NATIONAL ENERGY TECHNOLOGY LABORATORY

AUGUST 2023

CARBON CAPTURE NEWSLETTER

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

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 Funding for University-Led Projects Supporting Decarbonization and Net-Zero Greenhouse Gas Emissions

The U.S. Department of Energy's (DOE) Office of Fossil Energy and Carbon Management (FECM) announced up to $17.7 million in funding available to support novel, early-stage research and development (R&D) at eligible U.S. colleges and universities, including creating new academic curricula related to geosciences and supporting interdisciplinary training in humanities-driven science, technology, engineering, and mathematics fields. The funding opportunity is offered through FECM's University Training and Research (UTR) Program, which includes the University Carbon Research (UCR) and the Historically Black Colleges and Universities and Other Minority Serving Institutions (HBCU–MSI) sub-programs. These programs serve to educate and train the next generation of engineers and scientists working to advance integrated solutions key to meeting the Biden-Harris administration's goal of a net-zero emissions economy by 2050.

Interagency News and Updates

2023 FECM/NETL Carbon Management Research Project Review Meeting

The FECM/National Energy Technology Laboratory (NETL) Carbon Management Research Project Review Meeting will be held Aug. 28–Sept. 1, 2023, in Pittsburgh, Pennsylvania. The meeting will provide attendees with a chance to share in the knowledge and insights gained by more than 150 DOE-sponsored R&D projects from the following FECM R&D programs: Point Source Carbon Capture (PSCC), Carbon Dioxide Removal (CDR), Carbon Conversion, and Carbon Transport and Storage (CTS). A mixture of plenary, multi-topic breakout, and interactive poster sessions will be used to share research results and provide opportunities for discussion and collaboration on the subject research efforts, both domestic and international. In addition to the project researchers, participants may include employees of other government agencies, electric utilities, research organizations, and industry. The meeting will be co-located with the United States Energy Association's (USEA) inaugural Carbon Management Technology Showcase (CMTS). Note that registration for the CMTS is separate from the registration for the 2023 FECM/NETL Carbon Management Research Project Review Meeting.

DOE Announces Funding to Reduce Emissions Across America's Industrial Sector

DOE announced $135 million for 40 projects that will reduce carbon pollution from the industrial sector and move the nation toward a net-zero emissions economy by 2050 by advancing key transformational and innovative technologies. Primarily funded through DOE's Industrial Efficiency and Decarbonization Office, the 40 selected projects will be led by 36 different universities, national laboratories, and companies spread across 21 states. The projects that will support R&D and pilot-scale demonstrations to reduce energy usage and emissions from these subsectors are grouped into six categories: Decarbonizing Chemicals, Decarbonizing Iron and Steel, Decarbonizing Food and Beverage Products, Decarbonizing Cement and Concrete, Decarbonizing Paper and Forest Products, and Cross-Sector Decarbonization Technologies. Learn more about the projects here.

Director's Corner: Digital Innovation and Acceleration for NETL R&D

In support of its mission to drive innovation and deliver solutions for an environmentally sustainable and prosperous energy future, NETL is also driving digital innovation. Tools like science-based models, artificial intelligence and machine learning (AI/ML) methods, data analytics, and high-performance computing are accelerating NETL R&D for clean, efficient, and affordable energy production and use. Through NETL's Science-based Artificial Intelligence and Machine Learning Institute (SAMI)—an initiative that accelerates innovation and makes breakthrough discoveries in subsurface, materials, and offshore research—NETL is enabling AI-driven solutions and support for applied energy science, environmental and social justice, and other strategic objectives within DOE's and NETL's missions.

NETL Mickey Leland fellows Daniel Paluso and Andrew Bean analyze core samples for the EDX virtual core library at NETL's subsurface CT scanning facility.

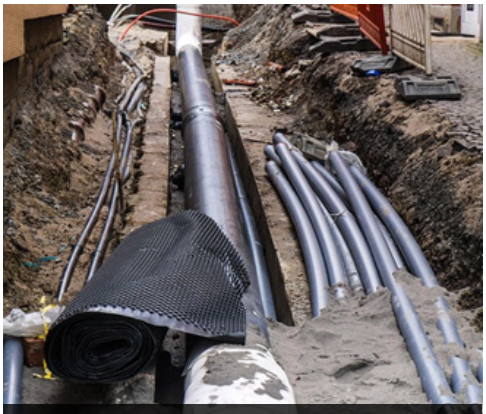
Interagency News and Updates (continued)

DOE Announces Selections for Carbon Capture FEED Studies

DOE's Office of Clean Energy Demonstrations (OCED) selected eight integrated front-end engineering design (FEED) studies for award negotiations to support the development of community-informed integrated carbon capture, transport, and storage systems. The FEED studies, representing five different U.S. states and one tribal nation, will address the design of integrated carbon capture and storage (CCS) projects and support the buildout of CCS capacity toward achieving a clean and equitable energy economy. Learn more about the eight FEED Studies selected for award negotiations here.

NETL Develops Pipeline Route Planning Database to Guide CO_2 Transport Decisions

NETL identified technical gaps, prioritized research needs, and developed tools to facilitate and optimize a robust, national-scale carbon dioxide (CO_2) transportation infrastructure. Strategically planning safe and sustainable routes for transportation of CO_2 from where it is captured to where it can be stored underground or converted into other products is a critical priority in achieving a greenhouse gas (GHG)-neutral economy by 2050. NETL has responded to that challenge by creating an expansive and accessible CCS Pipeline Route Planning Database, available through NETL's Energy Data eXchange (EDX®), to guide routing decisions and increase transportation safety.



NETL has created an accessible carbon capture and storage Pipeline Route Planning Database to guide decisions on safely transporting CO_2 from capture sources to underground storage sites and conversion facilities.

Functional Materials Team Factsheet Released

NETL's Materials Engineering and Manufacturing (MEM) Core Competency Directorate is internationally recognized for its expertise in designing, developing, and deploying advanced structural materials and tailored functional materials for use in energy applications and extreme service environments. The MEM Directorate is organized into three teams that collectively maintain NETL's applied materials science and engineering competency: (1) Structural Materials Team, (2) Functional Materials Team, and (3) Materials Characterization Team.

Interagency News and Updates (continued)

DOE Launches New Energy Earthshot to Decarbonize Transportation and Industrial Sectors

DOE announced the launch of the Clean Fuels & Products Shot™, a new initiative that aims to significantly reduce GHGs from carbon-based fuels and products. This is the seventh DOE Energy Earthshot, which focuses on reducing carbon emissions from the fuel and chemical industry through alternative, more sustainable sources of carbon to achieve a minimum of 85% lower GHG emissions as compared to fossil-based sources by 2035. The Clean Fuels & Products Shot aims to meet projected 2050 net-zero emissions demands for 100% of aviation fuel; 50% of maritime, rail, and off-road fuel; and 50% of carbon-based chemicals by using sustainable carbon resources.

EPA Proposes New Carbon Pollution Standards for Fossil Fuel-Fired Power Plants to Tackle the Climate Crisis and Protect Public Health

The U.S. Environmental Protection Agency (EPA) proposed new carbon pollution standards for coal and natural gas-fired power plants that will protect public health, reduce harmful pollutants, and deliver up to $85 billion in climate and public health benefits over the next two decades. The proposal for coal and new natural gas power plants would avoid up to 617 million metric tons of total CO_2 through 2042, which is equivalent to reducing the annual emissions of 137 million passenger vehicles, roughly half the cars in the United States. Through 2042, EPA estimates the net climate and health benefits of the standards on new gas and existing coal-fired power plants are up to $85 billion.

Industrial Demonstration Program Concept Paper Notifications

In March 2023, DOE announced a roughly $6 billion funding opportunity to accelerate decarbonization projects in energy-intensive industries and provide American manufacturers a competitive advantage in the emerging global clean energy economy. For the first stage of this process, OCED required Concept Paper submittals and reviewed 411 submissions, of which 130 were encouraged to submit a full application. Applicants proposed projects in all 50 states and Puerto Rico and indicated interest in pursuing a diverse range of transformative technological solutions. OCED issued notifications encouraging or discouraging applicants from submitting full applications. Notifications followed an assessment of each Concept Paper based on evaluation criteria that included decarbonization potential, timeliness, market viability, replicability, community benefits, and overall project strength.

New 48C Tax Credit to Spur Historic Investments in Manufacturing and Critical Materials

The Qualifying Advanced Energy Project Credit (48C)—established by the 2009 Recovery Act and expanded with a $10 billion investment under the Inflation Reduction Act—aims to strengthen U.S. industrial competitiveness and clean energy supply chains. As the nation builds a net-zero economy, the 48C tax credit aims to play a critical role to create high-quality jobs, reduce industrial emissions, and increase domestic production of critical clean energy products and materials. In particular, the 48C program provides a carve-out for projects in communities with closed coal plants and mines, where the existing infrastructure and workforce are well-suited to the demands of new clean energy manufacturing.

Interagency News and Updates (continued)

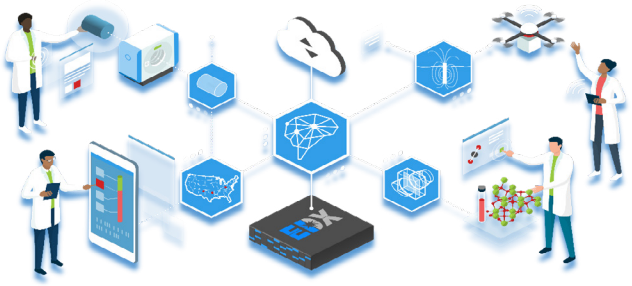
Highlights from LPO's June 2023 Newsletter

The DOE Loan Programs Office (LPO) webinar "Introducing New Guidance for the Title 17 Clean Energy Financing Program" details new program guidance, which updates project eligibility, application requirements, and evaluation criteria, consolidating several existing solicitations into one easy-to-read document. Download the slides and see LPO's Title 17 Clean Energy Financing Program webpage for more information. In the LPO Sector Spotlight, Director Jigar Shah examines how LPO is supporting carbon management projects across the United States. Director Shah also details how LPO partners with FECM to offer access to capital for large-capacity, common-carrier CO_2 transport projects under the Carbon Dioxide Transportation Infrastructure Finance and Innovation Act (CIFIA) Program. The LPO Tech Talk: Carbon Management provides a general overview of LPO's projects across the carbon management value chain, including PSCC; transport, utilization, and storage; and atmospheric CDR.

Pathways to Commercial Liftoff: Carbon Management Webinar Held

DOE's Pathways to Commercial Liftoff is a department-wide initiative to strengthen engagement between the public and private sectors to accelerate the commercialization and deployment of key clean energy technologies. The initiative's reports provide the private sector and other industry partners a valuable, engagement-driven resource on how and when certain technologies—beginning with advanced nuclear, carbon management, clean hydrogen, and long-duration energy storage—can reach full-scale deployment. The latest report discusses the carbon management ecosystem, including PSCC, utilization, storage, and CDR technologies, as well as barriers to carbon management technology deployment at scale. More information on DOE's Pathways to Commercial Liftoff is available here.

DOE Memo Enhances Energy Research Data Access



In late 2022, Assistant Secretary of FECM Brad Crabtree signed a memo recognizing the importance of preserving all data gathered within the FECM R&D portfolio, where it will be made publicly available via assets like EDX. The memo from Assistant Secretary Crabtree complies and supports guidance related to public access to federally funded R&D products, requiring all finalized data products associated with FECM-funded work to be contributed to EDX. FECM research teams have voluntarily used and contributed to EDX over the years, but the memo elevates the stakes.

Interagency News and Updates (continued)

NETL Discovers Potential Sources of Platinum Group Metals as Part of a Process for CDR

NETL researchers discovered valuable quantities of platinum group minerals (PGMs)—precious metal commodities that are critical for the clean energy economy. The discovery was a byproduct of research at NETL in Albany, Oregon, the home for mineral processing R&D. The federally funded research focused on pulling critical minerals from ultramafic rocks before they are subjected to enhanced mineralization or natural weathering—processes that accelerate the decomposition of calcium and magnesium-rich silicate rocks and a chemical reaction that removes CO_2 from the atmosphere. Ultramafic rocks contain minerals that are naturally highly reactive to CO_2. Researchers believe that enhanced mineralization can help stabilize and store CO_2.

NETL researchers led by Jon Yang, Ph.D., discovered platinum group minerals—extremely rare mineral commodities used in industrial applications and consumer products—in samples from the Twin Sisters olivine mine in Whatcom County, Washington.

DOE Announces Winners of the First Annual Carbon Management Collegiate Competition

FECM announced the winners of the American-Made Carbon Management Collegiate Competition. The competition challenged students to help shape the future of carbon management by proposing regional carbon networks capable of transporting at least one million metric tons of CO_2 per year from industrial sources such as power plants or ethanol production facilities to locations that either use the CO_2 to manufacture products or for permanent storage. The Carbon Management Collegiate Competition inspired students to envision a bright future for carbon capture, storage, and transportation industries. Participating students learned industry-relevant skills and gained hands-on experience in carbon management development.

University Training and Research Fact Sheet Released

The UTR Program supports novel, early-stage research at U.S. colleges and universities that advances the FECM mission of delivering integrated solutions related to minimizing the environmental impacts of fossil fuels while working toward net-zero emissions. By investing in the education and training of America's future scientists and engineers, this program highlights the key role technology plays in addressing America's energy challenges, promotes the development of innovative and disruptive technologies, and reinforces workforce development as a part of the nation's continued economic prosperity. The UTR Program, which provides opportunities for traditionally underrepresented communities in science, technology, engineering, and mathematics (STEM) fields, consists of two sub-programs: HBCU–MSI and UCR.

Proceedings for Transport Workshop Now Available

Proceedings for DOE's Roadmap for CO_2 Transport Fundamental Research Workshop are now available. Presentations are provided from DOE laboratories and other partners, including those from academia and industry.

Interagency News and Updates (continued)

SSAE June Newsletter Released

The June 2022 edition of the Strategic Systems Analysis and Engineering (SSAE) Newsletter provides updates about recent research initiatives undertaken within NETL's SSAE directorate. This latest edition details activities that SSAE is leading to gain insights into new energy concepts, support the analysis of energy system interactions, and advance its capabilities.

Biden-Harris Administration Invests Funding to Expand Infrastructure to Support CO_2 T&S

DOE announced $251 million to support 12 selected projects across seven states that will bolster the nation's carbon management capabilities. The projects, funded by the Bipartisan Infrastructure Law (BIL), will expand CO_2 transport and storage (T&S) infrastructure to help significantly and responsibly reduce CO_2 emissions from power generation and industrial operations. In addition, DOE announced the second opening of a five-year, $2.25 billion funding opportunity to provide for the continuous development of commercial-scale carbon storage infrastructure. Expanding commercial CO_2 T&S will provide new economic opportunities and help achieve President Biden's goal of a net-zero emissions economy by 2050.

FECM's Engagement Home Page

FECM fosters and leverages connections with international and domestic partners; collaborates within DOE and the broader U.S. government; supports community, tribal, and stakeholder engagement; and encourages public-private partnerships to assist in meeting the Biden-Harris administration's climate goals. FECM's Engagement page includes links to upcoming events, news and blogs, and other resources.

CDR Interactive Project Map

The CDR interactive project map contains information for active and inactive projects managed under NETL's PSCC and CDR Programs. The map data can be filtered to view specific information related to projects with certain criteria, such as the point source capture approach, technology, ending scale, application type, and key technology.

Apply to Review FECM Funding Opportunity Applications

FECM is looking for a diverse pool of individuals to review the equity, justice, jobs, and community engagement sections of funding opportunity applications. To apply to review, send a resume to SCI_FECM@NETL.DOE.GOV. Reviewers should have academic, subject matter, and/or practitioner experience in at least one of following areas: diversity, equity, inclusion, and accessibility; community and stakeholder engagement; workforce development and quality jobs; and/or environmental justice.

DOE STEM Portal

DOE is building pathways for a diverse workforce to pursue STEM careers. 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)

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. In the next few years, the BIL will stand up 60 new DOE programs, including 16 demonstration and 32 deployment programs, and expand funding for 12 existing research, development, demonstration, and deployment 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

FECM/NETL Carbon Management Research Project Review Meeting

The FECM/NETL 2022 Carbon Management Project Review Meeting will be held Aug. 28–Sept. 1, 2023, in Pittsburgh, Pennsylvania. This meeting will share knowledge and insights from the following FECM R&D programs: PSCC, CDR, Carbon Conversion, and CTS. A mixture of plenary, multi-topic breakout, and interactive poster sessions will be used 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 USEA's inaugural CMTS. *Note that registration for the CMTS is separate from the registration for the 2023 FECM/NETL Carbon Management Research Project Review Meeting.*

North America CCS & Hydrogen Decarbonization Summit

The North America CCUS & Hydrogen Decarbonisation Summit, to be held Sept. 12–13, 2023, in Chicago, Illinois, will assess and review opportunities within the North American Energy Sector and review hydrogen roadmaps set out by different states. The summit will also focus on the implementation of CCS and carbon capture, utilization, and storage (CCUS) within industrial operations and how hydrogen can decarbonise industry and transport.

Carbon Capture Canada

Carbon Capture Canada, to be held Sept. 12–14, 2023, in Alberta, Canada, showcases Canada's opportunity for carbon capture, underground storage, and technology innovation. The event includes a three-day convention, with a two-day business conference, expanded tradeshow floor, and in-person tour of CCUS projects.

U.S. and International Events (continued)

PCCC-7

The 7th International Energy Agency Greenhouse Gas R&D Program Post Combustion Capture Conference (PCCC-7) will be in person, Sept. 25–27, 2023, in Pittsburgh, Pennsylvania. The conference format will consist of a two-stream program for oral presentations, a poster session, and a small exhibition area. NETL and DOE will co-host PCCC-7, bringing together post-combustion capture experts to share knowledge, findings, and expertise. An optional tour of NETL's Pittsburgh facility will be offered Sept. 28, 2023.

Pittsburgh Coal Conference

The 2023 International Pittsburgh Coal Conference, to be held in Istanbul, Turkey, Oct. 4–6, 2023, is an outgrowth of a series of conferences spanning more than three decades, dealing with coal utilization, both in the United States and internationally. The conference will provide opportunity for in-depth and focused exchange of technical information and policy issues among representatives from industry, government, and academia throughout the world.

2023 AIChE Annual Meeting

The 2023 American Institute of Chemical Engineers (AIChE) Annual Meeting, to be held Nov. 5–10, 2023, in Orlando, Florida, is an educational forum for chemical engineers interested in innovation and professional growth. Academic and industry experts will cover wide range of topics relevant to cutting-edge research, new technologies, and emerging growth.

2023 NCCC & Expo

The 2023 National Carbon Capture Conference (NCCC) & Expo 2023, to be held Nov. 7–8, 2023, in Des Moines, Iowa, is a two-day event designed for companies and organizations advancing technologies and policy that support the CDR from all sources, including fossil fuel-based power plants, ethanol production plants, and industrial processes, as well as directly from the atmosphere. The program will focus on research, data, trends, and information on all aspects of CCUS with the goal to help companies build knowledge, connect with others, and better understand the market and carbon utilization.

Appalachian Hydrogen and Carbon Capture Conference 2023

The Appalachian Hydrogen & Carbon Capture Conference, to be held, Nov. 30, 2023, in Canonsburg, Pennsylvania, will feature several speakers who work closely with DOE and understand the workings of both the government and the oil and gas industry.

UNFCCC COP 28

The 2023 United Nations Climate Change Conference (UNFCCC), to be held Nov. 30–Dec. 12, 2023, in Dubai, United Arab Emirates, will comprise the 28th meeting of the Conference of the Parties (COP 28); the fifth meeting of the COP serving as the Meeting of the Parties to the Paris Agreement; the 18th meeting of the COP serving as the Meeting of the Parties to the Kyoto Protocol; the 59th meeting of the Subsidiary Body for Implementation; and the 59th meeting of the Subsidiary Body for Scientific and Technological Advice.

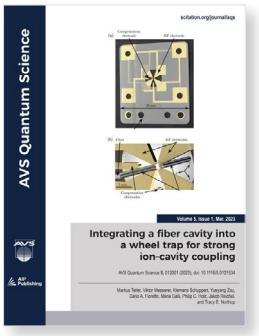
Business and Industry News

DAC Technology Licensed to Knoxville-Based Holocene

An innovative and sustainable chemistry developed at DOE's Oak Ridge National Laboratory (ORNL) for capturing CO_2 from air has been licensed to Holocene, a Knoxville-based startup focused on designing and building plants with direct air capture (DAC). The process uses an aqueous solution containing ORNL-discovered receptors called Bis-iminoguanidine (BIGs) to absorb CO_2. As this happens, BIGs turn into an insoluble crystalline salt, which can easily be separated from the liquid solution. The research team discovered this new chemistry by chance while conducting fundamental crystallization experiments. The resulting Bis-Iminoguanidine Negative Emission Technology, or BIG-NET, received an R&D 100 Award in 2021.

Quantum Computing for Carbon Capture Simulations

Scientists from NETL and the University of Kentucky used a quantum algorithm and simulator to study the chemical reactions underlying one of the most popular commercial solvents used in atmospheric carbon capture. The team demonstrated that their quantum resources were capable of computing chemical reactions of larger molecules that were unsolvable on classical supercomputers. Their results were published in AVS Quantum.



HEP Selected for Funding Opportunity Through DOE's Carbon Capture Technology Program

Howard Energy Partners (HEP) has been selected for a $3 million funding opportunity through DOE's Carbon Capture Technology Program. The federal funding will be used to evaluate the technical and economic feasibility of transporting up to 250 million tons per year of CO_2 from multiple sources in the Gulf Coast region along a pipeline pathway between Corpus Christi, Texas, and the Mississippi River. HEP was one of only three projects selected to focus on FEED as part of the DOE's investment to bolster the nation's carbon management capabilities.

CCUS Webinar Presentation Now Available

A CETPartnership informational webinar was held on June 12, 2023, to present possibilities within CCUS, hydrogen, and renewable fuels. DOE is a member of CETPartnership and has committed to funding projects focused on hydrogen and CCUS.

Information Event for Upcoming CETPartnership Call 2023

All interested stakeholders are invited to join the December 6, 2023, information event to find out more about the Transition Initiatives 3 (TRI 3) and TRI 6 Call Modules for the upcoming CETPartnership call 2023. Join the meeting here.

Publications

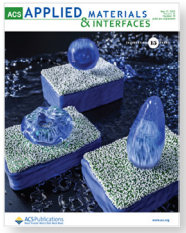
Single polymer sorbent fibers for high performance and rapid direct air capture

ALI K. SEKIZKARDES, VICTOR A. KUSUMA, JEFFREY T. CULP, PATRICK MULDOON, JAMES HOFFMAN, JANICE A. STECKEL, DAVID HOPKINSON, JOURNAL OF MATERIALS CHEMISTRY A, ISSUE 22, 2023. SUBSCRIPTION MAY BE REQUIRED.

Encapsulation of Nanoparticle Organic Hybrid Materials within Electrospun Hydrophobic Polymer/Ceramic Fibers for Enhanced CO_2 Capture

KYLE D. KERSEY, GAHYUN ANNIE LEE, JEFFREY H. XU, MICHELLE K. KIDDER, AH-HYUNG A. PARK, YONG LAK JOO, ADVANCED FUNCTIONAL MATERIALS, MAY 16, 2023. SUBSCRIPTION MAY BE REQUIRED.

Implementation of a Core–Shell Design Approach for Constructing MOFs for CO_2 Capture

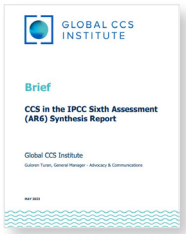


YIWEN HE, PAUL BOONE, AUSTIN R. LIEBER, ZI TONG, PRASENJIT DAS, KATHERINE M. HORNBOSTEL, CHRISTOPHER E. WILMER, NATHANIEL L. ROSI, ACS APPL. MATER. INTERFACES, VOLUME 15, ISSUE 19, MAY 4, 2023.

Modeling and optimization of carbon-negative NGCC plant enabled by modular direct air capture

PENGFEI CHENG, DAVID M. THIERRY, HOWARD HENDRIX, KATHERINE D. DOMBROWSKI, DARSHAN J. SACHDE, MATTHEW J. REALFF, JOSEPH K. SCOTT, APPLIED ENERGY, VOLUME 341, JULY 1, 2023. SUBSCRIPTION MAY BE REQUIRED.

CCS in the IPCC Sixth Assessment (AR6) Synthesis Report



GULOREN TURAN, GLOBAL CCS INSTITUTE, MAY 2023.

Net-zero CO_2 by 2050 scenarios for the United States in the Energy Modeling Forum 37 study

MORGAN BROWNING, JAMES MCFARLAND, JOHN BISTLINE, GALE BOYD, MATTEO MURATORI, MATTHEW BINSTED, CHIOKE HARRIS, TRIEU MAI, GEOFF BLANFORD, JAE EDMONDS, ALLEN A. FAWCETT, OZGE KAPLAN, JOHN WEYANT, ENERGY AND CLIMATE CHANGE, VOLUME 4, DECEMBER 2023. SUBSCRIPTION MAY BE REQUIRED.

Energy Technology Perspectives 2023

INTERNATIONAL ENERGY AGENCY, JANUARY 2023.

Credible Pathways to 1.5°C

INTERNATIONAL ENERGY AGENCY, APRIL 2023.

Asymmetric chloride-mediated electrochemical process for CO_2 removal from oceanwater

SEONI KIM, MICHAEL P. NITZSCHE, SIMON B. RUFER, JACK R. LAKE, KRIPA K. VARANASI, T. ALAN HATTON, ENERGY & ENVIRONMENTAL SCIENCE, ISSUE 5, 2023.

About DOE Carbon Capture:

DOE/NETL is developing the next generation of advanced CO_2 capture technologies through NETL's Point Source Carbon Capture Program (PSCC) and advancing a diverse set of CDR approaches to directly remove CO_2 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

- Carbon Dioxide Removal Program Fact Sheet
- Carbon Capture Infographics
- Interactive Project Maps: PSCC and CDR
- Compendium of Carbon Capture Technology
- Carbon Dioxide Capture Handbook
- CCSI^2
- Systems Analysis
- Conference Proceedings
- Accomplishments Posters: PSCC and CDR

Contact Us

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Andrew Jones, Carbon Dioxide Removal Technology Manager, 412.386.5531

Amishi Claros, Acting Director, CO_2 Removal and Conversion, 202.586.1888

Dan Hancu, DOE Senior Program Manager, Point Source Carbon Capture, 240.220.1186

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626 Cochran Mill Road
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Program staff are also located in **Houston, Texas** and **Anchorage, Alaska**

CUSTOMER SERVICE: 1-800-553-7681

www.netl.doe.gov

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