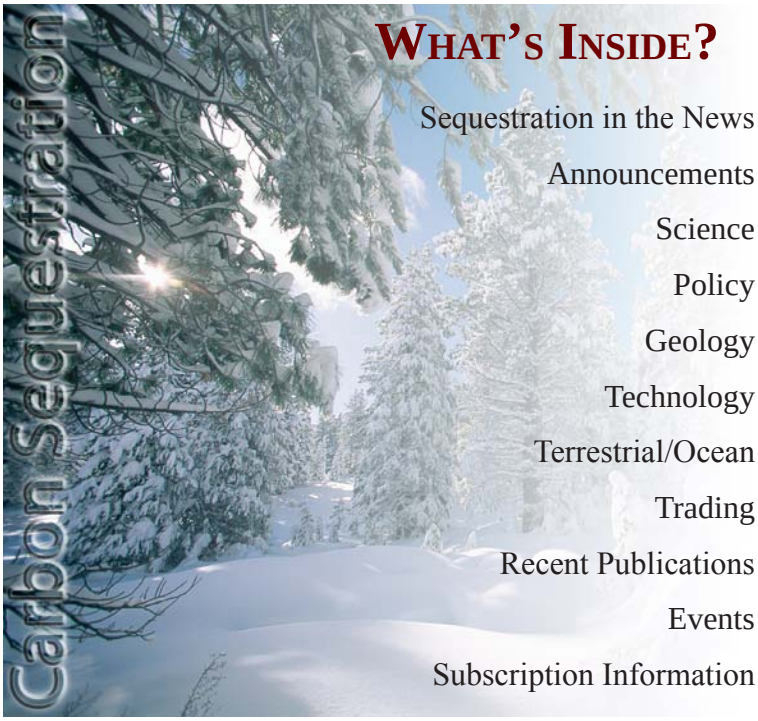
Carbon Sequestration Newsletter

December 2007



What's Inside?

Highlights

***Fossil Energy Techline*, "DOE Releases Environmental Impact Statement for FutureGen Project."**

The US Department of Energy (DOE) has released the Final Environmental Impact Statement (EIS) for the FutureGen Project, detailing the potential environmental effects of constructing the world's first coal-fired power plant that produces both electricity and commercial-grade hydrogen gas from coal, in addition to capturing and storing carbon dioxide (CO_2). The document evaluated four possible project sites in Mattoon, Illinois; Tuscola, Illinois; Jewett, Texas; and Odessa, Texas, and concluded each site offers an acceptable locale for funding the project, which is scheduled to begin operating in 2012. DOE will issue a Record of Decision for the Final EIS no sooner than 30 days after the Environmental Protection Agency (EPA) publishes its Notice of Availability of the Final EIS in the Federal Register. The Final EIS contains extensive evaluations of the potential environmental impacts for each site with respect to design, construction, and operation of the facility. Following the release of the Draft EIS on June 1, 2007, DOE conducted public meetings around each of the four final sites during the 45 day comment period. The FutureGen Industrial Alliance, a non-profit consortium of coal producers and electricity generators, is responsible for making the final decision regarding the siting of the facility, which DOE anticipates to be made public before the end of the 2007. Once operational, the 275-megawatt facility will serve as the cleanest fossil fuel-fired plant in the world. To view the Final Draft of the FutureGen Environmental Impact Statement, click on: http://www.netl.doe.gov/technologies/coalpower/futuregen/EIS/FG%20Summary%20-%20FINAL.pdf. November 9, 2007, http://www.fossil.energy.gov/news/techlines/2007/PrintVersion_1_29761_29761.html?plain%20target.

Sequestration in the News

***Arizona Public Service News Release*, "APS, SRP, Tucson Electric Power Join Coalition to Test Storing Carbon Dioxide Underground to Reduce Greenhouse Gases."**

Three major utilities participating in the West Coast Regional Carbon Sequestration Partnership (WESTCARB) will launch a geologic sequestration pilot test near Joseph City, Arizona. The validation test, to be conducted by Arizona Public Service, Salt River Project, and Tucson Electric Power, involves injecting commercial CO_2 at a depth of approximately 4,000 feet into an underground saline formation. Although located near the APS Cholla Power Plant, the project will not capture the emissions from the coal-burning power plant for this test. The injected CO_2 will be monitored to validate the safety and long-term storage potential of this geologic formation. Local residents and community leaders gave positive feedback about the project at public hearings held in August. WESTCARB is one of the seven Regional Carbon Sequestration Partnerships formed by DOE to determine the best approaches for capturing and permanently storing CO_2. To learn more about WESTCARB, visit the partnership website at: www.westcarb.org. October 24, 2007, http://www.aps.com/general_info/newsrelease/newsreleases/NewsRelease_424.html.

***Reuters*, "NRG to Test CO_2 Capture at Coal Unit," and *Greenwire*, "Companies Will Add Carbon-Capture to Texas Power Plant."**

NRG Energy and Powerspan Corporation announced plans to demonstrate a CO_2 capture and storage process at the NRG-owned, coal-fired WA Parish plant in Fort Bend County, located southwest of Houston, Texas. After the CO_2 is captured from the 125-megawatt plant's flue gas, using Powerspan's electrocatalytic oxidation

Sequestration in the News (continued)

technology (ECO_2), companies in the region will use the CO_2 for enhanced oil recovery. The ammonia-based ECO_2 solution is designed to capture CO_2 from flue gas emitted after combustion. Powerspan expects the facility to be operational in 2012, with 90 percent of the flue gas CO_2 captured – totaling an NRG-projected one million tons of CO_2 captured and sequestered annually. Once functional, the $150 million venture will rank among the world's largest carbon sequestration projects. The announcement comes on the heels of Powerspan's teaming with BP Alternative Energy in August to commercialize the ECO_2 technology and conduct a pilot test at an Ohio coal plant in early 2008. November 2, 2007. http://www.reuters.com/articlePrint?articleId=USN0257439020071102 and November 2, 2007, http://www.eenews.net/Greenwire/print/2007/11/02/11.

***Columbus Dispatch*, "Going Underground," and *Columbus Dispatch*, "CO_2 Could Go Underground."**

Researchers from the Midwest Regional Carbon Sequestration Partnership, headed by Battelle, have completed an experimental well to determine the potential of Ohio's geology to sequester the region's CO_2 emissions. As part of the Ohio Stratigraphic Borehole Project, sensing equipment was placed, and a hole was drilled to a depth of 8,695 feet. Beginning at 40 feet deep, the team collected geological cuttings every five feet until the 1,215 foot mark, where the sampling collection rate shifted to every 10 feet. Following the drilling, geologists conducted several tests, including examining core samples and lowering equipment into the shaft to measure porosity, testing for radioactivity levels; and injecting saline into prospective layers to determine how fluids move through rock. Tests revealed that the Rose Run and Clinton sandstones are potentially porous enough to sequester CO_2 in the region. While the project took place in eastern Ohio's Tuscarawas County, geologists are also monitoring the Mount Simon sandstone in western Ohio and a layer called Copper Ridge in southern Ohio as potential CO_2 storage sites. November 6, 2007, http://www.columbusdispatch.com/live/content/science/stories/2007/11/06/sci_borehole.ART_ART_11-06-07_B4_NN8ARQL.html?print=yes&sid=101 and November 6, 2007, http://www.columbusdispatch.com/live/content/local_news/stories/2007/11/06/borehole.ART_ART_11-06-07_B1_TV8CSPE.html?print=yes&sid=101.

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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.

ANNOUNCEMENTS

CSLF Launches Discussion Board.

The Carbon Sequestration Leadership Forum (CSLF) announced the creation of a public meeting place (PuMP) for policy makers, financial institutions, technology experts, project sponsors, and the public to post comments and questions about carbon capture and storage. Visit http://www.cslforum.org or access the forum directly at: http://www.cslforum.org/cslfpump/forums/list.page.

UCL Launches Carbon Capture and Storage Legal Initiative.

University College London (UCL) launched the Carbon Capture Legal Programme (CCLP) website; making carbon capture program information readily available to governments, companies, lawyers, and non-governmental organizations. The website will include links to legislation dealing with climate change, emissions trading regimes, and carbon capture and storage. To view the website, go to: http://www.ucl.ac.uk/cclp/.

Video Interview with World Resources Institute Associate.

World Resources Institute (WRI) representative, John Venezia, discusses a series of policy briefs on carbon capture and storage that are being released by WRI. The interview probes the obstacles facing carbon capture and storage technology and the opportunities that could arise from carbon capture and storage implementation. The video is available at: http://www.eenews.net/tv/video_guide/693.

Tuscola Energy Alliance and Website Formed.

In advance of the impending FutureGen site designation, a Tuscola, Illinois based coalition of local residents, community leaders, and agricultural and industrial partners have formed the Tuscola Energy Alliance. The website includes information about FutureGen, the qualities that make the Tuscola site a viable location, and the opportunity for individuals to voice their support. To browse the website, visit: http://www.tuscolaenergyalliance.org/index.cfm.

SCIENCE

***University of East Anglia News Release*, "North Atlantic Slows on the Uptake of CO_2."**

Results of a decade long study, conducted by Dr. Ute Schuster and Professor Andrew Watson of the University of East Anglia's School of Environmental Sciences, show that the North Atlantic Ocean's CO_2 uptake slowed considerably between the mid-1990s and early 2000s. The paper, titled "Large variations in anthropogenic carbon accumulation in the North Atlantic subtropics," surmises that the North Atlantic served as the most intense sink for atmospheric CO_2 since the industrial revolution, consequently slowing climate change. However, after collecting data from merchant ships equipped with automatic instruments for measuring CO_2 levels in the water, Schuster and Watson found a sudden proportional decrease in the North Atlantic's CO_2 uptake and inferred a slowdown in Southern Atlantic's uptake. The majority of the data came from a container ship making a round-trip from the West Indies to the United Kingdom once a month, generating more than 90,000 CO_2 measurements over the course of the study. Specifically, the data reveal that uptake decreased 50 percent from the mid-1990s to 2002-05. To view a PDF of the study, click: http://lgmacweb.env.uea.ac.uk/ajw/Reprints/brown_et_al_submitted.pdf. October 22, 2007, http://www1.uea.ac.uk/cm/home/services/units/mac/comm/media/press/2007/oct/North%2BAtlantic%2Bslows%2Bon%2Bthe%2Buptake%2Bof%2BCO_2.

***Greenwire*, "Warming Tied to Mass Extinctions -- Study," and *University of York Press Release*, "Fossil Record Supports Evidence of Impending Mass Extinction."**

According to research conducted by Dr. Peter Mayhew of the University of York and University of Leeds Professor Tim Benton, the gradual rises in temperature and sea level throughout Earth's history have been precursors for mass extinctions. The two population ecologists predict that if future, real world conditions align with their projections, a new mass extinction event could occur, affecting some 50 percent of the animal and plant species on Earth. Through the analysis of fossil records, the scientists compared the number of species and overall marine and terrestrial biodiversity to sea temperatures and divided their data into 10 million-year-periods. They concluded that biodiversity is lower during warmer "greenhouse" phases and extinction rates relatively high, with the opposite holding true in "icehouse" periods. As a result of their findings, they believe that four of the past five mass extinctions over the last 520 million years are attributable to warmer tropical seas and thus, a warmer Earth. The two believe the last mass extinction occurred 251 million years ago, when 95 percent of animal and plant species died. Also, the study shows the Earth goes through 60-million-year climate cycles, oscillating between warmer "greenhouse" periods and cooler "icehouse" phases. To see a full text version of the study, go to: http://www.journals.royalsoc.ac.uk/content/3x081w5n5358qj01/fulltext.pdf. October 24, 2007, http://www.eenews.net/Greenwire/print/2007/10/24/13 and October 24, 2007, http://www.eurekalert.org/pub_releases/2007-10/uoy-frs102207.php#.

Policy

***Wall Street Journal Online*, "Energy (A Special Report) -- Regulators; Cutting Edge: Is Canada's Approach to Reducing Greenhouse-Gas Emissions a Breakthrough – or a PR Gimmick?"**

In 2010, Canada will become the first country to implement a different approach to the Kyoto Protocol. Rather than limiting the total amount of emissions, oil, gas, power, iron, steel, chemical, cement, and other material producers can increase production so long as the ratio of their emissions to the basic unit of production in their industry declines. Critics argue the policy will not result in emissions cuts because, for example, a power generator's ratio is based on kilowatt-hours and an oil producer's ratio is based on barrels of oil, leading some to believe that the ratios support political interests, instead of aiding the environment. The proposed policy is based on the thinking that cutting emissions to percentages below the Kyoto mandated 1990 levels would devastate the Canadian economy. In addition, this past September, Canada agreed to the Sydney Declaration, vowing to reduce energy intensity, or the amount of energy needed to produce a dollar of gross domestic product, by 25 percent by 2030. While no deductions in overall emissions totals are mandated, large industrial companies are required to reduce their emission ratios by 18 percent below 2006 levels in 2010 and by two percent each following year through 2020. The government's hope is that once this policy is meshed with energy efficiency measures and renewable fuel drives, Canada's greenhouse-gas emissions will fall one fifth by 2020. The options for those failing to reduce their emission-ratio targets include pursuing renewable energy projects, trading CO_2 credits on the international or Canadian market after it launches later this year, or paying a $15.35 ($15 Canadian) fine per metric ton of CO_2 above their target ratio into a technology development fund. For many, the most intriguing technology is carbon sequestration, because Alberta possesses many oil and gas wells capable of storing CO_2. November 12, 2007, http://online.wsj.com/article/SB119463318508988186.html. (Subscription required.)

"The energy-climate challenge: Recent trends in CO_2 emissions from fuel combustion."

Fossil fuel combustion is the single largest human influence on climate, accounting for 80 [percent] of anthropogenic greenhouse gas emissions. This paper presents trends in world carbon dioxide (CO_2) emissions from fossil fuel combustion worldwide, based on the estimates of the International Energy Agency (IEA) [IEA, 2006a. CO_2 Emissions from Fuel Combustion 1971–2004. International Energy Agency, Paris, France]. Analyzing the drivers of CO_2 emissions, the paper considers regions, types of fuel, sectors, and socio-economic indicators.

The paper then examines the growing body of climate change mitigation policies and measures, both multinational and federal. Policies discussed include the Kyoto Protocol, the European Union Emissions Trading Scheme, and the potential measures to be implemented in 2012 and beyond. CO_2 emissions of recent years have grown at the highest rates ever recorded, an observed trend incompatible with stabilizing atmospheric concentrations of greenhouse gases and avoiding long-term climate change. Within this aggregate upward trend, a comparison of emissions sources proves dynamic: while industrialized countries have so far dominated historical emissions, rapid growth in energy demand of developing economies, led by China, may soon spur their absolute emissions beyond those of industrialized countries. **Roberta Quadrelli and Sierra Peterson**, *Energy Policy*, Available online: September 4, 2007, doi: 10.1016/j.enpol.2007.07.001, http://www.sciencedirect.com/science/article/B6V2W-4PK8G4S-1/2/c4379d67d5511f07a27cfc91d4cdb9bd. (Subscription may be required.)

Geology

"The Atmospheric Background of Perfluorocarbon Compounds Used as Tracers."

There are seven cyclic perfluoroalkane compounds, which can be detected in extremely low concentrations, that are used to track mass movement and transfer in a variety of research and practical applications. They are used in leak detection in underground storage and pipelines and in atmospheric transport and diffusion research on local, regional, and continental scales. They are likely to be a used globally for monitoring carbon sequestration in geological formations. The atmospheric background levels of these compounds must be accurately known, and trends in their concentrations determined for these compounds to be effective in monitoring CO_2 reservoirs and because there are environmental concerns about their release. Results of measurements of perfluorocarbon background concentrations from two recent field programs are presented, and trends in these values examined using data collected over the last 25 years. The current atmospheric concentrations of these compounds are in the low parts per quadrillion levels, and their annual atmospheric growth rate is less than 1 part per quadrillion per year. The environmental effects of these compounds are examined and found to be negligible at current release rates. **Thomas B. Watson, Richard Wilke, Russell N. Dietz, John Heiser, and Paul Kalb**, *Environmental Science Technology*, Available online: September 15, 2007, DOI: 10.1021/es070940k, http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/2007/41/i20/abs/es070940k.html. (Subscription required.)

Technology

"Should a Coal-Fired Power Plant be Replaced or Retrofitted?"

In a cap-and-trade system, a power plant operator can choose to operate while paying for the necessary emissions allowances, retrofit emissions controls to the plant, or replace the unit with a new plant. Allowance prices are uncertain, as are the timing and stringency of requirements for control of mercury and carbon emissions. [The authors] model the evolution of allowance prices for SO_2, NO_x, H_g, and CO_2 using geometric Brownian motion with drift, volatility, and jumps, and use an options-based analysis to find the value of the alternatives. In the absence of a carbon price, only if the owners have a planning horizon longer than 30 years would they replace a conventional coal-fired plant with a high-performance unit such as a supercritical plant; otherwise, they would install SO_2 and NO_x controls on the existing unit. An expectation that the CO_2 price will reach $50/t in 2020 makes the installation of an IGCC with carbon capture and sequestration attractive today, even for planning horizons as short as 20 years. A carbon price below $40/t is unlikely to produce investments in carbon capture for electric power. **Dalia Patiño-Echeverri, Benoit Morel, Jay Apt, and Chao Chen**, *Environmental Science Technology*, Available online: October 17, 2007, DOI: 10.1021/es0711009, http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/2007/41/i23/abs/es0711009.html.

Terrestrial/Ocean

"Induced effects of hedgerow networks on soil organic carbon storage within an agricultural landscape."


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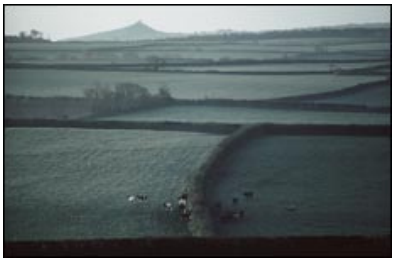
Hedgerow network landscapes or "bocages" are present throughout a large part of Western Europe [Baudry, J., Bunce, R.G.H. et al., 2000. Hedgerows: an international perspective on their origin, function and management. Journal of Environmental Management 60 (1), 7–22.]. These manmade landscapes are typically comprised of fields separated by boundaries, often marked by perennial vegetation (hedges or shelterbelts), yet little is known about the effect of these field margins on soil organic carbon (SOC) stocks and their dynamics, which offer large carbon sequestration potential [Walter, C., Mérot, P., Layer, B., Dutin, G., 2003. The effect of hedgerows on soil organic carbon storage in hill slopes. Soil Use and Management 19, 201–207.; Falloon, P., Powlson, D., Smith, P., 2004. Managing field margins for biodiversity and carbon sequestration: a Great Britain case study. Soil Use and Management 20, 240–247.]. In hedged landscapes, hedges induce a modification to the soil A-horizon geometry at the slope scale, as attributed to an anti-erosive effect, along with a local modification of the associated SOC stocks. Most studies undertaken within this context have been performed in two dimensions and under favorable conditions for soil accumulation with the hedges lying perpendicular to the steepest slope direction. Consequently, an extrapolation of these findings to the entire landscape can lead to overestimating SOC stocks at the landscape scale. The aims of this paper were to: quantify SOC stocks, describe their spatial variability in three dimensions, and identify the main determinants behind this variability within an agricultural hedgerow network landscape. To achieve these aims, [the authors] conducted a detailed field survey that took into account all three dimensions of the soil cover and anthropogenic structures. [The authors] then analyzed the spatial distribution of SOC contents and stocks with respect to pedological and landscape parameters. **Stéphane Follain, Christian Walter, Arnaud Legout, Blandine Lemercier and Gilles Dutin,** *Geoderma*, Available online: September 4, 2007, doi: 10.1016/j.geoderma.2007.08.002, http://www.sciencedirect.com/science/article/B6V67-4PK8MRG-1/2/00b73c4c173020ba6108a0c487f64a88. (Subscription may be required.)


National Geographic

Trading

Carbon Market Update, Nov. 15, 2007

CCX-CFI 2007 ($/tCO$_2$)	EU ETS-EUA DEC 2008 ($/tCO$_2$)
$2.05 (Vintage 2007)	$33.18

(Converted from € to US$)

***Reuters*, "World Carbon Market Seen Doubling this Year: IETA," and *Reuters*, "U.S. Exchanges Explore Carbon Trading Market."**

After growing from $11 billion in 2005 to $30 billion in 2006, International Emissions Trading Association (IETA) representatives believe the carbon emissions trading market will double to at least $60 billion this year as investors and businesses seek to profit from reducing greenhouse gases. They added that the European Union's Emissions Trading Scheme (EU ETS) is still the main source of market value, but emissions trading markets across the globe are evolving quickly. In the United States, several carbon trading market developments are beginning to take shape as exchanges monitor the global market's growth and domestic government policy: New York Stock Exchange operator NYSE Euronext announced a partnership with French bank Caisse des Depots to initiate a carbon trading market in 2008; CME Group Incorporated recently hinted at plans to develop carbon trading products after its 10 percent acquisition of the Brazilian Mercantile and Futures Exchange (BM&F); and Nymex Holdings Incorporated's, owner of the New York Mercantile Exchange (NYMEX), statement that it will begin offering carbon trading contracts in the first quarter of 2008. Unlike the European Union, the US has not established a nationwide cap on greenhouse gases, but several large corporations voluntarily trade carbon allowances. November 5, 2007, http://www.reuters.com/articlePrint?articleId=USSP20658520071105 and November 6, 2007, http://www.reuters.com/articlePrint?articleId=USN0640911720071106.

Recent Publications

"Final Environmental Impact Statement of FutureGen Project."

This Environmental Impact Statement (EIS) provides an analysis of the potential environmental impacts of the proposed FutureGen Project. The project would include the planning, design, construction, and operation of the proposed FutureGen facility, a prototype electric power and hydrogen (H_2) generating plant that would employ coal gasification technology integrated with combined-cycle electricity generation and sequester carbon dioxide (CO_2) emissions. The project would also include an ongoing research program, which would be the principal feature of the prototype plant. The FutureGen Initiative, announced by President George W. Bush on February 27, 2003, is based on recommendations in the National Energy Policy (NEP), issued in May 2001 (NEP, 2001). The NEP cites, in broad terms, the need to promote diverse and secure sources of energy and the expected need for coal to play a significant role in providing that energy. The NEP specifically states, "In the long term, the goal of the [clean coal technology] program is to develop low cost, zero-emission power plants with efficiencies close to double that of today's fleet." Action is needed to support the President's announcement emphasizing the need for the FutureGen Initiative and to support other federal initiatives including the National Climate Change Technology Initiative (June 11, 2001) and the Hydrogen Fuel Initiative (January 28, 2003). These initiatives aim to reduce the Nation's output of greenhouse gas (GHG) emissions from coal-fueled energy production, to improve the global environment, and to provide advanced technologies to meet the world's energy needs. **(See article in this month's Highlights section, "DOE Releases Environmental Impact Statement for FutureGen Project," which references the release of the document.)** To download the complete FutureGen Final EIS, click on: http://www.netl.doe.gov/technologies/coalpower/futuregen/EIS/FG%20Summary%20-%20FINAL.pdf.

"A Program to Accelerate the Deployment of CO_2 Capture and Storage (CCS): Rationale, Objectives, and Cost."

This White Paper analyzes one strategy for accelerating the deployment of carbon capture and storage (CCS) by the coal-fueled electricity-generation industry. This strategy involves providing reimbursement for the incremental costs of installing and operating CCS systems, with reimbursement provided for: (1.) Retrofitting some existing commercial-scale (500+ MW net capacity, before installation of CCS) coal-fueled electric generation plants with CCS and operating these for five years; (2.) Incorporating CCS into some new, commercial-scale (400+ MW net capacity, after installation of CCS) coal-fueled electric generation plants and operating these for five years; and (3.) Launching large-scale (1 to 3 million metric tons per year) demonstrations of geologic storage of carbon dioxide (CO_2) primarily in saline formations and operating these for five years, using CO_2 from non-utility industrial sources. The paper sets forth two alternative sets of objectives and outcomes for such a cost reimbursement program, based on program size. The objectives of the Smaller-Scale Program (10 commercial-scale demonstrations of CCS at coal-fueled electric power plants, plus five CCS demonstrations using CO_2 from other industrial sources) would be to establish reliable CCS cost and performance data, and to build experience with CCS. The objectives of the Larger-Scale Program (30 commercial-scale demonstrations of CCS at coal-fueled power plants plus 10 demonstrations of CCS using CO_2 from other industries sources) would be much more ambitious. Here the objectives are to achieve significant reductions in CO_2 capture costs and energy penal¬ties, build broad public acceptance of CO_2 storage, and promote the timely development of CCS regulatory systems, in addition to establishing reliable cost and performance data and experience with CCS. To download the first of six white papers prepared for the Pew Center on Global Climate Change as part of the Coal Initiative Series, go to: http://www.pewclimate.org/docUploads/CCS%20Deployment.pdf.

"Coal Meeting the Climate Challenge: Technology to Reduce Greenhouse Emissions."

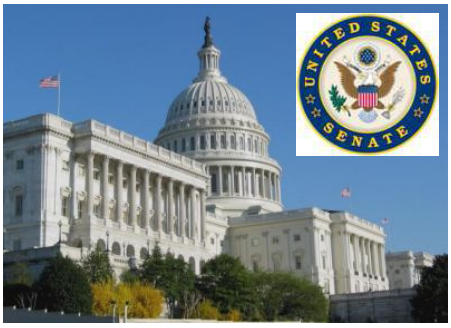
A sustainable energy future is one where society's energy needs are met using resources available to us over the short, medium and long term. At the same time, it means producing and utilizing all these energy sources in a way that minimizes adverse impacts on the environment and maximizes economic and social benefits. This is a significant challenge – particularly because of surging energy demand, concerns about energy security, and the environmental impacts of energy production and consumption. [Humankind has] to take steps to reconcile economic and social objectives with environmental imperatives – specifically those posed by climate change. Over the last ten years, world primary energy demand has risen by over 20 [percent] and this upward trend is set to continue. Fossil fuels will continue to dominate energy consumption; still meeting around 80 [percent] of energy needs in 2030. Coal will meet over 25 [percent] of global energy demand. Coal is abundantly available, affordable, reliable, geographically well-distributed and easy and safe to transport. Coal markets are well-functioning and responsive to changes in supply and demand. The major challenges facing coal are concerned with its environmental impacts. Viable, highly effective technologies have been developed to tackle the release of pollutants – such as oxides of sulfur (SO_x) and nitrogen (NO_x) – and particulate and trace elements, such as mercury. More recently, greenhouse gas (GHG) emissions, including carbon dioxide (CO_2) and methane (CH4) have become a concern because of their link to climate change. To read the entire report from the World Coal Institute, go to: http://www.worldcoal.org/assets_cm/files/PDF/coal_meeting_the_climate_challenge.pdf.

Recent Publications Continued

"Storage of Carbon Dioxide in Geologic Structures: A Legal and Regulatory Guide for States and Provinces."
This report is the product of the Interstate Oil and Gas Compact Commission (IOGCC) Task Force on Carbon Capture and Geologic Storage. It is the culmination of a two-phase, five-year effort. This Phase II report takes the form of a Guidance Document for U.S. states and Canadian provinces. Its purpose is to provide to a state or province contemplating adoption of a legal and regulatory framework for the storage of carbon dioxide (CO_2) in geologic media the resources needed to draft a framework that meets the unique requirements of that particular state or province. It is anticipated that a state adopting a regulatory framework for CO_2 storage will make changes to the model framework as necessary to conform to state law. The Task Force therefore envisions that what will result will be a substantially consistent system for the geologic storage of CO_2 regulated at the state and provincial level in conformance with national and international law and protocol. To read the complete regulatory guide, go to: http://www.iogcc.state.ok.us/docs/MeetingDocs/Master-Document-September-252007-FINAL-(2).pdf.

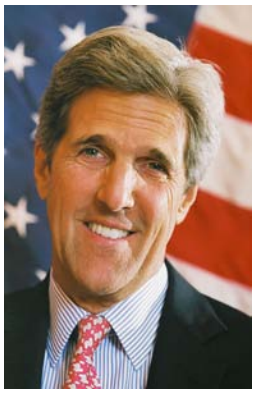
Legislative Activity

***Wall Street Journal Online*, "Senate Panel Backs Cap-and-Trade for Limiting GHG."**

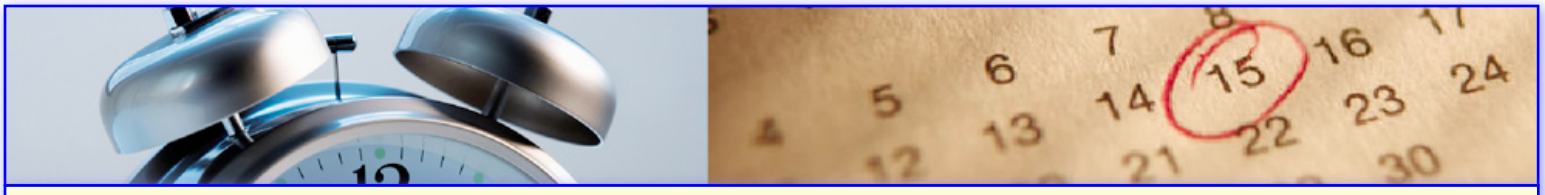


On November 1, 2007, a US Senate Environment and Public Works subcommittee voted 4-3 to approve legislation that would institute a cap-and-trade system to limit greenhouse gases. Should the bill come to fruition, companies would receive allowances beginning in 2012 to release a predetermined amount of CO_2 and other greenhouse gases, with the amount of emissions permitted decreasing 70 percent by 2050. The responsibly for allocating credits would fall into the hands of the EPA, while a newly created "Climate Change Credit Corporation" would auction off 18 percent of the credits at the program's onset; by 2036 that figure would rise to 73 percent. Over the first five years of the program, electrical power companies would receive 19 percent of the allowances and industrial companies would receive 20 percent, with the free, tradable allowances completely phased out by 2036. About 55 percent of the auction proceeds would fund energy technology deployment, such as developing new automobiles. The bill arises from a United Nations panel estimate that greenhouse gas emissions must be reduced 50 to 85 percent below 2000 levels by 2050 to avert significant damage to the environment. To browse the Senate Committee web site, see: http://epw.senate.gov/public/index.cfm?FuseAction=Hearings.Hearing&Hearing_ID=ec1a7a4f-802a-23ad-4773-1e922d374f71. To view the legislation, go to: http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=85a349e8-0579-4b3b-a642-70219ab09f41. November 1, 2007, http://online.wsj.com/article/SB119393294388879212.html?mod=googlenews_wsj. (Subscription may be required.)

***Reuters*, "Kerry Floats GHG Sequestration Proposal."**



Massachusetts Senator John Kerry introduced a bill titled "Carbon Capture and Storage Technology Act of 2007," on November 8, 2007, calling for billions of dollars to be spent boosting carbon sequestration research and development funds and assembling a nationwide assessment of CO_2 storage capacity. The bill would authorize DOE to create a competitive grant program for the construction of three to five coal-fired power plants capable of capturing CO_2 and an equal number of sequestration projects able to exhibit the storage of one million tons of CO_2 per year. The power plants would receive $2.4 billion per year thru 2015, while the sequestration projects would receive $1.6 billion per year, with half of the power plants and 20-50 percent of the sequestration projects costs covered by non-federal sources. The bill requires at least two of the sequestration projects inject CO_2 into deep saline aquifers, instead of unminable coal seams or depleted oil or gas reservoirs. In addition, a task force composed of EPA, DOE, and US Geological Survey officials would develop regulations regarding safe transportation and storage of CO_2, possible liability issues, and storage site certifications. DOE would also be responsible for researching and developing several capture techniques, including oxygen-fueled pulverized coal combustion, separation of oxygen and air, and coal gasification. To view a copy of the proposed legislation, click on: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:s2323is.txt.pdf. November 8, 2007, http://www.eenews.net/EEDaily/print/2007/11/08/6.



EVENTS

December 3-5, 2007, **Carbon Capture Status and Outlook**, *Almas Temple Club, Washington DC*. This conference will provide attendees with a global update on key technical, economic, financial, and policy developments in implementing carbon capture for power plants and other major industrial applications. To download the conference agenda and obtain registration information, go to: http://www.infocastinc.com/capture.html.

December 3-7, 2007, **CO_2 Flooding Conference**, *Onmi Mandalay Hotel Las Colinas, Irving, Texas and Midland Center Downtown, Midland, Texas*. This unique, two-part conference brings together players from both the oil industry and leaders in the emerging carbon capture and storage industry, whose expertise entails CO_2 processing, compression, injection, and reservoir maintenance and surveillance. The conference will examine FutureGen; case histories of actual CO_2 floods and sequestration projects; reports from DOE's Regional Carbon Sequestration Partnerships; and geological parameters affecting CO_2 enhanced oil recovery and CO_2 storage. In addition, attendees will take a "field trip" to Whiting Petroleum's new North Ward Estes CO_2 flood near Monahans, Texas. For further information and registration, go to: http://www.hartenergyconferences.com/index.php?area=details&confID=54.

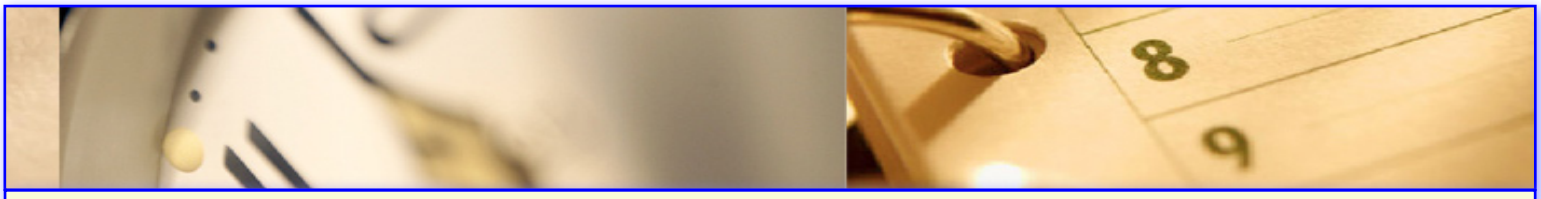
December 5-6, 2007, **Business in the Wilderness: Shaping Your Carbon Choices**, *Omni Shoreham, Washington DC*. This conference offers business leaders the opportunity to collaborate and discuss the commercial use of new carbon technologies. In particular, attendees will learn about emerging technological solutions for carbon management, network with carbon policy makers, and help develop the new "Carbon Management Council." To learn more about this event, go to: http://www.carbonmanagementcouncil.org/conf.asp.

December 10-14, 2007, **AGU Fall Meeting**, *Moscone Center, San Francisco, California*. The AGU Fall Meeting provides an opportunity for researchers, teachers, students, and consultants to present and review the latest issues affecting the Earth, the planets, and their environments in space. This meeting will cover topics in all areas of Earth and space sciences. A session entitled "Carbon Sequestration: Reservoirs, Techniques, Policy" will cover novel and current work in geologic, terrestrial, and oceanic carbon sequestration, as well as Monitoring, Mitigation and Verification (MMV) development as it relates to sequestration. For complete information, visit: http://www.agu.org/meetings/fm07/.

January 15-16, 2008, **Seizing the Investment & Compliance Opportunities of Carbon Emissions**, *Marriott Bloor Yorkville, Toronto, Ontario, Canada*. This two day event teaches attendees solutions for measuring, monitoring, and profiting from emission reduction investments falling under the Canadian government's regulatory framework. Speakers will cover topics ranging from the latest international efforts to stimulate investment in emission reduction; the opportunities to reduce carbon emissions; and the challenges and solutions being adopted. To view agenda and request a conference brochure, go to: https://webserv.c5groupinc.com/www_secure/conf_details.php?conf=4892&view=ovrv.

January 17-18, 2008, **Emerging Opportunities in Carbon Markets**, *Westin Colonnade Coral Gables, Coral Gables, Florida*. Emerging Opportunities in Carbon Markets will address the development of current emissions trading systems, focusing on budding business opportunities, the fostering of technological development and innovation, and the impact on global finance. In addition to providing stimulating discussion and numerous networking opportunities, this event offers several carbon related forums, including a panel discussion about the cap-and-trade system versus a carbon tax. For further conference details, go to: http://www.environmental-finance.com/conferences/2007/Miami08/details.htm.

January 17-18, 2008, **3rd EU Energy and Environment Law and Policy Seminar & Conference**, *Radisson SAS Royal Hotel, Brussels, Belgium*. This conference brings together important market players and policy makers to discuss the future of the European energy market. In addition to four sessions titled "Europe's Emerging Energy and Environmental Policy," "The Internal Energy Market: The Third Liberalization Package," "Competition Policy and the Internal Energy Market," and "Meeting the Challenges of Kyoto," included is a break-out session about carbon sequestration, focusing on objectives, financing, research, and policy. For complete information, visit: http://www.claeys-casteels.com/energyconference/1718january.php?pg=A000.



Events (Continued)

January 24-25, 2008, **Carbon Trading: Opportunities and Risks in Global Emissions Markets**, *JW Marriott Hotel, Houston, Texas*. Designed for aiding energy traders, emission traders, and investors with knowledge about the evolving carbon trading market, this inaugural conference focuses on several key issues: the mechanisms of carbon trading; managing risk in carbon markets; allocations versus auctions of allowances; market impact of Phase II carbon trading rules in the EU; and the next steps in the US carbon trading market. For event registration and agenda, visit: http://www.platts.com/Events/2008/pc803/index.xml.

January 27-28, 2008, **11th Annual EUEC Energy and Environment Conference**, *Westin La Paloma, Tucson, Arizona*. One of America's most recognized technical meetings, the EUEC Energy and Environment Conference offers attendees six concurrently running tracks and several pre-conference workshop opportunities. Among the topics to be addressed: the development of ongoing and future carbon capture and storage techniques and projects; terrestrial sequestration activities; domestic and international climate policy; and regional climate initiatives. To view the extensive conference agenda, visit: http://www.euec.com/downloads/Program%20Agenda.pdf.

February 26-27, 2008, **The Future of the Carbon Market**, *Le Méridien Piccadilly, London, England*. In an industry where regulatory and economic developments are driving change, The Future of the Carbon Market strives to aid participants with their preparation for Phase II of the EU Emission Trading Scheme and its increasingly strict emissions cap. Discussion will focus on market liquidity and the price of carbon; the adaptation of businesses to the new regime; making sound, long-term strategic decisions; and the regulatory uncertainty as political leaders negotiate a follow up to the soon expiring Kyoto Protocol. For conference registration and agenda, go to: http://www.marketforce.eu.com/carbon/.

February 26-27, 2008, **Carbon Forum America**, *Moscone Center, San Francisco, California*. Carbon Forum America is the first US industry event that combines a trade fair with a conference, creating a unique opportunity for attendees to mingle with key players in the carbon community. Presentations will cover subjects ranging from new solutions and technologies for carbon abatement; the market's use of voluntary carbon standards; new energy sources and their effects on energy pricing; and the interaction of Green Investment Schemes with the CDM. To view a PDF version of the conference brochure, go to: http://www.carbonforumamerica.com/documents/CFAExhibit10_11_07.pdf.

For subscription details...

Please visit http://listserv.netl.doe.gov/mailman/listinfo/sequestration, enter your email address, and create a password. This will enable you to receive a pdf version of the Carbon Sequestration Newsletter at no cost.

To view an archive with past issues of the newsletter, see: http://www.netl.doe.gov/technologies/carbon_seq/refshelf/subscribe.html.

To learn more about DOE's Carbon Sequestration Program, please contact Sean Plasynski at sean.plasynski@netl.doe.gov, or Dawn Deel at dawn.deel@netl.doe.gov.

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