APRIL 2021

GARBON 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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Direct Air Capture Virtual Kickoff Meeting

The Direct Air Capture (DAC) Kickoff Meeting, hosted by the United States (U.S.) Department of Energy's (DOE) National Energy Technology Laboratory (NETL), was held virtually on February 24-25, 2021. The meeting consisted of 47 presentations from researchers and scientists at NETL and other national laboratories, universities, organizations, research institutes, and DOE program directors on the topics of DAC and direct ocean capture (DOC). The wide range of topics presented over the course of the two-day meeting encouraged and facilitated discussions among the presenters and attendees about DAC and DOC technology areas and serves to foster collaboration between various organizations, national laboratories, and DOE offices and agencies. This open forum provided participants an opportunity to explore new ideas and presented an opportunity to inform the future direction of the NETL research and development (R&D) portfolio, including the development of reference life cycle analysis and techno-economic analysis methods for DAC. FEBRUARY 2021

Interagency News and Updates

DOE Invests to Advance Transformational Air Pollution Capture

DOE announced funding for research into DAC technology, which captures carbon emissions directly from the air, replicating the way plants and trees absorb carbon dioxide (CO₂). DAC has the potential to create jobs, advance America's efforts to combat climate change, and achieve President Biden's goal of net-zero emissions by 2050. DOE supports the search for carbon removal solutions at both the basic and applied science levels. This funding announcement made through DOE's Office of Science complements recent applied research efforts in DAC funded by DOE's Office of Energy Efficiency and Renewable Energy and the Office of Fossil Energy (FE). MARCH 2021

NETL Director to Brief State Lawmakers on Efforts to Reduce Carbon Emissions

During an address to the Pennsylvania Senate Environmental Resources and Energy Committee on Wednesday, March 10, 2021, NETL Director Brian Anderson, Ph.D., highlighted NETL-supported projects to reduce emissions of CO_2 , technologies to capture and store it, and processes to make value-added products from the carbon waste stream. During the proceedings, Anderson, officials from the Pennsylvania Department of Conservation and Natural Resources, representatives from the energy industry, and others presented updates on the deployment of CO_2 management and mitigation technologies. NETL manages a broad portfolio of carbon capture projects, including post-combustion 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 DAC and bioenergy with carbon capture and storage (BECCS). MARCH 2021

NETL Representatives Attend CERAWeek 2021 to Gain Latest on Net-Zero Emissions Efforts

NETL researchers attended the annual energy conference, CERAWeek, March 1–5, 2021. The event, organized by the IHS Markit, focused on the theme of "The New Map: Energy, Climate and Charting the Future." Representatives from companies and organizations around the world gathered virtually to learn how the global energy ecosystem is currently



influenced by forces such as new technologies, changing energy consumption patterns, and the increased interest in reducing greenhouse gas (GHG) emissions and reversal of global warming. MARCH 2021

White House Forms Climate Innovation Working Group

President Biden created a new Climate Innovation Working Group to assist federal efforts to advance affordable, innovative technologies that can help achieve the goal of net-zero, economy-wide emissions by 2050. The Climate Innovation Working Group will emphasize research to foster clean energy supply chains in the United States and strengthen American manufacturing focusing on programs at land-grant universities, Historically Black Colleges and Universities, and other minority-serving institutions. **FEBRUARY 2021**

Interagency News and Updates (continued)

DOE Workshop on Modeling Carbon Capture Technology in the Industrial Sector

DOE focused on modeling carbon capture in the industrial sector during a virtual workshop on February 17–18, 2021. Through the event, DOE was able to gain insight into how the organization can facilitate progress in this area and help the country reduce its GHG emissions. Workshop discussions covered challenges to capturing industrial CO₂, gaps for industrial carbon capture utilization and storage (CCUS) modeling, and needed improvement in CCUS in the industry sector. **FEBRUARY 2021**

A Sponge to Soak Up Carbon Dioxide in the Air

Berkley Laboratory scientist Jeffrey Long discusses his work with a promising technology under development for negative emissions technologies using a material called metal-organic framework (MOF) as a sorbent for capturing CO_2 . The extremely high internal surface areas of MOFs allow small amounts, if designed properly, to remove an enormous amount of CO_2 from the atmosphere. FEBRUARY 2021

DOE Announces Funding Opportunity for Transformative Clean Energy Solutions

DOE announced funding for transformative clean energy technology R&D via its Advanced Research Projects Agency-Energy (ARPA-E) OPEN 2021 funding opportunity (DE-FOA-0002459). Concept papers are due April 6, 2021. Please see Section D. TECHNICAL CATEGORIES OF INTEREST (specifically Category 4: POWER GENERATION AND ENERGY PRODUCTION: FOSSIL/NUCLEAR, subcategory F: Carbon Capture, Technologies for carbon capture, use, and



storage, excluding biological/agricultural carbon management). More information is available on the Open 2021 website. FEBRUARY 2021

DOE Announces Funding Opportunity for Direct Air Capture Research

DOE Office of Science Basic Energy Sciences will award funding for research into carbon capture emissions technologies. Required preapplications to funding opportunity announcement on Materials and Chemical Sciences Research for Direct Air Capture of Carbon Dioxide (DE-FOA-0002481) are due March 30, 2021. The awards will focus on Novel Energy Transfer Mechanisms for Regeneration of and Mass Transport in Direct Air Capture Systems; Understanding Temporal Changes That Occur during Separations; and Science-Driven Synthesis and Assembly of Innovative Materials for Direct Air Capture. MARCH 2021



U.S. and International Events

Appalachian Hydrogen & Carbon Capture Conference

The Appalachian Hydrogen & Carbon Capture Conference, to be held April 8, 2021, in Pittsburgh, PA, will explore challenges in hydrogen and carbon capture in the Appalachian region. Lynn Brickett, Carbon Capture Program Manager, DOE, and Bob Schrecengost, Senior Program Manager in the Advanced Energy and Hydrogen Systems division of DOE-FE, are scheduled panelists.

2021 ARPA-E Energy Innovation Summit

The 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. Register here.



Gordon Research Conference: Permanently Removing CO₂ from Our Emissions and Atmosphere

The fourth installation of the CCUS Gordon Research Conference series, to be held May 30–June 4, 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?

Trondheim CCS Conference

Trondheim Carbon Capture and Storage (CCS) Conference (TCCS) is a global scientific CCS technology conference. The conference 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 virtually on June 22–23, 2021. The objective of TCCS-11 is to bring forward, present, and discuss work undertaken within R&D institutions, universities, and industry.

U.S. and International Events (continued)

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 in the United Kingdom October 19–21, 2021. The event will gather post-combustion capture experts to share their knowledge, findings, and expertise.

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

The IEA Clean Coal Centre's 10th International Conference on clean coal technologies will take place June 1–4, 2022, in Pittsburgh, PA. The event will bring together stakeholders representing industry, academia, and government for four days of 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 hearing expert perspectives on regional energy policy developments and the outlook for the coal sector worldwide.



CLEAN COAL TECHNOLOGIES 2021 CONFERENCE 1-4 JUNE, PITTSBURGH

Business and Industry News

Climate Targets Unattainable Without 'New Dawn' for Carbon Capture Says IEA

During the online release of a new report, CCUS in Clean Energy Transitions, Fatih Birol, Executive Director of IEA stressed the importance of CCUS to meet international climate goals. The report includes a detailed analysis of CCUS development and deployment in the U.S., China, and Europe. SEPTEMBER 2020



CEMEX in Carbon Capture Collaboration

DOE awarded CEMEX's U.S. funding to research, engineer, and develop a pilot for a breakthrough carbon-capture unit. The project will be anchored to CEMEX's Victorville, CA, cement plant and will research cost-competitive solutions to eliminate current plant carbon emissions. **FEBRUARY 2021**



Publications

Towards improved cost evaluation of Carbon Capture and Storage from industry

SIMON ROUSSANALY, NIELS BERGHOUT, TIM FOUT, MONICA GARCIA, STEFANIA GARDARSDOTTIR, SHAREQ MOHD NAZIR, ANDREA RAMIREZ, EDWARD S. RUBIN, INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL, VOLUME 106, 103263, MARCH 2021. (SUBSCRIPTION MAY BE REQUIRED FOR ACCESS.)

Computational modelling of adsorption and diffusion properties of CO₂ and CH₄ in ZIF-8 for gas separation applications: a density functional theory approach

HARI P. PAUDEL, WEI SHI, DAVID HOPKINSON, JANICE A. STECKEL, YUHUA DUAN, REACTION CHEMISTRY & ENGINEERING, 2021. (SUBSCRIPTION MAY BE REQUIRED FOR ACCESS.)

Carbon-Neutral Pathways for the United States

JAMES H. WILLIAMS, RYAN A. JONES, BEN HALEY, GABE KWOK, JEREMY HARGREAVES, JAMIL FARBES, MARGARET S. TORN, AGU ADVANCES, JANUARY 14, 2021.



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 FOR ACCESS.)

Technology Brief: Carbon Capture, Use and Storage (CCUS)

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE, MARCH 5, 2021.







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
- CCSI²
- Systems Analysis
- Conference Proceedings
- Accomplishments Posters
- Fossil Energy Techlines

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

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www.netl.doe.gov

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