MAY 2021

CARBON CAPTURE NEWSLETTER

U.S. DEPARTMENT OF ENERGY | OFFICE OF FOSSIL ENERGY | NATIONAL ENERGY TECHNOLOGY LABORATORY

HIGHLIGHTS

The newsletter is compiled by the National Energy Technology Laboratory to provide information on recent activities and publications related to carbon capture.

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U.S. DEPARTMENT OF ENERGY | NETL NATIONAL ENERGY TECHNOLOGY LABORATORY

NETL Director Shares Pathways to Decarbonization During CMU's Energy Week

NETL Director Brian Anderson, Ph.D., highlighted NETL's carbon capture technology development and its vital role in decarbonizing the energy sector during Carnegie Mellon University's (CMU) Energy Week, which was held virtually March 22–26, 2021. View the recording here. NETL manages a broad portfolio of carbon capture projects, including post- and pre-combustion capture to reduce carbon emissions in a wide spectrum of industries, from fossil-fueled power generation to manufacturing and heavy industry, as well as negative emissions technologies, such as direct capture of carbon dioxide (CO_2) from the atmosphere and bioenergy with carbon capture. In addition to NETL's investment in identifying and maturing innovative carbon capture technologies, the lab also developed advanced modeling and simulation capabilities—such as the Carbon Capture Simulation Initiative (CCSI) and Carbon Capture Simulation for Industry Impact ($CCSI^2$)—that help accelerate development and scale-up these technologies. Platforms such as the Institute for the Design of Advanced Energy Systems (IDAES) will also support the design of integrated energy systems, which will synergistically incorporate diverse energy sources—including renewable, nuclear, and fossil with carbon capture—to more effectively provide environmentally sustainable, cost-effective, and reliable power, heat, mobility, and a variety of other products and services.

Interagency News and Updates

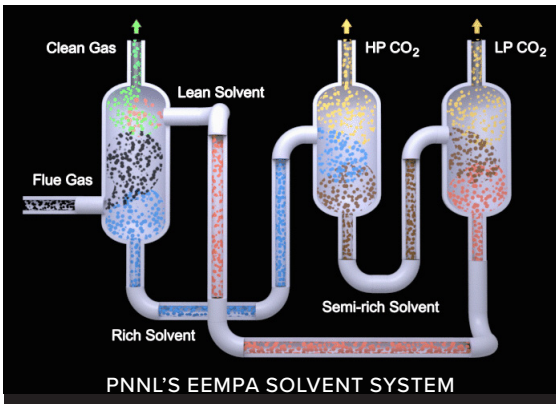
Carbon Capture S&T Accomplishments Available

The U.S. Department of Energy (DOE) National Energy Technology Laboratory's (NETL) Science and Technology (S&T) Accomplishments Posters highlight exceptional research and development (R&D) achievements from the previous year, showcasing NETL's progress toward promoting safe, reliable, and affordable energy nationwide while protecting the environment for future generations. The featured accomplishments of the Carbon Capture Program present advancements in the R&D of carbon capture technologies. Posters for 2018–2020 are available here.

Materials and Chemical Sciences Research for Direct Air Capture of Carbon Dioxide

DOE's Office of Science (SC) Program in Basic Energy Sciences (BES) announced its interest in receiving applications from single investigators and teams for support of experimental and theoretical efforts to advance fundamental understanding of the capture of CO_2 from dilute sources, including combined capture and chemical conversion of CO_2. Although direct air capture (DAC) of CO_2 generally refers to the capture of CO_2 from ambient air, this Funding Opportunity Announcement (FOA) also considers the removal of CO_2 from partially concentrated air and natural fluids that received their CO_2 directly from ambient air. Enhanced understanding of scientific phenomena and approaches for DAC would accelerate progress and strengthen the foundation for applications that deliver economic benefit and/or energy security.

PNNL-Developed Solvent Breaks Barriers, Captures Carbon for Less Than Industrial Counterparts



In a study published in the March 2021 edition of International Journal of Greenhouse Gas Control, researchers from DOE's Pacific Northwest National Laboratory (PNNL)—along with collaborators from Fluor Corporation and the Electric Power Research Institute—describe properties of the solvent, known as EEMPA, that allow it to sidestep the energetically expensive demands incurred by traditional solvents. The method reduces costs by 19% compared to current commercial technology. The new technology, which requires 17% less energy to accomplish the same task as its commercial counterparts, surpassing barriers that have kept other forms of carbon capture from widespread industrial use, can be easily applied in existing capture systems.

ORNL Researchers Redesigning Building Equipment for Carbon Capture and Beyond

A mechanical engineer who leads the newly formed Multifunctional Equipment Integration Group at Oak Ridge National Laboratory (ORNL) is designing a carbon capture platform for incorporation into existing rooftop heating and air conditioning units on commercial and residential buildings. Focused on DAC, the research represents a shift in how the scientific community has traditionally thought about ways to manage CO_2 emissions, whose climbing levels have the potential to upset the delicate balance of ecosystems, contributing to extreme weather patterns and crop loss.

Interagency News and Updates (continued)

Scientists, Industry Experts Agree California's Carbon Capture and Storage Can Be a Reality

During a forum, titled "Carbon Capture and Sequestration in California: Regional Insights and Community Attitudes," a group of scientists, California policymakers, and industry leaders came together to discuss the reality of getting to net-zero emissions in the state. Speakers highlighted the progress made one year after the "Getting to Neutral" report was released, as well as results from a report released in early March 2021, titled "Permitting Carbon Capture & Storage Projects in California." The new report outlines updates to regulatory frameworks that push carbon capture technologies forward while safeguarding the environment, public health, and safety during these activities.

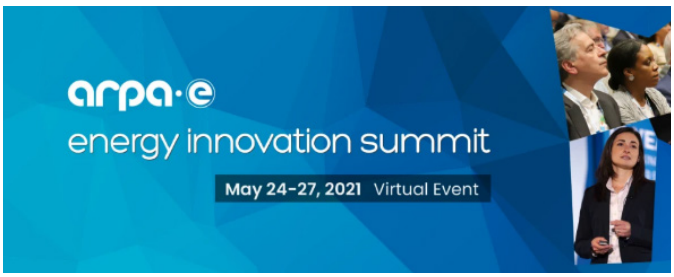
U.S. and International Events

University of Michigan's Global CO_2 Initiative (GCI) May Webinar Series

University of Michigan's Global CO_2 Initiative (GCI) is holding a webinar series with several dates in May 2021. Featured speakers will discuss carbon capture utilization and storage life cycle assessments and techno-economic assessments.

2021 ARPA-E Energy Innovation Summit

The Advanced Research Projects Agency—Energy (ARPA-E) Energy Innovation Summit, to be held (virtually) May 24–27, 2021, is an annual conference and technology showcase focused on finding new and innovative ways to address America's energy challenges. The summit brings together experts from different technical disciplines and professional communities.



IEA Clean Coal Centre's 10th International Conference on Clean Coal

The International Energy Agency (IEA) Clean Coal Centre's 10th International Conference on Clean Coal Technologies will take place June 1–4, 2022, in Pittsburgh, Pennsylvania. The four-day event will bring together stakeholders representing industry, academia, and government for talks, panel discussions, site visits, and knowledge sharing. Delegates obtain insight into new technologies that can meaningfully reduce the environmental impact of coal, as well as hear expert perspectives on regional energy policy developments and the outlook for the coal sector worldwide.

U.S. and International Events (continued)

Trondheim CCS Conference

The bi-annual Trondheim Carbon Capture and Storage (CCS) Conference (TCCS) is a global scientific CCS technology conference that typically features 150 oral presentations, five or six parallel sessions, more than 100 posters, and keynote speakers. The 11th conference, TCCS-11, will be held June 22–23, 2021 virtually. The objective of TCCS-11 is to bring forward, present, and discuss work undertaken within R&D institutions, universities, and industry.

International Pittsburgh Coal Conference

The 2021 International Pittsburgh Coal Conference (PCC), sponsored by the University of Pittsburgh, Swanson School of Engineering, will be held virtually Sept. 20–23, 2021. The annual event is focused on all aspects of coal, energy, and the environment. It aims at fulfilling the ultimate goal of efficient and effective use of coal while protecting the environment. The PCC provides a unique opportunity for in-depth and focused exchange of technical information and policy issues among representatives from industry, government, and academia throughout the world.

IEAGHG 6th Post-Combustion Capture Conference

The International Energy Agency Greenhouse Gas R&D Programme's (IEAGHG) 6th Annual Post-Combustion Capture Conference will be held virtually on Oct. 19–21, 2021. The event will gather post-combustion capture experts to share their knowledge, findings, and expertise.

Carbon Capture Technology Conference and Expo

The Carbon Capture Technology Conference and Expo is a two-day event to be held Oct. 20–21, 2021, in Stuttgart Messe, Germany. Experts from around the world will discuss the latest advances in new technology for carbon capture, storage, and transport, as well as unique ways of utilizing CO_2 to produce net-zero fuels and for other manufacturing processes.

Gordon Research Conference: Permanently Removing CO_2 from Our Emissions and Atmosphere

The fourth installation of the Carbon Capture, Utilization, and Storage (CCUS) Gordon Research Conference series, to be held Oct. 24–29, 2021, in Waterville Valley, New Hampshire, will examine the following questions: (1) *Can the United States decarbonize safely and with a variety of approaches appropriate for the variety of power and industrial challenges?* and (2) *Can the United States develop methods to clean up the atmosphere in time to keep within reasonable temperature limits?*

Business and Industry News

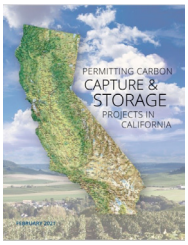
Baker Hughes Acquires Exclusive License for MSP Technology

Baker Hughes entered into a global exclusive licensing agreement with SRI International to use SRI's innovative mixed-salt process (MSP) for CO_2 capture, the company announced. SRI has received support from DOE's Office of Fossil Energy (FE) and NETL in developing its MSP technology. The agreement with SRI further expands and complements Baker Hughes' CCUS for various applications. The MSP combines readily available potassium and ammonia salt solutions to enable reduced reboiler and auxiliary electric loads, emissions, and water usage. In addition, the MSP requires a smaller footprint than competing CCUS solutions.

Publications

Techno-economic comparison of various process configurations for post-combustion carbon capture using a single-component water-lean solvent

YUAN JIANG, PAUL M. MATHIAS, CHARLES J. FREEMAN, JOSEPH A. SWISHER, RICHARD F. ZHENG, GREG A. WHYATT, DAVID J. HELDEBRANT, INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL, VOLUME 106, 103279 MARCH 2021. (SUBSCRIPTION MAY BE REQUIRED.)



Permitting Carbon Capture & Storage Projects in California

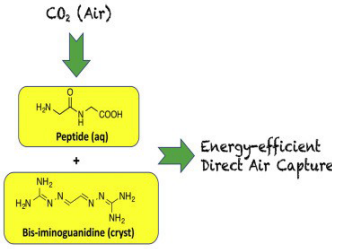
GEORGE PERIDAS, LAWRENCE LIVERMORE NATIONAL LABORATORY, LLNL-TR-817425, FEB. 2021.

Gigatonne One: A CCS roadmap for the United States and beyond

RICHARD MIDDLETON, JEFFREY BIELICKI, KEVIN ELLETT, BRENDAN HOOVER, RYAN KAMMER, SEAN YAW, 15TH INTERNATIONAL CONFERENCE ON GREENHOUSE GAS CONTROL TECHNOLOGIES GHGT-15, MARCH 24, 2021.

Direct air capture of CO_2 with aqueous peptides and crystalline guanidines

RADU CUSTELCEAN, KATHLEEN A. GARRABRANT, PIERRICK AGULLO, NEIL J. WILLIAMS, CELL REPORTS PHYSICAL SCIENCE, IN PRESS, MARCH 30, 2021. (SUBSCRIPTION MAY BE REQUIRED.) *Image to right: Graphical abstract for "Direct air capture of CO_2 with aqueous peptides and crystalline guanidines"*



Advanced absorber heat integration via heat exchange packings

THOMAS MOORE, DU NGUYEN, JAISREE IYER, PRATANU ROY, JOSHUAH K. STOLAROFF, SEPARATIONS: MATERIALS, DEVICES AND PROCESSES, FEB. 15, 2021. (SUBSCRIPTION MAY BE REQUIRED.)

Surprising olefin/paraffin separation performance recovery of highly aged carbon molecular sieve hollow fiber membranes by a super-hyperaging treatment

WULIN QIU, LIREN XU, ZHONGYUN LIU, YANG LIU, PEZHMAN ARAB, MARK BRAYDEN, MARCOS MARTINEZ, JUNQIANG LIU, ABHISHEK ROY, WILLIAM J. KOROS, JOURNAL OF MEMBRANE SCIENCE, VOLUME 620, ISSUE C, FEB. 1, 2021. (SUBSCRIPTION MAY BE REQUIRED.)

About DOE's Carbon Capture Program

NETL's Carbon Capture Program is developing the next generation of advanced carbon dioxide (CO_2) capture technologies. The U.S. Department of Energy's (DOE) Fossil Energy Program has adopted a comprehensive multi-pronged approach for the research and development of advanced CO_2 capture technologies that have the potential to provide step-change reductions in both cost and energy requirements as compared to currently available technologies.

The Compendium of Carbon Capture Technology provides a technical summary of the DOE/NETL's Carbon Capture Program, assembling carbon dioxide capture technology research and development (R&D) descriptions in a single document.

Carbon Capture Reference Materials

- Carbon Capture Program Factsheet
- Carbon Capture Infographics
- Compendium of Carbon Capture Technology
- Carbon Dioxide Capture Handbook
- CCSI^2
- Systems Analysis
- Conference Proceedings
- Accomplishments Posters
- Fossil Energy Techlines

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Program staff are also located in **Houston, Texas** and **Anchorage, Alaska**

CUSTOMER SERVICE: 1-800-553-7681

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