Crosscuts

Artificial Intelligence and Machine Learning Crosscut[1]
Funding by Organization and Budget Control
($K)

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
AIQ	Office of Artificial Intelligence and Quantum	—	—	1,200,000
	Subtotal, AIQ	**—**	**—**	**1,200,000**
ARPA-E	ARPA-E Projects	117,500	TBD	TBD
	Subtotal, ARPA-E	**117,500**	**—**	**—**
CESER	Risk Management Tools and Technologies	33,500	25,500	17,800
	Subtotal, CESER	**33,500**	**25,500**	**17,800**
CIO	Office of the Chief Information Officer	-	3,569	6,422
	Subtotal, CIO	**-**	**3,569**	**6,422**
CMEI	Advanced Materials and Manufacturing Technologies	32,700	8,000	20,000
	Alternative Fuels & Feedstocks (formerly Bioenergy Technologies and Hydrogen and Fuel Cell Technologies)	20,000	9,000	250
	Building Technologies	2,000	11,500	—
	Energy Grid Integration	20,000	—	—
	Hydropower & Hydrokinetic (formerly Water Power Technologies)	2,500	2,500	2,500
	Industrial Technologies (formerly Industrial Efficiency and Decarbonization)	4,000	4,000	4,000
	Integrated Energy Systems (formerly Solar Energy Technologies and Wind Energy Technologies)	5,000	16,000	—
	Transportation Technologies (formerly Vehicle Technologies)	23,500	46,920	2,400
	Subtotal, CMEI	**109,700**	**97,920**	**29,150**
EIA	National Energy Information System	—	1,750	2,500
	Subtotal, EIA	**—**	**1,750**	**2,500**
EHSS	Advanced Computer Tools to Identify Classified Information	2,200	1,400	1,400
	Data Analytics and Machine Learning	547	500	500
	Subtotal, EHSS	**2,747**	**1,900**	**1,900**
HGEO	Coal	6,100	13,300	16,500
	Oil and Gas	2,000	7,000	24,000
	Geothermal	10,000	2,000	2,000
	NETL Infrastructure	6,000	6,000	6,000
	NETL Research and Operations	1,890	1,935	2,378
	Subtotal, HGEO	**25,990**	**30,235**	**50,878**

[1] This crosscut includes both programmatic funding to develop and improve AI/ML technology as well as administrative expenses for DOE's procurement and use of commercial AI tools

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
NNSA	Defense Nuclear Nonproliferation	47,900	51,500	52,400
	Weapons Activities	118,319	219,840	161,637
	Naval Reactors	9,373	11,288	10,700
	Subtotal, NNSA	**175,592**	**282,628**	**224,737**
NE	Advanced Materials and Manufacturing Technologies	1,000	1,000	1,000
	Advanced Sensors and Instrumentation	680	890	250
	Gateway for Accelerated Innovation in Nuclear	—	280	—
	Power Reactor Optimization (formerly Light Water Reactor Sustainability)	5,610	11,145	11,171
	Advanced Small Modular Reactor RD&D	—	2,000	—
	Nuclear Energy Advanced Modeling and Simulation	500	2,800	3,300
	Materials Recovery and Waste Form Development	—	3,000	—
	Next Generation Fuels	—	3,000	—
	Advanced Nuclear Fuel Availability	—	1,500	—
	Advanced Reactor Safeguards & Security	500	500	650
	Accident Tolerant Fuel Program	200	250	250
	Advanced Reactor Technologies	550	1,550	13,650
	National Reactor Innovation Center	2,000	2,150	2,000
	Nuclear Science User Facilities	500	13,200	4,700
	Used Nuclear Fuel Disposition R&D	—	479	—
	Integrated Waste Management System	500	6,021	-
	Used Nuclear Fuel and High-Level Waste	-	-	350
	Regulatory Development	1,515	250	500
	Mining, Conversion, and Transportation	—	1,500	—
	Subtotal, NE	**13,555**	**51,515**	**37,821**
OE	Transmission Reliability & Resilience	7,700	7,565	8,910
	Energy Delivery Grid Operations Technology	—	950	950
	Resilient Distribution Systems	3,200	3,826	5,400
	Cyber Resilient & Secure Utility Communication Networks	300	829	1,629
	Energy Storage	950	3,106	1,556
	Transmission Planning & Permitting	—	615	615
	Subtotal, OE	**12,150**	**16,891**	**19,060**
OIG	Office of Inspector General	—	—	800
	Subtotal, OIG	**—**	**—**	**800**
OSTR	Office of Strategy and Technology Roadmaps	—	—	2,000
	Subtotal, OSTR	**—**	**—**	**2,000**
LM	Legacy Management	270	270	170
	Subtotal, LM	**270**	**270**	**170**

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
SC	Advanced Scientific Computing Research	89,873	116,957	119,498
	Basic Energy Sciences	47,000	65,428	63,009
	Biological and Environmental Research	26,400	33,906	32,835
	Fusion Energy Sciences	24,000	39,776	39,540
	High Energy Physics	65,722	80,851	80,160
	Isotope R&D and Production	1,000	1,860	1,948
	Nuclear Physics	20,000	33,940	33,364
	Subtotal, SC	**273,995**	**372,718**	**370,354**
SWPA	Program Direction	—	—	405
	Operations & Maintenance	—	—	495
	Subtotal, SWPA	**—**	**—**	**900**
Title 17	Administrative Expenses	—	—	550
	Subtotal, Title 17	**—**	**—**	**550**
WAPA	Operations & Maintenance	4,000	4,000	4,000
	Subtotal, WAPA	**4,000**	**4,000**	**4,000**
Total, Artificial Intelligence and Machine Learning Crosscut		**768,999**	**888,896**	**1,969,042**

Overview of Artificial Intelligence (AI) and Machine Learning (ML)

Recent advancements in AI, driven by the computing revolution underway, are enabling enormous progress and breakthroughs that will help address the key challenges of our time – from more effective cancer screening and targeted treatments to world-changing advanced manufacturing, to reducing red tape and accelerating the transformation of our electricity grid and deployment of energy technologies, to state-of-the-art production capabilities for our nuclear stockpile, to enabling the discovery and exploitation of non-traditional signatures for nuclear proliferation detection. This AI and ML crosscut includes both programmatic funding to develop and improve AI/ML technology as well as administrative expenses for DOE's procurement and use of commercial AI tools.

Launched by the President's Executive Order (EO) in November 2026, the Genesis Mission is a dedicated, coordinated national effort led by DOE to unleash a new age of AI-accelerated innovation and discovery. The EO directs DOE to build the American Science and Security Platform, an integrated AI infrastructure harnessing the world's largest collection of federal scientific datasets, high-performance computing systems, and capabilities across the national laboratory complex to accelerate breakthroughs across DOE's core missions. In FY 2026, the Working Families Tax Cut Act appropriated funds for DOE to begin investments in cloud computing and develop state-of-the-art self-improving AI models, leveraging private sector partnerships to support AI-driven scientific research and discovery. FY 2027 represents the Department's first budget cycle to operationalize this Presidential directive, and the investments requested here reflect DOE's initial, targeted commitment to fulfilling that mandate across the Department's science, energy, and national security missions.

DOE is also leveraging AI to improve decision-making, enhance efficiency, and support both its enterprise and operations. This includes streamlining workflows and leveraging AI to generate insights from vast datasets, while also managing risks through AI governance frameworks as detailed in DOE's AI Strategy and Policy.

Highlights of Program Efforts in FY 2027

Artificial Intelligence and Quantum (AIQ)

- New funding requested in FY 2027 to support multiple new AI supercomputers and the Genesis Mission
- Coordinates the collaboration of the federal government, national laboratories, and industry in support U.S. AI and quantum research investments
- Directly supports facility operations and infrastructure for supercomputers at the national laboratories

Cybersecurity, Energy Security, and Emergency Response (CESER)

- AI-FORTS will continue investments, though at slightly a lower funding level than in FY 25, through direct lab funds. Work will ramp up to counter adversarial use of AI, while continuing to invest in the AI testbed and tools to enhance security and reliability through AI.

Chief Information Officer (CIO)

- Harness secure Artificial Intelligence to elevate workforce productivity and enable superior data-driven decisions.
- Modernize boundary monitoring sensors to increase automation, leverage AI-powered insights, optimize data integrations, and simplify cloud-based management for improved operational efficiency.

Critical Minerals and Energy Innovation (CMEI)

- Advanced Materials and Manufacturing Technologies: Supports use of AI and ML in supporting smart manufacturing of energy technologies, including batteries, critical materials, and high-performance materials.
- Alternative Fuels & Feedstocks (formerly Bioenergy Energy Technologies and Hydrogen and Fuel Cell Technologies): Uses AI/ML to develop new catalysts, develop new organisms using synthetic biology tools, model biomass feedstocks as they undergo pre-processing, and model bioenergy technology systems to support scale-up.
- Industrial Technologies: Supports innovative strategies to apply AI/ML techniques to complex process design challenges in decarbonized industrial systems.
- Transportation Technologies (formerly Vehicle Technologies): Develops technology solutions that improve the mobility energy productivity of both passenger and freight movement through the development of connectivity, communication, automation, and other transportation solutions that are enabled by AI and advanced computing technologies.
- Hydropower & Hydrokinetic (formerly Water Power Technologies): Develops operations and management (O&M) data analytics and progress into the application of whole life cost modeling. It will also complete the industry-focused pilot study and finalize the digital twin development process for new users. It will identify target applications and value propositions for advanced sensors in powertrain, dam, and cybersecurity systems. Efforts will continue support focused on risk detection and valuation of distributed renewables.

Energy Information Administration (EIA)

- EIA is integrating AI tools to significantly enhance operational efficiency and innovation across a broad spectrum of activities, from automating general office tasks and refining internal documentation to revolutionizing complex technical processes. Key applications include leveraging AI for advanced coding functions such as generation, debugging, and legacy code translation, as well as optimizing survey design, data collection, and statistical analysis. Furthermore, AI will play an important role in content delivery through style governance and web modernization, in improving system design and architecture, and in streamlining administrative functions. This comprehensive approach aims to bolster

EIA productivity, improve data integrity and analysis, and foster more effective communication and decision-making throughout the agency.
- In terms of support of AI and ML development, EIA generates long-term projections and analysis of the electric power demand and supply in the United States. This includes analysis and projection of data center electricity demand, which provide insights into the use and development of AI.

Hydrocarbons and Geothermal Energy Office (HGEO)
- Office of Coal will support research and development (R&D) efforts to advance coal-based energy systems at existing facilities which employ AI/ML integration. Supported projects will test and validate sensors, diagnostic approaches, and develop digital twin models that can improve the efficiency, reliability, and/or flexibility of existing plant operations.
- Office of Oil and Gas will support R&D efforts through the HydroCarbon-MATerials (HC-MAT) NETL-led national lab consortium, to advance physics-based, data driven alloy modeling frameworks for predicting high temperature creep behavior of steels. These models use AI/ML tools and incorporate the effects of alloy chemical composition, microstructure, and microstructural aging on high temperature creep, including model validation with experimental data.
- Most of the remaining geothermal potential in the western United States lies in blind and hidden systems. Large, systematic drilling campaigns now underway within the Office of Geothermal, supported by improved spatial and statistical modeling could unlock more than a hundred new discoveries and several gigawatts of firm renewable power. To accelerate the shift from accidental to targeted exploration, the team will unify foundation models for subsurface modeling and sparse data integration across a range of time and distance scales and physical processes, enabling more accurate and comprehensive resource mapping.
- High-Performance Computer (Super Computer) provides funding for the lease of Joule 3, NETL's Supercomputer. The FY 2027 Budget Request includes $6 million for the continuation of a 4-year lease. In addition, $6 million is requested for NETL's high performance computer (HPC) lease. HPC is an essential element in more than 50% of NETL's research projects.

Nuclear Energy (NE)
- Advanced Materials and Manufacturing Technologies: The Advanced Materials and Manufacturing Technologies subprogram supports use of AI and ML in manufacturing of nuclear technologies, database development, non-destructive examinations, and rapid qualifications.
- Advanced Sensors and Instrumentation: The request supports integration of AI algorithms into advanced control methods that are intended for existing and advanced reactor platforms.
- Power Reactor Optimization (PRO) (formerly Light Water Reactor Sustainability (LWRS)): AI R&D supports continuing and optimizing existing nuclear power plant performance through improving reliability, streamlining work management, and accelerating upgrades and licensing. In FY 2027, the PRO program will develop tailored AI methods and tools through advanced R&D, and better optimize outcomes via pilot demonstrations, guidance reports, and licensing of AI models and code to address nuclear industry challenges focuses on manual, human-intensive tasks with high automation potential across operations, maintenance, engineering, and compliance.
- Nuclear Energy Advanced Modeling and Simulation: The request provides funding for application of machine-learning techniques to develop reduced-order models (ROMs) and surrogate models across various nuclear engineering applications. These efforts aim to accelerate complex simulations for reactor and fuel modeling, improve uncertainty quantification, and enhance material performance predictions.
- Advanced Reactor Safeguards and Security (ARSS): AI has a strong potential in the development of more efficient physical protection and material accountability. In FY 2027, efforts will continue to expand AI into other physical protection operations to optimize reactor design and ensure regulatory

requirements are incorporated; and expand research to address measurement uncertainty of burnup in pebble bed reactors to enhance fuel utilization and improve material accountability.

- Advanced Reactor Technologies (ART) Program: In FY 2027, the ART program will continue activities to leverage AI to accelerate the deployment of advanced reactor technologies to address growing energy demands. The ART program will also continue to support the PROMETHEUS project which will use AI to design, license, manufacture, construct, and operate a reactor with human-in-the-loop workflows, enabling at least 2x schedule acceleration and greater than 50% operational cost reductions. The ART program will continue developing a Frontier-AI prototype to facilitate industry access to historical engineering knowledge from the Fast Flux Test Facility (FFTF) program and will continue incorporating additional FFTF knowledge sources beyond the initial Lessons Learned, enabling exploration of critical historical reactor design, construction, and operational information to inform and accelerate new advanced reactor designs. The FY 2027 will support the continued demonstration of AI for automated control of microreactors. Activities would also include integration in control logic for switching between loads on a microgrid and the use of AI/ML for integration with sensors and detecting flaws.
- National Reactor Innovation Center (NRIC): In FY 2027, NRIC will incorporate AI into engineering design workflows to assist in the reviewability and traceability of key engineering documents.
- Nuclear Science User Facilities: The FY 2027 request supports scientific high-performance computing for nuclear energy activities including AI hardware and user support under the Nuclear Science User Facilities subprogram. The subprogram also supports the development of AI tools and curated data to reduce the time and cost for irradiation and post-irradiation examination testing with the goal to accelerate nuclear energy research and deployment.
- Accident Tolerant Fuels: The FY 2027 request supports ML development and application to microscopy image analysis. This will build on methodologies demonstrated by NSUF and laboratory-directed R&D.
- Used Nuclear Fuel and High-Level Waste Disposition (formerly Used Nuclear Fuel Disposition R&D and Integrated Waste Management System): The FY 2027 request supports advanced nuclear waste disposition through AI, focusing on AI-assisted site characterization for fatal flaw analysis using extensive geological data and AI-assisted end disposition design for licensable mined repositories in various geological media, including the integration of deep boreholes. This dual approach leverages AI to accelerate site selection and optimize repository design for used nuclear fuel and reprocessed waste streams. Ultimately, these AI initiatives aim to enhance the safety, efficiency, and regulatory confidence in the nation's nuclear waste management strategy. This holistic approach to leveraging AI also encompasses initiatives to develop and deploy AI/ML tools for the efficient review, classification, and release of legacy documents to the nuclear industry.

Office of Electricity (OE)

- Transmission Reliability and Resilience (TRR) supports next-generation mathematical and statistical algorithm development utilizing AI/ML to manage grid uncertainty to ensure reliable, secure, and economical grid operations. TRR also supports grid operations, and will support the Genesis Mission and making rich datasets for AI/ML to use for both training and verification.
- Energy Delivery Grid Operations Technology supports the Genesis Mission.
- Resilient Distribution Systems creates innovative AI/ML and other data science tools to manage large amounts of utility data, reduce costs, and improve reliability of transmission and distribution coordinated controls and supports the Genesis Mission.
- Cyber Resilient & Secure Utility Communication Networks (SecureNet) supports grid communications and secure data environments necessary for the use of AI in grid operations (along with non-AI use cases) and the Genesis Mission. In FY 2027, SecureNet pursues AI-enabled digital twins to enhance grid operational technology cyber resilience.

- Energy Storage uses AI/ML and other innovative data science methods supporting the Rapid Operational Validation Initiative (ROVI) to help technology innovators and stakeholders across sectors understand and forecast long-term performance, cost, and operational reliability of new storage technologies and supports the Genesis Mission.
- Transmission Planning & Permitting supports the Genesis Mission.

Office of Science (SC)

AI represents a paradigm shift in the practice of scientific discovery. SC recognizes the power that AI has to accelerate progress in scientific research and missions by developing new data analysis tools and integrating data focused approaches with our more traditional R&D ecosystem. SC is uniquely positioned to not only benefit from, but also advance, current AI activities to maintain U.S. leadership in science and technology and drive U.S economic competitiveness. Several AI topics are of interest and coordinated across SC programs, particularly those in scientific hypothesis generation and reasoning, real-time control and experimental automation, accelerator and detector controls systems and other real-time applications of large-scale science infrastructure, and the development of AI for extreme environments and extreme scale. SC's portfolio of research, across all science programs and leveraging a wide range of funding modalities, is strategically coordinated under the auspices of the DOE's Genesis Mission.

- ASCR: To significantly improve the efficiency, precision, and robustness of scientific AI systems, including AI systems incorporating enhanced scientific reasoning, ASCR will expand: foundational research in applied mathematics and continue to improve the capabilities of AI for modeling, simulations, and decision support while protecting the privacy of data; foundational computer science research will continue to develop AI-driven knowledge-synthesis capabilities for hypothesis generation and reasoning; intelligent system software; innovative software and hardware development tools; scalable and low-latency methods for efficient AI training and inference; and methods to benchmark, verify, and validate emerging AI capabilities. ASCR will continue collaborations and co-design activities with the other SC and DOE programs to develop and tailor frontier AI and big data solutions across a range of applications and scientific user facilities in support of the Genesis Mission, including accelerating the holistic automation of scientific workflows and the initiation of fundamental investments needed to incorporate state-of-the-art robotics. In FY 2027, ASCR increases its investments for partnerships with industry in computationally efficient, leap-ahead technologies for scientific AI and HPC, including new AI hardware promising transformative improvements.
- BES: In FY 2027, BES continues support for the AI and the Genesis Mission, including research to advance the use of modern data science approaches to accelerate discovery in chemical and materials sciences and to analyze and control data generated at the scientific user facilities to optimize the facilities' scientific output. Efforts across the research portfolio will advance the development and use of AI-enabled tools and techniques that improve the collection, processing, and analysis of theoretical calculations and experimental data sets, development of innovative physics-guided AI approaches that can accelerate discovery, and development of scalable, automated synthesis with real-time adaptive control. Support will also continue development of AI-based approaches to improve the efficiency and reliability of accelerator and instrument operations, near real-time analysis of data to optimize instrument utilization, enhanced analysis of user data generated by new capabilities and advanced detector technologies, and the integration of experimental and computational facilities to realize novel workflows.
- BER: Research continues to harness AI to transform genomic science and drive biotechnology innovation by rapidly analyzing large genomic and biological datasets enabled by advances in genome sequencing, editing, experimentation and bioimaging from the Joint Genome Institute (JGI), Environmental Molecular Sciences Laboratory (EMSL) and other BER modeling and data platforms. Integrating AI with experimental systems in automated labs will also enable faster, self-reinforcing

systems for iterative scientific discovery and engineering of microbes and plants through real-time data analysis and streamlined protocols. Researchers will gain access to advanced AI tools, accelerating discoveries and solutions for the nation's energy and environmental security, and leadership in biotechnology innovation.

- FES: In FY 2027, FES will continue to align the AI/ML program with the FES Roadmap and the Genesis Mission through the development of the AI-Fusion Digital Convergence Platform. Increased support will be synergized with activities in the Scientific Discovery through Advanced Computing (SciDAC) and Fusion Innovation Research Engine (FIRE) Collaboratives. Topical areas will continue to span across the FES research portfolio, with emphasis on supporting the nascent fusion industry and existing DOE User Facilities. Research areas include, but are not limited to, accelerating high-fidelity simulations including plasma transients, multiscale materials modeling, and AI agents that assist with machine operation will be developed for User Facilities.
- HEP: HEP AI/ML activities strategically support the Genesis Mission. Through partnerships, HEP develops and shapes the Platform's computing ecosystem to meet its data intensive and large user needs. This involves curating exabyte scale AI-ready data and developing transformational models and techniques that significantly enhance HEP research and drive new discoveries. HEP engages broadly in the Genesis Mission, from simulation and theoretical modeling to experiment design, real-time facility operations, and AI-ready infrastructure that couples world-leading computing and experimental facilities. This activity focuses on HEP's unique contributions and the integration of cutting-edge AI technologies for a clear AI advantage in the HEP mission. HEP supports the use of AI/ML to enable the management and analysis of vast datasets, optimize complex detector and particle beam systems, and accelerate scientific discovery through identification of subtle patterns and anomalies. Through the Genesis Mission, HEP focuses AI/ML activities around collaborations developing AI-ready datasets and transformative AI models. In FY 2027, HEP will continue to advance AI/ML necessary to develop future cutting-edge HEP facilities and experiments. HEP will further the availability of AI-ready datasets, while continuing R&D that makes use of them, to realize an AI advantage for HEP's world leading endeavors.
- NP: NP is advancing its mission through the development of AI-ready datasets and AI models that take advantage of those datasets. NP efforts are aligned with the Genesis Mission, coordinated with ASCR and HEP, and target two key science questions: 1) How do the rich patterns observed in the structure and reactions of nuclei emerge from the interactions of neutrons and protons? 2) How do quarks and gluons make up protons, neutrons, and ultimately, atomic nuclei? Addressing these questions requires current and future accelerator-based facilities to use AI to achieve unprecedented energies and intensities. The development of domain-specific data standards and metadata for multi-modal data, including expert knowledge documentation, will feed the American Science Cloud (AmSC) and use AI to accelerate discovery of new physics and address questions on the fundamental nature of nuclear matter.
- IRP: In FY 2027, the Isotope R&D Program (IRP) will increase its focus on AI/ML, expanding on existing research. Key areas include machine learning, robotics, autonomous systems, and data analytics, alongside developing digital twins to optimize isotope research, development, and production. Priorities include: enhancing control and optimization of accelerator and enrichment systems; implementing predictive maintenance and automated operations; providing AI-enhanced workforce training; deploying robotics for worker safety; advancing design via digital twins; and using data analytics to predict accurate cross sections and excitation functions for isotope production.

National Nuclear Security Administration (NNSA)

- Weapons Activities: FY 2027 Request supports the second year of high-priority AI for Nuclear Security (AI4NS) pilot projects, allowing capabilities to be extended, hardened, and validated. Several capabilities will be transitioned into early production use. The funding will also support procurement of AI hardware, as needed, for AI4NS capabilities to be efficiently deployed.
- Defense Nuclear Nonproliferation: The FY 2027 Request continues efforts within Defense Nuclear Nonproliferation Research and Development leveraging the unique capabilities of the DOE/NNSA National Laboratories to develop and apply AI and data science technologies to critical national security challenges in nuclear nonproliferation, including the development of robust data management capabilities and AI models using the program's extensive data to detect and characterize foreign nuclear weapons development activities and monitor foreign stockpiles. The FY 2027 request funds ongoing AI threat-assessment work within the Nuclear Threat Science subprogram. Specifically, this request funds the application of a comprehensive, scalable, and repeatable evaluation and reporting framework for assessing how AI could advance an adversary's nuclear capability and how it impacts information security threats.

Quantum Information Sciences Crosscut
Funding by Organization and Budget Control
($K)

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
CESER	Risk Management Tools and Technologies	—	5,000	—
	Subtotal, CESER	**—**	**5,000**	**—**
NNSA	Weapons Activities	11,250	11,000	11,000
	Naval Reactors	3,500	4,500	5,100
	Subtotal, NNSA	**14,750**	**15,500**	**16,100**
OE	Transmission Reliability & Resilience	2,050	2,000	2,000
	Subtotal, OE	**2,050**	**2,000**	**2,000**
OSTR	Office of Strategy and Technology Roadmaps	—	—	250
	Subtotal, OSTR	**—**	**—**	**250**
SC	Advanced Scientific Computing Research	96,517	110,517	166,145
	Basic Energy Sciences	92,000	98,500	103,472
	Biological and Environmental Research	14,500	21,000	21,900
	Fusion Energy Sciences	10,000	18,000	18,900
	High Energy Physics	50,566	57,066	59,919
	Isotope R&D and Production	4,300	6,300	6,616
	Nuclear Physics	10,866	17,366	18,234
	Subtotal, SC	**278,749**	**328,749**	**395,186**
Total, Quantum Information Sciences Crosscut		**295,549**	**351,249**	**413,536**

Overview of Quantum Information Sciences

Quantum information science (QIS) harnesses the laws of quantum mechanics, which govern matter and energy at the atomic and subatomic levels, to store, transmit, manipulate, compute, and measure information. QIS could yield transformative new types of computers, sensors, and networks, with the potential to improve the Nation's prosperity and security. Since 2020, the DOE National QIS Research Centers (NQISRCs) have advanced critical R&D across the American QIS enterprise through integrated research campaigns that address major challenges in quantum computing, communication, sensing, and materials to impact science, energy, security, communication, medicine, finance, and logistics. The NQISRCs were renewed in FY 2026, further strengthening American quantum leadership by ushering in a new era of scientific and engineering advancements.

Highlights of Program Efforts in FY 2027

Cybersecurity, Energy Security, and Emergency Response (CESER)

- In accordance with Congressional report language, CESER is funding a quantum networking pilot program with a partner utility.

Office of Electricity (OE)

- Transmission Reliability and Resilience develops next-generation mathematical and statistical algorithms utilizing quantum technology/computing/sensing to ensure reliable, secure, and economical grid operations.

Science (SC)
SC's QIS Investments are focused on 4 key areas:

- QIS Core Basic Research: Realizing the full potential of QIS requires a detailed understanding of the behavior of quantum systems, knowledge of how to integrate the components into complex systems, and precise control of the structures and functionalities. Further, the discovery and characterization of new

quantum materials and chemistries offer the possibility to open new and transformative pathways for quantum technology development. In FY 2027, SC will continue to invest in basic QIS research leveraging multiple research modalities in key DOE mission-relevant domain areas, including materials science and chemistry, computing, simulation, imaging and sensing, networking, and isotope enrichment. SC research will advance our ability to understand and apply QIS while also using QIS to enable new breakthroughs in basic and applied science.

- Scientifically Relevant Quantum Computation: Today's quantum computers are orders of magnitude less performant than necessary to execute scientifically relevant computations. The FY 2027 request will explore incentive-based competitions to catalyze and advance quantum computing developers toward scientific relevance. Contemporaneous activities supported by the FY 2027 request, including algorithms, applications, and the software stack will bring down the computational resources necessary to perform scientifically relevant quantum computations.
- National QIS Research Centers: In FY 2020, DOE established five National QIS Research Centers to accelerate the transformational advances in basic science and quantum-based technology needed to develop world-leading capabilities in QIS, and in support of the NQI. The Centers program was recompeted in FY 2025 with the five NQISRCs renewed for a second five-year period, establishing a vision for the next phase of the National QIS Research Centers. The FY 2027 request will continue support for the renewed Centers.
- Infrastructure and Supporting Technologies: The FY 2027 Request will continue to support DOE funded research and scientific user facilities to provide the tools and infrastructure to enable collaborative integration of advanced synthesis, processing, characterization, verification, validation, theory, modeling, testing, benchmarking, and fabrication scale-up to advance QIS. The FY 2027 request will explore a quantum computing user facility for the deployment of a scientifically-relevant fault-tolerant quantum computer as well as test bed activities to support this endeavor. SC's suite of scientific user facilities will continue to provide leading-edge experimental and computational capabilities to advance QIS R&D, from the molecular scale to the device scale, and support new approaches to enable greater private sector utilization. SC will continue to develop related advanced technology and core competencies for isotopes critical to QIS. SC will expand its focus on leveraging basic-research successes to build capabilities for the nation for quantum computing and networking.

SC Programs:

- Advanced Scientific Computing Research (ASCR) – Key QIS contributions will continue to provide early access to new technology through quantum computing access and to support basic research programs in applied mathematics, computer science, quantum networking, and hardware; to develop end-to-end software toolchains to program and control quantum systems and networks at scale and develop efficient algorithms delivering quantum advantages; and benchmarking and verifying simulation methods and protocols. ASCR will explore distributed and scalable architectures for quantum-classical hybrid computing and incentive-based competitions to advance scientifically relevant quantum computing.
- Basic Energy Sciences (BES) – BES will continue to support research and enabling infrastructure to advance understanding and control of quantum coherence and entanglement in quantum materials and molecular systems to enable applications in information processing, communication, sensors, and energy technologies. BES will also support research aimed at translating advances in quantum technologies to accelerate discovery in BES science domains. Efforts will continue to be supported through multiple modalities—from single investigators to large scientific teams.
- Biological and Environmental Research (BER) – BER will continue to support exploration of QIS concepts for enhanced imaging, sensing, and characterization of cellular metabolic processes.
- Fusion Energy Sciences (FES) – FES will continue to support the development of quantum computing concepts to address inherently nonlinear plasma dynamics and fusion challenges; the implementation of plasma-relevant quantum algorithms on current and emerging quantum hardware platforms; the identification of quantum sensing techniques to enhance diagnostic capabilities in plasma science and fusion applications; and the application of plasma-based methods—including high energy density plasmas and low-temperature plasmas—to develop and control novel quantum materials for QIS applications.

- High Energy Physics (HEP) – HEP will continue to support core research into QIS-enabled discovery furthering the HEP mission to understand the universe: specific topics include foundational QIS and quantum field theory; basic research and development of quantum sensors; research applications of quantum simulations and computing; QIS-enabled pathfinder experiments that address the HEP science drivers.
- Nuclear Physics (NP) – NP supports research on novel quantum computing and quantum algorithms, building quantum simulators for classically challenging nuclear physics problems, and creating foundations for advanced quantum technologies, sensors, and nuclear clocks to accelerate discovery science. Nuclear physics expertise and techniques are applied to improve qubit performance and fault tolerance. Ongoing industry collaborations are leveraged to develop novel devices for exploring nuclear physics and applications in gauge field theories.
- Isotope R&D and Production Program (IRP) – Activities will continue to develop domestic enrichment technology and cultivate core competencies for key isotopes essential to QIS systems. A primary goal is to eliminate reliance on supply chains from sensitive countries. Research will concentrate on optimizing isotope enrichment technologies, advancing gas conversion processes, and managing ultra-pure materials critical for QIS applications and related research.

National Nuclear Security Administration (NNSA)

- Weapons Activities: Support research and development of quantum algorithms, applications, and quantum resource estimation for classified stockpile responsiveness missions.
- Naval Reactors: Quantum sensing for industrial and nuclear applications, quantum algorithm development and benchmarking for engineering, and energy storage.

Critical Minerals and Materials Crosscut
Funding by Organization and Budget Control
($K)

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
ARPA-E	ARPA-E Projects	90,354	TBD	TBD
	Subtotal, ARPA-E	**90,354**	**TBD**	**TBD**
CMEI	Advanced Materials and Manufacturing Technologies	51,800	45,000	100,000
	Advanced Mining and Mineral Production Technologies	—	—	364,000
	Alternative Fuels & Feedstocks (formerly Bioenergy Technologies and Hydrogen and Fuel Cell Technologies)	13,200	1,000	—
	Hydropower & Hydrokinetic (formerly Water Power Technologies)	3,352	2,100	2,100
	Integrated Energy Systems (formerly Solar Energy Technologies and Wind Energy Technologies)	4,000	13,000	—
	Manufacturing Deployment Office	—	—	4,200
	Transportation Technologies (formerly Vehicle Technologies)	94,300	137,767	12,000
	Subtotal, CMEI	**166,652**	**198,867**	**482,300**
EIA	National Energy Information System	—	1,250	2,200
	Subtotal, EIA	**—**	**1,250**	**2,200**
HGEO	Mining and Processing	-	-	30,000
	Subtotal, HGEO	**-**	**-**	**30,000**
NE	Mining, Conversion, and Transportation	1,500	—	1,425
	Subtotal, NE	**1,500**	**—**	**1,425**
SC	Advanced Scientific Computing Research	—	2,500	2,500
	Basic Energy Sciences	25,000	30,000	30,000
	Biological and Environmental Research	15,000	10,000	10,000
	Subtotal, SC	**40,000**	**42,500**	**42,500**
Total, Critical Minerals and Materials Crosscut		**298,506**	**242,617**	**528,425**

Overview of Critical Minerals and Materials

As highlighted in EO 14272, *Ensuring National Security and Economic Resilience Through Section 232 Actions on Processed Critical Minerals and Derivative Products*, critical minerals and materials (CMM) are vital for U.S. national security, American energy independence, and a robust economy. DOE CMM investments span fundamental scientific discovery; technology development, testing and scaling; resource characterization and exploration; and commercialization support. These investments constitute immediate commercialization actions to address the CMM crisis. They also constitute essential mid- to long-term research, development, and demonstration activities that will future proof the supply chain and transform the U.S. private sector's capabilities in mining, mineral processing, derivative product manufacturing, and recycling.

To realize U.S. controlled and globally competitive CMM supply networks, the DOE invests in innovation and commercialization across the full supply chain which includes mining and extraction, processing, manufacturing, management at end-of-life (including remanufacture, refurbish, repair, reuse, recycle, and repurpose), and advancing alternative materials, components, and systems that reduce reliance on CMM.

Highlights of Program Efforts in FY 2027

Critical Minerals and Energy Innovation (CMEI):

- Advanced Materials and Manufacturing Technologies: Will expand critical materials research investments, with focus on research, development and pilot scale demonstrations aimed at increasing domestic availability of these materials, developing alternatives, and increasing the resiliency of critical materials supply chains.
- Advanced Mining and Mineral Production Technologies: Coordinate with complementary investments in other DOE offices through the DOE-wide Critical Materials Collaborative (CMC) to ensure future American mineral dominance across critical mineral and material supply chains. Invests in technologies to accelerate domestic mineral extraction and processing. Specifically, focus on research, development, and demonstration efforts on advanced and innovative extraction, processing, reduction to metal, and refining technologies. The program fosters collaboration and characterizes diverse mineral production options across the U.S., driving local support for mineral projects.
- Manufacturing Deployment: Focus on increasing capacity of critical minerals, materials and energy products at commercial scale. Perform analysis and developing supply chain analytical tools needed to identify national and economic security vulnerabilities in energy supply chains.

Energy Information Administration (EIA)

- Pursue data collections through multiple pilot surveys targeting critical minerals in FY 2027, leading to related published research. EIA also intends to continue its collaborative efforts with the U.S. Department of the Interior's U.S. Geological Survey to support the modeling and forecasting demand for energy technologies that use critical minerals.
- Publish work under energy consumption surveys on an annual basis, rather than as multi-year deliverables with outdated information, including subjects that may indicate critical mineral and materials demand.

Hydrocarbons and Geothermal Energy Office (HGEO)

- Undertake research and development (R&D) to modernize coal mining and processing, extend the life of existing mines, and grow the industry by enabling recovery of coal from seams previously considered un-mineable. The program will encompass efforts for advancing mining research and development by leveraging technologies such as robotics, automation, and AI to enhance mining safety and operational efficiency. The program will also advance technologies that aim to innovate processing techniques, including recovering fines and utilizing methods such as plasma and biomimicry.

Nuclear Energy (NE)

- Mining, Conversion, and Transportation - Uranium is the most-used fuel material by nuclear power plants. The first step in the nuclear fuel cycle for energy generation is to procure uranium concentrate (e.g., U3O8, triuranium octoxide), which is primarily produced through uranium mining. NE supports uranium mining, conversion, and transportation R&D efforts to continuously revitalize and strengthen the domestic uranium mining industry to benefit the entire front-end of the U.S. nuclear fuel cycle.

Science (SC)

- Advanced Scientific Computing Research (ASCR): Foundational research to advance AI and computational methods to more rapidly identify processes, materials, and chemical properties.
- Biological and Environmental Research (BER): Research continues in critical minerals and materials research that leverages advanced biodesign concepts to engineer microbes, plants, and microbial communities in extracting and recovering critical elements with enhanced selectivity and efficiency.
- Basic Energy Sciences (BES): Research continues to focus on understanding of the role of REEs, PGEs, and other critical elements in determining the properties of materials and chemical components (such as catalysts) at length scales ranging from electronic to atomic and microstructural scales; on the use of such knowledge to reduce, eliminate, or find substitutes for energy-relevant technologies; and on advancing geoscience and separation science to enhance and redefine the extraction, recovery, and chemical processing of critical elements. Also included is understanding of REE and PGE chemistry, including selective separations from solutions, and dynamics and reactivity at mineral-water interfaces during extraction and recovery.

Grid Crosscut
Funding by Organization and Budget Control
($K)

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
ARPA-E	ARPA-E Projects	—	TBD	TBD
	Subtotal, ARPA-E	**—**	**TBD**	**TBD**
Baseload Power	Baseload Power	—	—	760,000
	Subtotal, Baseload Power	—	—	**760,000**
CMEI	Building Technologies	—	13,900	—
	Energy Grid Integration	90,000	—	—
	Hydropower & Hydrokinetic (formerly Water Power Technologies)	20,526	20,776	46,000
	Industrial Technologies (formerly Industrial Efficiency and Decarbonization)	31,200	30,000	8,000
	Integrated Energy Systems (formerly Solar Energy Technologies and Wind Energy Technologies)	—	66,000	—
	Transportation Technologies (formerly Vehicle Technologies)	19,200	—	—
	Subtotal, CMEI	**160,926**	**130,676**	**54,000**
EIA	National Energy Information System	4,291	4,399	4,510
	Subtotal, EIA	**4,291**	**4,399**	**4,510**
NE	Advanced Reactor Demonstration Program	5,000	5,000	5,000
	Subtotal, NE	**5,000**	**5,000**	**5,000**
OE	Transmission Reliability & Resilience	33,000	27,500	27,500
	Energy Delivery Grid Operations Technology	31,000	31,000	34,500
	Resilient Distribution Systems	53,000	25,000	20,600
	Cyber Resilient & Secure Utility Communication Networks	15,500	10,800	10,500
	Energy Storage	92,500	85,000	51,700
	Transformer Resilience & Advanced Components	22,500	22,500	22,500
	Applied Grid Transformation Solutions	13,500	13,500	10,300
	Transmission Planning & Permitting	—	—	4,000
	Subtotal, OE	**261,000**	**215,300**	**181,600**
	Total, Grid Crosscut	**431,217**	**355,375**	**1,005,110**

Overview of Grid

In accordance with Executive Order 14154, *Unleashing American Energy*, and 14262, *Strengthening the Reliability and Security of the United States Electric Grid*, DOE is committed to a reliable, diversified, and affordable supply of energy that sustains the basics of modern life and military preparedness. Researching, developing, demonstrating, and deploying innovative solutions and advancing transmission systems across the country are essential to building out a better grid to meet the growing demand for electricity to all Americans. Electricity is a foundation of America's society and economy. Quality of life, stable employment, modern healthcare, industrial competitiveness, national prosperity, and innovation all depend on access to affordable, reliable, and secure power. The electric system supporting this foundation is an engineering marvel with more than 12,000 utility-scale generation plants, 700,000 circuit miles of transmission lines, and 5.5 million miles of distribution lines to deliver over 4 trillion kilowatt hours of electricity to homes, businesses, and critical institutions across the Nation annually.

When disruptions occur in this interconnected system, their consequences are outsized, triggering economic losses, threatening public safety, and posting significant risks to national security. This intricate and complex foundational system is facing the most acute stress in its history. Current trends are unsustainable and the FY 2027 Request focuses grid activities on stabilizing our electric system, optimizing the grid to maximize its value, and positioning the system to grow.

Challenges and Objectives

Five broad and interlinked grid challenges represent the critical issues confronting the Nation's electric system, spanning time horizons, technologies, stakeholder groups, and market structures.

- Delivering Affordability: Achieving grid affordability amid aging infrastructure and expansion needs
- Scaling for New Loads: Addressing the scale and rapid growth of electricity demand
- Modernizing for reliability: Emphasizing both innovation and dependability in a complex and dynamic environment
- Achieving Security and Resilience: Strengthening grid resilience and security in a dynamic risk landscape
- Advancing Supply Chain Security: Accelerating innovations in the face of shifting global supply chains

Three complementary paths will guide grid transformation to achieve sustained long-term energy abundance, providing a bridge to transition the American electric grid to one strengthening American energy leadership and innovation and enabling energy affordability, reliability, and security.

- Stabilization: Addressing urgent, emergency conditions to ensure safety, reliability, and system integrity
- Optimization: Enhancing grid performance and strengthening security through robust consideration of available technology options and process improvements
- Growth: Supporting long-term expansion by enabling innovation, advancing new technologies, and building capacity for a future-ready electric system.

Highlights of Program Efforts in FY 2027

Baseload Power

- This new initiative deploys resources to multiple DOE offices using unobligated balances from the Green New Scam programs passed under the previous Administration.
- The FY 2027 Request provides funding for grid optimization, capacity improvments, generation uprates, and other grid upgrades, including reconductoring existing transmission lines with advanced conductors.

Critical Minerals and Energy Innovation (CMEI)

- Hydropower and Hydrokinetic: Develop new strategies to quantify hydropower's value to the grid, advancing digital tools supporting fleet modernization. This request prioritizes turbine upgrades, dam safety improvements, digital controls, grid integration, and resilience retrofits to preserve and expand firm, dispatchable generation.

Energy Information Administration (EIA)

- The comprehensive work of EIA supports regulatory oversight, infrastructure planning, energy policy development, and market analysis, all of which are essential for maintaining a reliable, resilient, and efficient electric grid. EIA electric power surveys collect data on an hourly, monthly, and annual basis that allow policy makers and analysts to assess the U.S. electricity grid's generation capacity, its actual generation and fuel consumption patterns, and how electricity reaches consumers and is accounted for economically. EIA's models of electricity markets simulates how power is generated, dispatched, and priced, balancing demand with supply from various sources, while considering operational costs, environmental regulations, and transmission. EIA's models provide a view into how electricity markets may develop given specific assumptions surrounding policy, technology evolution, and cost.

Office of Nuclear Energy (NE)

- Advanced Reactor Demonstration Program – Demonstration 2 TerraPower. The TerraPower Natrium Demonstration Project integrates a sodium-cooled fast reactor with a molten salt energy storage system. This innovative design allows the reactor to operate continuously while boosting output to 500 MWe for extended periods, making it a flexible and cost-competitive energy source for the grid. The molten salt storage system enables the reactor to provide reliable, dispatchable power and enhance grid stability.

Office of Electricity (OE)

- Transmission Reliability and Resilience (TRR), in collaboration with the electric industry, researches, develops, and demonstrates system monitoring and diagnostics, advanced data analytics and modeling, and robust control technologies. These technologies are critically needed to assess and enhance the reliability and performance of the electricity system, mitigate large-scale blackouts, and adapt to evolving system needs, emerging risks, and interdependencies. TRR's investments will make the present and future grid resilient, reliable, efficient, affordable, and secure.
- Energy Delivery Grid Operations Technology enhances the analytical capability needed to ensure reliable and resilient energy delivery and to identify scalable solutions to manage emerging threats. The core of the portfolio is the North America Energy Resilience Model (NAERM), a hybrid data/model platform for the assessment of significant interdependencies within the energy sector that could affect reliability and resilience.
- Resilient Distribution Systems focuses on RD&D of grid technologies, tools, and techniques needed to maintain power to end users and coordinate information and control across segments of the electricity system, such as transmission, distribution, loads, and microgrids. Strategic investments in innovative technologies, tools, and practices will improve grid reliability, affordability, and security, while also providing grid system planners, stakeholders, and operators with better solutions for coordinating decision-making and investment strategies across grid system domains.
- Cyber Resilient and Secure Utility Communications Networks develops solutions to strengthen information security in the electricity delivery system. Modernizing communications and control systems to support end-to-end information security for real time operations, from the grid edge to the control center and back, is essential to ensure the efficient, reliable, resilient, and afford operation of the electrical power system in a complex and dynamic risk landscape.
- Energy Storage transforms storage technologies into solutions for a reliable, resilient, secure, and affordable future-ready grid. Storage enhances the electricity resources usefulness, providing new tools to improve grid economics, reliability, security, and resilience, and creating new infrastructure planning options from deferral to rapid expansion. The Budget emphasizes rapid de-risking and accelerating market readiness of new storage technologies to give Americans reliability and affordability solutions by the next year, rather than the next decade.
- Transformer Resilience and Advanced Components (TRAC) strengthens the Nation's electricity delivery system by addressing key challenges such as aging infrastructure, evolving electrical loads including the rapid emergence of large electrical loads, and increasing needs for all grid components to withstand both system transients and extreme physical events. As supply chain disruptions and global competition for materials have highlighted the risks associated with relying on foreign sources for critical grid components, TRAC also develops resilient, high-performance equipment that can be manufactured using domestic materials and supply chains.
- Applied Grid Transformation Solutions (AGTS) tests and validates innovative grid technologies prior to their deployment in the field, increases awareness of advanced grid solutions that can meet pressing industry needs, and drives standards that promote U.S. leadership, innovations, and grid technologies in global markets. AGTS testbeds and pilot demonstrations provide industry with the data, insights, and support to inform grid transformation, assess infrastructure investments, and advance U.S. interests and influence in critical grid supply chains.
- Transmission Planning and Permitting (TPP) accelerates the build-out and modernization of the Nation's electric grid to secure American energy dominance while making electricity more affordable to Americans. TPP activities encourage development of needed transmission capacity to meet projected electricity demand growth that has significantly outpaced existing electric grid capacity growth.

Research and Development (R&D) Crosscut
Funding by Organization and Budget Control
($M)

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
ARPA-E	Conduct of R&D	460	350	200
	Subtotal, ARPA-E	**460**	**350**	**200**
BPA	Conduct of R&D	2	2	2
	Subtotal, BPA	**2**	**2**	**2**
CESER	Conduct of R&D	108	93	108
	Subtotal, CESER	**108**	**93**	**108**
CMEI	Conduct of R&D	1,885	1,400	472
	R&D Facilities and Equipment	65	66	17
	Subtotal, CMEI	**1,950**	**1,466**	**489**
EM	Conduct of R&D, Defense Environmental Cleanup	40	19	19
	Subtotal, EM	**40**	**19**	**19**
HGEO	Conduct of R&D	1,517	665	452
	R&D Facilities and Equipment	14	6	4
	Subtotal, HGEO	**1,531**	**671**	**456**
NE	Conduct of R&D	1,281	1,114	1,183
	Subtotal, NE	**1,281**	**1,114**	**1,183**
NNSA	Conduct of R&D, Defense Nuclear Nonproliferation	524	508	466
	R&D Facilities and Equipment, Defense Nuclear Nonproliferation	31	30	25
	Subtotal, Defense Nuclear Nonproliferation	**555**	**538**	**491**
	Conduct of R&D, Naval Reactors	905	948	957
	R&D Facilities and Equipment, Naval Reactors	247	478	787
	Subtotal, Naval Reactors	**1,152**	**1,426**	**1,744**
	Conduct of R&D, Weapons Activities	4,536	4,453	4,964
	R&D Facilities and Equipment, Weapons Activities	707	549	638
	Subtotal, Weapons Activities	**5,243**	**5,002**	**5,602**
	Subtotal, NNSA	**6,950**	**6,966**	**7,837**
OCED	Conduct of R&D	179	—	—
	Subtotal, OCED	**179**	**—**	**—**
OE	Conduct of R&D	180	159	128
	Subtotal, OE	**180**	**159**	**128**
SC	Conduct of R&D	6,680	6,589	5,545
	R&D Facilities and Equipment	1,336	1,437	1,382
	Subtotal, SC	**8,016**	**8,026**	**6,927**
	Total, Research and Development Crosscut	**20,697**	**18,866**	**17,349**

Conduct of R&D
Funding by Classification and Organization
($M)

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
Basic Research	CESER	11	—	11
	NNSA-DNN	154	165	153
	OE	13	12	9
	SC	6,680	6,589	5,545
	Subtotal, Basic Research	**6,858**	**6,766**	**5,718**
Applied Research	ARPA-E	345	263	150
	BPA	1	1	1
	CESER	67	53	67
	CMEI	916	650	215
	EM-DEC	13	6	6
	HGEO	1,484	651	442
	NE	548	523	642
	NNSA-DNN	206	197	177
	NNSA-NR	125	137	134
	NNSA-WA	3,700	3,688	3,913
	OE	75	67	52
	SC	—	—	—
	Subtotal, Applied Research	**7,480**	**6,236**	**5,799**
Experimental Development	ARPA-E	115	87	50
	BPA	1	1	1
	CESER	30	40	30
	CMEI	969	750	257
	EM-DEC	27	13	13
	HGEO	33	14	10
	NE	733	591	541
	NNSA-DNN	164	146	136
	NNSA-NR	780	811	823
	NNSA-WA	836	765	1,051
	OCED	179	—	—
	OE	92	80	67
	Subtotal, Experimental Development	**3,959**	**3,298**	**2,979**
Total, Conduct of R&D		**18,297**	**16,300**	**14,496**

R&D Facilities and Equipment
Funding by Classification and Organization
($M)

		FY 2025 Enacted	FY 2026 Enacted	FY 2027 Request
R&D Facilities, Construction and Rehabilitation	CMEI	60	60	15
	NNSA-NR	219	464	772
	NNSA-WA	193	30	106
	SC	1,178	1,243	1,204
	Subtotal, R&D Facilities, Construction and Rehabilitation	**1,650**	**1,797**	**2,097**
R&D Equipment, Major Equipment	CMEI	5	6	2
	HGEO	14	6	4
	NNSA-DNN	31	30	25
	NNSA-NR	28	14	15
	NNSA-WA	514	519	532
	SC	158	194	178
	Subtotal, R&D Equipment, Major Equipment	**750**	**769**	**756**
Total, R&D Facilities and Equipment		**2,400**	**2,566**	**2,853**

Program R&D Efforts

ARPA-E supports the delivery of 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. ARPA-E executes its budget through funding opportunity announcements that address applications that are not represented in its present portfolio and develops new opportunities opened by the outcomes of previous programs.

CESER seeks to enhance the security and resilience of the nation's critical energy infrastructure from all hazards. CESER's R&D investments aim to bolster capabilities by developing game-changing cybersecurity tools, technologies, methodologies, and guidance that aid in securing energy infrastructure. These tools and technologies will help energy industry identify, protect, detect, respond, and recover in the face of increasingly advanced cyber threats. CESER has instituted coordination and integration of cybersecurity requirements in research and development efforts across DOE's science and energy programs, building cybersecurity into the energy delivery system components. CESER will supplement these efforts with development, demonstration and deployment of crosscutting tools leveraging emerging technologies and techniques. CESER also includes research, development and demonstration (RD&D) to address risks to the energy sector from non-cyber hazards such as physical attack and impacts of climate change, e.g., increased wildfires and severe hurricanes. CESER will develop tools that help with risk characterization and analysis and enable early detection and mitigation of these risks.

NE supports the diverse civilian nuclear energy programs of the U.S. Government to research and develop nuclear energy technologies, including generation, safety, and security technologies through strategic and innovative methods. NE seeks to enhance availability, economics, and security of nuclear-generated electricity in the United States. NE supports small modular reactor research as well as materials aging and degradation, safety margin characterization, safety technologies, and instrumentation and controls. Research is also conducted on 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 economic competitiveness and flexibility of nuclear energy. Additionally, NE supports research and

development activities in advanced manufacturing methods, fabrication, and transportation technologies that includes strong investments in modeling and simulation tools.

OE supports R&D for new technologies to strengthen, transform, and improve electricity delivery infrastructure so consumers have access to reliable, resilient, secure, and affordable sources of electricity. OE provides solutions to technical, market, institutional, and operational failures that go beyond any one utility's ability to solve. OE works to ensure that our Nation's electricity delivery system can accommodate changes at generation and load sides of the grid.

SC supports the Administration's objectives to advance bold, transformational leaps in U.S. science and technology (S&T) and ensure America remains the global S&T leader for generations to come. The FY 2027 Request supports a portfolio of basic scientific research probing some of the most fundamental questions in areas such as: fusion energy and plasma physics; nuclear and high energy physics; materials sciences and chemistry; biological systems; applied mathematics; next generation high-performance computing and simulation capabilities; artificial intelligence and machine learning; isotope science and production; quantum information sciences; and basic research to advance new accelerator and energy technologies. The SC Request increases investments in Administration priorities including basic research on Artificial Intelligence (AI) and Machine Learning (ML), Quantum information Sciences (QIS), fusion energy sciences, and Critical Minerals and Materials (CMM) research initiatives. The SC Request supports ongoing investments in fusion development in support of the Long Range Plan (LRP). The Request continues support for the National Quantum Information Science (QIS) Research Centers for basic research and early-stage development to accelerate the advancement of QIS through vertical integration between systems, theory, hardware, and software. The Request continues investments in microelectronics and isotope production and research. These initiatives position SC to advance and address new research opportunities through collaborative, cross-program efforts.

NNSA contributes directly and crucially to U.S. nuclear security R&D by supporting key investments in science and technology innovation that support the stewardship of the nuclear weapons stockpile, modernize the nuclear security enterprise, protect the U.S. from weapons of mass destruction threats, enable science-based certification of the stockpile, and provide the U.S. Navy with nuclear reactors that meet complex evolving requirements.