CURC CARBON UTILIZATION RESEARCH COUNCIL
ADVANCING FOSSIL ENERGY SOLUTIONS

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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

CURC General Membership Meeting & Capitol Hill Day: March 13-14

On March 13th, CURC held a General Membership meeting to prepare for our annual Capitol Hill Day meetings. We were pleased to be joined by 11 Congressional staffers from the House Ways and Means, Science, Energy & Commerce, and Appropriations Committees and the Senate Finance, Energy and Natural Resources, Environment and Public Works, and Appropriations Committees, who discussed with our membership how each of their Committees are considering fossil energy technology policies this Congress.

On March 14th, CURC members visited Capitol Hill to participate in our annual meetings. Despite the inclement weather, CURC had meetings with 30 Congressional offices.

CURC asked members of Congress to support the development and deployment of fossil energy technologies by:

- Cosponsoring legislation in the House and Senate to expand and increase the Section 45Q Carbon Sequestration Tax Credit
- Preserve robust funding to the DOE Fossil Energy Research and Development Program for Fiscal Years 2017 and 2018
- Fund Large Scale Pilot Plant Efforts in the R&D Program Budget
- Authorize a new Fossil Energy RD&D program that reflects today's technology development needs as reflected in the CURC-EPRI Roadmap
- Enable the development of new fossil energy projects, including carbon capture, in any energy and infrastructure legislative proposals

Special thanks to all CURC members that risked the weather to travel to D.C.!

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UPCOMING EVENTS

CURC General Membership Meeting
June 26-27, 2017
Washington, D.C.

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

CURC-DOE-NETL Workshop: April 3-4

CURC conducted its annual Program Workshop with the National Energy Technology Laboratory (NETL) and the Department of Energy in Pittsburgh, PA. We were delighted to be joined by NETL Director Dr. Grace Bochenek, Deputy Director of Science and Technology Strategic Plans and Programs Dr. Randall Gentry, and Darren Mollot, Director of the Office of Advanced Fossil Energy Technology at the U.S. Department of Energy. Special thanks to our Technical Subcommittee Chair, David Julius of Duke Energy, for chairing the meeting.

Participants at the CURC-NETL-DOE Workshop in Pittsburgh, PA.

In total, there were over 50 participants in the workshop consisting of CURC Technical Subcommittee members, NETL representatives, and DOE leadership to discuss developments in advanced coal and fossil generation technologies and public/private sector efforts to support technology development.

Presentations from the Workshop will be made available in the members only section of our website.

THANK YOU TO OUR 2017 MEETING SPONSORS

TRI-STATE Generation and Transmission Association, Inc. A Touchstone Energy Cooperative · B&W · Southern Company · NRECA America's Electric Cooperatives · BATTELLE · MITSUBISHI HEAVY INDUSTRIES AMERICA, INC.

ONGOING CURC EFFORTS

CURC-EPRI Roadmap Update

CURC's Technical Subcommittee is 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 is expected to be released this summer.

CURC SPEAKING ENGAGEMENTS

2017 Washington Clean Air Summit
May 3, 2017
Washington, D.C.

Coal: Launching a New Era
May 22, 2017
Kingsport, TN

Clearwater Clean Energy Conference
June 12, 2017
Clearwater, Florida

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 to continue with a Phase II Report studying options to finance unilateral and multilateral large-scale CCS pilot projects.

Phase II of this effort will consider successful financing approaches used for emerging electric power technologies in other nations and use this information to assess possible approaches to overcome those barriers. The Phase II Report will be published this Spring.

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 CO_2 used in enhanced oil recovery (EOR).

The study is expected to be released in mid-summer.

FEDERAL ADVOCACY

Funding for Fossil Energy Research and Development

CURC joined a letter to President Trump from several coal companies, labor organizations and ClearPath Action urging the President and his administration to support robust federal investments in fossil energy technology research and deployment. The letter outlines the crucial role that federal support plays in developing and commercializing technology and the significant benefits that could result from fossil energy R&D.

CURC is working with Members in both the House and Senate to encourage the Energy and Water Appropriations Subcommittees to provide robust funding to the DOE's Fossil Energy Research and Development Program for Fiscal Year 2018. Congressmen David McKinley (R-WV) and Mike Doyle (D-PA) submitted a letter to House Energy and Water Appropriations Subcommittee Chairman Mike Simpson (R-ID) and Ranking Member Marcy Kaptur (D-OH) urging them to provide robust funding to the DOE Fossil Energy Research and Development Program. Joining the Congressmen in signing the letter were Representatives Bill Johnson (R-OH), Kevin Cramer (R-ND), Rosa DeLauro (D-CT), Jim Costa (D-CA), Robert Pittenger (R-NC), Glenn Thompson (R-PA) and Steve Stivers (R-OH). A similar effort is underway in the Senate.

Section 45Q Carbon Sequestration Tax Credits

Senate sponsors of legislation to strengthen and expand the Section 45Q Tax Credit for carbon sequestration are seeking introduction of a bill this spring. CURC continues to meet with Senate offices to encourage co-sponsorship of the legislation.

The legislation follows introduction of S. 3179, the Carbon Capture Utilization and Storage Act, last year by Senator Heitkamp. That bill was supported by a uniquely bipartisan group of Senators that we hope will support the new legislation.

Congressman Conaway of Texas is working on companion 45Q legislation that will be introduced in the House, which would follow the introduction of H.R. 4622, the Carbon Capture Act, introduced in the last Congress.

NEWS ROUNDUP

CURC Welcomes New Member NET Power

This January, technology developer NET Power joined CURC's membership.

Using a patented thermodynamic cycle called the Allam Cycle, NET Power is able to generate lower-cost power from fossil fuels than existing power plants while eliminating all air emissions, including carbon dioxide.

Additionally, the CO_2 that NET Power plants generate from burning fuel is produced as a high-pressure, high-quality byproduct, ready for pipeline transportation and storage. In many places, this CO_2 can be sold for use in enhanced oil recovery (EOR), permanently sequestering the CO_2 and providing significant added value for NET Power plant owners.

During a trip to Texas earlier this year, CURC representatives toured the NET Power demonstration plant in La Porte, Texas. NET Power plants have several key features that enable them to inherently eliminate all air emissions. This means no carbon dioxide, particulate matter, mercury, SOX or NOX is released to the atmosphere. A NET Power plant's only major byproducts are liquid water and a high-pressure, high-purity stream of carbon dioxide that is sent into a pipeline for sequestration or utilization in industrial processes.

We are pleased to welcome NET Power to the coalition and appreciate their contribution to our efforts. For more information, please visit their website.

Petra Nova Ribbon Cutting

On April 13, Secretary of Energy Rick Perry participated in a ribbon-cutting ceremony to mark the opening of the Petra Nova Project in Thompsons, TX. Petra Nova is the world's largest post-combustion carbon capture project and was completed on schedule and on-budget. It will capture at least 90% of the CO_2 emitted from its coal-fired generating unit, which will be used for EOR at the West Ranch oil field. More information can be found here.

CURC member Mitsubishi Heavy Industries America supplied the CO_2 capture technology for the project, which uses a high-performance solvent for CO_2 absorption and desorption. Earlier this year, CURC Executive Director Shannon Angielski and CURC members Roxann Laird (Southern Company) and Dan Walsh (NRECA) visited the Petra Nova site, pictured here.

CURC members Roxann Laird (Southern Company) and Dan Walsh (NRECA) at the Petra Nova site in Texas.

CURC Co-Chair Barbara Walz Profiled in Tri-State Leadership Connection

CURC Co-Chair Barbara Walz, Senior Vice President of Policy & Compliance at Tri-State Generation & Transmission Association, was profiled in Tri-State's "Leadership Connection", an internal publication that shares the accomplishments of Tri-State's employees. Included within Barbara's profile is a description of her substantial work with CURC and how our organization's work assists its members, including Tri-State.

Holly Krutka Moves to Peabody Energy

Holly Krutka, formerly of Tri-State, moved to become the Vice President of Coal Generation and Emissions Technologies at Peabody Energy, where she will continue her work on efforts to enhance the existing coal fleet and commercialize high efficiency, low emissions technologies and CCS. CURC offers its congratulations to Holly and we look forward to continuing to work with her on coal technology policy.

CURC Members Receive DOE Funding for CO_2 Utilization Projects

DOE selected seven projects to receive $5.9 million to focus on novel ways to use CO_2 captured from coal-fired power plants in support of FE's Carbon Storage program's Carbon Use and Reuse portfolio. Gas Technology Institute and the University of Kentucky, both CURC members, were selected to receive funding for projects.

Gas Technology Institute received funding for two projects. It will receive $800,000 to develop a Direct E-Beam Synthesis process to produce valuable chemicals, such as acetic acid, methanol, and CO from CO_2 captured from a coal-fired power plant in Illinois and $799,807 to develop a novel catalytic reactor process to convert CO_2 captured from a coal-fired power plant into methane, which will be dry reformed to produce syngas.

The University of Kentucky was awarded $999,833 for a project to develop a process to convert CO_2 from coal-fired flue gas using microalgae-based CO_2 capture, with subsequent conversion of the resulting algal biomass to bioplastics, chemicals, and fuels.

MEMBER SPOTLIGHT – GAS TECHNOLOGY INSTITUTE

In October 2016, the U.S. Department of Energy (DOE) announced that it would award up to $80 million for a six-year project to design, build and operate a 10 MWe sCO_2 pilot plant test facility in San Antonio, TX. CURC member Gas Technology Institute (GTI) serves as the Prime Contractor and System Lead. The facility will be built at the Southwest Research Insitute (SwRI) campus in San Antonio, Texas, and CURC member General Electric (GE) will supply turbomachinery technology.

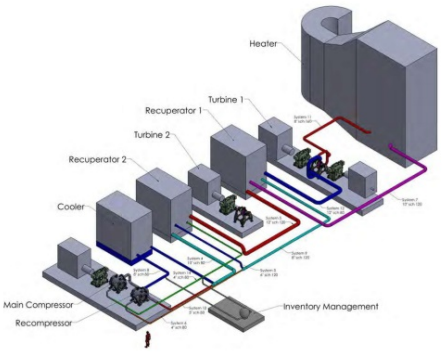
For more information, click here.

10 MWe sCO_2 Brayton Cycle Test Facility

With SwRI and GE, GTI will design, build and operate the facility under DOE's Supercritical Transformational Electric Power (STEP) program.

Key Features

- Highly compact turbomachinery
- Large temperature range
- High thermodynamic efficiencies at >550°C
- Stable, non-toxic working fluid

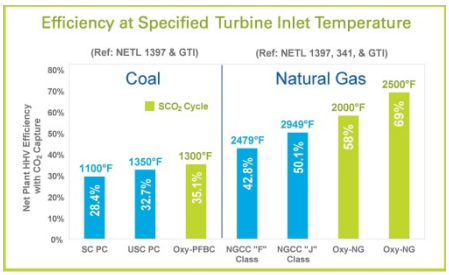


Applications

- Waste heat recovery
- Fossil (coal, natural gas)
- Solar-thermal
- Nuclear

Benefits

- 2-5% plant efficiency increase for same turbine inlet temperature
- 85% reduction in turbomachinery size
- Lowers emissions for fossil plants



gti Prime Contractor and System Lead

SwRI Host Site and Test Operations

GE Turbomachinery Technology