THE CARBON SEQUESTRATION NEWSLETTER

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

November 2003

Sequestration in the News

CALL FOR PAPERS for the Third Annual Conference on Sequestration. May 2-6, 2004, Alexandria, VA. This year's conference will be conducted in cooperation with the Department of Commerce, the Department of Agriculture and the Environmental Protection Agency. Email carbonsq@exchange-monitor.com or see http://www.carbonsq.com/ (posted soon)

Business Week. An article, "Putting carbon dioxide in its place," describes a test bore hole being drilled into a saline formation in West Virginia. The formation underlies coal-fired power plant owned and operated by American Electric Power Co (AEP). The hole (2,800 meters deep) is finished, and researchers are analyzing the samples from each layer. Economists peg CO_2 burial cost at a relatively affordable $1 to $8 per ton of CO_2, but CO_2 capture costs are still high. Howard Herzog (MIT), Dale Heydlauff (AEP) and Vello Kuuskraa (ARI) are quoted in this article. *Business Week*, October 20, http://www.businessweek.com/index.html [subscription required, search for "carbon dioxide"] The project is also highlighted in the *Milwaukee Journal Sentinel*, "Global warming solution may be underground," September 28.

UK vote of confidence to CO_2 capture and storage. Plans have just been approved to build a #350 million Integrated Coal Gasification Combined Cycle (IGCC) power station close to Hatfield Colliery in Yorkshire, UK. The 430MW plant will convert coal into hydrogen to generate electricity. Pollutants such as sulphur dioxide and nitrogen oxide will be converted to useable by-products while CO_2 will be separated before combustion. http://www.ieagreen.org.uk/ [Newsletter, Issue 68]

Bozeman Daily Chronicle. The Department of Energy has designated Montana State University as the leader of a regional partnership aimed at reducing GHG emissions. Funded with a $1.6-million grant from the agency - matched by $400,000 in state and regional dollars - the partnership will identify suitable ways of sequestering GHGs in the northern Rockies, including Montana, Idaho and South Dakota. Susan Capalbo, professor of agricultural economics at MSU, leads the partnership. October 2, http://www.bozemandailychronicle.com/articles/2003/10/02/news/greenhousebzbigs.txt

India Times October 30 issue contains an overview article on CO_2 sequestration in the oceans. The article opines, "The US Department of Energy also finds the technique attractive, and is funding research in the area." http://economictimes.indiatimes.com/cms.dll/html/uncomp/articleshow?msid=257769&Curpg=1

The Beacon Journal. Battelle Memorial Institute will lead a $2.4 million study of the viability of pumping CO_2 gas into underground rock formations in the Midwest as a means of curtailing global warming. "It's unique to have a research team with such depth and breadth of skills paired with major industrial firms such as these," said Ron Cudnick, Battelle's program manager. "Think Tank, Utilities have plan for CO_2," *Akron Beacon Journal*, OH http://www.ohio.com/mld/beaconjournal/6919514.htm A press release from the Ohio Department of Natural Resources quotes Thomas Berg, chief of the ODNR Division of Geological Survey, as saying, "In Ohio, coal-fired electric utility plants, steel mills and fertilizer plants generate the largest amounts of carbon dioxide. Showing where these sources are in relation to the best geologic storage reservoirs provides decision makers the tools they need for planning sequestration options."

IGCC proposed in Minnesota. Excelsior Energy Inc. wants to build a 1,000 MW "coal-gasification" plant in the Iron Range region of Minnesota. Xcel Energy Inc., which would be the plant's largest customer, is unconvinced the plant will work, and environmentalists worry pollution controls won't be sufficient. "The primary environmental claim [for coal-gasification plants] is the hope or expectation of at some point capturing 100 percent of the CO_2 emissions," said Michael Noble, director of Minnesotans for an Energy-Efficient Economy. *Star Tribune*, Oct. 14 (registration required), http://www.startribune.com/stories/535/4152512.html

Science

FY 2004 SBIR/STTR Program Solicitations now available. Several topic areas in the SBIR solicitation pertain to carbon sequestration. In particular, topic 46, "sequestration of carbon" which included subtopics "Identifying Suitable CO_2 Storage Sites of Verifiable Integrity and Quantified Capacity," "Sequestration of CO_2 in the Outer Layers of the Earth's Crust," "Regenerable Processes for CO_2 Capture," and "Instrumentation Systems for Monitoring and Verifying Carbon Sequestration in Terrestrial Systems" Also of interest are topics 45, Greenhouse and Hydrogen Gas Research, 29, Advanced fossil fuels research, 22, Biological Carbon Sequestration Research, and 21, Carbon Cycle Measurements of the Atmosphere and the Biosphere. The closing date for grant application submission is January 6, 2004. http://www.science.doe.gov/sbir/Solicitations/FY%202004/contents.htm

Swapping CO_2 for methane in hydrates. A team of Canadians and Koreans, through the National Research Council Canada, has shown in laboratory experiments that CO_2 can extract gaseous methane from methane hydrates, and be stored away long-term. "Injecting carbon dioxide to extract methane from methane hydrate deposits?" *Chemie.de*, Germany, October 27, http://www.chemie.de/news/e/30425/

Geology

EOR CO_2 NM depot. BOC opened a CO_2 depot in Hobbs, New Mexico, to distribute to Enhanced Oil Recovery customers in the Permian Basin. The liquefied gas is obtained from BOC's CO_2 plant in Denver City, Texas. "BOC Opens Carbon Dioxide Depot in New Mexico," *Business Wire*, October 23, 2003 http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news_view&newsId=20031023005487&newsLang=en. Also, http://www.boc.com/news/article_detail.cfm?ID=589

Genesis Energy to enter carbon business. Houston-based Genesis Energy LP may begin a wholesale CO_2 marketing business. "Genesis Energy to buy carbon dioxide assets," *Houston Business Journal*, http://houston.bizjournals.com/houston/stories/2003/10/13/daily42.html?jst=b_ln_hl

Zero sum research? Australia and the US share defense of coal-powered electricity through a "climate action partnership" which directs research to CO_2 capture and geologic sequestration. The Howard Government allocated $112 million for strategic fossil fuel energy research, mainly for carbon sequestration. The article notes a correlating decrease in renewable energy R&D. "The Coalition of the global polluters," *The Age* (Melbourne), October 23, 2003.

Technology

Mineral membrane moves forward. A zeolite mineral membrane, made by a team at Yamaguchi University in Japan, acts as a molecular sieve to filter CO_2 from power station flue gas. CO_2 passes through the new membrane over 100 times as fast as N_2, at temperatures of up to 200 degrees C. (Chemical Communications). "Mineral sieve filters out carbon from flue gases," *New Scientist*, October 4.

Canadian engineering firm to study CO_2 capture for United Arab Emirates. Lavalin International Inc. has been awarded an engineering and design study by the Abu Dhabi National Oil Company (ADNOC) in United Arab Emirates, to determine the most suitable method of recovering CO_2 from boilers and steam reformers. The CO_2 will be used at the Bab Thamama "B" oil reservoir in an EOR process. http://www.newswire.ca/releases/October2003/03/c7859.html

Ocean

Phytoplankton in rapid decline. Plant life covering the surface of the world's oceans is disappearing at a dangerous rate, scientists have discovered. According to Watson Gregg, a NASA biologist at the Goddard Space Flight Center, the greatest loss of phytoplankton has occurred where ocean temperatures have risen most significantly between the early 1980s and the late 1990s. http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2003/10/06/MN31432.DTL&type=science

Ocean health. According to this article, oceans have begun to undergo accelerated transformations: Rising temperatures and water levels, damage to coral reefs, disappearing salt-marsh and mangrove swamps, declining fish stocks, and rising levels of pollution. A central concern is the rapid accumulation of carbon in the atmosphere, and its effect on oceans. The article considers the question of speeding up oceans' natural biological pump to move carbon from the surface to the bottom of the oceans. "What future for the oceans," *Foreign Affairs*, October 2003.

Terrestrial

Organic farming and soil carbon storage. Researchers at the Rodale Institute say a long-term study shows organic farming practices retain 15 to 28 percent more soil carbon than conventionally farmed soil - roughly 1,000 pounds of carbon per acre foot of soil. Using data on corn and soybeans gathered since 1981 in east-central Pennsylvania, the system keeps crops in the field longer, grows legume cover crops and uses manure fertilizer. "Organic-farming benefit shown," *Philadelphia Inquirer*, Oct 12, http://www.philly.com/mld/inquirer/news/local/6995051.htm, See "Farming systems trial," The Rodale Institute http://www.rodaleinstitute.org/bookstore/products/farm_books/main.shtml

Ozone interference with carbon uptake. Field tests performed by researchers at Michigan Technological University and the Forest Service's North Central Research Station indicate that plants and soils might be less able to clean the air of excess CO_2 when ozone levels are high. With ambient concentrations of ozone and CO_2 both raised by 50 percent, the formation rates of soil carbon are reduced by 50 percent relative to the amounts entering the soil when the forests were exposed to increased CO_2 alone. "Reduction of soil carbon formation by tropospheric ozone under increased CO_2 levels," *Nature*, 425, October 16, 2003. See "Ground-level ozone degrades soil, study says," *Atlanta Journal Constitution*, http://www.ajc.com/news/content/news/1003/16ozone.html

Forestry and CDM. "The role of forestry sinks in the CDM: Analysing the effects of policy decisions on the carbon market" Hamburg Institute of International Economics: http://www.hwwa.de/Publikationen/Discussion_Paper/2003/241.pdf

Trading

CCX News: New members. Premium Standard Farms, a livestock/agriculture company, joined CCX as a charter member. Natsource, an energy and environmental brokerage firm, REFCO, a diversified financial services firm, and Evolution Markets LLC, an emissions and OTC brokerage firm, all joined the CCX as liquidity providers. http://www.chicagoclimatex.com/news/pdf/Refco_Joins_CCX_10_23_03.pdf

Market values. The Chicago Climate Exchange has announced the results of its first auction of CO_2 emission allowances. A total of 125,000 tonnes of CO_2 was sold at a price average less than $1/tonne. "Chicago climate exchange announces result of first auction," *BusinessWire*, September 30, http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news_view&newsId=20030930005470&newsLang=en

Continuous trades to start. The Chicago Climate Exchange starts daily electronic trading on 31 October. "New trading start date for CCX," *Environmental Finance*, October 17, http://www.environmental-finance.com/onlinews/17octccx.htm

Iowa farms to experiment in carbon trades. The Iowa Farm Bureau Federation will begin a four-year pilot program to aggregate and trade carbon credits from Iowa fields. Credits from carbon sequestered in no-tilled and minimum-tilled cropland and permanent pasture will be aggregated by Farm Bureau for trading on the newly formed Chicago Climate Exchange. "Our hope is to enroll at least 100,000 acres in Iowa in this program," says David Miller, director of commodity services for the Iowa Farm Bureau. "FB launching pilot carbon credit trading," Iowa Farm Bureau, October 21, http://www.ifbf.org/publication/spokesman/story.asp?number=21813&type=News

Policy

U.S. speech on climate change policy. Remarks from the State Department's senior climate negotiator, Harlan Watson, at the European Policy Center in Brussels prominently mention carbon sequestration. "With regard to technology, there is a growing realization that existing energy technologies, even with substantial improvements, cannot meet the growing global demand for energy while delivering the emissions reductions necessary to stabilize atmospheric GHG concentrations. We need to develop and deploy globally "transformational" technologies -- that is, revolutionary changes in the technology of energy production, distribution, storage, conversion, and use. Some examples include carbon sequestration, hydrogen, and advanced nuclear technologies. Full speech from Mr. Watson available at http://usinfo.state.gov/usinfo/Archive/2003/Oct/08-436829.html

Ratification challenge. Environment ministers of the EU's "big three" nations, the UK, France and Germany, issued a joint declaration directly calling on Russia and the US to ratify the Kyoto Protocol and allow it to be implemented worldwide. "UK joins global warming challenge to US and Russia," *PA News,* October 23, http://www.news.scotsman.com/latest.cfm?id=2089445

States attempt to force EPA to regulate GHG emissions. Law enforcement officials from eleven states, the District of Columbia and American Samoa petitioned a federal appeals court on October 23 to force the EPA to regulate emissions of CO_2 under the Clean Air Act. *Newsday*, http://www.newsday.com/news/local/wire/ny-bc-ct--globalwarming1023oct23,0,1702977.story?coll=ny-ap-regional-wire also "The warming is global but the legislating, in the US, is all local," *New York Times*, http://www.nytimes.com/2003/10/29/national/29CLIM.html?ex=1068008400&en=bf070bbd07a049dc&ei= 5062&partner=GOOGLE

Washington State proposes electricity CO_2 constraints. A Washington state proposal would require new fossil-fueled plants of 350 MW or larger to offset 20% of their CO_2 emitted during its 30 years of operation. The regulations set a mitigation cost of 87 cents per ton of CO_2. "Washington proposes CO_2-mitigation rules," *Seattle Press*, October 7, http://www.seattlepress.com/article-10314.html

Florida Power & Light to join EPA's Climate Leaders Program. FPL, the first electric utility to join the CLP, announced that by 2008 it will reduce the average carbon intensity of its power generation by 18% below the 2001 level of 1.05 lb CO_2/kWh. This will be achieved through efficiency improvements, natural gas use, increased nuclear production, expanded use of wind-driven turbines, and energy conservation programs. "FPL vows to cut rate of greenhouse gas emissions by 18% at power plants," *Fort Lauderdale Sun Sentinel*, FL, October 29, http://www.sun-sentinel.com/news/local/southflorida/sfl-cpollute29oct29,0,1361722.story?coll=sfla-home-headlines

Deciding when to act. A recent working paper from CICERO reconsiders the importance of irreversibility in climate change and abatement technology investments, both of which are subject to uncertainty that will change gradually over time as a result of learning. "Option values and the timing of climate policy," CICERO Working Paper 2003:04, http://www.cicero.uio.no/publications/detail.asp?2388

Governments as participants in GHG markets. Emissions trading has traditionally been undertaken by private firms facing emission reduction requirements. However governments will represent a significant portion of all purchases in emerging GHG markets. Authors from Natsource analyze the issues associated with government involvement. Paper presented at the third annual Workshop on GHG Emissions Trading hosted by the IEA in Paris, September 23.Draftpaper can be downloaded at: http://www.natsource.com/feature.asp?n=408

Climate policy instruments and economics. Several articles from the journal *Environmental modeling and assessment* address the issues of limiting impacts on domestic energy-intensive industries, global welfare cost, marginal abatement cost and its relation to the carbon price; and possible competition between Russia and China, and control of non-CO2 GHGs. "Assessing the impact of carbon tax differentiation in the European Union;" "A stochastic dynamic game of carbon emissions trading;" "Coupling climate damages and GHG abatement costs in a linear programming framework," "Modeling non-CO_2 greenhouse gas abatement," and others. *Environmental modeling and assessment*, 8 (3, 2003).

Events

November 2-6, **The 12th International Conference on Coal Science**, Cairns Convention Centre, Cairns, Australia. Topics include: Global warming, GHG emissions, CO_2 mitigation and sequestration. http://www.aie.org.au/iccs/

November 4&5, **Delivering climate technology: Programmes, policies and politics (RIIA)**, London, UK. 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**, Piracicaba, Brazil. The institute will be held in collaboration with the Center for Nuclear Energy applied to Agriculture of the University of Sao Paulo and the soil carbon sequestration research unit of the Research Institute for Development of France. 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 25-27, **Power Generation World Europe,** London, UK . Addressing the key strategic issues of the liberalised European energy market, http://www.pointcarbon.com/article.php?articleID=2404

December 9, **Carbon Management Workshop**, Midland, TX. Hosted by the Society of Petroleum Engineers. Sessions on "Enhanced Oil Recovery Using CO_2 Floods" and "Carbon Sequestration in Oil and Gas Reservoirs and GHG Credits." Tentative field trip to Amerada's Seminole CO_2 Facilities on Dec 10th http://www.spe-pb.org/?pg=co2

December 8-12, **AGU Fall meeting CALL FOR PAPERS,** San Francisco, CA. A special sequestration section, "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, TX. http://ageco.tamu.edu/faculty/mccarl/acs/CASMGS_CONF_send.HTM

February 8-11, 2004, **A GTI Conference & Exhibition, Natural Gas Technologies II**, Phoenix, AZ Cosponsored by the U.S. Department of Energy's National Energy Technology Laboratory's Strategic Center for Natural Gas Methane emissions detection, GHG management and CO_2 sequestration technologies. Contact: 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_2 sequestration to impact the fossil fuel economy. CO_2 Sequestration Sessions (DEG), contact Nicholas Woodward and Susan Hovorka, Co Chairs, nick.woodward@science.doe.gov and susan.hovorka@beg.utexas.edu.

Events Cont'd

April 13-15, 2004, **15th Annual Earth Technologies Forum, CALL FOR PAPERS** Washington, DC. Abstracts due Nov 7th. co-sponsored by the International Climate Change Partnership (ICCP), and the Alliance for Responsible Atmospheric Policy, and in cooperation with the U.S. EPA, the UNEP, the UNDP, U.S.DOE, U.S.AID, Environment Canada, Industry Canada, Japan Ministry of Economy, Trade and Industry, Australian Greenhouse Office, Netherlands' Reduction Plan for the Non-CO_2 GHGs, World Council for Sustainable Development, IETA, and others. http://www.earthforum.com

June 7-10, 2004, **Working for Clean Air in Clearwater, CALL FOR PAPERS**, Clearwater, FL. The U.S. EPA and the Emissions Inventory Improvement Program are co-sponsoring the 13th annual international symposium on emission inventories. The technical program committee is interested in papers that describe the application of new technologies, including emissions related to climate change. Abstracts due December 1, to Sally Dombrowski, dombrowski.sally@epa.gov. http://www.epa.gov/ttn/chief/conferences.html

September 5-9, 2004, **GHGT-7 CALL FOR PAPERS**, Vancouver, Canada. GHGT-7 is being organized by University of Regina, Natural Resources Canada, and the IEA GHG R&D Programme. Abstracts should be submitted online by December 31st to the conference website: http://www.ghgt7.ca, and http://www.ieagreen.org.uk/GHGT7CfP.pdf

Recent Publications

GHGT6 Proceedings. The proceedings of the 6th International Conference on GHG Control Technologies are now available to order. 240 papers are contained in two hardbound volumes, with an accompanying CD-ROM. An overview is included of research and development advances and opportunities is included. Ordering Details: ISBN: 0-08-044276-5, 1940 pages Includes CD-ROM. Price $275, an online order form is available on the Elsevier website; http://www.elsevier.com/inca/publications/store/6/7/2/9/5/6/index.htt).

Energy Policy Journal. The extent to which carbon capture and sequestration (CCS) technologies might lower the cost of CO_2 control in competitive electric markets will depend on how they displace existing generating units in a system's dispatch order, as well as on their competitiveness with abatement alternatives. Despite conservative assumptions about cost, CCS units are seen to provide significant reductions in baseload CO_2 emissions at a carbon price below 100$/tC. The ability to retrofit coal plants for post-combustion C capture is not seen to lower the overall cost of C abatement. "Fossil electricity and CO_2 sequestration: how natural gas prices, initial conditions and retrofits determine the cost of controlling CO_2 emissions," *Energy policy* 32 (3, 2004): 367-382

Recent Publications

Issues with GHG intensity as a metric. GHG intensities are an appealing tool to foster abatement without imposing constraints on economic growth. This paper shows, however, that the computation of intensities is subject to some significant statistical and conceptual problems which relate to the inflation proofing of GDP growth. The choice of price index, the updating of quantity weights and the choice of base year prices can have a significant impact upon the commitment of intensity targets. "Price-related Sensitivities of GHG Intensity Targets," by Benito M|ller and Georg M|ller-F|rstenberger, *Climate Policy* (soon to be published in), http://www.OxfordClimatePolicy.org

Full issue of *Energy Policy* magazine devoted to Climate Policy. Articles include: "The challenging economic and social issues of climate change," "Climate coalitions and international trade: assessment of cooperation incentives by issue linkage," "The safety valve and climate policy," and "On the quality of compliance mechanisms in the Kyoto Protocol," Volume 32, Issue 4, (March 2004) http://www.sciencedirect.com/science/journal/03014215

The October/November issue of the AETF Review. Articles included are: "Kyoto - Threat or opportunity?" "The need for a carbon signal," and "Canada's domestic trading program." Australian Trading Emissions Forum Review, October 2003, http://www.aetf.net.au

Market prices and activity in 2002. A report on North American carbon offset market activity, pricing, and price forecasts. The results show a significant divergence between the European and North American markets, and between those in Canada and the US. "2003 Canada-US GHG Offset price survey," International Offsets Unlimited, Inc., October 2003, http://www.carboncorp.ca/internationaloffsets/

NREL transport report. The National Renewable Energy Laboratory published "Consumer Views on Transportation and Energy," a report on how the American public views various transportation, energy, and environmental issues. Topics covered by the surveys include energy policy; global warming; alternative fuels and vehicles. http://www.nrel.gov/docs/fy03osti/34468.pdf.

A methane/CO_2 economy. Vision Instruments and the University of Michigan's Department of Mechanical Engineering propose to use methane and CO_2 to support an energy economy, instead of hydrogen. Instead of a single pipeline or tank of hydrogen, there are two pipelines or tanks, forming a circuit. CO_2 is sent back to the energy source to react with hydrogen (produced from electrolysis), producing methane. Fuel cells are not required, and there are no huge infrastructure changeovers. The researchers determined that it will be more efficient and less expensive than a pure hydrogen economy. "VISION Instruments and University of Michigan propose innovative approach to hydrogen economy," *Emediawire*, http://www.emediawire.com/releases/2003/10/prweb84970.htm

Rapidly changing tone. If CO_2 generated by making hydrogen from fossil fuels were sequestered underground, cars and power plants of the future would not release GHGs. *The Economist* recommends a gradually rising gasoline tax, along with increased investment in alternative energy R&D. "The end of the Oil Age," *The Economist*, October 25, 2003.

Climate Policy Journal. Issue 3(3) papers include: Climate Negotiations Beyond Kyoto: Developing Countries Concerns and Interests, The Impact of Private Investor's Transaction Costs on the Cost Effectiveness of Project-Based Kyoto Mechanisms. http://www.sciencedirect.com/science/journal/14693062

Policy beyond 2012. The National Institute for Environmental Studies (NIES) and the Institute for Global Environmental Strategies (IGES) in Japan are collaborating on a research project on international climate policy regimes beyond the first commitment period of the Kyoto Protocol. http://www.iges.or.jp/en/from/event/event3/event3.html [Japanese translator required for English version]

Emissions trading in Western Europe, Datamonitor's report "Emissions Trading in Western Europe" examines the implications to Europe's utilities of EU policy on emissions reductions, and the future of emissions trading in key European markets. http://click.cminteractive.com/?LZRXaldo=1096640

International Journal of Environment and Pollution. The most recent issue of this journal contains amongst others the article "Sustainable urban transportation: Impacts of CO_2 mitigation strategies on local pollutants." For more information, see: http://www.environmental-center.com/magazine/inderscience/ijep/

Energy and Transportation: Challenges for the Chemical Sciences in the 21st Century. Book contains a 4-page chapter, "Could Carbon Sequestration Solve the Problem of Global Warming?" offering pros and cons of various sequestration approaches. http://www.nap.edu/catalog/10814.html?onpi_listserv100303

Legislative Activity

Cap and trade proposal for GHG emissions defeated. On October 30, the U.S. Senate rejected a proposal for mandatory caps on "greenhouse gas" emissions from utilities and other industries. The vote on the Climate Stewardship Act of 2003, which was co-sponsored by Sen. John McCain (R-Ariz.) and Sen. Joseph I. Lieberman (D-Conn.), was 55-43. http://www.washingtonpost.com/wp-dyn/articles/A43988-2003Oct30.html

Energy bill. Disputes over a $16 billion package of energy tax credits and incentives prevented Republican negotiators from finalizing U.S. energy legislation. "Energy bill held up by tax package dispute," *Reuters*, October 20, http://www.planetark.org/dailynewsstory.cfm/newsid/22586/story.htm

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