NETL-RUA
Regional University Alliance

NEWS

*Shared Intellect • Shared Laboratories • Shared Resources*

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# In Search of the Game Changer: Third Annual Energy and Innovation Conference Promotes Collaboration

Until the 15th century, book production was laborious; then came the printing press. Until the 19th century, information could travel no faster than a person on horseback; then came the telegraph. These game-changing technologies revolutionized industries and changed how we relate to the world around us.

Attendees at the third annual Energy and Innovation Conference learned how to nurture and bring to market their own game-changing technologies. On September 17, 2013, more than 200 business leaders, manufacturers, researchers, and investors convened at the Hilton Garden Inn in Canonsburg, PA, to gain new perspectives on fostering 21st-century innovations. The National Energy Technology Laboratory (NETL)–Regional University Alliance (RUA) teamed up with Catalyst Connection to host the conference, which attracted media attention and raised the profile of NETL-RUA and the research it makes possible.

*Christopher Miller engaging the Energy and Innovation Conference attendees with his keynote address.*

After a welcome by **Anthony Cugini**, an early champion of NETL-RUA, and Petra Mitchell, president and CEO of Catalyst Connection, conference attendees listened to the keynote address, which emphasized strategies for developing successful, game-changing innovations. Such strategies are crucial since—as Christopher Miller, the keynote speaker, reported— it is estimated that out of 3,000 raw ideas, only one results in a product that pervades its market. According to Miller (CEO and founder of Innovation Focus) the best innovations are "driven by a cross-functional team."

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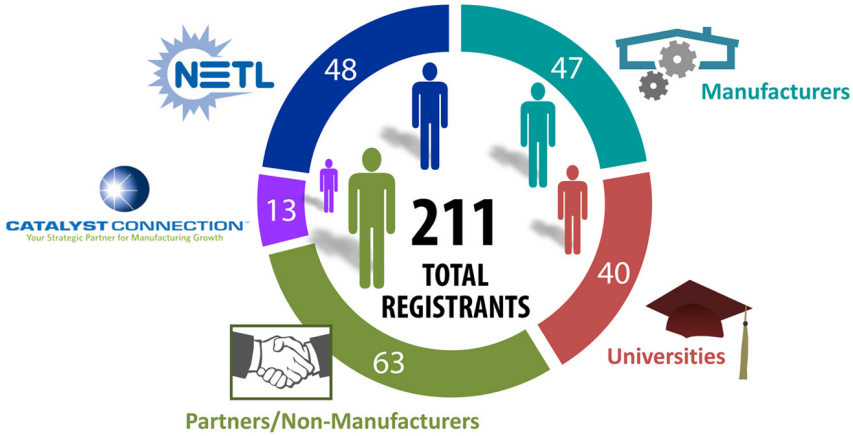

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The conference certainly didn't want for innovative ideas and technologies. During the NETL-RUA technology showcase, NETL and university scientists gave presentations on game-changing technologies that may one day transform the way we monitor water purity, power trucks, prevent oxidation, and capture power-plant emissions. A panel of experts recognized one technology with the Game Changer Award, while conference attendees recognized another with the Audience Choice Award (see sidebar).

Of course, no innovation can become a game changer without commercialization. A presentation by Connie Palucka, managing director of Catalyst Connection, and a panel discussion focused on that topic. Other panel discussions covered corporate innovation strategies and the use of external resources to develop products.

> ***"This NETL-RUA opportunity—there's a lot of power in that."***
>
> — David Berry, NETL
> Energy Process Innovation Division Director

By bringing so many panelists, speakers, and attendees together, the conference facilitated the very "cross-functional" teambuilding that Miller advocates. But so too does NETL-RUA. During his presentation, **David Luebke**, NETL-RUA's technical coordinator for carbon capture, made that point well. He praised NETL-RUA for giving him "the ability to reach out to all the good universities and pull in the right people to solve a problem." And **Dave Berry**, the director of NETL's Energy Process Innovation Division, summed up the point during a panel discussion: "This NETL-RUA opportunity—there's a lot of power in that."

Conference materials are now available on MOSS.

3RD ANNUAL ENERGY & INNOVATION CONFERENCE

## Award-Winning Technologies

**Dustin McIntyre**, an NETL research scientist, won the **Game Changer Award** for the improved laser-induced breakdown spectroscopy (LIBS) system he and his NETL-RUA team developed. The LIBS system makes it possible to continuously monitor subsurface gases, liquids, and solids in extreme environments. It obviates sample collection, and it avoids the downsides of sample analysis.

*From left: Connie Palucka (Catalyst Connection), Christopher Matranga, Dustin McIntyre, and Cindy Powell (NETL).*

**Christopher Matranga**, who directs NETL's Molecular Science Division, took home the **Audience Choice Award**. A nanocatalyst he and his NETL-RUA team devised can be used to turn carbon dioxide into carbon monoxide, which has many industry applications. The nanocatalyst is nearly 100 percent selective and efficient. Legislation to reduce carbon emissions would only increase the demand for such a catalyst.

*Presenters at the Emerging Energy and Environmental Technology Showcase with Cindy Powell (NETL, Office of Research and Development (ORD) Director). From left: Hunaid Nulwala (CMU), and Paul Ohodnicki, Todd Garner, Christopher Matranga, Powell, Dustin McIntyre, David Luebke, and Paul Jablonski from NETL.*

## *Technology Spotlight*

# NETL-RUA Researchers Paving the Way for a Greener Tomorrow One Roof at a Time

Energy efficiency, water conservation, and greenhouse gas reduction are just some of the initiatives that drive current green roof research at NETL. Green roofs—sometimes called living roofs or eco-roofs—are conventional roofs that are partially or completely covered with a layer of vegetation. Because green roofs are so environmentally friendly, both NETL's Morgantown and Pittsburgh campuses feature them.

Green roofs have been popular in Europe for centuries. They reduce storm water runoff from rooftops, which in turn reduce sewer water overflows into rivers. They also reduce smog and heating and cooling costs, improve carbon sequestration, help maintain the cooler stream temperatures fish need to thrive, and reduce urban heat island effects, which are caused when concrete (and other impermeable materials) trap heat and raise surrounding air temperatures.

To optimize green roofs and promote their widespread use, NETL is collaborating with NETL-RUA researchers to develop alternate plant growth media that contain fossil fuel byproducts such as coal fly ash, coal gasification char, and charred biomass. These waste materials can supply and retain plant nutrients, reduce nutrient leaching, and promote microbial growth beneficial to green roof vegetation. According to URS Corporation (URS) scientist **Jinesh Jain**, the use of waste materials as plant growth media also re-harnesses previously expended energy rather than incurring additional energy costs through the manufacture of new material commonly used on green roofs.

*Jain (URS) and Edenborn (NETL) examine results of green roof studies on Building 84 at the Pittsburgh NETL site.*

Jain, West Virginia University (WVU) scientist **Dorothy Vesper**, and NETL's **Hank Edenborn**—all NETL-RUA members—are also collaborating on research at the new Center for Sustainable Landscapes at Phipps Conservatory and Botanical Gardens in Pittsburgh, PA. The center has been designed to generate its own energy, capture and treat all of its water onsite, and meet or exceed the highest green building standards. According to Edenborn, a microbiologist, this research will address a number of water quality variables associated with water management systems, including rainwater harvesting, a lagoon system for storm water treatment, a constructed wetland for sanitary water treatments, rain gardens, a green roof, and permeable paving in parking areas. The NETL-RUA researchers hope that demonstrating these sustainable and energy-efficient technologies will lead to more green roofs being incorporated into future building designs.

## *NETL-RUA Announces its Newest Brochure "Engineering the Future of Energy"*

*"The time to redraw America's energy blueprint is now."* This is the message that the NETL-RUA brochure, "Engineering the Future of Energy," is spreading. The brochure describes both NETL-RUA's in-house research and collaborations with academic, industry, and federal research organizations to help meet the nation's energy challenges and create a sustainable energy future. The brochure focuses on the Alliance's fossil energy goals through research aimed to minimize $CO_2$ emissions, safety risks, and hazardous by-products while increasing domestic energy resources and enhancing power distribution systems. The brochure is now available on MOSS and in e-book and print versions.

# *Noteworthy Achievements*

## Striking a Balance: NETL Receives Patent for Catalyst Technology

Just as the right ratio of flour to sugar is necessary for baking the perfect cake, optimum balance is key in science. NETL recently received a patent for what could be called the recipe for the perfect catalyst system for hydrocarbon oxidation processes. A team of NETL-RUA researchers found that the optimum ratio of components in the oxidation of fuels is no less important for achieving the desired results than the proper ratio of ingredients is in any recipe.

The United States Patent and Trademark Office assigned Patent #8,486,301 to NETL for *Method of preparing and utilizing a catalyst system for an oxidation process on a gaseous hydrocarbon stream*. NETL patented the methodology to optimize metal oxide-based catalyst systems. The optimum catalyst makeup depends on the fuel type, reaction conditions, desired fuel conversion, and acceptable catalyst lifetime.

NETL-RUA researchers—including **David Berry**, **Dushyant Shekhawat**, and **Dan Haynes** (NETL) and **Mark Smith** (URS)—collaborated to find the proper distribution of metals for creating an active and well-dispersed catalyst composed of metals locked into place in an oxide crystal structure.

Berry is excited about the possibilities for the technology because "it provides a basis for designing an effective catalyst that is specific for every customer's application." The patent has been licensed by NETL spinoff company Pyrochem Catalyst Corporation, which also holds a license to the NETL pyrochlore catalyst technology.

## *Upcoming Events*

- **Small Business Administration Annual Meeting**
  November 14, 2013 | NETL Pittsburgh | Pittsburgh, PA
- **NETL-RUA Spring Meeting**
  March 11, 2014 | Waterfront Place Hotel | Morgantown, WV

## NETL Researchers and Technologies Win Coveted Honor

For almost 30 years, the Federal Laboratory Consortium (FLC) for Technology Transfer has presented awards for an array of technologies. The FLC awards are considered to be one of the most prestigious honors in the technology transfer field.

Two teams of NETL scientists (including four NETL-RUA members) are recipients of two FLC Far West Region awards for Outstanding Technology Development. The award recognizes laboratory employees and their partners who have accomplished outstanding work in the process of transferring federally developed technology to the marketplace. **Paul Jablonski** and **Jeff Hawk** (both in NETL's Structural Materials Development Division) won the award for their homogenizing process for producing superior heat-resistant alloys, which eliminates the trial and error involved in more effectively dispersing elements throughout an ingot, thereby significantly improving mechanical behavior. **Rigel Woodside** (a research engineer in NETL's Thermal Sciences Division) and **Paul King** (NETL's Senior Management Technical Advisor for Business Development in the Public Affairs and Strategic Outreach Division) won the award for their arc-position sensing (APS) technology, which they developed with Chris Nordlund of ATI Albany Operations. The APS system allows operators to digitally monitor arc position as an ingot undergoes vacuum arc re-melting, the primary way to melt and refine specialty metals for use in aerospace and other advanced applications.

Additionally, NETL's Advanced Virtual Energy Simulation Training and Research (AVESTAR®) Center was awarded the FLC Mid-Atlantic Region award for Excellence in Technology Transfer for the 3D Virtual Energy Plant Simulator and Immersive Training System. Award winners from the AVESTAR team include **Stephen E. Zitney** (Director, AVESTAR Center and chemical engineer in NETL's Computational Science and Engineering Division), **Eric Liese** (mechanical engineer in NETL's Computational Science and Engineering Division), **Terry Jordan** (computer engineer in NETL's Computational Science and Engineering Division), and **Priyadarshi Mahapatra** (research engineer from URS). NETL is utilizing the AVESTAR Center's industry workforce training, engineering education, and advanced research programs to transfer the virtual reality-based software solution to the energy industry, academic institutions, and research organizations. The 3D virtual energy plants were deployed at the NETL and WVU AVESTAR Centers in July and November 2012, respectively. The award will be presented to NETL at the FLC Mid-Atlantic Region meeting in November 2013.

If you have information that you would like to feature in future newsletters, send that information to NETL-RUA-FB@netl.doe.gov. All issues of E News can be found on MOSS and the NETL-RUA website.

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