

CARBON CAPTURE NEWSLETTER

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



National Carbon Capture Center (NCCC)

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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NETL Renews Partnership with Southern Company to Operate National Carbon Capture Center

The U.S. Department of Energy (DOE) Office of Fossil Energy (FE) and the National Energy Technology Laboratory (NETL) have renewed an agreement with Southern Company to operate the [National Carbon Capture Center \(NCCC\)](#), setting the stage for expansion at the DOE-sponsored facility into new areas of research to reduce greenhouse gas emissions from fossil fuel-based power plants, and to advance carbon dioxide (CO₂) utilization and direct air capture (DAC) solutions. Under the agreement, which is valued at \$140 million (effective October 1, 2020), Southern Company will continue to manage and operate the research center for an additional five years. NCCC's work on utilization technologies will help advance applications where CO₂ emissions are captured and used to manufacture value-added products such as building materials, fuels, plastics and chemicals—partially offsetting CO₂ capture costs from power generation and providing alternatives to traditional manufacturing processes.



U.S. DEPARTMENT OF
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Interagency News and Updates

Carbon Capture Technologies Successfully Reviewed at DOE-NETL 2020 Virtual Integrated Project Review Meeting

The DOE-NETL 2020 Virtual Integrated Project Review Meeting carbon capture sessions were held Monday–Wednesday, October 5–7, 2020, featuring leading experts in the field of developing cost-effective carbon capture technologies for the fossil energy power-generation sector. Subject matter experts from DOE, national labs (including NETL), academia, and industry participated. NETL implements a robust carbon capture R&D program to develop the next generation of advanced CO₂ capture technologies. The [proceedings](#) of the 2020 Virtual Integrated Project Review Meeting are available on the NETL website, including the carbon capture sessions.

U.S. Department of Energy Issues a Request for Information for Enhanced Weathering Research Opportunities

DOE-FE, in collaboration with the Office of Energy Efficiency and Renewable Energy, the Office of Science and NETL announced a request for information (RFI) about “enhanced weathering” research opportunities that could lead to advances in the capture and storage of CO₂. In this RFI, DOE seeks input from stakeholders on what research is needed to support enhanced weathering as a viable negative emissions technology for CO₂ removal from the atmosphere. Responses to this RFI must be submitted no later than 8 p.m. (ET) on November 6, 2020.

A Steam-Stable MOF for High-Capacity Carbon Capture

Researchers from University of California, Berkeley; [Lawrence Berkeley National Laboratory](#); and ExxonMobil Corp. validated the efficacy of the new tetra-amine-functionalized magnesium-based metal-organic frameworks (MOFs) in removing CO₂ emissions—reporting a six-fold increase in effectiveness over conventional amine-based carbon capture methods. *CHEMICAL ENGINEERING*, SEPTEMBER 2020

ARPA-E Energy Briefs: Direct Air and Ocean Capture of CO₂

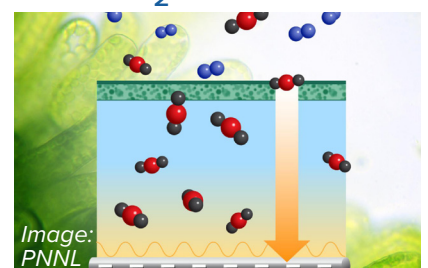
In this video posted by [Advanced Research Projects Agency–Energy \(ARPA-E\)](#), ARPA-E Fellows discuss their work on capturing CO₂ directly from ambient air and ocean water. DAC and direct ocean capture (DOC) of CO₂ are areas of interest for research and development (R&D) of new energy technologies. AUGUST 2020

ORNL Study Analyzes Potential of BECCS

Analysis conducted by [Oak Ridge National Laboratory \(ORNL\)](#) and [published in the journal *Land*](#) confirmed that the BECCS approach can store from 200 million metric tons of CO₂ per year in the near term to more than 700 million metric tons per year by 2040. According to the study, the cumulative potential of CO₂ storage in the United States, while using BECCS technology, would be 46 billion metric tons by the year 2100. This represents 4 to 30% of global CO₂ storage that could be needed by BECCS by 2100 as outlined in various scenarios by the Intergovernmental Panel on Climate Change (IPCC) 2018 report. *ORNL NEWS*, SEPTEMBER 2020

PNNL Researchers Studying New Method to Capture CO₂ from Air

Pacific Northwest National Laboratory (PNNL) researchers, in collaboration with the Massachusetts Institute of Technology and the University of Alabama, will study a three-component system that mimics key functions of microbes that absorb and utilize CO₂. The research utilizes a selective membrane and specialized liquid to transport CO₂ to an electrode surface for storage or conversion into ions. The three-year project is funded by DOE’s Office of Sciences, Basic Energy Sciences Program. *PNNL NEWS*, SEPTEMBER 2020



Upcoming U.S. and International Conferences

2020 Virtual AIChE Annual Meeting

The American Institute of Chemical Engineers (AIChE) will hold its 2020 Annual Meeting virtually, November 16-20, 2020. The program will include technical sessions, lectures, and virtual networking opportunities covering a wide range of topics, including carbon capture, utilization, and storage (CCUS).

International Conference on CO₂, Energy, Climate and Society

The International Conference on Carbon Dioxide, Energy, Climate and Society (ICCDECS 2020), to be held virtually November 5-6, 2020, aims to bring together academic scientists, researchers, and research scholars to exchange and share their experiences and research results on CO₂, energy, climate, and society. It also provides an interdisciplinary platform to present and discuss recent innovations, trends, and concerns, as well as practical challenges encountered and solutions adopted, in these fields.

SPE Virtual Symposium: CCUS and Contaminants Management

This Society of Petroleum Engineers (SPE) virtual symposium, to be held December 7-9, 2020, will focus on providing technical solutions that are critical to effectively develop assets with high contaminants and provide new ideas to meet the goals for the region.

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Business and Industry News

Climeworks Hosted Direct Air Capture Summit 2020

On September 8, 2020, Climeworks hosted the Direct Air Capture Summit 2020, a conference discussing CO₂ removal solutions and their potential to stop or even reverse climate change. Experts from various backgrounds served as keynote speakers, providing insights on climate science and policy, different carbon capture solutions, and CO₂ storage.

The Energy Cast Podcast Episode 92 Discusses CCUS Research

This episode of the Energy Cast podcast includes a discussion with NCCC Director John Northington on the benefits that a strong support staff at a functioning power plant can provide for carbon capture, utilization, and storage (CCUS) research. *ENERGY CAST, AUGUST 2020*

DOE/NETL Awards Grant to CAER to Develop Next-Generation CO₂ Capture Technology

DOE's National Energy Technology Laboratory (NETL) awarded a grant to the University of Kentucky Center for Applied Energy Research (CAER) to develop an ammonia (NH₃)-based looping integrated CO₂ capture and utilization technology that will reduce capital and operating costs by 50%. In traditional CO₂ capture systems, the flue gas from the power plant is pretreated for cooling/sulfur dioxide (SO₂) removal, extracted steam is required for solvent regeneration, and the CO₂ must be compressed for downstream utilization or storage. The CAER-proposed system will eliminate those steps. *UNIVERSITY OF KENTUCKY NEWS, OCTOBER 2020*

Proposal Could Extend Carbon Capture Project Operations

In a report prepared for DOE, officials propose an overhaul of the San Juan Generating Station, retrofitting the power plant to keep it in operation for at least another 10 years. The San Juan Generating Station is set to close in 2022. The retrofitted plant will be designed to remove 90% of CO₂ emissions, a portion of which will be used in a research project for injection into the ground. *AP, OCTOBER 2020*

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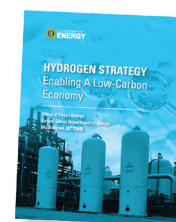
Publications

Modular CO₂ Capture Processes for Integration with Modular Scale Gasification Technologies: Literature Review and Gap Analysis for Future R&D

This DOE/NETL literature review and gap analysis provides a review of the technology options available for integrating modular-scale carbon capture technologies with modular-scale coal gasification processes. This report can be used to guide future R&D of pre-combustion carbon capture technologies and ensure they are well aligned with future gasification processes and end-use applications. *NICHOLAS S. SIEFERT ET AL., NETL TECHNICAL REPORT SERIES, DOE/NETL-2020/2149, OCTOBER 1, 2020*

Hydrogen Strategy: Enabling a Low Carbon Economy

This document summarizes current hydrogen technologies and communicates DOE/FE's strategic plan to accelerate research, development, and deployment of hydrogen technologies in the United States. *DOE/FE, JULY 2020.*



A Single-Component Water-Lean Post-Combustion CO₂ Capture Solvent with Exceptionally Low Operational Heat and Total Costs of Capture – Comprehensive Experimental and Theoretical Evaluation

RICHARD F. ZHENG, ET AL., ENERGY & ENVIRONMENTAL SCIENCE, SEPTEMBER 2020. (SUBSCRIPTION MAY BE REQUIRED)

Alkylamine Incorporation in Amidoxime Functionalized Polymers of Intrinsic Microporosity for Gas Capture and Separation

ASHLEY MILES ET AL., COMMUNICATION, AUGUST 2020 (SUBSCRIPTION MAY BE REQUIRED)

Levelized Cost of CO₂ Captured Using Five Physical Solvents in Pre-combustion Applications

HUSAIN E ASHKANANI ET AL., INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL, VOLUME 101, OCTOBER 2020, 103135 (SUBSCRIPTION MAY BE REQUIRED)

Steam-Stable Basic Immobilized Amine Sorbent Pellets for CO₂ Capture Under Practical Conditions

WALTER C WILFONG ET AL., ACS APPLIED MATERIALS AND INTERFACES, VOLUME 11, ISSUE 41, SEPTEMBER 2019

Uncertainty analysis in the techno-economic assessment of CO₂ capture and storage technologies. Critical review and guidelines for use

MIJNDERTVAN DER SPEK ET AL., INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL, VOLUME 100, SEPTEMBER 2020, 103113 (SUBSCRIPTION MAY BE REQUIRED)

About DOE's Carbon Capture Program

NETL's [Carbon Capture Program](#) is developing the next generation of advanced carbon dioxide (CO₂) 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 CO₂ capture technologies that have the potential to provide step-change reductions in both cost and energy requirements as compared to currently available technologies. The success of this research will enable cost-effective implementation of carbon capture technologies that can be applied to the existing fleet of fossil fuel-fired plants, new plants, industrial facilities, and the removal of CO₂ from the atmosphere. Cost-competitive carbon capture technologies have the potential to support the fossil sector while advancing U.S. leadership in high efficiency, low-emission generation technologies.

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](#)

Carbon Capture Infographics contain visual representations of the program and its associated technologies. These are designed to help convey program highlights in a compact and shareable form. [Check out the latest!](#)



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CUSTOMER SERVICE: 1-800-553-7681

www.netl.doe.gov

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