THE CARBON SEQUESTRATION NEWSLETTER

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October 2002

Sequestration in the News

British Energy Minister Calls for Sequestration Study. British Energy Minister Brian Wilson called for a new study on reducing GHG emissions from fossil-fueled power stations. The investigation will look at the feasibility of CO_2 capture and injection into underground depleted oil and gas wells in the North Sea and consider environmental impacts, leakage, enhanced oil recovery, need for further technology development and partnerships, and the legalities and economics of capture and injection. The Department of Trade and Industry will conduct the study with input and guidance from an advisory group of industry representatives. "British Innovation Can Lead the Way in Reducing Greenhouse Gases," M2 Communications, CO2E.com, September 17, 2002.

CO_2 in the Japanese Iron and Steel Industry. The steel industry currently accounts for close to 15% of Japanese GHG emissions. An article in *Energy Policy* summarizes a new model, the Steel Environmental Strategy Assessment Program, which has been developed to analyze the CO_2 emission reduction potential in the Japanese iron and steel industry. The model can be used to study the impact of carbon taxes on technology selection, iron and steel trade, and product demand for the next three decades. "CO_2 in the Iron and Steel Industry: An Analysis of Japanese Emission Reduction Potentials," *Energy Policy*, vol. 30, issue 10, 2002.

Australian Plan for Coal to be Greener. Australian coal producers plan to ask their Federal Government for up to $50 million to help build a new coal-fired power plant that would inject excess CO_2 into natural saltwater reservoirs at least 600m underground. Currently, coal-fired power plants contribute 85 percent of Australia's electricity and are the largest single source of GHG emissions. "Plan for Coal to be Greener," *The Australian*, September 6, 2002.

Measuring CO_2 Dispersion after Injection. Researchers at the British Geologic Survey have used a time-lapse seismic technique to look at how CO_2 disperses when injected 1 km under the seabed. The technology has been tested at the Sleipner injection site in the North Sea and shows that the CO_2 is contained by an impermeable cap of shale and clay. "Scientists Find Eco-friendly Use for Old Oil Fields" and "Waste Gas Buried in North Sea Reservoirs," *The Financial Times*, September 11, 2002, and "Carbon Burial Experiment Works," *BBC News*, September 10, 2002.

CO_2 Sequestration Seen as a Powerful Tool. "CO_2 sequestration is one of the most powerful tools we have of reducing CO_2 emissions to the atmosphere" said Andy Chadwick, principal geologist at the British Geological Survey. Chadwick noted the relatively high cost of sequestration, but said that a lot of research is being conducted to find ways to reduce the cost and suggested that depleted oil and gas fields could prove to be useful storage areas. He also stated that sequestration is an intermediate measure over the next 50-60 years to help realize the major emissions reductions that are needed. "Inject CO_2 Emissions into Earth's Crust," *Reuters*, September 10, 2002.

Colin Powell Touts U.S. Climate Change Program. In a speech at the World Summit on Sustainable Development, U.S. Secretary of State Colin Powell said the U.S. is taking action to address environmental challenges such as climate change. He used the nation's commitment to a "multi-billion dollar program to develop and deploy advanced technologies to mitigate GHG emissions" as an example of U.S. dedication to the environment. "Powell Touts Billion Dollar Program on Climate Change: Africa News Service," CO2E.com, September 4, 2002.

High-Temperature Membrane. Los Alamos National Laboratory has developed a new high-temperature polymer membrane for separating and capturing CO_2. The new membrane is operationally stable at temperatures up to 370 deg C, which is 220 deg C higher than current commercially available polymer membranes. The higher operating membranes could greatly reduce the increased energy use associated with CO_2 capture in certain applications. "High-Temperature Polymer Helps Clear the Air," *JOM*, *Member Journal of the Minerals, Metals, & Materials Society*, September 2002, vol. 54, issue 9, p.7.

The State of Food and Agriculture 2002. Released by The United Nations Food and Agriculture Organization (FAO), this report has a special chapter entitled "Harvesting Carbon Sequestration Through Land-use Change: A Way Out of Rural Poverty?" According to the report, paying farmers to change to carbon-sequestering land-use methods can play a significant role in promoting sustainable development in poor areas, assuming effective design of incentives and compensation programs. "UN FAO's Food and Agriculture 2002 Examines the Potential Impact of Carbon Sequestration on Hunger and Poverty," *AScribe Newswire*, September 16, 2002. The report is available on the FAO web site.

Protein in Soil Helps Sequester Carbon. Scientists at USDA's Agricultural Research Service (ARS) have discovered that the protein glomalin helps stabilize soil and keeps carbon from escaping to the atmosphere. The protein is shed from fungi living on plant roots and has a 'sticky' consistency. Tests on U.S. soils showed that the protein stores close to one third of soil carbon, an amount much greater than humic acid, which had been thought to store the majority of organic carbon. Scientists say that, depending on conditions, glomalin stays in the soil between 7 and 42 years. USDA is also studying glomalin levels to measure the amount of carbon stored in tropical soils. "Rich Soil Good for Trapping Carbon Dioxide – Study," *Reuters*, September 9, 2002.

Soil Carbon Sequestration in Sub-Saharan Africa. In an article in *Climatic Change*, author Lasse Ringius looks at soil carbon sequestration in sub-Saharan Africa as a way to mitigate greenhouse gases and increase agricultural productivity. Ringius documents improvements in agricultural practices and land-use management that could result from increased carbon sequestration initiatives. "Soil Carbon Sequestration and the CDM: Opportunities and Challenges for Africa," *Climatic Change*, September 1, 2002, vol.54, issue 4.

Carbon Ring Consortium. Rothschild Australia and Australia-based environmental group E3 International have launched a fund which will allow highly polluting companies to offset their emissions by buying carbon credits from cleaner firms. With individual investments of no less than $100,000, the Consortium hopes to raise $2 million. It is expected that by June 2003 the carbon credits purchased will be ready for distribution among investors. "Rothschild, E3 Launch Carbon Credit Investment Fund," *Reuters*, September 3, 2002.

Public Carbon Trading Website. 500 PPM has developed a website that allows the general public to offset CO_2 emissions they create through personal air travel. Website users can calculate their emissions and then offset them by purchasing verified emission offsets that come from emission reduction projects in South Africa, Brazil, India, and Jamaica. The money collected goes back to the local community or business that sold the offsets and can be used for additional emission reduction projects.

New Jersey Trading Plan Being Scrapped. New Jersey plans to scrap an air-pollution-control program entitled The Open Market Emissions Trading Program, which allows companies to buy credits from other companies that have successfully reduced their emissions if they pollute above permitted levels; some 39 companies have made use of it to meet emissions standards. State Department of Environmental Protection Commissioner Bradley Campbell is pulling the plug, saying the program has hurt state efforts to reduce air pollution. "The program has failed," Campbell wrote in a letter to the U.S. EPA. "Jersey Spiking Whitman Plan," *New Jersey Star-Ledger*, September 17, 2002.

Events and Announcements

GHGT-6 Abstracts Available. Abstracts for The Sixth International Conference on Greenhouse Gas Control Technologies are now available. GHGT-6 is being held this week from October 1-4, in Kyoto, Japan at the Kyoto International Conference Hall. The conference is providing a forum for discussing the latest in GHG Control Technologies, including capture, storage and utilization of CO_2. The conference is organized by Research Institute of Innovative Technology for the Earth (RITE), the IEA Greenhouse Gas R&D Programme, and the Japan Society of Energy and Resources (JSER). NETL will be presenting two papers on the Carbon Sequestration Program. For more information on the conference, visit http://www.ieagreen.org.uk/ghgt6.htm. Abstracts are available at http://www.rite.or.jp/GHGT6/ (click on Conference Program to view abstracts). **I**

BC's Carbon Sequestration Conference. The Carbon Reducing Technology and Management Conference will be held October 24th and 25th in Houston, Texas. The conference will address regulatory and policy issues, commercialization, profitability, public acceptance, and industrial perspectives related to carbon sequestration.

The Geological Society of America 2002 Annual Meeting. A special topic session on geological carbon sequestration will be included at The Geological Society of America 2002 Annual Meeting & Exposition on October 27–30 in Denver, Colorado. For more information, contact Curt White, curt.white@netl.doe.gov.

Future Energy Systems and Technology for CO_2 Abatement. Organized by The Technological Institute, this symposium will cover the potential impact of chemistry, catalysis, and process engineering in CO_2 abatement from industry, transport, and other areas. CO_2 capture and sequestration will also be covered. The symposium will be held in Antwerpen, Belgium, from November 17-20, 2002.

USDA Symposium on Natural Resource Management to Offset Greenhouse Gas Emissions will be held November 19-21, 2002, in Raleigh, NC. Researchers will present management options for increased carbon storage, innovative technologies and methodologies for monitoring and measuring terrestrial carbon stocks, and economic projections. For more information, visit http://www.sgcp.ncsu.edu/carbon2002/.

EPA State and Local Climate Change Conference. EPA is holding the 5th State and Local Climate Change Partners' Conference November 20-22 in Annapolis, Maryland. Meeting topics will include greenhouse gas registries, science and policy updates, and renewable energy and energy efficiency opportunities. The conference will feature new tools for state greenhouse gas inventories and co-benefits analysis. Regional breakout sessions are planned. For general conference information, contact Andrea Denny at denny.andrea@epa.gov.

The American Geophysical Union Fall Meeting will be held December 6-10 in San Francisco. A special session entitled "Carbon Sinks and Carbon Management: Scientific Perspectives on Potential Benefits and Consequences" will be convened as part of the conference. The conference code for this session is U08. For more information visit: http://www.agu.org/meetings/fm02/.

Electric Utilities Environmental Conference. The 6th Annual Conference on Air Quality & Global Climate Change will be held January 27-30, 2003, in Tucson, Arizona. The conference will cover policy, trading, voluntary programs, and science and technology options, including carbon sequestration. DOE is one of the conference sponsors.

NETL at the February AAAS Meetings. Carbon Sequestration is on the agenda at The American Association for the Advancement of Science annual meeting, which will be held February 13-18, 2003, in Denver, Colorado. NETL has organized two symposia, "Comparative Assessment: Carbon Sequestration as a Greenhouse Gas Mitigation Strategy" and "Climate Change Mitigation Strategy: Technical Challenges for Carbon Sequestration," which will be included in the Dealing with Global Change track on Monday, February 17, 2003. For more information on NETL symposia, please contact Sarah Forbes at NETL.

NETL's Second National Conference on Carbon Sequestration will be held May 5-8, 2003 in Washington, DC. More details will be provided soon. The First National Conference was held May 2001 and was attended by over 400 national and international experts from government, academia, and industry. For conference proceedings from that event are available on the NETL website.

Petroleum Geologist Convention. The next annual convention of the American Association of Petroleum Geologists (AAPG) entitled "Energy: Our Monumental Task" will be in Salt Lake City, Utah, on May 11-14, 2003. A special session on "Geological Sequestration of CO_2" has been arranged (click on session O-22).

Recent Publications

Carbon Capture Project. A Media Release entitled "The Carbon Capture Project: Technology Solutions for Environmental Needs" is available on NETL's website. The article discusses the CCP and its near-term goals related to capture and storage technology innovations.

Australasian Emissions Trading Forum. The latest issue of the AETF Review is available for downloading. Articles in this issue deal with trading developments in the US and trends within industry and government towards greenhouse action, international developments in climate change policy and issues for future global response, and doing business in a part-Kyoto world.

NETL Factsheets. The following new Fact Sheets are now available on the NETL Reference Shelf:

- **High Temperature Membranes.** "CO_2 Separation Using a Thermally Optimized Membrane": The primary purpose of this project is to develop membranes for CO_2 separation that operate under a broad range of industrially relevant conditions (e.g. high temperature and pressure).

- **Hydrotalcite Membrane for CO_2 Removal.** "CO_2 Selective Membrane for Water-Gas-Shift Reaction with Simultaneous Recovery of CO_2": The main objective of this research is to develop a defect-free hydrotalcite membrane for selective CO_2 removal that will be effective in the water-gas-shift reaction environment, (i.e. at 300-600 deg C and in the presence of steam).

- **CO_2 Separation from Syngas.** "CO_2 Hydrate Process for Gas Separation from a Shifted Synthesis Gas Stream": The goal of this project is to construct and operate a pilot-scale unit utilizing the hydrate process for CO_2 separation.

- **Advanced Oxyfuel Boilers.** "Advanced Oxyfuel Boilers and Process Heaters for Cost Effective CO_2 Capture and Sequestration": The primary purpose of this project is to develop and demonstrate the integration of a novel ceramic oxygen transport membrane (OTM) with the combustion process to enhance boiler efficiency and CO_2 recovery.

- **CO_2 Capture from Flue Gas.** "CO_2 Capture from Flue Gas Using Dry Regenerable Sorbents": The goal of this project is to develop a simple, inexpensive process to separate CO_2 as a virtually pure stream from a fossil fuel combustion system using a regenerable sorbent.

Legislative Activity

Comprehensive Energy Policy Update. Conferees resumed discussions on *H.R. 4/S.517*. On September 12, conferees agreed on language dealing with pipeline safety issues, the *Price-Anderson Act*, and 10-year funding to develop clean coal technology, among other topics. Conferees met on September 19 to address differences over CAFE and electricity restructuring. The conferees made some progress on CAFE standards, agreeing on several aspects: 1) CAFE requires an increase in fuel economy to achieve an additional savings of five billion gallons of oil between 2006 and 2012, 2) manufacturing incentives for dual-fuel vehicles will be extended through 2008, and 3) The National Academy of Sciences will conduct a study to determine the impacts of a more stringent CAFE standard after 2010.

More Stringent Energy Legislation in California. On September 13, 2000 California Governor Gray Davis signed legislation that will require the state to double its supply of renewable energy to 20 percent of all retail power sales by 2017, the highest level in the US. "New California Law Doubles Renewable Energy Target," *Reuters*, September 13, 2002.

This newsletter is produced by the National Energy Technology Laboratory and presents summaries of significant events related to carbon sequestration that have taken place over the past month.

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If you would like to know more about DOE's Carbon Sequestration R&D Program, please contact Scott Klara at NETL, klara@netl.doe.gov, or visit the website at www.netl.doe.gov/coalpower/sequestration/.