

MAY 2017



Noël Bakhtian

Noël Bakhtian has been named the new director of the Center for Advanced Energy Studies. The announcement was made April 4 by INL Director Mark Peters,

who cited her experience in energy policy and technology. Bakhtian is scheduled to start May 15, replacing Mike Hagood, who has been interim director since last fall.

Bakhtian most recently served as senior policy adviser for environment and energy in the White House Office of Science and Technology Policy. Prior to that, she was the inaugural Energy-Water Nexus lead at the U.S. Department of Energy Office of International Affairs. She was technical lead on several grant programs for DOE's

Wind and Water Power Technologies Office, and consulted on energy research and development and investment for the U.S. Defense Advanced Research Projects Agency (DARPA).

While pursuing her master's and doctorate from Stanford University's Department of Aeronautics and Astronautics, she did most of her research at NASA's Ames Research Center, in its advanced computing division, coming up with new entry, descent and landing technology for Mars missions. After getting her Ph.D., she won an AAAS Energy and Environment Fellowship and worked in the office of U.S. Sen. Jeanne Shaheen of New Hampshire.

Bakhtian also holds a master's degree in engineering from Cambridge University, where she was a Churchill Scholar. Her

research there involved unmanned aerial vehicles, gathering data from bird flight patterns in wind tunnels. Her bachelor's degree is from Duke University, where she was a Pratt Fellow.

Bakhtian is a trustee of the Summer Science Program, a science education non-profit organization, and is the energy and environment associate editor for the Science & Diplomacy Journal.

"Dr. Bakhtian's energy policy and technical experiences span the programmatic portfolio of CAES," Peters said in a news release. "She will help forward the CAES mission of conducting advanced energy research, educating the next generation of scientists and engineers, and partnering with industry to advance our regional competitiveness."

## CAES hosts Waste Water Treatment meeting

The Center for Advanced Energy Studies (CAES) held a meeting Feb. 23 in Boise on Waste Water Treatment, Recycling and Energy Research.

Co-hosted by the Northwest Food Processors Association (NWFPA), the one-day meeting brought together more than 30 researchers from government, national laboratories, industry and academic institutions to discuss challenges in wastewater management and energy efficiency. The agenda included speakers from CAES, the Idaho Department of Commerce, NWFPA, and representatives from 12 companies. Researchers from all CAES member institutions – Idaho National Laboratory, University of Idaho, Idaho State University, Boise State University and University of Wyoming – were in attendance.

Solving energy and water challenges are top priorities for the NWFPA, a trade association of over 140 processor companies and 350 suppliers in Idaho, Oregon and Washington. The NWFPA was instrumental in bringing key participants from the food processing industry to the meeting.

Pam Barrow, energy director of the NWFPA, explained why the association was interested in the event. "We are here to identify and find solutions for industry needs and issues, especially with water," Barrow said. "The work that CAES and INL does can help us find those answers."

Food processing is one of the Pacific Northwest's leading industries. Because of this, the goal of the meeting was to identify key energy and water food processing issues and plan a path forward.

CAES is using the identified priorities to create a research and education roadmap for wastewater management and energy efficiency studies.

### About CAES

The Center for Advanced Energy Studies (CAES), a consortium of Idaho National Laboratory, Boise State University, University of Idaho, and University of Wyoming, is a public/private research center that provides research capabilities, energy-related educational opportunities and industry assistance to fuel economic growth.

# INL, CAES send four teams to Energy I-Corps program

Four teams from Idaho National Laboratory recently returned from National Renewable Energy Laboratory in Golden, Colorado, after participating in Energy I-Corps, a U.S. Department of Energy program aimed at strengthening entrepreneurial culture at national labs. Formerly known as Lab-Corps, the program focuses on cultivating small-team collaboration between researchers and private entrepreneurs.

INL and CAES have been sending people to the program since it started in 2015. One new development this time was that Jordan Argyle, a University of Idaho graduate student from CAES, was the entrepreneurial lead of the team headed by Prabhat Tripathy, principal investigator for an electroplating process using aluminum bromide salts.

"We would like to get more graduate students like Jordan involved," said Dr. Tammie Borders, INL's Energy I-Corps leader. "He is using this as an enrichment of his graduate program."

During seven weeks of training provided by the NREL, each team visits companies in their specific market sectors, meeting face to face with potential customers. At the same time, they also meet with and are scored by panels of industry experts. The focus is not so much on what they are capable of inventing but on developing something useful that can impact industry right away.

"The program is building commercialization into the DNA of our researchers, which leads to industry-relevant research from initiation," Borders said.

The participating teams from INL/CAES included:

## ELECTROPLATING

**Team Members:** Prabhat Tripathy (principal investigator), Jordan Argyle (entrepreneurial lead), and Steve Herring (industry mentor).

This team took an electroplating that enables formation of a multilayered surface coating that is thick and uniformly pore-free, adhering to an object's substrate level. By operating at much lower temperatures than traditional plating methods, it also saves energy.



## AMAF

**Team Members:** Isabella van Rooyen (principal investigator), George Griffith (entrepreneurial lead) and Ed Lahoda (industry mentor).

This additive manufacturing technology provides a direct route to fabrication of dense uranium silicide using a novel hybrid laser-engineered net shaping process. By creating a small, localized melt pool from multiple powder sources, pellets can be uniformly fabricated to exact microstructure and chemistry specifications.

## EMRLD

**Team Members:** Steven Prescott (principal investigator), Ram Sampath (entrepreneurial lead) and Rob Sewell (industry mentor).

EMRLD is a probabilistic risk assessment (PRA) model based on three-phase discrete event simulation, which makes it ideal for dynamic time-dependent models and also makes coupling possible with other time-dependent physics based simulation models.

## RE-LIGHT

**Team Members:** Donna Baek (principal investigator), Devin Imholte (entrepreneurial lead) and Robert Fox and James Hedrick (industry mentors).

Re-Light's technology safely removes and separates mercury and rare earth elements from fluorescent lamps. Phosphor powders contain rare earth elements, which are considered critical elements worldwide based on their ubiquitous application in clean energy technologies and microelectronic devices. Recovery of these metals through urban mining is much more economical and sustainable.

## Energy I-Corps Lite kicks off at CAES

Expanding on the success of the Energy I-Corps program, INL has partnered with Cascadia CleanTech to launch its pilot National Lab Accelerator training, also referred to as Energy I-Corps Lite. Through the training, which started April 10, 13 INL teams – all partnered with seasoned industry mentors – met at CAES to learn lean innovation-to-market techniques, creating technology value propositions through customer discovery and validation.

The National Lab Accelerator training, along with the other seven Lab-Bridge pilot programs, was developed by the DOE EERE Lab Impact Team to accelerate lab-developed technology commercialization. This unique approach allows lab experts to explore their best ideas, providing them with the resources they need to test and validate their inventions through direct engagement with the marketplace.

# New CAVE installation begins at CAES

For more than seven years, the Computer-Assisted Virtual Environment (CAVE) has been one of the top assets at the Center for Advanced Energy Studies, but every piece of equipment has its pre-ordained life span, no matter how high-tech. In April, technicians began installing a new CAVE in the Applied Visualization Laboratory on CAES' second floor.

The new CAVE features a number of improvements, said Dr. James Money, Applied Visualizations Laboratory Lead. Most noticeably, it's bigger: 12'×12'×7.5', compared to the original CAVE's 10'×10'×7.5'. Measured in cubic feet, that represents a 44 percent increase.

The new HD projectors use lasers rather than bulbs. In addition to better resolution, they will cost less to maintain, Money said. Some modifications are also being made to the AVL, such as rewiring the power to 220 volts. In addition to the CAVE, a virtual

reality tracking system is being added for headset programs using Samsung Gear VR and HTC Vive.

Scientific research projects at CAES and INL use a suite of open-source data science software tools called the Scientific & Intelligence Exascale Visualization Analysis System (SIEVAS). Tools such as Paraview, Matlab, Visit and Google Earth can be easily connected to SIEVAS to allow for tight integration into the users' existing workflows. Immersive environments such as the CAVE and virtual reality systems then provide the verification and validation environments.

This summer, the four interns will include two returning students -- Rajiv Khadka of University of Wyoming and Marko Sterbentz of Idaho State University – plus two newcomers, Nathan Bitkofer of ISU and Luke Kingsley of University of Utah. All are majors in computer science

at respective institutions. During their internships, they will be working on multiresolution storage and visualization research at CAES for material-based scans and collaborative immersive techniques for low-cost solutions.

May 2017 marks the one-year anniversary of Money's arrival at CAES. His mission has been to make the AVL a leading resource for researchers and scientists to discover new insights through data analytics and visualization capabilities. A key focus of the lab is real-time and near-real-time methods for processing, exploiting and analyzing experimental and simulated results. The AVL includes an operational component for researchers and scientists, as well as scientifically based research into new methods that transition over time to INL's broader scientific mission.

## CAES, University of Wyoming team with global firm on energy study

A University of Wyoming/CAES project to establish a website related to the Western Energy Corridor has expanded its scope and brought on as a partner the Rhodium Group, a global strategic planning and policy analysis company based in New York City.

Eleven contiguous Western states were specifically directed in the Energy Policy Act of 2005 to create a coordinated and consistent interagency permitting process for energy distribution, along with recommendations on how to avoid or minimize environmental harm. One goal planners had was to promote "energy I.Q." and get people asking the right questions for a sensible debate.

"If we take a regional approach and look at what can be done for the entire area with partnerships, that's where we'll get some support," said Dr. Rob Godby, an economics and finance professor in UW's College of Business, when he spoke at the Intermountain Energy Conference in 2014.

A website was part of the plan, but Godby said the project stalled when they realized collecting comprehensive data about energy resources and economics was beyond the university's capabilities. To drill down to a county-by-county level required automated interfaces too sophisticated and expensive for students and faculty to develop.

Things were on hold until Godby talked with Trevor Houser, a partner in the Rhodium Group who leads the firm's energy and natural resources practice. Houser told him they were exploring a similar idea – a web portal along the lines of the Yale Program on Climate Change Communication (<http://climatecommunication.yale.edu>), only detailing energy outcomes across the country.

"Rhodium has the ability to do this in an automated, self-updating way," Godby said.

Another advantage is that the site can be built gradually. The first set of metrics they plan to collect – state revenues, per capita income, employment, etc. -- will be coal-

related. "From there, we can roll it out to other fuel types: oil, natural gas, uranium."

While Rhodium collects and processes data, CAES and University of Wyoming will provide insights and analysis. As a CAES/UW/Rhodium project, it will be a resource for policymakers and journalists and anyone seeking to gain insight into the economic implications of energy exploration and development. Other sponsors might be brought on as well. "This might be of broader interest to people across the country," Godby said.

Don Roth, the CAES associate director representing UW, said CAES branding could provide a seamless connection between UW/Rhodium Group, Idaho's universities and INL, with the broad expertise in CAES maximizing the project's impact. "We're looking forward to having a comprehensive tool to facilitate decision-making in the energy arena," he said.

Godby said they are planning to have a beta site up and running by mid-summer.

# CAES hosts first 'Engineering Your Future' event

Thirty-nine students from Idaho Falls area schools converged on the Center for Advanced Energy Studies (CAES) Feb. 22 to discover what the "E" in STEM represents.

It was National Engineering Week, and the leadership at Idaho National Laboratory decided it was an ideal time to premiere "Engineering Your Future," an event featuring workshops on mechanical engineering basics, wind energy, data visualization and drone flight simulation. Planning had originated around the GridGame, a computer program devised by INL engineer Tim McJunkin to simulate electrical power grid management. INL's Anne Seifert and Kortny Rolston-Duce made arrangements to broaden the focus to STEM, with hands-on activities from the Energy and Environment Science & Technology directorate.

The highlight of the event was a staging of the "GridGame" in the CAES Auditorium. Adding load, finding customers, and fighting off cyberattackers are all part of the scenario. Game points are earned by providing power and then used to buy more grid assets and grow the grid. Whoever ends up with the most money wins, but it's not that easy.

The winning student team was composed of Ashley Rivera, Dallin Peck and Alexander Clinger, all Compass Academy students.

"I think it went great," McJunkin said. "I think we got just the right mix of folks."



INL's Tim McJunkin helps out a team of students playing the GridGame at CAES in February

*NOTE: The Grid Game can be found online at <http://gridgame.ironforidaho.net/>*

## UI students advocate nuclear energy

Kelley Verner and Emma Redfoot, both of whom are doing their graduate studies at the Center for Advanced Energy Studies (CAES), recently attended the American Nuclear Society's spring meeting, April 6-10, in Pittsburgh. The two are co-founders of Students for Nuclear, an advocacy group that took shape at ANS winter meeting.

Redfoot majored in environmental studies at Lewis and Clark State College, in Portland, Oregon. Eager to learn more about the world, she took a semester off to live on an organic permaculture farm on the coast of Ecuador, where she worked as the ecotourism intern. After returning to college for a year, she took off another semester to research volunteer tourism in Peru.

The combined experience in both countries led her to conclude that poverty is directly linked to lack of energy resources. "I came to the conclusion that energy is the soil from which everything from clean water to literacy to women's rights can grow," she said. "I decided to take a deeper look."

After studying, Redfoot decided nuclear energy offered the best way to sustain a developing economy without pollution or carbon emissions. She is now working on a master's in nuclear engineering at UI.

Verner, a native of Idaho Falls, plans to pursue a doctorate in nuclear engineering after she finishes her master's in biological engineering through the UI. Like Redfoot, she sees nuclear energy as the best option for environmentally sustainable energy production, health improvements for people around the world and a source of high quality jobs and lives.

### CAES by the Numbers

**510**  
Visitors

**25**  
Tours

**13**  
Submitted Proposals

**8**  
Awarded Proposals

**23**  
New Students  
Working on CAES  
Projects

**29**  
Publications,  
Presentations and  
Proceedings

### CALENDAR

#### SEPTEMBER 7-8

**CAES Energy Policy Institute 7th Annual Energy Policy Research Conference,**  
**Park City, Utah.** Visit <https://epi.boisestate.edu> for more information.

Visit the CAES online calendar for more details on each event: <https://caesenergy.org/newsroom/calendar/>

Have comments, questions or suggestions for future newsletter topics?  
Contact Paul Menser, [paul.menser@inl.gov](mailto:paul.menser@inl.gov), 208-526-1638.

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