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. 22, NO. 11

CARBON TRANSPORT and STORAGE PROGRAM DOCUMENTS and REFERENCE MATERIALS

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

DOE/FECM/NETL HIGHLIGHTS

DOE Announces Set of FOAs to Manage and Store CO_2.

The U.S. Department of Energy (DOE) announced a set of funding opportunities to bolster investments in the carbon management industry and to reduce carbon dioxide (CO_2) emissions released into the atmosphere through power generation and industrial operations. The three Funding Opportunity Announcements (FOAs) will be supported by Bipartisan Infrastructure Law (BIL) funding to help drive the demonstration and deployment of carbon capture systems, along with carbon transport and storage infrastructure. The ***Carbon Storage Validation and Testing*** FOA supports the ***Carbon Storage Assurance Facility Enterprise (CarbonSAFE) Initiative*** and provides up to $2.25 billion to support the development of new and expanded large-scale, commercial carbon storage projects with capacities to store 50 or more million metric tons of CO_2, along with associated CO_2 transport infrastructure. The ***Carbon Capture Demonstration Projects Program*** FOA provides up to $2.54 billion to develop six integrated carbon capture, transport, and storage demonstration projects that can be readily replicated and deployed at fossil energy power plants and major industrial sources of CO_2 and certain types of chemical production facilities. The ***Carbon Dioxide Transport Engineering and Design*** FOA provides up to $100 million to design regional CO_2 pipeline networks to safely transport captured CO_2 from key sources to centralized locations.

From *energy.gov*. September 2022.

CONTINUE

ANNOUNCEMENTS

DOE Accepting LOIs for Loans Under CO_2 Transportation Infrastructure Finance and Innovation Program.

DOE is accepting Letters of Interest (LOIs) from applicants for loans under a new $2.1 billion Carbon Dioxide Transportation Infrastructure Finance and Innovation (CIFIA) Program. Enacted under the BIL, CIFIA offers funding for large-capacity, shared CO_2 transportation projects located in the United States. Appropriated annually through 2026, CIFIA will support shared infrastructure projects that connect anthropogenic sources of carbon with endpoints for its storage or utilization. The program is administered jointly by DOE's Loan Programs Office (LPO) and Office of Fossil Energy and Carbon Management (FECM). Additional details on eligibility, priority considerations, and financial terms and conditions are available on the ***CIFIA website***.

DOE Invests in Projects and Programs to Advance CCS.

DOE/FECM ***invested more than $6 million*** to support the University Coal Research (UCR) Program and the Historically Black Colleges and Universities and Other Minority Institutions (HBCU-OMI) Program. Both programs will fund projects that explore biomass feedstocks blended with waste coal and coupled with carbon capture and storage (CCS). DOE/FECM also ***invested more than $31 million*** to advance CCS for the natural gas power and industrial sectors. The selected projects will develop carbon capture technologies capable of capturing at least 95% of CO_2 emissions from natural gas power plants, waste-to-energy power plants, and industrial applications.

DOE Issues NOI for Carbon Storage FOA.

DOE issued a Notice of Intent (NOI) for an FOA titled "***Regional Initiative to Accelerate Carbon Management Deployment: Technical Assistance for Large-Scale Storage Facilities and Regional Carbon Management Hubs***." The objective of the planned FOA is to establish a consistent, effective mechanism for providing technical assistance to develop multiple large-scale carbon storage facilities and regional carbon management hubs that could store hundreds of millions of tons of CO_2 and inject more than 5 million metric tons of CO_2 per year.

White House Establishes Office of Clean Energy Innovation and Implementation.

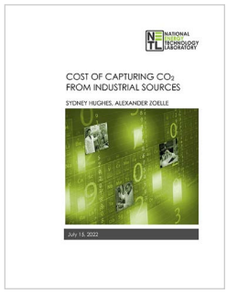
The White House announced the establishment of the White House Office on Clean Energy Innovation and Implementation within the Executive Office of the President. The office will help implement the Inflation Reduction Act of 2022 (IRA).

NREL Strategies for 100% Clean Energy.

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

A team of National Renewable Energy Laboratory (NREL) researchers studied tradeoffs of six possible technology strategies to get from 90% to 100% carbon-free electricity in the United States. The study was ***published in the online journal Joule***.

NETL Explores CO_2 Capture Retrofit Costs for Industrial Sources.

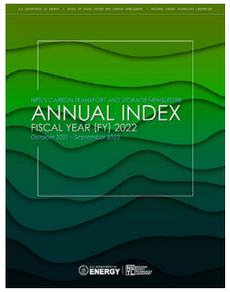


The National Energy Technology Laboratory (NETL) published "***Cost of Capturing CO_2 From Industrial Sources***," an update to ***a 2014 study*** that examines the costs of retrofitting a variety of industrial processes with state-of-the-art CO_2 capture systems. The report is accompanied by NETL's Industrial Sources ***Carbon Capture Retrofit Database (CCRD)***, a tool that enables users to estimate the cost of capture for a given industrial plant or an entire industrial sector using either study assumptions or user inputs.

DOE Announces Funding for CDR and Carbon Conversion.

DOE/FECM announced funding for research and development (R&D) projects to advance carbon dioxide removal (CDR) and carbon conversion technologies. Direct air and ocean capture of CO_2, with storage of the captured CO_2 in geologic formations or converted to value-added products, has a critical role in helping the United States achieve the Biden-Harris administration's goal of net-zero greenhouse gas (GHG) emissions by 2050.

FY 2022 Carbon Transport and Storage Newsletter Annual Index Available.



The FY 2022 Carbon Transport and Storage Newsletter Annual Index is available. The document is a compilation of NETL's Carbon Transport and Storage Newsletters published from October 2021 through September 2022.

NETL Releases 2022 Compendium of Carbon Capture Technology.

Compiled biannually to provide a technical summary of CO_2 capture technology R&D sponsored by DOE/NETL's ***Point Source Capture*** (PSC) and ***Carbon Dioxide Removal*** (CDR) Programs, ***NETL's 2022 Compendium of Carbon Capture Technology*** presents 124 projects in a single document, all of which were active between October 1, 2019, and October 1, 2021.

USDA Investment Includes Carbon Storage Project.

USDA

The U.S. Department of Agriculture (USDA) announced investments under the ***Partnerships for Climate-Smart Commodities*** funding opportunity, which will create market opportunities for American commodities produced using climate-smart production practices. USDA anticipates that these projects will result in more than 50 million metric tons of CO_2-equivalent stored over the life of the projects.

ANNOUNCEMENTS *(cont.)*

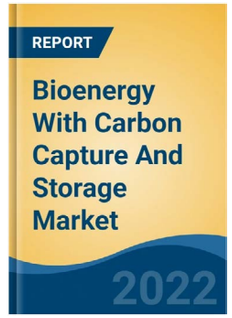
PA Holds Informational Briefing on CCUS.

Government and industry officials conducted an informational briefing about Pennsylvania's (USA) potential as a carbon capture, utilization, and storage (CCUS) hub. Earlier this year, a co-sponsorship memo was circulated to establish the Pennsylvania Geologic Storage of Carbon Dioxide Act, which would create a legal and regulatory framework for CCS projects in the state.

Summit Carbon Solutions Achieves Milestone.

Summit Carbon Solutions has secured easement agreements for more than half of the proposed route for a planned carbon capture, transport, and storage project in Iowa (USA). The 1,400 easement agreements with 800 Iowa landowners total nearly 350 miles.

BECCS Market Projected to Grow.



According to a report by Research and Markets, the global bioenergy with carbon capture and storage (BECCS) market is projected to grow throughout 2023–2027. "***Bioenergy With Carbon Capture And Storage Market – Global Industry Size, Share, Trends, Opportunity and Forecast, 2017-2027 Segmented By End Use, By Technology, By Form of Energy, By Application, By Region***" outlines the demand for biofuels and the production of biofuels to obtain energy from biomass.

Companies to Assess CCS for Maritime.

BASF and Samsung Heavy Industries will collaborate on CCS onboard maritime vessels by conducting a feasibility assessment of BASF's OASE® blue technology for flue gas applications. The scope of the Memorandum of Understanding includes a marinization study, as well as engineering design and construction of a carbon capture unit.

PROJECT AND BUSINESS DEVELOPMENTS

EPA Approves MRV Plan for CO_2 Storage.

Stakeholder Midstream received approval from the U.S. Environmental Protection Agency (EPA) for its monitoring, reporting, and verification (MRV) plan to store CO_2 in its injection well in Yoakum County, Texas (USA). The well currently injects more than 70,000 metric tons of CO_2 per year but had a permitted capacity of more than 375,000 metric tons. The well is located near several interstate CO_2 pipelines.

From *Midland Reporter-Telegram*. September 2022.

Large-Scale DAC Project Launched in Wyoming.

CarbonCapture announced the launch of a large-scale direct air capture (DAC) project in Wyoming (USA). Project Bison is expected to be operational by the end of 2023, and is expected to be capable of capturing and storing 5 million tons of CO_2 per year by 2030.

From *Reuters*. September 2022.

Collaboration to Provide Support for CCS Projects.

The International CCS Knowledge Centre and energy consulting firm GLJ signed a teaming agreement to support the development of large-scale CCS/CCUS projects. The two Canadian companies will identify opportunities for collaboration as Canada develops a national strategy for CCS, including the implementation of an investment tax credit.

From *International CCS Knowledge Centre Media Release*. September 2022.

Energy Companies to Develop Technologies to Reduce Emissions.

Offshore energy companies in Brazil have entered into a joint research and technology development project focused on developing technologies to reduce carbon emissions. The project, named i-Concept JIP Phase 2, will address subsea factory and advanced subsea processing systems, enhanced oil recovery (EOR) by injection of CO_2, and CCUS. The participants include Repsol Sinopec Brasil, Shell Brasil Petróleo, and Deep Seed Solutions, among others.

From *Offshore Energy*. September 2022.

North Sea CCS Monitoring Pilot Project Completed.

Magseis Renewables completed a high-resolution, 3D seismic data acquisition offshore Norway over a CCS area. The company utilized its extended high-resolution acquisition technology, combined with ocean bottom nodes, to provide imaging of the targeted carbon storage reservoir and the overburden.

From *Offshore Energy*. September 2022.

LEGISLATION AND POLICY

California Bill to Create Regulatory Framework for CCUS.

Passed by the California state legislature, S.B. 905 requires the California Air Resources Board (CARB) to establish a Carbon Capture, Removal, Utilization, and Storage Program. In addition, the bill requires CARB to adopt regulations for a unified permit application for the construction of CCUS projects, develop a centralized database to track the deployment of CCUS and CDR technologies and the development of CCUS projects, adopt protocols to support additional and new methods of CO_2 utilization or storage, and adopt financial responsibility regulations applicable to CCUS projects.

From *JD Supra*. September 2022.

Legislation Spurs Plans for CCS Plant in WV.

Competitive Power Ventures Inc. announced plans to build a natural gas power plant in West Virginia (USA) with CCS technology. The IRA expanded the 45Q tax credit for industry and power, increasing the credit from $50 to $85 per metric ton of CO_2 stored through geologic storage, and from $35 to $60 per metric ton of CO_2 stored via EOR.

From *E&E News*. September 2022.

EPA Conducting Outreach on Power Plant Carbon Regulations.

EPA opened a non-regulatory ***docket*** to collect written input from "a broad group of stakeholders," seeking their input on how to write rules to address power plant carbon emissions. EPA held a series of virtual meetings with stakeholders earlier this year to solicit advice on structuring standards for new and existing fossil fuel power plants under a specific section of the Clean Air Act. EPA plans to release proposals to limit carbon from new and existing coal and natural gas power plants in 2023.

From *E&E News*. September 2022.

Australia Passes Law for Net-Zero Emissions by 2050.

Australia's parliament passed government legislation pledging to reduce CO_2 emissions by 43% by 2030 and to net zero by 2050. The emissions reduction target for 2030 is 50% more than previous targets.

From *Reuters*. September 2022.

EMISSIONS TRADING

RGGI Auction Results Announced.

The states participating in the Regional Greenhouse Gas Initiative (RGGI) announced the results of the 57th RGGI auction of CO_2 allowances. A total of 22,404,023 CO_2 allowances were sold at a clearing price of $13.45 (bids ranged from $2.44 to $20.00 per allowance). None of the 11.61 million cost containment reserve (CCR) allowances made available were sold, nor were any of the 10.96 million emissions containment reserve (ECR) allowances. (The CCR is a fixed additional supply of allowances made available for sale if an auction's interim clearing price exceeds $13.91. The ECR is a designated quantity of allowances to be withheld if an auction's interim clearing price is below $6.42.) Additional details are available in the ***Market Monitor Report for Auction 57***.

From *RGGI Press Release*. September 2022.

SCIENCE

NETL Research Finds Some Rock Formations Could "Self-Heal" Fractures in Presence of CO_2.

Using unique laboratory equipment, NETL researchers were able to determine that certain rock formations have the ability to self-seal fractures in the presence of stored CO_2, meaning igneous rock intrusions in the eastern United States could potentially store CO_2 underground. The results of the research were ***published in an NETL report*** and an article in ***the Geological Society of London***. The primary objective of the study was to characterize core from depth with methods not available to most researchers. The study provides a baseline set of measurements to examine the reactivity of the cores when exposed to CO_2.

From *NETL News*. September 2022.

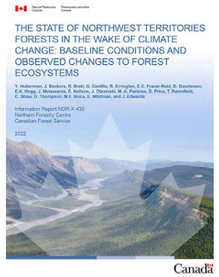
EU Briefing on Soil Carbon.

The European Environment Agency published a briefing on soil carbon based on information extracted from 2021 national GHG inventories. The briefing also provides an overview of the status of soil carbon pools across Europe.

From *European Environment Agency*. September 2022.

SCIENCE *(cont.)*

Report Details CO_2 Storage in NWT of Canada.



According to a ***previously published report*** by Natural Resources Canada, forests in the Northwest Territories (NWT) of Canada stored more CO_2 than the entire territory released in 25 of the 30 years studied. The purpose of the report was to provide baseline information about NWT forests that can be used to measure future changes, such as those caused by climate change. The report also includes details about carbon stored in the natural environment.

From *CBC*. September 2022.

University of Sydney Soil Research Projects to Benefit Carbon Storage.

The University of Sydney received a federal grant from the Australian government to fund soil research projects to build a new knowledge base to support practices and improve productivity, profitability, and climate resilience for Australian farmers. One of the projects will provide an understanding of the role soil viruses play in promoting and maintaining soil health, carbon storage, and nutrient cycling. Another project will explore the interaction of various components in soils to better understand their linkages and benefits to soil carbon storage.

From *The University of Sydney*. September 2022.

Researchers Develop Kelp Aquaculture Model to Maximize Carbon Storage.

Researchers from the University of Maine (USA), in collaboration with Conscience Bay Research, have developed a kelp aquaculture model for the Gulf of Maine that maximizes carbon storage and cost-effectiveness as a carbon sink. Using 18 different variables, the researchers created a model for kelp aquaculture in the region and were able to reduce the cost of carbon storage through kelp aquaculture from $17,048 per ton of CO_2 equivalent to $1,257. The study was ***published in Frontiers of Marine Science***.

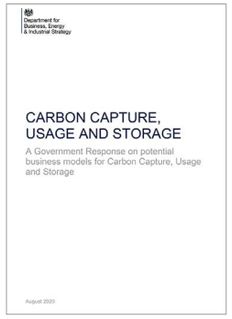
From *The University of Maine*. September 2022.

PUBLICATIONS

CO_2 Intermediate Storage (CIS) Concept Overview.

The following is from the Introduction of this DOE/NETL report: "…Several studies and feedback from industry stakeholders have proposed CO_2 intermediate storage (CIS) as one strategy that could buffer variations in anthropogenic CO_2 supply and demand…The objective of this overview is to provide a comprehensive set of qualitative considerations to inform future quantitative technical and economic CIS analyses. This overview focuses on CO_2 EOR as the end-user for CCUS supply chains that might implement CIS. CO_2 EOR is currently the most common end-use for anthropogenic CO_2. Worldwide, CO_2 EOR currently utilizes approximately 78 percent of all anthropogenic CO_2 captured; in the United States (U.S.), 95 percent of all anthropogenic CO_2 captured is utilized by CO_2 EOR end-users. Beside the environmental benefit, CO_2 EOR promotes U.S. energy independence through oil production and offsets CCUS CAPEX and OPEX with earnings from oil sales. This overview will add a comprehensive discussion of CIS-related topics to existing literature to provide a reference for future assessments, models, and analyses of subsurface CIS within CCUS supply chains."

Carbon Capture, Usage and Storage: A Government Response on potential business models for Carbon Capture, Usage and Storage.



The following is from the Executive Summary of this U.K. Department for Business, Energy & Industrial Strategy document: "Carbon Capture, Usage and Storage (CCUS) can play an essential role in reaching net zero. It can be an engine to drive cleaner, sustainable growth, transforming [the UK's] industrial heartlands. It can also unlock new jobs and innovative businesses, raising productivity and competitiveness across the UK. [The UK is] committed to deploying CCUS this decade. [The UK is] determined to realise the key strategic opportunities of CCUS in a way that is affordable and value of money for the consumer and taxpayer. Alongside the CCS Infrastructure Fund, announced at Budget, [the UK] will continue to develop and implement new CCUS business models. The consultation, 'Business Models for Carbon Capture, Usage and Storage', published in 2019, was a necessary first step in this process. It sought views on possible new business models for CCUS and outlined government's work in developing potential business models for low carbon hydrogen production."

PUBLICATIONS *(cont.)*

What are the potential paths for carbon capture and storage in Sweden? A multi-level assessment of historical and current developments.

The following is from the abstract of this article: "Carbon capture and storage (CCS), including bioenergy with carbon capture and storage (BECCS), could contribute to climate change mitigation strategies. However, the 2020s is not the first time that CCS is high on the agenda. This study explores the differences between the past and current developments of CCS and discusses how incumbent actors' experiences can inform the understanding of potential future energy system transitions in Sweden. For this purpose, a multi-level perspective (MLP) analysis was conducted based on documents, interviews and focus groups with key actors. Since the 2000s, increased urgency of climate change has further pushed policy makers into action. In addition, there is a new framing of CCS that underscores the potential of BECCS to provide negative carbon dioxide (CO_2) emissions, as well as prospects for offshore storage of CO_2 in Norway and other territories. As such, this study shows that Sweden could be on a transformation pathway towards implementing CCS alongside other mitigation measures."

Adrian Lefvert, Emily Rodriguez, Mathias Fridahl, Stefan Grönkvist, Simon Haikola, and Anders Hansson, *Energy Research & Social Science*. (Subscription may be required.)

New line-source solution and scaling relations for diffusive leakage of brine from an infinite aquifer-caprock composite domain during geological storage of CO_2.

The following is from the abstract of this article: "Diffusive leakage of heat or chemical species from the storage layers is ubiquitous in engineering systems. Understanding the measure of diffusive fields around the target layer may be used to better design a prospective engineering system and characterize anomalies in the observed pressure, chemicals, and temperature. [The authors] report a novel analytical solution to a widely occurring yet unsolved diffusion type problem where a storage layer with a line-source at the inner boundary is embedded in an infinite medium. The analytical difficulty posed by two-dimensional flow and mutual interaction between surrounding formations and storage layer is handled by successively applying Hankel and Laplace transforms. The obtained solution was verified analytically and compared with the classical Theis solution. Afterwards, [the authors] focus [their] discussion around CO_2 storage problem and analyze the pressure perturbation behavior, temporally and spatially, to identify the degree of dependency of model parameters. [The authors] identify that the diffusive leakage rate scales with the square root of nondimensional time. The distance to the maximum local radial leakage (Rmax) is found to be nonvariant to the model parameters and scales with the square root of the nondimensional time. It was found that more than 99% of the total leakage takes place within 5Rmax radius from the injection point..."

Ayon Kumar Das, Morteza Dejam, and Hassan Hassanzadeh, *International Journal of Greenhouse Gas Control*. (Subscription may be required.)

Effects of CO_2 adsorption on molecular structure characteristics of coal: Implications for CO_2 geological sequestration.

The following is from the abstract of this article: "With a series of global problems such as greenhouse effect caused by the gradual increase of atmospheric CO_2 concentration, CO_2 geological storage has become one of the effective measures. To study the influence of the interaction between CO_2 and coal on the molecular structure characteristics of coal, three coals of different ranks were selected for CO_2 adsorption and were subjected to X-ray diffraction, Raman spectroscopy and Fourier transform infrared spectroscopy experiments. The results indicate that with increasing of CO_2 pressure: 1) Due to the solubility differences of different minerals, the contents of quartz in the coal samples gradually increases, while the contents of calcite, pyrite and kaolinite decreases; 2) The average number of the aromatic layers gradually decreased indicates that some aromatic layers are destroyed and order degree is lowered in the coal microcrystalline structure, resulting in a gradual increase of the inter-layer spacing between aromatic layers, the stacking of aromatic layers; 3) The concentration of aromatic rings gradually decreases leading to the intermolecular structural defects are obvious and the gradual evolution of the microcrystalline structure into the more disordered crystal structure; 4) The hydroxyl groups are predominated by oxidation reactions in long-flame coal and lean coal, while they are mainly governed by swelling in anthracite; 5) The ratio between aliphatic and total hydrogen atoms (H_{al}/H), aliphatic structure (I_1) and 'A' factor values of the anthracite reveal a slight increase, while the aromaticity 2 (AR2) and degree of condensation 2 (DOC2) values display a decreasing trend. These values of long-flame coal and lean coal only slightly change. The influence of CO_2 intrusion on coal properties due to the changes of molecular structure and CO_2 trapping mechanisms are discussed. [The authors'] research contributes to understand deeply the geological sequestration of CO_2 in coal seams and higher CO_2 injection pressures should be adopted."

Xiaolei Wang, Huihui Liu, Dongming Zhang, Xiuzhu Yuan, Ping Zeng, and Hao Zhang, *Fuel*. (Subscription may be required.)

PUBLICATIONS *(cont.)*

Pore fluid substitution effects on elastic wave propagation in Berea sandstone: Implication to seismic monitoring of CO_2 geologic storage.

The following is from the abstract of this article: "This study presents an experimental demonstration of seismic monitoring of CO_2 geologic storage based on the observation of pore fluid substitution effects on elastic wave propagation along a core sample of Berea sandstone. Two-phase core flooding of distilled water (H_2O) and supercritical carbon dioxide ($scCO_2$) was characterized with ultrasonic measurements along a sample in subsurface conditions (750–800 m depth). [The authors'] experimental results show that the compressional (P) wave propagation was clearly sensitive to the pore fluid substitutions between CO_2 and H_2O; however, the shear (S) wave was not. The dynamic bulk modulus of water-saturated samples was considerably higher than that of dry or CO_2-saturated samples with ~22% porosity, whereas little variation was seen in the dynamic shear modulus, regardless of pore fluids. Changes in P-wave velocity, amplitude, and phase were observed during the gradual substitutions of pore fluids; however, no clear changes were seen in the S-wave. Hysteresis in the P-wave characteristics occurred between drainage and imbibition, which was likely due to the different wettability of the two fluids. The characteristics also depend on the distribution (parallel or serial) of the two fluids in the sample as well as the volumetric fractions of the fluids. Thus, no unique relationship exists between the seismic characteristics and the CO_2 saturation degree, rather it also depends on the capillary pressure and the compressibility ratio of the two fluids. [The authors'] results suggest that time-lapse seismic records are satisfactory for detecting subsurface CO_2 plume appearance and migration, however, supplementary data are required for quantitative prediction of CO_2 volumetric distribution in the plume."

Aryong Yun and Insun Song, *International Journal of Greenhouse Gas Control*. (Subscription may be required.)

Low carbon optimal operation of integrated energy system based on carbon capture technology, LCA carbon emissions and ladder-type carbon trading.

The following is from the abstract of this article: "Facing the problem of the exhaustion of fossil energy and the low-carbon requirements of the power industry, low-carbon technology cooperates with market mechanisms to achieve low-carbon operation of the integrated energy system (IES). This paper establishes an IES considering carbon capture technology (CCT). Life cycle assessment (LCA) analysis the greenhouse gas emissions of different energy chains in IES. The normalized carbon emission coefficient is calculated. The carbon emission coefficient and the reward and punishment ladder-type carbon trading mechanism are used to calculate the carbon trading cost. And the economic benefits of carbon capture power plants are evaluated. Based on the constraints of the system's operating mechanism, with the optimal economic cost as the objective function, a low-carbon economic operating model is established in an integrated energy system that considers carbon capture technology. The model is analyzed through an example. In the example results, the total cost of the model is slightly increased by 3.2%. And the carbon emissions are greatly reduced by 72.66%. It proves that the reasonable planning of the carbon trading market and the transformation of high-carbon power plants can effectively promote the low-carbon development of IES."

Rutian Wang, Xiangyun Wen, Xiuyun Wang, Yanbo Fu, and Yu Zhang, *Applied Energy*. (Subscription may be required.)

Study on the basic physical conditions of CO_2 geologic sequestration reservoir in the Majiagou Formation in the Ordos Basin.

The following is from the abstract of this article: "Carbon dioxide capture and storage is one of the important ways to achieve large-scale CO_2 emission reduction and enhance the oil recovery. The site selection and potential assessment of CO_2 geological storage requires a systematic study of the basic physical conditions of the geological storage layer in the storage area, and the site selection and storage potential evaluation of CO_2 geological storage first require a systematic study of the basic physical conditions in the areas for CO_2 storage. Because of the insufficient research on the basic physical conditions of the Majiagou Formation in the Ordos Basin, this study mainly studies the top burial depth, ground temperature, formation pressure, and the density of CO_2 of the Majiagou Formation in the Ordos Basin. The research shows: (1) The top burial depth of the Majiagou Formation is a simple slope with high in the east and low in the west in the Ordos Basin. The temperature on the top of the Majiagou Formation gradually increases from 66–73°C in the east to 132–140°C. The pressure on the top of the Majiagou Formation gradually increased from 20–30 Mpa in the east to 30–40 Mpa in the west, which indicates that the modern underground pressure field of the Majiagou Formation belongs to the normal pressure system, and the temperature field belongs to the medium-low temperature system, which provides favorable geotemperature and pressure conditions for CO_2 injection and storage. (2) The CO_2 density on the top of the Majiagou Formation gradually rose from 740–790 kg/m^3 in the east to 950–1000 kg/m^3 in the west, which provides data support for CO_2 storage potential evaluation and provides methodology for the study of basic physical conditions of other CO_2 geological storage layers."

Ping Lu, Zun-sheng Jiao, Zhi-Zhan Wang, Yu-Ze Nan, Yong Bai, and Yan Ma, *Energy Reports*. (Subscription may be required.)

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 depositional environments. 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, basalt formations, and organic-rich shale basins—and to improve the understanding of how CO_2 behaves in the subsurface. These objectives are key to increasing 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:

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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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