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

VOL. 24, NO. 6

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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:

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DOE/FECM/NETL HIGHLIGHTS

DOE Re-Opens Funding Opportunity for CO_2 Transport Networks to Manage Carbon Emissions

The U.S. Department of Energy's (DOE) Office of Fossil Energy and Carbon Management (FECM) announced funding to support the transport of carbon dioxide (CO_2) to locations for geologic storage or conversion to useful products. The CO_2—captured from industrial and power generation facilities, as well as from legacy CO_2 emissions captured directly from the atmosphere—may be transported by any mode of transport, such as pipelines, rail, trucks, barges, or ships (including any combination of transport modes). The third opening of this funding opportunity announcement (FOA) will support front-end engineering design (FEED) studies for regional CO_2 transport networks to safely transport captured CO_2 from key sources to centralized locations. Selected projects will focus on carbon transport costs, transport network configurations, and technical and commercial considerations that enable industrial-scale deployment of carbon capture, conversion, and storage. The ***application deadline for this FOA*** is July 9, 2024.

From *energy.gov*.

CONTINUE

DOE/FECM/NETL HIGHLIGHTS

DOE Announces Funding to Help Expand CO_2 Transport Infrastructure

DOE-FECM announced available funding for projects that will help expand CO_2 transportation infrastructure to support the reduction of CO_2 emissions across the United States. The ***Carbon Dioxide Transportation Infrastructure Finance and Innovation Future Growth Grants*** FOA will provide future growth grants under DOE's Carbon Dioxide Transportation Infrastructure Finance and Innovation Program, made available through the Bipartisan Infrastructure Law. Future growth grants are intended to provide financial assistance for designing, developing, and building CO_2 transport capacity up front that will be available for future carbon capture and direct air capture (DAC) facilities as they are developed and for additional CO_2 storage and/or conversion sites as they come into operation. Under this FOA, the transport system—which may include pipelines, rail, trucks, barges and/or ships—must connect, either directly or indirectly, two or more CO_2 emitting sources to one or more conversion sites or secure geologic storage facilities.

From *energy.gov*. May 2024.

DOE Announces Investments to Design CO_2 Transport Systems

DOE announced funding to help connect sources of CO_2 to secure geologic storage locations in the northwest, Northern Great Plains, and southeast regions of the United States. The four selected projects, funded by the Bipartisan Infrastructure Law, will support FEED studies for regional transport networks to safely transport captured CO_2 from key sources to centralized locations for storage. The projects will focus on carbon transport costs, transport network configurations, and technical and commercial considerations to enable industrial-scale deployment of carbon capture and storage (CCS). The National Energy Technology Laboratory (NETL), under the purview of DOE-FECM, will manage ***the selected projects***.

From *energy.gov*. April 2024.

DOE Selects Projects to Evaluate Potential for EOR with Geologic Storage in Unconventional Reservoirs

DOE-FECM announced the selection of two projects to receive funding to evaluate the potential of oil and gas production and geologic storage of CO_2 from unconventional reservoirs through CO_2 enhanced oil recovery (CO_2-EOR). The projects will help evaluate the feasibility for permanent storage of CO_2 in depleted unconventional shale oil and gas reservoirs, repurposing existing infrastructure. The two selected projects will focus on examining the effectiveness of CO_2-EOR with the geologic storage process when applied to low-permeability, tight-oil unconventional reservoirs, as well as understand the potential to safely store CO_2 in these complex systems. In conjunction with this testing, the projects will collect critical data on how CO_2-EOR and carbon storage can be co-optimized with the goal of reducing the carbon footprint of the incremental oil produced. NETL, under the purview of DOE-FECM, will manage the ***selected projects***.

From *energy.gov*. April 2024.

ANNOUNCEMENTS

DOE Announces Demonstrate Deploy Decarbonize 2024

DOE announced that Demonstrate Deploy Decarbonize 2024 (Deploy24) will take place in Washington, DC, December 4–5, 2024. Hosted by DOE, Deploy24 is the second annual gathering of decision-makers from across the private and public sectors—including senior industry executives, capital allocators, community leaders, and others across the clean energy supply chain—all focused on accelerating the deployment of critical energy and decarbonization technologies and supply chains in the United States.

From *energy.gov*. March 2024.

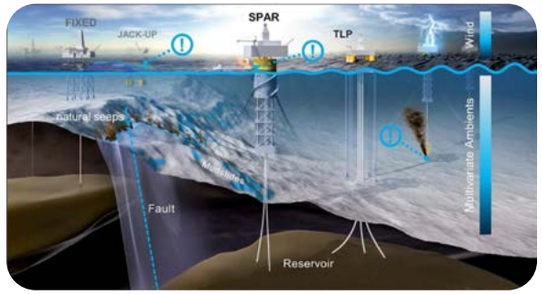
NETL Chairing Carbon Transport and Storage Session at 2024 AIChE Annual Meeting

NETL is chairing a session on carbon transport and storage at the 2024 American Institute of Chemical Engineers (AIChE) Annual Meeting (October 27–31, 2024, in San Diego, California). The session, titled "Engineering Geologic Carbon Dioxide Storage Systems," will focus on CCS research and development (R&D) for permanent, efficient and cost-effective storage of CO_2.

2024 AIChE ANNUAL MEETING

ANNOUNCEMENTS *(cont.)*

NETL Analytical Tool Available on EDX



NETL publicly released an award-winning analytical tool that uses advanced big data computing, artificial intelligence (AI), machine learning, and advanced analytical models to evaluate energy infrastructure integrity—a capability that can lead to effective cost savings and improved operational measures for environmental safety. The NETL-developed ***Advanced Infrastructure Integrity Model (AIIM)*** web mapping application is available on DOE's Energy Data eXchange® (EDX). AIIM began in 2018 as an approach to assess offshore energy infrastructure integrity but has also been used to perform onshore infrastructure assessments related to carbon capture, transport, and storage research.

From *NETL*. May 2024.

DOE Carbon Management Portal

DOE-FECM released a user-friendly platform that can be used to find and access reports, fact sheets, data, and other information on a variety of topics related to carbon management. The ***Carbon Management Portal*** aims to help communities and other stakeholders access information grounded in science to better understand carbon management technologies.

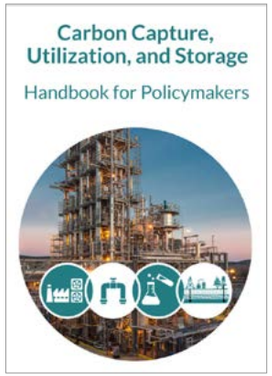
From *energy.gov*. May 2024.

DOE Announces DAC EPIC Prize Finalists

DOE-FECM announced five finalists to receive a total of $1.5 million for developing commercialization programs that support technologies that remove CO_2 emissions directly from the atmosphere. The Direct Air Capture Energy Program for Innovation Clusters (EPIC) Prize is one of several prize competitions hosted by DOE and funded by the Bipartisan Infrastructure Law to support breakthrough DAC technologies that demonstrate strong potential to accelerate economic support and expand domestic carbon removal. DAC is a process that separates CO_2 from the air for underground storage or for conversion into useful carbon-containing products.

From *energy.gov*. April 2024.

Publication of U.S. Government-Funded CCUS Handbook for Policymakers



In support of the ***Clean EDGE (Enhancing Development and Growth through Energy) Asia*** initiative, the U.S. Department of State's Bureau of Energy Resources (ENR) and the U.S. Department of Commerce's Commercial Law Development Program (CLDP) jointly announced the launch of the ***Carbon Capture, Utilization, and Storage: Handbook for Policymakers***. The handbook, sponsored by ENR and developed by CLDP, is a guide to empower legislators, ministries, regulators, and state-owned companies to adopt and enforce legal instruments that will rapidly and effectively deploy carbon capture, utilization, and storage (CCUS) capabilities.

From *U.S. Department of State*. April 2024.

Report on CCS Opportunities in PA

The Clean Air Task Force released a report detailing the magnitude of storage capacity for CO_2 in Pennsylvania based on publicly available and private data. ***The report*** identified 219 facilities in the state that could benefit from CCS technology subsidized by the section 45Q tax credit to transition to a decarbonized future. The report also found that in most cases, CO_2 pipelines will likely be necessary to transport CO_2 from where it is captured to where it will be stored due to geologic considerations of the emissions sites and the geographical distribution of sources.

From *Clean Air Task Force*. April 2024.

EPA Finalizes Guidelines to Reduce Emissions from Power Plants

EPA United States Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) announced a suite of final rules to reduce emissions from fossil fuel-fired power plants. The rules were finalized under separate authorities, including the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act.

From *EPA News Release*. April 2024.

Alliance to Explore CCS Solutions

CGG and Baker Hughes signed a memorandum of understanding (MOU) to explore jointly offered CCS solutions. The collaboration and proposed commercial alliance intend to support the increase of CCS projects by providing high-quality and fully integrated end-to-end solutions to screen, select, characterize, and monitor potential carbon storage sites worldwide.

From *Yahoo Finance*. May 2024.

Investment to Facilitate Development of CCS Projects in Canada

BISON LOW CARBON VENTURES

Mizuho Bank Ltd. announced an investment in Bison Low Carbon Ventures Inc. to facilitate development of Bison's CCS projects in Alberta, Canada. Bison is an Alberta-based carbon storage project developer with two storage hub projects that are being evaluated for regulatory approval and commercial development.

From *Bison Low Carbon Ventures News Release*. April 2024.

Report Examines Potential of CCUS Technology

A research report from Clean Prosperity's Net-Zero Pathways for Canada project examined the potential of CCUS technology to address emissions from Canada's major industrial sectors. The report, ***Evaluation of carbon capture and storage potential in Canada***, mapped the locations and emissions of high-emitting industrial facilities that could integrate CCUS technology. The facilities were grouped according to their distance to potential geologic storage basins and to functioning or planned infrastructure for CO_2 transport and injection.

From *Carbon Capture Journal*. April 2024.

ANNOUNCEMENTS *(cont.)*

Report on the Role of Carbon Credits in Scaling Up Clean Energy Technologies

A report explores how carbon credits could help scale up direct air capture and storage (DAC+S), among other clean energy technologies. ***The Role of Carbon Credits in Scaling Up Innovative Clean Energy Technologies*** was prepared jointly by the International Energy Agency and GenZero.

From *IEA*. April 2024.

Invitation to Submit Abstracts for 2024 GSA Annual Meeting

The Geological Society of America (GSA) is calling for abstract submissions for its annual meeting, GSA CONNECTS 2024, to be held in Anaheim, California, September 22–25, 2024. The topical session "T56: Geologic Carbon Storage" will provide a forum for researchers to share their research in all aspects of geologic carbon storage, including but not limited to site selection, geologic and geophysical site characterization, modeling and monitoring of CO_2 injection/migration, risk assessment, and case studies of large-scale geologic carbon storage projects. The submission deadline is June 18, 2024.

From *Geological Society of America*. May 2024

PROJECT AND BUSINESS DEVELOPMENTS

Climeworks to Study DAC+S in Norway

Climeworks was awarded funding in the framework of Enova's "Preliminary Study Carbon Capture 2030" to study large-scale DAC+S in Norway. Enova aims to help companies that want to capture large amounts of CO_2 to get closer to an investment decision for capture plants, with the goal of operation by 2030.

From *Climeworks Press Release*. April 2024.

Denmark Awards Funds for CCS Projects

Denmark's government awarded financial support to three CCS projects. The Danish Energy Agency entered into contracts with BioCirc CO_2, Bioman, and Carbon Capture Scotland. The projects are expected to develop and mature the CCS value chain in the Scandinavian nation, with all the CO_2 planned to be stored in Denmark.

From *Upstream*. April 2024.

CCS Partnership Formed in Kenya

DAC firm RepAir and carbon storage company Cella launched a partnership aimed at creating dedicated value chains for extracting CO_2 from the atmosphere and storing it underground through in situ mineralization. RepAir's proprietary DAC solution is projected to capture carbon at approximately $50 per ton at the gigaton scale, The storage agreement will streamline the sale of high-quality carbon credits to off-takers, enabling corporations to meet evolving environmental, social, and governance standards; manage offsets; and advance toward net-zero goals. The DAC unit and CO_2 storage facility will be adjacently located to Cella's initial demonstration project in the Kenyan Rift Valley, and the project, co-located with geothermal energy production, is set to operate solely on renewable energy sources.

From *PR Newswire*. April 2024.

Saudi Arabia, EU to Collaborate on CCUS

Saudi Arabia and the European Union (EU) are collaborating on a proposed MOU aimed at accelerating private investment in renewable energy, improving electricity interconnections, and integrating renewable sources into the electricity grid. The proposed collaboration will also extend to the hydrogen sector and clean technologies, including CCUS.

From *Saudi Gazette*. April 2024.

Offshore Geologic Survey Conducted at Bayou Bend CCS

Bayou Bend CCS LLC commissioned subsea specialist Sulmara to conduct an archaeological and geohazard assessment of the proposed Bayou Bend pipeline route from the landfall to the future offshore platform locations, which has the potential to reduce emissions from regional industrial facilities by storing CO_2 underground. Sulmara utilized an electric WAM-V 16 uncrewed surface vessel for the offshore data acquisition to help significantly lower the overall carbon footprint of the assessment by reducing the number of diesel-burning vessels offshore, as well as shortening the time required to conduct the survey.

From *Sulmara News*. April 2024.

FEED Contract Awarded for CCUS Project

MHI-LCSC, a part of Mitsubishi Heavy Industries Ltd. (MHI) Group, and Kiewit were awarded a FEED contract for a carbon capture technology, which utilizes MHI's proprietary Advanced KM CDR Process™, at Heidelberg Materials North America's Edmonton, Alberta, CCUS project. Heidelberg Materials North America will be commissioning a full-scale net-zero cement plant at its Edmonton location by adding CCUS technology to an already state-of-the-art facility. The plant could eventually capture and store an estimated 1 million metric tons of CO_2 each year. Subject to finalization of federal and provincial funding agreements, the company anticipates the final investment decision to be taken in 2024.

From *Heidelberg Materials*. April 2024.

PROJECT AND BUSINESS DEVELOPMENTS *(cont.)*

FEED Contract Awarded for CCS Project

Technip Energies was awarded a FEED contract from Viridor for the CCS project at an existing waste-to-energy facility in Runcorn, United Kingdom (UK). Technip Energies will provide a detailed design as part of the FEED study, incorporating the Canopy by T.EN™ solution supported by Shell CANSOLV CO_2 capture technology. The solution is a key component of Technip Energies' Capture.Now™, which is their strategic CCUS platform that encompasses various technologies and solutions.

From *Carbon Herald*. April 2024.

Mpumalanga CCS Pilot Project Completed

A CCS pilot project has been completed at a site in Leandra, Mpumalanga, in eastern South Africa. The pilot was developed by the Council for Geoscience and was co-financed by the government and the World Bank. Financing was awarded because of the site's proximity to the integrated energy and chemical company ***Sasol*** and its synthetic fuel plant in Secunda, both large sources of CO_2 emissions. Several reports on the geology and engineering design requirements are being compiled before the project proceeds to the construction phase.

From *Mail & Guardian*. April 2024.

Plans Outlined for New UK CCS Projects

Independent hydrocarbon producer Perenco outlined plans for two new UK CCS projects. The company is currently in the appraisal phase, assessing the risks and practicalities of commercial-scale carbon storage. Both projects—Poseidon and Orion—are based on Perenco-operated gas fields in the southern North Sea. According to company officials, Orion, with an expected startup date in 2031, will have an ultimate storage capacity of around 126 million metric tons of CO_2; Poseidon, with an expected start date in 2030, is expected to have a capacity of 935 million metric tons of CO_2.

From *Energy Voice*. April 2024.

UK Company Invests in CCS Technology

UK energy company enfinium announced plans to invest in CCS technology at the Parc Adfer waste-to-energy facility in Deeside, North Wales. Since more than half of the waste processed at the facility is organic, installing CCS technology would enable the plant to take more CO_2 out of the atmosphere than it produces. The proposal has been put forward for grant support from the UK government as part of the expansion of their "Track-1" carbon capture program. The captured carbon will be transported using the pipeline network currently being developed in the region for the HyNet carbon capture cluster.

From *enfinium News Release*. April 2024.

LEGISLATION AND POLICY

PA Senate Approves CCUS Framework

The Pennsylvania State Senate approved legislation that would establish the framework for potential CCUS. ***Senate Bill 831*** next moves to the House. According to projections, Pennsylvania has the potential to store approximately 2.4 billion metric tons of CO_2 underground.

From *Pennsylvania Business Report*. April 2024.


PRINTER'S NO. 1514

THE GENERAL ASSEMBLY OF PENNSYLVANIA

SENATE BILL
No. 831 Session of 2023

INTRODUCED BY VAN, ROBINSON, STEFANO AND WOGEL, JUNE 20, 2023

AS AMENDED ON THIRD CONSIDERATION, APRIL 8, 2024

AN ACT

Providing for the injection of carbon dioxide into an underground reservoir for the purpose of carbon sequestration, for the ownership of pore space in strata below surface lands and waters of the Commonwealth, for conveyance of the surface ownership of real property; imposing duties in the Department of Environmental Protection; and establishing the Carbon Dioxide Storage Facility Fund.

California Sets Targets to Reach Carbon-Neutrality by 2045

As part of the ***California Climate Commitment***, the state is setting 81 targets for nature-based solutions that support the ability of the land to absorb more CO_2 than it releases. Specific targets include 11.9 million acres of forest managed for carbon storage and biodiversity and water supply protection, and 2.7 million acres of shrublands and chaparral managed for carbon storage, resilience, and habitat connectivity.

From *Office of California Governor Gavin Newsom*. April 2024.

Alabama Legislature Passes CO_2 Storage Bill

The Alabama State Senate and House passed legislation that will allow manufacturers to store CO_2 emissions in pore space where oil and natural gas have been pumped out of the ground. In addition, the ***legislation*** creates the Underground Carbon Dioxide Storage Facility Administrative Fund and the Underground Carbon Dioxide Storage Facility Trust Fund.

From *Yellowhammer News*. May 2024.

EU Parliament Approves Deal on Carbon Removal Certification Scheme

The European Parliament approved a deal with national governments on a new carbon removal scheme, establishing a registry for certified units of CO_2 that have been removed from the atmosphere via industrial or nature-based processes.

From *Euractiv*. April 2024.

LEGISLATION AND POLICY *(cont.)*

EU Strategy to Develop CCS Technologies

The European Commission adopted an ***Industrial Carbon Management Communication*** that outlines its ambitions for a strategy to boost the deployment of technologies in the EU that can capture, store, transport and use CO_2 emissions from industrial facilities. While the Communication does not change current rules, it identifies a series of actions to undertake at the EU and national level to establish a business environment that enables industrial carbon management in the EU in the decades ahead.

From *Lexology*. April 2024.

Canadian Province Announces CCS Legislation

The government of the Canadian province of Manitoba introduced legislation that would create a framework for industries to begin work on underground CCS projects. The proposed legislation would allow the Manitoba government to implement a licensing process for CCS projects that would include a comprehensive assessment for each project.

From *Manitoba Government News Release*. April 2024.

EMISSIONS TRADING

RGGI Compliance Materials Available

The states participating in the Regional Greenhouse Gas Initiative's (RGGI) sixth control period released ***guidance materials*** for CO_2 budget source compliance for the 2024 interim control period. The 2024 interim control period began on January 1, 2024, and extends through December 31, 2024. Each CO_2 budget source must provide allowances for compliance equal to 50% of its emissions by March 3, 2025.

From *RGGI*. May 2024.

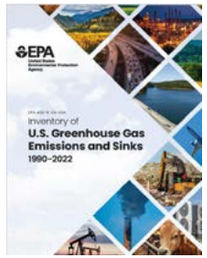
Global Carbon Trading Revenues Grew in 2023

According to the International Carbon Action Partnership's annual emissions trading status report, global revenues from the sale of carbon permits in emissions trading systems (ETSs) grew from $64 billion in 2022 to $74 billion in 2023. Jurisdictions making up 58% of global gross domestic product are now using an ETS, according to the report, with 36 systems currently in place. In addition, another 22 ETSs are under development or consideration.

From *Reuters*. April 2024.

SCIENCE

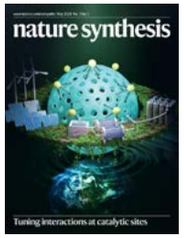
EPA: Forests Storing Less CO_2 Than Before



According to EPA's ***annual report on greenhouse gases (GHGs)*** by sector, U.S. forests stored 787 million metric tons of CO_2 equivalent in 2022, down from 844.2 million metric tons the year before and from 974 million in 1990. The numbers, EPA says, reflect a downward trend during the period and are part of the reason for the overall decline in carbon storage attributable to land use, including agriculture. (Total carbon storage in the land use and forestry category fell by 11% from 1990 to 2022.)

From *E&E News*. April 2024.

Scientists Discover Carbon-Storing Material



A team led by scientists in Edinburgh created hollow, cage-like molecules with high storage capacities for GHGs such as CO_2. The researchers used computer simulations to accurately predict how molecules would assemble themselves into the new porous material, a method that scientists believe could be further enhanced in the future through the use of AI. The research was published in the journal ***Nature Synthesis***.

From *The North West Star*. April 2024.

Researchers Study Soil Inorganic Carbon

While most studies investigating the role of soil in the global carbon cycle focus on organic carbon, a study ***published in Science*** instead concentrated on soil inorganic carbon, analyzing more than 200,000 soil measurements from around the world. The researchers found that the top two meters of soil globally holds approximately 2.3 trillion metric tons of inorganic carbon, which is around five times more carbon than found in all the world's terrestrial vegetation. The researchers estimate that approximately 23 billion metric tons (1%) of this carbon may be released over the next 30 years.

From *The Conversation*. April 2024.

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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