



Noël Bakhtian

New CAES director addresses researchers, staff

If there's one thing CAES director Noël Bakhtian hopes not to hear before too long, it's people telling her, "I don't understand what CAES is."

On the job since mid-May, Bakhtian spoke July 24 in the CAES auditorium, offering her impressions of what she's seen so far and where she sees the consortium headed, including refreshing the CAES vision and strategy.

"I want us to be thinking big," she told researchers, interns and staff. "What do we want to be known for, across the country,

in 5 to 10 years?" Collaborative planning and communication will be key to creating a stronger vision and brand, she said.

Along with her appointment, CAES has moved on the Idaho National Laboratory organizational chart from reporting to the Energy and Environment Science & Technology directorate to an equal footing with all INL directorates. "Reporting to INL Director Mark Peters and staying in close communication with the associate laboratory directors will enable CAES to create stronger collaborations across INL."

In fact, the INL lab plan mentions CAES 19 times. The openness of the CAES campus makes collaboration possible with industry and organizations like the Northwest Food Processors Association. "I think the concept

of CAES, based on collaborations, is very strong," Bakhtian said.

The reorganization means staffing changes as well. Interviews are underway for a chief operating officer, and communications and partnerships lead. Two associate directors have left this summer. David Solan, director of the CAES Energy Policy Institute at Boise State University, has taken a job with DOE in Washington, D.C., and Tom Wood, from University of Idaho, retires this month.

Bakhtian said she is determined to build a cohesive, inclusive, and diverse team, with CAES individuals serving as ambassadors for CAES at their home institutions. As she said, "I hope you will always feel like you're CAESers at heart."

CAES INTERNS 2017



Every summer since it opened in 2009, CAES has hosted interns and given them a place to learn and grow. This summer's interns have come to do work with CAES professors, the Nuclear Science User Facilities and the Center for Space Nuclear Research. Bottom row (l. to r.): Kelley Verner, Grace Marcantel, Rebecca Wild, KayCee Holden, Jessica Berry,

Joshua Rhodes, Syed Zameeruddin "Zameer" Mazharuddin; Middle row (l. to r.): Rajiv Khadka, Marko Sterbentz, Justin Mansell, Brittany Grayson, Matthew Wells, Lucas Beveridge, Darrell Cheu; Back row (l. to r.): Steven Wacker, Luke Kingsley, Nathan Morrical, Seth Dustin, Ashoak Nagarajan, Laura Hawkins, Dominik Fritz, Jacob Quint; Not pictured: Megan Isabelle,

About CAES

The Center for Advanced Energy Studies (CAES), a consortium of Idaho National Laboratory, Boise State University, Idaho 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.

Dani Barna, Thomas Blackham, James Headen, Matthew Herald, Javier Morales, Kavitha Chintam, Steven Cheng, William Harris, "Vince" Meng-Jen Wang, Ryan Stewart, Keyou Mao, Miu Lun (Andy) Lau, Michael Janis.

INL/CAES Team to Lead Utah FORGE Earth and Reservoir Modeling

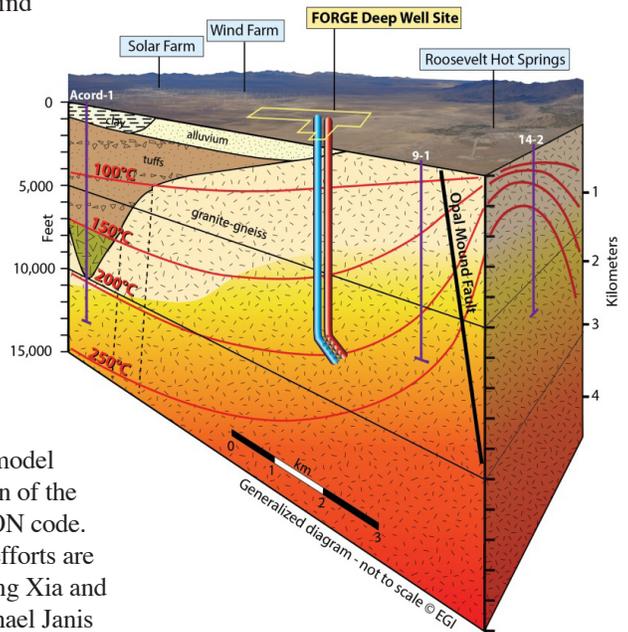
A team of Idaho National Laboratory scientists and former members of the Snake River Geothermal Consortium are leading the creation of the “earth model” and subsequent “reservoir models” for the University of Utah FORGE candidate site near Milford, Utah.

FORGE stands for Frontier Observatory for Research in Geothermal Energy, a U.S. Department of Energy project aimed at establishing a field site for research into and development of enhanced geothermal systems (EGS). These are engineered subsurface reservoirs where there is hot rock but limited pathways through which fluid can flow. In EGS development, injecting fluid into the hot subsurface rock reopens fractures, creating hot water and steam that carries energy to the surface, driving turbines and generating electricity. It has been estimated that EGS has the potential to provide up to more than 100 gigawatts of electricity to more than 100 million American homes.

FORGE Utah is one of two candidate sites selected for Phase 2 of the project. It is part of Beaver County’s energy

corridor, and sits near new wind farms, a solar power plant, and an existing geothermal power plant.

The INL/CAES team, led by Rob Podgorney, is preparing a Work for Others (WFO) agreement that will run through March 2018. The scope includes building the earth model (a graphical and numerical representation of the structure of the subsurface) and the reservoir model (a computational representation of the structure), using INL’s FALCON code. The computational modeling efforts are being led by Hai Huang, Yidong Xia and Jing Zhou. CAES interns Michael Janis (University of Oklahoma) and Andy Lau (Boise State) are assembling the earth model and writing the code to transfer it into FALCON.



An artist’s representation of the FORGE site in Utah.

Collaborative planning meeting held on produced water, rare earth elements

Economic management of produced water, including recovery of value-added materials, is of critical importance to the energy sector. Rare earth elements not only present a significant opportunity, but their extraction aligns with ongoing CAES projects on strategic material production.

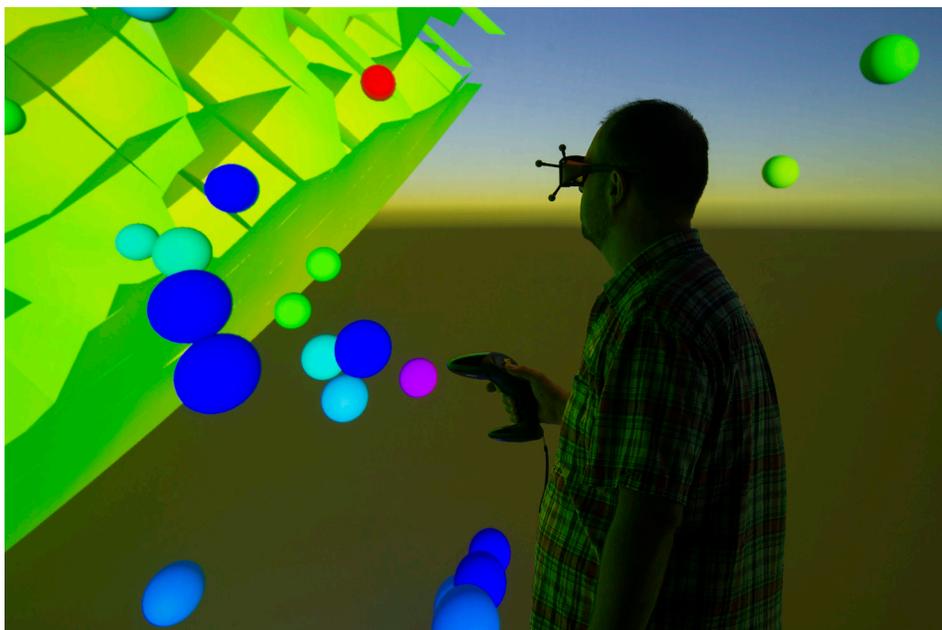
A working group meeting was held June 26 at University of Wyoming on Produced Water/Rare Earth Element Management, to identify strategic goals, critical assets existing expertise, knowledge gaps, and innovation opportunities. Coordinators included Kipp Coddington (UW director, Carbon Management Institute), Jon Brandt (UW professor, director of the Center of Excellence for Produced Water

Management), Bill Bellamy (CH2MHill vice president & UW Professor of Practice), and Travis McLing and Rob Podgorney (INL research scientists).

CAES and INL are in the middle of a three-year collaboration with UW’s Carbon Management Institute and the U.S. Geological Survey, developing new methodologies to analyze trace elements in high-salinity brines. The U.S. Department of Energy announced in June 2016 that the UW/INL/USGS research project had been one of four selected to receive up to \$4 million to assess the occurrence of rare earth minerals and other critical materials that may be dissolved in high-temperature fluids associated with energy extraction.

Rare earth elements (REEs) are used in everyday devices such as rechargeable batteries, cellphones, catalytic converters, magnets and fluorescent lighting. Over the past 20 years there has been an explosion in demand. For strategic reasons, the United States has sought to explore where REEs can be extracted economically in North America.

Representatives from all CAES institutions participated, and a total of 25 faculty, staff and graduate students attended. Specific collaborations and teams were tasked to develop “white papers” on key near- and long-term objectives and processes to optimize produced water utilization and rare earth production as a base for regional economic development.



TAP technician joins Transient Kinetics Lab staff at CAES

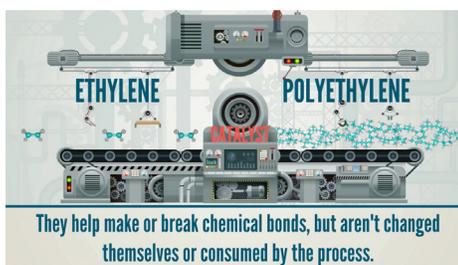
James Pittman, who fabricated the first Temporal Analysis of Products system for its inventor, Dr. John Gleaves, in the late 1980s, has joined the Transient Kinetics Laboratory staff at CAES.

A professional welder since high school, Pittman, 61, was working for a fabricator in St. Louis when Gleaves, an associate professor at Washington University in St. Louis' School of Engineering & Applied Science, approached the company about building his first TAP.

Gleaves asked Pittman to set up a machine shop at his home and work for him as a subcontractor. In addition to building TAP systems and servicing them worldwide, Pittman met INL's Dr. Rebecca Fushimi when she was pursuing her doctorate in chemical engineering.

Designed for precise kinetic characterization of gas-solid reactions in catalysis, adsorption and other applications, TAP systems are very intricate. Their piping must be vacuum welded from inside, and they have many small, delicate parts.

Pittman said he handles the "nuts and bolts" so researchers can focus on "the smart stuff," but Fushimi, who has known him since 1998, said his skills go far beyond that of a mechanic. "His experience in building hardware around scientific concepts is going to be essential to the success we expect developing better techniques for catalyst design," she said.



New video explains TAP systems

In an effort to educate the public about the work being done on the two temporal analysis of products (TAP) systems at the CAES Transient Kinetics Laboratory, INL posted a new video in June. The three-minute clip uses easy-to-understand

Wireless tracking added to Applied Visualization Lab

CAES booted up its new CAVE Automated Virtual Environment (CAVE) in July, replacing the one that had been in the Applied Visualization Laboratory (AVL) since 2010. This gives CAES greater capability to provide researchers from universities, industry and government agencies with a user facility where they can visualize and address scientific and technical challenges.

The four-panel system — 12'x12'x7.5' — uses rear digital projection to display computer graphics on three walls and the floor. Large data sets can be loaded quickly into the system. Wearing stereoscopic glasses to create depth perception and using a wand to manipulate and control data, researchers can study such things as contaminant flows through water systems, power transmission lines over topographically accurate terrain or graphite billets from a nuclear reactor.

The AVL has also completed installation of the wireless Phasespace Tracking system, including testing and development of a prototype application for a Samsung Gear Virtual Reality (VR) smartphone. The next steps will be to complete wiring of the tracking on the remaining headsets and testing using wireless internet (WiFi) for up to seven Samsung Gear VR applications.

graphics and text to explain platform chemical manufacturing and how TAP research might lead to new and improved catalysts. The video can be viewed here: https://youtu.be/NvT_-SkB8vk



Dr. Amy Moll

Dr. Amy Moll named CAES associate director for BSU

Dr. Amy Moll has been named the CAES associate director representing Boise State University. She joins Dick Jacobsen (Idaho State University),

Tom Wood (University of Idaho) and Don Roth (University of Wyoming).

Moll came to BSU from Hewlett-Packard in 2000. She co-founded the Department of Materials Science and Engineering with Bill Knowlton, and served as its first chair. In 2011, she was named dean of BSU's College of Engineering, a position she held until earlier this year.

"Amy's leadership experience in academia, personal focus on materials, and strategic ties to BSU will strengthen the CAES leadership progress in tightening the research and education collaboration between our five institutions," said CAES Director Noël Bakhtian.

Moll holds a bachelor's degree in ceramic engineering from the University of Illinois, and earned her master's and doctorate in materials science and engineering from the University of California at Berkeley.

In 2011, she was instrumental in the production of "Making Stuff," a four-part television series created by PBS Nova, in collaboration with Discovery Center of

Idaho, the Micron Foundation, Idaho Public Television and Idaho National Laboratory. Moll's work helped fund the series, with a \$1 million grant from the U.S. Department of Energy for education and outreach, and a \$2.5 million gift from the National Science Foundation. She also served as technical expert by scripting, reviewing scripts and pitching ideas for filming.

In 2015, she was honored with a "100 Inspiring Women in STEM" Award from Insight Into Diversity magazine. The awards recognize exemplary women who inspire and encourage the next generation of young women to pursue careers in Science, Technology, Engineering and Math.

CAES hosts visitors from BSU, IAEA

On June 8, CAES hosted a visit by Boise State University faculty and Idaho National Laboratory staff. The visit was an opportunity for BSU to introduce Dr. Tammi Vacha-Haase, the new dean of the Graduate College. She was accompanied by Mark Rudin, Harold Blackman, Amy Moll and David Solan, along with Elli Brown of INL's Boise office. The team met with INL Chief Research Officer Kelly Beierschmitt, Associate Laboratory Director for National & Homeland Security Zach Tudor, Associate Laboratory Director for Nuclear Science & Technology Kemal Pasamehmetoglu, University Partnerships Manager Michelle Bingham and others to discuss ongoing and potential joint research opportunities.

CAES also supported a multiday visit by an International Atomic Energy Agency

(IAEA) team reviewing INL capabilities for potential designation as an IAEA International Centre based on Research Reactors (ICERR). ICERR designation is granted to organizations that operate research reactors and can demonstrate sound experience in hosting nuclear R&D projects that involve significant international participation. INL and Oak Ridge National Lab have submitted a joint application. An ICERR designation could bring about new international scientific and engineering networks and serve as a reference point for new joint R&D programs, with shared results and international peer reviews. CAES' strengths in supporting research by foreign nationals and serving as a training ground for nuclear scientists and technicians were highlighted during the review.

CAES Wins grant from Vandal Ideas Project

An interdisciplinary team of graduate students and faculty from the University of Idaho at CAES was awarded a grant from the Vandal Ideas Project. The grant was awarded to fund the project entitled: Increasing the Go-on Rate in Southeast Idaho Through the Nexus of Food, Energy, and Water. The aim of the project is to increase the percentage of high school seniors from southeast Idaho going to college by providing mentorship for senior projects relating to the Food, Water, and Energy Nexus. Kelly Verner, the project's principal investigator, holds a master's from the University of Idaho in Idaho Falls. The project is also supported by Marc Skinner and CAES' Robert Borrelli, co-PIs along with CAES master's students John Peterson, Emma Redfoot, Jieun Lee and Seth Dustin.

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, 208-526-1638.

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