THE CARBON SEQUESTRATION NEWSLETTER

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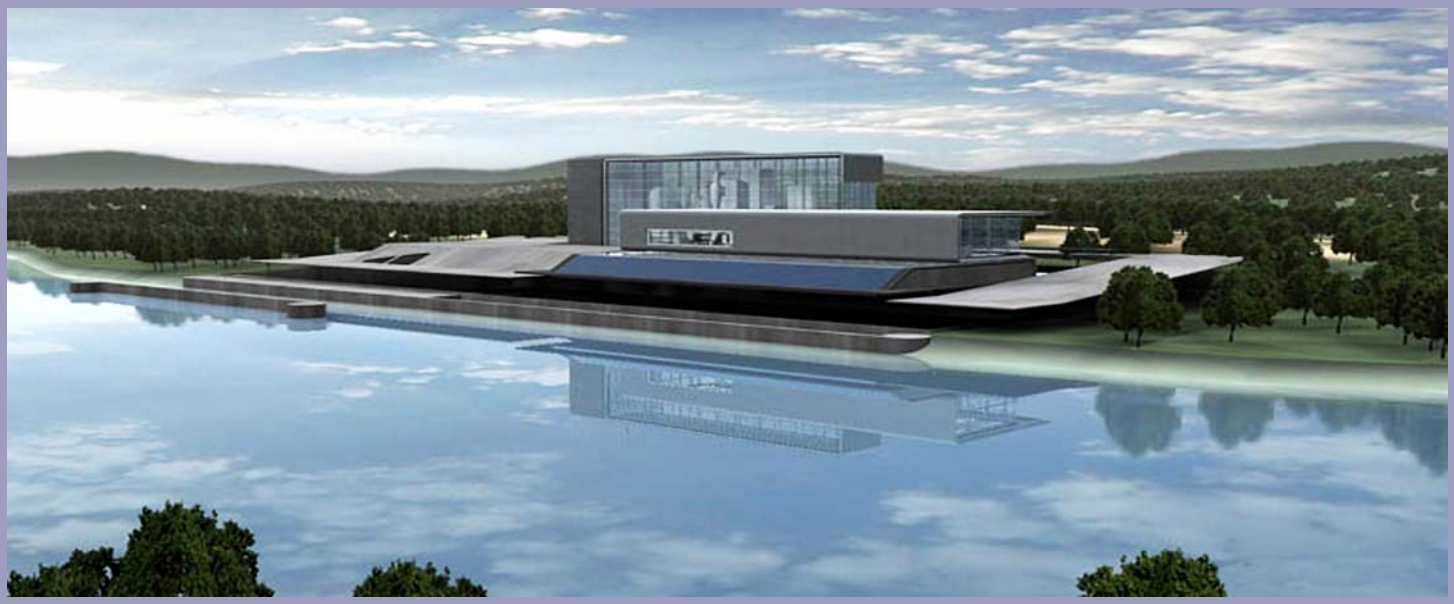
February 2007

HIGHLIGHTS



Artist Rendition of the FutureGen Plant (Source: US Department of Energy)

***DOE Press Release,* "U.S. and China Announce Cooperation on FutureGen and Sign Energy Efficiency Protocol at the U.S.-China Strategic Economic Dialogue."** China will follow India and South Korea in becoming the third country to join the United States in the FutureGen International Partnership. They will also participate in the Government Steering Committee of the FutureGen Initiative. FutureGen is a $1 billion initiative to build a near-zero emission fossil fuel-fired power plant run by both electricity and commercial-grade hydrogen from coal. The two nations also signed an Energy Efficiency and Renewable Energy Protocol during the US-China Strategic Economic Dialogue session, which was held in Beijing. This agreement renews the joint collaboration in developing and deploying clean, energy efficient and renewable energy technologies including solar, wind, biomass, geothermal, and hydrogen energy. US Secretary of Energy Samuel W. Bodman joined other US government and industry officials on a five day trip to Asia that began on December 12. He met with senior Chinese government officials to discuss ongoing cooperative efforts to continue the advancement of energy security and other energy related issues. The Asia Pacific Partnership on Clean Development and Climate; the International Partnership for a Hydrogen Economy; the Carbon Sequestration Leadership Forum; the International Thermonuclear Experimental Reactor; and the Generation IV International Forum are examples of these cooperative efforts. Secretary Bodman expressed his appreciation of China's commitment to join the United States in their advancement of new technologies to enhance energy efficiency and reduce emissions. December 15, 2006, http://www.energy.gov/news/4535.htm.

Sequestration in the News

***Greenwire,* "Appropriations Delays Pose Threat to FutureGen."** Plans to utilize $54 million toward building FutureGen, a near-zero emissions coal-fueled power plant, may be delayed if Congress fails to approve the new budget in fiscal year 2007. The result would be a continuing resolution, whereby federal programs would be forced to operate at fiscal 2006 funding levels. That would mean that only $18 million would be available for the FutureGen operating budget until Congress passes their annual spending legislation. House and Senate Republicans had agreed to give the Bush administration $54 million in 2007, which would add to the already approved $45 million in funding since President Bush first introduced the concept in his 2003 State of the Union address. In total, Congress has been asked to supply two thirds of the $1 billion cost for FutureGen, with the remainder of the funding coming from private industry and foreign countries. If 2007 funding is not approved, FutureGen will face competition from other specialized contractors who are already bidding on other power plant construction projects and industrial expansions. The site selection for FutureGen is expected by next September and construction is slated to start in 2009. December 8, 2006, http://www.eenews.net/Greenwire/2006/12/08/archive/4/?terms=greenhouse%20gases.

***Herald Sun,* "Carbon Storage Project to Go Ahead."** The Australian government granted $4.8 million ($6.1 million Australian) to the Co-operative Research Centre for Carbon Dioxide ($CRCCO_2$) to undertake a major carbon dioxide (CO_2) capture and geological sequestration project in the Otway Basin of Victoria, Australia. This grant will add to the $23.5 million ($30 million Australian) already obtained for the project scheduled to begin in early 2007. The first stage of the project will involve drilling a well to a depth of 2000 meters, followed by separation of CO_2 from methane. The CO_2 will subsequently be compressed and injected into a deep geological formation in western Victoria. Long-term monitoring will be conducted. $CRCCO_2$ and its partners have established a new company called CO_2CRC Pilot Project. Carbon capture and storage technology will allow Australia and other countries to utilize existing energy infrastructure and enable the continued use of coal as a viable energy source. December 22, 2006, http://www.news.com.au/heraldsun/story/0,21985,20965269-5005961,00.html.

***CNW Telbec.* "Canada's New Government Launches ecoEnergy Technology Initiative."** In Canada, Gary Lunn, Minister of Natural Resources, and John Baird, Minister of the Environment, announced the ecoEnergy Technology Initiative on January 17. The initiative is a $197 million ($230 million Canadian) investment in research, development and demonstration of clean-energy technologies, including carbon dioxide sequestration, clean coal, clean oil sands production and renewable energy. Priorities within the program will be further developed with provinces and industry partners through consultations. January 17, 2006, http://www.cnw.ca/fr/releases/archive/January2007/17/c6537.html.

***Rancher Energy Corporation Press Release*, "Rancher Energy Secures CO_2 for Enhanced Oil Recovery via Supply Agreement with Anadarko Petroleum,"** and ***Rancher Energy Corporation Press Release,* "Rancher Energy Completes Acquisition of Highly Prospective Big Muddy Oil Field."** Rancher Energy Corporation has completed the purchase of the Big Muddy Oil Field in Wyoming's Powder River Basin for $25 million. The oil field acquisition will allow the company to pursue enhanced oil recovery (EOR) projects by injecting carbon dioxide (CO_2) into the reservoirs to stimulate oil production. Prior to the purchase, Rancher Energy Corporation announced that it will obtain the supply of CO_2 for the EOR project through an agreement with Anadarko Petroleum Corporation. The company hopes to generate substantial sequestration credits through its use of carbon sequestration through EOR. The newly acquired field covers an area of 8,500 acres and currently produces about 60 barrels of oil per day. Rancher Energy Corp. also hopes to acquire Cole Creek South and South Glenrock B fields, which also

Announcements

Call for Papers for Sixth Annual Conference on Carbon Capture and Sequestration, May 7-10, 2007, Sheraton at Station Square, Pittsburgh, Pennsylvania. Conference organizers invite you to submit an abstract for consideration in the selection of possible paper and poster presentations for the conference technical sessions. General topics will include Capture and Separation, Sequestration of Carbon Emissions in Geologic Formations, Methods for Reporting CO_2 Emissions, Emissions Trading and Offsets, International Initiatives and Programs, and Policy Issues, among other carbon sequestration-related topics of interest. Deadline for abstract submissions is February 26, 2007. **(See this Newsletter's Events section for more details, and this link: http://www.carbonsq.com/.)**

Vacancy Announcement. NETL has an immediate opening for an engineer/scientist with experience and knowledge of fossil and other energy systems. Specifically, the position is responsible for analyzing the environmental benefits and economic impacts of advanced fossil energy technologies and other energy systems relevant to global climate change. Learn more about vacancy announcement NETL-07-06/07-07 by viewing this link: http://www.netl.doe.gov/technologies/carbon_seq/Resources/vacancy.html.

DOE Announces Thomas D. Shope as New Principal Deputy Assistant Secretary for Fossil Energy. The announcement was made on December 19 by Jeffrey Jarrett, Assistant Secretary for Fossil Energy. To read the full announcement, see: http://www.fossil.energy.gov/news/techlines/2006/06074-Thomas_Shope_Named_PDAS.html.

DOE Invites Nominations for Advisory Committee. The US Department of Energy is seeking nominations for qualified individuals to serve on the Unconventional Resources Technology Advisory Committee (URTAC), a federal advisory committee established under the Energy Policy Act of 2005. The committee is made up of approximately 25 members who will advise the Secretary of Energy on the development and implementation of activities related to onshore unconventional natural gas and other petroleum resources, including reduction of greenhouse gas emissions and carbon sequestration. Nominations for the committee must be received by January 26, 2007. To learn more about the URTAC and how to submit nominations, see: http://www.fossil.energy.gov/programs/oilgas/advisorycommittees/UnconventionalResources.html.

Read Jeffrey Jarrett's Column on Carbon Sequestration. Jeffrey Jarrett, Assistant Secretary, Office of Fossil Energy, of the US Department of Energy, has contributed an article about Carbon Sequestration which appeared in *The Pittsburgh Post Gazette* on January 21, 2007. The article can be read in its entirety at: http://www.post-gazette.com/pg/07021/755289-109.stm.

IPCC will Release Its Fourth Assessment Report "Climate Change 2007" on February 2, 2007. The report will present a comprehensive and rigorous picture of the global state of knowledge of climate change. Check the website for the report. http://www.ipcc.ch/.

Comments Sought for Carbon Registry. Comments from the public are being accepted for a new, online Carbon Registry managed by the Georgia Forestry Commission. The proposed protocol for Georgia's Carbon Sequestration Registry will be posted on the website through February 15, 2007 and was written by the Georgia Forestry Commission (GFC) and University of Georgia forest researchers. The Registry plan describes the standards for project eligibility, registering projects, processes and procedures. Implementation of the plan in Georgia could allow the carbon sequestration services of Georgia forestland to be traded to emission-dependent companies. To log onto the GFC website and view the full January 11, 2007 GFC News Release, go to: www.gatrees.org.

hold excellent potential for EOR using CO_2 injection. The Big Muddy field was discovered in 1916 and has produced approximately 52 million barrels of oil (MMBO) from several producing zones. It is also the second most prolific field in the State of Wyoming. Rancher Energy Corp. focuses on the oil and gas sector by specializing in evaluating older, historically productive fields in order to determine their potential for secondary and tertiary recovery. December 19, 2006, http://www.marketwire.com/mw/release_html_b1?release_id=196718, and January 8, 2007, http://www.marketwire.com/mw/release_html_b1?release_id=200509.

Science

***Reuters,* "2007 Predicted to be World's Warmest Year."** Global warming and El Niño could result in temperatures that would mark 2007 as the warmest year on record, surpassing the previous record set in 1998. Many scientists claim that this increase is due mainly to carbon dioxide emissions from electricity generation and mobile sources. The past year is set to be the sixth warmest on record globally, and the ten warmest years have all occurred since 1994. Prior to that year, temperature records had not been broken in 150 years. Britain's Meteorological Office has forecast the world's average temperature to be 0.54 degrees Celsius above the 1961-1990 long-term average of 14.0 degrees Celsius, or an increase from 57.2 to 58.2 degrees Fahrenheit. Scientists also predict that temperatures will rise between two and six degrees Celsius in this century. It is hopeful that the G8 summit scheduled for June 2007 will initiate discussions for global action beyond the Kyoto Protocol, which is set to expire in 2012. January 4, 2007, http://today.reuters.com/news/articlenews.aspx?type=scienceNews&storyID=2007-01-04T113318Z_01_L03183156_RTRUKOC_0_US-CLIMATE-WARMEST.xml&WTmodLoc=NewsHome-C3-scienceNews-2.

Policy

***Reuters,* "EU Environment Chief Seeks 30 Percent Emissions Cut."** European Union (EU) Environment Commissioner Stavros Dimas announced that he will set a target for a 30 percent reduction in EU greenhouse gas emissions by 2020. Originally, EU heads of state and government called for a 15-30 percent reduction by 2020. This announcement comes in anticipation of the series of energy and environmental proposals for fighting global warming that will be announced by the Commission on January 10. These proposals will provide additional options for international climate change initiatives after the Kyoto Protocol expires in 2012. December 19, 2006, http://www.planetark.com/dailynewsstory.cfm/newsid/39548/story.htm.

***Greenwire,* "EU Dismisses Carbon Tax on Kyoto Dissidents."** A proposal by French Prime Minister Dominique de Villepin to tax the carbon emissions of countries that do not participate in the Kyoto Protocol has been dismissed. Peter Mandelson, the European Union Trade Commissioner, pointed out that nonparticipation is not illegal and would be very difficult to put into practice. Furthermore, implementing such a tax would violate World Trade Organization rules. December 18, 2006, http://www.eenews.net/Greenwire/print/2006/12/18/9. (Subscription may be required.)

***Reuters,* "Schwarzenegger Signs California Carbon Emissions Cut."** California Governor Arnold Schwarzenegger signed an executive order on January 18, the first of its kind in the US to cut carbon levels in vehicle fuels by at least 10 percent by 2020. The order will also implement the law adopted last summer mandating state emissions caps to reduce greenhouse gas levels 25 percent by 2020. The order is also intended to encourage the development and use of alternative vehicle fuels. The new fuel regulations will go into effect no later than December 2008. The Air Resources Board, the California Environmental Protection Agency and the California Energy Commission will work out the details of the new regulations. January 19, 2007, http://www.planetark.com/avantgo/dailynewsstory.cfm?newsid=39911.

Geology

"Specific Storage Volumes: A Useful Tool for CO_2 Storage Capacity Assessment." Subsurface geologic strata have the potential to store billions of tons of anthropogenic carbon dioxide (CO_2); therefore, geologic carbon sequestration can be an effective mitigation tool used to slow the rate at which levels of atmospheric CO_2 are increasing. Oil and gas reservoirs, coal beds, and saline reservoirs can be used for CO_2 storage; however, it is difficult to assess and compare the relative storage capacities of these different settings. Typically, CO_2 emissions are reported in units of mass, which are not directly applicable to comparing the CO_2 storage capacities of the various storage targets. However, if the emission values are recalculated to volumes per unit mass (specific volume) then the volumes of geologic reservoirs necessary to store CO_2 emissions from large point sources can be estimated. The factors necessary to convert the mass of CO_2 emissions to geologic storage volume (referred to here as Specific Storage Volume or 'SSV') can be reported in units of cubic meters, cubic feet, and petroleum barrels. The SSVs can be used to estimate the reservoir volume needed to store CO_2 produced over the lifetime of an individual point source, and to identify CO_2 storage targets of sufficient size to meet the demand from that given point source. These storage volumes also can then be projected onto the land surface to outline a representative "footprint," which marks the areal extent of storage. This footprint can be compared with the terrestrial carbon sequestration capacity of the same land area. The overall utility of this application is that the total storage capacity of any given parcel of land (from surface to basement) can be determined, and may assist in making land management decisions. **Sean T. Brennan and Robert C. Burruss,** *Natural Resources Research,* Published online December 15, 2006, http://www.springerlink.com/content/n1g6686n60v621p0/?p=4bf567fe1bf74862a44bbdd969af73d1&pi=27. (Subscription required.)

"Thermo-hydro-mechanical Modeling of CO_2 Sequestration System Around Fault Environment." Geological sequestration of carbon dioxide (CO_2) shows great potential to reduce greenhouse gas emissions. However, CO_2 injection into geological formations may give rise to a variety of coupled chemical and physical processes. The thermo-hydro-mechanical (THM) impact of CO_2 injection can induce fault instability, even possibly lead to seismic activities in and around the disposal reservoir. A sequential coupling approach under some assumptions was proposed in the numerical study to investigate the THM behavior of the CO_2 sequestration system concerning the temperature, initial geological stress, injection pressure and CO_2 buoyancy. The fault was treated as a flexible contact model. The effects of CO_2 injection on the mechanical behavior of the faults were investigated. The Drucker-Prager model and the cap model were used to model the constitutive relationship of formations. The numerical results show that injection pressure sensitively affects the relative slip change of the fault. At the initial stage of the sequestration process, the injection pressure plays a key role in affecting the pore pressure of the formations. However, as time continues, the influence of CO_2-induced buoyancy becomes obvious on the pore pressure of the formations. In general, The THM effects of CO_2 geosequestration do not affect the mechanical stability of formations and faults. **Qi Li, Zhishen Wu, Yilong Bai, Xiangchu Yin and Xiaochun Li,** *Pure and Applied Geophysics,* Published online December 20, 2007, http://www.springerlink.com/content/b24t48566625775t/?p=edfad81ea2624efb8a5571342c9904b2&pi=1. (Subscription required.)

Technology

"Making carbon sequestration a paying proposition." Atmospheric carbon dioxide (CO_2) has increased from a pre-industrial concentration of about 280 parts per million (ppm) to about 367 ppm at present. The increase has closely followed the increase in CO_2 emissions from the use of fossil fuels. Global warming caused by increasing amounts of greenhouse gases in the atmosphere is the major environmental challenge for the 21st century. Reducing worldwide emissions of CO_2 requires multiple mitigation pathways, including reductions in energy consumption, more efficient use of available energy, the application of renewable energy sources, and sequestration. Sequestration is a major tool for managing carbon emissions. In a majority of

cases CO_2 is viewed as waste to be disposed; however, with advanced technology, carbon sequestration can become a value-added proposition. There are a number of potential opportunities that render sequestration economically viable. In this study, the authors review these most economically promising opportunities and pathways of carbon sequestration, including reforestation, best agricultural production, housing and furniture, enhanced oil recovery, coalbed methane (CBM), and CO_2 hydrates. Many of these terrestrial and geological sequestration opportunities are expected to provide a direct economic benefit over that obtained by merely reducing the atmospheric CO_2 loading. Sequestration opportunities in 11 states of the Southeast and South Central United States are discussed. Among the most promising methods for the region include reforestation and CBM. The annual forest carbon sink in this region is estimated to be 76 teragrams of carbon per year (Tg C/year), which would amount to an expenditure of $11.1–13.9 billion/year. Best management practices could enhance carbon sequestration by 53.9 Tg C/year, accounting for 9.3 percent of current total annual regional greenhouse gas emission in the next 20 years. Annual carbon storage in housing, furniture, and other wood products in 1998 was estimated to be 13.9 Tg C in the region. Other sequestration options, including the direct injection of CO_2 in deep saline aquifers, mineralization, and biomineralization, are not expected to lead to direct economic gain. More detailed studies are needed for assessing the ultimate changes to the environment and the associated indirect cost savings for carbon sequestration. **Fengxiang X. Han, Jeff S. Lindner and Chuji Wang,** *Naturwissenschaften*, Published online November 14, 2006, http://www.springerlink.com/content/h1t011588136547 2/?p=68bebc293219422d8a059349b4f5889d&pi=9. (Subscription required.)

Terrestrial/Ocean

"Satellite-derived estimates of potential carbon sequestration through afforestation of agricultural lands in the United States." Afforestation of marginal agricultural lands represents a promising option for carbon sequestration in terrestrial ecosystems. An ecosystem carbon model was used to generate new national maps of annual net primary production (NPP), one each for continuous land covers of 'forest', 'crop', and 'rangeland' over the entire U S continental area. Direct inputs of satellite "greenness" data from the Advanced Very High Resolution Radiometer (AVHRR) sensor into the NASA-CASA carbon model at 8-kilometer spatial resolution were used to estimate spatial variability in monthly NPP and potential biomass accumulation rates in a uniquely detailed manner. The model predictions of regrowth forest production lead to a conservative national projection of 0.3 petagrams of carbon (Pg C) as potential carbon stored each year on relatively low-production crop or rangeland areas. On a regional level, the top five states for total crop afforestation potential were: Texas, Minnesota, Iowa, Illinois, and Missouri, whereas the top five states for total rangeland afforestation potential are: Texas, California, Montana, New Mexico, and Colorado. Afforestation at this level of intensity has the capacity to offset at least one-fifth of annual fossil fuel emission of carbon in the United States. These projected afforestation carbon gains also match or exceed recent estimates of the annual sink for atmospheric CO_2 in currently forested area of the country. **Christopher Potter, Steven Klooster, Seth Hiatt, Matthew Fladeland, Vanessa Genovese and Peggy Gross,** *Climatic Change,* Published online January 7, 2007, http://www.springerlink.com/content/644174p587752 2r7/?p=edfad81ea2624efb8a5571342c9904b2&pi=0. (Subscription required.)

"Carbon sequestration in the U.S. forest sector from 1990 to 2010." Forest inventory data supplemented with data from intensive research sites and models were used to estimate carbon stocks and sequestration rates in US forests, including effects of land use change. Data on the production of wood products and emission from decomposition were used to estimate carbon stocks and sequestration rates in wood products and landfills. From 1990 through 2005, the forest sector (including forests and wood products) sequestered an average 162 teragrams of carbon per year (Tg C $year^{-1}$). In 2005, 49 percent of the total forest sector sequestration was in live and dead trees, 27 percent was in wood products in landfills, with the remainder in down dead wood, wood products in use, and forest floor and soil. The pools with the largest carbon stocks were not the same as those with the largest sequestration rates, except for the tree pool. For example, landfilled wood products comprise only 3 percent of total stocks but account for 27 percent of carbon sequestration. Conversely, forest soils comprise 48 percent of total stocks but account for only 2 percent of carbon sequestration. For the tree pool, the spatial pattern of carbon stocks was dissimilar to that of carbon flux. On an area basis, tree carbon stocks were highest in the Pacific Northwest, while changes were generally greatest in the upper Midwest and the Northeast. Net carbon sequestration in the forest sector in 2005 offset 10 percent of US carbon dioxide emissions. In the near future, the authors project that US forests will continue to sequester carbon at a rate similar to that in recent years. Based on a comparison of the authors' estimates to a compilation of land-based estimates of non-forest carbon sinks from the literature, the authors estimate that the conterminous US annually sequesters 149–330 Tg C $year^{-1}$. Forests, urban trees, and wood products are responsible for 65–91 percent of this sink. **Peter B. Woodbury, James E. Smith and Linda S. Heath,** *Forest Ecology and Management,* Available online January 16, 2007. http://www.sciencedirect.com/science/article/B6T6X-4MV19VM-3/2/d5d65e9f2b93b324785a2f7ae2a52978. (Subscription may be required.)

"Sequestration offsets versus direct emission reductions: Consideration of environmental co-effects." Atmospheric greenhouse gas accumulation, and consequential temperature increase, can be remedied by emission reductions or agricultural carbon sequestration. Both options have direct and external environmental effects. This paper examines the magnitudes of existing estimates of corresponding external co-effects and how they could affect optimal combination of emission reductions and agricultural carbon sequestration. The authors discuss whether government intervention, in the form of taxation/subsidization, is justified for internalizing the externalities considering their relative magnitudes, implementation costs and potential benefits that could be derived from such intervention. The authors conclude that the existing estimates of external benefits from sequestration and emission reduction do not provide enough support for allocating resources to alter the market mix of carbon sequestration and direct emission reduction strategies. **Levan Elbakidze and Bruce A. McCarl,** *Ecological Economics,* Volume 60, Issue 3, January 15, 2007, Pages 564-571. http://www.sciencedirect.com/science/article/B6VDY-4JCCH2T-2/2/6ba72c884dfde6ffe749e63e95ad4655. (Subscription may be required.)

"Transfers and environmental co-benefits of carbon sequestration in agricultural soils: retiring agricultural land in the Upper Mississippi River Basin." This study investigates the carbon sequestration potential and co-benefits from policies aimed at retiring agricultural land in the Upper Mississippi River Basin, a large, heavily agricultural area. In addition to empirically measuring environmental co-benefits, the authors also compute economic transfers, which have sometimes been referred to as a co-benefit. Very little empirical work measuring the potential magnitude of these transfers has previously been undertaken. The authors compare and contrast alternative targeting schemes. They find that there are considerable amount of co-benefits and transfers and that the geographic distribution of

co-benefits and transfers varies significantly with the specific benefit targeted. This implies that policy design related to targeting can have very important implications for both environmental conditions and income distributions in sub-regions. Issues related to policy design in the presence of co-benefits are considered. **Hongli Feng, Catherine L. Kling and Philip W. Gassman, *Climatic Change,*** Published online December 21, 2006, http://springerlink.metapress.com/content/b157167t57304j64/?p=3062f6e110254017a86197a3f145dd0e&pi=6. (Subscription required.)

Trading

Carbon Market Update, January 16, 2007	
CCX-CFI 2007 ($/tCO2) **$4.00 (Vintage 2007)**	EU ETS-EUA DEC 2007 ($/tCO2) **$ 5.49** **(Converted from € to US$)**

***Reuters,* "UK to Offset Pollution from Jet-Setting Ministers."** On December 28, the British government confirmed their purchase of 255,000 tons worth of carbon credits in order to offset emissions generated from airline flights taken by UK government officials while on travel. The credits were bought at a price of $19.27 (9.76 pounds) per ton, for a total purchase price of almost $4.8 million (2.5 million pounds). The carbon credits will be used from 2007 to 2009, and the option to purchase an additional 50,000 tons of credits may be taken. The government has plans to invest in projects registered under the Kyoto Protocol. In order to alleviate concern expressed by some environmental organizations in Britain, the government will publish a consultation paper in January 2007 which will outline the details of the various carbon offsetting schemes. It will then issue a follow-up report in April 2007 with recommendations to participate in the most environmentally sound schemes. The credits were purchased from Trading Emissions Plc, an investment fund run by EEA Fund Management which invests in renewable energy projects in developing countries including Brazil, Thailand and the Philippines. December 29, 2006, http://www.planetark.org/avantgo/dailynewsstory.cfm?newsid=39649.

***Greenwire*, "Dell Launches Carbon Sequestration Initiative."** Michael Dell, chairman of Dell Incorporated, launched the company's "Plant a Tree for Me" initiative in an effort to offset greenhouse gas emissions produced by computers. This is Dell's second green initiative following the company's industry-first pledge made last fall to recycle customers' Dell-branded computers and peripheral equipment at no charge. The new program gives Dell customers the opportunity to make a donation to The Conservation Fund and Carbonfund.org when they buy a computer. Donations can range from $2 with a notebook computer purchase to $6 for purchase of a desktop PC. Money from the donations will be used by the nonprofit groups to plant trees that convert carbon dioxide into oxygen, thus reducing the greenhouse gases that contribute to global warming. The Conservation Fund estimates that one laptop computer emits 0.42 tons of carbon dioxide (CO_2) over its lifetime, and a desktop model releases 1.26 tons of CO_2. Over a seven year period one tree could sequester 1.33 tons of CO_2, enough carbon to offset those amounts. Trees will be planted in areas where they will not be harvested for timber, such as wildlife refuges and county parks. Emissions created during the shipping of Dell products will also be targeted in the donation program, and other larger companies, including Travelocity and Expedia, offer similar opportunities to their customers. January 10, 2007, http://www.eenews.net/Greenwire/print/2007/01/10/16. (Subscription may be required.)

Recent Publications

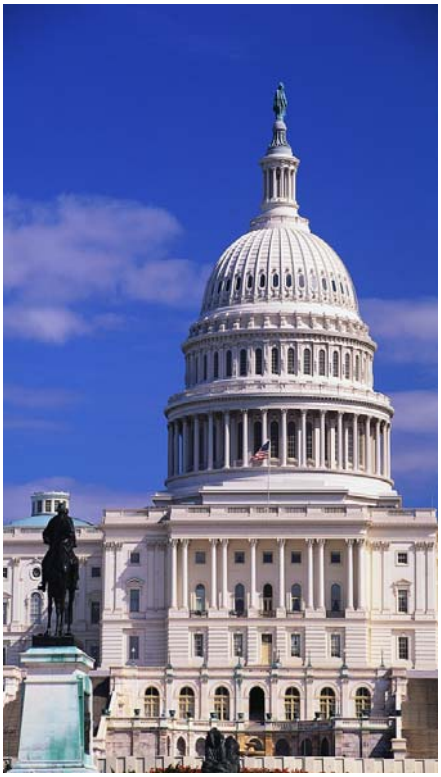
"Sustainable Power Generation from Fossil Fuels: Aiming for Near-Zero Emissions from Coal After 2020." Coal and gas account for over 50 percent of the EU's electricity supply and will remain an important part of their energy mix in the future. On the international level, it is expected that twice as much electricity as today will be produced from coal by 2030. However, increasing concern over the effects of climate change means that Europe has to take the lead in undertaking serious measures to ensure that they reduce carbon emissions from coal and work on developing cleaner coal technologies. On January 10, 2007 the European Commission therefore adopted an Energy Package for Europe, which included a Communication on the sustainable use of fossil fuels in electricity generation. The Communication sets out the policy guidelines and the conditions for a continued and sustainable use of fossil fuels, in particular of coal, as primary energy sources in

the power generation sector. To read the complete Communication from the Commission to the Council and the European Parliament see: http://ec.europa.eu/energy/energy_policy/doc/16_communication_fossil_fuels_en.pdf.
To view the memo regarding this report, see: http://ec.europa.eu/energy/energy_policy/doc/16_fossil_fuels_%20memo_en.pdf.

"Trends in Public Attitudes on Global Warming," Stephen Ansolabehere, Thomas E. Curry, Howard Herzog, MIT, October 2006. Any attempt by industry or governments to address greenhouse gas emissions and global warming will require wide public understanding or recognition of this problem and willingness to bear the costs of remedies. With that end in mind, MIT has instituted a cross-national survey research program aimed at tracking public understanding of this problem and support for and opposition to policies that may be required in order to lessen emissions. The first of these surveys was conducted in 2003 in the United States. It showed a relatively low level of public recognition of the problem and willingness to bear costs of a remedy. That survey was replicated in the United Kingdom, Sweden, and Japan. Across all four nations varying degrees of acceptance of the problem and varying beliefs about what national government should do were found. Researchers did find a unified response in one critical aspect – willingness to pay. In no country was the median person willing to pay 10 percent more per month on electricity bills in order to lower carbon emissions. That was 2003. The first effort to track changes in public attitudes came in 2006. Researchers replicated the 2003 survey in October 2006 using the same survey design and same questionnaire that they administered three years prior. Little has changed in public policies concerning global warming. However, there has been considerable public discussion in the United States of this problem. Findings from this survey offer the first evidence from any survey organization that there has been a real change in public attitudes on this issue. Because researchers used the same survey design and questionnaire, they were able to compare directly the public attitudes today with those just three years ago. Americans' attitudes have changed in two key respects. A sizable majority now recognizes global warming as a problem, and the salience of that problem has grown. And, perhaps more importantly, the willingness to pay for remedies has risen 50 percent. To access the MIT survey data, go to: http://www.eenews.net/features/documents/2006/12/05/document_pm_01.pdf, and to read MIT's full analysis of the survey, see: http://www.eenews.net/features/documents/2006/12/05/document_pm_02.pdf.

Legislative Activity

***E&E Daily*, "Global Warming, Energy Top Senate Democrats' Floor Plans,"** and ***E&E Daily,* "Warming Policy Debate Picks Up Steam as Dems Move Into Power."** In a memo sent on January 3 to Senate Democrats, the incoming majority leader, Senator Harry Reid (D-Nevada), included global warming as one of ten specific legislative items to be addressed by the 110th Congress. Leaders from both the House and Senate also mentioned climate change and energy policy in their opening day speeches to Congress. Reid's plan to implement this legislation will begin with hearings held through a committee process. Senator Barbara Boxer (D-California), chairwoman of the Environment and Public Works Committee, and Jeff Bingaman, Senate Energy and Natural Resources Committee Chairman, (D-New Mexico) will lead the effort. Senator Bingaman has already circulated draft global warming legislation to industry, environmental groups, economists and others. The current draft legislation, which ensues an earlier draft, calls for stricter industry regulations relating to air pollution and carbon dioxide emissions. Majority Whip Dick Durbin (Illinois), the second highest ranking Senate Democrat, predicts bipartisan interest in global warming and recommended questions about climate change be put before Boxer. To read the full memo by Senator Harry Reid, go to: http://www.eenews.net/features/documents/2007/01/04/document_daily_01.pdf, and to read the Bingaman draft legislation, see: http://www.eenews.net/features/documents/2007/01/05/document_gw_01.pdf.
January 4, 2007, http://www.eenews.net/EEDaily/print/2007/01/04/2, and January 8, 2007, http://www.eenews.net/EEDaily/2007/01/08/archive/1/?



terms=carbon%20sequestration (Subscription may be required.)

***AP,* "Details of Competing Global Warming Plans in the U.S. Senate."** Three global warming bills were recently introduced in the US Senate. The "Climate Stewardship and Innovation Act of 2007" was introduced on January 12 by Senators John McCain, (R-Arizona), Joseph Lieberman, (I-Connecticut), and Barack Obama, (D-Illinois). The bill aims to reduce emissions to one-third of 2000 levels by 2050. It would set up a cap-and-trade system where the US Environmental Protection Agency (EPA) administrator would set up a system for distributing, borrowing and trading emissions credits. The act would establish a national greenhouse gas (GHS) database in order to track and analyze emissions. Companies could earn cap-and-trade credits by participating in emissions reductions projects in other countries. Also companies which reach emissions goals ahead of their timeframe would earn additional credits. The "Global Warming Pollution Reduction Act" was introduced on January 16 by Senator Bernie Sanders, (I-Vermont) and was co-sponsored by Senator Barbara Boxer, (D-California), Senator Ted Kennedy, (D-Massachusetts) and others, totaling 11 in all. The Act would require a reduction of emissions of GHG to 1990 levels by 2020, and further decreases every ten years to 80 percent below 1990 levels by 2050. This bill has no mechanism for cap-and-trade, but would establish emissions standards for vehicles. All power plants built after 2012 would have to comply with mandatory GHG emission standards, which would apply to all plants by 2030 no matter when they were built. A requirement of 0.5 percent of electricity generation would have a low carbon coal requirement by 2015, with five percent of generation to follow that requirement by 2020. The "Electric Utility Cap-and-Trade Act" was introduced by Senator Dianne Feinstein (D-California), and Tom Carper (D-Delaware) on January 17. This bill seeks to cap GHG emissions in the electricity sector at 2006 levels in 2011 and 2001 levels in 2015. By 2020 emissions would need to be reduced to 25 percent below where they would be expected to be without action. The bill sets up a cap-and-trade system with one credit equivalent to one ton of carbon dioxide emissions, with allocation based on emission reduction goals outlined in the bill. The EPA would auction credits each year and the money would go toward the development of new low-carbon technologies and mitigating the effects of climate change. A scientific panel would be established to make recommendations to the EPA every four years regarding emission reduction rates. January 17, 2006, http://www.mercurynews.com/mld/mercurynews/news/local/states/california/northern_california/16482721.htm.

***Greenwire*, "Automakers Ask Court to Dismiss California Lawsuit."** The "Big Six" automakers filed a motion on December 15 to dismiss the state of California's lawsuit, *California v. GM*, which would hold the major automobile industry financially accountable for global warming caused by new automobile emissions. Attorneys for the automobile companies, including General Motors Corporation, Toyota Motor North America Incorporated, Ford Motor Company, Honda North America Incorporated, Chrysler Motors Corporation and Nissan North America Incorporated, argue that federal courts are prohibited from intervening to create new common law on vehicle emissions and fuel economy, as written in existing congressional and executive branch regulations. California Attorney General Bill Lockyer (D), who filed California's original complaint in September 2006, is being accused of creating a tort lawsuit out of the international political debate that surrounds the subject of global warming. The Supreme Court heard arguments last month in a similar case, *Massachusetts v. EPA*. The Court is expected to hand down a decision by this summer concerning the Environmental Protection Agency's decision not to regulate greenhouse gas emissions from new cars and trucks. To read the automakers' motion, go to: http://www.eenews.net/features/documents/2006/12/18/document_gw_01.pdf, and to view California's original complaint, see: http://www.eenews.net/features/documents/2006/09/20/document_pm_01.pdf. December 18, 2006, http://www.eenews.net/Greenwire/print/2006/12/18/8. (Subscription may be required.)

***Reuters,* "Massachusetts to Join Northeast US Greenhouse Pact."** Massachusetts will join the Regional Greenhouse Gas Initiative (RGGI), a pact among northeastern US states to control emissions. The announcement was made on January 18 by Governor Deval Patrick to join the initiative to cap carbon dioxide emissions from electricity plants at current levels until 2015 and then reduce emissions by 10 percent by 2019. Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York and Vermont have also pledged their commitment to the pact, and support is also expected from Maryland, Washington D.C., and possibly California. Estimated savings from green investments funded by the pact could reduce annual household electricity bills by $21 to $26 by 2015, although in the short term electricity bills may initially increase by $3 to $16 per year. In total, the investments could reduce the states $8 billion electricity bill by

$160 million. Under the RGGI plan, power plants would have limits as to how much carbon dioxide they can emit. Once the limit is exceeded they would then have to buy carbon credits from cleaner operating plants. Profits from the emissions market would go to the state which, in turn, would invest in green technology and conservation. The regional pact would cap carbon dioxide emissions from electricity plants at current levels until 2015, and then require a 10 percent decrease by 2019. January 19, 2007, http://www.planetark.com/avantgo/dailynewsstory.cfm?newsid=39906.

Events

May 7-10, 2007, **Sixth Annual Conference on Carbon Capture and Sequestration,** *Sheraton at Station Square, Pittsburgh, PA.* This conference will bring together the experts directly involved in developing, demonstrating and deploying carbon capture, separation and sequestration technologies as part of the Administration's Climate Change Technology Program. In addition, this year the Carbon Sequestration Leadership Forum Task Force on Capacity Building in Emerging Economies will sponsor a Workshop in conjunction with the conference devoted to possible approaches that can be undertaken to build capacity in the governmental and industrial sector to facilitate the development, deployment and public acceptance of carbon capture and sequestration. For conference and registration information, see: http://www.carbonsq.com/.

February 5-8, 2007, **Fourth USDA Greenhouse Gas Conference**, *Baltimore Marriott Camden Yards, Baltimore, MD.* The purpose of this conference is to provide a forum for presentation of scientific, technical, and policy information related to the impacts of climate change on agriculture and forestry, and the potential role of management practices in related ecosystems and product use in mitigating climate change. The conference will feature a combination of plenary sessions, technical breakout sessions, and poster sessions organized to maximize interactions, discussion, and dialogue. For information, see: http://www.acsmeetings.org/carbon/index.php?Token=&check=1&page=.

February 6-8, 2007, **Asia Pacific Economic Cooperation Clean Fossil Energy Technical and Policy Seminar**, *Hanoi Horison Hotel, Hanoi, Vietnam.* Organized under the auspices of the APEC Expert Group on Clean Fossil Energy (chaired by the United States), the theme for this year's seminar is "Clean Coal as a Sustainable Energy Development Strategy." Co-sponsored by DOE and Japan, the seminar will feature two days of presentations on coal utilization policy and technologies including coal mining, advanced pulverized coal combustion, integrated gasification combined cycle systems, and carbon sequestration. A tour of Vietnam's largest opencast anthracite mine and coal export facility will be offered, and the EGCFE will hold a conjoining annual business meeting. Participants include policy-makers and technology managers from government and industry, including 10-12 of the 21 APEC member economies. Mr. Scott Smouse, International Team Leader at the Department of Energy's National Energy Technology Laboratory and EGCFE Chairman, will represent the US. For seminar and hotel registration, and to view the agenda, see: http://eneken.ieej.or.jp/japac/document/0810740050013.pdf.

February 7, 2007, **Environmental Trading 101,** *Chicago, IL.* This seminar will cover five primary trading instruments, including water quality trading; emissions trading including carbon, sulfur dioxide (SO_2), nitrogen oxide (NOx), and greenhouse gases (GHG); renewable energy credit (REC) trading; Demand response trading / or energy efficiency trading; and weather derivatives trading. Please see the link to register, or for more information: http://www.frallc.com/conference.aspx?ccode=sh139.

February 12-14, 2007, **Time to Adapt-Climate Change and the European Water Dimension**, *BMWi (Federal Ministry of Economics and Technology), Berlin, Germany.* This symposium aims to provide a platform for representatives from governments, science and research, stakeholder groups

Events (continued)

and non-governmental organizations to discuss the likely impacts of climate change on water management and water dependent sectors such as agriculture, energy, inland navigation and tourism, as well as options for adaptation, and to strengthen the political profile of these issues. For further information, see:
http://www.climate-water-adaptation-berlin2007.org/contact.htm.

March 13-15, 2007, **Carbon Markets Insights 2007**, *Bella Center*, *Copenhagen, Denmark.* This event will reflect on, amongst other major issues, the opening up of the EU emissions trading scheme to the global carbon markets. Carbon Market Insights is set to be the largest carbon market conference to date. For information, see: http://www.pointcarbon.com/Events/Carbon%20Market%20Insights/category401.html.

March 22-23, 2007, **Optimising the Back Office in the Energy Trading Market**, *Central London, England*. This conference will examine the issues affecting the back office and provide strategies from energy firms and financial institutions. Looking across power, gas, oil and CO_2 asset classes, the event will provide solutions in order to get closer to the standardization required to significantly automate back office processes. For further information or to receive a brochure, see: http://www.marcusevans.com/events/CFEventinfo.asp?EventID=11740.

April 19-20, 2007, **The 18th Global Warming and International Conference and Expo (GW18)**, *Sheraton Miami Mart Hotel and Convention Center, Miami Florida.* Historically, GW represents the oldest and most consistently sustained conference dedicated to the exchange of scientific data, governmental assessments, and public policies concerning global climate change, including global warming and extreme climatic events. More detailed information can be found at: http://www.gw18.globalwarming.net/index.php.

May 15-17, 2007, **Third International Conference on Clean Coal Technologies for our Future**, *T Hotel and Conference Centre, Cagliari and Sotacarbo Coal Research Centre, Carbonia, Sardinia, Italy.* The ability to use coal in an environmentally acceptable and sustainable manner is an important issue to consider. This conference will allow participants to share in the debate and formulate the important decisions that the individuals involved in the coal industry must make for the future. For further information and to visit the conference website, see: http://www.cct2007.it/.

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