

University of Pittsburgh Receives \$22M Grant for Energy Research

The [Center for Energy](#) in the University of Pittsburgh's Swanson School of Engineering has received a \$22 million grant from the [Richard King Mellon Foundation](#)—one of the largest private foundation grants in Pitt's history. The gift will accelerate the research and education efforts of the Center, which is dedicated to improving energy technology development and sustainability through the work of more than 70 world-class faculty members and their research teams.

The majority of the grant will be used to create new faculty positions and graduate fellowships and to establish a fund for spurring innovative research. The grant—which also will support research infrastructure and center operations—is designed to bolster the Center's position as a significant partner in energy research.

"With this funding, we will be in a much better position to attract top-notch faculty and students to our region," said Center for Energy Director Brian Gleeson. "This will advance our creative and productive partnerships with regional and national companies, and with national laboratories, particularly our region's National Energy Technology Laboratory (NETL)."



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E News is your monthly source for the latest information about NETL-RUA's research, activities and other important news. If you have information that you would like to feature in future newsletters, send that information to paul.deffenbaugh@contr.netl.doe.gov or jane.engel@contr.netl.doe.gov

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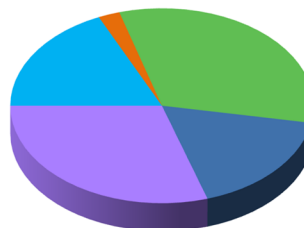
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NETL-RUA METRICS SNAPSHOT

PRODUCTS		
	FY2011	FY2012
Publications	194	10
Patents	11	2
Licenses	9	4
Students Graduated	20 PhD	9 PhD
	8 MS	6 MS

RESEARCH PERSONNEL



Total = 479

- Graduate Students
- Undergraduate Students
- University Researchers
- URS Researchers
- NETL Researchers

** Products data is updated quarterly

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Successful Collaborations Grow the R&D Portfolio

NETL-RUA has proven to be a network that encourages members to creatively and collaboratively develop ideas to meet solicited research needs. NETL-RUA collaborates on well over 170 projects and includes over 500 research personnel. In 2011, NETL-RUA teams pulled together to collaborate on over 30 research proposals with a potential of over \$32 million in total funded research. To date, as shown in Table 1, over \$4.1 million has been awarded.

So how did we get here? In late 2010, NETL-RUA was just beginning to align member resources to work together for a common end. Members of the collaborative were organizing to create strong teams in response to broad agency announcements and federal opportunity announcements. The outcome has been significant—with even more expected soon!

In 2011, 92 percent of the proposed efforts were submitted to federal agencies; 80 percent of those were to DOE. The goal for 2012 is to diversify the portfolio of resources and target opportunities outside of DOE and other government agencies.

Table 1. Successful Collaborative Proposals

Solicitation Organization	Team	Project Title	Funding Awarded
DOI Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE)	NETL WVU URA	Role of Gas Hydrates during the Release of Well Fluids into the Deep Ocean	\$893,987
DOE Energy Efficiency and Renewable Energy (EERE)	NETL PSU WVU Pitt URS	Optimizing parameters for predicting the geochemical behavior and performance of discrete fracture networks in geothermal systems	\$1,515,763
Advanced Research Projects Agency – Energy (ARPA-e)	CMU Pitt	Nanocomposite Magnet Technology for High Frequency MW Scale Power Converters	\$1,700,825

>> **CENTER FOR ENERGY**, *Continued from Front Page*

Upcoming Events

- April 2, 2012** Research Committee Meeting
2–4 p.m. EST
- April 3, 2012** Education Committee Meeting
2–4 p.m. EST
- April 18, 2012** Communications Committee Meeting
1–3 p.m. EST
- April 25, 2012** Technology Transfer Committee Meeting
1–3 p.m. EST

NETL has enjoyed an especially strong collaborative partnership with the Center through the NETL-Regional University Alliance. Historically, numerous Pitt professors, students and NETL-RUA researchers have been involved in joint research, creating synergies and relationships committed to the resolution of grand energy challenges.

NETL Director Anthony Cugini commented on the relationship between the lab and Pitt: “NETL is charged with advancing energy options to fuel our economy, strengthen our security, and improve our environment. We are a proactive supporter of educational initiatives at all levels, funding hundreds of research and development projects at U.S. universities to advance energy science and technology, and to provide a trained workforce for the energy industry of the future. Pitt and the Center for Energy are among our most active collaborative partners in this effort.”

Dennis Yablonsky, CEO of the Allegheny Conference on Community Development, put a complementary spin on the impact of the Richard King Mellon Foundation gift: “Pittsburgh is the new center of innovation in American energy. This region is implementing a new model for collaboration across business, government, and academia to maximize its competitive advantages in energy and related industries. Pitt’s Center for Energy has played a key role in these efforts, and we applaud the Richard King Mellon Foundation’s investment in enhancing the University’s capabilities.”

According to Gerald D. Holder, U.S. Steel Dean of Engineering at Pitt, “Energy will be the defining technical, social, and political issue of the next century. While there are enormous pressures to reduce energy consumption, there will continue to be significant growth in the worldwide demand for energy.”

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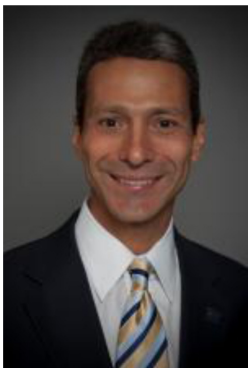
NETL-RUA Researcher Helping to Spec Needs for Offshore Wind Power

[Gregory Reed](#), professor in the Department of Electrical and Computer Engineering and director of the Power & Energy Initiative at the University of Pittsburgh, Swanson School of Engineering, is part of a team working to identify breakthrough technical advances to enable cost effective use of offshore wind resources. Reed is also the technical lead for the Grid Technology Collaborative, a strategic growth initiative of the NETL-RUA that is seeking to provide world class research in power electronics for advanced grid infrastructures.



Offshore wind provides a significant amount of power to grids in Europe. However, although the United States is bordered by two oceans as well as the Gulf of Mexico and the Great Lakes, the nation makes virtually no use of offshore wind generated power.

With a \$900,000 grant from the U.S. Department of Energy (DOE), Reed and colleagues from the team, which includes industrial partners [ABB, Inc.](#), and [Duke Energy](#), are aiming to assess the technological advances necessary to bolster the power delivery capability from offshore to onshore, making it a feasible economic value proposition. The group will be providing critical data for a roadmap to reach DOE's goal of achieving 54 gigawatts of deployed offshore wind generating capacity in the U.S. by 2030.



"We'll be looking at a combination of traditional and advanced electric power delivery options—including state-of-the-art power electronics-based transmission technologies, integrating AC and DC power converters, and undersea cable systems—to assess the most effective integration of offshore wind into onshore networks," says Reed.

Coming up in next month's issue...

News from the NETL-RUA
Spring Meeting

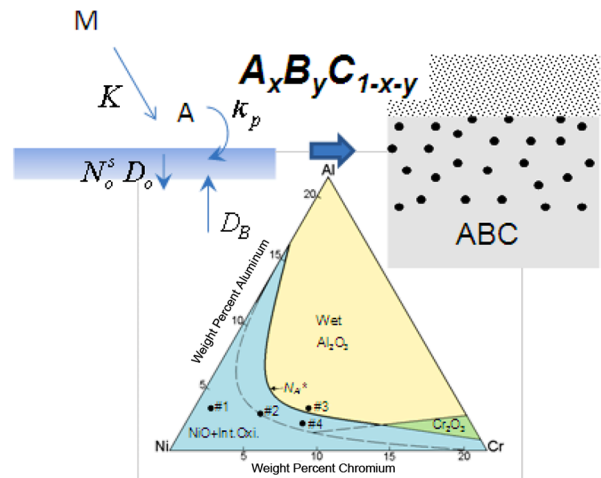
Materials for Fusion Reactors

A key NETL-RUA strength is the ability to rapidly form research teams with unique approaches in response to opportunities for new research. Recently, this was demonstrated when three pre-proposals by separate collaborative research teams were invited to submit full proposals by the [DOE Office of Fusion Energy Sciences](#) (FES). The DOE's effort will foster research on materials for future fusion energy systems.

A team of nine faculty members from Carnegie Mellon University, Penn State, and Virginia Tech and staff members from NETL, URS, and [Sandia National Laboratory](#) proposed a method for rapidly evaluating a universe of possible alloy compositions and structures using optimization methodology. The proposal utilizes composition spread alloy film (CSAF) samples to quickly sift potential three- and four-component alloy compositions to identify those likely to be useful. Experimental work will be coupled with rapid mechanical testing and computer simulations to forecast properties for bulk materials based on CSAF generated thin film results.

Penn State led another proposal team which included NETL and the [Army Research Laboratory](#). This project leverages an integrated computational-prediction and experimental-validation approach to gain fundamental insights into existing structural materials of interest such as alloys and fiber reinforced composites, ultimately developing new materials with tailored alloy chemistry and processing conditions to meet the extreme requirements of commercial fusion designs.

A third project is led by the University of Tennessee and staff members of NETL and URS. The aim of this effort is to develop high-entropy alloys (HEAs) for use as structural materials in fusion reactors. In contrast to conventional alloys, which are based on one principal element, HEAs have as many as five or more principal elements. The presence of multi-principal elements actually leads to simplified microstructures, which often have excellent engineering properties such as high strength, ductility, corrosion resistance, and wear resistance.



Engineering materials for strength, ductility and corrosion and wear resistance.

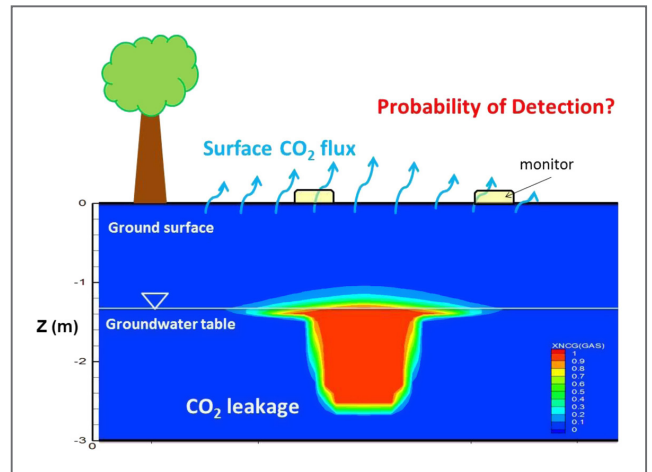
NETL-RUA Research on CO₂ Leak Detection Monitoring: Ensuring What Goes Down, Stays Down

The development of effective processes and sites for carbon capture and storage (CCS) is a high priority for planners in the United States, and other industrialized nations seeking to reduce greenhouse gas emissions. Sites for geologic sequestration must be chosen with care to maximize storage capacity and minimize the potential for leakage. However, even with the best efforts, some carbon dioxide (CO₂) leakage back to the surface could occur. Leak detection monitoring is needed to protect health and safety in the unlikely case of large leakage events, and to ensure that the more likely occurrences of small leakage rates over time do not compromise the greenhouse gas mitigation objectives of the CCS program.

In NETL Regional University Alliance (NETL-RUA) research conducted jointly by Mitchell Small at Carnegie Mellon University (CMU); Donald Gray at West Virginia University (WVU); and Grant Bromhal, Brian Strazisar, and Arthur Wells at the Morgantown and Pittsburgh campuses of NETL; new methods are being developed to design and assess the effectiveness of leak detection monitoring networks at sequestration sites.

The research combines knowledge of the performance of different monitoring technologies (NETL), advanced CO₂ subsurface plume modeling (WVU), and innovative statistical methods (CMU) to predict the likelihood that a monitoring network will successfully detect leakage events of a given size (bigger leakage rates are easier to detect) occurring at an uncertain location at the site. The methodology also leads to a decision support system for the operational phase of the sequestration site, in which the information from different monitoring devices can be combined to infer the probability that leakage has occurred, and if so, its location and magnitude.

Monitoring technologies explored to date include surface chamber flux monitoring of CO₂ and the monitoring of synthetic tracers added to the injected CO₂, with research now expanding to consider measurements of groundwater chemistry and below-surface pressure and seismic properties of the storage reservoir.



Alliance Researchers Receive Secretary of Energy Achievement Honor Awards

A group of NETL-RUA researchers were recently recognized by the U.S. Department of Energy as individual recipients of the Secretary of Energy's Achievement Honor Award, the highest annual award granted by the Secretary of Energy to individuals as part of a team effort.

George Guthrie, Grant Bromhal, Roy Long, and Bryan Morreale of NETL, **Doug Wyatt and Neal Sams** of URS, **Brian Anderson** and **Shahab Mohaghegh** of West Virginia University, and **Robert Enick** of the University of Pittsburgh were recognized for their exceptional work as part of the Flow Rate Technical Group/Nodal Analysis Team responsible for estimating the flow rates and oil spillage into the Gulf of Mexico from the BP Macondo well during the Deepwater Horizon oil spill.

The awardees are cited for "efficient and tireless efforts to assemble, reduce, and analyze data and vet results [which] guided key decisions, helping to speed the ultimate solution and reduce the environmental costs of the disaster."

The efforts of the entire team are captured in a [National Academy of Sciences](#) publication soon to be released.

