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EERC EDGE

Our Edge
Is Our People

March–April 2009

Nikhil Patel, Research Scientist, is the Project Manager and developer of the system that produces electricity from scrap railroad ties, one of several cutting-edge technologies being commercialized by the EERC.

EERC aggressively commercializing several cutting-edge technologies

The Energy & Environmental Research Center (EERC) at the University of North Dakota (UND) is commercializing several groundbreaking EERC-developed technologies with a strong focus on furthering economic development in North Dakota and the region.

The EERC is committed to moving technologies out of the laboratory and into the commercial marketplace.

"We are internationally recognized for our applied energy and environmental research programs, which translate to a never-ending stream of commercialization opportunities," said EERC Director Gerald Groenewold. "We do not do fundamental research. Every program, and every contract, is derived with the intent of answering critical questions and/or developing technology that has economical, practical applications in the marketplace."

The following is a select list of current commercial opportunities from the EERC's numerous applied research programs.

The EERC is the first enterprise in the world to produce **100% renewable jet fuel and diesel from crop oils** through its Advanced Tactical Fuels Program, with support from several

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government and private entities. The fuels are essentially identical to their petroleum-derived counterparts, providing a pathway to energy security for the U.S. military and the entire nation. The EERC is working with Tesoro (the North Dakota branch) and several other commercial entities to commercialize the technology, which would produce billions of dollars' worth of alternative fuels annually.

The EERC is working with RLP Energy, Inc. (Grand Forks), the latest company to collocate an office at the EERC, to provide customized **mercury control solutions** to electric utilities. Mercury control is one of the major global challenges associated with the development of clean coal technologies.

The EERC has developed a **high-pressure hydrogen production process** for converting liquid fuels. For more on this, see the article on page 3.

With dramatic increases in fertilizer prices, dependence on imports, and logistical costs, it is vital to develop alternative, domestic supplies for **fertilizer production**. The EERC, in conjunction with the North Dakota Corn Growers Association, the Minnesota Corn Research & Promotional Council, the U.S. Department of Energy, and the U.S. Department of Agriculture, is advancing a technology to produce fertilizer using a proprietary, significantly lower-cost concept that can use coal or biomass instead of natural gas. The first commercial demonstration is planned for 2010 in North Dakota.

Many agricultural and other biomass residues have a high energy value; however, this value is lost as they are transported off-site at a disposal cost. The EERC is working with Aboriginal Cogeneration Company (Manitoba, Canada) to commercialize an **EERC-developed system to produce electricity from scrap railroad ties**. This same technology can be applied to numerous biomass feedstocks, such as agricultural residues and wood wastes and, as such, has a very large global market. As local communities, corporations, and farmers seek to lower operational costs and revenues, utilization of biomass residues provides an economically attractive solution for producing on-site heat and power. The first commercial demonstration of this technology is planned for next year in British Columbia.

–Derek Walters

Jarda Solc meets President of the Czech Republic

Jarda Solc, EERC Senior Research Manager, participated in panel discussions at the 2009 International Conference on Climate Change held in New York City March 8–10. Among many leading scientists and policymakers at the conference, Solc had the great honor of speaking with President Vaclav Klaus of the Czech Republic, who came to New York to deliver a keynote speech.

Solc said, "It is quite a rare opportunity to talk to presidents, in particular those who are highly recognized and respected for their economic achievements before they were elected. President Klaus's depth of knowledge of the global socioeconomic implications of current climate change disputes and his genuine interest in technical details were refreshing."

–Trish McGuire

Photo from Jarda Solc

President Vaclav Klaus of the Czech Republic (left) and Jarda Solc of the EERC.

EERC Foundation receives patent application approval for on-demand hydrogen-fueling system

After 6 years of diligent prosecution, the U.S. Patent and Trademark Office has issued the EERC Foundation an allowance for a patent application on a system that produces high-pressure hydrogen on-demand. The final patent will be approved in the very near future.

The EERC technology converts alcohols and liquid fuels, such as ethanol, methanol, and gasoline, to high-pressure hydrogen at the time of fueling. Utilizing this state-of-the-art process, the prohibitive infrastructure costs of nationwide hydrogen transportation and storage will be eliminated so that hydrogen refueling will be accessible and affordable. The hydrogen is produced on-site, on-demand at the fuel pump, rather than at a separate location.

"Through the hydrogen programs at the EERC, we are breaking down barriers, bringing down the costs, and shortening the timetable to the point where hydrogen will be a major component of our national energy future," said EERC Director Gerald Groenewold. "The high-pressure hydrogen production technology is a cornerstone technology for achieving those goals."

This technology is a cornerstone for the EERC's proposed United States–Israel Hydrogen Fueling and Fleet Demonstration, which proposes to demonstrate hydrogen as a fuel for transit buses in North Dakota and Tel Aviv, Israel. The EERC is currently seeking federal cofunding for that project.

Tom Bechtel, EERC Foundation Board President and the Principal at TFB Consulting Services in New Bern, North Carolina, said, "The EERC Foundation Board of Directors is extremely proud of this milestone. It is a marvelous example of the ever-increasing portfolio of EERC technologies the Foundation is bringing to commercial deployment."

The technology is being commercialized for both civilian and military applications. Industrial applications will provide near-term commercial opportunities for North Dakota in manufacturing and cold-weather testing. The first demonstration of this technology is tentatively planned for Grand Forks in 2010.

Ongoing research in the EERC's National Center for Hydrogen Technology, with support from the U.S. Department of Energy National Energy Technology Laboratory and over 85 corporate partners, has proved the conversion of liquid fuels into hydrogen is technically, logistically, and economically possible for use within the world's transportation industry.

–Derek Walters

An illustration of a hydrogen-fueling station (HPWR stands for high-pressure water reforming).

EERC's family spirit extends beyond work

After a long, snowy, and cold winter, EERC staff were hoping for a carefree spring. However, many homes were threatened with the possibility of flooding. Four EERC employees reached out for assistance in shoring up their homes with sandbags. True to the hardworking, team-oriented, let's-get-the-job-done-right mentality of the EERC, staff showed up at the homes of Tom Erickson, EERC Associate Director; John Pavlish, Senior Research Advisor; Brandon Pavlish, Research Manager; and Laura Raymond, Research Manager.

There was work for every ability: holding a sandbag, filling the sandbag, moving the sandbags closer to the line, and then passing the bags in a human chain to where the bags were placed. Additionally, volunteers helped put out the food and beverages provided by the homeowners and donated more of the same.

Erickson's neighbor asked him what army showed up to sandbag. Erickson said, "It's a relief to have so many able bodies respond to a call for help."

Erickson estimated that 8000–9000 sandbags were filled and stacked at his place alone. Staff also volunteered to help with the removal of the sandbags and donated not only time but vehicles to help haul the bags away.

Pulling together in a time of need proves once again that the people who work at the EERC are indeed extraordinary.

–Trish McGuire

Photo from Wes Peck

Brandon Pavlish (left) gets help from Joshua Mason, Network Administrator/Computer Specialist, and Tyler Curran, Research Engineer.

Photo from Jib Willson

Ed Steadman (looking toward the camera), Senior Research Advisor, keeps a positive attitude at the home of Brandon Pavlish.

Photo from Jib Willson

Tom Erickson (left, green hat) assesses the progress of the sandbag wall at his home.

EERC people engage in photographic pursuits

Mayor's Choice Award winner

Wes Peck, EERC Research Scientist, has been taking pictures for years, both for work and pleasure. Peck recently received two awards at the Northern Exposures photography contest in East Grand Forks, Minnesota. Peck's "Christmas Break" received the Mayor's Choice Award, and his "Heavy Rollers" received an Award of Distinction for a color photograph.

Christmas Break

"I submitted the pictures as a challenge to myself to try something new but never imagined that I would be noticed, let alone earn an award," said Peck. "It came as quite a surprise when they called my name. I have to give credit to my wife for helping me pick pictures to submit (and tolerating my habit) and to Paul Gronhovd for his advice and constructive criticism."

To see more photos by Wes Peck, please go to www.flickr.com/photos/44442915@N00.

UND 24/7 photography contest winner

Trish McGuire, EERC Technical Editor, recently received First Place in the UND 24/7 photo contest. The theme of the contest was "UND life: 125 years and counting." All of the UND 24/7 winning images will be on the Graphics and Photography Society Web site, on Channels 3/17, and in the Memorial Union, with the prints framed and hung in the Student Health Services entry.

McGuire's winning picture was developed from a concept by Anna Krause, a Social Work major, that showed Social Work students holding up posters that highlight the work of social workers.

"It was great fun working with Anna to make her concept work," said McGuire. "And I really appreciate that the UND Graphics and Photography Society found us worthy of this recognition. We're both delighted."

New employees

You'll have to really work to meet **Steve Hawkinson**, the new Building Services Technician, as he has the overnight shift at the EERC.

Hawkinson previously worked as a Building Services Technician at UND Facilities, cleaning at O'Kelly Hall and later fielding maintenance requests at the Communications Center. He found the desk job a little too sedentary for him.

"I gained 40 pounds answering the phone," Hawkinson said, "so when this position opened up, I jumped at it. I really like cleaning—that's why I'm here."

Hawkinson attended college near Minneapolis, Minnesota, taking engineering courses. He hopes to finish that degree while he works here, specializing in electrical engineering with a computer engineering emphasis. Hawkinson has had several very different careers. In the cities, he worked in business banking for Norwest Wells Fargo for 5 years and did mechanical engineering work for a truss company.

Hawkinson and his wife have three sons and three daughters. His oldest daughter has made him a grandpa.

When he is not working, Hawkinson can generally be found near a computer. Self-taught, he likes to build computers and program them. He got into the computer field early in the 1990s and has been doing computer programming for himself and as a side business since 1997. He currently works part-time for a local company setting up Web sites for businesses in the area.

Nicholas Kalenze has joined the Water Group at the EERC as a Research Engineer, where he works in the areas of waste to heat and energy and anaerobic digesters. His professional areas of interest include applying water reuse and recovery technologies on a global scale for municipal and industrial facilities.

"The aspect of my job that interests me the most is joining a team of hard-working multidisciplinary scientists and engineers working on water and energy demand projects," said Kalenze.

A native of Grand Forks, Kalenze earned a B.S. in Civil Engineering from Florida State University and a Master of Engineering degree in Environmental Engineering from UND in December 2008. Before he was hired full-time, Kalenze was a graduate research assistant and then a temporary employee at the EERC, performing research on water reuse technologies for thermoelectric power generation, weather data processing, and water and wastewater contaminant sources for the Red River Water Management Consortium.

Kalenze and his wife enjoy going to the lake cabin, visiting his family in Florida, and taking trips to attend music concerts. They like to read, watch lots of movies, and go for walks and bike rides.

"One of my greatest passions is playing guitar," Kalenze said. "People often find this surprising, but in college, I almost had my major in music. I believe that music is somewhat similar to engineering because a person has to understand principles of math to be successful at both music and engineering."

Transition

Katherine Anagnost is a Research Specialist–Project Manager at the EERC, where she works for the Plains CO_2 Reduction (PCOR) Partnership, one of seven regional partnerships of the U.S. Department of Energy's Regional Carbon Sequestration Partnership program. The PCOR Partnership assesses the technical and economic feasibility of capturing and storing (sequestering) CO_2 emissions from stationary sources in the northern Great Plains and adjacent areas. Anagnost received her B.S. degree in Legal Assistance from Moorhead State University. Anagnost's principal areas of interest and expertise include planning, development, and management of designated projects related to CO_2 sequestration.

Prior to this position, Anagnost was a Contracts Officer for the EERC.

"I'm really excited to be on the PCOR Partnership team and look forward to learning more about the research side of things," said Anagnost. "I think that my training in the Contracts Office has given me a valuable overview of the business side of the EERC and will be of great benefit in my new responsibilities with the PCOR Partnership. I consider myself truly lucky to be given this opportunity."

–Sandy Van Eck

Nebraska newcomer of the year

Lora Evenstad, daughter of EERC Research Specialist Dean Evenstad, has already made an impression in her first year at the University of Nebraska. Early in March, Lora Evenstad was named the Big 12 Event Specialist of the Week, winning the vault and floor events during that match. Later in March, at the Big 12 gymnastics championship, Evenstad was named Big 12 Newcomer of the Year.

Nebraska Coach Dan Kendig, who won the Big 12 Coach of the Year award for the sixth time in his career, said of Evenstad on Nebraska's Web site, "She's the real deal. She possesses the ability to do something very difficult and make it look extremely easy."

–Trish McGuire

Photo from Scott Brulin, Huskers.com

Pavlish travels to Slovenia

John Pavlish, Senior Research Advisor and Director of the Center for Air Toxic Metals®, traveled to Ljubljana, Slovenia, in April 2009 to participate in and present at the Mercury Emissions from Coal (MEC) meeting. The MEC members are international experts on mercury and gathered to discuss and identify ways to reduce global mercury emissions. Approximately once a year, this group meets in a different country to share information on emerging technologies and the most current mercury research.

"This forum provides an excellent opportunity for international experts in the field of mercury to gather and share cutting-edge information on technology advancements and different perspectives on the mercury issue relevant to countries throughout the world," said Pavlish.

The group, led by Dr. Lesley Sloss of the IEA Clean Coal Centre for Europe, has been very successful in achieving international recognition. Within the last year, this group has been recognized for its expertise on mercury internationally and has established a formal partnership with the United Nations Environment Program (UNEP) mercury program to provide expert opinion, advice, direction, and data on mercury control and emissions from coal combustion systems. On February 20, 2009, environment ministers throughout the world met at the UNEP Governing Council meeting in Nairobi, Kenya, and issued an announcement that some 140 countries have unanimously decided to launch negotiations on an international mercury treaty to address worldwide emissions and discharges of the toxic pollutant, to be enacted by 2013. This international progress was largely as a result of renewed support from the United States to reduce mercury globally.

Pavlish said, "It is particularly important now, given the EERC's worldwide recognition as experts in this field, that we attend these meetings to share our knowledge so that advances toward mercury reductions can be achieved timely and effectively throughout the world."

–Trish McGuire

SNAPSHOTS:

Bowling champion

Tami Votava, Assistant Manager of Resource Management, placed first in the Singles Event of the Greater Grand Forks Women's Bowling Association City Bowling Tournament held at the Red Ray Lanes in February. Votava bowled a handicap series of 716, which included games of 209, 205, and 203 for a series of 617. The 617 score was also the High Scratch Series for the tournament.

"I have been bowling for 12 years, and this was my first 600 series—to do it in a tournament was so fun!" said Votava. "My doubles partner, Shelly Harlow, and I finished second in the Doubles Event also."

Then 6 weeks later, Votava bowled a 255 game and a 621 series in her weekly bowling league.

"I finished the year with a 169 average," said Votava. "It was definitely the best year of bowling I've had."

–Trish McGuire

Women Build® update

For those interested in participating in the next Habitat for Humanity® and Habitat for Humanity Women Build projects, the first project could begin in June, and the official Women Build project could begin in late July or early August. A single family home and a twin home are being planned for the Habitat homes. More information will be available later. Lucinda Hamre, EERC Research Specialist, is one of the University of North Dakota cocoordinators.

–Trish McGuire

Upcoming Events

See www.undeerc.org for more information.

BIOMASS '09
Power, Fuels, and Chemical Workshop
July 14–15, 2009
Grand Forks, North Dakota

GASIFICATION SHORT COURSE
September 9–10, 2009, Grand Forks, ND

INTERNATIONAL CONFERENCE ON AIR QUALITY VII
Mercury, Trace Elements, SO_3, Particulate Matter, and Greenhouse Gases
October 25–29, 2009, Arlington, VA

EERC EDGE

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