Energy-Water Nexus

Energy-Water Nexus Research in Idaho

Energy and water are two of the world’s most critical resources for sustaining life. The interconnected energy-water cycle is at the core of manufacturing and processing facilities, which use energy for water production and treatment, and which use water for energy generation, transmission and storage. The U.S. Department of Energy, the National Science Foundation and the U.S. Department of Agriculture have emphasized the importance of energy and water as interconnected critical resources.

The University of Idaho (UI) is involved in research initiatives related to the energy-water nexus, especially in the arid West, where population growth, urbanization and resource demands strain the allocation of scarce water. In the food processing industry—a significant part of Idaho’s economy—excessive energy and water consumption limits growth and increases costs. Reducing the footprint of the energy-water cycle presents great challenges and opportunities for both incremental improvements to existing facilities and the creation of new technologies to fundamentally alter the energy-water cycle.

The Center for Advanced Energy Studies, or CAES—a collaboration among University of Idaho, Boise State University, Idaho State University, the University of Wyoming and the Idaho National Laboratory (INL)—launched its Energy-Water Initiative in 2016. The initiative’s three focus areas are treatment and reuse of water in industry and energy production, by-product management in industrial processes and desalination.

UI also is engaged in the NSF and USDA NIFA’s Innovations at the Nexus of Food, Energy and Water Systems (INFEWS) program. In September 2016, researchers in the UI Center for Resilient Communities received a nearly $3 million grant for the ReFEWS project, which will map opportunities for reclaiming and reusing nutrients and water from agricultural and aquacultural processes in Idaho.

Background

In 2014, the DOE’s Water-Energy Tech Team prepared a report, “The Water-Energy Nexus: Challenges and Opportunities,” which outlines technology research, development, demonstration and deployment challenges. A national strategy built from this report will require regional approaches.

The overarching goal of the NSF and USDA NIFA INFEWS program is to catalyze interdisciplinary research to transform scientific understanding of the food-energy-water nexus in order to improve system function and management, address system stress, increase resilience and ensure sustainability.

Recent Accomplishments

- CAES hosted a virtual meeting of over 24 potential Energy-Water Initiative collaborators in December 2016 to introduce researchers to capabilities and infrastructure available within the CAES institutions and discuss funding and collaboration opportunities.
- The vice president for research offices of UI and the University of Washington held a phone conference in December 2016 to explore a collaborative approach for an Industry/University Cooperative Research Center opportunity as part of the CAES Energy-Water Initiative.
leaders agreed there is a potential to leverage a joint proposal between CAES and the UW Center for Sustainable Produced Water Management.

- Avista Corp. awarded a $93,600 grant to UI, CAES and INL researchers to evaluate North Idaho food processing companies’ plants and identify opportunities to reduce water and energy use.
- The ReFEWS project has recruited two new graduate research assistants to the team with specialties in mapping and water management, and stakeholder engagement and sustainable practices. Upcoming goals include completing hotspots mapping for food, energy, and water in the Upper Snake River Basin, and completing the establishment of the stakeholder advisory group for the project.
- UI is a partner in a $3 million INFEWS project led by Washington State University (WSU), awarded in September 2016, studying how to better coordinate and manage the food, water and energy needs of the Columbia River Basin. UI College of Law faculty and students will provide law and policy perspectives.

**Upcoming Goals**

- UI, WSU and Oregon State University will convene a workshop April 10-11, 2017, to catalyze tri-state research on food-energy-water systems. The vice presidents for research at the three institutions are seeking interdisciplinary teams poised to address FEW research challenges, representing UI, WSU, OSU, INL and Pacific Northwest National Lab (PNNL). The workshop will be an interactive and intensive gathering of three to five research teams to actively develop funding strategies and program building.
- CAES and the Northwest Food Processors Association (NWFPA) will host a working meeting with industry leaders Feb. 22-23, 2017. The meeting’s goal is to encourage a discourse on issues confronting the food processing industry related to wastewater management and energy efficiency. Speakers from UI, INL, NWFPA and Idaho Power Company and representatives from each of the attending food processing companies will provide their viewpoints on these important topics. The outputs from this meeting will be used to create a research and education roadmap to guide Idaho toward sustainability in the areas of wastewater management and energy efficiency.

**Projected Impact of Continued and Increased Funding**

Investments in research related to the energy-water nexus will directly benefit Idaho’s manufacturing and food processing industries through small- and large-scale changes. Reduced energy and water consumption will lower costs and enable growth.

**Accounts:** Various in Department of Energy, Office of Science, NSF/Research and Related Activities, and Department of Agriculture/AFRI.

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