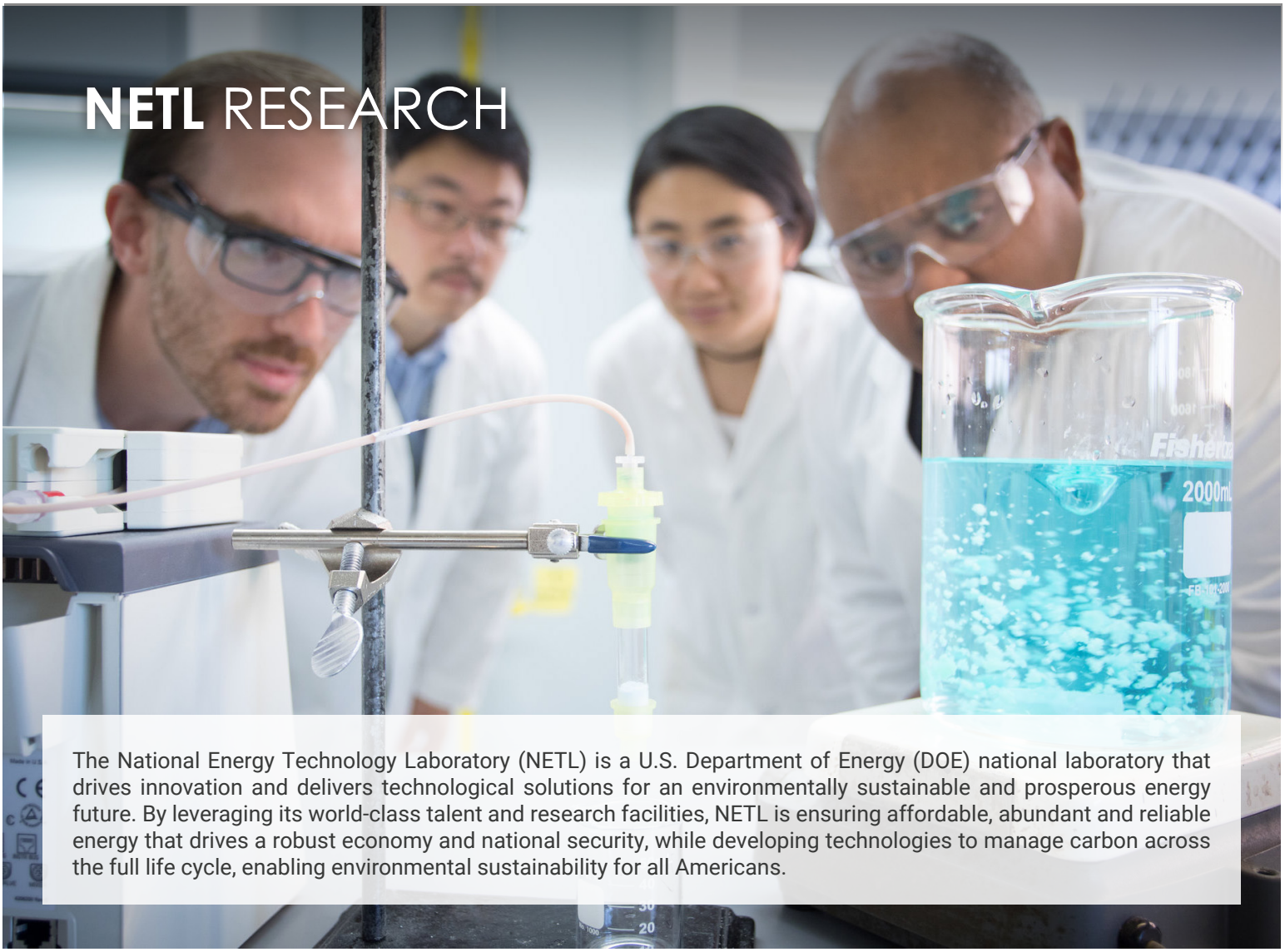
NETL RESEARCH



The National Energy Technology Laboratory (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. By leveraging 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.

NATIONAL ENERGY TECHNOLOGY LABORATORY

NETL is the only government-owned, government-operated (GOGO) national laboratory in DOE's arsenal, providing unique capabilities. Leveraging the power of workforce inclusivity and diversity, highly skilled innovators at NETL's research laboratories — in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania — conduct a broad range of research activities that support DOE's mission to ensure America's security and prosperity by addressing its energy and environmental challenges through transformative science and technology solutions.

The laboratory undertakes robust in-house research and delelopment (R&D) and manages an extensive external R&D portfolio across various DOE offices. These include the Office of Fossil Energy and Carbon Management (FECM); the Office of Energy Efficiency and Renewable Energy (EERE); the Office of Cybersecurity, Energy Security, and Emergency Response (CESER); the Office of Electricity (OE); the Grid Deployment Office (GDO); the Office of Manufacturing and Energy Supply Chains (MESC); and the Joint Office of Energy and Transportation. NETL's external R&D includes more than 1,100 R&D activities in 50 states and has a total award value of more than $6 billion, complemented by private sector cost-sharing of $1.4 billion — with more than 500 partners from small and large businesses, national and international research organizations, colleges and universities, and other government laboratories, including NETL's sister DOE national laboratories. Through these partnerships, the laboratory fosters the growth of groundbreaking technologies that propel economic progress while diminishing risks.

ACCELERATING DEVELOPMENT OF EMERGING TECHNOLOGIES

NETL is at the forefront of accelerating emerging technologies. The laboratory's multidisciplinary teams, armed with cutting-edge expertise, are dedicated to pioneering transformative energy solutions. Through the advancement of carbon management and resource sustainability technologies, NETL's R&D is actively shaping the energy future.

As the nation's only DOE GOGO laboratory, NETL is in a unique position to bridge the gap between early-stage research and practical solutions for the energy sector. The laboratory's core competencies include computational science and engineering, energy conversion engineering, geological and environmental systems, materials engineering and manufacturing, program execution and integration, and strategic systems analysis and engineering.

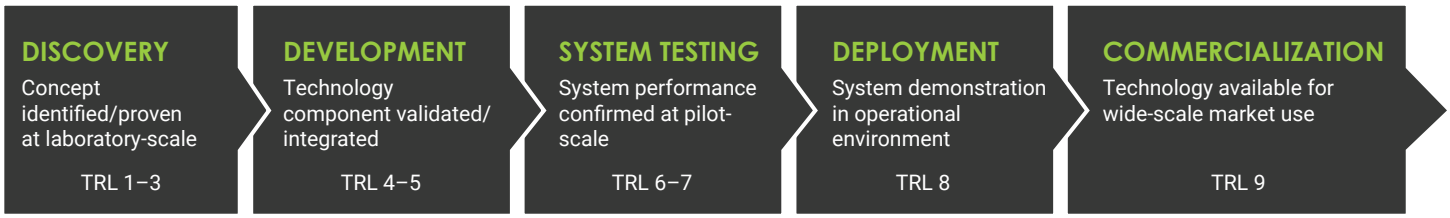
NETL supports the entire spectrum of energy technology development, from initial concept ideas to deployment and commercialization. The laboratory offers independent, unbiased, science-based analyses of technologies, energy policies, legislation and regulations. With NETL's expertise in science, engineering and technology, the laboratory tackles national priorities by spearheading targeted R&D initiatives.

TECHNOLOGY TRANSFER

NETL leverages partnerships with entrepreneurs, companies and universities to efficiently commercialize laboratory-developed technologies, ensuring optimal utilization of federal R&D funds. By engaging in diverse partnership relationships, NETL mitigates technical and economic risks, advances technologies through development stages, and addresses manufacturing and supply-chain challenges. Through agreements and licenses, NETL offers a range of technologies for transfer, prioritizing partners with robust commercialization plans and a commitment to sharing intellectual property benefits with the public. Additionally, NETL utilizes various agreements — such as Cooperative Research and Development Agreements (CRADAs), Memoranda of Understanding (MOUs), and Memoranda of Agreement (MOAs) — to facilitate effective technology transfer and collaboration.

TECHNOLOGY MATURATION

Technology Readiness Level (TRL) is a nine-point scale used to consistently identify technology development progression.

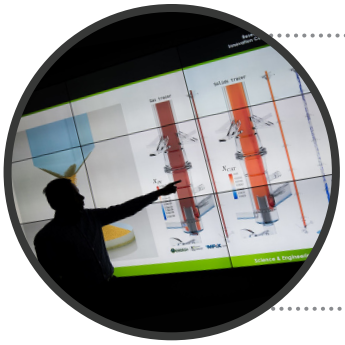


COMMUNITY ENGAGEMENT AND ENVIRONMENTAL JUSTICE

In pursuit of a sustainable energy future for all Americans, NETL recognizes the importance of minimizing its impact on frontline communities. Not only does NETL focus on innovation, but the laboratory also prioritizes environmental justice. Through initiatives that actively engage with communities that have historically been impacted by energy production, NETL ensures their voices are heard and their concerns are addressed. By forging open channels of communication and collaboration, NETL aims to usher in a new era of energy solutions that benefit everyone equitably.

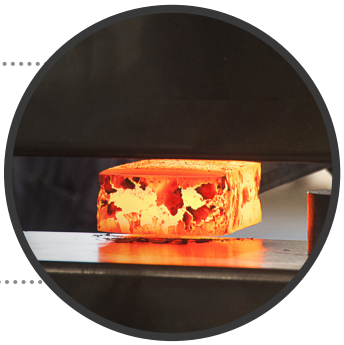
IN-HOUSE CORE COMPETENCIES

NETL conducts research in five areas, building upon R&D competencies, to enhance technical skill related to carbon management and resource sustainability technologies. The laboratory's core competencies in integrated science, engineering and technology enables researchers to address the current energy challenges while planning and seeking solutions for the future. NETL conducts research, development, demonstration and deployment guided by comprehensive system analysis and performs experiments at real conditions with real samples at the right scales, accelerating deployment via advanced modeling. Multidisciplinary teams work toward solution-driven research, discovering, maturing and deploying innovative technologies that are critical to ensuring that the laboratory continues to provide technology options to meet the nation's energy needs.



COMPUTATIONAL SCIENCE AND ENGINEERING

High-Performance Computing
Data Analytics
Artificial Intelligence and Machine Learning
Multi-Scale Modeling (Atomistic to Device)

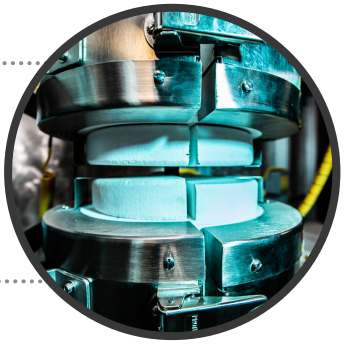


MATERIALS ENGINEERING AND MANUFACTURING

Structural and Functional Materials
Design, Synthesis, Characterization,
Manufacturing and Performance Assessment

GEOLOGICAL AND ENVIRONMENTAL SYSTEMS

Geo-Analysis and Monitoring
Data Storage, Management and Analysis
Geochemistry



ENERGY CONVERSION ENGINEERING

Process and Systems
Multi-Scale Modeling, Simulations and Optimization
Energy Market Analysis

STRATEGIC SYSTEMS ANALYSIS AND ENGINEERING

Reaction Engineering
Design and Validation
Innovative Energy and Water Processes

PROGRAM EXECUTION AND INTEGRATION

Technical Project Management
Finance and Acquisition
R&D Planning

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