

CARBON CAPTURE NEWSLETTER



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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DOE Announces Principles to Guide Excellence and Accountability in Carbon Management

The U.S. Department of Energy's (DOE) Office of Fossil Energy and Carbon Management (FECM) announced the release of the final Responsible Carbon Management Initiative (RCMI) Principles under its RCMI. With this announcement, DOE embarks on the pilot phase of the RCMI, which aims to encourage and recognize project developers and others in industry pursuing the highest levels of safety, environmental stewardship, accountability, community engagement and societal benefits in carbon management projects. The 10 RCMI Principles focus on community engagement; workforce development and quality jobs; tribal engagement; environmental justice; environmental responsibility; air, water, and soil quality; health and safety; emergency response; transparency; and long-term stewardship. Accompanying the RCMI Principles, the [RCMI Resources](#) provide background, context and guidance to support project developers' implementation of each principle. This resource library provides up-to-date and useful information sourced from carbon management project stakeholders, including research, reports, tools, best practices and other supportive materials from DOE, other federal agencies, academia, non-government organizations and others.

Interagency News and Updates



FECM Announces Funding for Test Centers to Advance Carbon Capture and Conversion Technologies

FECM announced up to \$127.5 million in federal funding to support the development of carbon dioxide (CO₂) capture, removal and conversion test centers for cement manufacturing facilities and power plants. This funding opportunity announcement (FOA) will support three areas of focus: Carbon Capture, Removal, and Conversion Test Center at an Electric Generating Unit will focus on providing post-combustion flue gas testing capabilities representative of domestic coal and/or natural gas-based power systems; Enabling Capital Improvements at Existing Carbon Capture Test Facilities will focus on providing enhanced capabilities and infrastructure improvements at existing flue gas testing centers representative of domestic fossil-based power systems; and Carbon Capture, Removal, and Conversion Technology Test Center at a Cement Manufacturing Facility will focus on providing flue gas testing representative of domestic cement manufacturing facilities.

DOE Modifies FOA: Support Procurement of Commercial and Industrial Products Derived from Anthropogenic Carbon Oxides

DOE announced it has modified a funding opportunity to award \$100 million to support states, local governments and public utilities in purchasing products derived from converted carbon emissions. This amendment will increase the maximum federal share up to \$5 million dollars per award. The goal is to speed up adoption of advanced carbon management technologies, creating a market for environmentally sustainable alternatives in fuels, chemicals and building products sourced from captured emissions from industrial and power generation facilities. The current modification increases the potential award size, updates procurement and use definitions, updates terms and conditions, and changes community benefits reporting requirements.

FECM Announces Funding to Expand Portfolio of Carbon Management Technologies to Reduce Carbon Emissions

FECM announced up to \$54.4 million in additional funding available to advance diverse carbon management approaches that reduce CO₂ emissions. The funding will support the development of technologies that capture CO₂ from industrial and power generation sources or directly from the atmosphere and transport it either for geologic storage or conversion into valuable products such as fuels and chemicals. The FOA will support the following areas of interest: Reactive Carbon Capture Approaches for Point Source Capture or Atmospheric Capture with Integrated Conversion to Useful Products; Engineering-Scale Testing of Transformational Carbon Capture Technologies for Natural Gas Combined Cycle (NGCC) Power Plants; Engineering-Scale Testing of Transformational Carbon Capture Technologies in Portable Systems at Industrial Plants; Preliminary Front-End Engineering Design (Pre-FEED) Studies for Carbon Capture Systems at Existing (Retrofit) Domestic NGCC Power Plants; Pre-FEED Studies for Carbon Capture Systems at Hydrogen Production Facilities Using Coal, Mixed Coal/Biomass, or Natural Gas Feedstock; and Enhancing CO₂ Transport Infrastructure: Pre-FEED Studies for Multimodal CO₂ Transfer Facilities.



FECM Announces Funding to Catalyze Commercial CDR Technology

FECM announced funding of up to \$52.5 million, made available through President Biden's Investing in America agenda, to advance carbon dioxide removal (CDR) technologies that reduce legacy CO₂ by removing it directly from the atmosphere to counter-balance emissions from hard-to-abate sectors. The American-Made Commercial Direct Air Capture (DAC) Pilot Prize, funded by the Bipartisan Infrastructure Law (BIL), will support the development and deployment of DAC pilot projects that have demonstrated commercial readiness. Phase 1 of the Commercial DAC Pilot Prize is [currently accepting applications](#) through February 7, 2025.

Interagency News and Updates (continued)

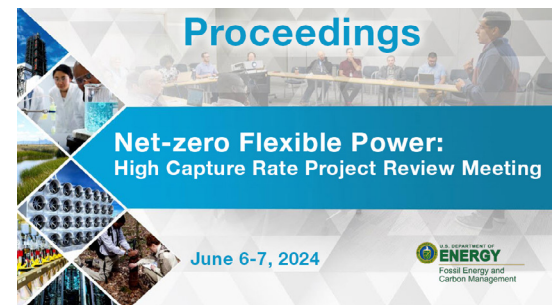
2024 FECM/NETL Carbon Management Research Project Review Meeting Proceedings

Proceedings are now available for the five-day 2024 FECM/NETL Carbon Management Research Project Review Meeting held in August 2024. This meeting provided attendees a chance to share in the knowledge and insights gained by more than 150 DOE-sponsored research and development (R&D) projects from the following programs: Point-Source Carbon Capture (PSCC), CDR, Carbon Conversion, and Carbon Transport and Storage.



Net-zero Flexible Power: High Capture Rate Project Review Meeting Proceedings Available

Proceedings from the June 5–6, 2024, Net-zero Flexible Power: High Capture Rate Project Review Meeting are now available. The meeting included an overview of high capture rates activities at FECM, presentation on the state of net-zero flexible power, review of current FECM projects on high capture rates, overview of the FLExible Carbon Capture and Storage Program, two talks, and three panels.



Mitchell Cement Plant Decarbonization Project

The Mitchell Cement Plant Decarbonization Project, led by Heidelberg Materials US Inc. (Heidelberg Materials), plans to construct and operate an integrated carbon capture, transport and storage system at their newly modernized plant located in Mitchell, Indiana. This project would capture at least 95% of the CO₂ and store it in a geologic formation beneath the plant property. This project expects to prevent two million tons of CO₂ per year from entering the atmosphere and would demonstrate a pathway to decarbonize existing cement plants in the United States. This project builds on the ongoing Office of Clean Energy Demonstrations (OCED) awarded FEED study and storage site development and represents one of the first carbon capture and storage (CCS) projects for cement facilities in the nation.



Funding Notice: BIL: Carbon Utilization

DOE announced it is making \$100 million available to support states, local governments and public utilities in purchasing products derived from converted carbon emissions. The goal is to speed up adoption of advanced carbon management technologies, creating a market for environmentally sustainable alternatives in fuels, chemicals and building products sourced from captured emissions from industrial and power generation facilities. The Carbon Utilization Procurement Grants Program will help offset 50% of the costs to states, local governments and public utilities or agencies to procure and use products developed through the conversion of captured CO₂ and carbon monoxide emissions. The commercial or industrial products to be procured and used under these grants must demonstrate a significant net reduction in greenhouse gas (GHG) emissions compared to incumbent products via a life cycle analysis (LCA). The LCAs are checked for conformance and approved by the National Energy Technology Laboratory (NETL).



Interagency News and Updates (continued)

NETL Director and Researchers Present at American Chemical Society Fall Meeting

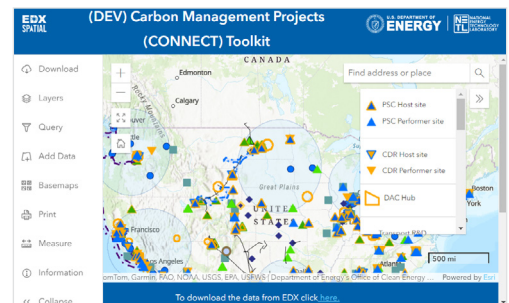
In August 2024, DOE's NETL Director Marianne Walck spoke at the American Chemical Society (ACS) Fall Meeting in Denver, Colorado. She was invited to present as part of ACS's Women in Energy Symposium and discussed NETL research on a variety of topics related to carbon management and sustainable resource development. Director Walck spoke on how NETL's work has helped prove the technical and commercial



viability of carbon capture, carbon transport and geologic storage—and highlighted that the work will help the nation achieve decarbonization and net-zero goals, build a sustainable natural gas supply chain to meet the energy needs of the country, and develop a secure domestic supply of critical minerals/rare earth elements to support the country's economic and national security. In addition to Director Walck, ACS attendees heard presentations from NETL's David Luebke, Yee Soong, Thuy Duong Nguyen Phan, Jan Steckel and Ping Wang.

CONNECT Toolkit (BETA)

The Carbon Management Projects (CONNECT) Toolkit is an online exploratory visualization tool that provides the public with a single point of access to authoritative information on federally funded projects with links to more details on each project. It includes a portfolio of federal research, development and demonstration (RD&D) projects that have been announced to advance technologies for PSCC, CDR, carbon conversion, and carbon transport and storage—collectively referred to as carbon management. The RD&D projects included in the CONNECT Toolkit are either completed, ongoing or are currently under award negotiation. The projects included reflect distinct stages of project development, ranging from early-stage laboratory research to pilot-scale testing and commercial-scale demonstration, and are supported by different agencies across the federal government, including offices at DOE such as FECM and OCED.



Sutter Decarbonization Project

The Sutter Decarbonization Project plans to demonstrate and deploy a commercial-scale carbon capture system at the Sutter Energy Center, a 550-megawatt NGCC power plant near Yuba City, California. The Sutter Decarbonization Project plans to use ION's ICE-21 solvent to capture up to 1.75 million metric tons of CO₂ from this facility each year, transport it and store it more than a half mile underground in saline geologic formations. This project will be the first in the world to deploy an air-cooling system at a carbon capture facility, which will eliminate the use of cooling water and significantly minimize freshwater usage. To minimize land disturbance, the Sutter Decarbonization Project plans to construct and operate a transportation pipeline running parallel to or using an existing natural gas pipeline right-of-way.



Interagency News and Updates (continued)

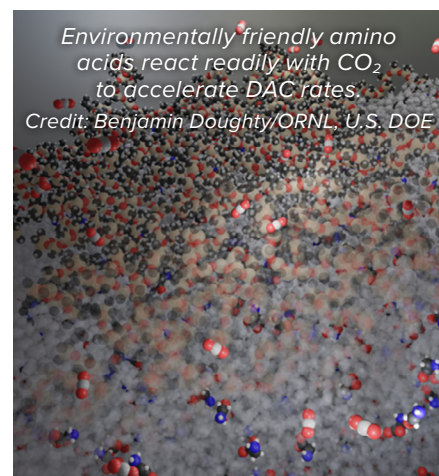
Notice of Intent: UTR for FECM

FECM released a notice of intent to issue a FOA in support of its [University Training and Research \(UTR\) Program](#). The UTR Program encompasses the University Carbon Research and Historically Black Colleges and Universities and other Minority-Serving Institutions (HBCU-MSI) programs. If released, the FOA is expected to focus on the following R&D activities: Curriculum to Grow Carbon Management Education Capacity, Critical Mineral Supply Chain Career Awareness Outreach Program, Soil Carbon Sequestration: Establishing Technical and Social Baselines to Enable Broader Adoption, and Using Artificial Intelligence and Machine Learning to Advance Point Source Capture and Train the Next Generation of Engineers (HBCU-MSI only). The potential FOA may include additional and/or revised areas of interest to those listed above.



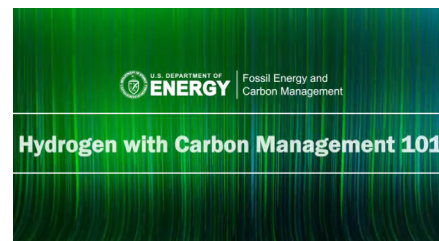
Small Chemical Change May Reap Big Climate Reward

Researchers at Oak Ridge National Laboratory (ORNL) have demonstrated that small molecular tweaks to surfaces can improve absorption technology for DAC. Amino acids, which react readily with CO₂ and are environmentally friendly, have potential for use in liquid-based DAC. However, they are not naturally drawn to surfaces where they might interact with environmental CO₂. A team from ORNL added a charged polymer layer to an amino acid solution, and then, through spectroscopy and simulation, found that [the charged layer can hold amino acids at its surface](#). The surface-bound amino acids accelerated CO₂ capture by 15%.



Hydrogen with Carbon Management 101 Video

In DOE's Hydrogen with Carbon Management 101 video, Bob Schrecengost, Division Director of FECM's Hydrogen with Carbon Management Program, highlights the work that FECM is doing to help produce, transport, store and use hydrogen from domestic natural gas and sustainably sourced biomass resources while capturing and storing the CO₂ produced in the process, resulting in a clean hydrogen fuel and preventing the release of CO₂ emissions into the atmosphere.



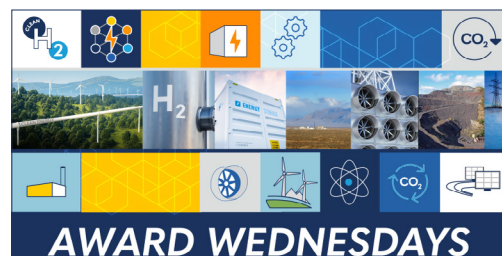
Advancing FECM's Vision and Commitment to Achieving a Net-Zero Emissions Future

FECM's priority is reaching the Biden administration's goals of a fully decarbonized power sector by 2035 and net-zero U.S. GHG emissions by 2050. FECM's Strategic Vision establishes a framework to be used by the office to help the United States make informed carbon management decisions to achieve deep decarbonization economy-wide and address legacy emissions. While FECM has a key role to play, reaching these bold climate goals will take historic domestic and international efforts, as well as continued collaboration across DOE and other federal agencies, governments, industry, nongovernmental organizations and communities.

Interagency News and Updates (continued)

Award Wednesdays | July 31, 2024

On Wednesdays, OCED announces the latest projects that have successfully completed award negotiations. (OCED will only issue an Award Wednesday notification on weeks when an award has been finalized.) OCED awarded the Appalachian Hydrogen Hub with \$30 million for the first tranche of funding (out of the total project federal cost share of up to \$925 million) to begin Phase 1 activities. OCED awarded the FUZES project, led by NextEra Energy Resources Development LLC, with nearly \$400,000 (of the total project federal cost share of up to \$49.1 million) to begin Phase 1 of the project plan.



DOE Announces Funding for Technologies to Expand the Use of Renewable Power



DOE announced \$41 million for 14 projects to develop renewables-to-liquids technologies—harnessing renewable energy sources like wind and solar to produce liquids for sustainable fuels or chemicals that can be transported and stored as easily as carbon-intensive liquids like gasoline or oil. Renewable energy resources are often not co-located with the current U.S. power grid, and by enabling the transportation of sustainable fuels, the selected projects can reduce interconnection barriers while helping reduce emissions from hard-to-decarbonize industrial sectors. The selected project teams will work to develop systems that operate at a renewable energy production site and use its electricity, CO₂ and water to create liquids that can be used as renewable fuels or drop-in replacements for conventional fuels. The clean energy created can then be used throughout the United States for a variety of purposes, including in tough-to-decarbonize sectors like transportation.

DOE Invests Funding to Provide Technical Assistance in Geologic Basins Targeted for Carbon Storage

FECM announced the selection of nine university and industry-led projects to receive \$44.5 million in federal funding to advance commercial-scale carbon capture, transport and storage across the United States. These regional partnership projects will accelerate the understanding of specific geologic basins to enable the storage of CO₂ emissions from industrial operations and power plants, as well as from legacy emissions in the atmosphere. The partnerships will provide technical, informational, and educational assistance to stakeholders involved in DOE and private sector-based carbon transport and storage projects located throughout the country, as well as to communities where these projects are located. NETL will manage the selected projects.

DOE STEM Portal

DOE is building pathways for a diverse workforce to pursue careers in science, technology, engineering and mathematics (STEM). DOE seeks to engage learners at all levels to promote STEM and energy literacy and to attract, inspire and develop a STEM identity and a sense of belonging in STEM. DOE is committed to promoting and supporting people from all backgrounds and perspectives, including individuals and communities that have been historically underrepresented in STEM fields and activities at DOE.



Interagency News and Updates (continued)

Explore Career Opportunities with FECM

FECM is looking for enthusiastic, driven professionals to join the team and help define the future of energy. Learn more about FECM's [Workforce Programs](#) and sign up for FECM career alerts to receive the newest vacancies. Text FECM CAREERS to 468311 to receive text message alerts or subscribe [here](#).

Explore 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. The BIL is standing up 60 new DOE programs, including 16 demonstration and 32 deployment programs, and is expanding funding for 12 existing research, development, demonstration and deployment 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

Industrial Decarbonization North America 2024

The Industrial Decarbonization North America 2024 summit, to be held Oct. 1–2, 2024, in Pittsburgh, Pennsylvania, will convene senior decision-makers from across the industrial value chain to strategize deep decarbonization, form profitable cross-sectoral coalitions, and roll-out the next wave of net zero ahead of 2030.

Conference: Carbon Capture Summit USA

The Carbon Capture Summit USA, to be held Oct. 15–16, 2024, in Houston, Texas, will explore next-generation carbon capture, utilization, storage and transportation that meets net-zero emissions targets. The conference will spotlight innovative carbon capture, utilization and storage technologies that transform carbon emissions into valuable resources, promoting a sustainable circular carbon economy.



Conference: GHGT-17

The 17th Greenhouse Gas Control Technologies (GHGT) Conference, to be held Oct. 20–24, 2024, in Calgary, Alberta, Canada, is the principal international conference on GHG mitigation technologies. The GHGT conferences are held every two years in member countries, rotating between North America, Europe and Asia. Each conference is a forum for technical discussions related to the field of GHGT.



U.S. and International Events (continued)

Conference: Carbon Capture Technology Expo Europe

Carbon Capture Technology Expo Europe, to be held Oct. 23–24, 2024, in Messe Hamburg, Germany, is a solutions-driven forum that will discuss the development of new carbon capture technologies and propel carbon capture into the mainstream for stationary and mobile applications. The two-day event will explore how to rapidly accelerate the deployment and commercialization of CDR technologies as a key solution on the pathway to net-zero carbon emissions.



Appalachian Hydrogen & Carbon Capture Conference

The Appalachian Hydrogen & Carbon Capture Conference, to be held Nov. 7, 2024, in Pittsburgh, Pennsylvania, will report on the latest projects coming out of DOE and major corporations. The evening prior will feature a reception acknowledging Marcellus's 20th anniversary, partnering with the Washington Chamber of Commerce to recognize Range Resources. View the agenda [here](#).



Meetings: Global CCS Institute 2024 Americas

The Global CCS Institute is an international think tank whose mission is to accelerate the deployment of CCS. The [Global CCS Institute 2024 Americas Finance Meeting](#) will be held Nov. 6, 2024, in Houston, Texas, followed by a reception. [Global CCS Institute 2024 Americas Member Meeting](#) will be held Nov. 7, 2024, in Houston, Texas, followed by a reception.



Conference: Deploy24

Hosted by DOE, Demonstrate Deploy Decarbonize 2024 (Deploy24) will be held Dec. 4–5, 2024, in Washington, D.C. Deploy24 will bring together decision-makers from the private sector, government and the broader ecosystem dedicated to accelerating the deployment of critical energy and decarbonization technologies in the United States. The conference gathers fellow clean energy leaders from across the country to discuss how to effectively and equitably use federal and private sector investments to strengthen the energy system and secure a clean energy future. Register [here](#).



Business and Industry News

Carbon Capture Pilot Construction Project in Springfield, Illinois, Nears Completion

Springfield, Illinois, public power utility City Water, Light & Power in June 2024 celebrated the near completion of construction for its 10-megawatt-electric slipstream carbon capture pilot project for DOE. Ronald Munson (far right in photo), NETL's PSCC



Technology Manager, attended the ribbon-cutting. The pilot project will evaluate a new large-scale capture system for its performance and economics, which will be compared to predictions. The carbon capture system is based on a BASF proprietary solvent coupled with a Linde proprietary design that reduces regeneration energy, lowers solvent circulation rates, and enhances heat recovery. The construction phase of the project is due to be completed in November 2024.

Carbon America's FrostCC™ Technology Demonstrates Ultraclean Carbon Capture

Carbon America's novel cryogenic carbon capture technology, FrostCC™, successfully completed 1,000 hours of testing at the National Carbon Capture Center (NCCC). FrostCC™ is a cryogenic PSCC system that removes CO₂ from flue gas before it is released into the atmosphere. It does this by cooling the flue gas below the sublimation temperature of CO₂, causing it to "frost" as dry ice and physically separate from the gas mixture. This solid CO₂ is periodically melted and collected as a liquid, making it ready for compression and transportation to storage sites. FrostCC™ does all of this without the use of water or chemicals and runs exclusively on electricity. During its testing at NCCC, FrostCC™ successfully demonstrated its ability to capture CO₂ and co-pollutants from flue gas and further validated the process and models for design. The next step in development for FrostCC™ will be a demonstration of its full-scale commercial product.



*The FrostCC™ system installed at the NCCC in Wilsonville, Alabama.
(Photo: Business Wire)*

Publications

Engineering-Scale Testing of the Biphasic Solvent Based CO₂ Absorption Capture Technology at a Covanta Waste-to-Energy Facility

Yongqi Lu, NETL, MAY 15, 2024.



Development of Self-Assembly Supports Enabling Transformational Membrane Performance for Cost-Effective Carbon Capture

Hans Wijmans, Fanglei Zhou, Jenny He, Tim Merkel, Pingjiao Hao, Jay Kniep, Craig Paulaha, Carlos Cassilas, Adam Borsali, Khoi Nguyen, Witopo Salim, Zhen Sun, Haiqing Lin, James Tran, Nate Lynd, Ben Pedretti, Isaac Tan, NETL, JULY 3, 2024.



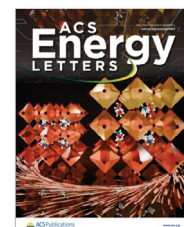
Direct Air Capture of CO₂ via Reactive Crystallization

Diāna Stamberga, Jeffrey D. Einkauf, Meishen Liu, Radu Custelcean, CRYSTAL GROWTH & DESIGN, VOLUME 24, ISSUE 11, APRIL 30, 2024. (SUBSCRIPTION MAY BE REQUIRED.)



Closing the Loop: Unexamined Performance Trade-Offs of Integrating Direct Air Capture with (Bi)carbonate Electrolysis

Hussain M. Almajed, Recep Kas, Paige Brimley, Allison M. Crow, Ana Somoza-Tornos, Bri-Mathias Hodge, Thomas E. Burdyny, Wilson A. Smith, ACS ENERGY LETTERS, VOLUME 9, ISSUE 5, MAY 1, 2024.



Assessing Impacts of Atmospheric Conditions on Efficiency and Siting of Large-Scale Direct Air Capture Facilities

Xuqing Cai, Mark A. Coletti, David S. Sholl, Melissa R. Allen-Dumas, JACS AU, VOLUME 4, ISSUE 5, MAY 1, 2024.



Cross-sectoral assessment of CO₂ capture from U.S. industrial flue gases for fuels and chemicals manufacture

M. Jibrān S. Zuberi, Arman Shehabi, Prakash Rao, INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL, VOLUME 135, JUNE 2024.



About DOE Carbon Capture:

DOE/NETL is developing the next generation of advanced CO₂ capture technologies through NETL's Point Source Carbon Capture Program (PSCC) and advancing a diverse set of CDR approaches to directly remove CO₂ emissions from the atmosphere through NETL's Carbon Dioxide Removal Program.



The Digital 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 searchable database.



Carbon Capture Reference Materials

- Point Source Carbon Capture Program Fact Sheet
- Carbon Dioxide Removal Program Fact Sheet
- Carbon Capture Infographics
- Interactive Project Maps: PSCC and CDR
- Compendium of Carbon Capture Technology
- Carbon Dioxide Capture Handbook
- CCSI²
- Systems Analysis
- Conference Proceedings
- Accomplishments Posters: PSCC and CDR

Contact Us

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Program staff are also located in **Houston, Texas** and **Anchorage, Alaska**

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