



NETL's Regional Summary

WEST VIRGINIA

The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) in Morgantown, West Virginia, creates innovative solutions that strengthen the security, affordability and reliability of energy systems and natural resources. Approximately 500 Morgantown-based NETL employees are dedicated to advancing the nation's energy future by developing and deploying applied energy technologies for the region and beyond.

The Morgantown site serves as a hub for energy innovation, focusing on advancements in geological and environmental sciences, energy conversion, computational science, and materials engineering. NETL researchers leverage computational tools, engineering expertise and strategic partnerships to address national energy challenges. The laboratory's capabilities include chemical reaction engineering, microwave chemistry for ammonia synthesis, integrated energy system development, novel reactor designs for high-value carbon and chemical production, natural gas extraction and processing, fuel cell and electrolyzer innovation, advanced subsurface imaging using in situ computed tomography (CT) technology, and next-generation combustion systems.

Through collaborations with industry, government agencies and academia — including West Virginia University (WVU) — NETL is accelerating the transition of innovative technologies from the lab to real-world applications, strengthening regional industries, and driving long-term energy advancements.

Regional Economic Impact

In 2024, NETL conducted an economic analysis to quantify the laboratory's impacts on West Virginia, highlighting its contributions to job creation and overall economic growth in the region.

Economy

\$206M

Total Economic Impact
(direct, indirect and induced)

\$152M

Total Expenditures

Jobs

1,449

Jobs (direct, indirect
and induced full-time
equivalent jobs)

536

**Federal Employment and
Site-Support Contractor**
(full-time equivalent jobs)

DOE Program Execution

NETL uniquely functions as a DOE field office supporting DOE offices in all aspects of program execution. In 2024, NETL supported more than 40 research activities in West Virginia.

\$91.9M

DOE Share (Cost Plan)

\$109.1M

Total Award Value
(Cost Plan)

\$17.2M

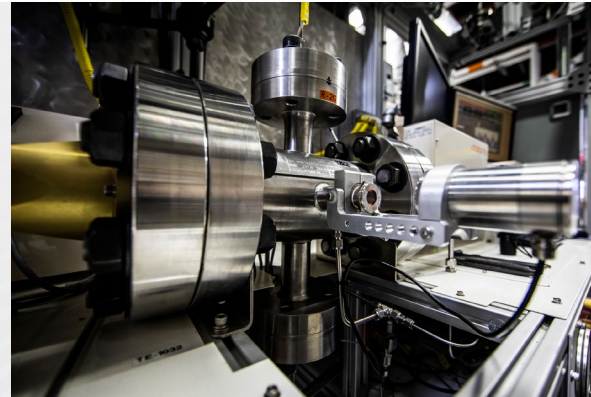
Performer Share (Cost Plan)

Facilities

The Center for Microwave Chemistry achieves breakthroughs in reaction science that push the boundaries of explored research. The Center helps scientists and engineers test chemical and fuel transformations using catalysts and electromagnetic methods, allowing them to explore new processes under various conditions that are not possible in standard labs. The Center lets researchers conduct experiments with various fuel types, including coal, biomass and liquid hydrocarbon fuels, under a range of pressures, which can lead to fuel flexibility and enhanced energy security.

The Center for Advanced Imaging, Visualization and Characterization provides advanced imaging and characterization of rock cores and materials, helping researchers examine dynamic processes inside samples across a range of scales. Capabilities include probing different subsurface phenomena and detailing the microscopic structure of materials. Using advanced imaging techniques, researchers gain insight into the behavior of fluids at representative subsurface pressures and temperatures. This knowledge is essential to providing data for energy resource management.

The Integrated Energy Systems Facility supports research on high-efficiency power systems that achieve flexible turndown, thereby increasing reliability and resiliency of the modern grid. Specialties include advanced energy systems, including thermal and electrical integration and control, system operability, and flexible generation response, with a focus on hybrid energy cycles and integrated energy and materials generation concepts. NETL's equipment helps organizations that want to improve the efficiency and reliability of power systems by developing and testing new technologies that increase energy generation and provide a platform for integrated energy system controls development.



Research Breakthroughs

Ammonia Synthesis Using Microwave Technology

NETL researchers developed an innovative approach for low-cost ammonia production at laboratory scale. The low-pressure, low-temperature process requires significantly less energy compared to conventional methods, making it economically viable for small-scale, local production. This is especially relevant for farming communities, which can use ammonia in fertilizer suitable for all soil types. The technology supports the Department of Energy, which seeks to advance cost-effective technology solutions for advanced energy and industrial processes.

NETL's MFiX-Exa Enhances Scientific Discovery and Real-World Efficiency

NETL researchers are using MFiX-Exa, an exascale-capable multiphase computational fluid dynamics code, to transform scientific discovery and increase efficiency in the real world. In a first-of-its-kind computational fluid dynamics-discrete element method (CFD-DEM) science run on the world's first exascale supercomputer, Frontier, MFiX-Exa made it possible to model NETL's 50-kW pilot-scale chemical looping reactor (CLR) which contains approximately 5 billion particles. Building on that success, researchers are leveraging MFiX-Exa to investigate pilot and industrial scale multiphase reactors and improve the efficiency of a biological reactor, further accelerating American energy innovation.

Breakthrough Computing Solution Achieves Unprecedented Speed and Efficiency

In partnership with Cerebras Systems, NETL researchers are leveraging the wafer-scale computer platform to address complex energy and data challenges with unprecedented speed and a 1000x improvement in power efficiency compared to traditional high-performance computing. This groundbreaking scientific simulation capability facilitates real-time insights and complex reasoning to accelerate innovation across industrial and energy systems from fuel production and combustion to thermal management.

Community Involvement

West Virginia Science Bowl (WVSB)

The DOE National Science Bowl is a nationwide academic competition that requires students to answer questions about science, technology, engineering and math (STEM) topics. For more than 30 years, NETL has hosted and provided volunteers for the WVSB regional middle school and high school competitions, held annually in partnership with WVU, to select students from the region to participate in the annual National Science Bowl in Washington, D.C.

In 2025, 284 students and educators from 24 high schools and 23 middle schools competed in the WVSB, which 72 NETL volunteers staffed.

Carnegie Science Center SciTech Days

In 2024, NETL staff collaborated with the Carnegie Science Center to showcase the lab's STEM careers to middle school and high school students from Pennsylvania and West Virginia. This event included flash workshops, demonstrations, interviews and career conversations.

NETL STEM Education and Outreach Program

NETL continues to demonstrate a commitment to STEM education and supports all levels of learning through our STEM Education and Outreach Program. NETL's workforce provides students with hands-on learning experiences, career path discussions and presentations to heighten their awareness of, and interest in, careers in STEM fields.



R&D Collaborations

NETL collaborates with industry, academia, national laboratories and government agencies to advance energy innovation. These partnerships leverage NETL's expertise, facilities and research capabilities to tackle critical energy challenges. Through these partnerships, stakeholders can:

- Work with NETL on research and development (R&D) projects.
- Access NETL's facilities, equipment and research services.
- Establish agreements that define collaboration terms and maximize research impact.
- Secure and license NETL's intellectual property.



NETL is a U.S. Department of Energy (DOE) national laboratory dedicated to advancing the nation's energy future by creating innovative solutions that strengthen the security, affordability and reliability of energy systems and natural resources. With laboratories in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania, NETL creates advanced energy technologies that support DOE's mission while fostering collaborations that will lead to a resilient and abundant energy future for the nation.



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