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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.

COALITION ACTIVITIES

Overview of CURC General Membership Meeting: June 27, 2017

On June 27th, CURC held its Summer General Membership Meeting at the offices of Edison Electric Institute in Washington, D.C. We were pleased Congressman David McKinley (R-WV) joined us as our keynote speaker. Mr. McKinley's comments focused on how the United States should approach its energy future. He was encouraged by the progress at Petra Nova and how industry continues to look at alternative technologies and approaches such as the Allam cycle. He believes that the U.S. will need to display leadership in carbon capture and more efficient fossil fuel technologies as other countries have backed away from CCS because the world will continue to use coal.



Congressman David McKinley (R-WV) addressing CURC members in Washington, D.C.

The CURC membership also had the opportunity to hear from Doug Hollett, Principal Deputy Assistant Secretary of Fossil Energy at the Department of Energy, who discussed the office's outlook for fiscal years 2017 and 2018.

The afternoon session highlighted presentations made by CURC members and guest organizations that provide an overview of their projects, technologies in development, and initiatives. The following representatives participated:

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UPCOMING EVENTS

**CURC Steering Committee and
General Membership Meeting**
October 26, 2017
Washington, D.C.

- Michael Reid, Duke Energy
- Walker Dimmig, NET Power
- John Harju, Energy & Environmental Research Center
- David Edwards, Air Liquide
- Anthony Leo, FuelCell Energy
- Rod Blunk, Siemens

Presentations from both the morning and afternoon sessions are available on the members only section of the CURC website.

THANK YOU TO OUR SUMMER MEETING SPONSORS



CURC Meetings with Congressional Appropriators

CURC members traveled to Capitol Hill on June 28th to meet with appropriators in both the House and Senate. CURC met with 11 Congressional offices, including former House Appropriations Committee Chairman Hal Rogers and Senator John Hoeven (R-ND).



CURC members with Congressman Hal Rogers (R-KY).

CURC stressed our message that increased funding in fiscal year 2018 for the Fossil Energy Research and Development program at the Department of Energy is critical to advance our energy objectives, increase exports of U.S.-

manufactured energy equipment and fossil fuel resources, and fuel our economy. Importantly, CURC advocated that federal support of research and development is necessary beyond early stage research, as sustained public investment is critical to commercialize new energy technologies.

CURC is pleased that the House and Senate responded favorably to the CURC recommendations with restored and increased funding. More details below.

FEDERAL ADVOCACY

Funding for Fossil Energy Research and Development

CURC continues to work with Members in both the House and Senate to provide robust funding for DOE's Fossil Energy and Research and Development (FER&D) Program for FY 2018. In July, the House passed its FY 2018 Energy-Water spending bill as part of a broader security-themed "minibus" package of

CURC SPEAKING ENGAGEMENTS

Shenhua Delegation Meeting

September 8, 2017
Washington, D.C.

CSIS Electricity in Transition: The Changing Landscape for Coal in the United States

September 8, 2017
Washington, D.C.

Mines and Money

October 2, 2017
Toronto, ON

International Brotherhood of Boilermakers Tripartite Conference

October 3, 2017
Myrtle Beach, SC

spending bills. CURC is pleased that an amendment offered by Congressman McKinley (R-WV) to boost funding of the Fossil Energy Research and Development Program (FE R&D) at DOE to FY 2017 enacted levels was adopted by voice vote during debate on the floor. The House bill sharply rejects proposed cuts to funding for the FE R&D Program at DOE.

In the Senate, the Appropriations Committee approved its FY 2018 Energy-Water spending bill, where it will now head to the Senate floor for consideration by the full chamber. The bill provides \$572.7 million for Fossil Energy Research and Development () programs at the Department of Energy , with a requirement for DOE to develop a Roadmap for the Fossil Energy program and direction to fund the National Carbon Capture Center as well as the Regional Carbon Sequestration Partnerships.

Earlier this year, Congress came to an agreement on an omnibus appropriations measure for the remainder of FY 2017. CURC was instrumental in securing funding increases for the Department of Energy Coal CCS R&D program in the bill, as well as in the creation of a new \$50 million transformational large pilot program, a recommendation that originated from the CURC-EPRI Roadmap. The House has recommended an additional \$25 million for the pilot program in their FY 2018 bill.

Bipartisan Group of Senators Introduce Legislation To Strengthen and Extend Section 45Q Tax Credit

On July 13th, Senators Heidi Heitkamp (D-ND), Sheldon Whitehouse (D-RI), Shelley Moore Capito (R-WV) and John Barrasso (R-WY) announced the introduction of new legislation to strengthen and extend the section 45Q tax credit for carbon sequestration. S. 1535, the Furthering carbon capture, Utilization, Technology, Underground



CURC Executive Director Shannon Angielski making a statement of support alongside the original Senate cosponsors of the FUTURE Act.

storage, and Reduced Emissions Act ([FUTURE Act](#)), follows 45Q legislation introduced during the 114th Congress also introduced by Senator Heitkamp, the Carbon Capture, Utilization and Storage Act. The bill currently has 25 bipartisan cosponsors and is supported by over [40 stakeholder groups](#). CURC issued a [press release](#) supporting the legislation, and multiple CURC members issued [statements of support](#).

Last week, Congressman Mike Conaway (R-TX) introduced companion legislation in the House, the Carbon Capture Act (H.R. 3761). The Carbon Capture Act would increase the value of the Section 45Q tax credit to \$35 over 10 years, incorporate the needs of different technologies and business models, improve the transferability of the credit, and fully incorporate utilization beyond enhanced oil recovery. Currently, the credit creates financial uncertainty for

investors because of the insufficiency of the credit amount and the arbitrary cap on the number of tons of captured carbon dioxide (CO₂) that are eligible for the credit. The changes to the Section 45Q tax credit in this bill will facilitate needed private sector investment in CCUS technologies by mitigating some of the barriers that make return on investment less certain. The bill currently has 32 bipartisan cosponsors. CURC issued a press release in support of the legislation. To view the release, click [here](#).

Treasury Department Releases Guidance on Development Bank Financing for New Coal Plants

On July 18, the Treasury Department released guidance for U.S. Positions on Multilateral Development Banks (MDBs) Engaging on Energy Projects and Policies. The guidance is very broad, but departs from the 2013 guidance issued by Treasury during the Obama Administration which prohibited U.S. support in financing the development of international coal projects. Earlier this year, CURC sent a [letter](#) to President Trump encouraging the Administration to reverse the 2013 guidance. Full text is included below:

“The Executive Director for the United States at each of the Multilateral Development Banks (MDBs) will exercise the U.S. voice and vote on MDB projects and energy policy in a manner consistent with the following objectives:

- Promote universal access to affordable, reliable, sustainable and clean energy.
- Help countries access and use fossil fuels more cleanly and efficiently, and help deploy renewable and other clean energy sources.
- Support development of robust, efficient, competitive, and integrated global markets for energy.”

UPDATE ON CURC INITIATIVES

International Study of Financing Options for Multilateral CCS Pilot Projects

After the release of the Global CCS White Paper last year, CURC is continuing its work with Japan's New Energy and Industrial Technology Development Organization (NEDO), the United States Energy Association (USEA), and a number of international collaborators on a Phase II Report studying options to finance unilateral and multilateral large-scale CCS pilot projects.

Phase II of this effort considers successful financing approaches used for emerging electric power technologies in other nations and use this information to assess possible approaches to overcome those barriers. For more information, including the Phase II Report, see our [website](#).

Jobs and Economic Benefits Analysis

ClearPath Action and CURC are commissioning a study on the impact of job creation and economic benefits of fossil energy RD&D and deployment to the U.S. economy. The objective of the study is to estimate how deployment of improved technology can have a positive impact on fossil fuel jobs and the American economy under a high economic growth outlook. The study will include an outlook of carbon capture on both coal and gas, look at the impact of increased utilization of the existing fleet, and measure the impact of CO₂ used in enhanced oil recovery (EOR).

The study is expected to be released this fall.

CURC-EPRI Roadmap Update

CURC's Technical Subcommittee continues its work on updating the CURC-EPRI Roadmap to include natural gas in the portfolio of technology pathways to improve the cost and performance of fossil fuel generation systems. The [2015 CURC-EPRI Roadmap](#) was used to make recommendations to the Senate Energy and Natural Resources Committee that were eventually incorporated into the Senate-passed Energy Policy Modernization Act of 2016. The 2017 Roadmap Update will be released this fall in conjunction with the Jobs and Economic Benefits Analysis.

NEWS ROUNDUP

CURC Provides Comments to Senate Finance Committee on Tax Reform

In July, CURC submitted [comments](#) to the Senate Finance Committee outlining why the Section 45Q tax credit should be an important part of a reformed tax code and encouraging the Committee to adopt the provisions of the recently introduced FUTURE Act in any tax reform legislation considered by the Committee.

The comments focus on the potential that increased government support – and a strengthening and extension of Section 45Q – could provide for domestic energy production, including the ability to produce billions of additional barrels of domestic oil from existing fields using EOR. They also highlight that CCUS technologies are an important tool to achieve GHG emission reduction goals while not sacrificing potential economic gain.

Update on Recently Introduced Legislation

Earlier this summer, Congressman Morgan Griffith (R-VA) introduced two bills to revise the current EPA rules for determining when modifications at existing major stationary sources trigger the new source review (NSR) permitting requirements. One bill, [H.R. 3127](#), provides a categorical exemption from the NSR requirements for “any energy efficiency project, pollution control project, or reliability project” that is undertaken at an existing source. The other bill, [H.R. 3128](#), would change the emission increase test that is used for determining when a non-exempted project at an existing source results in a significant emissions increase that triggers NSR review. To view CURC’s summary of each bill, please click [here](#).

On Wednesday, August 2, Senators John Hoeven (R-WY) and Steve Daines (R-MT) introduced the “[CO2 Regulatory Certainty Act](#)”. The bill would modify IRS guidelines for reporting greenhouse gas reporting requirements for eligible EOR projects, and enable EOR operators to report under EPA regulations that already reflect operational and legal differences between enhanced oil and gas recovery and geological storage under the Clean Air Act and the Safe Drinking Water Act. The legislation is cosponsored by Senators Thad Cochran (R-MS) and Roger Wicker (R-MS).

In July, Senator Joe Manchin (D-WV) introduced S. 1563, the “[Rare Earth Element Advancing Coal Technologies Act](#)”. The bill authorizes \$20 million for the Office of Fossil Energy to develop advanced separation technologies for the extraction of rare earth elements and minerals from coal and coal byproducts and requires a report to Congress on the research and potential commercial impacts of the technology.

CURC Submits Response to RFI on Fossil Fuel Large-Scale Projects

In June, CURC submitted a response to DE-RFI-0001776, titled “Fossil Fuel Large-Scale Pilots”. CURC strongly endorsed federal support for fossil fuel large-scale pilot projects and answered the questions posed in the “Request For Information”. Click [here](#) to view the response. CURC has advocated for funding and implementation of this program in the FY 2017 appropriations process, and are happy to see this funding recommendation made by Congress, as well as the Department seeking input on how best to solicit projects to take advantage of this funding.

CURC Members Receive DOE/NETL Funding

Rare Earths

The University of North Dakota Institute for Energy Studies will receive \$2.75 million to continue its use North Dakota subbituminous lignite coal and coal-related material as feedstock to test their REE recovery system. The West Virginia University Research Corporation will receive \$2.66 million to use acid mine drainage solids as a feedstock for recovery of REEs and other useful materials. The University of Kentucky Research Foundation will receive \$6 million to use two sources of coal preparation (coal washing) byproducts as feedstock for recovery of REEs.

The projects are expected to be completed by 2020. To learn more, click [here](#).

Solid Oxide Fuel Cell Technology

West Virginia University was awarded \$300,000 to modify the internal surfaces of porous composite cathodes used in commercial SOFCs using atomic layer deposition (ALD).

University Turbine Systems Research

Pennsylvania State University will receive \$600,000 to develop a computational 3-D model that can be implemented within current turbine manufacturing design practices. The results of this work are expected to provide significant gains in turbine operating temperature, durability, and lower cooling flow requirements, leading to transformational impact on the gas turbine field.

Ohio State University will receive \$600,000 for their project which focus on the design and development of novel superalloys with improved creep strength under high operating temperatures. Incorporation of heat-resistant alloys into turbine wheels will lead to improved turbine performance and operating efficiency.

MEMBER SPOTLIGHT – WYOMING INFRASTRUCTURE AUTHORITY



The Wyoming Integrated Test Center (ITC) will be a research test facility located on the site of Basin Electric's Dry Fork Station near Gillette, Wyoming. The ITC will provide a **location for researchers to test Carbon Capture, Utilization and Sequestration (CCUS) technologies** using 20 MW of actual coal based flue gas. It will be one of a handful of such facilities in the world and only the second one in the United States.



FUNDING

The ITC is funded by a \$15 million appropriation from the State of Wyoming, matched with an additional \$5 million from Tri-State Generation and Transmission and \$1 million from the National Rural Electric Cooperatives Association. Basin Electric Power Cooperative is providing the host site at their Dry Fork Station in Gillette, as well as many additional in-kind contributions including engineering and construction management services. The Wyoming Infrastructure Authority is managing the pre-commissioning phase of the project. Along with these entities, the University of Wyoming School of Energy Resources, Rocky Mountain Power and Black Hills Corporation have also assisted in various capacities.

\$15 MILLION from State of Wyoming

\$5 MILLION from Tri-State Generation and Transmission

\$1 MILLION from the National Rural Electric Cooperative Association

FACILITY

Pre-construction engineering and design work started in 2015, and the first phase of construction occurred in March and April 2016 during the Dry Fork Station's regularly scheduled maintenance shutdown. Additional engineering is ongoing with site preparation and second phase construction work to begin later in 2016. The ITC is scheduled to be completed in 2017.

The ITC will not be a typical "bricks and mortar" laboratory facility. It will consist of a network of ductwork delivering specific amounts of flue gas to test bays. The test bays will be simple gravel pads where the modular test apparatuses will be brought in, attached to the flue gas delivery system and run for a specified number of hours to gather data. At the conclusion of the test, they will be removed and new researchers will arrive with their devices to begin new tests. The modular design of the ITC will keep capital costs low and allow for maximum flexibility in test capacities and scale-up capabilities.

TENANTS

The XPRIZE Foundation is one of the first tenants of the ITC. They will utilize approximately 3 MW of flue gas to conduct the final phase of their NRG COSIA Carbon XPRIZE competition between December 2017 and February 2020. The competition will award \$10 million in prizes to the technology that best transforms coal based flue gas into a valuable product. At the conclusion of the competition, the XPRIZE allocation of flue gas and research bays will be available to new research teams.

Simultaneously with the XPRIZE competition, an additional 17 MW of flue gas and testing space will be available to conduct CCUS research. Applications are available and being considered for this large research bay.

\$10 MILLION IN PRIZES for technology that best transforms coal based flue gas into valuable product.

LEARN MORE AT WYOMINGITC.ORG

INTEGRATED TEST CENTER | WYOMING INFRASTRUCTURE AUTHORITY

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The Wyoming Infrastructure Authority works to diversify and expand the state's economy by adding value to Wyoming's infrastructure for the benefit of Wyoming and the region. WIA promotes the value the state's energy resources; supports the necessary infrastructure; enhances resource development and operation; and ensures a credible and objective voice for Wyoming. WIA is the managing entity for the Integrated Test Center. Learn more at www.wyia.org.