

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY
U.S. HOUSE OF REPRESENTATIVES
HEARING CHARTER

The Energy Water Nexus: Drier Watts and Cheaper Drops
Thursday, March 7, 2019
10:00AM EST
2318 Rayburn House Office Building

PURPOSE

The purpose of the hearing is to examine energy and water nexus issues in support of H.R. 34, the “Energy and Water Research Integration Act of 2019,” as introduced by Chairwoman Eddie Bernice Johnson and Ranking Member Frank Lucas at the beginning of the 116th Congress. This legislation ensures that the Department of Energy considers water intensity in energy research and development activities and energy intensity in water production and use. The hearing will focus on current issues and opportunities for efficiency improvements.

WITNESSES

- **Dr. Vincent Tidwell** is a Principle Member of Technical Staff at Sandia National Laboratories. Dr. Tidwell has more than 20 years of experience conducting and managing research on basic and applied projects in water resource management, nuclear and hazardous waste storage and remediation, and collaborative modeling. Currently, he is leading several studies that address issues concerning the energy-water nexus, including support for long-term transmission planning in the Western and Texas interconnections, climate impacts on energy-water relations, and international energy-water pinch points. Dr. Tidwell was a Lead Author for the Land-Water-Energy cross-sectorial chapter for the 2014 National Climate Assessment.¹
- **Ms. Kate Zerrenner** is a Senior Manager at the Environmental Defense Fund (EDF). Ms. Zerrenner leads EDF’s Texas and national energy-water nexus efforts, and develops and implements strategies to promote energy and water efficiency in Texas. Her work aims to address financial, regulatory, and behavioral barriers to advancing clean energy options that reduce climate change impacts, water intensity, and air pollution. Prior to

¹ “Vincent Tidwell Biography.” Green is Good. Accessed 27 Feb 2019. <https://greenisgoodshow.com/guest/sandia-national-laboratories-dr-vincent-tidwell/>

joining EDF, Ms. Zerrenner worked at the U.S. Government Accountability Office analyzing U.S. action on climate change and the voluntary carbon offset market; SAIC, on climate change projects for the U.S. Department of Energy and the U.S. Environmental Protection Agency; and the U.S. Department of Energy.²

- **Dr. Richard Bonner** is the Vice President of Research & Development of Advanced Cooling Technologies. Dr. Bonner has led research programs involving the thermal and fluid sciences, including several programs related to the Energy-Water Nexus. He has published more than 45 papers, 1 patent, and 4 patent applications. Dr. Bonner has also led advanced thermal product development programs, from concept to production, for over 125 customers covering a wide range of commercial industries.
- **Dr. Ramen P. Singh** is the Associate Dean for Engineering at OSU-Tulsa, and a Professor and Head of the School of Materials Science and Engineering at Oklahoma State University. Dr. Singh's research focuses on the failure mechanics of advanced and complex material systems. His research has been funded by the National Science Foundation, NASA, the Oklahoma Center for the Advancement of Science & Technology, the Oklahoma Transportation Commission, the US Army Research Office, the Department of Energy, and industry.
- **Dr. Michael Webber**, Dr. Michael E. Webber is based in Paris, France where he serves as the Chief Science and Technology Officer at ENGIE, a global energy and infrastructure services company. Dr. Webber is also the Josey Centennial Professor in Energy Resources and Professor of Mechanical Engineering, at the University of Texas at Austin. He is the author of *Thirst for Power: Energy, Water and Human Survival*, published in 2016.³

BACKGROUND

The energy-water nexus is a growing area of concern. Generally, this term refers to the fact that the production of energy requires large volumes of water while the treatment and distribution of water is also dependent upon readily available energy. Both energy and water are under considerable stress in the United States, particularly in the southwest and western regions of the country.

² "Kate Zerrenner Biography." Environmental Defense Fund. Accessed 27 Feb 2019.

<https://www.edf.org/people/kate-zerrenner>

³ "Michael Webber Biography." Webber Energy Group. Accessed 27 Feb 2019.

<http://www.webberenergygroup.com/people/michael-webber/>

In 2012, the Science, Space, and Technology Committee asked GAO to identify key energy water nexus issues that Congress and federal agencies should consider when developing policies for energy and water resources. GAO reviewed five reports related to the energy water nexus that GAO previously released (the first released in 2009) to create a new summary report. It recommended that DOE create an energy water nexus program, with involvement from other federal agencies. This was asked of the DOE by Congress in the Energy Policy Act of 2005.⁴

The Department of Energy created the Energy Water Nexus Crosscut Team in late 2012. In 2014, DOE published *The Water-Energy Nexus: Challenges and Opportunities*, which outlined future energy water nexus work for DOE. After the release of this report, DOE hosted a roundtable series (six in total) to enable stakeholder dialogue.⁵

Although the current Administration eliminated coordinated support for this research area in 2017, there are a few related initiatives within DOE today. The Water Security Grand Challenge is a broad initiative announced in October 2018 “to advance transformational technology and innovation to meet the global need for safe, secure, and affordable water.”⁶ In December 2018, DOE released a funding opportunity announcement for an Energy-Water Desalination Hub in accordance with funds appropriated by Congress in FY 2017, FY 2018, and FY 2019. The goal of this Hub is to create affordable freshwater utilizing energy efficient technologies.⁷ And most recently, in February 2019, DOE announced a prize competition “to spur innovation in wave energy-powered desalination systems.”⁸

THE ENERGY AND WATER RESEARCH INTEGRATION ACT OF 2019

The Energy and Water Research Integration Act of 2019 (H.R. 34) directs the Secretary of Energy to integrate water considerations into the Department of Energy's (DOE) research, development, and demonstration programs in order to: (1) advance energy technologies and practices that would minimize freshwater withdrawal and consumption, increase water use efficiency, and utilize nontraditional water sources; and (2) improve the understanding of the energy required to provide water supplies and the water required to provide energy supplies throughout the United States. The bill also requires the Secretary of Energy to work with other relevant agencies, nongovernmental organizations, and State and local governments to develop

⁴ GAO 2012. ENERGY-WATER NEXUS Coordinated Federal Approach Needed to Better Manage Energy and Water Tradeoffs. <https://www.gao.gov/assets/650/648306.pdf>

⁵ “Energy Water Nexus Crosscut.” DOE. <https://www.energy.gov/energy-water-nexus-crosscut>

⁶ “Water Security Grand Challenge.” DOE. <https://www.energy.gov/eere/water-security-grand-challenge>

⁷ “Department of Energy Announces \$100 Million Energy-Water Desalination Hub to Provide Secure and Affordable Water.” DOE. <https://www.energy.gov/articles/department-energy-announces-100-million-energy-water-desalination-hub-provide-secure-and>

⁸ “DOE Announces Prize Competition for Wave Energy Water Desalination.” DOE. <https://www.energy.gov/articles/doe-announces-prize-competition-wave-energy-water-desalination>

and regularly update a Strategic Plan which includes technical milestones for achieving and assessing progress toward these objectives.

Finally, the bill requires the Secretary of Energy, in coordination with other relevant agencies, to create an Energy-Water Subcommittee of the Secretary of Energy Advisory Board to oversee these activities. The Subcommittee must consist of representation from each program within the Department and each Federal agency that conducts research relevant to this area, as well as representatives from research and academic institutions, States, and industry with expertise in technologies and practices relating to the energy-water nexus. The Subcommittee is also tasked with: (1) making recommendations on the development of data collection and data communication standards and protocols; (2) recommending improvements to Federal water use data to increase understanding of trends in energy generation and fuel production; and (3) recommending best practices for utilizing information from existing monitoring networks to provide uniform water and energy use and infrastructure data.