000	-100.0%
Use of Mercury Receipts	-3,000	-3,000	-3,000	0	0.0%
Total, Environmental Management by Site	7,586,200	7,586,200	7,643,202	+57,002	+0.8%

Appropriation Overview

The **Office of Environmental Management (EM)** supports the Department of Energy (DOE) to meet the challenges of the nation's Manhattan Project and Cold War legacy responsibilities. EM was established in 1989 and is responsible for the cleanup of millions of gallons of liquid radioactive waste, thousands of tons of spent (used) nuclear fuel and nuclear materials, disposition of large volumes of transuranic and mixed/low- level waste, huge quantities of contaminated soil and water, and deactivation and decommissioning of thousands of excess facilities. This environmental cleanup program results

from six decades of nuclear weapons development and production and Government-sponsored nuclear energy research. It involves some of the most dangerous materials known to mankind. To date, EM has completed cleanup activities at 92 sites in 30 states and in the Commonwealth of Puerto Rico. EM is currently responsible for cleaning up the remaining 15 sites in 11 states.

Cleaning up these remaining sites will support the Justice40 Initiative and advance the Administration's equity goals. Justice40 is a government-wide effort to deliver at least 40 percent of the overall benefits from certain Federal investments, including the remediation and reduction of legacy pollution, and training and workforce development, to disadvantaged communities. Under Justice40, EM's work will primarily focus on benefits from soil and groundwater remediation and STEM education. The EM budget also supports a whole-of-Government effort to advance equity for all Americans by including historic support for marginalized people and locations with increased resources for the Minority Serving Institutions Partnership Program and a new Community Capacity Building initiative to invest in historically underserved communities.

Program Highlights

- **Savannah River**

At the Savannah River Site, the FY 2023 request supports the Liquid Waste Program, to achieve additional risk reduction by stabilization and immobilization of high activity radionuclides through vitrification into canisters at the Defense Waste Processing Facility and disposition of decontaminated salt solution in Saltstone Disposal Units. The mission of the Saltstone Disposal Units #8 and #9 project is to construct two cylindrical reinforced concrete tanks designed to contain over 32,000,000 gallons of Saltstone grout each, which is the waste from the disposition of the decontaminated salt solution resulting from salt waste processing. The mission of the Saltstone Disposal Units 10-12 project is to construct three cylindrical reinforced concrete tanks designed to contain over 32,000,000 gallons of Saltstone grout each. In FY 2023, the Salt Waste Processing Facility will implement the change to the Next Generation Solvent which will require a one-month outage in the second quarter. This change in solvent will enable Salt Waste Processing Facility to increase the processing rate to 9 million gallons per year by the end of FY 2023 and process a total volume of 5,950,000 gallons in FY 2023.

The Defense Waste Processing Facility will process at a rate approximately three times its current rate to receive and vitrify the product from the Salt Waste Processing Facility. To meet the operational needs of the Salt Waste Processing Facility and coincident increase in the Defense Waste Processing Facility processing, more than 20 tanks will be undergoing some level of preparation for waste removal and transfer of waste for feed at any one time.

The FY 2023 request also supports continued risk reduction of the Nuclear Materials Program missions to store, stabilize, and disposition EM owned nuclear materials and spent nuclear fuel, as well as support the necessary mission for maintaining the safe and environmental compliant state of excess nuclear processing facilities until their future decommissioning. The Nuclear Materials Program missions at the Savannah River Site includes operations of H-Canyon, L-Basin, K-Area Facilities, and the surveillance and maintenance of excess nuclear facilities in F-Area. In FY 2023, H-Canyon will be maintained in a high state of readiness and continue surveillance and maintenance activities. The mission for the K-Area Facilities is to safely store surplus plutonium and to down blend the material into an acceptable waste form for disposition at the Waste Isolation Pilot Plant in Carlsbad, New Mexico. In FY 2023, the K-Area Facilities will continue glovebox operations and increase down blending of plutonium to 24/7 operations. Other facilities in K-Area will support final packaging of the down blended containers for the Waste Isolation Pilot Plant characterization/certification and storage of the final waste form until disposal. The FY 2023 request maintains the safe and environmental compliant state of the Savannah River Site excess nuclear facilities including the completion of deactivation activities for Building 235-F and layup activities for the F/H Analytical Laboratory. Completion of these actions will allow reduced surveillance costs, as well as the hazards in the facilities.

The FY 2023 request continues to support direct funding to meet EM's share of the Savannah River Site legacy pension obligations. The FY 2023 request also establishes direct funding for EM's share of operations, maintenance and utilities for the Savannah River National Laboratory.

The increase over the FY 2021 Enacted level is attributed to an increase in preparation of tanks for waste removal and feed preparation in support of Salt Waste Processing Facility operations at planned rates, an increase in Saltstone Disposal Units 10-12, as well as initiating deactivation and decommissioning of 235-F.

- **Office of River Protection**

The Department is working to complete and operate the treatment facilities to safely immobilize and dispose of tank waste at Hanford. The FY 2023 budget request represents continued progress toward important cleanup required by the Amended Consent Decree and Tri-Party Agreement. The request is designed to maintain safe operations of the tank farms to protect workers, the public, and the environment; enable the development and maintenance of infrastructure necessary to enable waste treatment operations; and progress single shell tank retrievals. The budget request also focuses on the Waste Treatment on Immobilization Plant High-Level Waste Facility to advance facility engineering and design. The mission of the Waste Treatment Plant Project is to construct a treatment facility to blend waste from the tank farms with molten glass, which is placed into stainless steel canisters suitable for long-term storage of high-level waste and disposal of low-level waste.

The decrease from the FY 2021 Enacted level reflects an overall reduced funding need as the Low Activity Waste portion of the Waste Treatment Plant is completed and enters cold commissioning.

- **Richland**

The Richland Operations Office manages all cleanup activities at Hanford not managed by the Office of River Protection, while also providing site-wide services shared by the two offices. Cleanup activities include soil and groundwater remediation, facility decontamination and decommissioning, and disposition of waste other than the tank waste managed by the Office of River Protection. Richland's FY 2023 request continues important cleanup progress required by the Tri-Party Agreement. It will maintain safe operations; perform Hanford site-wide services; support Direct Feed Low-Activity Waste startup and commissioning; and conduct critical site infrastructure projects. The budget request also supports progress in modifications to the Waste Encapsulation and Storage Facility for transfer of the cesium-strontium capsules to dry storage by August 2025, continued groundwater treatment progress, accelerated Resource Conservation and Recovery Act compliance well drilling, additional groundwater treatment implementation, and completion of 105KW Fuel Storage Basin above and below water debris disposition and deactivation activities.

The decrease from the FY 2021 Enacted level is due to the completion of the Plutonium Finishing Plant mission, and a reduced funding need for the Waste Encapsulation and Storage Facility. The River Corridor reduction supports other Hanford and EM wide priorities. River Corridor will continue to work on Facility/Waste Site/Canyon surveillance and maintenance, Aging Facility Risk Mitigation, K Basin, and River Corridor Operation Activity.

- **Oak Ridge**

The FY 2023 budget request continues cleanup activities at the Oak Ridge site, including slab and soil remediation at the East Tennessee Technology Park; addressing high-risk excess contaminated facilities at Oak Ridge National Laboratory and Y-12, disposition of U-233 material and transuranic waste; design for the On-Site Waste Disposal Facility to support cleanup of ORNL and Y12; and continued investment in mercury characterization and remediation technologies.

The decrease from the FY 2021 Enacted level is attributed to planned progress on construction of the Outfall Mercury Treatment Facility and processing transuranic waste, as well as the ramp down in remaining work to complete the cleanup of the East Tennessee Technology Park.

- **Idaho**

At the Idaho Site, the FY 2023 Request continues progress in characterizing, packaging, and shipping stored contact-handled and remote-handled transuranic waste. The Request also furthers processing, characterizing, packaging, and shipping mixed low-level radioactive waste and remote-handled mixed low-level radioactive waste to off-site disposal facilities. The FY 2023 Request completes treatment of contact handled sludge waste, bringing to a close a decades-long effort to treat legacy waste in Idaho. The Advanced Mixed Waste Treatment Project will continue Resource Conservation and Recovery Act closure activities and transition to demolition and dismantlement efforts. The Request also supports continued spent nuclear fuel transfers from wet storage to dry storage which remains on track to meet

the settlement agreement milestone ahead of the January 1, 2023, due date, and funds Integrated Waste Treatment Unit radiological operations to process liquid tank waste. Finally, the Request includes three line-item construction projects: 1) design activities for a Spent Nuclear Fuel Staging Facility (22-D-403), 2) expansion of the Idaho Comprehensive Environmental Response, Compensation, and Liability Act Disposal Facility (22-D-404), and 3) initiation of the Calcine Disposition Project (23-D-402).

The decrease from the FY 2021 Enacted level is attributed to the Integrated Waste Treatment Unit transition from completion of facility modifications to radiological operations and reflects completion of Idaho Nuclear Technology and Engineering Center infrastructure-related projects to reduce future liabilities. The decrease also reflects a reduction in Radioactive Waste Management Complex infrastructure support as waste processing progresses and facilities transition from Resource Conservation and Recovery Act Closure to demolition and dismantlement.

- **Carlsbad**

The Carlsbad Field Office is responsible for managing the National Transuranic Waste Program and the Waste Isolation Pilot Plant (WIPP), the Nation's only mined geologic repository for the permanent disposal of defense-generated transuranic waste. The Waste Isolation Pilot Plant FY 2021 request supports disposal facility operations, regulatory and environmental compliance actions, the Central Characterization Project to perform transuranic waste characterization/certification activities to maintain progress toward legacy transuranic waste related milestones at generator sites, transuranic waste transportation capabilities, continued progress on repairing or replacing infrastructure, modernizing underground equipment to zero-emission battery-electric vehicles powered equipment, the Safety Significant Confinement Ventilation System (15-D-411), and Utility Shaft (15-D-412).

The increase from the FY 2021 Enacted level is attributed to continued investments in infrastructure recapitalization projects as well as mine modernization activities. Increase also reflects transportation activities from multiple locations required for sustained operations at a rate of up to 17 shipments per week.

- **Paducah**

The FY 2023 budget request supports activities to continue environmental remediation and to further stabilize the gaseous diffusion plant. The stabilization activities include non-destructive assay characterization, activities to remove hazardous materials, and surveillance and maintenance. This budget request also supports the safe operation of the Depleted Uranium Hexafluoride Conversion facility.

The FY 2023 decrease from the FY 2021 Enacted level reflects progress on C-400 deactivation, subsurface investigation, and remediation, and completion of the Tennessee Valley Authority substation and deactivation of the C-531 switchyard.

- **Portsmouth**

The FY 2023 budget continues decontamination and decommissioning activities. This budget request also supports the safe operation of the Depleted Uranium Hexafluoride Conversion facility. The FY 2023 Budget Request includes funding the On-Site Waste Disposal Facility, Line-Item Capital Project #2 (20-U-401) to receive the debris from the X-333 Process Building. The mission of these projects is to construct an on-site facility for the disposal of debris generated from the demolition of the Portsmouth Gaseous Diffusion Plant and associated facilities.

Increase supports significant progress for X-333 Process Building D&D, On-Site Waste Disposal Facility construction, waste placement operations, and completion of X-326 Process Building demolition. The increase from the FY 2021 Enacted level also supports operations of the Depleted Uranium Hexafluoride conversion facility and plant and safety reliability modifications and the initial infrastructure to support shipping oxide and heel cylinders.

- **Los Alamos National Laboratory**

FY 2023 activities will continue to focus on the removal of legacy waste, conduct of soil and groundwater investigations and remediation where needed, and protection of surface water at the Los Alamos National Laboratory. Consistent with the priorities established with the New Mexico Environment Department in the 2016 Consent Order, cleanup activities will continue to focus on groundwater and soil remediation and surface water protection. The Chromium

Plume Control Interim Measure to control migration of a hexavalent chromium plume beneath Mortandad and Sandia Canyons will continue. Additionally, Plume-Center Characterization activities will continue to investigate and develop a corrective measure for remediation of the hexavalent chromium plume. Characterization and risk assessment for the Royal Demolition Explosives (RDX) groundwater plume in Cañon de Valle will continue. Implementation of the individual storm water permit will continue, and investigation and cleanup of several aggregate areas will be completed. Characterization and cleanup at Technical Area 21 will continue as well as retrieval and repackaging of the below-grade transuranic waste to include readiness activities and infrastructure needs to manage the processing and packaging of the waste at Area G. In addition, the FY 2023 request will continue deactivation and decommissioning activities for the Ion Beam project, a National Nuclear Security Administration high-risk excess facility.

In 2021, EM-Los Alamos (EM-LA) was named a Justice40 Pilot Program. In FY 2023, funding will focus on three areas: 1). Soil and groundwater remediation; 2). workforce development including job training programs and STEM education; and 3). Grants for the Santa Fe Indian School and Pueblos as Part of Los Alamos Pueblos Project.

The increase from the FY 2021 Enacted level is due to installation of additional chromium and RDX plume characterization groundwater monitoring wells; acceleration of aggregate area work under the Southern Boundary and Pajarito Watershed Campaigns; vapor monitoring at Material Disposal Areas C and L; and support for the decontamination and decommissioning of high-risk excess nuclear facilities.

- **Mission Support**

The FY 2023 Request supports an increased focus for the Minority Serving Institutions Partnership Program to advance job creation, racial equality, and environmental justice to strengthen Historically Black Colleges and Universities and other Minority Serving Institutions by developing 21st century infrastructure, as well as advancing STEM education for the pipeline of worker needed for the cleanup mission.

The FY 2023 Request also establishes the Community Capacity Building initiative that will address equity concerns within disadvantaged communities by establishing a new grant program to provide assistance and capacity building based on needs identified through Tribal consultation and stakeholder engagement.

The increase from the FY 2021 Enacted level is to support the Minority Serving Institutions and Community Capacity Building initiatives.

DEPARTMENTAL ADMINISTRATION

(\$K)

FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY21 Enacted	
			\$	%

Departmental Administration

Office of the Secretary	5,582	5,582	6,642	+1,060	+18.99%
Congressional & Intergovernmental Affairs	5,000	5,000	7,142	+2,142	+42.84%
Chief Financial Officer	53,590	53,590	62,283	+8,693	+16.22%
Economic Impact & Diversity	10,169	10,169	34,140	+23,971	+235.73%
International Affairs	26,825	26,825	62,141	+35,316	+131.65%
Artificial Intelligence and Technology Office	2,500	2,500	2,608	+108	+4.32%
Chief Information Officer	140,200	140,200	233,731	+93,531	+66.71%
Subtotal, DA	243,866	243,866	408,687	+164,821	+67.59%
Other Departmental Administration					
Management	54,358	54,358	86,317	+31,959	+58.79%
Project Management Oversight and Assessments	13,000	13,000	13,550	+550	+4.23%
Chief Human Capital Officer	24,918	24,918	35,366	+10,448	+41.93%
Office of Small & Disadvantaged Business Utilization	3,386	3,386	3,825	+439	+12.97%
General Counsel	35,000	35,000	43,722	+8,722	+24.92%
Office of Policy	7,000	7,000	31,073	+24,073	+343.90%
Public Affairs	4,000	4,000	5,936	+1,936	+48.40%
Office of Technology Transitions	17,639	17,639	0	-17,639	-100.00%
Subtotal, Other DA	159,301	159,301	219,789	+60,488	+37.97%
Strategic Partnership Projects (SPP)	40,000	40,000	40,000	0	0.00%
Total, Departmental Administration (Gross)	443,167	443,167	668,476	+225,309	+50.84%
Defense-Related Administrative Support (DRAS)	-183,789	-183,789	-170,695	+13,094	-7.12%
Subtotal, Departmental Administration	259,378	259,378	497,781	+238,403	+91.91%
Miscellaneous Revenues					
Revenues Associated with SPP	-40,000	-40,000	-40,000	0	0.00%
Other Revenues	-53,378	-53,378	-60,578	-7,200	+13.49%
Subtotal, Miscellaneous Revenues	-93,378	-93,378	-100,578	-7,200	+7.71%
Total, Departmental Administration (Net)	166,000	166,000	397,203	+231,203	+139.28%

Appropriation Overview

The **Departmental Administration (DA)** appropriation funds 14 management and mission support functional organizations that have enterprise-wide responsibility for administration, accounting, budgeting, contract and project management, human resources management, congressional and intergovernmental liaison, energy policy, information management, life-cycle asset management, legal services, energy jobs, energy justice, workforce diversity, equal employment opportunity, ombudsman services, small business advocacy, sustainability, arctic energy coordination, and public affairs.

The DA appropriation also budgets for Strategic Partnership Projects (SPP) expenses and offsetting collections and for Miscellaneous Revenues that offset the costs of the overall program of work. Additionally, the DA program of work operates by executing Defense Related Administrative Support (DRAS) funding appropriated within Other Defense Activities (ODA) to account for the support DA programs provide for the Defense portion of DOE.

Program Highlights

In FY 2023, DA program increases are intended to strengthen enterprise-wide management and mission support functions, per the Administration's priorities, as the highlights below outline:

- **Office of the Chief Financial Officer (CFO):** Funding will continue to support corporate business systems to meet and comply with updated cyber security requirements and initiatives; fund operation in a Cloud environment; continued implementation of the Robotic Process Automation (RPA) initiative across the CFO activities and enhance systems supporting enterprise business processes and systems.
- **Economic Impact & Diversity (ED):** Funding will support ED's role as central coordinator and departmental subject matter expert on equity and justice, to include technical assistance to minority businesses, Minority Serving Institutions, and third-party evaluation of Justice40 benefits. Funding continues support for direct oversight of Civil Rights/Employment Equal Opportunities (EEO) to support increased Civil Rights Enforcement, Compliance, and Technical Assistance for the DOE enterprise (except for NNSA), and to directly oversee the affirmative employment and diversity and inclusion functions for the DOE enterprise (except for NNSA and the PMAs). Staffing level supports EEO consolidation, energy justice, diversity, equity, and inclusion activities.
- **International Affairs (IA):** Funding will support the Administration's efforts to accelerate international climate progress, deploy American innovation, and support economic prosperity at home and abroad and continue to pursue international climate and clean energy cooperation through key multilateral and bilateral forums with the objective to reduce global greenhouse gas emissions, create good paying American jobs, enhance U.S. competitiveness, protect those most vulnerable to climate change. IA's investment in the Net Zero World Initiative, DOE's signature contribution to the Presidents Build Back Better World Initiative, provides comprehensive technology and investment roadmaps to help key large emitters across the globe achieve net zero emissions by 2050.
- **Office of the Chief Information Officer (OCIO):** Funding will support OCIO's continued modernization of DOE's IT infrastructure and IT services to provide the capacity, flexibility, and resiliency required of a modern and secure enterprise. Proposed modernization initiatives will continue to reduce cybersecurity risk through improved cybersecurity technology and automation, scale capacity commensurate with demand, and establish IT enterprise capabilities. Further, this will allow for commercial/managed IT service implementation with engineered and inherent cybersecurity capabilities and provide foundational requirements for enhanced cybersecurity tools, products, and capabilities. Vulnerabilities identified by the SolarWinds intrusion incident of December 2020, will continue to be addressed through funds specifically dedicated to cyber incident response and recovery management in the FY 2023 Request.
- **Management (MA):** Funding will support MA's mission fulfillment, and expansion of the Department's electric vehicle fleet and charging infrastructure as part of a transition from GSA-leased gas-powered vehicles to GSA-leased Zero Emission Vehicles.
- **Office for Human Capital (HC):** Funding will support current operational levels, maintain HC's vital customer service mission, and support ongoing initiatives related to developing more agile, cost-effective operations and modernizing hiring practices to improve the DOE workforce's ability to deliver mission outcomes. Additional funding will support hiring increases related to Bipartisan Infrastructure Law, build upon Talent Teams and dedicated resources to provide HR and hiring managers with new tools and capabilities that are needed to effectively support mission needs.
- **Office of Policy (OP):** Funding supports performance of priority analyses and policy work across the Department's activities, focused on technology; infrastructure; state, local, and tribal activities; energy jobs, and supports the Arctic Energy Office.

- **Artificial Intelligence Technology Office (AITO):** Funding will strengthen DOE AI capabilities and applications, invest in AI systems R&D, and build multi-sector collaboration that will maintain American AI leadership.

Bipartisan Infrastructure Law

Up to one-tenth of one percent of Bipartisan Infrastructure Law (BIL) funding may be transferred to DA for management and mission support. In FY 2023, the DA offices will support BIL implementation by, in part, ensuring that staffing, IT, and other needs are promptly addressed and that equity considerations are integrated into all levels of implementation.

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	
				\$	%
Environment, Health, Safety and Security Mission Support					
Environment, Health, Safety and Security Mission Support					
Program Direction	134,320	134,320	138,854	+4,534	+3.4%
Program Direction	72,000	72,000	76,685	+4,685	+6.5%
Total, Environment, Health, Safety and Security Mission Support	206,320	206,320	215,539	+9,219	+4.5%

Appropriation Overview

Environment, Health, Safety and Security (EHSS) supports implementing DOE's commitment to maintain a safe and secure work environment for all Federal and contractor employees; ensure operations do not adversely affect the environment, health, and safety of surrounding communities; and protect national security and other entrusted assets. EHSS supports achieving DOE's mission in a safe, secure, environmentally responsible manner by providing consistent policy, technical assistance, and corporate leadership for environment, health, safety, and security program areas.

Specifically, EHSS maintains policies and guidance that promote safe, environmentally sustaining work practices in the areas of occupational, facility, nuclear, and radiation safety; environmental protection; and quality assurance; supports Departmental and national preparedness and response efforts associated with radiation emergencies and accidents and domestic and international research on exposures of workers and the public to nuclear, radiological, and other hazardous materials; provides health and environmental services to the people of the Marshall Islands; provides medical screenings for former DOE and DOE-related vendor employees, and supports the Department of Labor in implementation of the Energy Employee Occupational Illness Compensation Program Act; provides technical security and analytical expertise to develop and assist in the implementation of safeguards and security programs that protect national security assets entrusted to DOE; implements U.S. Government nuclear weapons-related technology classification and declassification program; maintains policies and guidance related to physical protection, personnel and information security and nuclear materials accountability; provides technical assistance to DOE programs, site offices and laboratories to implement cost effective security measures tailored to the mission; maintains corporate security-related information management systems to determine the potential for an undue risk to individual sites, DOE, and national security; provides for the protection of DOE Headquarters facilities and access authorizations for DOE Headquarters personnel.

Program Highlights

In FY 2023, the Request proposes to:

- Keep DOE's EHSS policies efficient, effective and in compliance with national policies.
- Support cost effective implementation of EHSS requirements including continued support for implementation of DOE's Design Basis Threat Order.
- Identify and assess effective, safe, and reliable physical security technologies to replace obsolete systems at nuclear facilities and laboratories.
- Continue to improve DOE's safety culture by expanding the safety culture community of interest to share best practices, performing safety culture assessments, and monitoring safety culture performance including analyzing and monitoring results to improve safe accomplishment of work.
- Manage DOE's classification program to protect national security interests and develop advanced computer tools to decrease the cost and increase the accuracy of derivative classifier work throughout the DOE/NNSA complex.
- Manage programs that support EHSS excellence and efficiency across the complex such as the Voluntary Protection Program.

- Manage programs that promote improvements in EHSS knowledge and capabilities such as the Nuclear Safety Research and Development Program and international health studies.

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	
				\$	%
ARPA-E Projects	392,000	392,000	643,000	+251,000	+64%
Program Direction	35,000	35,000	57,150	+22,150	+63%
Total, Advanced Research Projects	427,000	427,000	700,150	+273,150	+64%
Agency - Energy					

Appropriation Overview

The U.S. Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E) was established by the America COMPETES Act of 2007 (Public Law 110–69), as amended. The mission of ARPA-E is to enhance the economic, climate, and energy security of the United States through the development of advanced technologies that reduce imports of energy from foreign sources; reduce energy-related emissions, including greenhouse gases; improve the energy efficiency of all economic sectors; provide transformative solutions to improve the management, clean-up, and disposal of radioactive waste and spent nuclear fuel; improve the resilience, reliability, and security of infrastructure to produce, deliver, and store energy; mitigate the causes of, reverse the impact of, adapt to, or increase resilience against climate change; and monitor, analyze, and utilize climate emissions data. ARPA-E will ensure that the United States maintains a technological lead in developing and deploying advanced technologies. ARPA-E will identify and promote revolutionary advances in energy and climate-related applied sciences, translating scientific discoveries and cutting-edge inventions into technological innovations. It will also accelerate transformational technological advances in areas where industry by itself is not likely to invest due to technical and financial uncertainty. ARPA-E focuses on novel early-stage energy and climate research and development with technology applications that can be meaningfully advanced with a small investment over a defined period of time. ARPA-E coordinates its work with DOE's basic research and applied programs and other Federal research agencies to ensure work is not duplicated.

Program Highlights

ARPA-E has established a nimble, effective management structure and developed a portfolio of technical programs that is delivering innovative, investable opportunities to the commercial sector. ARPA-E will continue to deliver value to the U.S. economy with continued emphasis on maintaining a healthy portfolio of projects. These projects cover a broad range of topics, with a growing focus on additional scale-up of the most promising projects that have demonstrated success in technical development, project management, and definition of commercial pathways.

Since its inception in 2009 through September 2021, ARPA-E has provided approximately \$2.9 billion in funding to over 1,270 projects through focused programs and open funding solicitations. A total of 183 ARPA-E projects have attracted more than \$7.6 billion in private-sector follow-on funding, 266 project teams have partnered with other agencies for further development, and 109 companies have been formed from ARPA-E projects. In addition, ARPA-E project teams have generated 4,871 peer-reviewed journal articles and received 789 patents from the U.S. Patent and Trademark Office.

In FY 2023, the Administration proposes to expand ARPA-E's scope to include R&D on climate adaptation and resilience innovations. This will enable work beyond the energy technology-focused projects necessary to achieve net zero emissions by 2050, including coordination across agencies, to meet the Administration's goals to adapt and strengthen resilience from the most devastating impacts of climate change. The Administration looks forward to working with Congress to develop the required legislation to advance these goals. This expanded scope complements ARPA-E's advanced energy mission and reflects the need to address additional climate change-related initiatives. Funding is requested to support the Administration's broader climate technology agenda that will drive innovation to tackle the climate crisis while creating good paying jobs, assure the United States remains the world's leader in climate technologies, and increase societal resilience to climate change impacts. ARPA-E will work with the other Agencies to develop transformative solutions for the climate crisis, including adaptation, and resilience, and lay the foundation for future improvements in R&D across the Federal Government.

In FY 2023, ARPA-E plans to release up to 22 new funding opportunity announcements (FOAs) focused on energy and climate adaptation and resiliency (pending authorization expansion). The FOAs will address new areas not represented in the present portfolio and develop new opportunities opened by the outcomes of previous programs. The assessment process for the new programs is now underway.

Potential technology areas for focused programs in FY 2023:

Energy-related topics may include: Grid resilience, reliability, flexibility, and operation; advanced nuclear or fusion technologies; disruptive storage for transportation and/or grid; carbon neutral or negative fuels; and decarbonization and/or greenhouse gas (GHG) capture.

Climate-related topics may include: Climate sensors and monitoring for dramatically improved GHG detection, climate analysis, and severe event prediction; carbon neutral/negative agricultural production and general land, freshwater, and ocean use; prevention of GHG emissions from land sources; carbon neutral waste and recycling; and resilient infrastructure to protect against climate-related severe events.

ARPA-E plans to release another Seeding Critical Advances for Leading Energy Technologies with Untapped Potential (SCALEUP) FOA in FY 2023 in order to continue the push toward commercialization for previous extremely early-stage ARPA-E programs and to continue the focus on ensuring manufacturing in the U.S.

ARPA-E will also continue its stand-alone Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) program to provide additional support to small businesses beyond the significant number of awards to small businesses via ARPA-E's standard non-SBIR/STTR solicitations. ARPA-E plans to release SBIR/STTR funding through its annual Supporting Entrepreneurial Energy Discoveries (SEED) program, as well as focused FOAs targeted for SBIR/STTR awards.

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\\$K)	
				FY 2023 Request vs FY 2021 Enacted	
				\$	%
Energy Information Administration					
National Energy Information System	126,800	126,800	144,480	+17.7	+13.9%
Total, Energy Information Administration	126,800	126,800	144,480	+17.7	+13.9%

Appropriation Overview

The **U.S. Energy Information Administration (EIA)** is the statistical and analytical agency within the U.S. Department of Energy (DOE). EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. EIA is the nation's premier source of energy information and, by law, its data, analyses, and forecasts are independent of approval by any other officer or employee of the U.S. government.

EIA conducts a wide range of data collection, analysis, forecasting, and dissemination activities to ensure that its customers, including Congress, federal and state governments, the private sector, the public, and the media, have ready access to timely, reliable, and relevant energy information. EIA's data and analysis inform important energy-related decisions, such as the availability of energy sources; government, business, and personal investment decisions; and policy development.

Program Highlights

The FY 2023 Budget Request of \$144,480,000 would enable EIA to continue delivering the critical data, analysis, forecasts, and long-term energy outlooks on which the agency's stakeholders rely. In addition, this funding level would enable EIA to advance its program on multiple fronts to address key emerging energy issues, including information needs identified in the Bipartisan Infrastructure Law (Infrastructure Investment and Jobs Act, P.L. 117-58). In these initiatives, EIA would actively engage other federal, state, and local entities as appropriate to harmonize data collection efforts and leverage data-sharing agreements and third-party information to efficiently expand program coverage where feasible.

- Expand the Residential Energy Consumption Survey (RECS) to collect and publish household energy use for Puerto Rico and the other populated U.S. territories. The work would begin with a pilot study testing potential collection methodologies, which would then be used to inform the design and execution of official collection efforts to provide representative statistics for each individual territory and could be used in conjunction with the statistics for the U.S. mainland. EIA would also explore the feasibility of collecting and publishing new Commercial Buildings Energy Consumption Survey (CBECS) data for the populated U.S. territories.
- Begin modernizing the National Energy Modeling System (NEMS) to more fully address the transitional nature of the energy sector, such as the increasing penetration of renewables and the ability to model deep decarbonization scenarios. EIA would also improve technology representation in the *Annual Energy Outlook* (AEO) to more fully account for dynamic market and industry developments in the AEO's long-term projections.
- Collect and publish new and highly relevant electricity information in response to stakeholder needs. For example, EIA would release regional hourly data on wind and solar generation, collect new data on the hybrid operation of solar and battery projects installed and operated for mutual efficiency, and collect new data on sales of electricity to power electric vehicles. This initiative would also enable EIA to publish wholesale electricity price data on a near real-time basis and provide regional estimates of emissions related to electricity generation. EIA would also explore the feasibility of collecting and publishing new data on electric vehicle infrastructure and city-level data on electricity-related emissions.
- Provide near real-time information to support the federal response to unforeseen energy disruptions and natural disasters. This effort would enable rapid emergency data collection and expansion of third party data and analysis. EIA would be able to collect and analyze regional data in the event of severe supply disruptions to report supply conditions and constraints, expanding EIA's short-term market analysis to provide context that supports more informed stakeholder decision making during and after severe disruptions.

The FY 2023 funding will also enable EIA to maintain and enhance cybersecurity capabilities in response to new threats and evolving DOE and federal requirements to support an expanding cloud presence.

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$ K)	
				\$	%
Office of Enterprise Assessments					
Enterprise Assessments	24,435	24,435	27,486	+3,051	+12.5%
Program Direction	54,635	54,635	57,941	+3,306	+6.1%
Total, Office of Enterprise Assessments	79,070	79,070	85,427	+6,357	+8.0%

Appropriation Overview

The **Office of Enterprise Assessments (EA)** supports the Department's mission priorities and strategic plan for the secure, safe, and efficient operation of the Department's science and energy research, environmental cleanup activities, and nuclear weapons complex by conducting independent assessments of security and safety performance throughout the Department, taking enforcement action for contractor violations of security and safety regulations, and providing training programs that institutionalize enterprise security and safety lessons learned. EA activities complement, although do not replace, the responsibility of DOE line management for compliance with security and safety requirements to manage the Department's programs effectively.

EA reports directly to the Office of the Secretary and is independent of the DOE programs that develop and implement security and safety policy and programs and therefore is more able to provide objective and timely information to DOE senior leadership, contractor organizations, and other entities on the methods to appropriately protect national security material and information assets; and whether Departmental operations provide for the safety of its employees and the public. EA activities evaluate the Department's effectiveness in promoting protection strategies that are based on informed risk management decisions. EA is designated to implement statutorily authorized contractor enforcement programs pertaining to classified information security, nuclear safety, and worker safety and health. EA also operates the DOE National Training Center (NTC) in Albuquerque, New Mexico, to enhance the proficiency and competency of the Department's security and safety personnel.

Program Highlights

In FY 2023, EA is strengthening the Department's posture and ability to protect national security assets, its employees, and the public by:

- Conducting comprehensive independent security performance assessments and follow-up assessments at DOE National Security / Category I Special Nuclear Material sites, using limited notice safeguards and security performance tests to provide accurate, up-to-date assessments of DOE site security response capabilities; and evaluating actions to detect insider threats from individuals who may seek to compromise national security and/or the ability of the Department to meet its mission;
- Increasing the number of assessments performed and enhancing the methods and tools used to conduct comprehensive independent cybersecurity assessments, including unannounced red team performance testing, to identify vulnerabilities in the Department's National Security, Intelligence, scientific, and other information systems against external and internal attacks;
- Conducting nuclear safety, worker safety and health, and emergency management independent performance assessments of the Department's operations including high hazard nuclear construction projects and operations such as those at the Los Alamos National Laboratory, Y-12 National Security Complex, Savannah River Site, Hanford Site, and Idaho National Laboratory;
- Management and implementation of the DOE enforcement function that holds contractor organizations accountable for noncompliance with worker safety and health, nuclear safety, Unclassified Controlled Nuclear Information, and classified information security regulations;
- Providing training programs that promote the competency and proficiency of DOE federal and contractor employees and performing other related functions via the DOE National Training Center in Albuquerque, NM, to institutionalize security and safety performance improvements and incorporate lessons-learned; and
- Using risk-informed and fact-based analysis to identify emerging trends in safety, security, and cybersecurity within the Department.

LEGACY MANAGEMENT

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	
				\$	%
Legacy Management					
Legacy Management	142,797	142,797	174,163	+31,366	+22%
Program Direction	20,262	20,262	21,983	+1,721	+8%
Total, Legacy Management	163,059	163,059	196,146	+33,087	+20%

Appropriation Overview

Legacy Management (LM) protects human health and the environment by providing long-term management solutions at over 100 World War II and Cold War era sites where the federal government operated, researched, produced, and tested nuclear weapons and/or conducted scientific and engineering research. Residual hazards remain at these sites after cleanup is completed due to technical limitations of remedial work. As a result, the U.S. Department of Energy (DOE) maintains a post-closure obligation to reduce legacy pollution and protect human health and the environment after cleanup is completed. LM fulfills DOE's post-closure obligation by providing long-term stewardship (LTS) of sites that have no continuing mission. In the next five years, LM anticipates adding over 20 new sites to its LTS portfolio.

The LM request provides funding for its core LTS activities including Long-Term Surveillance and Maintenance (LTS&M) at its current sites. Funding also supports determination of the condition, and risk posed by physical, radiological and chemical hazards at abandoned Defense-Related Uranium Mine (DRUM) sites. Funding further enables the Archiving and Information Management program, assures post-retirement benefits to former contractor workers and executes the Department's Mineral Leasing Program. Other functions include asset management, furthering the goals of Environmental Justice as well as providing education, communication, history and outreach to many affected States and Local communities.

Program Highlights

LM's FY 2023 request is approximately \$33,087,000 above its FY 2021 enacted level. In addition to supporting the enhancement of core LTS activities mentioned above, \$10,075,000 will allow LM to strengthen its foundational Environmental Justice program activities, enabling the program to reach a larger number of affected communities. This funding also supports Executive Order 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government," and Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad." Funding ensures equity and climate resilience are assessed and implemented for all LM's activities.

In addition, \$5,992,000 supports acceleration of major maintenance and repair at sites with natural and climate-change induced degradation. In FY 2023, funding will be applied to stabilization of the North Walnut Creek hillside at Rocky Flats site in Colorado and repair of the mud pits at Amchitka site in Alaska.

The remaining \$17,020,000 supports the proposed FY 2023 cost-of-living pay increase for civilian employees; providing legacy benefits to more than 10,000 former contractor workers; transition activities related to new sites; inventorying, risk screening, and safeguarding of DRUM sites on Navajo Nation and other Tribal lands; deployment and implementation of new Continuous Diagnostics and Mitigation (CDM) and Endpoint Detection and Response (EDR) tools to improve the monitoring, detection and response to cyber-attacks; execution of beneficial reuse of DOE properties such as the Shirley Basin South site in Wyoming; and extensive community interaction and outreach to support the long-term stewardship mission.

	(\$K)				
	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted	
				\$	%
Office of Hearings and Appeals					
Office of Hearings and Appeals	4,262	4,262	4,477	+215	+5%
Total, Office of Hearings and Appeals	4,262	4,262	4,477	+215	+5%

Appropriation Overview

Office of Hearings and Appeals (OHA) is the central administrative adjudicatory body for the Department of Energy. OHA's jurisdiction includes conducting evidentiary hearings to determine an employee's eligibility for a security clearance, Freedom of Information Act and Privacy Act appeals, and requests for exception relief from DOE regulations and orders, such as regulatory relief from the appliance energy efficiency standards. OHA also offers alternative dispute resolution services such as mediation for a variety of matters.

Program Highlights

Over the last ten years, OHA has reduced its case-processing time in all areas of jurisdiction without compromising the high quality of decisions. The Request supports salaries and benefits for 24 FTEs operating in OHA's Personnel Security and Appeals Division, Employee Protection and Exceptions Division, and the Alternative Dispute Resolution Office.

OFFICE OF THE INSPECTOR GENERAL

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	\$
Office of the Inspector General					
Office of the Inspector General	57,739	57,739	106,808	+49,069	+85.0%
Total, Office of the Inspector General	57,739	57,739	106,808	+49,069	+85.0%

Appropriation Overview

The **Office of the Inspector General (OIG)** reviews the integrity, economy, and efficiency of Department of Energy (DOE) programs and operations, including the National Nuclear Security Administration (NNSA) and the Federal Energy Regulatory Commission. The OIG has the authority to inquire into all DOE programs and activities as well as related activities. Audits, inspections, investigations, and other reviews are used to detect and prevent fraud, waste, abuse, and violations of the law.

The Federal Information Security Modernization Act of 2014 directs the OIG to conduct an annual evaluation of DOE's information security systems. The OIG is also charged with reviewing the Department's efforts to eliminate improper payments, in conformance with the Improper Payments Elimination and Recovery Act of 2010. The OIG routinely conducts reviews of the most significant management challenges facing the Department, to include its Environmental Management programs. In addition, the OIG addresses alleged violations of law that impact Department programs, operations, facilities, and personnel.

Program Highlights

- **Incurred Cost Audits of Management and Operating Contracts.** The OIG will conduct independent incurred cost audits of the Department's Management and Operating Contracts, valued at over \$17 billion. In addition, audits of M&O contractors' Disclosure Statements will become an integral part of the newly implemented independent audit strategy for M&O contractors' incurred costs.
- **Data Analytics.** The OIG's Data Analytics program has developed novel insights into DOE spending and anomalies. With a 30 percent increase in the number of audits, inspections and investigations requiring the support of data analytics, the OIG will leverage its novel insights into DOE spending and anomalies and seek to expand the use of analytic tools to identify trends or provide indications of fraud.
- **Inspections, Intelligence Oversight, and Special Projects.** OIG's Inspections team will continue to focus on intelligence oversight, special inquiries raised by Congress or senior departmental officials, and allegations received from OIG's Hotline. Since December 2019, the OIG Hotline experienced a 25 percent increase in complaints. Likewise, over the same period, whistleblower investigations increased more than 70 percent since 2019. The OIG expects this growth to continue and, as a result, will direct additional resources to perform appropriate oversight.
- **Investigations.** In recent years, the Department experienced an 18 percent increase in contract and grant fraud cases, an 18 percent increase in cases involving integrity of government officials, and a 60 percent increase in national security and intellectual property cases. This additional work by our Office of Investigations resulted in a 36 percent increase in the number of criminal investigations and a substantial increase in the dollar value of contractor fraud cases. The increased level of enhanced information sharing and collaboration within the department, other federal agencies, data analytics, and incurred cost audits has increased OIG's workload and demand for federal investigators. In addition, the OIG seeks to expand its focus on high priority, high value areas including subcontract awards that account for several billion dollars each year, anti-trust violations, public corruption, and fraud in the areas of grants, loans, and other DOE programs. Furthermore, the OIG will continue to utilize Special Assistant United States Attorneys to increase criminal prosecutions.
- **Audits.** OIG performs audits on Department programs and operations, focused on providing reliable and credible financial and performance information. The scope of this work is determined through a risk-based approach focused on areas of greatest risk to the Department. The OIG seeks to increase oversight of key DOE program areas such as Power Marketing Administrations, Environmental Safety and Health, clean energy, national security, and other high-risk areas identified by the Department's Administration and GAO.
- **Subcontract Oversight.** The OIG continues to assess the Department's contract award and administration process to its subcontractors. Approximately 90 percent of the Department's annual budget is spent on contracting, with 30 to 50 percent of that amount being dispersed to subcontractors. To date, OIG work has resulted in sizeable settlements with subcontractors; therefore, the OIG plans to direct additional resources to the oversight of subcontract administration.

- **Cybersecurity Oversight Efforts.** Over the past year, the OIG has detected a 70 percent increase in the number of cybersecurity weaknesses identified, an alarming increase in vulnerabilities within the DOE IT environment. Additionally, hacks and breaches have become more sophisticated and ubiquitous. For example, the Solarwinds hack led to the infiltration of at least 18 thousand government and private networks, including DOE. Consequently, the OIG seeks to expand the range and frequency of its penetration testing and other security testing measures to minimize risk to DOE systems.
- **NNSA Modernization Efforts.** NNSA has undertaken a modernization effort that involves major projects (e.g., weapons complex transformation). OIG will conduct reviews that will proactively seek to identify opportunities to improve the efficiency and effectiveness of these operations.
- **Environmental Management.** The Department's environmental liability of \$512 billion remained on the Government Accountability Office's Biennial High Risk List in 2021. The OIG will continue to review the efficacy of the Department's environmental programs.
- **Clean Energy and IT Modernization.** The OIG will expand its oversight into these, and other emerging priority areas for the Department, to help to prevent fraud, waste, and abuse in these new and expanding programs.
- **New Offices/Classified Space.** OIG will continue its efforts to open offices in strategic locations and acquire access to a sensitive compartmented information facility (SCIF) pursuant to the Department's ability to provide additional space and support OIG's mission.

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	(\\$K)	
				FY 2023 Request vs FY 2021 Enacted	
				\$	%
Office of Technology Transitions					
Departmental Administration					
Office of Technology Transitions	17,639	17,639	0	-17,639	N/A
Office of Technology Transitions					
Program Direction	0	0	13,183	+13,183	N/A
Programs	0	0	8,375	+8,375	N/A
Total, Office of Technology Transitions	17,639	17,639	21,558	+3,919	+22%

Appropriation Overview

The mission of the Office of Technology Transitions (OTT) is to expand the commercial and public impact of the research investments of the Department of Energy (DOE). OTT serves a multi-disciplinary role across the Research, Development, Demonstration, and Deployment (RDD&D) continuum to support the transition of technologies to the market. OTT does so by providing public-private partnering support, market-informed analytics, support in the development of commercialization roadmaps, commercial adoption risk assessments, and by providing management of DOE's ongoing lab-to-market and other technology commercialization activities, including the statutory Technology Commercialization Fund, the Energy I-Corps, the Energy Program for Innovation Clusters (EPIC), Energy Tech University Prize, and the Lab Partnering Service. OTT stewards DOE technology transition activities, including policy reform, data collection and analyses, industry stakeholder convenings, and amplification of DOE technology transfer success stories across the DOE as well as engaging with other Federal agencies to improve awareness of the benefits of engaging the DOE research enterprise.

Program Highlights

The FY 2023 Budget proposes a separate appropriation account to increase transparency and reflect the need for multi-year funding for OTT programmatic activities. The funding increase in FY 2023 supports expansion of labor-intensive mission activities, including improved outcome metrics tracking; strengthened commercialization and market adoption risk analytics, enhanced industry outreach and stakeholder engagement, and expanded program execution and awards management responsibilities.

OTT's key activities in FY 2023 include:

- Technology Commercialization Fund – focuses on commercializing promising technologies, including those from the National Laboratories, by 1) enhancing the pipeline of technologies positioned for commercial deployment, and 2) enabling the commercialization ecosystem by seeding new approaches to maximize public-private partnerships.
- Energy Program for Innovation Clusters (EPIC) – encourages the growth of regional energy innovation ecosystems across the US through competitive funding for incubators and accelerators.
- Energy I-Corps – trains National Laboratory scientists/engineers through an immersive commercialization program that pairs them with industry mentors with a goal to develop entrepreneurial skillsets and engage in entrepreneurial opportunities centered around customer outreach and partnership with the private sector.
- Energy Tech University Prize – supports student engagement through a business plan competition for multidisciplinary student teams to identify an energy technology, assess its market potential, and propose a commercialization strategy.
- Lab Partnering Service – provides investors and external stakeholders interested in advancing energy innovation the ability to connect with leading DOE National Laboratory expertise, technologies, and facilities through a searchable, online platform that serves as a front door to the National Laboratory enterprise.
- Market/Commercialization Analytics – supports scoping and execution of targeted market analysis, market adoption risk assessments, and commercialization roadmaps to support DOE investment decisions; supports alignment of existing technology roadmaps and program plans to demonstration and deployment pathways to maximize impact.
- Stakeholder Engagement – facilitates industry convening and partnering through dedicated commercialization experts.

- Tech Transfer Coordination – stewards DOE’s technology transfer by shepherding both the statutory Tech Transfer Working Group and Tech Transfer Policy Board.
- Outcome Tracking – improves impact and outcome tracking; effectively leveraging data to illustrate success of commercialization activities across DOE.

	FY 2021 Enacted	FY 2022 Annualized CR*	FY 2023 Request	(\$K)	
				FY 2023 Request vs FY 2021 Enacted	\$
Federal Energy Regulatory Commission (FERC)					
Just and Reasonable Rates, Terms and Conditions	182,261	184,834	226,921	+44,660	+24.5%
Safe, Reliable, and Secure Infrastructure	142,757	136,402	172,762	+30,005	+21.0%
Mission Support through Organizational Excellence	79,332	83,114	108,717	+29,385	+37.0%
FERC Revenues	404,350	-404,350	-508,400	-104,050	-25.7%
Subtotal, Federal Energy Regulatory Commission	0	0	0	0	N/A
Fees and Recoveries in Excess of Annual Appropriations	-9,000	-9,000	-9,000	0	0.0%
Total, Federal Energy Regulatory Commission	-9,000	-9,000	-9,000	0	0.0%

Note.--A full-year 2022 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Continuing Appropriations Act, 2022 (Division A of P.L. 117-43, as amended). The amounts included for 2022 reflect the annualized level provided by the continuing resolution.

Appropriation Overview

The **Federal Energy Regulatory Commission (FERC or the Commission)** is an independent agency within the Department of Energy (DOE) that regulates the transmission and wholesale sale of electricity and natural gas in interstate commerce, as well as the transportation of oil by pipelines in interstate commerce. FERC also reviews proposals to build interstate natural gas pipelines, natural gas storage projects, and liquefied natural gas (LNG) terminals, and FERC licenses non-federal hydropower projects. The Commission assists consumers in obtaining reliable, safe, secure, and economically efficient energy services at a reasonable cost through appropriate regulatory and market means, and collaborative efforts. Congress assigned these responsibilities to FERC in various laws including the Federal Power Act, enacted 100 years ago, the Public Utility Regulatory Policies Act of 1978, the Natural Gas Act, the Natural Gas Policy Act of 1978, and the Interstate Commerce Act. More recently, as part of the Energy Policy Act of 2005, Congress gave FERC additional responsibilities to protect the reliability and cybersecurity of the Bulk-Power System through the establishment and enforcement of mandatory reliability standards, as well as additional authority to enforce FERC regulatory requirements through the imposition of civil penalties and other means. Regulated entities pay fees and charges sufficient to recover the Commission's full cost of operations.

The FY 2023 request for the Commission is \$508.4 million and 1,508 full-time equivalents (FTEs). The Commission's requested budget supports an increase of 43 FTEs. Most of the FTE increase will staff the new Office of Public Participation established in FY 2021, as it continues to grow towards full operating capacity. The remaining additional FTEs are requested to address staffing levels across the other 12 Commission program offices to support the Commission's evolving work demand and associated workforce requirements to achieve strategic objectives and performance targets.

The FY 2023 request also supports continued funding for program contracts associated with hydropower and natural gas infrastructure, including environmental reviews, public participation and outreach, stakeholder engagement, construction oversight, and expert witness contractor assistance which support the Commission's programs.

Program Highlights

Ensure Just and Reasonable Rates, Terms, and Conditions

The nation's security and economic prosperity depend on maintaining economically efficient, safe, reliable, and secure energy services at a reasonable cost for consumers. FERC's regulations and orders ensure just and reasonable rates, terms, and conditions for jurisdictional services.

In carrying out its regulatory role, FERC uses a range of ratemaking activities as well as market oversight and enforcement. FERC's jurisdiction includes the wholesale sale and transmission of electricity and natural gas in interstate commerce, the interconnection of new electric generation in interstate commerce, and the transportation of oil and certain other liquid fuels by pipeline in interstate commerce. FERC's ratemaking activities leverage both regulatory and market means, and

involve the issuance of orders and the establishment of rules and policies. FERC's enforcement activities include both increasing compliance and detecting and deterring market manipulation.

Through these efforts, FERC ensures that consumers have access to the energy services they need and that service providers are reasonably compensated.

Ensure Safe, Reliable, and Secure Infrastructure

Infrastructure for which FERC approval is required includes interstate natural gas pipelines and storage projects, LNG facilities, and non-federal hydropower. In addition, the Commission has authority to site electric transmission facilities in certain circumstances. Ensuring the development of safe, reliable, and secure infrastructure that is in the public interest and that provides energy for consumers at a reasonable cost is a significant, multifaceted challenge.

FERC's regulatory role in reviewing proposed infrastructure projects involves balancing the benefits of a proposed project against the proposed project's adverse impacts, including environmental concerns as well as impacts to landowners and communities. Additionally, FERC considers the minimization of risks to the public in the operation of the infrastructure project. To promote safe, reliable, and secure infrastructure, FERC must ensure the sustainability and safety of non-federal hydropower projects and LNG facilities throughout their entire life cycle; oversee the development and review of, as well as compliance with, mandatory reliability and security standards for the Bulk-Power System; and help to secure the Bulk-Power System from cyber and physical attacks. The Commission also protects FERC-jurisdictional energy infrastructure through collaboration and sharing of best practices.

Provide Mission Support Through Organizational Excellence

The public interest is best served when the Commission operates in an efficient, responsive, and transparent manner. The Commission pursues this goal by maintaining processes and providing services in accordance with governing statutes, authoritative guidance, and prevailing best practices. In accomplishing this goal, the Commission will use its resources efficiently, empower its employees, and earn the public trust. These essential outcomes are indicative of a model regulatory agency.

FERC addresses internal needs and enables organizational excellence by providing processes and services that help office leadership prioritize resource allocations, make prudent investments that yield returns that directly benefit the agency's mission, and use Commission resources in an efficient manner. These processes and services also help management meet federal statutes that require the Commission to recover its operating costs from the entities it regulates and to do so in a manner that avoids unnecessarily increasing the cost of energy to consumers.

FERC provides services, tools, and resources that equip employees to drive success and accomplish the agency's mission. The Commission's FY 2023 request makes continued investments in its people, information technology resources, and facilities. The Commission allocates 61 percent of its budget to directly cover personnel compensation costs of its employees on an annual basis. The Commission's request reflects a personnel compensation increase of \$24.9 million or 8.7 percent above the FY 2022 congressional request level to support an increase of 43 FTEs and accounts for a 4.6 percent pay raise in January 2023. Given this significant investment, the Commission places extremely high value on its employees and is focused on ensuring that employees have a performance management system that clarifies expectations, removes barriers to performance and engagement, and provides useful feedback that supports employee effectiveness.

Additionally, the Commission's request includes \$115.6 million in FY 2023 to support information technology (IT) investments. This is an increase of \$15.6 million, or 16 percent, over the FY 2022 request to Congress. This increase provides additional funding related to support IT investments for mission delivery and IT infrastructure, security, and management. For example, the Commission's Application Layer Modernization initiative is a five-year effort that will modernize mission critical systems. At the conclusion of the modernization effort, the Commission anticipates cost avoidance in legacy operations and maintenance costs through the reduction of highly specialized resources needed to currently support those critical systems. Furthermore, in 2023 the Commission will continue its goal of providing a best-in-class IT environment for the Commission and its stakeholders while continuing to meet federal mandates such as IPv6 and implementation of the requirements of zero trust architecture.

The Commission is also undergoing a multi-year renovation effort within its headquarters building. As a result of these modernization efforts, the Commission will consolidate all National Capital Region lease locations into the headquarters building and reduce its real estate footprint by approximately 123,000 square feet. The Commission will be surrendering

approximately 59,792 rentable square feet (51,973 usable square feet) in the headquarters building, 30,193 rentable square feet (25,477 usable square feet) at 1100 1st Street, and 32,957 rentable square feet (28,574 usable square feet) at 999 North Capitol Street, post renovation. At the current market rate, the reduction in space would result in estimated rent savings of approximately \$6.9 million annually. The Commission anticipates realizing full savings from these efforts beginning in FY 2025. The FY 2023 request includes \$8.1 million to cover construction costs related to FERC's data center, hearing rooms, and security and information technology enhancements for FERC headquarters.

The Commission promotes transparency and equity, open communication, and a high standard of ethics to facilitate trust and understanding of FERC's activities. FERC supports this by maintaining legal and other processes in accordance with the principles of due process, fairness, and integrity. FERC's proactive communication, along with an online document repository and timely responses to inquiries, fosters awareness and understanding of the Commission's activities. FERC considers matters involving environmental justice and equity consistent with its statutory authority. In particular, the Commission has a strong commitment to working with affected communities, including environmental justice communities and landowners who may be directly impacted by Commission decisions on jurisdictional infrastructure proposals. FY 2023 funding supports the resource needs being identified in the Commission's equity assessment process initiated during FY 2021 for staff, consultants, and commissioned studies. These resources will help the agency achieve the environmental justice and equity goals developed during the equity assessment process, consistent with the Commission's equity plan that will be submitted to the White House by April 15, 2022. The Commission also promotes understanding, participation, and engagement with the public, stakeholders, Tribes, and jurisdictional entities. The Commission will increase its engagement with the public through its newly established Office of Public Participation.