Carbon Sequestration Newsletter

September 2007

What's Inside?

Highlights

***Fossil Energy Techline*, "Climate Technology: DOE Readies First Big U.S. Projects in CO_2 Capture and Storage.**

The US Department of Energy (DOE) is currently reviewing Phase III proposals for large-scale geologic sequestration projects in support of the Regional Carbon Sequestration Partnership Program. The program, which was formed in 2003 to research the best approaches to capture and permanently store the greenhouse gas, carbon dioxide (CO_2), will enter its next phase in October with announcements of Phase III deployment projects. The new stage of the Regional Partnerships' work will follow as a logical extension of work completed to date during Phase I and Phase II, which encompassed the identification of point-source emissions and potential geologic storage formations in the United States and Canada, identifying potential projects, and performing geologic field tests to examine the various sequestration options. The Phase III proposals present scenarios using large-scale sequestration in saline formations, CO_2 capture in coal-based power generation, and CO_2 sequestration for enhanced oil recovery efforts. Each of the proposed large-scale tests encompasses full project cycles to cover site characterization, injection operations and monitoring, site closure, and post-injection monitoring activities. Phase III projects are expected to continue through 2017 and will greatly enhance present international efforts for viable, large-scale demonstrations of carbon capture and storage. To learn more about DOE's Carbon Sequestration Regional Partnerships Program, visit DOE's National Energy Technology Laboratory (NETL) Carbon Sequestration Regional Partnership website at: http://www.netl.doe.gov/technologies/carbon_seq/partnerships/partnerships.html. August 3, 2007, http://www.fossil.energy.gov/news/techlines/2007/PrintVersion_1_29416_29416.html?print.

Sequestration in the News

***Pantagraph.com*, "Blagojevich Signs FutureGen Incentive Bill," and *The News-Gazette.com*, "FutureGen Bill Now a Law."**

Illinois Governor Rod Blagojevich signed legislation aimed at helping to bring the $1.4 billion FutureGen plant to Illinois. FutureGen is DOE's zero-emissions coal-fired power plant initiative. If the plant is sited in Illinois, it would be located in either Mattoon or Tuscola. Illinois' best and final offer to build FutureGen will be submitted on August 1. The offer will include a $17 million state grant, $50 million in low-interest loans from the Illinois Finance Authority, several tax breaks and a package of local incentives. Since the FutureGen project includes carbon sequestration, the new state law establishes monitoring responsibility and offers liability protection from lawsuits related to the highly unlikely release of carbon dioxide. Illinois is competing against Texas which would site the plant in either Jewett or Odessa. Texas has passed a law containing similar legal protections.

July 30, 2007, http://www.pantagraph.com/articles/2007/07/30/money/doc46ae5ce578e01817155333.prt, and July 31, 2007, http://www.news-gazette.com/news/print/2007/07/31/futuregen_bill_now_a_law/. (Subscription required.)

***KTRE, TX News Release*, "FutureGen Project," and *The Dallas Morning News*, "Perry Makes Final Pitch to FutureGen Plant."**

On August 1, Texas Governor Rick Perry presented his state's final proposal to become home to DOE's FutureGen project. With the final site announcement pending before the end

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This newsletter is produced by the National Energy Technology Laboratory to provide information on recent activities and publications related to carbon sequestration. It covers domestic, international, public sector, and private sector news.

Sequestration in the News (continued)

of the year, the Texas cities of Odessa and Jewett are competing for the FutureGen Industrial Alliance's award to host the site. Perry hopes that the state's energy expertise and strong business climate will land the plant in his state. Texas is offering financial incentives that include $240 million in tax credits, $21 million in state funding, and commitments of public-private partnerships with major corporations, including Luminant, NRG Energy and Kinder Morgan. Texas is also offering to support carbon sequestration in its FutureGen offer. Texas Railroad Chairman Michael Williams, who chairs the FutureGen Texas team, said that Texas would offer liability protection for that effort. Two Illinois towns, Mattoon and Tuscola, are also being considered for the project award. August 1, 2007, http://www.ktre.com/global/story.asp?s=6873451&ClientType=Printable and August 2, 2007, http://www.dallasnews.com/sharedcontent/dws/bus/stories/080207dnbusperryfuturegen.35a82a2.html.

***PR Newswire*, "BP and Powerspan Collaborate to Demonstrate and Commercialize CO_2 Capture Technology for Power Plants."**

On August 3, BP Alternative Energy and Powerspan Corporation announced their collaboration on Powerspan's CO_2 capture technology for power plants, called ECO_2. The joint project will also include sequestration of the CO_2 captured at the test site into an 8,000 foot test well for secure, long-term storage. DOE's Midwest Regional Carbon Sequestration Partnership is collaborating on the pilot scale testing at FirstEnergy Corporation's R.E. Burger plant in Shadyside, Ohio. The test is scheduled to begin in early 2008. BP and Powerspan will conduct pilot testing of the ammonia-based CO_2 capture technology, which would be the first test of its kind to demonstrate both CO_2 capture and sequestration at a conventional coal-fired power plant. The process, developed through a cooperative agreement with NETL and Powerspan, uses an ammonia-based solution to capture the CO_2 in flue gas, which can then be used for enhanced oil recovery efforts or geologic sequestration. With success of the pilot test, BP and Powerspan hope for full-scale commercial deployment of the technology. DOE estimates that the ammonia-based CO_2 capture process could be more cost effective than commercially available amine-based capture technologies, and can be retrofitted to existing coal-fired power plants. August 8, 2007, http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/08-08-2007/0004641839&EDATE=.

Announcements

Call for Abstracts.
The American Geophysical Union Fall Meeting (December 10-14, 2007) in San Francisco has a Union session highlighting novel and current research related to geologic, terrestrial, oceanic and policy related to carbon sequestration (http://www.agu.org/meetings/fm07/?content=search&show=detail&sessid=690). Abstracts are due September 6, 2007, 19:59 Eastern Time.

Carbon Sequestration Testimony Given.
A Senate Energy and Natural Resources Oversight Hearing was held August 1 to receive testimony on recent advances in clean coal technology, with participation by Carl Bauer, Director of DOE's National Energy Technology Laboratory. To read Carl Bauer's testimony, which includes testimony regarding the laboratory's work in Carbon Sequestration, go to: http://energy.senate.gov/public/index.cfm?FuseAction=Hearings.Hearing&Hearing_ID=1645.

Georgia Governor Announces Carbon Sequestration Registry.
On August 3, Georgia became the first southern state to implement a public registry for landowners who use approved forest management practices on their land. The Carbon Sequestration Registry, managed by the Georgia Forestry Commission, can be found at www.gacarbon.org.

Listen to Podcast, "Climate Change USA."
SciPod is an international science podcast produced by New Scientist Magazine. This special edition podcast explores American attitudes toward climate change and other global warming issues. A link to this podcast can be found at:
http://media.newscientist.com/data/av/podcast/newsci-20070702-climate-change-usa.mp3.

The Carbon Sequestration Newsletter Annual Index.
Access the Annual Index covering September 2006-August 2007 issues of the Carbon Sequestration Newsletters at: http://www.netl.doe.gov/publications/carbon_seq/subscribe.html.

Science

***Science Daily*, "Global Warming: Carbon Dioxide 'Tree Banking' May Help, Provided Trees Have Optimal Water and Nutrient Levels."**

Results of a ten-year study, known as Free Air Carbon Enrichment (FACE), indicate that the introduction of extra CO_2 may result in trees growing more tissue, but there is a limit to the amount of CO_2 that a tree can store over time. During the experiment, the researchers pumped one and half times more CO_2 to the test pines than the trees would normally receive. Scientists were then able to formulate results about the carbon accumulations in the trees. The experimental data suggest that only those pines receiving greater amounts of both water and fertilizers are able to have an effect on the atmospheric concentrations of CO_2. Trees that received less water at the same time that CO_2 levels were increased showed no net gain in carbon sequestration. Increased levels of CO_2 also had no effect on "self thinning" of the forests, a process by which smaller trees die off as the most successful grow bigger. Furthermore, trees that grow more foliage due to increased CO_2 levels do not result in increased carbon storage, because foliage does not store carbon over time as effectively as carbon stored in wood. August 7, 2007, http://www.sciencedaily.com/releases/2007/08/070807084202.htm.

Reuters, "Floods, Heat Hit Europe, but Is It Global Warming?,"

Climate scientist Myles Allen, of Oxford University, leads a research project which uses computer modeling to determine if single weather events can be linked to global warming. The research involves "borrowing" the computing time of over 6,000 members of the general public to model run thousands of simulations of an individual British flood that happened in 2000, the wettest autumn recorded in 230 years. The individual computers run one climate simulation with or without manmade greenhouse gas emissions, to identify the contribution of global warming to the flood. The results will be published later this year. To read more about the World Wildlife Federation's Climateprediction.net project or to join the Climateprediction.net experiment go to http://www.climateprediction.net/. July 27, 2007, http://www.planetark.com/avantgo/dailynewsstory.cfm?newsid=43316.

Policy

***Reuters*, "UN Climate Change Meeting Aims at Rich Countries," and *Reuters*, "UN Climate Chief Skeptical about Global Carbon Tax."**

The first full-scale United Nations session dedicated to climate change was held on August 30 and 31 in New York. The meeting called for rich countries to take on the economic burden of global climate change. Assisting poorer countries to finance their efforts to cut greenhouse gas emissions was an option suggested to wealthy nations. The United States continues to support voluntary emissions cuts and President Bush has agreed with other Group of Eight industrialized nations to negotiate a new climate pact to extend the Kyoto Protocol beyond its expiration in 2012. Yvo de Boar, head of the U.N. Framework Convention on Climate Change, expressed skepticism about a global carbon tax, but stated that national taxes were possible. Moreover, he favors cap-and-trade laws, which offer financial incentive for emission reductions by assigning a cost to pollution. Another U.N. meeting on climate change is scheduled for September 24. August 2, 2007, http://www.planetark.org/avantgo/dailynewsstory.cfm?newsid=43427, and August 2, 2007, http://in.reuters.com/article/worldNews/idINIndia-28774420070801.

"Science-based permitting of geological sequestration of CO_2 in brine reservoirs in the U.S."

[The authors] present a science-based approach to the regulation and permitting of CO_2 sequestration activities. Any such regulatory scheme should address both operational (or short-term) issues and the long-term goals of geological sequestration of CO_2. In the United States many of the key operational issues, such as permitting injection wells and CO_2 pipelines, are reasonably well addressed in current Federal- and State-based rules and legislation. The long-term, overarching goal of sequestration projects of decreasing the rate of increase in atmospheric concentrations of CO_2 is not addressed by current regulations. [The authors] propose a hierarchical approach, in which the State/Federal government is responsible for developing regional assessments that result in broad regions of brine reservoirs being rated as "sequestration ready" (and designated in this paper as general permits). The burden faced by an applicant in permitting an injection site should be considerably less if the general area of the chosen site has been ranked favorably. Such a phased, hierarchical permitting process would be helpful in addressing public and stakeholder concerns related to the impact and safety of geological sequestration operations. It will also build in coordination between neighboring injection sites, where interferences are likely because of the large amount of CO_2 to be injected. **Jean-Philippe Nicot and Ian J. Duncan**, Environmental Science and Policy, Published online June 25, 2007, doi:10.1016/j.envsci.2007.05.003, http://www.sciencedirect.com/science/article/B6VP6-4P248H6-1/2/7a7dfaf6624caa2e9f41ced822b1b8d1. (Subscription may be required.)

Geology

"Time-lapse crosswell seismic and VSP monitoring of injected CO_2 in a brine aquifer."

Seismic surveys successfully imaged a small scale CO_2 injection (1,600 ton) conducted in a brine aquifer of the Frio Formation near Houston, Texas. These time-lapse borehole seismic surveys, crosswell and vertical seismic profile (VSP), were acquired to monitor the CO_2 distribution using two boreholes (the new injection well and a pre-existing well used for monitoring) which are 30 m [meters] apart at a depth of 1,500 m. The crosswell survey provided a high-resolution image of the CO_2 distribution between the wells via tomographic imaging of the P-wave velocity decrease (up to 500 m/s [meters per second]). The simultaneously acquired S-wave tomography showed little change in S-wave velocity, as expected for fluid substitution. A rock physics model was used to estimate CO_2 saturations of 10–20 [percent] from the P-wave velocity change. The VSP survey resolved a large (~70 [percent]) change in reflection amplitude for the Frio horizon. This CO_2 induced reflection amplitude change allowed estimation of the CO_2 extent beyond the monitor well and on three azimuths. The VSP result is compared with numerical modeling of CO_2 saturations and is seismically modeled using the velocity change estimated in the crosswell survey. **Thomas M. Daley, Larry R. Myer, J. E. Peterson, E. L. Majer, and G. M. Hoversten**, Environmental Geology, Published online July 25, 2007, DOI: 10.1007/s00254-007-0943-z, http://www.springerlink.com/content/x80826132064h837/?p=5748bcb387064315a157aad1b539584c&pi=0. (Subscription required.)

"Geologic factors controlling CO_2 storage capacity and permanence: case studies based on experience with heterogeneity in oil and gas reservoirs applied to CO_2 storage."

A variety of structural and stratigraphic factors control geological heterogeneity, inferred to influence both sequestration capacity and effectiveness, as well as seal capacity. Structural heterogeneity factors include faults, folds, and fracture intensity. Stratigraphic heterogeneity is primarily controlled by the geometry of depositional facies and sandbody continuity, which controls permeability structure. The permeability structure, in turn, has implications for CO_2 injectivity and near-term migration pathways, whereas the long-term sequestration capacity can be inferred from the production

Geology (Continued)

history. Examples of Gulf Coast oil and gas reservoirs with differing styles of stratigraphic heterogeneity demonstrate the impact of facies variability on fluid flow and CO_2 sequestration potential. Beach and barrier-island deposits in West Ranch field in southeast Texas are homogeneous and continuous. In contrast, Seeligson and Stratton fields in south Texas, examples of major heterogeneity in fluvial systems, are composed of discontinuous, channel-fill sandstones confined to narrow, sinuous belts. These heterogeneous deposits contain limited compartments for potential CO_2 storage, although CO_2 sequestration effectiveness may be enhanced by the high number of intraformational shale beds. These field examples demonstrate that areas for CO_2 storage can be optimized by assessing sites for enhanced oil and gas recovery in mature hydrocarbon provinces. **W. A. Ambrose, S. Lakshminarasimhan, M. Holtz, V. Núñez-López, S. Hovorka, I. Duncan**, Environmental Geology, Published online July 27, 2007, DOI: 10.1007/s00254-007-0940-2, http://www.springerlink.com/content/n502k12606481724/?p=9028d37ebb904e5fb5635008c6be1c4d&pi=0. (Subscription required.)

Technology

"CO_2 capture by adsorption with nitrogen enriched carbons."

The success of CO_2 capture with solid sorbents is dependent on the development of a low cost sorbent with high CO_2 selectivity and adsorption capacity. Immobilized amines are expected to offer the benefits of liquid amines in the typical absorption process, with the added advantages that solids are easy to handle and that they do not give rise to corrosion problems. In this work, different alkylamines were evaluated as a potential source of basic sites for CO_2 capture, and a commercial activated carbon was used as a preliminary support in order to study the effect of the impregnation. The amine coating increased the basicity and nitrogen content of the carbon. However, it drastically reduced the microporous volume of the activated carbon, which is chiefly responsible for CO_2 physisorption, thus decreasing the capacity of raw carbon at room temperature. **M.G. Plaza, C. Pevida, A. Arenillas, F. Rubiera and J.J. Pis**, Fuel, Published online July 2, 2007, doi:10.1016/j.fuel.2007.06.001, http://www.sciencedirect.com/science/article/B6V3B-4P3KYKW-1/2/8ae9e8eecebc889199c179357f27b505. (Subscription may be required.)

Terrestrial/Ocean

"Evaluation of carbon stock variation in Northern Italian soils over the last 70 years."

Carbon (C) sequestration in soils is gaining increasing acceptance as a means of reducing net carbon dioxide (CO_2) emissions to the

atmosphere. Numerous studies on the global carbon budget suggest that terrestrial ecosystems in the mid-latitudes of the Northern Hemisphere act as a large carbon sink of atmospheric CO_2. However, most of the soils of North America, Australia, New Zealand, South Africa and Eastern Europe lost a great part of their organic carbon pool on conversion from natural to agricultural ecosystems during the explosion of pioneer agriculture, and in Western Europe the adoption of modern agriculture after the Second World War led to a drastic reduction in soil organic carbon content. The depletion of organic matter is often indicated as one of the main effects on soil, and the storage of organic carbon in the soil is a means of improving the quality of soils and mitigating the effects of greenhouse gas emission. The soil organic carbon in an area of Northern Italy over the last 70 years has been assessed in this study. The variation of top soil organic carbon (SOC) ranged from −60.3 to +6.7 [percent]; the average reduction of SOC, caused by agriculture intensification, was 39.3 [percent]. This process was not uniform, but related to trends in land use and agriculture change. For the area studied (1,394 [square kilometers]) there was an estimated release of 5 [Teragrams] CO_2-C to the atmosphere from the upper 30 [centimeters] of soil in the period 1935–1990. **Ciro Gardi and Francesca Sconosciuto**, Sustainability Science, Published online July 27, 2007, DOI: 10.1007/s11625-007-0034-9, http://www.springerlink.com/content/r283173208j10uw4/?p=cbf5cfb9fd2846a3ad78969edb73d498&pi=0. (Subscription required.)

"Promotion of ecosystem carbon sequestration by invasive predators."

Despite recent interest in understanding the effects of human-induced global change on carbon (C) storage in terrestrial ecosystems, most studies have overlooked the influence of a major element of global change, namely biological invasions. [The authors] quantified ecosystem C storage, both above- and below-ground, on each of 18 islands off the coast of New Zealand. Some islands support high densities of nesting seabirds, while others have been invaded by predatory rats and host few seabirds. Our results show that, by preying upon seabirds, rats have indirectly enhanced C sequestration in live plant biomass by 104 [percent], reduced C sequestration in non-living pools by 26 [percent] and increased total ecosystem C storage by 37 [percent]. Given the current worldwide distribution of rats and other invasive predatory mammals, and the consequent disappearance of seabird colonies, these predators may be important determinants of ecosystem C sequestration. **David A. Wardle, Peter J. Bellingham, Tadashi Fukami and Christa P.H. Mulder**, Biology Letters, Published

Terrestrial/Ocean (Continued)

online July 24, 2007, DOI: 10.1098/rsbl.2007.0163, http://www.journals.royalsoc.ac.uk/content/?k=%e2%80%9cPromotion+of+ecosystem+carbon+sequestration+by+invasive+predators.%e2%80%9d++. (Subscription required.)

Trading

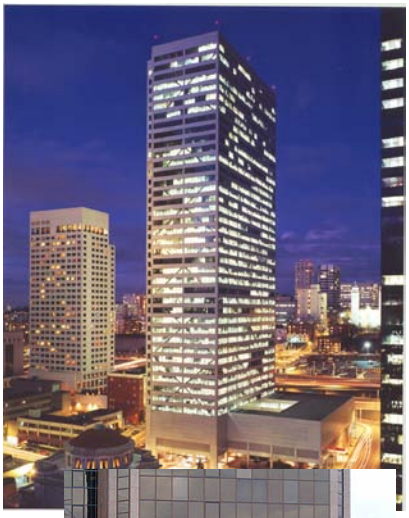
Carbon Market Update, August 15, 2007	
CCX-CFI 2007 ($/tCO$_2$) $3.50 (Vintage 2007)	EU ETS-EUA DEC 2008 ($/tCO$_2$) $26.36 (Converted from € to US$)

***Greenwire*, "Forest Service to Sell Carbon Credits to Fund Reforestation."**

The US Forest Service and National Forest Foundation are teaming up to start a voluntary carbon offset program aimed to fund reforestation projects in US forests. The plan will allow consumers to make donations to fund tree planting and other work in national

forests by calculating their carbon footprint and then donating money to the program, known as the Carbon Capital Fund. For $6 an individual can offset one metric ton of CO_2 and the money will go to forests damaged by wildfires, tornadoes, and other catastrophic events. It is estimated that US forests offset about 10 percent of CO_2 emissions in the US and that terrestrial sequestration could greatly increase that percentage. Other benefits include clean watershed and improved species habitat. The Forest Service has identified two projects to kick off the new program, including a 500-acre reforestation project in Custer National Forest in Montana and 1400 acres in Payette National Forest in Idaho. The Forest Service has been under scrutiny for allowing an estimated backlog of one million acres of land requiring reforestation. To learn more about the Carbon Capital Fund and to calculate your own carbon footprint, go to: http://www.carboncapitalfund.org/. July 26, 2007, http://www.eenews.net/Greenwire/print/2007/07/26/11. (Subscription may be required.)

***Bank of America Press Release*, "Bank of America Joins Chicago Climate Exchange, Makes Strategic Investment in Climate Exchange PLC."**



Bank of America, one of the world's largest financial institutions, announced that it will become a member of the Chicago Climate Exchange (CCX). The company will also join the Chicago Climate Futures Exchange (CCFE), a wholly-owned subsidiary of the CCX, and the European Climate Exchange (ECX), the largest exchange for allowances traded under the European Union's mandatory cap-and-trade scheme for CO_2 emissions. As part of a joint venture, Bank of America will acquire .5 percent of the current issued share capital of CLE. Bank of America recently announced a climate exchange initiative, a ten-year effort aimed at developing environmentally sustainable business practices through lending, investing, philanthropy, and the creation of new products and services. July 25, 2007, http://newsroom.bankofamerica.com/index.php?s=press_releases&item=7841.

Recent Publications

Carbon Sequestration Leadership Forum (CSLF) Strategic Plan Implementation Report (SPIR).
This quarterly report provides an overview of recent activities of CSLF task forces, stakeholders and the CSLF Secretariat. An improved element of this SPIR includes short status reports from CSLF projects, including the two new projects that were recognized by the CSLF at the Paris meeting: the Otway Basin Pilot Project (nominated by Australia and the United States), and the Zama Acid Gas EOR, CO_2 Sequestration, and Monitoring Project (nominated by Canada and the United States). To read an introductory letter to the report written by Thomas D. Shope, Acting Assistant Secretary for Fossil Energy and CSLF Policy Group Chair, see: http://www.cslforum.org/documents/ShopeSPIRChairmansLetter0707.pdf. To read the full July 2007 CSLF Strategic Plan Implementation Report, go to: http://www.cslforum.org/documents/SPIR0707.pdf.

"Energy Market and Economic Impacts of S. 280, the Climate Stewardship and Innovation Act of 2007."
This report responds to a request from Senators Joseph Lieberman and John McCain for an estimate of the economic impacts of S. 280, the Climate Stewardship and Innovation Act of 2007. S. 280 would establish a series of caps on greenhouse gas emissions starting in 2012 followed by increasingly stringent caps beginning in 2020, 2030 and 2050. It provides estimates of the effects of S. 280 on energy markets and the economy through 2030, the current time horizon of projections in the Energy Information Administration's (EIA) *Annual Energy Outlook (AEO2007)*. The gases regulated under S. 280 are carbon dioxide, methane, nitrous oxide, and three classes of fluorinated gases—hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Covered entities include those in the commercial, industrial, and electric power sectors with annual emissions at any single facility in excess of 10,000 metric tons carbon dioxide equivalent; refiners and importers of petroleum products sold for transportation; and producers and importers of fluorinated gases. EIA estimates that about 78 percent of the total greenhouse gas emissions in 2005 would be covered under the allowance program. The specific S. 280 allowance caps for each time period are: 2012 to 2019 – 2004 emissions level; 2020 to 2029 – 1990 emissions level; 2030 to 2049 – 22 percent below 1990 emissions level; 2050 and beyond – 60 percent below 1990 emissions level. Under S. 280, covered entities would be required to report their greenhouse gas emissions annually and submit a matching number of government-issued allowances. Some tradable allowances would be distributed for free and the remainder would be auctioned to raise funds for supporting programs. These include programs to encourage innovative emissions reduction technologies and to mitigate adverse economic impacts on consumers and communities. Allowances in excess of compliance needs can be banked for future use. Entities would also be able to meet up to 30 percent of their allowance obligation with offsets for emissions reductions from non-covered entities and foreign sources. To read the entire Energy Information Administration report, go to: http://www.eenews.net/features/documents/2007/08/06/document_pm_02.pdf.

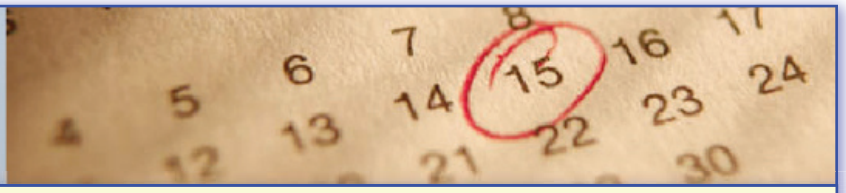
Legislative Activity

***E&E Daily*, "CO_2 Sequestration May Have Reached 'Adolescence'."**

On August 1, the Senate Energy and Natural Resources Committee held a hearing to discuss recent advancements in clean coal technology, including large-scale sequestration of CO_2 emissions. The hearing was the third full committee hearing of its kind held this year. Challenges facing the coal industry, including long-term liability issues related to permanent storage of CO_2 and public acceptance of sequestration technology were reported as testimony at the hearing. A National Coal Council representative presented a report that states that new CO_2 capture and storage technologies could be commercially available within the next 15 years. Carl Bauer, director of DOE's National Energy Technology Laboratory, also provided testimony and affirmed that DOE would announce a third round of solicitations for the Clean Coal Power Initiative. **(See the Announcements section of this newsletter for a link to Carl Bauer and other witnesses' testimony at the Senate oversight hearing.)** August 2, 2007, http://www.ens-newswire.com/ens/aug2007/2007-08-06-10.asp.

***Washington Post*, "Two Senators to Unveil Climate Bill," and *Associated Press*, "Senators Line Up Behind Economy-Wide Approach to Slow Global Warming."**

On August 2, Senator Joe Lieberman (I-Conn.) and ranking Republican, John Warner of Virginia outlined a bipartisan measure addressing climate change. The bill calls for three elements: a "Federal Reserve-style" board whose goal would be to regulate the cost of carbon; a 70 percent cut in greenhouse gas emissions below today's level by 2050; and initiation of a Climate Change Credit Corporation that would auction pollution credits among electric utilities, transportation, and other industries and use the revenue to promote new technologies, including carbon capture and sequestration. The Senators hope to have the bill to the Senate floor by late fall. Speaker of the House, Nancy Pelosi (D-Calif.) is preparing to offer a climate change bill in the House this fall which also favors a cap-and-trade program to reduce CO_2 emissions. August 2, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/08/01/AR2007080102321_pf.html, and August 3, 2007, http://climate.weather.com/articles/senators080307.html.



Events

September 10-11, 2007, **US Carbon Finance Forum**, *The Metropolitan Club, New York, New York*. This conference will unite investors with representatives from finance, industry and government bodies, to examine how carbon legislation will affect stakeholders in the US, and to identify existing opportunities in carbon markets worldwide. A faculty of over 40 high level speakers will the lead the debate, and provide cutting-edge insight into the challenges of carbon finance as well as the benefits of early action for both investors and industrial companies. Discussion forums in each session of the conference will allow delegates to take part in a high level debate with industry experts, benefiting from the latest analysis and opinion. To view the conference website and brochure, go to: http://www.uscarbonfinance.com/index.htm.

September 10-11, **Generation Strategies in an Era of Carbon Uncertainty**, *AED Conference Center, Washington, DC*. Attendees will get an "Inside-the-Beltway" view of where various bills stand in Congress, their different implications, and the role of the states. Included in the agenda are panel discussions on the technical and economic risks of carbon capture and sequestration on integrated gasification combined cycle and pulverized coal plants, and the trade-offs between various power and carbon-sink options. To access the link to the conference agenda and obtain registration information, see: http://www.infocastinc.com/carbongen.html.

September 12-13, 2007, **Carbon Constraint 2007**, *Hyatt Regency, Chicago, Illinois*. Carbon Constraint 2007 will address the power industry's management of carbon dioxide in an ever-increasing carbon-constraint world. Sessions will include the impact of carbon legislation on future generation, greenhouse gas legislation, the demand for CO_2 in enhanced oil recovery activities, and technologies under development for CO_2 capture and sequestration. To obtain complete conference information, click on: http://www.carbonconstraint.com/.

September 10-14, 2007, **The 24th Annual International Pittsburgh Coal Conference**, *Sandton Convention Centre, Johannesburg, South Africa*. The Twenty-Fourth Annual International Pittsburgh Coal Conference focuses on environmental emissions issues and technologies surrounding the continued use of coal and the development of future coal-based energy plants to achieve near-zero emissions of pollutants, reduced costs, and high thermal efficiency while producing a suite of products to meet future energy market requirements. Included in the topics of discussion will be the Kyoto protocol and policy issues, CO_2 capture technologies, sequestration in geological sinks, enhancing natural sinks, modeling and assessments and CO_2 utilization. For complete information, click on: http://www.engr.pitt.edu/pcc/2007%20Conference.htm.

September 11-12, 2007, **Carbon Markets USA**, *Hilton Hotel, San Francisco, California*. Attendees will explore how one of the world's largest future commodity markets will develop and impact their business. A technical session examining the potential of carbon capture and storage (CCS) in achieving significant emissions reductions is included in the agenda. The session will investigate what is being done to develop CCS technology, as well as the changes needed in regulatory and policy frameworks to support the growth of this technology. For a PDF version of the conference brochure, go to: http://www.greenpowerconferences.com/carbonmarkets/documents/BrochureCarbonMarketsUSA_000.pdf.

September 18-20, 2007, **Carbon Finance World 2007**, *The University of Chicago Gleacher Center, Chicago, Illinois*. This conference has been developed to examine the emerging opportunities in this new global market. This event will provide attendees with countless business development and networking opportunities, real investment prospects and an action plan for profitable growth. To find out more about this conference opportunity, go to: http://www.terrapinn.com/2007/carbon/Custom_14373.stm.

September 24-25, 2007, **European Clean Coal Conference: Optimizing the Energy Mix**, *The Westin Grand Hotel Berlin, Berlin, Germany*. The cost advantage of coal with CO_2 sequestration against natural gas is increasingly highlighting this fossil fuel as a key means of securing Europe's energy supply. This conference will highlight how the right mix of research, investment, and market incentives will stake a place for clean coal in a sustainable and secure energy future and how to optimize an energy portfolio in this rapidly evolving market place. For more information about this event, please see: http://www.platts.com/Events/pc775/index.xml.

Events (Continued)

October 2-5, 2007, **Greenhouse 2007**, *The Hilton, Sydney, Australia*. The conference will focus on projections for the future, the use of probabilities for risk management, the impact climate change will have on human activity, and changing perceptions of climate change. There will be many examples of industry and government approaches to tackling climate change, as well as presentations on the latest Australian and international science findings. This high-profile, prestigious international event is designed for representatives from industry, research organizations, government and the community. Links to the conference program, registration and accommodation information, and other useful links can be found at: http://www.greenhouse2007.com/.

October 3, 2007, **CO_2GeoNet – Training and Dialogue Workshop on CO_2 Geological Storage**, *Paris, France*. This workshop aims to provide participants with pertinent information and to encourage dialogue on essential questions concerning the technical aspects of CO_2 geological storage. For more information and to download a conference brochure, see the link on CO_2GeoNet website at: http://www.co2geonet.com/NewsData.aspx?IdNews=21.

October 4-5, 2007, **2nd International Symposium on Capture and Geological Storage of CO_2**, *Hôtel Le Méridien Étoile, Paris, France*. In order to reconcile the use of fossil fuels with the need to control the emissions responsible for global warming, CO_2 capture and storage represents a highly promising avenue, with much at stake, in both economic and industrial terms. This event follows the success of the first international symposium on emission reduction and CO_2 capture and geological storage held in Paris in 2005. In particular, the event will be an opportunity to present feedback from a number of pilot projects being conducted around the world. To view complete conference information, click on: http://www.co2symposium.com/IFP/en/CO_2site/colloque_va.htm.

October 16-17, 2007, **The 4th Trondheim Conference on CO_2 Capture**, *Transport and Storage, Nova Conference Center, Trondheim, Norway*. This international event focuses on research and development regarding CO_2 capture, transport and storage. The conference series has grown to become the key scientific CO_2 technologies conference in Norway, with all the major R&D institutions, oil and gas industry, Gassnova and the Research Council of Norway involved. To access the event website, go to: http://www.energy.sintef.no/arr/CO_2_2007/index.asp.

November 11-15, 2007, **20th World Energy Congress and Exhibition**, *Nuova Fiera, Rome, Italy*. With member committees in over 90 countries, the World Energy Congress aims to monitor the status of the energy sector and to find solutions to promote the economic development of the most industrialized and developing countries and, at the same time, a sustainable supply and use of energy for the greatest benefit to all people. The Congress is held every three years and is considered the most important energy forum. For complete information, see: http://www.rome2007.it/Congress/Congress.asp.

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