THE CARBON SEQUESTRATION NEWSLETTER

TABLE OF CONTENTS April 2002

Sequestration in the News

New Sequestration Research Projects. Three universities were selected by DOE's Carbon Sequestration R&D Program to receive research grants. The University of Texas at Austin will develop an alternative solvent that captures more CO_2 than MEA (monoethanol amine, a conventional state-of-the-art sorbent) scrubbing, at less cost. The University of Massachusetts will test a method for deep ocean sequestration. The test will blend liquid CO_2, water, and finely ground limestone into an emulsion that could be pumped into the ocean for long-term storage. The University of Kentucky proposes to displace natural gas from shale, and store CO_2 in the shale. "New Projects to Explore 'Breakthrough' Ideas for Capturing, Storing Carbon Gases," *DOE Techline,* March 6, 2002.

NETL Carbon Measurement Testing. Recent restoration projects sponsored by The Nature Conservancy (TNC) in the Brazilian Atlantic Rainforest serve as testing grounds for researchers measuring soil carbon. Using a laser-induced breakdown spectroscopy (LIBS) device developed by Los Alamos National Laboratory (LANL), NETL is working to develop new approaches to carbon measurement. The research is organized into two primary groups. The Applied Terrestrial Carbon Sequestration Partnership, led by NETL and LANL, is a multi-disciplinary team of scientists, and the Climate Action Project Research Initiative is a cooperative agreement between NETL and TNC. Both partnerships work with government and non-government organizations in Brazil. "NETL, LANL and TNC Measure Terrestrial Carbon," NETL, March 8, 2002.

Sequestration Time Frames. Researchers from Iowa State University created a dynamic model to investigate the optimal time paths of carbon emissions and sequestration. The researchers conclude that carbon sinks should be utilized as early as possible, and carbon flow into sinks should last until the atmospheric carbon concentration is stabilized. The researchers rule out any cyclical patterns of carbon sequestration and release, and assess three mechanisms to introduce sequestration into a carbon permit trading market. "The Time Path and Implementation of Carbon Sequestration," *American Journal of Agricultural Economics*, February 2002.

Incentives for Coal Compliance. The EPA will begin changing a clean air enforcement initiative begun under President Clinton in 1999. The Bush Administration has formally decided to discourage new government lawsuits against operators of coal-fired power plants in favor of incentives for mandatory emissions reductions. "EPA Will Ease Coal Plant Rules, Incentives to Replace Pollution Lawsuits," *Washington Post*, March 18, 2002.

Earth Technologies. The 13th Annual Earth Technologies Forum, an international conference and exhibition on global climate change and ozone protection technologies and policies, featured U.S. EPA Administrator Christine Todd-Whitman at the Keynote Address. Robert Kane, of DOE's Office of Fossil Energy, presented a talk on carbon sequestration called "Carbon Sequestration: A Third Pathway for Mitigating Global Climate Change," Washington DC, March 25, 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.

Sequestration in the News, Continued

Converting Tar to Oil. Researchers at Lightyear Technologies, Inc. (LTI) have developed nanomaterials that change tar into oil while it is still underground in tar sand deposits. The current production of crude oil from tar sands is a significant contributor to Canada's GHG emissions. According to the press release, the technology could help Canada reduce greenhouse gas emissions through a more efficient interaction between the molecule-size catalysts developed by LTI and molecules in the tar sands that need to be changed into crude oil. "Advance in Tar Sands Refining," LTI, March 11, 2002.

European Carbon Trading Market. At least 55 million tons of greenhouse gas emissions have been traded since 1996, as Britain, Denmark, Norway and the European Union enter the emissions trading market for carbon. The UK target is to cut greenhouse gas emissions by 23 percent from 1990 levels by 2010. In the U.S., roughly forty five U.S. Midwestern companies plan to launch the Chicago Climate Exchange by the third quarter of 2002, which proposes to cut regional emissions of six greenhouse gases by 2 percent below 1999 levels during 2002, and reduce them 1 percent annually. "Greenhouse trading takes off, U.S. on sidelines," *Reuters*, March 19, 2002.

Six More Companies Join EPA's Climate Leaders Program. Alcoa, Alcan Aluminum, British Petroleum, International Paper, Johnson & Johnson, and DOE's NREL (National Renewable Energy Laboratory) have joined the other 11 charter partners in the Environmental Protection Agency's voluntary Climate Leaders program. The Climate Leaders Program announced the new entries at the Earth Technologies Forum, on March 25th. A few companies have made preliminary commitments to reduce greenhouse gas emissions, including Alcoa, a leading producer of primary aluminum, by 25% from 1990 levels by 2010, and General Motors by 10% from current levels by 2005. EPA, March 25, 2002.

EPA recognizes 729 top energy-performing buildings in America. Energy Star awards were presented to large commercial institutions, healthcare facilities, supermarkets, schools and government facilities in 40 states. Buildings qualify for Energy Star by earning a score of 75 or higher on a 100-point national energy performance rating scale. The buildings saved $134 million in energy costs since 1999 and released 1.9 billion fewer pounds of carbon dioxide into the air. "Whitman Announces 729 of The Nation's Top Energy Performing Buildings," EPA, March 21, 2002.

PNNL and UMD Symposium Collaboration. The Joint Global Change Research Institute, a collaboration between the University of Maryland and the Pacific Northwest National Laboratory, held a one-day symposium on March 15th called "Climate Change: What's at Stake and What Can Be Done?" The symposium explored risks, policy questions, mitigation and adaptation strategies from a wide range of perspectives. March 15, 2002, University of Maryland.

Feature Topic: International Collaboration

Japan and the U.S. The governments of Japan and the U.S. released a statement of cooperation on a broad range of joint climate change science and technology research activities. The identified priority research areas include: improvement of climate models; research on greenhouse gas sinks including LULUCF (land use, land-use change and forestry); and development of mitigation and prevention technologies such as separation, recovery, sequestration and utilization of carbon and GHGs. U.S. Department of State, February 25, 2002.

Australia and the U.S. The governments of Australia and the U.S. announced an agreement to establish a Climate Action Partnership. The Partnership will focus on emissions measurement and accounting, stationary energy technologies, agriculture and land management, and other issues. U.S. Department of State, February 27, 2002.

Canada and the U.S. The governments of Canada and the U.S. announced an agreement to expand existing bilateral efforts to address global climate change. Cooperation will focus on technology development, carbon sequestration, emissions measurement and accounting, carbon sinks, and other approaches. Examples of opportunities for cooperation include clean coal technology and CO2 capture and storage technology development. U.S. Department of State, March 7, 2002.

Italy and the U.S. The governments of Italy and the US. identified priority climate change research activities in the areas of global and regional climate modeling, carbon cycle research, low-carbon technologies, and others. U.S. Department of State, January 22, 2002.

Events and Announcements

AGU Spring Meeting. A special interdisciplinary session called "Carbon Management Technologies: Feasibility, Impacts, Risks, and Economics" will be held at the 2002 Spring American Geophysical Union meeting (28 - 31 May 2002, Washington, DC). Sequestration technologies at various stages of development, ranging from operational on a small scale, to field-experimentation, to laboratory prototypes, to conceptual designs, will be examined for feasibility, scalability, environmental impacts and risks. For information on the meeting and session, visit the AGU website. The session will be May 29th, with a poster session in the morning and oral session in the afternoon.

Call for Carbon Mitigation Research Applications. DOE's Office of Biological and Environmental Research of the Office of Science is receiving applications for research funding through the Integrated Assessment of Climate Change Research Program. The deadline for receipt of formal applications is May 14, 2002. For more information contact Dr. John Houghton, email: john.houghton@science.doe.gov.

National Academies' National Association for Engineers Sequestration Symposium. The National Association for Engineers is holding a two day symposium in DC that will address current and emerging sequestration technologies. Issues covered include carbon separation and capture from energy sources, ocean, geologic, and terrestrial carbon storage, and advanced engineering processes. Economics, energy, society, and growth will also be addressed. A full day breakout session will follow to examine the components in detail. April 23-25, 2002, "Complement to Kyoto: Technologies for Controlling CO2 Emissions," NAE.

The North American Coalbed Methane Forum will be held April 24-25th in Washington, PA. The Spring 2002 agenda includes presentations by Consol Energy, the DOE Sequestration Program, GTI, BP, and others. Issues range from the natural gas market, directional drilling, Pittsburgh coalbed gob gas behavior, and micro turbines. April 24-25, 2002, WVU Petroleum and Natural Gas Engineering. For more information, call (304) 293-7682 x3406.

Recent Publications

Feature: NETL Journal of Energy and Environmental Research. NETL has released the second *Journal of Energy and Environmental Research*. The journal contains papers on geologic sequestration, modeling, and ocean sequestration by NETL researchers, in collaboration with investigators from industry, academia, and other national laboratories. The papers included in the first two issues were presented at the First National Conference on Carbon Sequestration, May 14 to 17, 2001 in Washington, D.C. NETL, February 2002.

Graduate Carbon Management Science Theses. A recently updated report compiled by the Carbon Dioxide Information Analysis Center provides bibliographic citations, abstracts, and keywords for doctoral and masters theses supported by DOE's Environmental Sciences Division (and its predecessors). "Graduate Student Theses Supported by DOE's Environmental Sciences Division: Fiscal Year 2001 Update," CDIAC, February 2002.

Review of Climate Change Scientific Papers. The Winter 2001 issue of *CO_2/Climate* Report provides a synthesis of key scientific papers and reports relevant to climate change that have appeared in international peer-reviewed literature in 2001. The synthesis is a brief summary of recent, incremental research highlights. *CO_2/Climate Report,* Meteorological Service of Canada, Winter 2001.

International Carbon Trading Market Analysis. The Pew Center on Global Climate Change recently released a report on the carbon trading market. The report concludes that although the market is fragmented, international trading activity has increased over the past five years. Progress in international climate talks, new carbon trading systems in Europe, private sector trading initiatives in the U.S., and a precedent of successful emissions trading with SO_2, have helped accelerate the market. *The Emerging International Greenhouse Gas Market,* Pew Center on Global Climate Change, March 19, 2002.

Recent Publications, continued

RFF "Safety Valve" Emissions Trading Scheme. Richard Morgenstern of Resources for the Future released a paper on a cap and trade approach applied to GHGs. According to the report, the impact of GHG emissions trading could extend throughout the economy, so to eliminate the risk of major economic disruption a relief mechanism, or "safety valve," is examined. When the price of the permits rises above a set amount, additional permits would be provided to cap the costs of the policy. "Reducing Carbon Emissions and Limiting Costs," RFF, February 2002.

Owners of Electric Generation in the U.S. A report which shows the relative emissions of the 100 largest owners of electric generation is a collaborative effort between the Natural Resources Defense Council (NRDC), Public Service Enterprise Group (PSEG) and the Corporate Climate Accountability Project of the Coalition for Environmentally Responsible Economies (CERES). It focuses on four emissions: CO_2, Mercury, NO_x and SO_x. *Benchmarking Air Emissions of the 100 Largest Electric Generation Owners in the U.S. – 2000*, CERES, March 2002.

Non-CO2 Greenhouse Gas Emissions. EPA's Methane and Sequestration Branch (Office of Air and Radiation) released a report presenting emissions and baseline projections of non-CO2 gases from major anthropogenic sources for 38 developed countries. *Non-CO_2 Greenhouse Gas Emissions from Developed Countries: 1990 – 2010,* EPA, Updated February 2002.

Legislative Activity

Greenhouse Gas Hearing. On March 13th the Senate Environment and Public Works Committee, chaired by Senator Jim Jeffords, I-Vermont, held a hearing on the economic and environmental risks of climate change. Witnesses included atmospheric scientists, environmental scientists, non-profit representatives, and financial analysts. Download witness testimonies and opening statements.

The Energy Policy Debate. The last few weeks in the Senate have been dominated by the Energy Policy debate. S517 has been amended by S2917, which contains a provision requested by Senator Byrd, D-West Virginia, to extend authorization for fossil fuels R&D from $485 million in FY 2003 to $558 million in FY 2006. The bill contains a $2 billion, 10-year clean coal technology demonstration program. The core research program goals include reduction of CO2 emissions by at least 40 percent through efficiency improvements and 100 percent with sequestration by 2015. NETL oversees the clean coal technology and other fossil energy research. Byrd and Senator Ted Stevens, R-Alaska, also crafted climate change provisions in the energy bill, which would commit $4.83 billion over 10 years for climate change R&D. The legislation provides for offices in DOE and the White House to implement a national climate change strategy. March 21, 2002. To download the currently debated National Energy Policy, visit http://energy.senate.gov.