

THE CARBON SEQUESTRATION NEWSLETTER

<http://www.netl.doe.gov/sequestration>

December 2004

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Sequestration in the News

Odessa American, "Basin Energy Leaders Foresee Good Times With 2nd Bush Term: Insiders Predict Release of DOE Exploration Funds." The Permian Basin oil and gas industry stands to benefit from having George W. Bush return to the White House for another four years, according to Bob Kiker, regional director of the Petroleum Technology Transfer Council. Said Kiker, "[Bush is] a strong supporter of the DOE, and he's also a strong supporter of CO₂ sequestration and enhanced oil recovery." November 4, 2004, <http://www.oaoa.com/news/nw110404b.htm>

Greenbiz, "Cinergy: Awakening a Sustainability Giant." Article provides a transcript of an interview with Cinergy CEO Jim Rogers. When asked about the uncertainty surrounding CO₂ reductions, Rodgers prefaced his response by admitting that one day we will live in a carbon-constrained world. Rodgers said Cinergy is responding by pursuing voluntary CO₂ emissions reductions and investment in IGCC technology. According to Rodgers, Cinergy plans to seek DOE money to apply carbon sequestration technology to the Wabash River Station. "It's not only in a region of Indiana where we have the grid infrastructure, but it's also in a part of the state where the geology is very receptive to sequestration. There's a lot of debate about whether it can be done, there's a lot of debate about whether it will ever be economic to do, but we feel that we need to experiment," said Rodgers. No Date, http://www.greenbiz.com/news/reviews_third.cfm?NewsID=27409

Pittsburg Tribune Review, "No Carbon Copycats: Scientists Call for Burying Pollution." Highlights the 14th annual Society of Environmental Journalists conference where a panel of emissions experts discussed the potential of carbon sequestration technology to reduce atmospheric levels of carbon dioxide. Article states that DOE has been advancing technology to overcome the costs associated with carbon sequestration. With seven partnerships across the U.S. and 150 companies researching the issue, DOE's Scott Klara said that they are on the path to sequester one million tons of carbon annually. "To put that into perspective," said Klara, "that's roughly enough to fill up the Empire State Building." October 24, 2004, http://pittsburghlive.com/x/tribune-review/trib/newssummary/s_265324.html

Scoop, "Hodgson: Climate Change and Business." Speaking at the 2004 Australia–New Zealand Conference and Trade Expo, Hon Pete Hodgson addressed the business opportunities associated with climate change. Said Hodgson, "Research plays a role, globally, in the quest for a bunch of holy grails, ranging from nuclear fusion, hydrogen storage to carbon sequestration, new biotechnologies for new biofuels, and the like. New Zealand, like many other countries is a participant in that quest. Business opportunities in these areas are prospective, rather than imminent, but if any of those holy grails is approached, significant wealth creation awaits." November 5, 2004, <http://www.scoop.co.nz/mason/stories/PA0411/S00135.htm>

BBC News, "Support Sought for CO₂ Storage." At a meeting of governments to discuss a major international treaty which bans the dumping of waste in the marine environment - the London Convention, set up in 1972 - UK environment minister Elliot Morley asked leading industrial nations to support a plan for storing carbon dioxide under the sea bed. Said Morley, "Our priority is to reduce emissions but, as an interim move, carbon sequestration is an option we should be exploring. If we are to move ahead with this option, we need to involve the international community, particularly to ensure we can be satisfied that it has proper safeguards built in for the marine environment." November 1, 2004, <http://news.bbc.co.uk/go/pr/fr/-/1/hi/sci/tech/3971307.stm>

The Independent, "UK to Pump Greenhouse Gas Under Sea." According to UK environment minister Elliot Morley, storing CO₂ in the seabed could help make deep cuts in the UK's emissions of carbon dioxide. Experts who back Morley claim that the UK could store all its carbon emissions for more than 100 years in exhausted oil and gas fields under the North Sea. October 31, 2004, <http://www.rense.com/general59/pump.htm>

CNN, "Texas Oil Fields May Store Carbon Dioxide." Near the town of Dayton, Texas, a University of Texas team successfully pumped 1,600 tonnes of carbon dioxide into the reservoirs of briny water more than 5,000 feet underground. "We have a lot of oil and gas fields in this area that are in decline," said Susan Hovorka. "The Gulf Coast is one of the best places on earth for this." Said Charles Christopher, BP's liaison with the Texas research project, "This [Texas] is going to be the place in the world where this [sequestration] is done." November 26, 2004, <http://edition.cnn.com/2004/TECH/science/11/29/environment.texas.reut/>

Sequestration in the News, Cont'd

"Frio Formation Test Well Injected with Carbon Dioxide."

In the first U.S. field test to investigate the ability of brine formations to store greenhouse gasses, researchers funded by the U.S. Department of Energy are closely monitoring 1,600 tons of carbon dioxide that were injected into a mile-deep well in Texas. Carbon dioxide has been successfully injected in the region for enhanced oil recovery, and fluid injection for waste disposal is widely accepted. *DOE/FE Techline*, November 19, 2004, http://www.fossil.energy.gov/news/techlines/2004/tl_frio_injection.html

Melbourne Indymedia, "Geosequestration: Burying Carbon or Burying Our Heads in the Sand?"

As a part of Australia's vigorous debate on Global Climate Change and options to reduce GHG emissions, this opinion article sets forth arguments against geosequestration. The article is triggered by the Australian government's funding of sequestration research and the recently initiated Gorgon project, a geosequestration project supported by Shell, Chevron, Texaco, and Exxon. October 29, 2004, <http://melbourne.indymedia.org/news/2004/10/82162.php>

The Charleston Gazette, "\$ Billion FutureGen Plant."

According to this article, worldwide attempts to curb CO₂ emissions threaten the future of West Virginia's coal industry. The industry's only hope is investing in clean coal technology and sequestration. Congress formerly earmarked \$237 million for FutureGen, but only \$18 million in planning funds was included in the \$388 billion spending bill passed at the end of November. November 29, 2004, <http://wvgazette.com/section/Editorials/200411286> (registration required)

New York Times, "U.S. and 13 Other Countries Agree on Push to Gather Methane Gas."

The United States and 13 other countries signed an agreement during the first Methane to Markets Ministerial meeting, held November 15-17 in Washington. The voluntary program is intended to capture methane gas from landfills, coal mines, and natural gas and oil systems. November 17, 2004, <http://www.nytimes.com>

Yankton Daily Press, A farmer's take on carbon sequestration.

This article, focused mainly on zoning issues related to livestock development, discusses concerns aired by producers at an agricultural Legislative Roundtable in South Dakota. Some producers branched off the subject to carbon sequestration, which allows farmers to collect payments for storing carbon dioxide in crops and soil. The article states that because the U.S. did not sign the Kyoto Treaty the development of carbon sequestration has slowed. Lisa Richardson, executive director of the South Dakota Corn Growers Association, said there are too many unanswered questions and too small of payments offered to the agricultural sector to make carbon sequestration a viable option. Said Richardson, "We need to figure out how to store it and measure it before figuring out a program for it." "Farmers Voice Concerns Many Unhappy With Livestock Zoning," December 1, 2004, http://www.yankton.net/stories/120104/com_20041201011.shtml

Foreign Affairs, "Out of the Energy Box (replacing oil)."

Authors contend that carbon sequestration "may be the only realistic way to satisfy the world's gargantuan energy needs while responsibly mitigating their side effects." November-December 2004, <http://www.foreignaffairs.org/20041101faessay83607/s-julio-friedmann-thomas-homer-dixon/out-of-the-energy-box.html>

Orlando Weekly, "BREATHE DEEP: A Coal-Burning Power Plant Near Tampa."

Discusses the recently announced clean coal project, a 285-megawatt coal gasification facility in Southeast Orange County. Presents opinions from Governor Jeb Bush and other persons in favor of the project, and also views from people who do not believe that clean coal will address global warming. Floridians' awareness of the Global Climate Change issue has been raised by the four hurricanes that went through the state this year. "The Coal Paradox," November 25, 2004, <http://www.orlandoweekly.com/news/Story.asp?ID=4697>

NETL Partners with Keystone on Climate Change Education.

The Department of Energy's National Energy Technology Laboratory (NETL) has joined with the Keystone Center in Colorado and teachers from around the nation in a first-of-a-kind effort to teach a new curriculum about climate change and carbon sequestration. Using laboratory experiments, role playing, and problem solving, the curriculum teaches students about local and global influences, carbon sequestration, and sustainability, as well as the economic and environmental results of climate change. "The curriculum was designed to give students the knowledge they need to make quality choices," said Sarah Forbes, a NETL policy analyst. "Climate change issues aren't going to be resolved today, so communicating to kids the different options for dealing with climate change needs to start now." "New Curriculum Promotes Climate Change Education," *DOE/FE Techline*, December 2, 2004, http://www.fossil.energy.gov/news/techlines/2004/tl_climate_curriculum.html

Announcements

"Industry Announces Collaboration to Accelerate Deployment of Advanced Coal-Based Power Plants."

The Electric Power Research Institute (EPRI) announced a new initiative, "CoalFleet for Tomorrow," to accelerate the deployment of clean, efficient, advanced coal technology and to develop options for managing the carbon dioxide emitted from power plants. Said Hank Courtright, an EPRI vice president, "During the first year of this program, we will concentrate much of our effort on accelerating integrated gasification combined cycle (IGCC) technology into the market in the 2005 to 2015 timeframe." Courtright continued, "We will also be increasing our understanding of the options for capturing and sequestering carbon dioxide, and determining potential beneficial uses for it. We plan to ensure the commercial availability and operation of all these technologies by 2015 to 2020." *EPRI Press Release*, November 11, 2004, http://www.epriweb.com/public/corp_CoalFleet.pdf

Regional Partnership Conference Proceedings Available.

The conference proceedings for the Regional Carbon Sequestration Partnerships Annual Program Review Meeting are available on the NETL Sequestration website at <http://www.netl.doe.gov/publications/proceedings/04/RCSP/rcsp04.html>

Workshop on Geological Storage of CO₂. The OSPAR workshop on the environmental impact of placement of carbon dioxide in geological structures in the maritime area took place in Trondheim, Norway on October 26-27, 2004. The workshop brought together 60 participants from nine countries. Links to presentations given at the workshop and the workshop findings can be found at <http://odin.dep.no/md/engelsk/aktuelt/pressem/022051-210039/dok-bn.html>

Science

"Alaska's Tundra Now Releasing Carbon Dioxide." A new study from the Pew Center on Global Climate change says the Arctic tundra is no longer absorbing carbon dioxide, it is now releasing it. Said Camille Parmesan of the University of Texas, "For many thousands of years Alaska has sucked up quite a lot of carbon from the atmosphere and put it into long-term storage as part of the frozen tundra. The carbon bank has now turned into a carbon exhaust." *Energy Bulletin*, November 13, 2004, <http://www.energybulletin.net/newswire.php?id=3154>

The PEW report entitled, "Observed Impacts of Climate Change in the U.S.," can be downloaded at http://www.pewclimate.org/docUploads/final_ObsImpact.pdf

"Greenhouse Gas Growth Rates." Hypothesizes that reversal of the growth of atmospheric CH₄ and other trace gases would provide a vital contribution toward averting anthropogenic interference with global climate. Such trace gas reductions may allow stabilization of atmospheric CO₂ at an achievable level of anthropogenic CO₂ emissions. Increased "natural" emissions of CO₂, N₂O, and CH₄ are expected in response to global warming. These emissions, an indirect effect of all climate forcings, are small compared with human-made climate forcing and occur on a time scale of a few centuries, but they tend to aggravate the task of stabilizing atmospheric composition. *Proceedings of the National Academy of Sciences*, November 16, 2004, <http://www.pnas.org/cgi/content/abstract/101/46/16109>

Policy

Putin signs Kyoto. Russia gave final approval to the Kyoto Protocol on global warming as President Vladimir Putin signed legislation ratifying the pact. Economist Yuri Safonov with the Russian Higher School of Economics says that Russia should be able to sell quotas for the discharge of about 2.2 billion tons of greenhouse gases without hurting its economy. "Russian president signs ratification of Kyoto Protocol on global warming," *San Francisco Chronicle*, November 5, 2004, <http://sfgate.com/cgi-bin/article.cgi?file=/news/archive/2004/11/05/international1511EST0589.DTL>

"Kyoto Can't do the Job Alone Says Expert." Eileen Claussen, President of the Pew Center for Global Climate Change, says more than just the Kyoto Protocol is needed to tackle climate change. Something other than Kyoto is needed to deal with coal. Said Claussen, "Some of the biggest emitters, including the United States, China and India, have huge coal resources. They are going to use them. We have to find a way to use coal so that it does not create a climate problem. That will require a huge research and development effort on carbon capture and sequestration." *New Zealand Herald*, November 8, 2004, <http://www.nzherald.co.nz/storydisplay.cfm?reportID=57030&storyID=3607930>

"Cost of Kyoto 'Five Times Above EU Estimate'." Implementing the Kyoto protocol might hit the EU economy five times harder than predicted by the European Commission, according to research presented by the lobby group Unice. A study by the consultants COWI found that current EU policies to meet Kyoto targets would most likely shave 0.48% off the bloc's GDP by 2010, predicting a drop in exports of around 0.5%, rising to as much as 5.1% for "energy-intensive" exports. The European Commission has forecast a drop in GDP of only 0.1%, though its study used a very different economic model. *Environment Daily*, November 18, 2004, <http://www.environmentdaily.com/articles/index.cfm?action=article&ref=17711>

State Actions to Address Climate Change. According to this article, nearly every U.S. state now has programs to reduce global warming pollution, and many have moved to the next step by working together in regional blocs. The article cites the cap-and-trade system developed by nine northeastern and Mid-Atlantic States, the alliance to boost energy efficiency and the use of renewables in the power grids of 19 western states, and California's tailpipe legislation as examples of state actions to address GHG emissions. Other states are seeking technological innovations to solve the problem. For example, the Ohio Coal Development Office funds projects that capture and sequester carbon dioxide emissions from coal combustion, while the South Carolina Hydrogen Coalition is promoting economic development by building expertise in hydrogen technology. "States Steam Ahead on Climate Change," *Inter Press Service*, November 24, 2004, <http://www.commondreams.org/headlines04/1124-08.htm>

Canada to adopt California-style tailpipe rules. By following California's new fuel-efficiency standards, Canada pledges to cut greenhouse gas emissions from road vehicles by 25 percent by 2010. Such a move to require carmakers to improve the efficiency of their vehicles means that the auto industry faces steep cuts in greenhouse gases in Canada as well as in California and the Northeastern United States, covering one third of the cars and trucks sold in North America. "Canada to follow California's lead on cars," *Point Carbon*, November 18, 2004, <http://www.pointcarbon.com/article.php?articleID=5351&categoryID=147>

EU urges emissions cut in aviation. A House of Lords report urges the British government to use its power as president of both the EU and G8 to curb the growth in carbon dioxide emissions from Europe's rapidly expanding aviation industry. Said Lord Renton, chairman of the Lords EU environmental sub-committee, "Carbon sequestration in oil wells or under the sea, macro-engineering to alter our planet's ability to reflect the sun's rays or to make the oceans soak up more carbon dioxide, and other radical measures are being considered by scientists and industry, but are far from viable at present. Policies to reduce greenhouse gas emissions from cars, airplanes, landfills, electricity and other sources are therefore crucial precautions." "Jet pollution must be cut in climate fight, warn peers," *The Guardian*, November 10, 2004, http://www.guardian.co.uk/uk_news/story/0,3604,1347326,00.html

"Curbing the U.S. Carbon Deficit." Article compares scenarios of land-based sequestration to emissions reductions arising from increased fuel efficiency in transportation, targeting ways to reduce net U.S. emissions by 10 percent (0.16 Pg of carbon per year). One-third of U.S. croplands or 44 million hectares would be converted to no-till for plantations to reach the target of 0.16 Pg of carbon per year. A doubling of fuel efficiency for cars and light trucks would also provide a reduction of 0.16 Pg of carbon per year. *Proceedings of the National Academy of Sciences*, November 9, 2004, <http://www.pnas.org/cgi/content/abstract/101/45/15827>

Geology

"Methane and Carbon Dioxide Adsorption-Diffusion Experiments on Coal: Upscaling and Modeling." A series of laboratory-scale experiments provide information on the kinetics of adsorption and desorption of CO₂ and CH₄ on coal. CO₂ sorption was consistently faster than CH₄ sorption under all experimental conditions. For moist coals, sorption rates of both gases were reduced by a factor of more than 2 with respect to dry coals, and the sorption rate was found to be positively correlated with temperature. Generally, adsorption rates decreased with increasing grain size for all experimental conditions. Based on the experimental results, simple bidisperse modeling approaches are proposed for the sorption kinetics of CO₂ and CH₄ that may be readily implemented into reservoir simulators. *International Journal of Coal Geology*, December 3, 2004, <http://www.sciencedirect.com/science/journal/01665162>

Technology

"A study of methods of carbon dioxide capture and sequestration—the sustainability of a photosynthetic bioreactor approach." Discusses engineered photosynthesis as a line of research that may, in the future, help to reduce the greenhouse effect in a sustainable manner. The topic of photosynthetic reaction, which has long been known as a natural process that can produce useful by-products of biomass, oxygen, and hydrogen, and can fix carbon dioxide, has been examined. Paper describes the design of a laboratory scale reactor. *Energy Conversion & Management*, February 2005, <http://www.sciencedirect.com/science/journal/01968904>

"Simulation of CO₂ capture using MEA scrubbing: a flowsheet decomposition method." This paper presents a method of converging a process model and optimizing key process operating variables, in particular the amine loadings and temperature of MEA entering the stripper. This method was applied to three different CO₂ concentrations (molar fraction, wet basis): 3% (to simulate flue gas from a gas turbine), 14% (flue gas from a coal plant) and 25% (flue gas from a cement plant). A minimum reboiler duty was found at a lean MEA loading of 0.25 for all CO₂ concentrations studied. *Energy Conversion & Management*, February 2005, <http://www.sciencedirect.com/science/journal/01968904>

Ocean

"Pacific Dominance to Global Air-Sea CO₂ Flux Variability: A Novel Atmospheric Inversion Agrees with Ocean Models." Addresses an ongoing debate regarding the geographic distribution of interannual variability in ocean-atmosphere carbon exchange. Finds that, for 1983–1998, both novel high-resolution atmospheric inversion calculations and global ocean biogeochemical models place the primary source of global CO₂ air-sea flux variability in the Pacific Ocean. In the model considered here, this variability is clearly associated with the El Niño/Southern Oscillation cycle. Both methods also indicate that the Southern Ocean is the second-largest source of air-sea CO₂ flux variability, and that variability is small throughout the Atlantic, including the North Atlantic, in contrast to previous studies. *Geophysical Research Letters*, November 2004, <http://www.agu.org/pubs/crossref/2004/2004GL021069.shtml>

Terrestrial

"Fine-Root Production Dominates Response of a Deciduous Forest to Atmospheric CO₂ Enrichment." Article presents a nearly continuous 6-year record of fine-root production and mortality from minirhizotron analysis of a closed-canopy, deciduous sweetgum forest in a free-air CO₂ enrichment experiment. Annual production of fine roots was more than doubled in plots with 550 ppm CO₂ compared with plots in ambient air. The preferential allocation of additional carbon to fine roots rather than to stemwood reduces the potential of long-term enhancement by elevated CO₂ of carbon sequestration in biomass. However, sequestration of some of the fine-root carbon in soil pools is not precluded, and there may be other benefits to the tree from a seasonally larger and deeper fine-root system. *Proceedings of the National Academy of Sciences*, June 29, 2004, <http://www.pnas.org/cgi/content/abstract/101/26/9689>

"Managed Grasslands: A Greenhouse Gas Sink or Source?" Paper describes a one year investigation of CO₂ and N₂O fluxes over a fertilized grassland in Ireland using two eddy covariance systems. Authors observed a net annual uptake of 9.45 T CO₂ ha⁻¹. N₂O emissions equivalent to 5.42 T ha⁻¹ CO₂ GWP counteracted 57% of the effect of the CO₂ uptake. Estimated methane emissions from ruminants (3.74 T ha⁻¹ CO₂ GWP) further counteract the CO₂ uptake, making the overall GWP nearly neutral. This delicate balance of the greenhouse gas fluxes underscores the significance of fertilizer application strategies in determining whether a managed grassland is a net GWP source or sink. *Geophysical Research Letters*, October 2004, <http://www.agu.org/pubs/crossref/2004/2004GL021161.shtml>

“Nitrogen Deposition and Plant Species Interact to Influence Soil Carbon Stabilization.” Study provides evidence from a 5-year grassland field experiment in Minnesota that under elevated atmospheric CO₂ concentration (560 ppm), plant species determine whether N deposition inhibits the decomposition of soil organic matter via inter-specific variation in root lignin concentration. Plant species producing lignin-rich litter increased stabilization of soil C older than 5 years, but only in combination with elevated N inputs. The results suggest that N deposition will increase soil C sequestration in those ecosystems where vegetation composition and/or elevated atmospheric CO₂ cause high litter lignin inputs to soils. *Ecology Letters*, December 2004, <http://www.blackwell-synergy.com/links/doi/10.1111/j.1461-0248.2004.00679.x/abs/>

“Scientist’s Plan Could Bury Global Warming.” A New Zealand economist, Dr. Peter Read, is promoting a massive worldwide plan to plant crops and bury charcoal to avoid global warming. Read advocates the use of fast-growing crops to produce ethanol or biodiesel. He says a massive global program of planting crops and plowing organic matter back into the soil could cut carbon dioxide back to pre-1800 levels – and feed poor countries at the same time. *New Zealand Herald*, November 22, 2004, <http://www.nzherald.co.nz/storydisplay.cfm?storyID=3612471&thesection=news&thesubsection=general>

Trading

“CCX Opens to Californian Forest Credits.” The Chicago Climate Exchange (CCX) announced that it will recognize the newly adopted California Climate Action Registry rules on accounting for carbon dioxide sequestration through forestry management. The decision by the CCX to recognize those credits will open the door for California’s forest owners to sell them into Chicago’s climate marketplace, providing a new source of revenue. *Point Carbon*, November 4, 2004, <http://www.pointcarbon.com/article.php?articleID=5182&categoryID=147>

“Japanese Firms Pick China for CDM.” Sumitomo Corp., Chugoku Electric Power Co. and Niigata Power Systems Co., a subsidiary of Ishikawajima-Harima Heavy Industries Co., are planning to invest in a project that will collect methane gas generated at Chinese coal mines and use it to produce electricity. The companies plan to install a gas engine with an output capacity of 2,000kw that will use methane gas produced at a coal mine in China's Heilongjiang Province to generate power. *Point Carbon*, November 15, 2004, <http://www.pointcarbon.com/article.php?articleID=5294&categoryID=147>

“The Carbon Game.” Article provides an excellent overview of carbon trading. Focuses on the European Trading Scheme (ETS), National Allocation Plans (NAP), and the Clean Development Mechanism (CDM). Also highlights the Acid Rain Program and the voluntary Chicago trading scheme in the U.S. *Nature*, November 18, 2004, <http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v432/n7015/index.html>

December 7-10, 2004, **The 2004 CO₂ Conference and EOR Carbon Management Workshop**, Midland, TX. The 10th Annual CO₂ Flooding Conference focuses on the use of carbon dioxide for enhanced oil recovery (EOR). Theme sessions will be offered during the conference that capitalize on the 32 year history of CO₂ injection in the Permian Basin. The 2nd Annual EOR Carbon Management Workshop has the distinct purpose of educating those interested in CO₂ geologic sequestration about crosscutting technologies and experience with EOR. For more information and to register, visit http://www.spe-pb.org/co2_conference/index.asp

December 13-17, 2004, **AGU Fall Conference**, San Francisco, CA. This meeting will cover topics in all areas of geophysical sciences, including a session entitled: Advancements in CO₂ Geologic Sequestration Measurement, Mitigation, and Verification (MM&V) Technologies Applied to Field Studies II. For more information visit <http://www.agu.org/meetings/fm04/>

January 13-14, 2005, **Climate Change Risks & Opportunities: Learning from the Leaders**, New York, NY. The conference will be divided into three blocks: Expert Briefings on the scientific basis for climate change mitigation and emerging policy frameworks; Corporate Spotlight on the business case for action on climate change and how leading companies have responded; and Interactive Workshops with industry leaders and policymakers to assist companies with integrating climate change into their strategic planning. Contact the Center for Economic and Environmental Partnership, Inc. in New York (Robyn Stewart, robyn@ceepinc.org, +1 518 432 6400) with any questions you might have.

January 16-20, 2005, **Chapman Conference on the Science and Technology of Carbon Sequestration**, Bahia Resort Hotel, San Diego, CA. The goal of this conference is to bring together scientists, engineers, and others who study long-term sequestration of carbon as a way of reducing potential global warming. For more information see <http://www.agu.org/meetings/cc05acall.html>

May 2-5, 2005, **Fourth Annual Conference on Carbon Sequestration**, Alexandria, VA. For more information, contact Exchange Monitor Publications at (202) 296-2814.

May 10-12, 2005, **International Conference on Clean Coal Technologies for Our Future**, Sardinia, Italy. For more information and to register visit <http://www.cct2005.it/> Deadline for submission of papers is February 28, 2005.

June 19-22, 2005, **2005 American Association of Petroleum Geologists Annual Convention**, Calgary, Canada. The purpose of this combined oral and poster session is to bring together researchers active in the field of CO₂ and acid gas injection in oil and gas reservoirs, coal beds and deep saline aquifers, whether for EOR, ECBM or sequestration, to present current operations, field and laboratory experiments, and integrated studies for the evaluation of sequestration sites and the long-term fate of the injected gases. For more information about the meeting and submission of abstracts please visit <http://www.aapg.org/calgary/technical/index.cfm>

Recent Publications

“Regulation Geosequestration.” The October/November edition of *AETF Review* contains an article on draft regulatory guiding principles for carbon dioxide geosequestration as developed by the Australian Ministerial Council for Minerals and Petroleum Resources (MCMPR). The draft regulatory framework addresses seven fundamental issues: access and property rights, long-term responsibilities, environmental issues, authorization and compliance, monitoring and verification, transportation issues, and financial issues. The article can be downloaded at <http://aetf.emcc.net.au/ContentStore/pdf/ReviewOctNov2004.pdf>

Arctic climate report released. The Arctic Climate Impact Assessment has been released and a summary of the report is available for download at <http://www.acia.uaf.edu/>
Also see: “Study: Arctic warming at twice the global rate,” *CNN*, November 8, 2004, <http://www.cnn.com/2004/TECH/science/11/08/globalwarming.reut/index.html>
“Study Reveals Global Warming Effects in Arctic,” *NPR, All Things Considered*, November 8, 2004, <http://www.npr.org/templates/story/story.php?storyId=4159482>

“Climate Change Impacts are Sensitive to the Concentration Stabilization Path.” Article derives pathways leading to stabilization of equivalent CO₂ concentration (including radiative forcing effects of all significant trace gases and aerosols) with a range of transient behavior before stabilization, including temporary overshoot of the final value. Compares resulting climate changes to the sensitivity of representative geophysical and ecological systems. Based on the limited available information, some physical and ecological systems appear to be quite sensitive to the details of the approach to stabilization. The likelihood of occurrence of impacts that might be considered dangerous increases under trajectories that delay emissions reduction or overshoot the final concentration. *Proceedings of the National Academy of Sciences*, November 23, 2004, <http://www.pnas.org/cgi/content/abstract/101/47/16411>

Legislative Activity

Omnibus not formally cleared yet, but final votes expected week of December 6. The FY '05 omnibus spending measure has not yet cleared Congress because of an error in the massive spending bill unrelated to environment and energy issues. Because the bill includes funding for the U.S. EPA and the Interior, Energy and Transportation departments, among other agencies, Congress before Thanksgiving was forced to pass a continuing resolution funding the federal government at FY '04 levels through December 8. The House is expected to return for a brief session December 6 to strike the error from the omnibus, thereby sending it to the president. *E&E Daily*, November 29, 2004, <http://www.eenews.net/EEDaily.php> (subscription required)

This newsletter is produced by the National Energy Technology Laboratory and presents summaries of significant recent events related to carbon sequestration. If you'd like to join the e-mail distribution list, email majordomo@list-manager.netl.doe.gov with "subscribe sequestration" in the body of the message. We encourage you to pass this along to interested persons. Contacts: Scott Klara, scott.klara@netl.doe.gov or Sarah Forbes, sarah.forbes@netl.doe.gov.