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



CARBON CARBON TRANSPORT and STORAGE NEWSLETER

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DOE/FECM/NETL HIGHLIGHTS

DOE Announces Funding for Carbon Management Programs.

The U.S. Department of Energy (DOE) announced funding for two carbon management programs to catalyze investments in transformative carbon capture systems and carbon transport and storage technologies. Funded by the Bipartisan Infrastructure Law (BIL), the two programs—*Carbon Capture Large-Scale Pilots* and *Carbon Capture Demonstration Projects Program*— aim to reduce carbon dioxide (CO₂) emissions from electricity generation and industrial operations. The *Office of Clean Energy Demonstrations (OCED)*, in collaboration with the *Office of Fossil Energy and Carbon Management (FECM)* and the *National Energy Technology Laboratory (NETL)*, will manage the programs. OCED is charged with accelerating deployment of carbon management technologies by de-risking these transformational technologies at scale and catalyzing private sector investment through public-private cost-share agreements. Read the full Funding Opportunity Announcements (FOAs) *here* and *here*.

HOHLIGHT

From energy.gov. February 2023.

ANNOUNCEMENTS

DOE Invests Funding in CCS Technologies.

DOE/FECM is funding three CO_2 storage projects and two carbon conversion projects selected under the Accelerating Carbon Capture and Storage Technologies (ACT) initiative's fourth call for projects. The ACT is a multi-national program to facilitate international collaboration on research and development (R&D) and technology innovation to accelerate the global deployment of carbon capture and storage (CCS) and carbon conversion technologies. The three selected CO_2 storage projects will explore options for geologic storage sites and solutions for CO_2 transport, injection, and monitoring.

From *energy.gov*. February 2023.

DOE/FECM Releases FY 2023 TCF to Support Partnerships Between Industry and National Labs.

DOE/FECM announced funding under its Fiscal Year (FY) 2023 **Technology Commercialization Fund (TCF)** Base Annual Appropriations National Laboratory Call for FECM Program-Led Topics. The solicitation offers an opportunity for private industry to partner with DOE's national labs to advance lab-developed intellectual property (IP) toward commercialization in technology areas covered by FECM's strategic vision.

From energy.gov. March 2023.

Technology Commercialization Fund

NETL, Supercomputing Center Pioneer CFD Simulation Announced.

Cerebras Systems announced the simulation of a real-time natural convection computational fluid dynamics (CFD) simulation in partnership with DOE/NETL. The simulation has the potential to help improve and accelerate projects like carbon storage.

From Newswise. February 2023.

NETL FY 2022 Accomplishments Report Available.

NETL Annual Accomplishments 2022 contains project posters that showcase the results NETL scientists, engineers, project managers, and partners have achieved to help ensure America's security and prosperity by addressing its energy and environmental challenges through transformative science and technology solutions. The accomplishments demonstrate the impact made possible through research aligned with DOE/FECM's research, development, demonstration, and deployment priorities.

From NETL. February 2023.



NETL Uses Microwaves to Reduce Costs of DAC Technologies.

NETL researchers have reported the successful use of microwaves to accelerate sorbent regeneration—results that can lead to the reduction of expensive water and energy requirements of some direct air capture (DAC) technologies. The research team published their work in the January 2023 issue of *Materials Today Sustainability*, and discussed their work on a *Spotify podcast*.

From NETL. March 2023.



GPI Publishes DAC Atlas.

The Great Plains Institute (GPI) published *An Atlas of Direct Air Capture: Opportunities for Negative Emissions in the United States.* The atlas examines key factors that impact regional suitability for developing DAC technology and associated infrastructure, including transporting and storing CO_2 .

From Better Energy. March 2023.

CO₂ Storage License Applied for in the North Sea.

Sval, Storegga, and Neptune applied for a CO_2 storage license in the Norwegian North Sea. The project, called Trudvang, has the potential to store up to 225 million metric tons of CO_2 . The application comes after the Norwegian Ministry of Petroleum and Energy announced (in January 2023) a new area in the North Sea for applications related to CO_2 injection and storage.

From Key Facts Energy. February 2023.

Carbon Storage Platform Licensed.

TGS licensed its **Carbon AXIOM** platform and associated well data products for carbon capture, utilization, and storage (CCUS). The platform, which now includes detailed analysis of saline aquifer potential in offshore Galveston, Texas, enables the assessment of depleted oil and gas reservoirs for CCUS purposes along the Texas, Louisiana, and Mississippi Gulf Coast regions.

TGS

From energy-pedia. February 2023.

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ANNOUNCEMENTS (cont.)

RGGI Reports Available.

The states participating in the Regional Greenhouse Gas Initiative (RGGI) released the "*Report on the Secondary Market for RGGI CO₂ Allowances: Fourth Quarter 2022.*" Prepared by independent market monitor Potomac Economics,

the report found no evidence of anticompetitive conduct in the



RGGI CO₂ allowance secondary market. RGGI also made available the **2022 Interim Compliance Summary Report**, which contains data regarding CO₂ allowances provided by CO₂ budget sources to meet their 2022 interim control period compliance obligation. (RGGI's fifth three-year control period took effect on January 1, 2021, and extends through December 31, 2023.)

From RGGI. February 2023.

UW's EORI Launches Dashboard.

The University of Wyoming's (UW) Enhanced Oil Recovery Institute (EORI) launched a dashboard offering information on EORI's current project locations and descriptions, as well as a chart depicting project types and their frequencies. In addition, *the dashboard* also contains a list of EORI's downloadable publications and a link to EORI's library of publications and presentations.

From University of Wyoming. February 2023.

Capture Status of Arab Carbon Storage Facilities Announced.

According to the Arab Monetary Fund, three carbon storage facilities in Saudi Arabia, the United Arab Emirates, and Qatar capture 10% of the world's CO_2 annually (around 40 million tons in 2020). Numerous Arab countries have set goals for renewable energies to be achieved in the 2030–2050 timeframe, while also aiming to reduce fossil energy sector emissions.

From Arab News. February 2023.

PROJECT AND BUSINESS DEVELOPMENTS

Companies Sign MOU to Develop CCS in Norway.

Horisont Energi and Neptune Energy signed a Memorandum of Understanding (MOU) with E.ON to develop a European CCS value chain. The companies will develop a land-based CO_2 terminal in Norway, a subsea pipeline, and a seabed liquid CO_2 distribution and injection system connected to the offshore underground storage. The MOU covers development, financing, and funding for handling CO_2 . The companies are using the collaboration to help link CO_2 projects on the Norwegian Continental Shelf with development of Europe's' CO_2 removal market, with the potential to open a commercial carbon removal market.



From Offshore Magazine. February 2023.

Large-Scale, Cross-Border Carbon Storage Project Announced.

CapeOmega and Neptune Energy announced they have begun working on NoordKaap—a large-scale concept for cross-border carbon storage that would allow industrial companies to store CO_2 . RWE is also reported to be involved and plans to explore how the project can ship CO_2 from its biomass Eemshaven plant to store the gas in the Dutch North Sea. The joint project is expected to become operational in 2028 and adopt a network-based approach to CCS, aimed at reducing costs and scaling the infrastructure. The project will involve utilizing vessels that can both transport CO_2 from and to terminals, as well as possessing the capability to inject the CO_2 at offshore sites.

From Carbon Herald. February 2023.

Saudi Aramco Identifying Fields for EOR.

The Saudi Arabian Oil Company, Saudi Aramco, is identifying fields whose production can be boosted with enhanced oil recovery (EOR) when a new carbon capture hub at the industrial complex of Jubail comes online in 2027. The carbon capture hub in the Red Sea-facing industrial city of Jubail is being developed as part of Aramco's plans to reach net-zero by 2050.

From S&P Global. February 2023.

Carbon Capture Project Aims to Remove CO₂ from Distilleries.

United Kingdom-based Carbon Capture Scotland, aiming to remove 1 million metric tons of CO_2 from the distillery industry by 2030, will source its carbon-removal technology from Danish supplier Airco Process Technology. The project will capture CO_2 from the fermentation processes association with distilleries, with the CO_2 captured being utilized or for geologic storage.

From Gasworld. February 2023.

Linde to Supply Clean H₂ by Storing CO₂.

Linde will supply clean hydrogen to OCI's blue ammonia plant in Texas by capturing and storing more than 1.7 million metric tons of CO_2 emissions each year. Linde will build, own, and operate an onsite complex at the OCI plant, which will include autothermal reforming with carbon capture, plus a large air separation plant.

From Reuters. February 2023.

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LEGISLATION AND POLICY

Carbon Capture and Utilization Parity Act Introduced.

A bill intended to create parity between the value for utilization and storage in the 45Q carbon capture tax credit was introduced in the U.S. Senate. *The Carbon Capture and Utilization Parity Act of 2023* would establish parity between 45Q carbon capture tax credits for utilization and storage, support industry investment in carbon-neutral products, and contribute to emissions reductions and a circular economy.

From U.S. Senator Sheldon Whitehouse Press Release. February 2023.



Germany Developing CCS Strategy.

The German government is developing a Carbon Management Strategy for CO_2 storage and utilization. According to projections, approximately 30 million tons of CO_2 will have to be captured, transported, reused, or disposed of by 2045 for the country to become carbon neutral. The focus of the strategy will be on industrial processes and waste, and it will include possible locations of capture plants, capture and utilization hubs, and transport pipelines for CO_2 .

From Energy Post. February 2023.

CCUS Legislation Reintroduced in Pennsylvania.

Legislation on establishing the legal and regulatory framework for potential CCUS in Pennsylvania is being reintroduced. As part of the legislative package, one of the bills would direct the Commonwealth to apply for primary enforcement authority from the U.S. Environmental Protection Agency (EPA) for CO_2 underground injection wells (Class VI wells). Several other states seeking to facilitate CCUS and its associated jobs and investment have secured primacy, which streamlines the permitting process.

From Senator Gene Yaw News Release. February 2023.

EMISSIONS TRADING

Indonesia Launches Carbon Trading Mechanism.

Indonesia launched the first phase of carbon trading for coal power plants. The first stage covers 99 power plants with a total installed capacity of 33.6 gigawatts connected to power grids owned by state utility Perusahaan Listrik Negara (PLN). Indonesia's carbon trade applies to power plants with a capacity of at least 100 megawatts; however, according to officials, it will later be rolled out to smaller coal plants and other fossil-fueled power plants, as well as power plants not connected to PLN's grid.

From Reuters. February 2023.

EU Carbon Price Reaches High Mark.

Allowances traded under the European Union's emissions trading system (EU ETS) hit an all-time high in February 2023. The price of carbon credits in the system has risen fivefold in the past three years.

From Financial Times. February 2023.

SCIENCE

Scientists Study Role of Salt in CO₂ Storage.

According to a new study led by researchers at The University of Texas at Austin's Bureau of Economic Geology, salt could play a large role in the transition to lower-carbon energy sources. Specifically, the *study* (Duffy et al., Tektonika [2023]) describes how large underground salt deposits could serve as hydrogen holding tanks, conduct heat to geothermal plants, and influence CO_2 storage.

From University of Texas at Austin Jackson School of Geosciences. February 2023.

Study Desired to Investigate Biochar, Plugging Oil and Gas Wells.

Colorado lawmakers want to commission a study to see if biochar, a carbon-rich substance similar to charcoal, can be used to plug hundreds of deserted oil and gas wells across the state, storing carbon in the process. If passed, the bill would help scientists assess whether biochar in wells is a viable form of carbon storage. The measure would direct Colorado State University to review current research and run new tests on the efficacy of biochar's filtration properties, the tonnage of carbon that could be stored, and how the substance would interact with its subterranean environment.

From CBS News Colorado. February 2023.

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PUBLICATIONS

N. Wijaya, D. Vikara, K. Bello, R. T. Vactor, M. Tarhoni, T. Grant, D. Morgan and L. Cunha, "*Exploratory Analysis of Offshore CO*₂ Storage Pilot Project in the Gulf of Mexico: Geologic, Infrastructure, and Cost Considerations," National Energy Technology Laboratory, Pittsburgh, December 9, 2022.

Di He, Ruina Xu, Tiancheng Ji, Peixue Jiang, "*Experimental investigation of the mechanism of salt precipitation in the fracture during CO₂ geological sequestration*," International Journal of Greenhouse Gas Control, Volume 118, July 2022.

K.A. Titus, D.E. Dempsey, R.A.M. Peer, "Carbon negative geothermal: Theoretical efficiency and sequestration potential of geothermal-BECCS energy cycles," International Journal of Greenhouse Gas Control, Volume 122, January 2023.

Saulo B. de Oliveira, Haline V. Rocha, Colombo C.G. Tassinari, "3D geochemical characterization of organic-rich shales of the Irati Formation, Paraná Sedimentary Basin: New perspective for CO₂ geological storage in southeastern Brazil," International Journal of Greenhouse Gas Control, Volume 114, February 2022.

Yanli Meng, Li Wang, Yigang Wei, Zhijun Shi, Ziqian Luo, "Time-frequency dynamics, co-movement and causality among returns of global carbon emissions trading schemes (ETSs): A tale of four markets," Journal of Cleaner Production, Volume 363, August 2022.

About DOE'S CARBON TRANSPORT and STORAGE **PROGRAM**

The **Carbon Transport and Storage Program** 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*.



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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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