

R & D facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY



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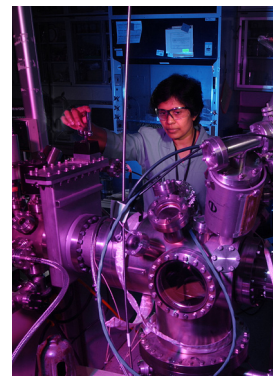


Office of Research and Development

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OFFICE OF RESEARCH AND DEVELOPMENT

The National Energy Technology Laboratory (NETL), one of the Department of Energy's 17 national laboratories, is leading research, development, and demonstration programs to resolve the environmental, supply, and reliability constraints of utilizing fossil fuels, including coal — the nation's most abundant fossil fuel resource. In support of this mission, NETL's Office of Research and Development (ORD) provides the DOE Fossil Energy R&D Program an onsite "corporate laboratory," where fundamental and applied fossil energy R&D is performed. Through its research, NETL is advancing scientific understanding of key fossil energy technologies; generating new ideas and directions for future programs; collaborating with regional and national universities; and helping to develop our nation's future scientific and energy engineering experts. For example, NETL researchers are addressing energy and environmental needs including: secure and reliable energy supplies, future roles for hydrogen, clean power generation from coal, global climate change research, and critical infrastructure assurance. While pursuing knowledge, science, and technology, NETL also has received numerous licensable patents.



NETL's researchers utilize state-of-the-art capabilities and facilities in Morgantown, WV; Pittsburgh, PA; and Albany, OR. The R&D program is conducted by a core group of some 150 Federal scientists and engineers, supplemented with support contractors and academic partners — attracting world-class researchers who work in unique facilities. NETL provides an impartial evaluation of new concepts and materials, along with expert, authoritative reviews of external R&D proposals. NETL also provides a venue for other Federal agencies (e.g., DOD, NASA) and research organizations to participate in collaborative research.

In addition, NETL conducts R&D in collaboration with external academic and industry partners. These collaborative efforts are designed to help overcome barriers to the commercialization of advanced power system, fuels, and environmental and waste management technologies. One benefit of this collaboration is the availability of onsite NETL research facilities, which eliminates the need for outside groups to build separate test platforms for each research concept.

To maintain a high level of quality and relevance, ORD conducts a comprehensive peer review of its research projects annually. Teams of external science and technology experts review research projects, providing a broad and comprehensive assessment of the current and planned R&D portfolio.

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Four Focus Areas

Research is conducted in four primary focus areas that build upon R&D strengths at NETL, and that address long-range issues central to continuing fossil fuel use in an environmentally and cost-effective manner.

Computational and Basic Sciences integrates physical and chemical experimental research with computational sciences as the preferred method for understanding and developing technologies, advanced materials, and multi-scale energy systems ranging from the molecular-scale to device-scale to plant-scale. Onsite computational and basic science research includes: computational chemistry, device simulations, advanced fuel systems including hydrogen, and gas hydrates.

Energy System Dynamics conceives, analyzes, and develops pre-commercial energy technology that minimizes the environmental impact of fossil fuel use, and maximizes reliable use of domestic energy sources and infrastructure. Some examples include research on: fuel cells/hybrids, gas turbine combustion, carbon capture, and new zero-emission technologies (e.g., FutureGen).

Geological and Environmental Systems conducts research into minimization and abatement of environmental problems associated with the development and use of fossil fuels. Research concentrates on geological sequestration of carbon dioxide, oil and gas exploration and production, air pollution/ particulate matter issues, removal of toxins from coal utilization system emissions, as well as water and coal utilization by-products.

Materials Science specializes in formulating, characterizing, and/or melting of most metals, alloys, and ceramics; casting, fabrication, and prototype development; and the recycle and remediation of waste streams associated with these processes. Research includes alloy development, materials production, physical and chemical analysis, and performance testing. NETL is one of the few places in the world where alloy development, melting, casting, fabrication, physical and chemical analyses and performance testing (wear, erosion, and various forms of corrosion) can be performed in one place.



University Collaboration Initiative

In 2005, ORD launched a new regional University Research Initiative that has greatly enhanced the collaborative nature of NETL's research. A wide-ranging set of collaborations with regional universities on fossil energy research issues is providing hands-on fossil energy technology training for experienced postdoctoral researchers, graduate students, visiting professors, and undergraduate students. The research is being conducted at NETL laboratories in Morgantown and Pittsburgh, in direct collaboration with NETL researchers.

Carbon Management Research

National and global concerns about the role of carbon dioxide (CO₂) in global climate change are driving the development of new CO₂ management technologies. The vision of NETL's Carbon Management Research Program is to conduct the research and analysis needed to develop energy-efficient and cost-effective methods to manage CO₂ that results from energy production. This research is focused on three areas: carbon capture, permanent storage, and risk assessment associated with permanent CO₂ storage. ORD's carbon management research directly supports the NETL Carbon Sequestration Program, and collaborative efforts developing through the Carbon Sequestration Regional Partnerships.

