

CARBON CAPTURE NEWSLETTER



Addressing Climate Change

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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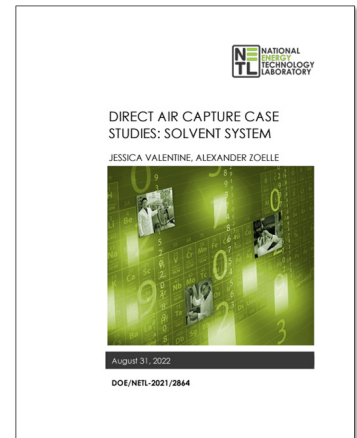
NETL Team Visits the Heartland to Advance Next-Generation Carbon Capture Technologies

The U.S. Department of Energy (DOE) Office of Fossil Energy and Carbon Management (FECM)/National Energy Technology Laboratory (NETL) Point Source Carbon Capture (PSCC) Program is developing the next generation of advanced carbon dioxide (CO₂) capture concepts to support the United States in achieving goals for a greenhouse gas (GHG)-neutral economy by 2050, a carbon-pollution-free power sector by 2035, and a 50% reduction from 2005 levels in economy-wide net GHG pollution by 2030. To gain more hands-on experience with commercially deployable solutions that can be applied to a wide spectrum of CO₂ emissions sources, the team traveled to view a number of carbon capture approaches in practice in Kentucky: Nucor Steel Gallatin Plant, Center for Applied Energy Research, Louisville Gas & Electric Kentucky Utilities (LG&E KU) E.W. Brown Generating Station, and LG&E KU Cane Run Generating Station. The PSCC Team recently resumed field visits to [research and development \(R&D\) sites](#) where crucial technologies are being advanced with NETL oversight and support to reduce emissions of CO₂.

Interagency News and Updates

NETL Case Study Explores Solvent-Based DAC Systems for the Removal of Atmospheric CO₂

A case study conducted by NETL examined the performance and cost of solvent-based direct air capture (DAC) system configurations that remove CO₂ from the atmosphere. The solvent-based DAC system evaluated in the case study, developed by Carbon Engineering, comprises air contactors that remove 74.5% of the CO₂ from the inlet air using a potassium hydroxide solvent, pellet reactors that convert potassium carbonate to calcium carbonate pellets and potassium hydroxide using calcium hydroxide, steam slakers that dry the calcium carbonate pellets and also regenerate calcium hydroxide through the reaction of calcium oxide with water, an oxy-fired calciner in which the calcium carbonate pellets are converted to calcium oxide and CO₂, a low-pressure air separation unit to provide oxygen to the calciner, and a CO₂ compressor for the CO₂ product.



NETL Welcomes New Principal Deputy Director

George Guthrie, Ph.D., has been named principal deputy director of NETL. Guthrie joins NETL from Los Alamos National Laboratory, where he served as deputy director for the applied energy programs, leading a diverse portfolio of applied R&D in applied energy and helping to establish and lead a place-based initiative in energy transition for the intermountain west. Guthrie is a scientist with more than 30 years of experience in geosciences and applied energy applications.



NETL Welcomes New Chief Research Officer

David C. Miller, Ph.D., has been named chief research officer of NETL. He previously served as an NETL senior fellow and provided technical and strategic leadership across the Strategic Systems Analysis and Engineering directorate. Miller initiated and led the Institute for the Design of Advanced Energy Systems, which is focused on computational approaches to enable the design and optimization of complex integrated energy and industrial systems, accelerating their development and deployment to support rapid decarbonization of the energy and industrial sectors. Miller also served as the technical director of the Carbon Capture Simulation Initiative, which pioneered new ways to maximize learning during pilot-scale testing to reduce technical risk during scale-up. Miller is a recipient of the Arthur S. Flemming Award for Exceptional Federal Service, Applied Science and Engineering.



Interagency News and Updates (continued)

NETL Celebrates DOE's Second Annual Carbon Management Day

NETL, in collaboration with FECM, celebrated its second annual Carbon Management Day on December 1 (12.01—the atomic mass of carbon). As a part of the celebrations, FECM hosted a [free and open-to-the-public webinar](#) on December 1, 2022, at 12:01 p.m. EST. The webinar featured industry experts, including FECM's Assistant Secretary Brad Crabtree and Principal Deputy Assistant Secretary Dr. Jennifer Wilcox, who provided updates on key initiatives, discussed FECM-funded carbon management projects, and informed stakeholders on how to get involved.



U.S. Secretary of Energy Advances America's Commitment to Reaching Net-Zero Global Emissions and Combatting Climate Change at COP27

U.S. Secretary of Energy Jennifer M. Granholm traveled to Sharm El-Sheikh, Egypt, for the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27). The Secretary joined the U.S. delegation at a critical moment for clean energy and global climate action, launching new partnerships and programs. The Secretary kicked off her first day in the U.S. Pavilion showcasing this year's achievements from [Net-Zero World](#), DOE's signature program to accelerate the global transition to net-zero emissions while enhancing economic prosperity. The Secretary announced the United States joined Mission Innovation's Net-Zero Industries Mission, which complements [DOE's Energy Earthshots™ Initiative](#). Additional DOE announcements made at COP27 to advance climate and clean energy action include the launch of Mission Innovation's [Carbon Dioxide Removal \(CDR\) Launchpad](#) and the launch of the [Africa Centre of Excellence for Carbon Management Technology and Innovation](#).



DOE Celebrates One-Year Anniversary of the BIL and Historic Investments in America's Clean Energy Future

DOE recently celebrated the one-year anniversary of President Biden signing the Bipartisan Infrastructure Law (BIL). During a panel at COP27, Secretary Jennifer M. Granholm reported on the implementation progress to-date of the BIL and looked ahead at the additional impact the law will have with the recently enacted Inflation Reduction Act (IRA).

Biden-Harris Administration Announces Funding from IRA to Strengthen America's National Laboratories

The Biden-Harris Administration announced \$1.5 billion from the IRA to build and upgrade America's national laboratories. The resources will upgrade scientific facilities, modernize infrastructure, and address deferred maintenance projects at DOE's Office of Science-managed national laboratories.

Interagency News and Updates (continued)

Funding Notice: BIL: Regional DAC Hubs

DOE's Office of Clean Energy Demonstrations (OCED), in partnership with FECM, announced more than \$3.5 billion in funding to develop four domestic regional DAC hubs, each of which will demonstrate a DAC technology or suite of technologies at commercial scale with the potential for capturing at least 1 million metric tons of CO₂ annually from the atmosphere and storing that CO₂ permanently in a geologic formation or through its conversion into products. The first FOA under this program released will make available more than \$1.2 billion to begin the process for conceptualizing, designing, planning, constructing, and operating the DAC hubs, with additional opportunities expected to follow in the coming years.



DOE Announces Funding for Regional Projects to Accelerate Deployment of Carbon Capture, Transport, Conversion, and Storage Technology

FECM and NETL announced \$20 million in funding for projects that will improve stakeholder access to region-specific information and technical assistance regarding the commercial deployment of carbon capture, transport, conversion, and storage technologies across the United States. FECM currently supports four regional projects that have already provided technical assistance on secure geologic carbon storage throughout the United States. The new FOA will augment these existing efforts by developing new technical assistance and public engagement projects with a more local geographic focus.

Biden-Harris Administration Announces Funding from the BIL to Finance Carbon Dioxide Transportation Infrastructure

DOE is now accepting letters of interest from applicants for loans under the new \$2.1 billion Carbon Dioxide Transportation Infrastructure Finance and Innovation (CIFIA) Program. Enacted under the BIL, CIFIA offers funding for large-capacity, shared CO₂ transportation projects located in the United States. Appropriated annually through 2026, CIFIA will support shared infrastructure projects, including pipelines, rail transport, ships and barges, and ground shipping that connect anthropogenic sources of carbon with endpoints for its storage or utilization.



Carbon Management Collegiate Competition

Funded by FECM, the Carbon Management Collegiate Competition tasks students to propose a regional carbon transport network. FECM invites college students to start building teams that will shape the future of carbon management. Diverse and interdisciplinary teams will propose a regional carbon transport network able to transport at least 1 million metric tons of CO₂ per year. Competitors will design a business model with consideration to regional stakeholders, challenges, and cost variability. To learn more, please view the [competition rules](#).



Interagency News and Updates (continued)

DOE Seeks Information on Regional and National CO₂ Transport Infrastructure

DOE released a [Request for Information \(RFI\)](#) to obtain input for implementing Future Growth Grants under the CIFIA Program established under the BIL. NETL is collecting the responses to the RFI. Future Growth Grants may cover the cost of developing extra transport capacity up front, before future CO₂ suppliers such as carbon capture and DAC facilities are developed, contracted, and brought online. This is solely an RFI and is not a Funding Opportunity Announcement (FOA). DOE is not accepting applications to this RFI.

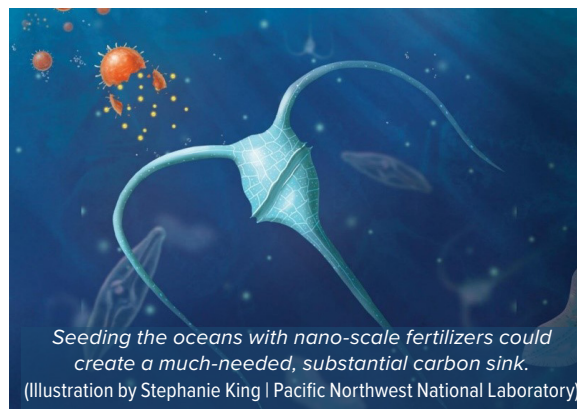


DOE Seeks Information on Developing Carbon Storage Field Laboratories

DOE released an RFI to obtain input on the best approaches and options for developing field laboratories, whether at [Carbon Storage Assurance Facility Enterprise \(CarbonSAFE\) initiative](#) project sites or other sites. NETL is collecting the responses to the RFI. This initiative will catalyze the rapid development and field-testing of technologies that would support a safe and affordable carbon capture and storage (CCS) industry.

Notice of Intent for Carbon Dioxide Removal Measurement, Reporting, and Verification Lab Call

DOE's Office of Technology Transitions (OTT), in partnership with FECM, intends to issue a lab call on Carbon Dioxide Removal Measurement, Reporting, and Verification Best Practices and Capabilities. The lab call is funded by the BIL, as part of the DOE Technology Commercialization Fund (TCF). OTT anticipates releasing the solicitation in the coming months, and eligible applicants include DOE national laboratories, plants, and sites.



Fertilizing the Ocean to Store CO₂

An international research team led by DOE's Pacific Northwest National Laboratory examined the scientific evidence for seeding the oceans with iron-rich engineered fertilizer particles near ocean plankton. The goal would be to feed phytoplankton, microscopic plants that are a key part of the ocean ecosystem, to encourage growth and CO₂ uptake. The analysis article appears in [Nature Nanotechnology](#).

Career Opportunities at NETL

At the core of NETL's success is its commitment to hiring the right people for the right positions. DOE's only government-owned and government-operated national laboratory offers exciting federal careers in research and engineering, technical project management, procurement, finance and budget, legal, and administrative support. Learn more at [NETL Careers](#).

Bipartisan Infrastructure Law Hub

The BIL represents the most dramatic changes to DOE since its founding in 1977. For the next five years, the BIL will stand up 60 new DOE programs, including 16 demonstration and 32 deployment programs, and expand funding for 12 existing research, development, demonstration, and deployment (RDD&D) programs. NETL's [BIL Hub](#) provides information on the BIL, including links to the Guidebook, DOE's Clean Energy Corps, DOE's Applicant Portal, and DOE's Grid Resilience Program, as well as information on solicitations and funding opportunities.

U.S. and International Events

CCUS 2023

Carbon, Capture, Utilization, and Storage (CCUS) 2023, to be held April 2023 at the University of Houston in Houston, Texas, will highlight current CCUS work and address related challenges, including subsurface geologic storage and site selection; CO₂ enhanced hydrocarbon recovery and utilization; reservoir modeling monitoring and risk assessment; case studies; industry applications; economics, incentives, and policy; infrastructure; and non-technical considerations.



GRC on Carbon Capture, Utilization, and Storage

The fifth edition of the Gordon Research Conference (GRC) on Carbon Capture, Utilization, and Storage will be held May 28–June 2, 2023, in Les Diablerets, Switzerland. The conference will examine scientific advances covering all dimensions of the anthropogenic carbon cycle: from capturing hard-to-abate CO₂ emissions to using CO₂ as feedstock and generating negative emissions by removing CO₂ from the atmosphere and oceans.

Carbon Capture Summit 2023

The key focus for the Carbon Capture Summit 2023, to be held June 2023 in Amsterdam, Netherlands, will be “working in collaboration with industry” by sharing expertise, building capacity, and providing advice and support so CCUS can play an integral role in reducing carbon emissions. Government agencies, global corporations, research bodies, and non-government organizations (NGOs) committed to learning and adopting CCUS technologies will participate in the event.



Carbon Capture Technology Expo

The Carbon Capture Technology Expo, to be held June 28–29, 2023, in Houston, Texas, will bring together leading engineering firms, technology manufacturers and suppliers, energy firms, the oil and gas sector, heavy industry, chemical companies, various manufacturing organizations, research groups and NGOs, consultants, and government bodies to explore how to rapidly accelerate the deployment and commercialization of carbon-removal technologies as a key solution on the pathway to net-zero carbon emissions.



Hydrogen Technology Conference & Expo

The Hydrogen Technology Conference & Expo, to be held June 28–29, 2023, in Houston, Texas, is dedicated to discussing advanced technologies for the hydrogen and fuel cell industry. The event brings together the entire hydrogen value chain to focus on developing solutions and innovations for low-carbon hydrogen production, efficient storage, and distribution, as well as applications, in a variety of stationary and mobile applications.

U.S. and International Events (continued)

Clearwater Clean Energy Conference

The 47th Clearwater Clean Energy Conference, to be held July 23–28, 2023, in Clearwater, Florida, provides essential information to power generators who must meet the pressures of energy utilization in the 21st century. The conference will include more than 200 technical presentations in four days, all offered both in person and virtually.

PCCC-7

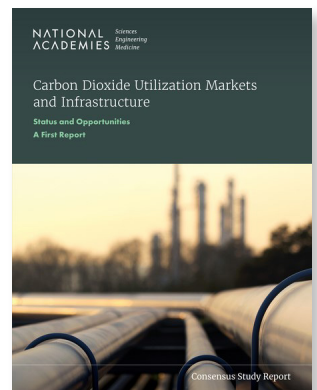
The next Post Combustion Capture Conference (PCCC-7) will be in person, Sept. 25–27, 2023, in Pittsburgh, Pennsylvania. The call for abstracts will open early-March 2023. The conference format will consist of a two-stream program for oral presentations, a poster session, and a small exhibition area.



Business and Industry News

Industry and Government Should Begin Planning CO₂ Utilization in Circular Economy, Says New Report

A [new report](#) from the National Academies of Sciences, Engineering, and Medicine assesses the state of the infrastructure for CO₂ transport, use, and storage, and identifies key opportunities to improve and expand on that infrastructure for utilization.



CEMEX and RTI to Advance Carbon Capture Technology

As part of their Future in Action Program, CEMEX USA has been awarded a \$3.7 million co-operative agreement from DOE in collaboration with non-profit research institute RTI International. The agreement will help fund an innovative carbon capture study utilizing RTI's non-aqueous solvent (NAS) technology. The front-end engineering design (FEED) study, which is to be conducted at CEMEX's Balcones cement plant in Texas, aims to determine and assess the overall costs of the integration of a 670,000 metric tons per year commercial-scale carbon capture system into the manufacturing process. During the 18-month study, the project team will also evaluate CO₂ capture from cement flue gas redirected into a tower for reaction with RTI's NAS with a 95% CO₂ capture efficiency.

Publications

Evaluating the Impacts of the Bipartisan Budget Act of 2018 45Q Tax Credit on CCS Network Costs

TRAVIS WARNER, DEREK VIKARA, ELIZABETH BASISTA, AND TIM GRANT, NETL, SEPT. 27, 2022.



Global Carbon Budget 2022

PIERRE FRIEDLINGSTEIN ET AL., EARTH SYSTEM SCIENCE DATA, VOLUME 14, ISSUE 11, 2022.

Microwave-accelerated regeneration of a non-aqueous slurry for energy-efficient carbon sequestration

T. JI, H. ZHAI, C. WANG, J. CULP, C.M. MARIN, H.P. PAUDEL, W.C. WILFONG, Y. DUAN, R. XIA, F. JIAO, B. KAIL, Q. WANG, Y. SOONG, F. SHIA, M. GRAY, MATERIALS TODAY SUSTAINABILITY, VOLUME 19, NOVEMBER 2022. (SUBSCRIPTION MAY BE REQUIRED.)

World Energy Outlook 2022

INTERNATIONAL ENERGY ADMINISTRATION, 2022.

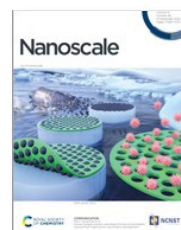


Development of an innovative process for post-combustion CO₂ capture to produce high-value NaHCO₃ nanomaterials

RUI WANG, HUSAIN E. ASHKANANI, BINGYUN LI, BADIE I. MORSI, INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL, VOLUME 120, OCTOBER 2022. (SUBSCRIPTION MAY BE REQUIRED.)

Designing optimal core–shell MOFs for direct air capture

PAUL BOONE, YIWEN HE, AUSTIN R. LIEBER, JANICE A. STECKEL, NATHANIEL L. ROSI, KATHERINE M. HORNBOSTEL, CHRISTOPHER E. WILMER, NANOSCALE, ISSUE 43, 2022. (SUBSCRIPTION MAY BE REQUIRED.)



About DOE Carbon Capture:

DOE/NETL is developing the next generation of advanced CO₂ capture technologies through NETL's Point Source Carbon Capture Program and the Carbon Dioxide Removal Program.



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 Dioxide Removal Program Fact Sheet
- Carbon Capture Infographics
- Compendium of Carbon Capture Technology
- Carbon Dioxide Capture Handbook
- CCSI²
- Systems Analysis
- Conference Proceedings
- Accomplishments Posters
- Fossil Energy Techlines

Contact Us

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