

NETL At a Glance

Background and Accomplishments

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About NETL

- NETL is a U.S. Department of Energy (DOE) national laboratory that drives innovation and delivers technological solutions for an environmentally sustainable and prosperous energy future. Using its world-class talent and research facilities, NETL is ensuring affordable, abundant and reliable energy that drives a robust economy and national security, while developing technologies to manage carbon across the full life cycle, enabling environmental sustainability for all Americans.
- NETL focuses on science and technology development leading to the commercialization of technologies that produce low-cost, reliable energy that spurs economic development while mitigating technical and environmental risks. NETL maintains nationally recognized technical competencies and collaborates with partners in industry, academia, and other national and international research organizations to nurture emerging technologies.
- NETL Core Competencies include
 - Computational Science & Engineering
 - Materials Engineering & Manufacturing
 - Geological & Environmental Systems
 - Energy Conversion Engineering
 - Strategic Systems Analysis & Engineering
 - Program Execution & Integration
- NETL's major initiatives are Decarbonization and Carbon Management, Environmentally Sustainable Supply Chains, Integrated Energy and Industrial Systems to Enable Deep Decarbonization, and Advanced Data and Computing Solutions for Applied Energy Challenges.
- As the DOE's only government-owned, government-operated (GOGO) laboratory, NETL implements R&D projects for DOE's Offices of Fossil Energy and Carbon Management; Energy Efficiency and Renewable Energy; Cybersecurity; Energy Security and Emergency Response; Manufacturing and Energy Supply Chains; Grid Deployment; and Clean Energy Demonstrations.
- The Laboratory's research portfolio includes more than 1,000 research activities across all 50 states, with a total award value that exceeds \$5 billion, which includes private sector cost-sharing of \$1.3 billion.
- NETL develops and deploys state-of-the-science best practices for energy technology modeling and data interoperability from emerging to mature technologies.
- New initiatives spearheaded by NETL will accelerate technology to enable the current energy transition that will lead to a 100% percent clean energy economy by 2050.
- Work performed at NETL provides opportunities for economic development by performing leading-edge fundamental and applied research and pushing technologies toward commercialization.
- NETL activities carefully consider the impacts and benefits to frontline communities and seek to engage environmental justice communities who have been negatively affected by energy production in the past.
- The NETL workforce exceeds 1,300 with R&D campuses in Morgantown, West Virginia; Pittsburgh, Pennsylvania; and Albany, Oregon. Strategic field offices are in Anchorage, Alaska and Houston, Texas.

Recent NETL Innovation Milestones

- A six-year project managed with NETL oversight has culminated in the manufacture of commercial-scale nickel superalloy components that are needed for higher-efficiency thermal power plants. [The Advanced Ultra-](#)

[Supercritical Component Testing Project](#) has enabled domestic manufacturers to fabricate full commercial-scale components that will enable plants to operate with greater efficiency and at conditions of up to 1,400 degrees Fahrenheit and steam or supercritical carbon dioxide pressures of at least 3,500 pounds per square inch.

- NETL's [Hybrid Performance \(HyPer\) facility](#) was created to support U.S. Department of Energy efforts to research highly efficient power generation technologies that can reduce U.S. dependence on foreign sources of oil and other energy feedstocks. HyPer researchers are also focused on achieving the Administration's goal of zero CO₂ emissions from power generators by 2035.
- NETL released [an analysis tool to advance commercialization of solid oxide cell \(SOC\) technology](#). The tool will assist commercial developers and researchers evaluate the costs of manufacturing large volumes of SOC and stacks, aiding the development and commercialization of SOC technology.
- NETL partnered with Membrane Technology and Research Inc. (MTR) to develop MTR's [membrane-based CO₂ capture process](#) that can capture greenhouse gases without using hazardous chemicals at a reduced cost. The technology is now undergoing a large pilot scale field test that will include the construction, installation and operation of a large carbon capture pilot system at the Wyoming Integrated Test Center in Gillette, Wyoming
- U.S. Department of Defense (DOD) progress on a \$4 million plan to pursue a technology for recovering rare earth elements (REEs) and other critical minerals from coal ash, has its roots in [a ground-breaking project spearheaded by NETL](#) and private partner – Physical Sciences Inc. (PSI). The DOD's action is an example of how NETL uses cooperative partnerships for technology development in the public and private sectors.
- A digital tool developed by NETL that helps examine ocean currents and wind patterns to predict where oil and other particles in the ocean are likely to travel in the events of an oil spill is being used for a range of non-energy related uses-like keeping track of the Great Pacific Garbage Patch for cleanup activities. [NETL's Climatological and Instantaneous Isolation and Attraction Model](#) (CIAM) leverages scientific expertise along with big data science, machine learning, and computing to forecast hazards and identify risks that contribute to offshore spills.
- Ammonia is used to clean, treat wastewater, fertilize crops, make chemicals, and serve as a refrigerant for cooling systems. [NETL researchers are investigating](#) ammonia's vast potential to be a carbon-free fuel for transportation and power generation thanks to some new laboratory capabilities.
- GE Global Research (GEGR), in partnership with Cooperative Energy, completed commissioning tests for a first-of-its-kind full-scale prototype large power transformer (LPT), [a technology that can lead to greater grid resilience](#) during power outages. Now fully operational as part of the power distribution system in Columbia, Mississippi, the LPT, represents the world's first variable impedance flexible design transformer in its class, rated at 60 megavolt amperes.
- [Bioengineering technology](#) has been developed by NETL's collaboration with the Montana State University Energy Research Institute and Center for Biofilm Engineering, Montana Emergent Technologies (MET), in which microbes initiate a process to help seal problematic defects in wellbore casing cement. The technology has been licensed as a commercial product and has already been used to plug more than 40 wells at sites across the U.S.
- Southwest Research Institute (SwRI), with support from NETL, concluded a five-year project resulting in the development of [a novel methane leak detection technology](#) that can reliably, accurately, and autonomously detect and estimate methane leaks in natural gas infrastructure and has the potential to significantly reduce greenhouse gas emissions in the energy sector. The technology represents a significant improvement over existing methane detection systems, which have significantly lower estimation capabilities.
- NETL released a detailed final report Feb. 14, 2022, that encapsulated public and private sector input and key themes associated with fossil energy's role in enabling an accelerated and affordable clean hydrogen future. The report, ["Enabling an Accelerated and Affordable Clean Hydrogen Future – Fossil Energy Sector's Role](#)

[Workshop Final Report,](#)” was based on a two-day workshop hosted by NETL and Gas Technology Institute in September 2021.

NETL Contributes Expertise and Technical Information in Local, State and National Venues

- A new report by NETL confirms that it would be [technically feasible to produce jet fuel at the Pittsburgh International Airport](#) (PIT) by converting natural gas from wells on the property into liquid fuel using a commercially available technology — a step that could build upon the airport’s already successful grid independence initiatives, insulate the airport from fuel disruptions in the marketplace, and provide a path to reduced greenhouse gas emissions.
- A build-out of America’s evolving carbon capture and storage (CCS) technologies offer noteworthy job growth potential with no significant supply chain risks, according to [an NETL-authored report](#) released by Secretary of Energy Jennifer M. Granholm. The report concluded that a CCS industry build-out could result in creation of up to 1.8 million jobs largely in the Midwest, Appalachian and Southern States, through construction, operation and maintenance of capture, pipeline and storage sites.
- NETL collaborated with education leaders in West Virginia and the Columbus, Ohio-based Center of Science and Industry (COSI) to create and distribute [“Learning Lunchboxes,”](#) which include materials and a guide to complete five engaging hands-on STEM-related activities for middle school students across West Virginia.

DOE’s FY 2023 Budget Request to Congress — NETL Highlights

- The Administration has requested \$893 million for Fossil Energy and Carbon Management (FECM) research for FY 2023, an increase of \$68 million the FY 2022 enacted FECM research budget of \$825 million.
- The President’s 2023 budget request for NETL is \$170.9 million, including:
 - \$83 million for NETL Research and Operations
 - \$55 million for NETL Infrastructure
 - \$29.9 million for Program Direction
 - \$3 million for leading the government-wide Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization