



Shared Laboratories,
Shared Intellect,
Shared Resources

the **ENERGY** lab

NATIONAL ENERGY TECHNOLOGY LABORATORY

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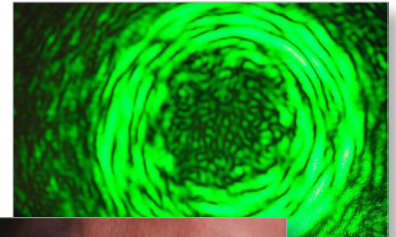
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NETL-RUA: Collaborative R&D for Technology Innovation

The U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) has a 100-year history of partnering with academia and industry to solve the nation's energy issues by developing and commercializing new technologies. NETL is continuing these long-standing partnerships through the NETL-Regional University Alliance (NETL-RUA). This partnership combines the facilities, expertise, and resources of NETL with those of five world-renowned research universities—Carnegie Mellon University, the Pennsylvania State University, the University of Pittsburgh, Virginia Polytechnic Institute and State University, and West Virginia University—as well as industry partner URS Corporation, one of the nation's largest and most comprehensive engineering services firms.

NETL-RUA researchers jointly develop and deploy the technologies that enable domestic coal, natural gas, and oil to power our nation's homes, industries, businesses, and transportation while protecting our environment and enhancing our energy independence. In addition to advancing today's technology, NETL-RUA draws on the power of its combined capabilities and experience to create the innovations that will facilitate the transition to a low-carbon energy future.



A keystone of NETL-RUA is its ability to combine experimentation and computational modeling to rapidly screen potential concepts and optimize system performance, resulting in accelerated commercial deployment and creation of new manufacturing and industry jobs. NETL-RUA mentors young professionals by engaging them in its pioneering research and prepares them to be the future leaders of a high-tech energy marketplace.



U.S. DEPARTMENT OF
ENERGY

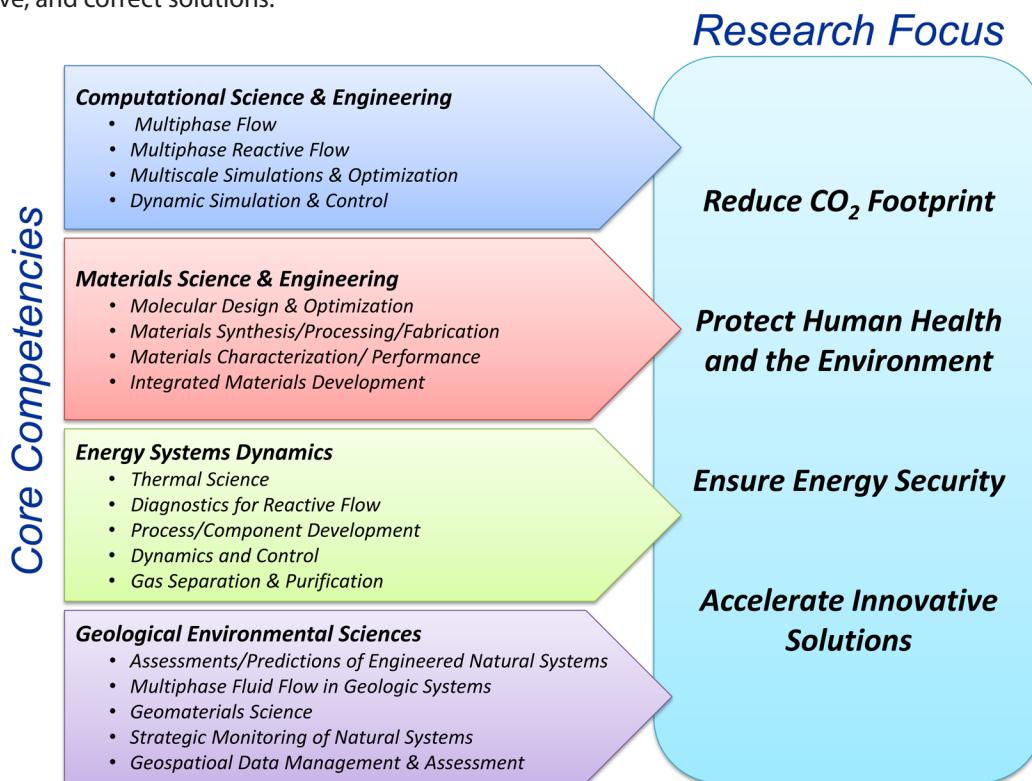
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Website: www.netl.doe.gov

Customer Service: 1-800-553-7681

Research Focused on Solutions

NETL-RUA capabilities are focused on solving the nation's most challenging energy issues. Through existing competencies, NETL-RUA can assemble the right team using the right technology to achieve timely, cost effective, and correct solutions.



Reducing the CO₂ Footprint

Reducing carbon emissions from fossil-fueled power plants can be accomplished through various options including optimized designs to improve process efficiency, reduce cost of CO₂ separation and capture, and utilize CO₂. To accomplish this, NETL-RUA researchers are developing high performance materials for system components; highly selective, lower-cost sorbents, solvents, and membranes; and novel CO₂ conversion processes.

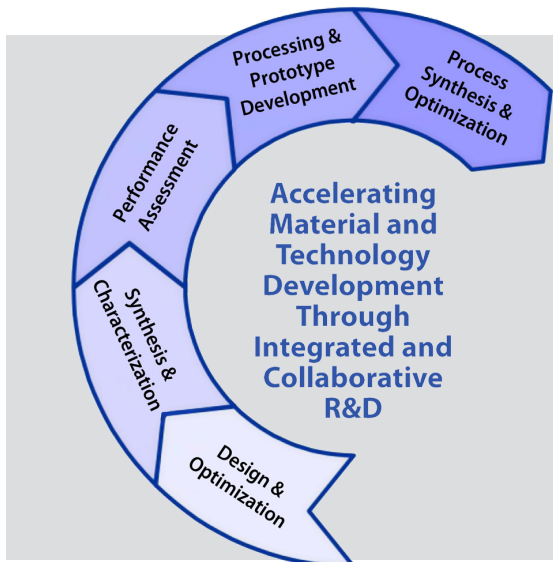
Continued use of fossil fuels is dependent on the ability to safely and permanently store CO₂ over long periods of time. NETL-RUA research efforts are increasing our understanding of CO₂ storage technology including CO₂ migration, revealing potential issues, providing remedies for leakage, and finding more accurate estimates of long-term storage potential.

Protecting Human Health and the Environment

NETL has been instrumental in developing technologies that reduce emissions of sulfur, NO_x, and particulate matter. Increasingly stringent emission regulations for fossil-based electric power generation and improved process control require the ability to quickly and cost-effectively measure gas composition and trace contaminants.

Ensuring Energy Security

The safe and clean production of affordable, domestic unconventional fossil energy resources can reduce our dependence on foreign sources of fuel. NETL-RUA research efforts have improved our ability to understand the behavior of these systems and the impacts and issues associated with production of these resources. Efforts also focus on innovative energy systems that will facilitate the transition from a fossil-based energy sector to a sustainable future energy market.



Accelerating Development and Deployment of Energy Technology

Combining experimentation and computational modeling makes it possible to accelerate technology development and deployment by more rapidly screening potential concepts, optimizing system performance, eliminating some scale-up design and testing, and ultimately reducing the risk of commercial deployment. Computer simulations and models can also be used as training tools for the operation and maintenance of advanced energy plants.

Research Recognition & Impact

A good measure of the impact of NETL-RUA research efforts is the number and breadth of awards garnered from outside organizations that objectively compare NETL-RUA research against that of peer organizations and researchers. The Alliance has garnered as many, or in some cases, more awards than other much larger national laboratories.

By that measure, NETL-RUA can be proud of its recognition as a research and technology innovator where “energy challenges converge and energy solutions emerge.” Some of the recent awards received by NETL-RUA include:

- Fourteen R&D 100 awards over the past five years
- 2011 and 2012 DOE Secretarial Honor Awards
- 2012 Presidential Early Career Award for Scientists and Engineers
- 2011 International Student Paper contest sponsored by the American Society for Metals International
- Great Minds in STEM™ Hispanic Engineer National Achievement Awards Corporation (HENAAC) award for Outstanding Technical Achievement.
- 2012 Council for Chemical Research Award

NETL-RUA is also home to prestigious researchers who are:

- National Academy of Science Energy Ambassadors
- Fulbright Scholars
- National Academy of Science Fellows



John Kitchin, CMU chemical engineering professor and NETL-RUA researcher accepts the 2012 Presidential Early Career Award for Scientists & Engineers.



Paul Turner of NETL accepts the 2012 DOE Secretarial Honor Award from Energy Secretary Steven Chu for the team that developed a platinum-chromium alloy that revolutionized heart stent functionality.

RESEARCH SPOTLIGHT

In collaboration with Boston Scientific Corporation, NETL developed a novel platinum-chromium alloy for coronary stent applications. The revolutionary alloy allows

for detection by x-ray devices while providing unprecedented flexibility and corrosion resistance. The technology has become the leading stent platform in the world accounting for more than \$4 billion in sales since its introduction in 2010.



In collaboration with industry and academic partners, NETL validated and advanced its novel high-temperature, chemically stable catalyst for converting heavy hydrocarbons into hydrogen-rich synthesis gas for use in solid oxide fuel cells. This technology was licensed to start-up company Pyrochem Catalyst Corporation and is under development for commercial applications.



NETL-RUA's Simulation Based User Center's High Performance Cluster, which ranks 54th in the world for speed and scale, is the home to the Carbon Capture Simulation Initiative (CCSI) toolset. The CCSI Toolset provides new models

and computational capabilities that will accelerate the commercial development of carbon capture technologies and a broad range of technology

development in power, refining, chemicals production, gas production, and more.



Partnership Arrangements

NETL has several different types of partnership agreements that give industrial collaborators unparalleled access to NETL-RUA members and facilities. These include Cooperative Research and Development Agreements, Contributed Funds Agreements, and Nondisclosure Agreements. These instruments enable industrial partners to negotiate agreements that suit their needs including agreements with Go/No-Go decision points to ensure that progress aligns with expectations. Once a technology is developed, it could be available for licensing.

NETL-RUA provides the framework, commitment, and integration of regional capabilities needed to meet the demand for clean, affordable, and abundant energy and secure our nation's energy independence and security.

More information about working with the NETL-RUA can be found at:

www.netl.doe.gov/rua

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RELEVANT LINKS

NETL Annual Review

<http://www.netl.doe.gov/rua/about/NETL-RUA-Annual-Review-2011.pdf>

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