

CSN

MARCH 2018

CARBON STORAGE
NEWSLETTER

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

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CARBON STORAGE PROGRAM
DOCUMENTS and
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DOE/NETL HIGHLIGHTS

DOE Announces Carbon Storage Program Funding Opportunity.

The U.S. Department of Energy's (DOE) Office of Fossil Energy (FE) announced the availability of funding for cost-shared research and development (R&D) projects in support of FE's *Carbon Storage Program*. The projects, which will be selected under the Funding Opportunity Announcement (FOA) "*Developing Technologies to Advance the Understanding of State of Stress and Geomechanical Impacts within the Subsurface*," will help to ensure safe and permanent geologic storage of carbon dioxide (CO₂), reduce risks, and inform policy associated with carbon storage operations. The National Energy Technology Laboratory (NETL)-managed projects will focus on two areas of interest: "Tools and Methods for Determining Maximum Principal Stress in the Deep Subsurface," which seeks projects to develop tools and methods for determining in-situ stress state in the deep subsurface, and "Methods for Understanding Impact of Vertical Pressure Migration Due to Injection on the State of Subsurface Stress," which seeks projects that will predict and compare with field observations the temporal and spatial stress and pressure changes in the underburden. From *energy.gov* on March 7, 2018.

ANNOUNCEMENTS

NETL Names Acting Director.

The DOE Assistant Secretary for Fossil Energy (ASFE) named Sean I. Plasynski the acting director of NETL. A 28-year veteran of Federal fossil energy research, Dr. Plasynski previously served as the executive director of NETL's Technology Development and Integration Center (TDIC), director of the Strategic Center of Coal, director of the Office of Coal and Power R&D, and Sequestration Technology manager.



Sean I. Plasynski, Acting Director

DOE Selects Projects to Receive Funding.

DOE's FE and NETL selected nine projects to receive funding for Phase I of the *Fossil Fuel Large-Scale Pilots* FOA. The projects selected have demonstrated technical success at the small-scale pilot stage and are ready to proceed to the large-scale development stage. DOE's FE also selected *seven projects* to receive funding for cost-shared R&D through the "Design and Testing of Advanced Carbon Capture Technologies" FOA. These projects will advance competitive operation of the Nation's fossil-based power-generation infrastructure by reducing energy consumption and capital costs associated with next-generation carbon capture systems. Lastly, DOE's FE selected *six projects* to receive funding under the "Novel and Enabling Carbon Capture Transformational Technologies" FOA. These projects will address the cost and operational challenges associated with current CO₂ capture technologies commercially available for industry.

CCS Facility Demonstrates Success.

The carbon capture and storage (CCS) facility at SaskPower's Boundary Dam Power Station located in Saskatchewan, Canada, was online for the entire month of January 2018, capturing 81,008 metric tons of CO₂ (approximately 81 percent of its max capacity). It marked the third time in more than a year that the facility had been online for the entirety of the month. Since startup in 2014, the facility has captured more than 1.9 million metric tons of CO₂.

Boundary Dam Power Station
(image courtesy of SaskPower)

ANNOUNCEMENTS *(cont.)*

Carbon Capture Coalition Launched to Further CCS Adoption.



The National Enhanced Oil Recovery Initiative (NEORI) has *rebranded* as the *Carbon Capture Coalition*, expanding its agenda following the reform and extension of the Federal Section 45Q tax credit for CO₂ storage. The Coalition's mission now includes, among other focus areas, working with government and stakeholders to support the development of CO₂ utilization and storage projects.

RGGI Report on Secondary Market.

The independent market monitor for the Regional Greenhouse Gas Initiative (RGGI) released a report containing information on the secondary market for RGGI CO₂ allowances, including future prices, market activity, and allowance holdings. Potomac Economics' "Report on the Secondary Market for RGGI CO₂ Allowances: Fourth Quarter 2017" addresses the period from October through December 2017.



PROJECT and BUSINESS DEVELOPMENTS

Climeworks Establishes New Market Mechanism with Carbon Storage.

Climeworks has signed several contracts for its new Carbon Dioxide Removal solution. Using direct air capture (DAC), Climeworks can remove CO₂ emissions from the atmosphere and store them underground via the CarbFix process in Iceland. Climeworks opened a commercial DAC plant in Hinwil, Switzerland, in May 2017, and, in October 2017, began participating in the CarbFix project in Iceland, where its DAC technology is capturing CO₂ to be mineralized and stored underground. From *Gasworld* on February 15, 2018.

Latrobe Valley Plants Looking at CCS.

CO2CRC is conducting a pre-feasibility study with Latrobe Valley power generators (located in Victoria, Australia) to explore retrofitting CCS technology. According to officials from CO2CRC, CCS technology has the potential to prolong the life of Latrobe Valley coal-fired generators, create jobs, and reduce the region's CO₂ emissions. Current CO2CRC research is being used to inform the CarbonNet project at Golden Beach (Victoria, Australia), where seismic seabed testing is being conducted to determine potential commercial-scale storage sites. From *Latrobe Valley Express* on February 12, 2018.



LEGISLATION and POLICY

Carbon Capture Bill Signed in to Law.

A bill to encourage technological innovation in carbon capture, utilization, and storage (CCUS), while also reducing CO₂ emissions, has passed U.S. Congress and was signed in to law. The *FUTURE Act, first introduced in July 2017*, supports maintaining a place for existing resources, such as coal, in the Nation's energy mix by encouraging the development and use of CCUS technologies and processes, while simultaneously spurring the adoption of low-carbon technologies to transform carbon emissions into useable products. In addition, the FUTURE Act extends and expands the 45Q tax credit to provide certainty to

utilities and other industrial sources, and incentivizes the build-out of industrial carbon capture products that use CO₂ and carbon monoxide (CO) for enhanced oil recovery (EOR) and carbon utilization. The bill also supports carbon capture technologies by increasing the "commence construction" window for carbon capture projects from five to seven years and the number of years to claim the credits from 10 to 12 years. From *U.S. Senator Heidi Heitkamp Press Release* on February 9, 2018.

EMISSIONS TRADING

Three-Way Joint Cap-and-Trade Auction Results Released.

California (USA), Québec, and Ontario (Canada) released the results of the first joint cap-and-trade auction of carbon allowances involving three jurisdictions. All of the 98,215,920 current (2016 and 2018) vintage CO₂ allowances sold at a settlement price of \$14.61, while 8,576,000 of the 12,427,950 advance (2021) vintage allowances sold at a settlement price of \$14.53. More information on the auction is *available online*. From *California Air Resources Board* on February 28, 2018.

New Timeline Proposed for Oregon's Cap-and-Trade Bill.

Oregon (USA) government officials proposed an *amendment* to a cap-and-trade bill. The *Clean Energy Jobs* Bill would cap Oregon's greenhouse gas (GHG) emissions in 2021 and launch a trading system for emissions permits. The amendment would allow lawmakers to vote on the "cap" for GHG emissions this session, while moving a vote on the "trade" portion of the bill to 2019. According to the amendment, if lawmakers do not approve a cap-and-trade program by the end of next year's legislative session, the Oregon Environmental Quality Commission will adopt one instead. From *OPB News* on February 20, 2018.

European Council Approves Carbon Market Reform.

Reforms to the cap-and-trade system with the European Union's (EU) carbon market received final approval from the EU Council. The changes to the EU's Emissions Trading System (ETS), which involve reducing the number of permits in circulation, seek to encourage industries to emit less carbon. The reform will strengthen prices by doubling the rate at which the scheme's Market Stability Reserve (MSR) soaks up excess allowances in the short-term; a new mechanism to limit the validity of allowances in the MSR will be put in place in 2023. In addition, the overall cap on the total volume of emissions will be reduced 2.2 percent each year. From *Reuters* on February 27, 2018.

CLIMATE and SCIENCE NEWS

[Study Observes CO₂ Exposure in Marine Ecosystem.](#)

A study conducted by a team of marine scientists showed that CO₂ from industry and land run-off may affect the marine ecosystem. During an experiment at Loch Sween on Scotland's west coast, researchers from Heriot-Watt University and Edinburgh and Glasgow University discovered that acute levels of CO₂ cause starfish to dissolve. While previous studies focused on the effect high levels of CO₂ had on individual plants or animals, this study, published in the *Marine Progress Ecology Series*, observed how whole marine ecosystems respond to short-term CO₂ exposure. From *BBC News* on February 19, 2018.

[Ocean Warming May Lead to “Disappearance” of King Penguin.](#)

Due to potentially warming oceans, up to 70 percent of the king penguin population may be forced to relocate or “disappear” from their breeding grounds in Antarctica, according to research published in *Nature Climate Change*. Scientists have found that future ocean warming could drive the Antarctic Polar Front, where king penguins typically hunt for food, further away from penguin

JOURNAL ARTICLES

[Highlights and Lessons from the EU CCS Demonstration Project Network.](#)

The following is the Abstract of this article: “The European CCS Demonstration Project Network (the ‘Network’) is currently composed of projects located in the Netherlands, Norway, Spain, and the UK. The goal of the Network is to accelerate deployment of CCS by sharing project development experiences about technology implementation, including transport and storage of CO₂, as well as regulatory environment and financial structures. This paper aims to provide an overview of some CCS insights gained from developing the Network projects. Besides technology and project development, sharing knowledge and lessons learned on project-level basis, have also given valuable insights on how policies can enable development and implementation of appropriate regulatory frameworks, and funding schemes towards effective deployment of CCS technology in power generation sector.” **Zoe Kapetaki, Jens Hetland, Thomas Le Guenan, Tom Mikunda, and John Scowcroft**, *Energy Procedia*. (Subscription may be required.)

[How should Information about CCS be Shared with the Japanese Public?](#)

The following is the Abstract of this article: “CCS is regarded as an important mitigation option of climate change. However, the public discussion about CCS has not conducted, and an energy policy concerning the introduction of CCS to thermal power plants has not been decided in Japan. There are little social researches about the public recognition of the current situation about the energy portfolio and the public's informational needs. The objective of this study is to analyze the attitudes and perception of CCS and thermal power generation through internet questionnaire surveys, and to provide appropriate information to promote public understanding and decision-making for introducing CCS technology for thermal power plants. Results showed that respondents did not grasp an accurate perception of the present energy situation such as the current energy portfolio and the role of thermal power generation. On the other hand, their risk perception toward climate change tended to decrease over time. They were not interested in CCS and almost everyone had not formed an impression of CCS yet, but people thought that CCS technology is more useful in Japan than the rest of the world. Thus the current energy situation, the baseline information and major premise, has to be shared in order to understand the impacts of introducing CCS technology. The public needs scientific evidence and explanation of implications and impacts in order to make decisions concerning the introduction of this technology. It is essential to provide appropriate information to the public linked with high public interest topics in order to overcome the lack of interest in CCS and increase public perception of its role in thermal power.” **Hiromi Kubota and Akio Shimota**, *Energy Procedia*. (Subscription may be required.)

breeding sites, causing the animals to find other suitable breeding locations. By using a set of global models to simulate future sea temperatures, the researchers determined that the maximum distance the penguins could travel to hunt fish was 700 kilometers. Their current typical journey from their breeding ground to the Antarctic Polar Front is in the range of 300 to 500 kilometers. From *Carbon Brief* on February 26, 2018.

[Pulverized Volcanic Rock Could Potentially Store CO₂.](#)

According to a study published in the journal *Nature Plants*, spreading pulverized volcanic rock on farm soils could absorb significant amounts of CO₂ from the atmosphere. Led by the University of Sheffield (UK), an international team of researchers studied the effect of “enhanced rock weathering” – using pulverized silicate rocks to speed the ability of minerals to store carbon in soil – on portions of the world's cropland. The researchers' preliminary estimates found that if farmers add enough pulverized rock per acre on a majority of the world's cropland, up to 4 billion metric tons of CO₂ could be removed from the atmosphere per year by 2100. From *Inside Climate News* on February 20, 2018.

[Probabilistic modeling and global sensitivity analysis for CO₂ storage in geological formations: a spectral approach.](#)

The following is the Abstract of this article: “This work focuses on the simulation of CO₂ storage in deep underground formations under uncertainty and seeks to understand the impact of uncertainties in reservoir properties on CO₂ leakage. To simulate the process, a non-isothermal two-phase two-component flow system with equilibrium phase exchange is used. Since model evaluations are computationally intensive, instead of traditional Monte Carlo methods, [the authors] rely on polynomial chaos (PC) expansions for representation of the stochastic model response. A non-intrusive approach is used to determine the PC coefficients. [The authors] establish the accuracy of the PC representations within a reasonable error threshold through systematic convergence studies. In addition to characterizing the distributions of model observables, [the authors] compute probabilities of excess CO₂ leakage. Moreover, [the authors] consider the injection rate as a design parameter and compute an optimum injection rate that ensures that the risk of excess pressure buildup at the leaky well remains below acceptable levels. [The authors] also provide a comprehensive analysis of sensitivities of CO₂ leakage, where [the authors] compute the contributions of the random parameters, and their interactions, to the variance by computing first, second, and total order Sobol' indices.” **Bilal M. Saad, Alen Alexanderian, Serge Prudhomme, and Omar M. Knio**, *Applied Mathematical Modelling*. (Subscription may be required.)

JOURNAL ARTICLES *(cont.)*

Effect of wettability heterogeneity and reservoir temperature on CO₂ storage efficiency in deep saline aquifers.

The following is the Abstract of this article: "Reservoir heterogeneity at various length scales is a well-established fact. This includes reservoir wettability – a key factor influencing CO₂ geo-storage efficiency and containment security – which changes with depth, and is generally non-uniform due to different depositional environments and fluid flow paths over geological times. However, the effect of heterogeneous wettability distribution on CO₂ storage efficiency is not understood. Moreover, there is a knowledge gap in terms of how temperature affects capillary and dissolution trapping, CO₂ mobility and vertical CO₂ migration distance, particularly when coupled with wettability heterogeneity effects. Thus, in this work [the authors] studied the effect of wettability heterogeneity and reservoir temperature on the vertical CO₂ plume migration, and capillary and dissolution trapping capacities. [The authors'] results clearly show that both wettability heterogeneity and reservoir temperature have a significant effect on vertical CO₂ migration, and the associated capillary and dissolution trapping mechanisms: both heterogeneously distributed wettability and higher temperature significantly accelerated the vertical CO₂ migration, CO₂ mobility and solubility trapping, while it reduced residual trapping. [The authors] thus conclude that wettability heterogeneity and reservoir temperature are important factors in the context of CO₂ geo-storage, and that heterogeneous wettability and higher reservoir temperatures reduce storage capacity." **Emad A. Al-Khdheawi, Stephanie Vialle, Ahmed Barifcani, Mohammad Sarmadivaleh, and Stefan Iglauer**, *International Journal of Greenhouse Gas Control*. (Subscription may be required.)

The impact of time-varying CO₂ injection rate on large scale storage in the UK Bunter Sandstone.

The following is the Abstract of this article: "CCS is expected to play a key role in meeting targets set by the Paris Agreement and for meeting legally binding [GHG] emissions targets set within the UK. Energy systems models have been essential in identifying the importance of CCS but they neglect to impose constraints on the availability and use of geologic CO₂ storage reservoirs. In this work [the authors analyze] reservoir performance sensitivities to varying CO₂ storage demand for three sets of injection scenarios designed to encompass the UK's future low carbon energy market. [The authors] use the ECLIPSE reservoir simulator and a model of part of the Southern North Sea Bunter Sandstone saline aquifer. From a first set of injection scenarios [the authors] find that varying amplitude and frequency of injection on a multi-year basis has little effect on reservoir pressure response and plume migration. Injectivity varies with site location due to variations in depth and regional permeability. In a second set of injection scenarios, [the authors] show that with envisioned UK storage demand levels for a large coal fired power plant, it makes no difference to reservoir response whether all injection sites are deployed upfront or gradually as demand increases. Meanwhile, there may be an advantage to deploying infrastructure in deep sites first in order to meet higher demand later. However, deep-site deployment will incur higher upfront cost than shallow-site deployment. In a third set of injection scenarios, [the authors] show that starting injection at a high rate with ramping down, a low rate with ramping up or at a constant rate makes little difference to the overall injectivity of the reservoir. Therefore, such variability is not essential to represent CO₂ storage in energy systems models resolving plume and pressure evolution over decadal timescales." **Clea Kolster, Simeon Agada, Niall Mac Dowell, and Samuel Krevor**, *International Journal of Greenhouse Gas Control*. (Subscription may be required.)

Optimal production and carbon emission reduction level under cap-and-trade and low carbon subsidy policies.

The following is the Abstract of this article: "In recent years, massive carbon emissions have caused serious global environmental damage such as a worsening greenhouse effect and thick haze. To curb carbon emissions as well as maintain sustainable economic development, governments promote the development of low carbon economy by issuing multiple policies among which the cap-and-trade policy (CTP) and low carbon subsidy policy (LCSP) are widely adopted. Moreover, manufacturers are increasingly adopting carbon emission reduction technology to produce greener products considering related government policies and rising environmental awareness among consumers. To give policy-making insights to governments as well as production and carbon emission reduction decision-making insights to manufacturers, this paper investigates the impacts of CTP and LCSP on the production and carbon emission reduction level of a manufacturer, and explores which policy is better for society. The results show that the carbon emission reduction level increases as the carbon trading price increases, whereas it is independent of the unit low carbon subsidy. Interestingly, the carbon trading price does not always have a negative effect on the manufacturer's profit, and the cap does not always produce a positive effect on the manufacturer's profit. More importantly, [the authors] find that LCSP is more beneficial to society when the environmental damage coefficient is less than a threshold, but otherwise CTP is more beneficial." **Kaiying Cao, Xiaoping Xu, Qiang Wu, and Quanpeng Zhang**, *Journal of Cleaner Production*. (Subscription may be required.)

The market performance of carbon trading in China: A theoretical framework of structure-conduct-performance.

The following is the Abstract of this article: "In order to provide feasible platform for the establishment of national carbon market in China and other developing countries, it is vital to competitively assess China's seven Pilot [ETSs] by comparing market performances. Hence, this paper employs the structure-conduct-performance (SCP) framework to qualitatively evaluate the external and internal performances of the China's carbon market. Particularly, a structural vector auto-regression (SVAR) approach is adopted to calculate the three invisible indicators of internal performance using time series of three typical Pilot ETS from the launching dates till May 4, 2016 with restrictions on return, trading volume and volatility variables. The results depicted that: (i) absence of legal binding forces (Market environment), market segmentation (Structure), excessive allowance allocation and lack of investment (Conduct) are main reasons for poor performance of China's Pilot ETS; (ii) with respect to internal performance, Hubei ETS has higher speculation and volatility sensitive to pricing returns. Hubei ETS also has the fastest information diffusion speed followed by Guangdong and Shanghai ETS. Guangdong ETS has a conservative investment environment and volatility is receptive to the changes in trading volume whereas Shanghai ETS has a mature investment environment." **Xueping Tan and Xinyu Wang**, *Journal of Cleaner Production*. (Subscription may be required.)

JOURNAL ARTICLES *(cont.)*

A systematic review of key challenges of CO₂ transport via pipelines.

The following is the Abstract of this article: "Transport of CO₂ via pipeline from the point of capture to a geologically suitable location for either sequestration or enhanced hydrocarbon recovery is a vital aspect of the CCS chain. This means of CO₂ transport has a number of advantages over other means of CO₂ transport, such as truck, rail, and ship. Pipelines ensure continuous transport of CO₂ from the capture point to the storage site, which is essential to transport the amount of CO₂ captured from the source facilities, such as fossil fuel power plants, operating in a continuous manner. Furthermore, using pipelines is regarded as more economical than other means of CO₂ transport. The greatest challenges of CO₂ transport via pipelines are related to integrity, flow assurance, capital and operating costs, and health, safety and environmental factors. Deployment of CCS pipeline projects is based either on point-to-point transport, in which case a specific source matches a specific storage point, or through the development of pipeline networks with a backbone CO₂ pipeline. In the latter case, the CO₂ streams, which are [characterized] by a varying impurity level and handled by the individual operators, are linked to the backbone CO₂ pipeline for further compression and transport. This may pose some additional challenges. This review involves a systematic evaluation of various challenges that delay the deployment of CO₂ pipeline transport and is based on an extensive survey of the literature. It is aimed at confidence-building in the technology and improving economics in the long run. Moreover, the knowledge gaps were identified, including lack of analyses on a holistic assessment of component impurities, corrosion consideration at the conceptual stage, the effect of elevation on CO₂ dense phase characteristics, permissible water levels in liquefied CO₂, and commercial risks associated with project abandonment or cancellation resulting from high project capital and operating costs." **V.E. Onyebuchi, A. Kolios, D.P. Hanak, C. Biliyok, and V. Manovic**, *Renewable and Sustainable Energy Reviews*. (Subscription may be required.)

Global Sequestration Potential of Increased Organic Carbon in Cropland Soils.

The following is the Abstract of this article: "The role of soil organic carbon in global carbon cycles is receiving increasing attention both as a potentially large and uncertain source of CO₂ emissions in response to predicted global temperature rises, and as a natural sink for carbon able to reduce atmospheric CO₂. There is general agreement that the technical potential for sequestration of carbon in soil is significant, and some consensus on the magnitude of that potential. Croplands worldwide could sequester between 0.90 and 1.85 Pg C/yr, i.e. 26–53 [percent] of the target of the '4p1000 Initiative: Soils for Food Security and Climate.' The importance of intensively cultivated regions such as North America, Europe, India and intensively cultivated areas in Africa, such as Ethiopia, is highlighted. Soil carbon sequestration and the conservation of existing soil carbon stocks, given its multiple benefits including improved food production, is an important mitigation pathway to achieve the less than 2°C global target of the Paris Climate Agreement." **Zomer, Robert J.; Bossio, Deborah A.; Sommer, Rolf; Verchot, Louis V.**, *Scientific Reports*. (Subscription may be required.)

REPORTS and OTHER PUBLICATIONS

Reduced-Order Model for the Impacts of Carbon Dioxide and Brine Leakage into an Unconfined, Oxidizing Carbonate Aquifer, Third-Generation.



BERKELEY LAB

NRAP Technical Team

The following is from the Abstract of this National Risk Assessment Partnership (NRAP) document: “NRAP consists of five DOE national laboratories collaborating to develop a framework for predicting the risks associated with carbon sequestration. The approach taken by NRAP is to first divide the system into components, including injection target reservoirs, wellbores, natural pathways including faults and fractures, groundwater, and the atmosphere. Next, develop a detailed, physics- and chemistry-based model of each component. Using the results of the detailed models, develop efficient, simplified models, termed reduced-order models (ROMs), for each component. Finally, integrate the component ROMs into a system model that calculates risk profiles for the site, using a probabilistic methodology. This report details the development of the groundwater ROM for an unconfined carbonate aquifer, loosely based on an unconfined portion of the Edwards Aquifer in south-central Texas. For practical reasons of computational efficiency, two sets of detailed multiphase reactive-transport simulations were performed separately: one emphasizing complex hydrogeology factors, the other emphasizing detailed geochemistry. These results were combined into a single groundwater ROM that considered both hydrogeologic and geochemical factors that might be expected to influence the fate and transport of brine and CO₂ in a shallow aquifer.”

Carbon Capture and Storage Sector: Worldwide Forecast until 2021.

The following is from a Summary of this document: “The use of CCS technology is one of the novel ideas that help reduce the amount of CO₂ released into the atmosphere by fossil fuel-dependent industries including power generation and oil and gas processing. The basic functioning of the CCS technology includes capturing the CO₂ before its release into the atmosphere and then transporting and storing it in an environmentally secure location. The experts estimate the worldwide [CCS] market to increase at a compound annual Growth rate of ~9.2 percent between 2017 and 2021. [The scope of this report] describes the ongoing situation and its growth expectations of the global [CCS] sector for 2017-2021. To calculate the market value, the industry report examines business dimensions with an eye on individual growth trends and contribution of upcoming market segments. The sector is segmented into the specified segments established on area: Americas; Asia-Pac; [and] Europe, Middle East and Africa (EMEA). The market study, Worldwide Carbon Capture and Storage Sector 2017-2021, has been produced established on a comprehensive and detailed market studies with data coming from specialists of the sector. The study describes the market outlook and its growth expectations over the next years. This study also comprises conversations with top vendors operating in this segment.”

The Clean Growth Strategy: Leading the way to a low carbon future.

The following is from an Introduction in this document: “The move to cleaner economic growth is one of the greatest industrial opportunities of our time. This Strategy will ensure Britain is ready to seize that opportunity. [The UK’s] modern Industrial Strategy is about increasing the earning power of people in every part of the country. [The UK needs] to do that while not just protecting, but improving the environment on which [their] economic success depends. In short, [the UK needs] higher growth with lower carbon emissions. This approach is at the heart of [the] Strategy for clean growth. The opportunity for people and business across the country is huge. The low carbon economy could grow 11 percent per year between 2015 and 2030, four times faster than the projected growth of the economy as a whole...”

ABOUT DOE'S CARBON STORAGE PROGRAM

The **Carbon Storage Program** advances the development and validation of technologies that enable safe, cost-effective, permanent geologic storage of CO₂. The Carbon Storage Program also supports the development of best practices for CCS that will benefit projects implementing CCS at a commercial scale, such as those being performed under NETL's Clean Coal Power Initiative and Industrial Carbon Capture and Storage Programs. The technologies being developed and the small- and large-scale injection projects conducted through this program will be used to benefit the existing and future fleet of fossil fuel power-generating facilities by developing tools to increase our understanding of the behavior of CO₂ in the subsurface and identifying the geologic reservoirs appropriate for CO₂ storage.

The [Carbon 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 Storage Program Resources



The [National Energy Technology Laboratory's CCS Database](#) includes active, proposed, and terminated CCS projects worldwide. The information is taken from publically available sources to provide convenient access to information regarding efforts by various industries, public groups, and governments towards development and eventual deployment of CCS technology. NETL's CCS Database is available as a Microsoft Excel spreadsheet and also as a customizable layer in Google Earth.

Newsletters, program fact sheets, best practices manuals, roadmaps, educational resources, presentations, and more are available via the [Carbon Storage Program Publications webpage](#).

Get answers to your carbon capture and storage questions at NETL's [Frequently Asked Questions webpage](#).

ABOUT NETL'S CARBON STORAGE NEWSLETTER

Compiled by the National Energy Technology Laboratory, this newsletter is a monthly summary of public and private sector carbon storage news from around the world. The article titles are links to the full text for those who would like to read more.



National Energy Technology Laboratory

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1450 Queen Avenue SW
Albany, OR 97321-2198
541-967-5892

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
304-285-4764

626 Cochran's Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940
412-386-4687

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

WEBSITE: www.netl.doe.gov

CUSTOMER SERVICE: 1-800-553-7681

Contacts

Traci Rodosta
304-285-1345
traci.rodosta@netl.doe.gov

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