



UNITED Carbon Sequestration Council STATES

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Sequestration News

In addition to new CCS related news items, this issue of Sequestration News updates some of the key information from the May 17th issue. The Waxman-Markey draft climate change bill is now H.R. 2454. The 932 page bill was introduced on May 15. Committee markup concluded and the bill was reported out of committee by a 33-25 vote on May 21. The Bill (HR 2454) contains Performance Standards for new coal plants that require CCS, as well as significant financial incentives for CCS. The estimated total value of these CCS financial incentives appears to be in the range of about \$160 – 260 Billion, depending on allowance prices. However, the implementing language is crucial to whether anyone actually get the funds needed, so more work remains.

Also included is the full DOE May 21 Techline reporting on some recent sequestration “lessons learned” from the **Midwest Regional Carbon Sequestration Partnership** (at the end of the news letter).

Waxman-Markey (W-M) Climate Bill

The House Energy and Commerce Committee approved a marked up version of the bill by a 33-25 vote on May 21 (<http://energycommerce.house.gov/>). Actions taken included adopting an amendment offered by Congressman Dingell (D-MI) and Congressman Inslee (D-WA) to create an independent agency within the Department of Energy called the "Clean Energy Deployment Administration (CEDA) that will provide loans and loan guarantees for the deployment of innovative green technologies. CEDA is required to pursue a "portfolio investment approach" to the types of investments it makes such that no more than 30 percent of the financial support made available through CEDA goes to one sector of the energy industry. Also adopted was an amendment offered by Congressman Zack Space. This amendment would allow existing coal plants that put 50% CO₂ capture on a 200 MW slipstream to qualify for CCS bonus allowances. These CCS retrofit bonus allowances would be available for up to a total of 1 GW equivalent of treated flue gas.

The overall deal reached on allowance allocations (worth approximately \$100 billion per year in the early years of the C&T program) is to allocate 35% to the electricity sector (phased out by 2030), 9% to natural gas local distribution companies, 1.5% to residential consumers of heating oil or propane, 15% to low/moderate income households to offset higher energy costs, 15% for “trade exposed” industries, 2% for refiners, **2% from 2014 thru 2017 and 5% in 2018 and later years for CCS at power plants**, 1% to “clean energy innovation centers”, 10% to States, and the remainder for a number of causes including

funding reductions in overseas deforestation, funding other international emission reductions and international adaptation. The emission cap in 2020, originally a 20% reduction from 2005 emission rates, was reduced to 17%. **A redraft (Substitute Amendment) of the bill was formally introduced by Chairman Waxman on May 15 as H.R. 2454**

(http://energycommerce.house.gov/index.php?option=com_content&view=article&id=1622:chairmen-waxman-and-markey-introduce-the-american-clean-energy-and-security-act&catid=155:statements&Itemid=81). The bill now proceeds to various other committees, notably the Ways and Means Committee which will consider the revenue provisions of the bill, prior to going to the House floor this summer.

CCS Related Senate Activity

The Senate is awaiting completion of House action prior to tackling climate change legislation, but is moving on energy legislation in the Energy and Natural Resources Committee chaired by Senator Bingaman. The key feature is an RES, similar to the one in the House climate change bill. Senator Bingaman has resisted recommendations by other Senators to treat coal w/CCS as counting toward an RES.

A hearing was held on May 14th on the May 7th bill introduced by Senator Bingaman (S. 1013) to promote the development and deployment of CCS technology. DOE's Assistant Secretary for Fossil Energy (Dr. Victor Der) testified, along with Dr. Kit Batten, Science Advisor, Office of the Deputy Secretary, U.S. Department of Interior (DOI), the Honorable Thomas Lubnau, Wyoming State Representative, House District 31, Mr. John Tombari, Vice President, Schlumberger Carbon Services, Mr. Karl Moor, Vice President and Associate General Counsel, Southern Company, and Mr. Scott Anderson, Senior Policy Adviser, Environmental Defense, and Ms. Chiara Trabucchi, Principal, Industrial Economics, Inc. who has published papers on liability issues associated with CCS.

The bill supported up to 10 demonstration projects. It provided limited liability indemnification for projects in the period 10 years after CO₂ plume pressure equilibrium, with the cost offset by a fee-per-ton on injected CO₂. In contrast, the IOGCC had recommended a liability scheme in which the "handoff" to federal monitors occurred 10 years after injection ceased. The bill would also authorize the siting of CO₂ storage projects on Federal land. DOE did not take a position on the Bill. Testimony and an archived video are available at:

http://energy.senate.gov/public/index.cfm?FuseAction=Hearings.Hearing&Hearing_ID=1d120df3-d757-96c3-28bc-f67b62a58ee6.

On May 21, Senator Casey introduced a bill to foster RD&D on CCS. The bill authorizes \$800 million for those activities in FY10. He said the purpose of his bill was to:

- Promote the rapid commercial demonstration and early deployment of carbon capture and storage systems that will allow the Nation to continue to use its abundant, secure, and low-cost coal resources while moving forward with a national program to reduce the impact of man-made emissions on our environment.
- Promote the continued research and development of advanced CCS and other coal power generation technologies in order to drive down costs, increase performance, and foster innovation. It is crucial that, in parallel to the commercial demonstration of current CCS technology, we continue to develop and advance new CCS ideas and concepts through a robust

research and development program in order to continue to lower the cost of complying with CO₂ regulations.

- Promote the export of U.S. CCS technologies to those countries, such as China and India, which also rely on coal as their dominant energy source – ensuring that the U.S. is the leader in developing and exporting clean coal technologies and taking advantage of the thousands of new clean energy jobs such an industry would create.
<http://casey.senate.gov/newsroom/press/release/?id=7D686C92-C5EC-48A8-9968-119AA6241AAE>

EPA and CCS

EPA is providing a webcast on Financial Responsibility requirements of UIC rules for CCS. The webcast is May 26. For registration, see: http://www.epa.gov/safewater/uic/wells_sequestration.html#webcasts

The White House announced the Administration's intent to propose stringent new CAFÉ standards for motor vehicles, as well as a limit on CO₂ emissions. The Department of Transportation published the details on how the joint EPA/DOT rulemaking might work. The rules still need to be proposed and promulgated before they can take effect. If adopted, these rules would trigger other CO₂ regulatory action under the Clean Air Act, such as permit requirements for major emitters of CO₂ (e.g., power plants). Hence, this action is closely related to the proposed EPA "endangerment finding".

<http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.43ac99aefa80569eea57529cdba046a0/>

Canada & CCS

A consortium led by Enbridge Inc. announced that it is ready to start a test project for injecting CO₂ from industrial operations into briny underground water reservoirs in Alberta. The 38-company Alberta Saline Aquifer Project is moving ahead with the second of three phases, identifying the Wabamun region west of Edmonton as a prime location for a \$30 million to \$50 million pilot project. Pending funding and regulatory approvals, the consortium will test technologies for injecting carbon dioxide into deep saline aquifers until as late as 2015 before moving ahead with a full-scale commercial development worth as much as \$200-million. Other members of the group include such companies as BP PLC, Atco Ltd., EnCana Corp, Penn West Energy Trust and Petro-Canada. <http://www.financialpost.com/news-sectors/story.html?id=1478251>

China & CCS

The EU commission is drawing up plans to build a CCS plant in China as early as 2015. The 27 member states will be asked next month to help fund the large-scale CCS plant. The cash is intended to persuade China to sign up to a sectoral emissions target in its power sector as part of a post-2012 global climate deal. Both the commission and the UK have just completed feasibility studies into CCS development in China, which were started back in 2006 as part of the Near Zero Emission Coal (NZEC) project. A report is now being prepared for release in June, which will call for the CCS plant to be built by 2015, five years earlier than originally anticipated. The cost of the Chinese CCS plant, expected to capture emissions from at least 300 MW of electricity generation, is likely to cost "several hundred" million Euros, the official said. EU member states will be asked to help fund the building costs, while private companies will be given incentives to invest either through the carbon market or by the possibility of EOR from the depleted fields used to store the CO₂. (*Point Carbon*, May 5)

Australia & CCS

The Australian Government efforts to sell exploration rights on the seabed for underground storage of carbon emissions have been slowed by the complexity of the emerging new regulations to govern this new system. Nearly a year ago, Resources Minister Martin Ferguson told *The Australian* he planned to auction exploration licenses as early as last December after creating the world's first legislation governing CCS. Despite releasing 10 areas for expressions of interest in March, no permits had been issued. Mr. Ferguson said he could not issue any permits until regulations were finalized. Government sources insisted yesterday that Mr. Ferguson's failure to secure early finalization for regulations surrounding undersea carbon storage was not an indication that successful commercialization of the technology was unlikely. They said the delay was similar to that normally experienced when governments released the seabed for petroleum prospecting.

<http://www.theaustralian.news.com.au/story/0,25197,25436193-5013871,00.html>

EU Countries & CCS

German renewable industry called on the national parliament to reject a bill on CCS. On May 6, the Bundestag, the German parliament, started to debate a governmental bill on underground storage of carbon dioxide that has been captured in power plants and industrial sites. The German Renewable Energy Federation (BEE) warned that the draft law could slow the development of clean energy sources after 2020. The BBE argued that priority would be given to CCS technology when it comes to picking geological reservoirs, instead of renewable energy sources. "We want priority to renewable energy sources instead of a first comes first served approach," Daniel Kluge of BBE told *Point Carbon*. At the moment there is only one GWh built in capacity of geothermal energy in Germany, but BEE estimates it could climb up to 4 TWh by 2020. Kluge said that apart from sites for geothermal energy, the clean energy industry may also require reservoirs for storing compressed air. Compressed air could also be used for power generation, and serve as a back-up to intermittent power supplies from sources like solar or wind. German Environment Minister Sigmar Gabriel issued a press release stating that the law is only a prerequisite for the industry to allow it to investigate whether the technology can be used safely. "Geothermal projects will take priority over the storage of CO₂," Gabriel said. (*Point Carbon*, May 6)

German energy companies could be facing a crippling tax on carbon storage if a proposal by the country's federal states becomes law. The states are looking for a 5 euro-per-ton (\$6.70) tax on CO₂ captured and stored by energy companies running coal-fired plants. A charge of that size could cost these companies more than 1 billion Euros each year. (Industrial Information Resources-Sugar Land, Texas, May 19).

Shipping groups may provide vessels capable of transporting CO₂ to offshore disposal sites. "In the short term shipping could well be looked at as a way to get CCS off the ground -- particularly for continental **EU** demonstration projects wishing to utilize distant North Sea storage," said Malcolm Ricketts, principal carbon analyst with energy consultants Wood Mackenzie. Norwegian shipping group IM Skaugen said there was commercial scope for the ship industry. Units of Danish oil and shipping group A.P. Moller-Maersk are also looking into the commercial potential of CCS. Maersk Tankers is focused on the transportation of CO₂, while Maersk Oil is looking into the storage aspect of CCS projects. Maersk has estimated that shipping CO₂ by tanker from Denmark to the North Sea would cost about \$12 per ton. Maersk has said a ship of 20,000 to 35,000 cubic meters that can hold 25,000 tons of CO₂ would be best suited for the job. <http://uk.reuters.com/article/oilRpt/idUKLF92559420090515?sp=true>

Norway recently delayed a project to build a carbon capture facility in Kaarstoe because of uncertainty over electricity production levels and CO₂ emissions at the accompanying power plant. The 425 MW Kaarstoe plant, Norway's first commercial power station fueled by natural gas, has been idle for much of the past year due to an unfavorable relationship between the price of gas and electricity. The Norwegian government recently issued a statement indicating that it had stopped the procurement process for contracts to construct the CO₂ facilities until it has "a clearer view on the operational pattern" of the Kaarstoe power station. Norway has not changed plans for a second CCS facility in Mongstad, another industrial hub on its North Sea coast. The decision means full-scale CO₂ capture at Kaarstoe -- a 3.46 billion crown (\$530 million) project that will be 10 times bigger than similar U.S. plants -- will be delayed beyond its scheduled start in late 2011 or early 2012. The current cost for capturing CO₂ at the experimental plant, and burying it in subsea structures, was "much higher" than that of purchasing the plant's CO₂ emissions on financial markets according to a representative of developer Gassnova. Demand for electricity in Norway has dropped 5% in January-March amid cuts by industry due to global economic woes. Norway is part of the single Nordic grid, where prices are some 14-20 Euros per megawatt hour lower than those in Germany. <http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE54E3UV20090515?sp=true>

Brazil & CCS

Brazil's environment minister defended a law requiring new power plants to offset their GHGs. Carlos Minc said the Brazilian government will not bow to industry lobbying against new rules requiring coal and oil-based power stations to offset their emissions by paying for carbon credits from afforestation, energy efficiency or renewable energy projects. The regulation, which was introduced on April 13 by Brazilian federal environment agency Ibama, requires the operator of new coal or fuel-oil power stations to submit CO₂ mitigation plans as a condition for getting its operating license approved. Since the regulation was introduced last month, the energy and fossil fuel industries have been actively opposing it. The Brazilian Coal Association argues that the new measure violates both Brazilian law and the UN framework climate change convention, by imposing emission limits in a country which does not have compulsory targets under the Kyoto protocol. Under the plan, plant operators must offset at least one-third of the projected emissions of the new facility through the planting of new forests, and the remainder through investment in renewable energy generation or measures to improve energy efficiency. At least half of the forestry projects must use native tree species, following the targets set out in Brazil's National Climate Change Plan, which envisages an end to net deforestation by 2015. The regulation would allow operators to include in their mitigation plan projects that were earning credits through the UN's clean development mechanism (CDM). (*Point Carbon*, May 11)

DOE Techline on a Recent Sequestration Test Result

Small-Scale Carbon Sequestration Field Test Yields Significant Lessons Learned

Information from Ohio Project Will Aid Future Sequestration Efforts

The Midwest Regional Carbon Sequestration Partnership, one of seven regional partnerships created by the U.S. Department of Energy (DOE) to advance carbon capture and storage technologies, has completed a preliminary geologic characterization and sequestration field test at FirstEnergy's R. E. Burger Plant near Shadyside, Ohio. The project provided significant geologic understanding and "lessons learned" from a region of the Appalachian Basin with few existing deep well penetrations for geologic characterization.

The initial targets for the geologic storage of carbon dioxide (CO₂) at the site were the Oriskany and Clinton Sandstones at depths between 5,500 and 8,000 feet in the Appalachian Basin. This region is geologically complex and little is known about these formations, especially in the western portion of the basin. Since the nearest well penetrations are more than 20 miles away from the Burger injection well, any and all data collected from the region is useful in determining the suitability of potential field test locations for CO₂ storage in the future. Results of the formation evaluation indicated that the porosity, void space, and permeability of the target formations were lower than expected. The pressure in the formations also rose unexpectedly with very low injection rates. This does not mean that the entire western flank of the Appalachian Basin will show these same rock properties; instead, it confirms the complex nature of the formations within the basin. The work demonstrates the importance of extensive drilling, formation evaluation, and testing to characterize and identify appropriate formations for CO₂ storage within the Appalachian Basin prior to injection. Other lessons learned include the following:

□ *Site Selections*—Although the Burger site was determined not to be in the optimal location for CO₂ storage from a geologic perspective, it was an excellent place to drill and test because of the extensive cooperation provided by FirstEnergy and the potential to co-locate the storage site with the plant. Data derived from rock property models and characterization information suggested that the site would have good geologic storage potential; however, the pressures necessary to inject CO₂ into the target formations proved to be much higher than anticipated. Additional testing methods must be developed to provide more information about the character of geologic formations chosen for injection testing. Power plants in the Appalachian region may eventually need to transport CO₂ relatively short distances to areas that have adequate storage formation characteristics.

□ *Design of Robust Formation Imaging, Evaluation, and Testing Program*—Because of the geologic complexity of this region, a robust wire line logging, imaging, and testing program should be designed and implemented at every potential geologic storage site considered within the region. Stakeholder understanding of the type of data collected from the various logging and testing tools and its interpretation will benefit future siting decisions. This evaluation plan will decrease overall costs at future field test sites. If economically feasible, drilling a pilot hole prior to drilling the injection hole would be ideal to develop a robust logging, coring, and testing program.

□ *Formation Stimulation*—As part of the project design process, project developers should request the ability to hydro-fracture the formation to create fractures that extend from a borehole into the targeted formation. This could provide a better injection rate into rocks that have moderate porosity and low effective permeability.

□ *Well Completion*—Project developers should also consider plans to complete the well at the target formation. Given the low permeability and porosity that exist at some areas in the Appalachian Basin, care should be taken so that well drilling and construction operations do not reduce or eliminate the effective permeability that is naturally present.

□ *Communications*—Continuous communications with all stakeholders, including those who are nontechnical, is vital throughout the field testing process, especially at key decision points, including collection of data to allow informed decision-making. Ultimately, the goal of geologic sequestration field testing is to successfully demonstrate the viability of safely storing injected CO₂ in geologic formations. To achieve this goal, DOE will continue to collect pertinent geologic information as part of its characterization phase within the Appalachian and other basins. Drilling deep wells into proposed

injection zones, performing formation evaluations to understand their rock properties, and testing injection capability within the zones are all necessary to develop a clear understanding of the overall potential of geologic formations to store CO₂. As DOE and its partners continue to gain understanding and experience related to geologic carbon storage by extensive characterization and injection of CO₂ at various sites across the United States and Canada, various best practices will be developed for undertaking sequestration projects. These best practices will provide guidance on site selection through monitoring of stored CO₂ after injection and well closure.

The Midwest Regional Carbon Sequestration Partnership is managed by the Battelle Memorial Institute, headquartered in Columbus, Ohio. The characterization and test were sponsored by the DOE Office of Fossil Energy's National Energy Technology Laboratory, with support from FirstEnergy, Praxair, and the Ohio Geological Survey.

http://www.fossil.energy.gov/news/techlines/2009/PrintVersion_1_33481_33481.html?print
5/21/2009



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