U.S. DEPARTMENT OF ENERGY | OFFICE OF FOSSIL ENERGY AND CARBON MANAGEMENT

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

CTSN CARBON TRANSPORT and STORAGE NEWSLETTER

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CARBON TRANSPORT and STORAGE PROGRAM DOCUMENTS and REFERENCE MATERIALS

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This newsletter was compiled by the National Energy Technology Laboratory to provide information on recent activities and publications related to carbon transport and storage. It covers domestic, international, and public and private sector news in the following areas:

DOE/FECM/NETL HIGHLIGHTS

NETL Researchers Launch Airborne Technology at Commercial-Scale CO_2 Storage Site.

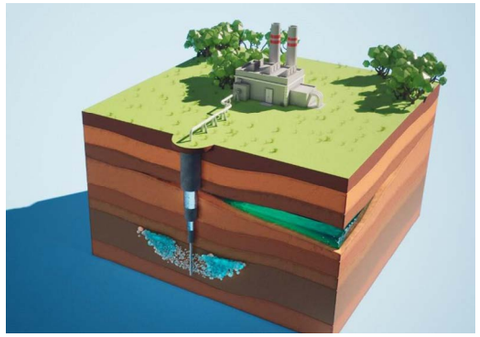
A team led by National Energy Technology Laboratory (NETL) researchers launched airborne technology at a commercial-scale carbon dioxide (CO_2) geologic storage site in Mississippi to complete a first-of-its-kind electromagnetic survey and to collect data needed to monitor greenhouse gas (GHG) stored in the subsurface. The researchers tested a superconducting quantum interference device (SQUID) magnetometer at the Kemper Carbon Storage Assurance Facility Enterprise (CarbonSAFE) site. The SQUID magnetometer can detect magnetic fields of extremely low magnitude. Detection and analysis of this measured geophysical data can help researchers identify geologic features and document changes when CO_2 is injected. The testing completed in Mississippi will also help determine if airborne electromagnetic surveys offer an effective, lower-cost solution for monitoring carbon storage sites. If successful, the technology will verify previous subsurface characterization efforts and develop baseline measurements and subsurface representations. In addition, the airborne surveys may assist operators of underground storage sites in their efforts to monitor CO_2 plume movement.

From *NETL*. May 2023.

CONTINUE

DOE/FECM/NETL HIGHLIGHTS *(cont.)*

NETL Data Portal to Help Accelerate CO_2 Storage Application Process.



NETL released a set of spatial data layers representing geologic, geophysical, structural, hydrologic, and contextual data designed to help users find suitable storage reservoirs and to support the initial preparations for a U.S. Environmental Protection Agency (EPA) Underground Injection Control (UIC) Class VI permit. This set of data layers, known as the ***Class VI Data Support Tool Geodatabase***, leverages public domain information from the Energy Data eXchange (EDX), the U.S. Geological Survey (USGS), State geological surveys, and other sources to indicate subsurface conditions. Upgrades to the geodatabase are planned; by December 2023, it will be integrated into a data visualization dashboard tool that will enable users to interact with the data in a virtual environment, and easily pull relevant spatial data and information into maps for a Class VI permit application without having to download the data to their local computer.

From *NETL*. April 2023.

DOE Announces Investment to Expand Infrastructure to Support CO_2 Transport and Storage.

The U.S. Department of Energy (DOE) announced an investment of $251 million to support 12 selected projects across seven states that will bolster the nation's carbon management capabilities. Funded by the Bipartisan Infrastructure Law (BIL), the projects will expand CO_2 transportation and storage infrastructure to help reduce CO_2 emissions from power generation and industrial operations. In addition, DOE announced the second opening of the $2.25 billion Carbon Storage Validation and Testing ***Funding Opportunity Announcement (FOA)***, which has been modified to accept applications under a broader scope, including storage complex feasibility in addition to the site characterization, permitting, and construction stages of project development. It also expands the definition of large-scale storage to allow for additional storage options.

From *energy.gov*. May 2023.

ANNOUNCEMENTS

2023 FECM/NETL Carbon Management Research Project Review Meeting.

The 2023 Office of Fossil Energy and Carbon Management's (FECM) and NETL's Carbon Management Research Project Review Meeting will take place August 28–September 1, 2023, in Pittsburgh, PA. Representatives for more than 150 DOE-sponsored research and development (R&D) projects will share the knowledge and insights gained from their projects funded by the following FECM R&D programs: ***Point Source Carbon Capture***, ***Carbon Dioxide Removal***, ***Carbon Conversion***, and ***Carbon Transport and Storage***. A mixture of plenary and program-specific sessions will span 4 1/2 days. Oral presentations, along with an interactive poster session one evening, aim to share research results and provide opportunities for discussion and collaboration on the subject research efforts, both domestic and international. The meeting will be co-located with the United States Energy Association's inaugural ***Carbon Management Technology Showcase*** (CMTS). (Note registration for the CMTS is separate from the registration for the 2023 FECM/NETL Carbon Management Research Project Review Meeting.)

NETL Develops CCS Pipeline Route Planning Database.

NETL has created an expansive and accessible Carbon Capture and Storage (CCS) Pipeline Route Planning Database to guide decisions on safely transporting CO_2 from capture sources to underground storage sites and conversion facilities. The ***CCS Pipeline Route Planning Database***, available through NETL's EDX, provides a comprehensive, national, big data resource to accelerate the country's energy transition. The publicly available database provides critical insights into the complex social, environmental, and regulatory variables that will be encountered during CCS deployment projects.

From *NETL*. May 2023.

DOE Releases Fourth "Pathways to Commercial Liftoff" Report in Carbon Management.

DOE ***released its fourth Pathways to Commercial Liftoff report***, focused on carbon management. The report discusses the whole carbon management ecosystem, including point-source carbon capture, utilization, and storage (CCUS) and carbon dioxide removal (CDR) technologies. According to the report, industry is poised to allocate billions of dollars in capital toward carbon management technologies, driven by industries with attractive economics for CCUS. The report also discusses solvable barriers to carbon management technology deployment at scale, including breaking through near-term bottlenecks in transport and storage.

From *energy.com*. April 2023.

NETL CCUS Research Explained at National Event.

NETL researchers participated in the ***CCUS Conference*** at the University of Houston in Texas, detailing NETL's key research on point source carbon capture, CO_2 removal, CO_2 conversion into products, reliable CO_2 storage, blue hydrogen production, and critical mineral production from industrial and mining waste. The work presented at the event demonstrated the ongoing need for skilled petroleum engineers, geologists, geophysicists, and other types of engineers to help define the future of carbon management.

From *NETL*. April 2023.

ANNOUNCEMENTS *(cont.)*

White House CEQ Announces Members of Task Force to Inform CCUS Deployment.

The White House Council on Environmental Quality (CEQ) announced members of two new task forces that will provide input to inform the responsible deployment of CCUS. The task forces (the *Carbon Dioxide Capture, Utilization, and Sequestration Federal Lands and Outer Continental Shelf Permitting Task Force and the Carbon Dioxide Capture, Utilization and Sequestration Non-Federal Lands Permitting Task Force*) will provide recommendations to the federal government on how to ensure that CCUS projects, including CO_2 pipelines, are permitted efficiently, reflect the input and needs of a wide range of stakeholders, and deliver benefits rather than harms to local communities.

From *The White House*. March 2023.

DOE/FECM Invests in Upgrading NETL Research Sites.

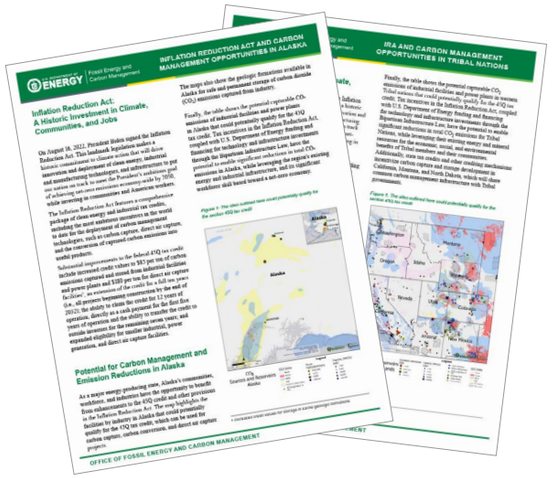
DOE/FECM announced $150 million in Inflation Reduction Act (IRA) funding to support the site-wide infrastructure and laboratory modernization upgrades at three of its NETL research sites. The IRA investment will be used to enhance core strengths at NETL's complexes in Pittsburgh, PA; Morgantown, WV; and Albany, OR, which include providing resources to apply artificial intelligence and machine learning to visualize and monitor the movement of CO_2 stored underground to address potential challenges for CCS.

From *energy.gov*. April 2023.

DOE/FECM Fact Sheets on Carbon Management and IRA Opportunities.

DOE/FECM released two fact sheets detailing how the IRA's commitment to energy and climate action has the potential to support the development of carbon management projects and infrastructure to benefit the economy and communities in ***Alaska*** and ***Western energy-producing Tribal Nations***, while also delivering deep reductions in carbon emissions.

From *energy.gov*. April 2023.



NETL to Co-Host Seventh IEAGHG Post-Combustion Capture Conference.

NETL and DOE will co-host the International Energy Agency Greenhouse Gas R&D Program's (IEAGHG) ***Seventh Post-Combustion Capture Conference (PCCC7)***, to be held September 25–28, 2023, in Pittsburgh, Pennsylvania. ***PCCC events*** are dedicated to sharing and publicizing the progress on all aspects of capture technology, including reports from commercial CCS plants in operation.

From *NETL*. April 2023.

Revamped Carbon Negative Shot Webpage.

DOE updated and redesigned its ***Carbon Negative Shot webpage*** to be a resource for information on CO_2 removal and to highlight the pathways DOE is pursuing under this ***Earthshot***.

From *energy.gov*. April 2023.

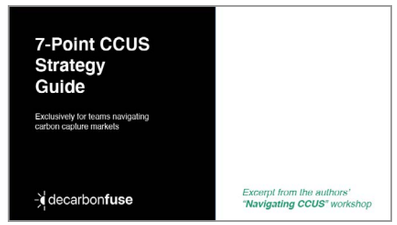
NETL Study Assesses Appalachian Region, Cites CCS.

The Appalachian region is well suited to be one of the nation's clean energy hydrogen hubs because of its natural gas resources, infrastructure, storage capacity, workforce, and industrial demand, according to a ***recently released report conducted by NETL*** (H. Singh, et al., "Appalachian Hydrogen Infrastructure Analysis," NETL, Pittsburgh, March 20, 2022). According to the authors, the study "demonstrates that Appalachia has the resources and infrastructure in and around its borders to lead a clean energy revolution by using natural gas with [CCS] to produce and store hydrogen."

Navigating CCUS Strategy Guide.

Decarbonfuse released a ***7-Point CCUS Strategy Guide***, which is an excerpt from their Navigating CCUS Workshop—a comprehensive full-day briefing to gain commercial and carbon development insights into CCUS projects.

From *Decarbonfuse*. April 2023.



Webinar Focused on Proving CO_2 Storage.

Finding Petroleum event organizers hosted a webinar titled "Monitoring of Offshore CO_2 Storage Sites—How can we be sure that it is staying there." The webinar explored what a solid "operating model" for how CO_2 storage should be monitored and verified would look like.

PROJECT AND BUSINESS DEVELOPMENTS

University, Texas Port Partner to Store CO_2 with DOE-Funded Grant.

Scientists at the Bureau of Economic Geology at the University of Texas Jackson School of Geosciences are helping the Port of Corpus Christi determine if it can store CO_2 from industrial operations at the port beneath the seafloor of the Gulf of Mexico. Funded by a DOE grant, the feasibility study will last two years and include a study of the best methods to transport CO_2 from the port to an offshore storage site.

From *The University of Texas at Austin, Jackson School of Geosciences*. March 2023.

LOI Signed for CCS Project.

Milestone Carbon signed a Letter of Intent (LOI) to evaluate approximately 46,000 acres for CCS in Louisiana's Terrebonne Parish. The carbon storage company plans to use the land to dispose of CO_2 emissions in geologic formations with the potential to store hundreds of millions of tons of CO_2. Milestone Carbon will also evaluate the land's potential for multiple EPA Class VI injection wells to support the decarbonization efforts of existing and planned industrial facilities in southeastern Louisiana.

From *Business Wire*. March 2023.

Pre-FEED Phase of CCS Project Completed.

COWI, an engineering and architecture consulting group, and Viridor, a renewable energy and waste management company, announced the ***completion of the pre-front-end engineering design (pre-FEED) stage*** of the Runcorn CCS project. The energy-from-waste facility will be retrofitted with CCS technology and is expected to remove 450,000 metric tons of atmospheric CO_2 annually. The project, which ***was shortlisted*** for the final stage of the United Kingdom (UK) government's industrial carbon capture sequencing process, will next move to a transition phase ahead of FEED, with the CCS technology expected to be deployed by 2025.

From *Carbon Capture Journal*. April 2023.

Partnership to Develop Carbon-Neutral Cement Plant.

Heidelberg Materials and the Government of Canada signed a Memorandum of Understanding (MOU) on a full-scale CCS facility for the cement industry. The Government of Canada committed to invest in the construction of the facility, which is part of Heidelberg Materials' Edmonton, Alberta, plant. The facility is scheduled to be operational by late-2026 and is expected to capture more than 1 million metric tons of CO_2 annually.

From *Heidelberg Materials Press Release*. April 2023.

Linde, ExxonMobil Agree to Transport, Store CO_2.

Linde and ExxonMobil signed a long-term agreement for the off-take of CO_2 associated with Linde's clean hydrogen production in Beaumont, TX. Under the terms of the agreement, ExxonMobil will transport and store up to 2.2 million metric tons of CO_2 a year from Linde's hydrogen production facility.

From *Linde Press Release*. April 2023.

Temporary CO_2 Storage Tank Placed for Northern Lights CCS Project.

Progress is being made with the first temporary CO_2 storage tank for the Northern Lights CCS project—a joint venture of energy companies Shell, Equinor, and TotalEnergies developing an open and flexible infrastructure to store CO_2 from industries across Europe. The tank, lifted and placed at the project's CO_2-receiving facility in Øygarden in western Norway, is the first of 12 for the first phase of the project's CO_2 storage development. When in operation, the facility is expected to handle 1.5 million metric tons of CO_2 per year; for the second phase, the facility will look to expand its capacity to more than 5 million metric tons per year.

From *Offshore Energy Today*. April 2023.

LEGISLATION AND POLICY

Australian Government Report Highlights Importance of Carbon Storage.

The Australian government's Climate Change Authority released an Insights Report to help policymakers and stakeholders better understand how carbon storage can be scaled up, accelerated, and used responsibly. "***Reduce, remove and store: The role of carbon sequestration in accelerating Australia's decarbonisation***" contains 23 policy insights as part of a "deep dive" into carbon storage, including recommending that the Australian government's net-zero plan and Climate Change Authority's Annual Progress Reports include storage; recommending the pursuit of policies that help ensure there is an adequate supply of carbon storage to meet demand; and suggesting Australia prioritize carbon storage approaches that make optimum use of resources for the volume of carbon stored.

From *Australian Government Climate Change Authority Media Release*. April 2023.

Pact Between Britain and Oklahoma to Focus on CCUS.

The British trade minister signed a trade and economic MOU with Oklahoma that will focus on boosting green trade, particularly in CCUS. According to officials, the deal is aimed at boosting the $215.6 million worth of goods British companies exported to Oklahoma in 2022 and generating more jobs for UK exporters.

From *Reuters*. April 2023.

EMISSIONS TRADING

RGGI States Initiate Auction Process for Auction 60.

The states participating in the Regional Greenhouse Gas Initiative (RGGI) released the Auction Notice and application materials for their 60th quarterly CO_2 allowance auction, to be held June 7, 2023. As indicated in the ***Auction Notice for CO_2 Allowance Auction 60***, a total of 22,026,639 CO_2 allowances will be offered for sale at a minimum reserve price of $2.50. Also available will be an 11,245,778 CO_2 allowance cost containment reserve (CCR to be accessed if the interim clearing price exceeds the CCR trigger price of $14.88), as well as an emissions containment reserve (ECR) of 10,616,464 allowances (available to be withheld if the interim clearing price is less than the ECR trigger price of $6.87).

From *RGGI News Release*. April 2023.

European Parliament Approves Upgrade of Carbon Market.

The European Parliament approved reforms to European Union (EU) climate change policies, including an upgrade of the bloc's carbon market. Parliament voted to approve a deal agreed to ***last year*** by negotiators from EU countries and Parliament to reform the carbon market to reduce emissions by 62% from 2005 levels by 2030. Under the upgrade, factories will lose the free CO_2 permits they currently receive by 2034, and shipping emissions will be added to the CO_2 market from 2024.

From *Reuters*. April 2023.

SCIENCE

Study Maps Carbon in the Arctic.

As reported ***in a study*** in the journal Geophysical Research Letters, scientists have mapped a woody deposit of the Mackenzie River Delta in Nunavut, Canada, that stores approximately 3.1 million metric tons of carbon. The 20-square-mile (51-square-kilometer) pileup of fallen trees stack up as the river twists and turns, resulting in long-term carbon storage. According to the study's authors, driftwood hidden by living vegetation or buried underground couldn't be counted using their method, meaning the delta's driftwood potentially stores at least twice as much carbon as their work found. (Sendrowski, A., et al., (2023). Wood-based carbon storage in the Mackenzie River Delta: The world's largest mapped riverine wood deposit. Geophysical Research Letters, 50, e2022GL100913.)

From *SciTechDaily*. April 2023.

Catalyst Promotes CO_2 Utilization.

A catalyst capable of converting CO_2 into useful methanol at room temperature and low-pressure conditions has been found. Researchers from the Tokyo Institute of Technology, Japan, developed an active and stable catalyst for CO_2 hydrogenation at room temperature that can be synthesized via a simple process. The results of their study were published in the ***Journal of the American Chemical Society***. (Hironobu Sugiyama, et al., Room-Temperature CO_2 Hydrogenation to Methanol over Air-Stable hcp-PdMo Intermetallic Catalyst. Journal of the American Chemical Society, 2023; DOI: 10.1021/jacs.2c13801.)

From *ScienceDaily*. April 2023.

About DOE'S CARBON TRANSPORT and STORAGE PROGRAM

The **Carbon Transport and Storage Program** at the National Energy Technology Laboratory (NETL) is focused on developing and advancing technologies to enable safe, cost-effective, permanent geologic storage of CO_2, both onshore and offshore, in different geologic settings. The technologies being developed will benefit both industrial and power sector facilities that will need to mitigate future CO_2 emissions. The program also serves to increase the understanding of the effectiveness of advanced technologies in different geologic reservoirs appropriate for CO_2 storage—including saline formations, oil reservoirs, natural gas reservoirs, unmineable coal seams, basalt formations, and organic-rich shale formations—and to improve the understanding of how CO_2 behaves in the subsurface. These objectives are necessary to increasing public confidence in safe, effective, and permanent geologic CO_2 storage.

The ***Carbon Transport and Storage Program Overview*** webpage provides detailed information of the program's structure, as well as links to the webpages that summarize the program's key elements.

Carbon Transport and Storage Program Resources

Newsletters, program fact sheets, best practices manuals, roadmaps, educational resources, presentations, and more information related to the Carbon Transport and Storage Program is available on ***DOE's Energy Data eXchange (EDX) website***.

Get Social with Us

There are several ways to join the conversation and connect with NETL's Carbon Transport and Storage Program:

Disclaimer

About NETL'S CARBON TRANSPORT and STORAGE NEWSLETTER

Compiled by the National Energy Technology Laboratory, this newsletter is a monthly summary of public and private sector carbon transport and storage news from around the world. The article titles are links to the full text for those who would like to read more (note that all links were active at the time of publication).

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