

The Carbon Utilization Research Council (CURC) is focused on technology solutions for the responsible use of our fossil energy resources to support our nation's need for reliable and affordable energy. For more information, please visit our website at [www.curc.net](http://www.curc.net).

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*The CURC newsletter communicates the work we have collectively accomplished in 2019.*

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**2019 CURC ACTIVITIES**

**Carbon Capture 101 Briefing Series**

Over the past six months, CURC, the Global Carbon Capture and Storage Institute, and the Carbon Capture Coalition joined together to host the “Carbon Capture 101 Briefing Series.” The Series was conceived to educate policymakers on the imperative of deploying carbon capture technology on a global scale, which both the Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA) have indicated is imperative to cost-effectively achieve global decarbonization goals.

Over the five-part Series, invited speakers discussed the need for carbon capture technology in an all-of-the-above energy portfolio, how the technology works, and the economic and environmental benefits it can provide if widely deployed.

We were pleased to be joined by the following keynote speakers during the Series:

- Senator John Barrasso (R-WY)
- Senator Shelley Moore Capito (D-WV)
- Senator Joe Manchin (D-WV)
- Senator Sheldon Whitehouse (D-RI)
- Congressman Marc Veasey (D-TX)
- Congressman David McKinley (R-WV)
- Jason Grumet, President, Bipartisan Policy Center
- Bob Perciasepe, President, Center for Climate and Energy Solutions

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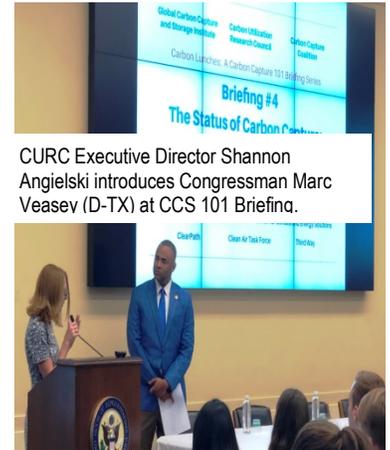
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- Allyson Anderson Book, Executive Director, American Geosciences Institute

CURC would like to thank all those who participated in the Briefing Series. There were over 550 attendees across all five briefings, a manifestation of the significant bipartisan momentum in favor of carbon capture deployment as a means to combat climate change.



CURC Executive Director Shannon Angielski introduces Congressman Marc Veasey (D-TX) at CCS 101 Briefing.

CURC, the Global Carbon Capture and Storage Institute, and the Carbon Capture Coalition would also like to extend our gratitude to our Carbon Capture 101 Briefing Series supporting organizations:



Presentations and video from each of the five briefings can be found [here](#).

### **CURC Executive Director Testifies Before House Energy & Commerce, House Science, Space & Technology Committees**

CURC Executive Director Shannon Angielski testified before two House Subcommittees on the importance of developing and deploying advanced fossil energy technologies like carbon capture, utilization and storage (CCUS).

On Wednesday, July 24<sup>th</sup>, Ms. Angielski testified before the House Energy and Commerce Committee's Environment and Climate Change Subcommittee in a hearing entitled "[Building America's Clean Future: Pathways to Decarbonize the Economy](#)."

CURC testimony before the Subcommittee focused on the role of technology innovation efforts to decarbonize the use of fossil fuels in the power sector, particularly with respect to CCUS, and how those efforts can be leveraged with other industrial uses of fossil fuels. Importantly, Ms. Angielski emphasized how investment in CCUS technology will transform carbon dioxide into an economic resource, lower the cost of reducing emissions, create jobs, save consumers money, safeguard the environment, and demonstrate that the technology can be used here as well as around the world.

## **CURC SPEAKING ENGAGEMENTS**

### **National Governors Association Global Energy Solutions Summit**

Washington, D.C.  
March 29, 2019

### **Southern States Energy Board Annual Conference & Expo**

Kingsport, TN  
May 21, 2019

### **CO2NNECT 2019**

Jackson Hole, WY  
May 22, 2019

### **International Energy Agency Clean Coal Centre Technologies Conference**

Houston, TX  
June 5, 2019

### **House Science, Space & Technology Subcommittee Hearing**

Washington, D.C.  
June 19, 2019

### **CURC-Global CCS Institute-Carbon Capture Coalition "CCS 101 Briefing"**

Washington, D.C.  
June 25, 2019

### **House Energy & Commerce Subcommittee Hearing**

Washington, D.C.  
July 24, 2019

### **National Energy Technology Laboratory 2019 CCUS and Oil and Gas Technologies Integrated Review Meeting**

Pittsburgh, PA  
August 27, 2019

### **International Coal Conference**

Pittsburgh, PA  
September 4, 2019

On June 19<sup>th</sup>, Ms. Angielski testified before the House Science, Space and Technology Committee's Energy Subcommittee in a hearing entitled "[Fossil Energy Research: Enabling Our Clean Energy Future](#)." The hearing focused on two bills, the Fossil Energy Research and Development Act of 2019 and the



CURC Executive Director Shannon Angielski (left) testifies before the House Space, Science and Technology Committee's Energy Subcommittee on June 19, 2019.

Industrial Decarbonization Technology Development Act of 2019. CURC's testimony focused on the Fossil Energy Research and Development Act and its adoption of recommendations from the *2018 CURC-EPRI Advanced Fossil Energy Technology Roadmap*.

Ms. Angielski's testimony submitted to the Committee can be viewed [here](#).

## **UPCOMING CURC EVENTS**

### **2019 Fall CURC General Membership Meeting**

CURC will hold its Fall General Membership Meetings on October 23-24, 2019 in Washington, D.C. We are excited to hear from our invited speakers from Congress, DOE, and industry stakeholders and look forward to seeing CURC members in D.C.!

## **FEDERAL ADVOCACY**

### **Senate, House Committees Advance CURC-Supported Bills to Boost Funding for Advanced Fossil Energy Technology Research**

The Senate Energy and Natural Resources Committee and House Science, Space and Technology Committee recently reported legislation that would reauthorize the Fossil Energy Research and Development Program at DOE.

On July 16, the Senate Energy and Natural Resources Committee reported 23 bills, including the Enhancing Fossil Fuel Energy Carbon Technology (EFFECT) Act (S. 1201). On July 24, the House Science, Space and Technology Committee reported three bills, including the Fossil Energy Research and Development Act (H.R. 3607).

## CURC Welcomes New Members

CURC is pleased to announce the addition of three new members to our organization:

### ION Clean Energy

The ION story began in 2008 when ION's founders saw the urgent need to improve the technology available for the removal of carbon dioxide being emitted from industrial sources like power plants and refineries. A lot has happened since those early days. Carbon capture has garnered worldwide attention from governments, NGOs, and industry.

ION, with the help of grants from the Department of Energy and other organizations, has been progressively developing and successfully demonstrating its carbon capture liquid absorption system at various scales, including a recent testing campaign at the largest capture facility in the world, Technology Centre Mongstad, (TCM) in Norway. ION is now ideally positioned to lead the capture industry into widespread commercialization.

### Nebraska Public Power District

The **Nebraska Public Power District (NPPD)** is a publicly-owned utility and a political subdivision of the state of Nebraska, with a service territory including all or parts of 86 of Nebraska's 83 counties. NPPD is partnering with ION Clean Energy to retrofit NPPD's Gerald Gentleman Station in Sutherland, NE with ION's solvent-based carbon capture technology. The project was recently

CURC is supportive of both bills, which incorporate the recommendations of the [2018 CURC-EPRI Advanced Fossil Energy Technology Roadmap](#) with respect to funding levels and program direction for research, development, and deployment of advanced fossil energy technologies at DOE. Both bills would accelerate deployment of CCUS and transformational advanced power cycle technologies for both coal and natural gas applications. They also encourage federal support of large-scale pilot and commercial demonstration testing, which is critical for private sector adoption of these new technologies.

### **CURC Submits Comments to IRS on Implementation of Revised Section 45Q Tax Credit**

In February 2018, President Trump signed into law the Bipartisan Budget Act of 2018, which included provisions from the FUTURE Act, legislation that revised the Section 45Q tax credit for carbon sequestration. Earlier this year, the Internal Revenue Service (IRS) issued a Request for Information on the Section 45Q tax credit program seeking comments on a range of issues. CURC drafted [comments](#) in response to the following issue areas raised in the IRS Notice:

- (1) Definition of "secure geological storage".
- (2) Recapture of the tax credits.
- (3) Definitions of carbon capture equipment, qualified carbon oxide, and qualified facility.
- (4) Types of contractual arrangements.
- (5) Election to transfer credit.
- (6) Commence construction.
- (7) Structuring of partnerships.

### **House & Senate Advance Bills to Fund DOE Fossil Energy R&D Program for FY 2020**

In June, the House passed H.R. 2740, legislation that included the FY 2020 Energy-Water appropriations bill. As passed by the House, the bills provides \$738.6 million for the Fossil Energy Research and Development Program at DOE. Within that number, the Coal CCS and Power Systems Program is funded at \$504.25 million, an \$18 million increase over the previous fiscal year.

On September 12, the Senate Appropriations Committee passed its FY 2020 Energy-Water bill. The bill would provide \$800 million in funding for the Fossil Energy Research and Development program, including \$517.3 million for the Coal CCS and Power Systems. Both of these recommendations are higher than the House-passed FY 2020 appropriations bill as well as enacted FY 2019 funds.

### **Carbon Capture Modernization Act Introduced in Senate and House**

Legislation to reform the Section 48A "Investment in Clean Coal Facilities" tax credit was introduced in the Senate and House earlier this year. The Senate legislation ([S. 407](#)) was introduced by Senators John Hoeven (R-ND) and Tina

selected to receive funding under DOE's FEED study solicitation (more information included below).

### Great River Energy

**Great River Energy (GRE)** is a not-for-profit electric cooperative serving 700,000 members who receive electricity through the 28 electric cooperatives that collectively own GRE. GRE is the second largest electric power supplier in Minnesota and one of the largest generation and transmission cooperatives in the country.

Smith (D-MN), and the House legislation ([H.R. 1796](#)) was introduced by Representatives David McKinley (R-WV) and Collin Peterson (D-MN). The bill, which has bipartisan support in both chambers of Congress, would make important technical modifications to the Section 48A credit that would unlock the potential of as much as \$2 billion in existing federal tax credits to incentivize investment in carbon capture technologies on coal plants.

Since the introduction of both bills, letters were sent by the bill sponsors in both chambers the [Senate Finance Committee](#) and the [House Ways and Means Committee](#) urging the leadership of those Committees to include the Carbon Capture Modernization Act in any year-end legislation that includes tax provisions.

### **USE IT Act Passed by Senate**

The Utilizing Significant Emissions with Innovative Technologies (USE IT) Act passed the Senate in July as a part of the FY 2020 National Defense Authorization Act (NDAA). The USE IT Act was introduced earlier in 2019 as separate legislation (S. 383) and is also included within the America's Transportation Infrastructure Act (S. 2302) as reported out of the Senate Environment and Public Works Committee.

The USE IT Act would accomplish the following:

- Clarify that CCUS projects and CO<sub>2</sub> pipelines are eligible for the permitting review process established by the FAST Act;
- Direct the Council on Environmental Quality (CEQ) to establish guidance to assist project developers and operators of CCUS facilities and CO<sub>2</sub> pipelines;
- Establish task forces to hear input from affected stakeholders for updating and improving guidance over time; and,
- Direct the Environmental Protection Agency (EPA) to use existing authority to support carbon utilization and direct air capture research.

## **NEWS**

### **CURC Members Receive DOE Funding for R&D**

CURC members were awarded significant recent federal funding for an array of research activities under several funding opportunities. Congratulations to each of the following CURC members for being selected by DOE:

#### Front-End Engineering and Design (FEED) Studies

- **The University of Illinois** will complete a FEED study for the installation of a carbon capture system at the Prairie State Generating Company's (PSGC) Energy Campus in Marissa, Illinois.

- **Electric Power Research Institute** will conduct a FEED study to determine the technological and economic feasibility of retrofitting California Resources Corporation's 550-MWe Elk Hills Power Plant (EHPP), located in Kern County, California, with a post-combustion carbon capture technology.
- **ION Clean Energy** will complete a FEED study for the installation of their advanced carbon capture system retrofitted to CURC member **Nebraska Public Power District's** Gerald Gentleman Station near Sutherland, Nebraska.
- **Southern Company Services** will complete a FEED study for the installation of a Linde-BASF aqueous amine solvent-based postcombustion CO<sub>2</sub> capture technology at an existing domestic natural gas-fired combined cycle power plant within Southern Company's portfolio of assets.
- Membrane Technology and Research, Inc. also received funding under this award to complete a FEED study at CURC member **Basin Electric Power Cooperative's** Dry Fork Station outside Gillette, Wyoming.

#### Regional Initiative to Accelerate CCUS Deployment

- **Battelle Memorial Institute** will combine the Midwest RCSP and the Midwest Geologic Sequestration Consortium to form a new regional initiative comprising midwestern and northeastern states.
- **Southern States Energy Board** will form SECARB-USA, encompassing parts of southern states with diverse storage opportunities in oil, saline, and unconventional reservoir settings.
- **University of North Dakota** will form the PCOR partnership to foster the development of CCUS in northwestern states and Canadian provinces

#### Large-Scale Fossil Fuel Pilot Projects

- The **University of Illinois** (Champaign, IL) received \$2.99 million to continue plans to design, construct, and operate an advanced amine-based post-combustion carbon dioxide (CO<sub>2</sub>) capture system at a coal-fired power plant.
- The **University of Kentucky Research Foundation** received \$2.29 million to move forward with plans to apply its transformative CO<sub>2</sub> capture approach to ensure continued utilization of abundant, low-cost coal while also affordably meeting and managing environmental concerns.

#### Enhanced Oil Recovery

- The **University of North Dakota** received \$8 million to determine the effect of injecting blended carbon dioxide (CO<sub>2</sub>) and rich gas into an active CO<sub>2</sub> EOR field to improve production performance and \$8 million to field-test an advanced machine learning approach to enable active (smart) well control during CO<sub>2</sub> EOR.
- **Battelle Memorial Institute** received \$7.99 million to develop improved strategies for EOR from challenging reservoirs along fault systems through advanced field characterization, integrated physics-based machine learning and data analytics, laboratory process development, and optimized field tests.
- The **University of Wyoming** received \$8 million to apply foam-assisted gas injection EOR through a field pilot test designed to pave a path for widespread deployment in unconventional plays.

#### **DOE Issues Funding Opportunity Under CarbonSAFE Program**

In DOE announced the availability of \$35 million in federal funding for the CarbonSAFE program under a new FOA. DOE issued a Notice of Intent to issue this funding opportunity in July. Projects selected under the new FOA will satisfy the following requirements:

- Complete a detailed site characterization of a commercial-scale CO<sub>2</sub> storage site (50 million metric tons of captured CO<sub>2</sub> within a 30 year period);
- Apply and obtain an underground injection control class VI permit to construct an injection well;
- Complete a CO<sub>2</sub> capture assessment; and, • Perform all work required to obtain a National Environmental Policy Act determination for the site.

Responses to the funding opportunity announcement are due by January 15, 2020.

### **EPA Finalizes Affordable Clean Energy Rule**

On June 19, EPA unveiled its final Affordable Clean Energy (ACE) rule under Section 111(d) of the Clean Air Act. The rule does not differ significantly from the proposed rule released in August of last year. It repeals the Clean Power Plan and establishes heat rate improvements as the best system of emissions reductions (BSER) for coal-fired power plants.

CURC's comments on the proposed ACE rule can be found [here](#) and a brief summary of the final rule can be found [here](#).

## CURC MEMBER SPOTLIGHT

### University of Wyoming School of Energy Resources

The *School of Energy Resources* (SER) at the University of Wyoming (UW) develops and deploys expertise to solve critical energy challenges and add value to the Wyoming energy sector. Through innovation, SER positions Wyoming as a recognized authority in energy at the national level and in the international arena. In pursuit of this mission, SER facilitates internal and external interdisciplinary coalitions and builds institutional capacity in energy education, research, and outreach.



Earlier this year, the Wyoming CarbonSAFE supervised the drilling of a deep CO<sub>2</sub> storage test well at Dry Fork Power Station.

Wyoming is a large producer of coal, oil, and natural gas, and continued use of these fossil fuels requires accelerated deployment of low-carbon emission solutions. Through applied energy study, the University's Center for Economic Geology Research (CEGR) is leading initiatives that will transform the global energy landscape.

#### Wyoming CarbonSAFE

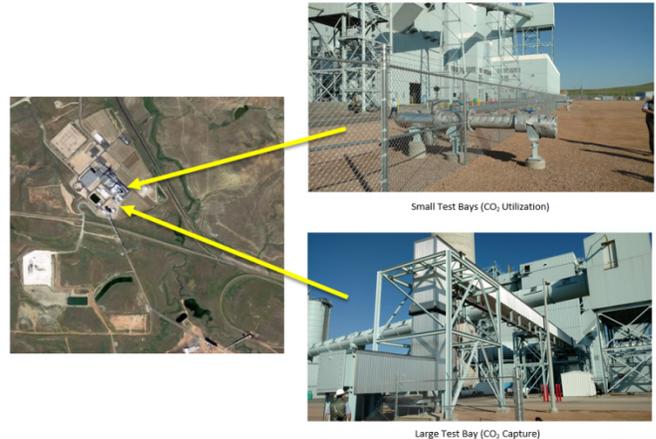
Funded by the U.S. Department of Energy, the Wyoming CarbonSAFE (Carbon Storage Assurance and Facility Enterprise) will characterize the geology of CO<sub>2</sub> storage reservoirs in proximity to the Dry Fork Station, a coal-based electric generation power plant near Gillette, Wyoming. The project team has already completed or will complete the following activities:

- a deep characterization well was drilled to a depth of 9,873 feet below land surface to collect geologic core, fluid, and geophysical logs
- The project team successfully collected 625 feet of geologic core from 9 different geologic formations and fluid samples from 6 geologic formations
- A 12.5-mile 3D seismic survey will be collected in 2020.

The Wyoming CarbonSAFE team is also comprised of Basin Electric Power Cooperative, Wyoming Integrated Test Center, UW Enhanced Oil Recovery Institute (EORI), Energy and Environmental Research Center at the University of North Dakota, and Advanced Resources International – a consulting research and development firm.

#### Other Initiatives

- Multi-year applied carbon engineering research and technology development program that seeks to identify ways to make value-added non-energy and fuel products from local coal resources. The primary objective is to create a new Wyoming (coal-based) conversion industry.
- The Center for Energy Regulation & Policy (CERP), launched in July 2019 to assist Wyoming policymakers and stakeholders to proactively address legislative and regulatory matters that impact the many opportunities and challenges in energy markets in the years ahead.



The Integrated Test Center (ITC) at Dry Fork Station is set up to study methods of carbon capture and utilization.