NCC APPROVES REPORT ON CO2 UTILIZATION

Members of the National Coal Council (NCC) approved, on August 30th, 2016, the report “CO2 Building Blocks: Assessing CO2 Utilization Options.” The report has been sent to U.S. Secretary of Energy Ernest J. Moniz and efforts are underway to schedule a briefing with U.S. Department of Energy staff to review report findings and recommendations.

As requested by Secretary Moniz, the NCC report is focused on profit-generating opportunities for CO2 utilization, both for geologic applications, such as enhanced oil recovery (EOR), enhanced water recovery (EWR) and enhanced coalbed methane (ECBM), and for non-geologic applications, such as fuels, fertilizers, building materials, plastics, inorganic/organic and specialty chemicals. The report was chaired by Kipp Coddington, Director of the Carbon Management Institute at the School of Energy Resources at the University of Wyoming.

The report, along with a fact sheet, a news release and the August 30th webcast presentation are available at: http://www.nationalcoalcouncil.org/page-NCC-Studies.html

See pages 6-7 below for a summary of key findings and recommendations.

NCC 2016 FALL MEETING
OCTOBER 4-5 – MILWAUKEE, WI

The NCC’s 2016 Annual Fall Meeting will be hosted October 4-5 in Milwaukee, Wisconsin. The theme for this year’s program is “Value-Added Opportunities for Coal.” Presentations feature projects and technologies that represent future growth markets for coal and coal by-products.

The schedule for the NCC 2016 Fall Annual Meeting:
Oct. 4 – Welcoming Reception – 6-8 pm
Oct. 5 – Full Council Meeting – 8:15 am-12:15 pm
Oct. 5 – Grab’n’Go Box Lunch – 12:15 pm
Oct. 5 – Oak Creek Plant Tour – 12:30-4 pm

REGISTER & SPONSOR TODAY

Visit the NCC website at http://www.nationalcoalcouncil.org/page-NCC-Events.html for hotel, meeting and sponsorship registration information or contact NCC Membership & Meetings Director, Hiranthie Stanford at 202-756-4524 or hstanford@NCC1.org.

See page 4 below for full program details.
IN MEMORIAM
Kelly Mader
It is with great sadness that we mourn the passing of a true gentleman and industry stalwart, Kelly Mader. Kelly served as a public policy advocate at Kennecott Energy and Peabody Energy before establishing the Energy Policy Network to advocate for the coal industry and its families. He served in the Wyoming House of Representatives and the Wyoming Senate. Kelly passed away on June 24, 2016. He will be greatly missed. Kelly Mader Obituary

NCC ASSOCIATES
Chuck McConnell, Rice University & Michael Nasi, Jackson Walker LLP
Intelligence Squared Climate Debate
On September 7th, Intelligence Squared (www.iq2us.org) hosted a debate at George Washington University on the motion: “Climate Change: The EPA Has Gone Overboard.” Arguing for the motion were Chuck McConnell, Executive Director of Rice University’s Energy & Environmental Initiative and Mike Nasi, Partner with Jackson Walker LLP. Arguing against the motion: Carl Pope, former Exec. Director, Sierra Club and Jody Freeman, Founding Director, Harvard Law School Environmental Law & Policy. It was a very spirited and engaging debate. Check out the website to see who won.

Todd Cunningham
Freelance Editing, Writing & Publishing Services
tcunningham03@comcast.net – 703-567-8122
NCC would like to thank Todd Cunningham for his years of service writing the “Coal Currents” section of our newsletter, which was discontinued earlier this year. Todd is well versed in providing coverage of coal/energy and environmental issues and specializes in writing white papers, case studies and special reports. Please contact Todd directly if you are interested in securing his services. Todd Cunningham LinkedIn

NCC NEW OFFICE ADDRESS & FAX
Effective August 15th, the NCC office has relocated to a new executive suite in the same building. Please update your records to reflect new info:
1101 Pennsylvania Ave., NW, Suite 300, Washington, DC 20004
Phone – 202-756-4524, Fax – 202-688-2201

Bob Bibb, Bibb Engineers, Architects & Constructors
Supporting U.S. Forest Service
http://www.bibb-eac.com/
Bob Bibb’s company is engaged in a variety of power, industrial and manufacturing projects that would keep any mere mortal busy enough. Bob is no mere mortal, however, and has many far-reaching interests. He is presently involved in an effort to raise funds for construction of the U.S. Forest Service History Museum to be built in Missoula, MT. For more info, visit www.forestservicemuseum.org or contact Bob at bobbibb@bibb-eac.com.

Keeping our NCC community informed of news from our members.
NCC members are invited to submit news items regarding their companies and organizations to Janet Gellicci at info@NCC1.org.
John Kennedy is a new member of the National Coal Council, appointed to serve in early 2016. John brings to the NCC 35 years of experience in power markets across the U.S. and in the effective utilization of PRB, Illinois Basin and NAPP coals. We value John’s service on the NCC Coal Policy Committee. Thank you for your service, John!

John Kennedy is Vice President and General Manager of Plant Operations for Dynegy’s fleet of coal-fueled power plants in Ohio. He is located in the company’s Cincinnati office, and is an electrical engineer with 35 years of industry experience in all facets of coal-fueled power plant operations and maintenance. John acquired a passion for coal generation while in college, working as a laborer at a central Illinois plant.

In the mid-1990s, John led efforts at a Midwest utility to develop business process changes in the transformation from a public utility business model to a competitive, independent power producer (IPP). Over a period of 10 years, he served in various leadership roles at several plants, facilitating cost reduction and reliability improvements to thrive in a competitive business model.

John served as a Vice President of Coal Operations at Midwest Generation from 2007 to 2011 and then as Executive Vice President of Edison Mission Energy from 2011 to 2014. A key to his success during that time was application of innovative emission control strategies to meet EPA air and water quality standards in a cost-effective manner. Prior to joining Dynegy in 2015, John served as a consultant conducting operational assessments at power plants in North America, the Philippines and South America.

John served on the Electric Power Research Institute’s Generation Advisory Council from 2009 to 2013 gaining valuable experience in current environmental control technologies, efficiency improvements and state-of-the-art repair methods. He was also an active member of Pennsylvania’s Electric Power Generator Association in 2011-12. In addition to his professional experience, he was an active Board Member at the Rauner YMCA, Metro Y of Chicago from 2006 through 2012.

John believes that the competitive power generation and retail business models are best positioned to meet customer’s needs and serve Ohio’s future. Competition drives innovation and incorporates both business and public interests to maintain low cost, reliable and environmentally responsible power generation.

John earned a Bachelor of Science degree from the University of Illinois Champaign-Urbana and is a registered professional engineer.

Dynegy is Responsible, Transparent, and Dynamic generating more than just power for our customers. We are committed to being a leader in the electricity sector. We are currently the second-largest generator of power in Ohio, and are expected to soon be the largest. At the same time, we currently serve 130,000 Ohio industrial, commercial and residential customers. We have approximately 450 dedicated, hard-working employees in Ohio, with a regional office located in downtown Cincinnati.

Throughout the Midwest and Northeast, Dynegy operates power generating facilities capable of producing nearly 26,000 megawatts of electricity — or enough energy to power about 21 million American homes. We’re proud of what we do, but it’s about much more than just output. We’re always striving to generate power safely and responsibly for our wholesale and retail electricity customers who depend on that energy to grow and thrive.

John Kennedy
Dynegy Inc.
312 Walnut Street, Ste 1500
Cincinnati, OH 45230
513-762-8250
john.kennedy2@dynegy.com
www.dynegy.com

JOHN C. KENNEDY, P.E.
VICE PRESIDENT & GENERAL MANAGER
PLANT OPERATIONS
DYNEGY INC.

John Kennedy is a new member of the National Coal Council, appointed to serve in early 2016. John brings to the NCC 35 years of experience in power markets across the U.S. and in the effective utilization of PRB, Illinois Basin and NAPP coals. We value John’s service on the NCC Coal Policy Committee. Thank you for your service, John!

John Kennedy is Vice President and General Manager of Plant Operations for Dynegy’s fleet of coal-fueled power plants in Ohio. He is located in the company’s Cincinnati office, and is an electrical engineer with 35 years of industry experience in all facets of coal-fueled power plant operations and maintenance. John acquired a passion for coal generation while in college, working as a laborer at a central Illinois plant.

In the mid-1990s, John led efforts at a Midwest utility to develop business process changes in the transformation from a public utility business model to a competitive, independent power producer (IPP). Over a period of 10 years, he served in various leadership roles at several plants, facilitating cost reduction and reliability improvements to thrive in a competitive business model.

John served as a Vice President of Coal Operations at Midwest Generation from 2007 to 2011 and then as Executive Vice President of Edison Mission Energy from 2011 to 2014. A key to his success during that time was application of innovative emission control strategies to meet EPA air and water quality standards in a cost-effective manner. Prior to joining Dynegy in 2015, John served as a consultant conducting operational assessments at power plants in North America, the Philippines and South America.

John served on the Electric Power Research Institute’s Generation Advisory Council from 2009 to 2013 gaining valuable experience in current environmental control technologies, efficiency improvements and state-of-the-art repair methods. He was also an active member of Pennsylvania’s Electric Power Generator Association in 2011-12. In addition to his professional experience, he was an active Board Member at the Rauner YMCA, Metro Y of Chicago from 2006 through 2012.

John believes that the competitive power generation and retail business models are best positioned to meet customer’s needs and serve Ohio’s future. Competition drives innovation and incorporates both business and public interests to maintain low cost, reliable and environmentally responsible power generation.

John earned a Bachelor of Science degree from the University of Illinois Champaign-Urbana and is a registered professional engineer.

Dynegy is Responsible, Transparent, and Dynamic generating more than just power for our customers. We are committed to being a leader in the electricity sector. We are currently the second-largest generator of power in Ohio, and are expected to soon be the largest. At the same time, we currently serve 130,000 Ohio industrial, commercial and residential customers. We have approximately 450 dedicated, hard-working employees in Ohio, with a regional office located in downtown Cincinnati.

Throughout the Midwest and Northeast, Dynegy operates power generating facilities capable of producing nearly 26,000 megawatts of electricity — or enough energy to power about 21 million American homes. We’re proud of what we do, but it’s about much more than just output. We’re always striving to generate power safely and responsibly for our wholesale and retail electricity customers who depend on that energy to grow and thrive.

John Kennedy
Dynegy Inc.
312 Walnut Street, Ste 1500
Cincinnati, OH 45230
513-762-8250
john.kennedy2@dynegy.com
www.dynegy.com
The NCC’s 2016 Annual Fall Meeting will be hosted **October 4-5** at the Hilton City Center in downtown Milwaukee, a Historic Hotels of America property built in 1927 in the Art Deco style.

**Hilton Milwaukee City Center**

Opening reception will be hosted on Tuesday, October 4th, 6-8 pm. The Full Council Meeting will be held 8:15 am-12:15 pm on Wednesday, October 5th.

Following the program, we’ll be hosting an optional tour of **We Energies’ Oak Creek Expansion Units 1 & 2**, among the cleanest and most efficient coal-fueled power plants in the U.S. Located on the shores of Lake Michigan, the combined supercritical units have a net generating capacity of 1,230 MW. [https://www.we-energies.com/home/OCXP_FS_C.pdf](https://www.we-energies.com/home/OCXP_FS_C.pdf)

Full Council Meeting Program ~

**KEYNOTE:** Update on Objectives & Activities of DOE’s Innovation CCS Initiative
Robert Ivy, Senior Advisor, Office of Fossil Energy, U.S. Department of Energy

**KEYNOTE:** We Energies’ Coal Units: Update on Air Quality Control Systems & Enhanced Flexibility Initiatives
Tom Metcalfe, Executive Vice President, We Energies & Wisconsin Public Service

Digital Power Plant Management: Enhancing Coal Plant Environmental Compliance
Peter Kirk, Head Digital Coal Solutions, GE Power

Carbon-eliminating Allam Cycle for Coal Power Plants
William Sawyer, Manager Hibbard Renewable Energy Center, Minnesota Power

Beneficial Uses of Coal and Coal Byproducts: Coal Ash & Rare Earth Elements
Danny Gray, Executive Vice President Government & Environmental Affairs, Charah, Inc.

**THANK YOU SPONSORS!**

Thank you to the following companies for their generous sponsorship support:
Soap Creek Energy, Joy Global, We Energies & CH2M

**WANTED: SPONSORS!**

We’re in need of 2-3 additional sponsors willing to contribute $500 to $2,000 to support our opening reception, breaks and tour. Please consider contributing today.

**REGISTER & SPONSOR TODAY**

Visit the NCC website at [http://www.nationalcoalcouncil.org/page-NCC-Events.html](http://www.nationalcoalcouncil.org/page-NCC-Events.html) for hotel, meeting and sponsorship registration information or contact NCC Membership & Meetings Director, Hiranthie Stanford at 202-756-4524 or hstanford@NCC1.org.
NATIONAL COAL ADVISORY COUNCIL

NCC ACTIVITIES & NEWS (continued)

WELCOME NEW NCC MEMBERS

NCC is pleased to welcome the following new members appointed by Secretary Moniz to serve on the Council for the 2016-2017 term. Many of these folks will be attending the NCC 2016 Fall Annual Meeting ~ please plan to join us at that meeting in personally welcoming these new members!

Donna Cerwonka ~ Assistant Vice President Utility Coal, CSX Transportation
Henry Cialone ~ President & CEO, Edison Welding Institute
David Denton ~ Senior Director Business Development/Energy Technology Division
                  RTI International
Danny Gray ~ Executive Vice President – Governmental & Environmental Affairs
                  Charah, Inc.
Denise Johnson ~ Group President of Resources Industries, Caterpillar
Tom Metcalfe ~ Senior Vice President – Power Generation, WEC Energy Group/We Energies

NCC UPCOMING SPEAKING ENGAGEMENTS

NCC’s CEO, Janet Gellici, will be presenting findings and recommendations from recent NCC reports at:
American Coal Council – October 12, 2016 Webcast
Power Plant Management & Generation Summit – October 24, 2016, Houston
Carbon Management Technology Conference – July 2017, Houston

CHAIR’S ADVISORY COUNCIL MEMBERS

CAC members work with NCC leadership to guide the strategic direction of the Council and also serve as members of the NCC Executive Advisory Board, convened at the request of Secretary Moniz to provide him with more impactful, more timely and more responsive advice.

For information on joining the CAC, please contact Janet Gellici jgellici@NCC1.org
PRINCIPAL RECOMMENDATIONS

The most impactful action the U.S. can employ to reduce CO₂ emissions is to incentivize the rapid deployment of carbon capture utilization and storage (CCUS) technologies.

- **Build on the Consensus.** Efforts should be undertaken to build on the expanding consensus among industry, the environmental community and governments that future CO₂ reduction goals cannot be met by renewable energy sources alone. An expanded coalition of fossil fuel users and producers should collaborate to help develop and commercially deploy CCUS technologies on an accelerated time schedule with the aim of achieving global climate objectives and insuring a reliable grid.

- **Prioritize CO₂ Utilization Technology Deployment.** Geological CO₂ utilization options, including but not limited to CO₂ for enhanced oil recovery (CO₂-EOR), have the greatest potential to advance CCUS by creating market demand for anthropogenic CO₂. Monetary, regulatory and policy investments in CO₂ utilization technologies should be roughly prioritized from geologic to non-geologic, with exceptions made if non-geologic technologies are found to be as effective as geologic storage.

- **Pursue Non-Geologic CO₂ Markets as Longer Term Opportunities.** Non-geologic CO₂ utilization options are unlikely to significantly incentivize CCUS in the near- to intermediate-term due to technical, greenhouse gas (GHG) lifecycle considerations and lack of scalability. However, a broadly deployed mix of CO₂ utilization technologies may help to advance CCUS incrementally, providing sufficient incentive to keep CCUS technologies moving forward. Non-geologic technologies that can “fix” CO₂ molecules intact, akin to geologic storage, hold the most promise and are worthy of continuing RD&D, including inorganic carbonates/bicarbonates, plastics/polymers, organic/specialty chemicals and agricultural fertilizers.

- **Pursue Impactful Options to Facilitate Regulatory Compliance.** U.S. and international GHG reduction objectives and timeframes dictate the need to employ CO₂ utilization technologies that can be quickly commercialized at significant scale. U.S. law recognizes CO₂-EOR and other geologic technologies as compliance options; non-geologic technologies may be used only if EPA determines they are as effective as geologic storage. NCC recommends applying a reasonable market potential threshold of 35 MTPY, which is roughly equivalent to the annual CO₂ emissions from about 6 GWe or a dozen 500 MWe coal-based power plants.

- **Establish a Technology Review Process.** There is benefit to establishing a technology review process that is as objective as possible to assess the benefits and challenges of different CO₂ utilization technologies and products. Evaluation criteria fall into three broad categories: 1) environmental considerations, 2) technology/product status and 3) market considerations. Evaluation criteria can be used to prioritize candidates for RD&D and product investment.

PRINCIPAL FINDINGS

The National Coal Council’s “CO₂ Building Blocks” report acknowledges the growing consensus among industry, the environmental community and governments that future CO₂ emission reduction goals cannot be met by renewable energy sources alone and that CCUS technologies for all fossil fuels will have to be deployed in the near term to achieve U.S. and global climate objectives.

* Fossil fuels – including coal, natural gas and oil – will remain the dominant global energy source well into the future by virtue of their abundance, supply security and affordability.

* Advancing CCUS is not just about coal, nor is it just about fossil fuels generally. Rather, it is a sine qua non for achieving stabilization of GHG concentrations.

* CO₂ for enhanced oil recovery (CO₂-EOR) represents the most immediate, highest value opportunity to utilize the greatest volume of anthropogenic CO₂, thereby incentivizing CCUS.

Technically Recoverable Domestic Oil and CO₂ Storage Capacity, State of the Art and “Next Generation” CO₂-EOR Technology

<table>
<thead>
<tr>
<th>Basin/Area</th>
<th>Technically Recoverable Oil (Billion Barrels)</th>
<th>Technical CO₂ Demand/Storage (Million Metric Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOA “Next Generation”</td>
<td>SOA “Next Generation”</td>
</tr>
<tr>
<td>1. Main Pay Zone CO₂-EOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower 48 Onshore</td>
<td>55.6</td>
<td>105.5</td>
</tr>
<tr>
<td>Alaska</td>
<td>5.8</td>
<td>8.8</td>
</tr>
<tr>
<td>Offshore GOM</td>
<td>23.5</td>
<td>52.9</td>
</tr>
<tr>
<td>Sub-Total</td>
<td>84.9</td>
<td>167.2</td>
</tr>
<tr>
<td>2. Residual Oil Zone CO₂-EOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROZ Fairways*</td>
<td>n/a</td>
<td>25.7</td>
</tr>
<tr>
<td>Below Oil Fields</td>
<td>n/a</td>
<td>16.3</td>
</tr>
<tr>
<td>Sub-Total</td>
<td>n/a</td>
<td>42.0</td>
</tr>
<tr>
<td>Total</td>
<td>84.9</td>
<td>209.2</td>
</tr>
</tbody>
</table>

* Aside from CO₂-EOR and other geologic CO₂ utilization options – including CO₂ in natural gas shale formations, enhanced coal bed methane (ECBM), enhanced water recovery (EWR) and geothermal energy storage – research is underway on two general utilization pathways. The first breaks down the CO₂ molecule by cleaving C=O bonds while the second incorporates the entire CO₂ molecule into other chemical structures. The latter holds relatively more promise as it requires less energy and tends to “fix” the CO₂ in a manner akin to geologic storage.

*Utilizing CO₂ in non-geologic applications faces hurdles, including yet-to-be resolved issues associated with thermodynamics and kinetics involved in the successful reduction of CO₂ to carbon products. Still these technologies are worthy of continuing evaluation and many hold long-term potential in specific applications.

* An objective technology review process that assesses the challenges and benefits of different CO₂ utilization technologies and products could be used to prioritize candidates for RD&D and product investment.

* Current U.S. policy favors geologic-based utilization pathways for Clean Air Act compliance. U.S. law recognizes CO₂-EOR and other geologic storage technologies as compliance options; non-geologic technologies may be used only if EPA determines they are as effective as geologic storage.

Thank you Report Chair, Kipp Coddington and Chapter Leads: Janet Gellici, Robert Hilton and Sarah Wade.
DOE FOSSIL ENERGY FUNDING NEWS

$28 Million for 14 R&D Projects to Advance Cleaner Fossil-Fuel Based Power Generation

On August 24th, DOE announced the selection of 14 R&D projects to advance energy systems that will enable cost-competitive, fossil fuel-based power generation with near-zero emissions. The project will accelerate the scale-up of coal-based advanced combustion power systems, advance coal gasification processes, and improve the cost, reliability and endurance of solid oxide fuel cells.

Award recipients include NCC member companies Babcock & Wilcox, Research Triangle Institute, LP Amina, General Electric and West Virginia University, as well as Southwest Research Institute (see below) and others. http://energy.gov/fe/articles/energy-department-invests-28-million-advance-cleaner-fossil-fuel-based-power-generation

NETL Announces $6.7 Million in CO2 Utilization Research Funding

On August 11th, DOE’s National Energy Technology Lab announced a $6.7 million funding opportunity for carbon utilization research projects to develop technologies that utilize CO2 from coal-based power plants as a reactant to produce useful products without generating additional CO2 or greenhouse gas (GHG) emissions validated via a product life cycle analysis (LCA).

Up to 8 projects are being sought in the areas of biological-based concepts, mineralization concepts and novel physical and chemical processes.

http://www.exchangemonitor.com/publication/ghg-daily-monitor/netl-announces-6-7-million-available-carbon-utilization-research-funding/

See NCC’s recent report on CO2 utilization for an assessment of geologic and non-geologic CO2 utilization options: http://www.nationalcoalcouncil.org/page-NCC-Studies.html

WHO KNEW?*

Southwest Research Institute (SwRI) is an independent, nonprofit applied R&D (research and development) organization headquartered in San Antonio, Texas. The staff of more than 2,700 specializes in the creation and transfer of technology in engineering and the physical sciences. SwRI’s technical divisions offer a wide range of technical expertise and services in such areas as engine design and development, emissions certification testing, fuels and lubricants evaluation, chemistry, space science, nondestructive evaluation, automation, mechanical engineering, electronics, and more. http://www.swri.org/swri.htm

The Institute is a self-described “Disneyland for scientists and engineers.”

Southwest Research Institute (SwRI) is leading a team to help formulate a plan for an oxy-combustion pilot plant under a $3.3 million project from DOE’s National Energy Technology Laboratory (NETL).

“Oxyfuel combustion has the potential to provide carbon emissions-free, high efficiency electricity in next-generation advanced power plants,” said Danny Deffenbaugh, Vice President of SwRI’s Mechanical Engineering Division. “SwRI continues to develop key technology components to make this clean and inexpensive power possible.”

The objective of the project is to provide a detailed design, specifications, cost and construction schedule for a 10 MW scale combustion pilot plant, to be built under a separate DOE project, that will validate the performance of flameless pressurized oxy-combustion technology for a broad range of coals and provide an understanding of what is needed to build a commercial-scale unit.

Flameless pressurized oxy-combustion technology reduces the cost of coal-based power plants by 20%, compared to a standard coal plant. The pilot plant will prove that the high-firing temperature and pressure of a flameless combustor will allow the use of a wide range of high-to-low rank coals and lignite, while still meeting emission requirements. The project is expected to be underway in October 2016. For more information, contact Deborah S. Deffenbaugh, (210) 522-2046.

*A regularly featured column on industry, university and government initiatives in support of clean coal technology development & commercialization.