

# THE CARBON SEQUESTRATION NEWSLETTER

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September 2004

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## Sequestration in the News

**BusinessWeek Cover Story on Global Warming.** Provides a comprehensive overview of the risks of climate change and actions to mitigate greenhouse gas emissions. Regarding sequestration, the article states "Utilities face the greatest threat since the bulk of the power they generate comes from climate-changing fossil fuels. That's why AEP, Cinergy Corp., and others are probing new technologies that would enable them to capture the carbon as coal is burned. That carbon could then be pumped deep into the ground to be stored for thousands of years." "Global Warming," *BusinessWeek*, August 16, 2004, [http://www.businessweek.com/magazine/content/04\\_33/b3896001\\_mz001.htm](http://www.businessweek.com/magazine/content/04_33/b3896001_mz001.htm).

**EPA Investigating Regulatory Impacts of CO<sub>2</sub> Storage in Geologic Formations.** The U.S. Environmental Protection Agency is forming a workgroup to look into the regulation of CO<sub>2</sub> storage in geologic formations as a means of controlling GHG emissions. EPA and DOE are working collaboratively on the issue, and several representatives from energy-producing states are developing recommendations for the EPA working group on potential state regulatory changes to accommodate CO<sub>2</sub> sequestration. InsideEPA.com (subscription required).

**UK to Study Carbon Sequestration.** The UK government's Department for Trade and Industry launched a national consultation on capture and storage of carbon dioxide from coal and gas-fired power plants. The idea would be viable by 2020, and cavities under the North Sea would be the best location, said UK energy minister Stephen Timms. "Despite progress with 'clean' power such as wind, and promises of greater energy efficiency, 'carbon abatement' is critical to the UK meeting its promise to cut emissions," said Timms. The UK also announced £50 million of support for wave and tidal energy projects over the next three years. A separate report commissioned by the Forum for Renewable Energy Development in Scotland (Fred's) forecasts that wave power could generate as much as 10 percent of Scotland's electricity by 2020. "North Sea burial for greenhouse gases: New wave of marine-based solutions to global warming," *The Observer*, August 1, 2004, <http://politics.guardian.co.uk/green/story/0,9061,1273889,00.html>. See also, "Government Studying Excess CO<sub>2</sub> Storage Methods," *PA News*, August 6, 2004, <http://news.scotsman.com/latest.cfm?id=3303967> and "Boost to Scotland's renewable energy with £50m investment," *The Herald*, August 2, 2004, <http://www.theherald.co.uk/news/21137.html>.

**Geosequestration in Australia.** ChevronTexaco, Shell, and ExxonMobil are pushing hard for the Australian federal and state governments to approve the injection of greenhouse gases underground so they can start work on what will be the world's largest geosequestration project off the north-west coast of Western Australia. The Australian government has made geosequestration its preferred technique for tackling greenhouse gases, but there are still issues that need to be addressed, such as, who will be responsible for securing or maintaining the carbon dioxide storage sites in the long term, and who will be liable if there is a leak. "Ministers debate CO<sub>2</sub> dumps," *Australian Financial Review*, July 30, 2004, <http://www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&DocId=6679>.

**A New Era For 'Big Oil'.** In an interview in the August 16, 2004 issue of Newsweek, John Browne, CEO of BP, shares his outlook on the turbulent energy market and the future of the oil and gas business. Browne says high oil prices are here to stay. BP is focused on increasing natural gas reserves, investing in photovoltaics, and hydrogen production from natural gas with carbon sequestration. "The Last Word: A New Era For 'Big Oil'," *Newsweek*, August 16, 2004, <http://msnbc.msn.com/id/5635162/site/newsweek/>.

**AEP Releases Emissions Assessment Report.** The report evaluates the impact of proposed federal legislation and regulations for reducing regulated emissions and carbon dioxide, including the Clean Air Interstate Rule, the Utility Mercury Reduction Rule, U.S. Sen. Thomas Carper's proposed Clean Air Planning Act of 2003, and U.S. Senators John McCain and Joseph Lieberman's amended Climate Stewardship Act of 2003. The report details the actions that AEP has undertaken to address regulated emissions and emissions of greenhouse gases, including co-founding the Chicago Climate Exchange (CCX), investing in terrestrial carbon projects and geologic sequestration research, and investing in wind generation and biomass. AEP also announced that the company will build at least one commercial-scale, base-load IGCC clean-coal plant by 2010. "AEP Releases Emissions Assessment Report of Board Subcommittee," *PR Newswire*, August 31, 2004, <http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=109&STORY=/www/story/08-31-2004/0002241170&EDATE>. Copies of AEP's emissions assessment report are available at <http://www.aep.com/environmental/performance/emissionsassessment/default.htm>.

## Announcements

**New NETL Carbon Sequestration URL.** The NETL Strategic Center for Coal website has been updated. As a result, the new URL for NETL's Carbon Sequestration Webpage is <http://www.netl.doe.gov/sequestration>.

The **2003 Annual Index** and the **2004 Annual Index** of "The Carbon Sequestration Newsletter" are now available on the Reference Shelf at <http://www.netl.doe.gov/coal/Carbon%20Sequestration/Resources/subscribe.html>. The documents (PDF files) contain blurbs from all the articles posted in the calendar year minus time-sensitive announcements for conferences, etc. Both files contain a subject index to facilitate navigation/searching of the documents.

**California Registry Draft Power/Utility Protocols Now Available for Public Comment.** On August 18, 2004, the California Climate Action Registry announced that draft protocols for the power/utility sectors are available for the public's consideration and comments at [www.climateregistry.org/PROTOCOLS/Industry](http://www.climateregistry.org/PROTOCOLS/Industry). In addition, the draft protocols will be formally vetted through a public workshop hosted by the California Energy Commission on September 9, 2004 in Sacramento, CA.

## Science

**"Narrowing uncertainty in global climate change."** This article discusses how a series of linked computer models at the Massachusetts Institute of Technology is being used to predict the likelihood of serious climate change with and without policies to stabilize atmospheric concentrations of carbon dioxide. Emphasis is placed on quantifying the uncertainty in future climate change projections. *The Industrial Physicist*, August-September 2004, Volume 10, Issue 4, <http://www.aip.org/tip/INPHFA/vol-10/iss-4/p20.html>.

**"Climate predictions gain surer footing."** Researchers who have devised a new approach to calculating global warming say they have reduced the uncertainty about the extent of warming to expect over the next 100 years. The method, which predicts a temperature rise of at least 2.4°C over the next century, is not dependent on guessing the values of unknown factors. "This should put climate modeling on a more solid footing and give policy makers a more rational basis for making decisions about preventing climate change and dealing with its consequences," says study leader James Murphy from the Hadley Centre for Climate Prediction and Research in Exeter. The results, presented in *Nature*, suggest that if carbon dioxide concentrations double over the next hundred years - as many believe they will - the planet will warm by between 2.4 and 5.4°C. A previous estimate released by the Intergovernmental Panel on Climate Change (IPCC), predicted a 1.4 to 5.8°C range. [news@nature.com](mailto:news@nature.com), August 11, 2004, <http://www.nature.com/news/2004/040809/full/040809-9.html>. For the original article, "Quantification of modeling uncertainties in a large ensemble of climate change simulations," see Murphy, et al. *Nature*, 430, 768 - 772 (2004).

**Study Disputes Idea that Trees can 'Relocate' Quickly in Response to Climate Change.** In a study with implications for how North American trees might respond to a changing climate, molecular information collected by Duke University researchers refutes a widely accepted theory that many of the continent's tree species migrated rapidly from the deep South as glaciers

retreated at the end of the last Ice Age. *Duke News*, August 2, 2004, [http://www.dukenews.duke.edu/news/treemove\\_0804.html](http://www.dukenews.duke.edu/news/treemove_0804.html).

## Geology

**"Coal-Bed Methane Triggers Promise and Concern."** Discusses the potential of coal-bed methane as a domestic natural gas resource (currently CBM supplies 7.5% of domestic NG) and also brings to light concerns over the cost of CBM clean-up and the environmental issues associated with the large quantities of water that are produced with the gas. Discusses a cross-border dispute between Canada and the state of Montana over a Canadian plan to extract CBM from nearby British Columbia. The main concern is that the process, which uses significant amounts of fresh water, would pollute their combined water sources. *UtiliPoint International IssueAlert*, August 2, 2004, <http://www.utilipoint.com/issuealert/article.asp?id=2214>.

## Technology

**"Coal gasification held back by cost."** A once-vibrant industry, coal mining in Illinois has lost thousands of jobs as in-state coal-fired power plants have switched to low-sulfur western coals. Gasification technology could be used to process Illinois coal and still comply with environmental regulations. "If you live in a carbon-constrained world, this [coal gasification] is your only alternative that offers the potential of carbon capture and sequestration," said Jim Rogers, chief executive of Cinergy. "We have worked extremely hard to bring in [coal gasification] projects," said Bill Hoback, bureau chief of the Illinois Office of Coal Development. So far they have not been successful. Illinois has as many as 10 coal-fueled power plants in the proposal stage. Of that, two are likely to come on line, but neither will use coal gasification. *Chicago Tribune*, August 24, 2004, <http://www.chicagotribune.com> (registration required).

**"IGCC leads clean technologies, but will it pass utility muster?"** Discusses IGCC technology and highlights the Polk Power Station and the Wabash Generating Station as examples of commercial applications. The article explores some of the concerns the utility industry has with IGCC, which include: capital costs, reliability issues, and IGCC's ability to be used in large-scale baseload applications. *Greenwire*, August 11, 2004, <http://www.greenwire.com> (subscription required).

## Ocean

**"Controversy over new method to cut atmospheric CO<sub>2</sub> levels."** Article discusses work done at the University of Massachusetts where liquefied CO<sub>2</sub> was mixed with pulverized limestone in water to form an emulsion that researchers say could be suitable for release into the ocean where it would then become sequestered (D. Golomb et al, *Environ. Sci. Technol.*, 2004, 38, 4445). Environmental groups oppose the method saying: "Dumping our carbon waste into the ocean would be a dangerous experiment we can't afford to undertake." Team leader Dan Golomb and colleagues are aware of the opposition they face and maintain their objective is to develop a more benign way to sequester CO<sub>2</sub> than alternative methods that acidify surrounding sea water. "Global warming debate heats up," *Chemistry World*, Issue 9, September 2004, <http://www.rsc.org/chemistryworld/news/free/CW00409N0010.htm>.

## Sequestration in the News, Cont'd

**Particular Algae May Help Corals Adapt to Warming Waters.** Coral reefs, widely expected to be endangered by warming waters due to climate change, may be aided by a particular form of algae that can help corals adapt to warmer temperatures, scientists recently revealed. Corals teamed with the alga *Symbiodinium D* have significantly better survival rates in warming waters than those reefs under similar conditions that lack the algae. "EESI Climate Change News, August 20, 2004, <http://www.eesi.org/publications/Newsletters/CCNews/8.20.04%20CCNews.htm>. For the original article see "Reefs get global warming lifeline," *Nature*, August 11, 2004, <http://www.nature.com/news/2004/040809/full/040809-8.html>.

### Terrestrial

**"Tracking Carbon from Sequestration in the Forest to Wood Products and Substitution."** Study shows that forest management and increased use of wood-based products lead to a significant reduction in atmospheric carbon by displacing more fossil fuel intensive products in housing construction. CORRIM: Phase I Final Report, March 25, 2004.

**"Life Cycle Environmental Performance of Renewable Building Materials."** Another report by the Consortium for Research on Renewable Industrial Materials (CORRIM) highlights the life cycle history of wood products, including a discussion of the carbon storage value of wood products. One of the conclusions is that environmental burdens, via carbon storage, could be lessened with increased forest management and wood substitution for materials that are more fossil fuel intensive - mainly concrete and steel. *Forest Products Journal*, June 2004, Vol. 54, No. 6.

**Nitrogen Dynamics in the Duke Forest FACE Study Reference.** Finzi et al. report "there were significant increases in canopy N and P contents under elevated CO<sub>2</sub>" (26 and 50%, respectively), and that "canopy biomass was significantly higher under elevated CO<sub>2</sub> during the first 4 years of this experiment." The authors concluded, "whole-canopy C assimilation is strongly stimulated by elevated CO<sub>2</sub> making this forest a larger net C sink under elevated CO<sub>2</sub> than under ambient CO<sub>2</sub>." "Canopy N and P dynamics of a southeastern US pine forest under elevated CO<sub>2</sub>," *Biogeochemistry*, 69: 363-378 (2004).

**NPR, "Bogs Watched for Warning Signs of Carbon Upset."** The August 25<sup>th</sup> edition of "All Things Considered" was dedicated to understanding the role of peat bogs in climate change. Globally, bogs contain more carbon than all the world's tropical rainforests. A decade ago, scientists started to worry that as the world warms, this vast store of carbon could vent out as carbon dioxide and speed up global warming. For the past eight years, researchers from McGill and Trent universities have set up a series of experiments at Mer Bleue bog to measure potential changes in carbon respiration. "Bogs Watched for Warning Signs of Carbon Upset: Wetlands a Global Warming Antidote, But for How Long?" Audio of the program is available at <http://www.npr.org/features/feature.php?wfld=3871344>.

### Trading

**Digging for Gold in the Carbon Market.** Australian gold miner and explorer Revesco Group Ltd. plans to pull out of the minerals sector to reinvent itself as an environmental services business, selling carbon credits to clients. Revesco company secretary Harley Whitcombe said the former miner would establish large scale, long-term, mallee eucalypt plantations under the brand name CO<sub>2</sub> Australia, with the aim of supplying the emerging carbon economy. "Revesco eyes tree planting business," August 3, 2004, *The Age*, <http://www.theage.com.au/articles/2004/08/03/1091476462547.html?oneclick=true#> (registration required).

**TECO Energy Joins Chicago Climate Exchange.** TECO Energy Inc. has joined the Chicago Climate Exchange (CCX). The company has committed to voluntarily reduce greenhouse gas emissions by 4 percent below the average of its 1998-2001 baseline by 2006. TECO Energy Press Release, August 5, 2004, [http://www.tecoenergy.com/ENNws08\\_05\\_04.html](http://www.tecoenergy.com/ENNws08_05_04.html).

**Companies make carbon credit trade.** TransAlta Corp. announced a deal to spend about \$9-million for credits worth 1.75 million tonnes of greenhouse gas emissions from hog farmer Agricola Super Ltd. of Chile. TransAlta generates about 30 million tonnes of greenhouse gases in Canada each year and hopes to use the credits in the period from 2008-12, during which Kyoto targets are to be met. Like most hog businesses, Agricola stores manure in open lagoons, which are major emitters of methane, a greenhouse gas. Agricola is using technology that reduces methane emissions and physical structures to capture gas emitted. "TransAlta, Chilean firm strike emissions swap deal," *The Globe and Mail*, August 25, 2004, <http://www.theglobeandmail.com/servlet/ArticleNews/TPStory/LAC/20040825/RKYOTO25/TPBusiness/TopStories>.

**"Greenhouse Gases Heat Up as a Commodity."** According to CCX vice president Rafael Marques, more than one million tons of carbon dioxide have been traded on the exchange since its inception. Although the number of emissions permits traded per month on the exchange is growing, the price per ton is hovering just below \$1, according to CCX. Bruce Braine, vice president of strategic policy analysis for American Electric Power (AEP), expects more power companies to join once overall membership reaches critical mass. *AlertNet*, August 26, 2004, <http://www.alternet.org/story/19683/>.

### Policy

**Evidence of Warming Cited in Report.** A new report to Congress suggests that evidence of global warming has begun to affect animal and plant populations in visible ways, and that rising temperatures in North America are due in part to human activity. Although the government issues this report each year, in this instance the overview covers two years of research on climate change and it is accompanied by a letter signed by the secretaries of energy and commerce and the President's science adviser. "Administration Shifts on Global Warming," *Washington Post*, August 27, 2004, <http://www.washingtonpost.com/wp-dyn/articles/A37232-2004Aug26.html>. See also, "White House Shifts Its Focus on Climate," *The New York Times*, August 26, 2004, <http://www.nytimes.com/2004/08/26/science/26climate.html?hp>.

**“China, Australia Sign Climate Change MOU.”** The Australian Government and China signed a Memorandum of Understanding on cooperation in climate change action. The Memorandum covers areas such as adapting to climate change, capacity-building, and public awareness. Point Carbon, August 16, 2004, <http://www.pointcarbon.com/article.php?articleID=4307&categoryID=147>.

### **Solving the Climate Problem with Current Technologies.**

Writing in the August 13<sup>th</sup> issue of the journal *Science*, Princeton researchers contend existing technologies and conservation efforts can curb rising emissions of carbon dioxide until cleaner energy solutions emerge. Princeton suggests doubling the fuel efficiency of cars, driving half as many miles, and boosting efficiency of power plants. Other recommendations include carbon sequestration, substituting cleaner-burning natural gas for coal, replacing lost forests to absorb carbon, and more careful farming methods to retain carbon in soil. “Study says U.S. shouldn't wait to curb carbon emissions,” *The Star Ledger*, August 13, 2004, <http://www.nj.com/news/ledger/index.ssf?/base/news-17/1092389553243270.xml>.

**CNN, “CO<sub>2</sub> rules set for California's cars.”** California released a plan to reduce greenhouse gas emissions from cars and trucks by about 30 percent by requiring hundreds of dollars in technology to control air pollution in new cars. The initial phase, from 2009 through 2012, calls for regulation requiring technology to reduce emissions by about 25 percent for cars and light trucks, and by about 18 percent for larger trucks and sport-utility vehicles. After 2016, when the plan is fully implemented, the recommended regulation would reduce emissions by up to 34 percent for cars and light trucks, and by 25 percent for larger vehicles. The initial phase is expected to add about \$292 to the cost of each car and small truck, and about \$308 to the cost of every large pickup and SUV. *CNN*, August 9, 2004, <http://www.cnn.com/2004/TECH/science/08/09/autos.emissions.reut/index.html>.

**UK Climate change policy 'off course,' says government report.** Government targets for reduced carbon dioxide emissions to the atmosphere will not be met, and environmental taxes, particularly on road traffic, are falling rather than rising, the Commons environmental audit committee says. Petrol and oil cost the same in real terms as they did in 1974, and the overall cost of motoring is slightly less. Bus travel is 50% more expensive, and rail 70%. “Climate change policy 'off course',” *The Guardian*, August 12, 2004, <http://www.guardian.co.uk/climatechange/story/0,12374,1281198,00.html>.

**New German Renewable Energy Law to Reduce CO<sub>2</sub> Emissions.** A new law on renewable energy came into effect in Germany in August. The law is expected to contribute to a reduction of CO<sub>2</sub> emissions of 40 million tonnes annually by 2010. The law aims to improve the investment framework within solar power, wind and hydro power, bio energy, and geothermal power. Germany's ambition is to produce 12.5 percent of its total power from renewables by 2010 and at least 20 percent by 2020. Point Carbon, August 2, 2004, <http://www.pointcarbon.com/article.php?articleID=4199&categoryID=147>.

**“Iran to Ratify the Kyoto Protocol.”** The Iranian Government ratified a bill for joining Iran to the Kyoto Protocol, Head of the Environment Protection Organization said. The Islamic Republic of Iran Broadcasting (IRIB) reported that through changing its process of industrial technology and energy production, the country has already made efforts to meet the Protocol's objectives. Point Carbon, August 4, 2004, <http://www.pointcarbon.com/article.php?articleID=4215&categoryID=147>.

## Events

September 5-9, 2004, **7th International Conference on Greenhouse Gas Control Technologies**, Vancouver BC, Canada. GHGT-7 is being organized by University of Regina, Natural Resources Canada, and the IEA GHG R&D Programme. [www.ghgt7.ca](http://www.ghgt7.ca). Contact: GHGT-7 Conference Secretariat, Ted Morris, Suite 150, 10 Research Drive, Regina, SK. S4S 7J7, Canada. Tel: +1 306 337 2290 Fax: +1 306 337 2301 [secretariat@ghgt7.ca](mailto:secretariat@ghgt7.ca).

September 13-17, 2004, **The International Pittsburgh Coal Conference**, Osaka Japan. Industrial Ecology topics include: life cycle studies of coal conversion plants; Industrial ecology of emission trading; and planning future energy plants, <http://www.engr.pitt.edu/pcc>. Topics: <http://www.engr.pitt.edu/pcc/04AbstractTopics.htm>.

September 18 - 22, 2004, **2004 Ground Water Protection Council Annual Forum, Recognizing Ground Water as a Critical Component of Our Ecosystem**, Charleston, South Carolina. Preliminary agenda includes presentations by DOE and EPA: “Status of Research Efforts Regarding Geosequestration of CO<sub>2</sub>: DOE Efforts” and “Regulatory Consideration for Geosequestration of CO<sub>2</sub>: EPA Perspective.” For more information visit [www.gwpc.org](http://www.gwpc.org).

September 19-22, 2004, **EMA 8th Annual Fall Meeting and International Conference**, Marriott Toronto Eaton Centre, Toronto, Canada. Speakers include Leona Dombrowsky and Tony Rockingham from the Ontario Ministry of the Environment, and Paul Portney from Resources for the Future. For more information and to register visit <http://www.emissions.org/conferences/fallconference04/>.

September 21-23, 2004, International workshop **Climate Change and Forest Sector: Clean Development Mechanism in Tropical Countries**, Seoul, Korea. The overall objective of the workshop is to promote the development of carbon markets through the implementation of clean development mechanism (CDM) forest activities such as afforestation and reforestation of degraded forest land in the tropics. For more information visit <http://www.ee-forest.org/eng/main.htm>.

## Events, Cont'd

September 29-30, 2004, The American Petroleum Institute, and its co-sponsor, the United States Department of Energy, will host the **3<sup>rd</sup> API Conference on the Oil and Natural Gas Industry's Voluntary Actions to Address Climate Change** in Arlington, Virginia. One of the seven sessions at this event will address carbon capture and sequestration projects and partnerships. For more information including a detailed agenda, and to register, go to [www.api.org/petroteam](http://www.api.org/petroteam) and scroll down to the conference date.

September 30-October 1, 2004, An Expert Workshop on **"Greenhouse Gas Emissions and Abrupt Climate Change: Positive Options and Robust Policy,"** Paris, France (IEA Meeting Room 2). The Workshop Mission Statement is "To address the policy implications of potential abrupt climate change." For details and registration visit [www.accstrategy.org](http://www.accstrategy.org).

October, 15-16, 2004, **Ninth European Ph.D Workshop on International Climate Policy**, Viterbo, Italy. The workshop is open to Ph.D. students and researchers from all disciplines working on different aspects of International Climate Policy. It offers a forum to present (preliminary) Ph.D. research ideas and results and discuss them with other students and researchers working in the field. Further information on the workshop, as well as on past Ph.D. workshops, is available on the following websites: [http://gaia.agraria.unitus.it/phd\\_ws9](http://gaia.agraria.unitus.it/phd_ws9); <http://www.ku-eichstaett.de/Fakultaeten/WWF/Lehrstuehle/VWF/icp/>. For registration, please contact Lucia Perugini ([perugini@unitus.it](mailto:perugini@unitus.it)). Registration closes on September 10th, 2004.

November 2004, **Climate Change and Business**, Auckland, New Zealand. Seven partner organizations are putting together a conference on the business opportunities arising from climate change. For further information, see: <http://www.climateandbusiness.com/>.

November 7-12, 2004, **American Institute of Chemical Engineers (AIChE) Annual Meeting**, Austin, TX, Session 09005, Greenhouse Gas Sequestration Technology. Proposals covering technologies for (1) separation and capture, (2) transport, and/or (3) long-term sequestration (geologic, terrestrial, etc.) of greenhouse gases are especially desired. CO<sub>2</sub> is the focus, but technologies specific to other greenhouse gases (CH<sub>4</sub>, N<sub>2</sub>O, etc.) are also welcomed. Proposals to Present (PTP) technical papers can be submitted at <http://www.aiche.org/annualapp>.

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](mailto: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>. Call for abstracts until September 30, 2004.

## Recent Publications

The "Hydrogen Economy" was mentioned in numerous sources this month. Some of the articles are as follows:

**A Special Issue of Science**, "Toward a Hydrogen Economy," is now available. Articles include: "The Carbon Conundrum" and "Choosing a CO<sub>2</sub> Separation Technology." *Science*, Volume 305, Issue 5686, Toward a Hydrogen Economy dated August 13 2004, <http://www.sciencemag.org/content/vol305/issue5686/index.shtml?etoc>.

**"The Hydrogen Economy: Opportunities, Costs, Barriers, and R&D Needs."** A report by the National Research Council Committee on Alternatives and Strategies for Future Hydrogen Production and Use provides an assessment of hydrogen as a fuel in the nation's future energy economy and describes a number of important challenges that must be overcome if it is to make a major energy contribution. There is a chapter dedicated to carbon capture and storage. The book is available online at <http://www.nap.edu/catalog/10922.html>.

**NPR, "Building a Hydrogen Economy."** The August 13<sup>th</sup> edition of "Talk of the Nation" was dedicated to a discussion on moving toward a hydrogen economy - the technological developments necessary to make it a reality, how long such a shift would take, and whether a move to hydrogen would truly free us from a dependence on fossil fuels. Guests included: Stephen Pacala, director of Carbon Mitigation Initiative at Princeton; John Turner, principal scientist, National Renewable Energy Laboratory in Golden, Colorado; and Amy Jaffe, associate director, Rice Energy Program at Rice University in Houston. Carbon sequestration, EOR, FuturGen, and Sleipner were all mentioned. Audio of the program is available at <http://www.npr.org/features/feature.php?wfld=3850465>.

**"Hydrogen: savior or fatal distraction."** Should developing a "hydrogen economy" be the number one priority, or should we be investing in more immediate ways to cut emissions, such as burying the carbon dioxide produced by fossil fuels? The article tackles this issue from both perspectives. John Turner of NREL, a leading advocate of hydrogen, argues in the journal *Science* that using renewable energy to generate hydrogen is the only "green" way to produce the energy to run our cars and trucks. On the other hand, Joseph Romm, an official responsible for renewable energy during the Clinton administration, says making hydrogen from renewables is far from being economically feasible. *Reed Business Information*, August 24, 2004, <http://www.fuelcellworks.com/Suppage1047.html>. See also, "Sustainable Hydrogen Production," Turner's article in *Science*, Vol. 305, August 13, 2004.

## Recent Publications, Cont'd

**Energy Policy.** The December 2004 issue contains articles on the Bush Administration's climate policy, CO<sub>2</sub> emissions in international trade, OPEC and the Kyoto Protocol, the Greek energy system and its Kyoto target, and more. For further information, see *Energy Policy*, Volume 32, Issue 18, Pages 1993-2088 (December 2004), <http://www.sciencedirect.com/science/issue/5713-2004-999679981-512875>.

**Special Edition on Climate Policy.** The October 2004 edition of *Global Environmental Change Part A* is dedicated to the benefits of climate policy. Topics include: estimating global impacts from climate change, regional and global impacts, abrupt climate change, and adaptation benefits and costs. *Global Environmental Change Part A*, Volume 14, Issue 3, Pages 195-297 (October 2004), The Benefits of Climate Policy Edited by Jan Corfee-Morlot and Shardul Agrawala, <http://www.sciencedirect.com/science/issue/6020-2004-999859996-514274>.

**California Warned of Global Warming Impact.** California was warned in a study published in the Proceedings of the National Academy of Sciences that global warming could cause dramatically hotter summers and a depleted snow pack in the state. According to the study, under the most optimistic computer model, periods of extreme heat would quadruple in Los Angeles by the end of the century, the Sierra Nevada snow pack would decline, and alpine forests would shrink. The most pessimistic model projects six to eight times as many heat waves and even more reduction in snow pack and high altitude forests. "Emissions pathways, climate change, and impacts on California," the *Proceedings of the National Academy of Sciences*, August 24, 2004; 101 (34), <http://www.pnas.org/cgi/content/full/101/34/12422>.

**Report Warns Europe Particularly Vulnerable to Climate Change.** Europe will suffer worse, and sooner, than other parts of the world from climate change, according to a new report from the European Environment Agency. The continent can expect more severe heat waves and more frequent and violent storms. Northern Europe can expect more precipitation, while southern regions are likely to experience drought. By 2080, cold winters could almost entirely disappear. The report urged a worldwide effort to reduce greenhouse gas emissions. See "Europe 'must adapt on climate'," *BBC News*, August 18, 2004, <http://news.bbc.co.uk/1/hi/sci/tech/3570602.stm>; "Europe facing ever-more weather extremes, warns new report," *TerraWire*, August 18, 2004, <http://www.terradaily.com/2004/040818114036.xd3pyn83.html>; and "A flash flood in the pan or a rainstorm caused by global warming?" *Independent News*, August 18, 2004, <http://news.independent.co.uk/uk/environment/story.jsp?story=552593>.

**New Online Book.** "Implementing Climate and Global Change Research: A Review of the Final U.S. Climate Change Science Program Strategic Plan," is available on the National Academies Press web site. The report reviews a draft strategic plan from the U.S. Climate Change Science Program, a program formed in 2002 to coordinate and direct U.S. efforts in climate change and global change research. National Research Council 2004, <http://www.nap.edu/catalog/10635.html>.

**Legal merits of tort-based climate change litigation.** In a follow-up to the July 21 filing of a lawsuit against the top five US carbon dioxide emitters, this article explores the legal merits of the case, which cites federal common law on public nuisance. "Climate Change a Nuisance? Nine State and City Attorneys General Bet a Lawsuit On It," *CSRwire*, August 8, 2004, <http://www.csrwire.com/sfarticle.cgi?id=1487>.

## Legislative Activity

Both the House and Senate are in recess through September 6. No legislative activity to report.

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