

NatCarb Contributes to Developing National Carbon Storage Options

Long-term geologic storage of carbon (as carbon dioxide) is an emerging driver for an interactive database to support proposed projects involving carbon capture and storage in the US and Canada. In response, the National Carbon Storage Interactive Atlas (NatCarb) has been developed to assemble data and information generated by the [Regional Carbon Sequestration Partnerships](#) (RCSPs) that encompass geological characterizations of reservoirs; and information generated on DOE funded carbon capture and storage (CCS) demonstration projects in the United States and Canada. The aim is to identify different geologic target formations as options to geologically store carbon dioxide (CO₂). The Atlas uses the power of interactive mapping and digital publishing to provide users the ability to assemble, manipulate, and analyze data collected by the RCSPs and CCS projects. The Interactive Atlas allows users to view, query, and use data at varying scales and in ways that better fit end user needs. The NatCarb Viewer is available on the [NETL website](#).

> See **NatCarb**, Page 2

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 julianne.klara@netl.doe.gov.

What's in This Issue

Strategic Growth Area Update—
Shale Gasp. 2

NETL-RUA Kicks Off AVESTAR™
Education Program on Process
Dynamics and Controlp. 3

NETL-RUA Isotope Analysis
Facility Installed at Pittp. 3

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NETL-RUA METRICS SNAPSHOT

CURRENT R&D PORTFOLIO

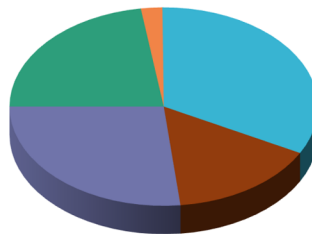
Total Active Projects	177
Project Award Value	\$18,996,283

PRODUCTS

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

* Products data is "updated quarterly"

RESEARCH PERSONNEL



Total = 535



January 2012

>> **NatCarb**, Continued from Front Page



NatCarb Viewer

NatCarb was created by NETL and NETL-RUA partner West Virginia University with input from the University of Kansas, the seven RCSPs in the Carbon Storage Program, and the ten site characterization projects funded by DOE under the American Recovery and Reinvestment Act of 2009 (ARRA).



NatCarb represents an initial effort at developing a CCS knowledge management system that comprises a range of strategies and practices used to identify, create, curate, analyze, and distribute information and technical data. The overarching goal is to enable the management of CCS knowledge as a strategic asset and to encourage the sharing of CCS resource assessment knowledge. The NatCarb approach combines the efforts of a series of NETL funded regional partnerships and characterization projects using a common methodology. The information and technical data are

assembled through a distributed system of online tools to produce both paper and interactive mapping products for use by CCS experts, policy makers, journalists, and the general public. NatCarb provided the source of data for the DOE-NETL publication, the [2010 Carbon Sequestration Atlas of the United States and Canada](#). NatCarb is contributing to the development of a national carbon storage strategy in which CCS will play a key role in meeting the carbon management needs of the US and Canada in the future.

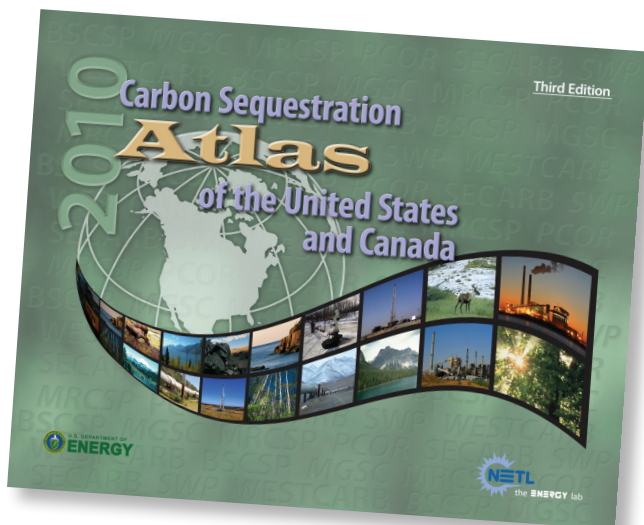
Strategic Growth Area Update

The Shale Gas strategic growth area team is focused on developing solutions for shale gas technology challenges and science-based resources for decision-making and general knowledge. Rapid development of the Marcellus Shale over the past few years has led to a number of technology needs related to sustainable development of the shale gas resource, and concerns regarding the potential effects of shale gas development on human health and the environment. The team will work to establish the NETL-RUA as an important resource in these areas, as defined through twin themes:

- Development of new technologies to promote the safe and environmentally sound production of shale gas resources.
- Baseline and environmental monitoring of shale gas activities to develop datasets for the public and policymakers for use in decision-making related to shale gas development.

During the autumn of 2011, the Shale Gas strategic growth area focused its efforts on developing a team coordination strategy that includes a research plan for addressing regional technology issues related to the development and production of natural gas from the Marcellus Shale. A seven-member Steering Committee comprising members from NETL, URS, CMU, Penn State, Pitt, Virginia Tech, and WVU was organized with the primary purpose of identifying R&D issues facing the petroleum industry in developing shale gas reserves, and leading the development and implementation of coordinated research projects across the NETL-RUA to address these R&D concerns. Development of the research focus and approach will be closely coordinated with input from the broader membership of the Shale Gas strategic growth area and NETL-RUA investigators with interest and capabilities in the target R&D areas. Some of the prospective technology areas for the Shale Gas team initial focus include:

- Novel production technologies and management strategies.
- Water discharge, reuse and treatment technologies.
- Disposal of salt, drill cuttings and concentrated brine.



NETL-RUA Kicks Off AVESTAR™ Education Program on Process Dynamics and Control

NETL-RUA chemical engineering professors **Richard Turton** and **Debangsu Bhattacharyya** are leveraging a latest technology Integrated Gasification Combined Cycle (IGCC) dynamic simulator at the Advanced Virtual Energy Simulation Training And Research (AVESTAR) Center to teach undergraduates process design and control at the West Virginia University (WVU). Established as part of the DOE's initiative to accelerate the widespread commercial deployment of advanced energy technologies, the AVESTAR Center was launched in May 2011, the result of a successful collaboration between NETL, industry, and university experts. The AVESTAR Center boasts two training and research locations in Morgantown, West Virginia. AVESTAR uses high-fidelity, real-time dynamic simulators based on an IGCC power plant with CO₂ capture.

In the WVU courses, students gain hands-on, simulator-based training experience and learn how a commercial-scale IGCC plant would respond to changes in manipulated inputs; such as coal slurry feed, flow rate, and power demand. Students also analyze how the plant's regulatory control system impacts plant performance and stability. Professor Bhattacharyya recently highlighted the AVESTAR education program in a Computer Aides for Chemical Engineering (CACHE) session at the 2011 American Institute of Chemical Engineers (AIChE) Annual Conference in Minneapolis. An Immersive Training System with 3D virtual reality, to be launched in 2012, will add another dimension of realism to the dynamic operator training system, and undoubtedly increase the number of students signing up for WVU's process design and control class.



Additional information on education opportunities at the AVESTAR Center can be found at

www.netl.doe.gov/avestar/education.html

NETL-RUA Isotope Analysis Facility Installed at University of Pittsburgh

A new NETL-RUA isotope analysis facility at the University of Pittsburgh will enhance research in geology relating to energy exploration and environmental assessment. The capability to precisely measure isotopes of elements (with varying numbers of neutrons) has become an essential analytical tool in isotope geochemistry and cosmological chemistry. The new isotope analysis facility includes a latest technology Multi-Collector - Inductively Coupled Plasma - Mass Spectrometer (MC-ICP-MS), a laser ablation workstation, and a desolvating system. The primary advantage of MC-ICP-MS is its ability to measure isotope ratios in a broad range of elements, including those with high ionization potential that are difficult to analyze by other techniques.

Diligent NETL-RUA teamwork, combined with excellent coordination and planning, led to the on-time delivery and installation of the \$750,000 MC-ICP-MS at the new University of Pittsburgh laboratory, housed in the Department of Geology and Planetary Science. Since installation, numerous researchers from the university and NETL have been accessing and running samples in the new laboratory.

The MC-ICP-MS technique has been successfully applied to a wide variety of topics including geo-chronology/thermo-chronology, fluid/rock interaction, and biogeochemistry and can add a new level of sophistication to NETL-RUA carbon sequestration research. The isotopic variations can, for example, be used to obtain the age of a specific geologic event, and to evaluate the interaction between geochemical systems and/or reservoirs. In the field of cosmological chemistry, isotopic compositions have been used to place constraints on nucleosynthetic processes and the timing and evaluation of solar system formation. While MC-ICP-MS is relatively a new technique, the future of this analytical tool is practically boundless. As the technique matures, MC-ICP-MS will increasingly become an important tool for monitoring environmental systems. As an example, the isotopic study of mercury (Hg) has been developed for fingerprinting pollution sources and identifying the reactions that govern the biogeochemistry of Hg cycling in the environment. It is expected that, in addition to current geological applications, MC-ICP-MS will continue to find widespread applications and acceptance in other disciplines, such as environmental science, biology, biochemistry, ecology, and archaeology.

At the MC-ICP-MS facility, researchers are developing the use of radiogenic isotopes (strontium, neodymium) and non-traditional stable isotopes (iron, copper, zinc, lithium, uranium) for research in the areas of carbon dioxide (CO₂) storage and unconventional gas exploration. These isotope systems can be useful for tracking brine migration, determining seal rock leakage, and studying fluid-rock reactions. Rapid analysis of multiple isotopes systems, made possible by MC-ICP-MS, will provide a powerful tool for quantifying and assessing geochemical processes related to shale gas extraction and CO₂ storage.

Committees Meet to Discuss Strategic Approach to Growth

A Joint Meeting of the Charter Committees for Research, Business Development and the Governmental Affairs Sub-Committee was held on January 5, 2012 at the University of Pittsburgh. These three groups are those primarily responsible for growing the Alliance. The meeting resulted in timely input to tactical and strategic activities for growth of the collaborative including an improved working knowledge on the part of participants on the requirements for effective support of collaborative growth; and insights on needed future developmental activities by each of the committees.

The three key opportunities for growth of the NETL-RUA were discussed:

- **Core Research** – Increase the size of research initiatives within the existing DOE/FE Research Portfolio. Because of budget constraints, the Alliance must seek alternative funding sources. Seed funding is primarily provided by NETL, and initiatives are led by NETL staff.
- **Strategic Growth** – Extend research portfolio into areas not presently supported by FE funding but related to fossil energy. Because of budget constraints, the Alliance must seek alternative funding sources. Seed funding is provided jointly by NETL, universities, and URS. Initiatives are co-led by Alliance members.
- **Strategic Expansion** – Research into non-fossil energy related areas. Opportunities to apply our expertise to non-fossil and non-energy markets are beyond DOE/FE mission so no NETL funding is available. Seed funding and leadership of these activities are to be provided by university and/or URS staff.

In two facilitated breakout sessions, the group divided into teams to 1) define roles and responsibilities of each Committee needed to accelerate growth of the collaborative research portfolio, and 2) define processes and actions to meet the challenge. During lunch, the leaders from the Grid Technologies, Rare Earth and Shale Gas Strategic Growth Areas provided a status report and identified needs that these Committees could help fulfill. ■

Upcoming Events

Jan. 25, 2012 Technology Transfer and
1-3 PM EST Commercialization Meeting

Feb. 1, 2012 Executive Committee Meeting
at West Virginia University

Feb. 7, 2012 Education Committee
2-4 PM EST Meeting



Save the Date:
NETL-RUA Spring Meeting, March 9, 2012

NETL-RUA Committee News

NETL-RUA Charter Committees are charged with supporting NETL-RUA's research and educational mission by collaboratively addressing critical initiatives and ongoing processes. This issue focuses on recent activities of the **Technology Transfer Committee**.

Technology Transfer Committee

This Committee plays a key role in growth of the NETL-RUA by providing guidance and common processes for contracting with new R&D customers, accelerating the development and commercialization of critical technology, and management of jointly developed intellectual property.

Since August, the Technology Transfer Committee has been reviewing best practices that could be implemented within the NETL-RUA based on experiences of the partner universities and URS, the industrial partner, with the goal of implementing a more comprehensive and greatly accelerated technology commercialization process for the Alliance.

Tara Bransted presented Carnegie Mellon University's standard technology spin-off practice. CMU's Terms, Templates, Misconceptions, and Philosophy approach utilizes a hybrid economic service model that emphasizes establishing a mutual long-term benefit for the university. Endeavors have centered on helping start-ups based on CMU developed technology, retaining faculty, and supporting regional economic development. CMU currently has equity in over 70 companies.

Ron Huss presented Penn State University's Technology Portfolio Valuation Process (TPVP) that was designed to estimate the potential monetary value of Penn State's intellectual property portfolio based on markets and the state of the technology. The TPVP included auditing by an outside firm to ensure the process meets appropriate financial standards. The Penn State's TPVP capability can dramatically accelerate technology development by bringing potential market value into the technology transfer process early in the commercialization cycle.

Mark Coburn presented Virginia Tech's "technology-pull" model, a program in which research and development activities are driven by industry needs. The "technology-pull" model capitalizes on the capacity to plan research activities based on identified industry needs. A recent case study performed for wireless technology research was discussed. For the study, professors, doctoral students, and post-docs attended a one-day presentation of an in-depth evaluation of communications industry needs and development of aggressive research and development schedules. The case study initiative resulted in 12 new technology disclosures in a three-to-six-month span.

Don Murano, URS General Counsel and a certified LEED AP (Accredited Professional), presented an overview on how environmentally sustainable practices can be integrated in everyday business for improved performance. Don's presentation provided a solid introduction into what can be accomplished within our everyday business environment.

Slides from all the presentations are posted at the NETL-RUA SharePoint site.