

# THE CARBON SEQUESTRATION NEWSLETTER

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October 2003

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

## Sequestration in the News

**Philadelphia Enquirer** summarizes the pros and cons of geologic CO<sub>2</sub> storage in general and highlights the borehole seismic study of the Mount Simon aquifer being conducted near AEP's coal-fired power plant in Mountaineer WV. "Digging deep for an answer to global warming," *Philadelphia Inquirer*, Sep 4, <http://www.philly.com/mld/philly/living/health/6685575.htm>

**Public Utilities Fortnightly** discusses the future involvement of coal utilities' in carbon capture and sequestration. IGCC is the most promising option for combining sequestration technology with power production, but there are no 500-MW models of IGCC plants, and the environmental superiority of IGCC is financially unrewarded in today's market. Technology development, incentives and clear regulations are needed to provide inexpensive coal power while emitting few pollutants and sequestering CO<sub>2</sub>, according to this article. "The carbon conundrum; Technology exists to sequester carbon--but will utilities ever buy in?" *Public Utilities Fortnightly*, August 2003, <http://www.pur.com/aug03.htm> (subscription required)

**Cinergy to cut emissions by 5%.** The Cincinnati-based power company with core operations that account for 1% of worldwide GHG emissions announced "a voluntary plan to reduce its greenhouse gas emissions to an average of five percent below their 2000 level during the period 2010 through 2012. Cinergy will spend \$21 million between 2004 and 2010 on projects to reduce or offset its emissions." Cinergy's Chairman, President and Chief Executive James Rogers said in a statement, "We are also participating in new technology development to find ways to burn coal without emissions, ". Company news release-[http://www.cinergy.com/News/default\\_corporate\\_news.asp?news\\_id=385](http://www.cinergy.com/News/default_corporate_news.asp?news_id=385)

**FutureGen News.** The town of Marion, Illinois is vying to host the project. "Bradley wants Marion behind FutureGen," *Marion Daily Republican* (Illinois), September 24, [http://www.mariondaily.com/articles/2003/09/24/local\\_news/news01.txt](http://www.mariondaily.com/articles/2003/09/24/local_news/news01.txt),

**Regional partnerships news.** DOE's seven regional partnerships also continued to receive press. "Carbon sequestration alliances to focus on assessing storage needs, resources," *Platts Coal Outlook*, September 1, see also "Energy Secretary Abraham Creates Regional Partnerships to Develop carbon sequestration options," *U.S. Newswire*, Sep 2, <http://releases.usnewswire.com/GetRelease.asp?id=121-09022003>, "Energy Dept. picks regional teams to plan carbon sequestration," *Waste News*, Sep 3, <http://www.wastenews.com/headlines2.html?id=1062620887>, and "New Mexico Tech named regional leader for science partnership" *New Mexico Business Weekly*, Sept 10, <http://albuquerque.bizjournals.com/albuquerque/stories/2003/09/08/daily8.html> "Illinois geological survey to lead study of carbon sequestration," *Chester Sun Times*, IL, Aug 27, [http://www.suntimesnews.com/2/news\\_archive/aug\\_03archives/0827illstudy.htm](http://www.suntimesnews.com/2/news_archive/aug_03archives/0827illstudy.htm)

**UK Ministers consider sub-sea geologic storage.** A report by UK government scientists recommends the study of capturing and storing CO<sub>2</sub> in the geologic strata beneath the North Sea to meet long-term GHG targets of 60% reduction by 2050. The Commons select committee on science and technology has endorsed the technology, saying it considers CO<sub>2</sub> sequestration "a necessary part of the transition to a non-carbon fuel economy". Said UK environment minister Elliott Morley, "I certainly think it should be looked at. I don't believe it's the long-term answer but it may have some benefits at the transitional stage in terms of moving away from dirty technology to clean technology. There is a gap that renewables are not going to fill in the short term." Enhanced oil and gas recovery in the North sea are also mentioned as options. "Plan to bury CO<sub>2</sub> emissions beneath North sea," <http://politics.guardian.co.uk/green/story/0,9061,1036594,00.html>, *The Guardian* (London), September 5, 2003. See also "Dispute scuppers CO<sub>2</sub> targets," *The Engineer*, September 12, 2003, *The Guardian*, September 6, "Minister backs plan to dump CO<sub>2</sub>," <http://www.guardian.co.uk/waste>

**Netherlands look into underground CO<sub>2</sub> storage.** Dutch Economy Minister mandated Gaz de France to undertake a feasibility study into CO<sub>2</sub> sequestration in depleted gas fields and aquifers in the Netherlands. The study will be called Crust (CO<sub>2</sub> re-use through underground storage). An earlier scoping study parliament reported that up to 10 billion tons of carbon could be sequestered. "Dutch Order CO<sub>2</sub> Study," *International Oil Daily*, September 22, 2003.

**CO<sub>2</sub> capture from wine making in Finland.** A Finnish CO<sub>2</sub> recovery plant will expand to capture 8,000 tonnes CO<sub>2</sub> per year from the wine and spirit fermentation plant of Altia. Messer Suomi invested EUR 4 M in the plant expansion. "Messer Suomi to boost CO<sub>2</sub> recovery: In Finland," *European Chemical News*, September 1, 2003

### Geologic CO<sub>2</sub> Storage

**Comprehensive database of domestic brines and brine formations available from NETL.** The NETL national brine database is a compilation of data from the Texas Bureau of Economic Geology; the U.S. Geological Survey; over seven hundred well data sets provided by various State Geologic Surveys, oil and gas reports, and other published literature sources. To obtain a copy on CD-ROM, contact James.Knoer@netl.doe.gov  
<http://www.netl.doe.gov/coalpower/sequestration/pubs/BrineCD.pdf>

**Coal sequestration model available.** Coal-Seq, a model developed by Advanced Resources International, screens potential ECBM and carbon sequestration projects in coal. The model consists of a database of reservoir simulator runs based on varying values for coal permeability, well spacing, coal depth, coal rank, injection rate, injection gas composition, and injection timing. Economic calculations can also be performed. <http://www.coal-seq.com/models.htm>

**MM&V at a commercial EOR operation.** Enhanced oil recovery in depleted fields has been operational at Rangely, Colorado since 1986, with over 23 million tonnes of CO<sub>2</sub> injected. This paper presents data on the measurements of methane and CO<sub>2</sub> in soil gas and as fluxes into the atmosphere. "CO<sub>2</sub> Sequestration in Depleted Oil/Gas Fields: Evaluation of Gas Miscroseeepage and CO<sub>2</sub> Fate at Rangely, Colorado U.S.A.," Colorado School of Mines,  
[http://aapg.confex.com/aapg/sl2003/techprogram/paper\\_78330.htm](http://aapg.confex.com/aapg/sl2003/techprogram/paper_78330.htm) Other AAPG 2003 Geologic Sequestration presentations:  
[http://aapg.confex.com/aapg/sl2003/techprogram/session\\_2165.htm](http://aapg.confex.com/aapg/sl2003/techprogram/session_2165.htm),

**Estimating CO<sub>2</sub> solubility in brine.** Researchers from Alberta Geological Survey, Canada developed a methodology to estimate the ultimate CO<sub>2</sub> sequestration capacity in solution (UCSCS) of an aquifer. They estimate that the Viking aquifer in the Alberta basin in western Canada can sequester 100 Gt CO<sub>2</sub> in solution in the formation water. "Sequestration of CO<sub>2</sub> in geological media in response to climate change: capacity of deep saline aquifers to sequester CO<sub>2</sub> in solution," *Energy Conversion and Management*, Volume 44, Issue 20, December 2003, <http://www.sciencedirect.com/science/journal/01968904>

### Technology

**Letters to Lackner.** Dan Golomb of UMass-Lowell and Meyer Steinberg of Brookhaven National Lab responded to Klaus Lackner's Perspective "A guide to CO<sub>2</sub> sequestration" (13 June, *Science*). Golomb takes issue with the practicality of using chemical sorbents on windmill rotors, which, he says, would take up too much space due to the partial pressure limits on substantial mass transfer. He also questions the thermal dynamics of using waste heat to convert CaCO<sub>3</sub> back into CaO. Lackner responds by rephrasing the capture area as a per capita number or 0.04 m<sup>2</sup> per person and points to the use of fuel cells which operate at a high enough temperature to perform the CaCO<sub>3</sub> to CaO conversion. "Issues of Carbon Sequestration," Dan Golomb, Meyer Steinberg, and Klaus Lackner, *Science* 2003 September 5; 301. (in Letters),  
<http://www.sciencemag.org/cgi/search?volume=&firstpage=&author1=&author2=&titleabstract=sequestration&fulltext=&fmonth=Oct&fyear=1995&tmonth=Sep&fyear=2003&hits=10&sendit.x=20&sendit.y=7>

**DOE funds crosscutting energy technological R&D.** Two projects funded are related to sequestration. University of California, Berkeley to design and synthesize iron catalysts with controlled and predictable activity and structural stability during Fischer-Tropsch reactions, and the University of Wisconsin's Department of Chemical Engineering seeks to predict catalyst activity and hydrocarbon selectivities over a range of temperatures, pressures, and hydrogen-to-carbon-dioxide ratios. "DOE Provides \$12.3 Million for Crosscutting Energy Projects," September 10,  
[http://www.energy.gov/engine/content.do?PUBLIC\\_ID=14125&BT\\_CODE=PR\\_PRESSRELEASES&TT\\_CODE=PRESSRELEASE](http://www.energy.gov/engine/content.do?PUBLIC_ID=14125&BT_CODE=PR_PRESSRELEASES&TT_CODE=PRESSRELEASE)

### Ocean

**Ocean acidification.** The coming centuries may see more ocean acidification than the past 300 million years as a result of increased levels of CO<sub>2</sub> in the atmosphere. "Oceanography: Anthropogenic carbon and ocean pH," *Nature*, September 2003, Ken Caldeira and Michael Wickett, <http://info.nature.com/cgi-bin24/DM/y/hL7W0Bhazm0Ch0EG80AU>, see also "GHGs linked to acidic oceans" Ananova, September 24, [http://www.ananova.com/news/story/sm\\_822606.html](http://www.ananova.com/news/story/sm_822606.html)

### Terrestrial

**Measuring tree root biomass with radar.** USDA Forest Service researchers are using ground-penetrating radar (GPR) to study tree roots nondestructively. Results are published in the September issue of the Soil Science Society of America Journal. "Using ground-penetrating radar to estimate tree root biomass," *Science Daily*, September 25,  
<http://www.sciencedaily.com/releases/2003/09/030925065001.htm>

**Forested financial investments.** Nissho Iwai Corp. will introduce an investment fund that supports its afforestation projects in Vietnam and offers CO<sub>2</sub> emission rights to investors as dividends. "Japan's Nissho Iwai to launch afforestation fund," *Asia Pulse*, September 18, 2003, <http://www.co2e.com/News/story.asp?StoryID=1283>

### Terrestrial, continued

**Reducing methane emissions from India rice fields.** A paper from the National Botanical Research Institute of Lucknow proposes strategies to contain methane emissions from tropical Asian paddy fields: Water management, use of fermented manures with low carbon to nitrogen ratio, application of sulfate-containing chemical fertilizers, selection of low methane emitting rice cultivars, and implementation of one or two short aeration periods before the heading stage. "Investigating options for attenuating methane emission from Indian rice fields," *Environment International*, Volume 29, Issue 5, August 2003, <http://www.sciencedirect.com/science/journal/01604120>

**Biodiversity and economic incentives for carbon sequestration.** The economic, ecological and legal implications of the interrelationship between carbon sequestration programs and biodiversity are sometimes negative, according to this paper. The relationship between the Kyoto process and the Convention on Biological Diversity is also studied. "Conflicts between biodiversity and carbon sequestration programs: economic and legal implications," *Ecological economics*, 46 (1, 2003)

**International abatement risks.** The risks associated with investing in GHG abatement projects in developing countries depend on the volatility of the growth rate of regional CO<sub>2</sub> emissions, and well-diversified portfolios significantly reduce investment risks, according to this paper. Existing models generally neglect investment risks and therefore overestimate the cost-savings due to international emissions trading. "International diversification of investments in climate change mitigation," *Ecological economics*, 46 (1, 2003)

**Global estimation of crop productivity.** This study integrates the Erosion Productivity Impact Calculator (EPIC) model with Geographic Information System (GIS) to simulate crop productivity at the global level. Using IPCC's future climate scenarios, GIS-based EPIC shows that global warming will be harmful for most countries. "Global estimation of crop productivity and the impacts of global warming by GIS and EPIC integration," *Ecological Modelling*, Volume 168, Issue 3, 15 October 2003, <http://www.sciencedirect.com/science/journal/03043800>

**European forests' role.** Britain's forests contain roughly enough carbon to offset one year's CO<sub>2</sub> emissions from fossil fuels and certain industrial processes. Measures taken to protect and expand forest areas can increase the biomass resource potentially available to future generations, the report "Forests, carbon and climate change: the UK contribution" states. "The carbon case for wood fuel," *Forestry & British Timber*, September 9, 2003, <http://www.forestry.gov.uk/website/PDF.nsf/pdf/fcin048.pdf?FILE/fcin048.pdf> See also "Use forestry waste, cut emissions," *Wired News*, September 21, from the World Forestry Congress meeting in Quebec City, <http://www.wired.com/news/technology/0,1282,60531,00.html>

### Trading

This month has seen a proliferation of news on Asian CDM and energy issues. Most of the articles and papers fall under the trading subject, but some are in the Policy topic heading as well.

**Dutch to invest in Vietnam CDM.** The Dutch Government will provide Vietnam with non-refundable aid via the United Nations Environment Programme. This aid will go towards a Clean Development Mechanism project in Vietnam. "Netherlands to help implement CDM in Vietnam," Vietnam News Agency, September 11, [http://www.vnagency.com.vn/NewsA.asp?LANGUAGE\\_ID=2&CATEGORY\\_ID=32&NEWS\\_ID=22882](http://www.vnagency.com.vn/NewsA.asp?LANGUAGE_ID=2&CATEGORY_ID=32&NEWS_ID=22882)

**Indonesian CDM interests potential buyers.** 13 carbon emission reduction projects are available under the Clean Development Mechanism, according to the Indonesian delegation at the environmental forum in the Philippines. "Indonesia carbon projects attract foreign buyers," *Jakarta Post*, September 16, <http://www.thejakartapost.com/detailnational.asp?fileid=20030916.C04&irec=3>, see also "Indonesia to 'sell' carbon emissions," *The Jakarta Post*, September 8, <http://www.thejakartapost.com/detailnational.asp?fileid=20030908.C05&irec=6>

**Landfill gas capture in Vietnam.** The Japan Consulting Institute (JCI) is validating a small-scale CDM project in Vietnam, the Landfill Closure and Gas Recovery and Utilisation Project in Haiphong. The project uses biological filtering. JCI would like to invite Parties, stakeholders and UNFCCC accredited NGOs to comment on the project design document. Comments can be sent until October 11, 2003 on the JCI website <http://www.jci-plant.or.jp/>

**Japan's planned trading system grows.** More than 100 companies and organizations will join the Japanese Ministry of Economy, Trade and Industry (METI) in creating a system for trading CO<sub>2</sub>. "Japan firms to join METI plan to create CO<sub>2</sub> rights trading system," *AFX News*, September 2, <http://www.co2e.com/News/story.asp?StoryID=1261>

**World Bank PCF to invest in Indian CDM.** The World Bank Prototype Carbon Fund will sign an agreement with Asia Bio Energy in India. World Bank officials repeated their intent to launch a new BioCarbon Fund. "Asia Bio Energy gets World Bank support," *Times of India*, September 24, <http://timesofindia.indiatimes.com/cms.dll/xml/uncomp/articleshow?msid=198837>

### Trading, cont'd

**NZ carbon credit subsidy.** New Zealand's government is offering 4 million carbon credits as a subsidy for projects that reduce GHGs. Projects must show additionality and deliver verifiable savings of at least 10,000 tonnes of carbon dioxide or its equivalent in other greenhouse gases during the first commitment period of the Kyoto Protocol, 2008 to 2012 to qualify. "Many a hoop to snaffle carbon credits," *The New Zealand Herald*, September 13, <http://www.nzherald.co.nz/business/businessstorydisplay.cfm?storyID=3523295&thesection=business&thesubsection=general&thesecodsubsection=&thetickercode=>

**CCX raises \$24.5 million.** The Chicago Climate Exchange, a voluntary market for GHG reductions, raised roughly \$24.5 million via a London-listed investment company, according to this article. "Chicago climate exchange raises £15 million," *Environmental Finance*, September 19, 2003, <http://www.environmental-finance.com/onlinews/19sepccx.htm>,

**World Resources Institute joins CCX.** "We are joining the Chicago Climate Exchange for two reasons. We want to strengthen a pioneering effort to create market-based solutions to the problem of climate change, and CCX helps us maintain our own organizational commitment to keep our net carbon dioxide emissions at zero," said Jonathan Lash, president of WRI. "WRI Joins Chicago Climate Exchange," WRI, September 25, [http://newsroom.wri.org/newsrelease\\_text.cfm?NewsReleaseID=263](http://newsroom.wri.org/newsrelease_text.cfm?NewsReleaseID=263)

**First brokered transaction in EU Emission Allowances in Nordic countries completed.** The power companies EN-ERGI E2 A/S from Denmark and Joensuu Energia Oy from Finland did not disclose any information on the trade. "Denmark has a very challenging target for the Kyoto period 2008-2012. We believe that the best way to prepare oneself and to learn about emissions trading is to carry out concrete deals," says Peter Hjorth Andersen, portfolio manager with ENERGI E2 A/S. "The first Nordic deal in EU emission allowances has been closed," Point Carbon, September 10, <http://www.pointcarbon.com/article.php?articleID=2412>

**Russia taking steps to form a domestic market for CO<sub>2</sub>.** Companies like Gazprom, Rusal, and Yukos may form an independent business council to help work out the rules for the market and future legislation concerning GHGs. "Russia to create domestic emissions trading market," Russian Information Agency, Novosti, September 26. [http://en.rian.ru/rian/index.cfm?prd\\_id=160&msg\\_id=3479718&startrow=1&date=2003-09-26&do\\_alert=0](http://en.rian.ru/rian/index.cfm?prd_id=160&msg_id=3479718&startrow=1&date=2003-09-26&do_alert=0) (subscription required).

### Policy

**Carbon Sequestration** is mentioned prominently in the U.S. Department of Energy's newly released DRAFT Strategic Plan. "the Department is focusing its efforts on carbon sequestration - the capture and permanent storage of carbon dioxide produced from the combustion of fossil fuels." <http://strategicplan.doe.gov/Draft%20SP.pdf>

**Breakthrough technologies needed for large CO<sub>2</sub> reductions.** At a speech in Berlin, US Energy Secretary Abraham described U.S. carbon sequestration research and clean coal technology programs. "US energy secretary says new technologies needed to achieve global climate goals," *US Newswire*, September 17, <http://story.news.yahoo.com/news?tmpl=story&cid=669&ncid=669&e=10&u=/030917/180/5aqwu.html>

**California Attorney General to sue EPA.** California's Attorney General Bill Lockyer will file a lawsuit against the US Environmental Protection Agency in a symbolic bid to force the federal government to regulate CO<sub>2</sub> emissions. This follows last month's ruling in which the EPA maintained it could not regulate CO<sub>2</sub> under the Clean Air Act. "California set to sue US EPA on CO<sub>2</sub> emissions," *Reuters*, September 19, 2003, <http://www.alertnet.org/thenews/newsdesk/N19316714.htm>

**West coast states team up to address CO<sub>2</sub>.** The Democratic governors of California, Oregon and Washington announced a new partnership to reduce GHGs. The partnership will work together to obtain better fuel-efficiency, remove barriers to the development of renewable electricity generation, develop coordinated GHG emission inventories and protocols, and collaborate on improved scientific tools to more precisely measure the impact of climate change. "West Coast States Unveil Climate Change Strategy," *The Energy Daily*, September 23, 2003, see also "The State; Governors Target Global Warming;" *Los Angeles Times*, September 23, 2003, "West coast states team up against greenhouse emissions," *Knight Ridder Newspapers*, September 22, 2003, [http://www.kentucky.com/mld/kentucky/news/breaking\\_news/6836249.htm](http://www.kentucky.com/mld/kentucky/news/breaking_news/6836249.htm)

**U.S. and Italy promote carbon capture and storage.** Sequestration was mentioned as an advanced technology option for GHG emissions reduction in a joint statement released by the U.S. and Italy on the development and deployment of transformational technologies for cleaner and more efficient energy. The workshop was hosted by the U.S. Department of Energy. The UN Framework Convention on Climate Change COP-9 will be held in Milan, Italy, December 1-12. "Joint Statement of the United States and Italy on Clean Energy Technologies and Climate Change," September 16, <http://www.state.gov/g/oes/rls/or/24168.htm>

## Sequestration in the News, cont'd

### Policy, cont'd

**Tighter target set for Japanese company.** The Japanese Kao Corp. has set a goal of reducing its emissions of CO<sub>2</sub> by 13 per cent from the fiscal 1990 level by 2005, after clearing an earlier target eight years ahead of schedule. "Japan's Kao sets new, stricter CO<sub>2</sub> emissions goal," *Asia Pulse* (Tokyo), September 4, <http://www.co2e.com/News/story.asp?StoryID=1263>

**U.S., Southeast Asia may cooperate on climate.** A delegation of senior US climate change policy experts visited Vietnam, Thailand and Malaysia. "Vietnam, US to discuss climate change initiatives," *Vietnam News Agency*, September 10, see also "US climate change team visiting," *Bangkok Post*, September 9, [http://www.bangkokpost.com/News/09Sep2003\\_news28.html](http://www.bangkokpost.com/News/09Sep2003_news28.html)

**Asian energy efficiency pact.** A mutual understanding between China and four countries from East Asia and the Asia-Pacific region in three areas calls for accelerating renewable energy use and energy efficiency co-operation. "Asian countries achieve energy understanding," *China Daily*, September 3, [http://www1.chinadaily.com.cn/en/doc/2003-09/03/content\\_260644.htm](http://www1.chinadaily.com.cn/en/doc/2003-09/03/content_260644.htm)

### Events

October 10-11, **The 7th Ph.D. Workshop on International Climate Policy**, Hamburg Institute of International Economics (HWWA), Germany. <http://www.sls.wageningen-ur.nl/enr/ICP/>

October 12-15, 2003, **Gasification Technologies 2003**, San Francisco, CA. <http://www.gasification.org/Conference/annual.html>

October 15-17, **The Coalition for Agricultural Soils Mitigation of Greenhouse Gases (CASMGs) Carbon Measurement and Monitoring Forum**, Manhattan, KS. [http://www.oznet.ksu.edu/ctec/Fall\\_Forum.htm](http://www.oznet.ksu.edu/ctec/Fall_Forum.htm)

October 21-23, **Carbon Sequestration and Clean Development Mechanism**, Manila, The Philippines. An international conference on tropical forests and climate change. <http://www.enfor.com.ph/announcements.html>

October 22-24, **3rd Forum on the State and Development of the GHG Market (IETA)** Including pre-conference workshop "The State of the CDM," <http://www.pointcarbon.com/article.php?articleID=2430>

November 2-6, **The 12<sup>th</sup> International Conference on Coal Science**, Cairns Convention Centre, Cairns, Australia. Topics include: Global warming, GHG emissions, CO<sub>2</sub> mitigation and sequestration. <http://www.aie.org.au/iccs/>

November 4-5, **Delivering Climate Technology: Programmes, Policies and Politics**, London, UK. Organized by the Royal Institute of International Affairs in association with the Carbon Trust. <http://www.riia.org/index.php?id=5&cid=36>

November 10-22, **IAI Summer Institute on Global Warming and Climate Changes: Causes, Mitigation Alternatives and International Actions**, [http://www.iaisummerinstitutes.iai.int/Files/SI03/GW\\_Announcement\\_English.pdf](http://www.iaisummerinstitutes.iai.int/Files/SI03/GW_Announcement_English.pdf)

November 16-21, **The American Institute of Chemical Engineers annual meeting**, San Francisco, CA. The Environmental and the Catalysis and Reaction Engineering divisions will sponsor two "GHG Sequestration Technology" sessions. <http://www.aiche.org/Annualapp/previewmodule/grouplist.asp?groupcode=09&>

November 18-19, **US Emissions Trading Conference, Emissions strategies in the North American carbon market**, Washington, DC. Sponsored by Oil Gas IQ. Contact Gareth Pearce at [gareth.pearce@iqpc.co.uk](mailto:gareth.pearce@iqpc.co.uk), to register, [www.oilandgasiq.com/NA-2047/PC](http://www.oilandgasiq.com/NA-2047/PC)

November 25-27, **Power Generation World Europe**, Addressing the key strategic issues of the liberalised European energy market, <http://www.pointcarbon.com/article.php?articleID=2404>

December 8-12, **AGU Fall meeting**, San Francisco, CA. Section on "Geophysical field studies and techniques applied to underground storage of GHG emissions in all phases of site characterization, injection and storage operations and monitoring." <http://www.agu.org/meetings/fm03/>

January 20-22, 2004, **Energy partner using soil carbon sequestration to offset GHGS**, College Station, Texas, USA. [http://ageco.tamu.edu/faculty/mccarl/acs/CASMGs\\_CONF\\_send.HTM](http://ageco.tamu.edu/faculty/mccarl/acs/CASMGs_CONF_send.HTM)

February 8-11, 2004, **A GTI Conference & Exhibition, Natural Gas Technologies II**, Phoenix, Arizona Cosponsored by the U.S. DOE NETL Strategic Center for Natural Gas Methane emissions detection, GHG management and CO<sub>2</sub> sequestration technologies. Contact: [paul.reneau@gastechnology.org](mailto:paul.reneau@gastechnology.org)

April 18-21, 2004, **American Association of Petroleum Geologists Meeting**, Dallas, TX. AAPG has asked for sessions on critical scientific results relevant to the subject of the potential for geological CO<sub>2</sub> sequestration to impact the fossil fuel economy. <http://www.aapg.org/meetings/dallas04/index.html>

## Recent Publications

**EIA analysis of McCain Climate Stewardship Act of 2003.** S. 139, the Climate Stewardship Act of 2003, would limit total (covered and non-covered) GHG emissions to 2000 levels by 2025. Under a reference case scenario EIA estimates the price of carbon emissions allowances under S. 139 would \$79 per ton of carbon in 2010 increasing to \$221 per ton of carbon in 2025. The EIA analysis (S. 139 case) expects geological sequestration to become economical, resulting in 140 gigawatts of capacity equipped with this technology (38 GW using coal) by 2025. EIA assesses the electricity supply situation under S. 139 as follows, "It is impossible to say which of the relatively low carbon technologies discussed – new nuclear, biomass, geothermal, wind, gas with sequestration, or coal with sequestration – might prove the most attractive over the next 20 years or so." *Analysis of S. 139, the Climate Stewardship Act of 2003*, EIA, July 3, [http://www.eia.doe.gov/env/env\\_pub.html](http://www.eia.doe.gov/env/env_pub.html) For the text of the Bill, <http://thomas.loc.gov/cgi-bin/bdquery/z?d108:s.00139:>.

**RFF analysis of McCain Climate Stewardship Act of 2003 (S.139).** Resources for the Future fellows analyzed S. 139 and praise its flexible trading structure and economy-wide approach calling it, "one of the most cost-effective proposals to date." "Summary and Analysis of McCain-Lieberman – "Climate Stewardship Act of 2003" S. 139, introduced 01/09/03," RFF, January 28, 2003. <http://www.rff.org/rff/News/Features/Understanding-the-McCain-Lieberman-Stewardship-Act.cfm>

**The Pew Center has conducted an assessment of the EIA assessment of S.139.** They claim that "the model's structure (that is, NEMS), combined with unrealistic input assumptions, results in unrealistically high cost projections." Full report at [http://www.pewclimate.org/policy\\_center/analyses/](http://www.pewclimate.org/policy_center/analyses/)

**EIA report on Clear Skies 3P and Carper 4P bills.** This report analyzes the impacts of S. 843, the Clean Air Planning Act of 2003 and S. 485, the Clear Skies Act of 2003. The economics impacts of limits on NO<sub>x</sub>, SO<sub>x</sub>, Hg and CO<sub>2</sub> (for S. 843) emissions from electricity generators are compared. CO<sub>2</sub> allowance prices are also projected to vary significantly across the Carper 4P cases. In 2010, CO<sub>2</sub> allowance prices are projected to range from \$4 to \$66 per metric ton carbon equivalent, while in 2025 the range widens to between \$26 and \$135 per metric ton carbon equivalent. Analysis of S. 485, the Clear Skies Act of 2003, and S. 843, the Clean Air Planning Act of 2003, EIA, September 23, [http://www.eia.doe.gov/oiaf/servicerpt/ccs/pdf/sroiaf\(2003\)03.pdf](http://www.eia.doe.gov/oiaf/servicerpt/ccs/pdf/sroiaf(2003)03.pdf) (2 MB)

**Carbon capture and sequestration techno-economics.** Researchers from Carnegie Mellon University examine the extent to which carbon capture and sequestration technologies might lower the cost of CO<sub>2</sub> control in competitive electric markets. This paper employs an electric system dispatch model to examine how natural gas prices, sunk capital, and the availability of coal plant retrofits affect CCS economics. Despite conservative assumptions about cost, CCS units are seen to provide significant reductions in baseload CO<sub>2</sub> emissions at a carbon price below 100\$/tC. "Fossil electricity and CO<sub>2</sub> sequestration: How natural gas prices, initial conditions and retrofits determine the cost of controlling CO<sub>2</sub> emissions," *Energy Policy*, Volume 32, Issue 3, February 2004, <http://www.sciencedirect.com/science/journal/03014215>

**Treaties to address the threat of global climate change: Critical review.** Resources for the Future authors use six criteria to evaluate the Kyoto Protocol and thirteen alternative policy proposals: environmental outcome, dynamic efficiency, cost effectiveness, equity, flexibility in the presence of new information, and incentives for participation and compliance. The Kyoto Protocol does not fare well on a number of criteria, but none of the alternative proposals fare well along all six dimensions. Kyoto is "too little, too fast"; developing countries should play a more substantial role and receive incentives to participate; implementation should focus on market-based approaches, especially those with price mechanisms; and participation and compliance incentives are inadequately addressed by most proposals. "13 + 1: A Comparison of Global Climate Change Policy Architectures," RFF, August 2003, <http://www.rff.org/rff/Documents/RFF-DP-03-26.pdf>

**Responsibility for GHG over-emissions.** This paper proposes a new way to assign responsibility for CO<sub>2</sub> emissions instead of territorial responsibility. It suggests that responsibility lies with the driving forces behind the activities that emit pollutants rather than direct emitters. "Allocating the responsibility of CO<sub>2</sub> over-emissions from the perspectives of benefit principle and ecological deficit," *Ecological economics*, 46 (1, 2003)

## Legislative Activity

**Clear skies prodded as potential addition to U.S. Energy Plan.** The Bush administration is lobbying to place Clear Skies within the energy bill being drafted in Congress. Environmental groups and many Democrats oppose the plan. "Bush air pollution proposal may put energy bill at risk," *Financial Times*, September 24,

**Barebones overview of key content in the US energy bill.** September 17, "Key provisions in the energy bill," *Scripps Howard News Service*, <http://www.knoxstudio.com/shns/story.cfm?pk=ENERGYSIDE-09-17-03&cat=WW>

*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](mailto: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. Contact: Sarah Forbes, [sarah.forbes@netl.com](mailto:sarah.forbes@netl.com), or Scott Klara, [klara@netl.doe.gov](mailto:klara@netl.doe.gov).*