CCS REGULATION

NEWSLETTER

Welcome to the CCS Regulation Newsletter. This is produced by the **MIT Carbon Capture and Sequestration Technologies Program**. It is a quarterly report designed to keep the reader up-to-date with the current regulatory news and issues surrounding Carbon Capture and Storage (CCS).
For more information about the program, please see http://sequestration.mit.edu.

Permitting Storage Sites in the US: Lessons Learned and Paths Forward

On October 8, 2014, at the recent GHGT12 conference in Austin, Texas, dozens of researchers and industry leaders gathered to hear a panel talk entitled "Permitting Storage Sites in the US: Lessons Learned and Paths Forward." Sean McCoy from the International Energy Agency moderated the panel, which included Mary Rose Bayer, co-leader of the Geologic Sequestration team in the U.S. Environmental Protection Agency's (EPA's) Office of Ground Water and Drinking Water; Sallie Greenberg, associate director of the Advanced Energy Technology Initiative at Illinois State Geological Survey; Dwight Peters, business manager at Schlumberger Carbon Services; and Bob Van Voorhees, executive director of the Carbon Sequestration Council. The panel reflected on lessons learned about EPA's Class VI permitting process and implications for the workability of future geologic sequestration projects. This article summarizes their discussion and the pertinent comments expressed by attendees.

Background on EPA's Class VI well rule

EPA's Class VI well rule for carbon dioxide sequestration represents the first new well class since the Agency implemented the five initial well classes to protect underground sources of drinking water (USDWs). In 2007, EPA initiated the development of a new regulatory framework for geologic sequestration. The Agency proposed the new Class VI rule in 2008 and promulgated the final rule in 2010. Carbon dioxide injection for enhanced oil recovery still falls under the Class II rule, but Class II

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Image: ADM Decatur. Recipient of Class VI well permit. Credit: Dept. of Energy on http://news.thomasnet.com

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wells intended for geologic sequestration must apply for a Class VI well permit when there is an increased risk to USDWs compared to Class II operations. EPA's criteria for Class VI wells include extensive requirements related to site characterization, well construction, monitoring procedures, post injection site care, emergency response, and financial responsibility.

To date, EPA has approved a total of six Class VI well permits, awarding four well permits to FutureGen 2.0 in Morgan County, Illinois, on August 29, 2014, and two well permits (one final, one draft) to Archer Daniel Midland's (ADM's) Illinois Industrial CCS Sources project in Decatur, Illinois, on September 23, 2014.

A hotbed of discussion

EPA's Class VI well rule has been the topic of much discussion in the past. In May 2013, this newsletter reported on a Carbon Sequestration Forum session on the workability of the regulation. At the time of that article, several permit applications were under review, but EPA had yet to issue any Class VI permits. The 2013 Forum session praised the flexibility of the regulations, which EPA designed to be adaptable to specific project sites and factors, but criticized the 50 year post injection site care and site closure (PISC) requirements as overly burdensome.

A year and a half later, the recent GHGT12 discussion touched on these same issues, but also highlighted other themes related to the rule. The panelists focused on these main topics:

- Technical collaboration between EPA and permit applicants.
- Causes and effects of the long permit processing timeframes.
- Aspects of successful projects.
- The relationship between Class VI wells and other well types.

EPA as a technical collaborator for Class VI wells

Throughout the GHGT12 panel session, Mary Rose Bayer stressed that EPA intended the Class VI well regulations to foster technical collaboration between permit applicants and the Agency. She cautioned that applicants should not look at the permit as a simple box checking exercise, but instead as an opportunity to engage with technical staff at EPA. This collaborative paradigm means that each well permit requires significant investments of expertise, time, and money from both EPA and the applicant.

These investments, however, reflect the Rule's ability to adapt to individual project sites. Moreover, they will help improve the regulatory decisions over time, particularly in areas related to risk quantification and assessment, over-pressurized injection formations, and plume monitoring. Finally, as Bob Van Voorhees noted, EPA's collaborative approach toward the Class VI permit has led to a helpful separation between well data collected for research purposes and data collected to satisfy the permit requirements. Applicants have been pleasantly surprised that well data collections intended solely for research purposes have not adversely affected the permitting process.

A lengthy permit review period

Perhaps the most common topic of discussion was the length of time required for permit approval. When asked about the biggest surprises in the permitting process, Sallie Greenberg immediately cited the permitting timeframe. Citing a similar example for gaining a Class I non-hazardous permit prior to the Class VI rule, she explained that her team had expected the process to take six months, but it ultimately took three years. The delay significantly affected project budgeting and management. Similarly, Bob Van Voorhees cautioned that future permitting cannot be allowed to take 12 to 36 months, and pointed toward the past delays as costing the industry experimental and scientific opportunities.

Mary Rose Bayer said that EPA is aware of sensitivities

around the permitting timeline. She explained that the permitting process necessarily relies on significant "information sharing" between EPA and each permit applicant. The Agency is interested in ensuring that it receives Class VI project data that supports the permit applicant's decision-making, allows EPA to determine regulatory compliance, and facilitates transparent communication with stakeholders. Future applicants can speed up the permitting process by, for example, communicating the rationale behind choosing particular locations for monitoring wells. Still, given EPA's responsibility as the permitting authority to review all information submitted and to ensure the permit applicant is in compliance with Federal regulations, it will continue to take time to evaluate permit applications and ensure that protective permits are issued.

Aspects of successful projects

All geologic sequestration wells must meet Class VI permit criteria, but successful projects will need to exceed many of the rule's regulations. While the permitting delay negatively affected some aspects of project management for the first Decatur well, it had one interestingly positive effect: it led to a more comprehensive environmental baseline. Sallie Greenberg anticipates that the extended baseline will pay dividends during future monitoring efforts. Dr. Greenberg explained that establishing environmental baselines and conducting environmental monitoring are two areas where successful project developers must exceed permit requirements.

Stakeholder engagement is another such area. Dr. Greenberg cautioned that developers who adhere too closely to the minimum public participation parts of the permitting process will fail to begin community meetings early enough in the process and will likely face significant opposition. Successful developers must initiate stakeholder engagement long before the permitting process starts. For example, Decatur project managers began meeting with the community in 2003, five years before submitting their 2008 Class I permit application. Engagement activities included science fairs, public meetings, hearings, focus groups, and school appearances.

Dwight Peters agreed but warned future applicants to remember that anything written into the permit becomes a legal requirement. For example, a facility that commits to two community meetings per week is then compelled to host the meetings each week, regardless of whether stakeholders show up.

The relationship between Class VI wells and other well types

The final discussion theme revolved around how Class VI wells might relate to wells used for enhanced oil recovery (EOR) or research activities. One attendee asked whether EPA allows for easy conversion of a well's type from Class II EOR to Class VI. Dwight Peters answered that such a change would likely not be pursued while EOR operations are ongoing. This is because EOR operators are focused on producing oil at minimum cost, not sequestering carbon dioxide.

Regarding research wells, Bob Van Voorhees pointed out that the stringent requirements of Class VI permits create disincentives for many types of activities. Of particular concern is the 50 year mandatory PISC, which is likely to be unnecessary for most research operations. Mr. Van Voorhees suggested that EPA revisit its initial strategy to permit research wells as Class V experimental technology wells. Mary Rose Bayer, however, indicated that EPA is interested, instead, in focusing on collaboration with permit applicants in an effort to work toward adapting the Class VI well requirements to enable research projects.

Advice for future well operators

As the panel came to a close, the moderator asked each panelist to share final words of advice with future permit applicants.

- Mary Rose Bayer: EPA is committed to partnering with applicants through early engagement and technical collaboration. Please don't view EPA simply as reviewers

and the permitting process as a "box checking exercise". EPA is focused on making technical, risk-based permitting decisions.

• Sallie Greenberg: Look to successful projects as models for your own wells. Begin working with EPA as soon as possible. Plan to exceed permit requirements in certain areas to support best practices and build prior and informed consent.

• Bob Van Voorhees: EPA designed the regulation to allow for a reasonable amount of flexibility, but the Agency can't identify best practices; that's the job of the research community and injection well operators.

• Dwight Peters: Begin the permitting process as early as possible. CCS projects are complex and require many other permits in addition to Class VI well approval. You wouldn't want to pursue a capture permit until you are sure you're sure you'll get a permit for storage. Pretty soon you're looking a decade into the future.

This article was researched and written by Josh Wolff.

For further comments and questions regarding this article, please email Josh Wolff at jmwolff@mit.edu

Publications

July 3, 2014. Findings of the 65th Annual Review of World Energy Use by BP show that coal's share of primary energy consumption reached 30.1%. The International Energy Agency (IEA) says the cost of CCS for coal fired power stations is dropping at a time when coal use is ramping up. In addition, developing economies have driven the global consumption of coal to its highest level since the 1970s as they need more affordable energy. Consumption of coal outside of OECD countries rose by a below-average 3.7 % but still accounted for 89% of global growth.
http://www.abc.net.au/news/2014-07-02/ccs-urgently-needed-as-coal-usage-rises/5505866

July 15, 2014. The US-China Climate Change Working Group (CCWG) submitted its Report to the Special Representatives of the Leaders of the United States and China for the Strategic and Economic Dialogue. The Report outlines progress made in the CCUS Initiative. The US and China intend to accelerate development and deployment of CCUS technology through joint effort on projects. These efforts feature commercial CCUS projects and industrial agreements, as well as bilateral government and academia-led efforts that are recognized by both governments. These efforts will assist China with information and technical support on CCUS technologies and demonstration projects.
http://www.state.gov/r/pa/prs/ps/2014/07/229308.htm

August 7, 2014. The UK Office of Carbon Capture and Storage has published Next steps in CCS policy. This document summarizes the policies and actions that the UK government has taken to support CCS deployment, and seeks views on a possible Phase 2 of CCS deployment in the UK. It also is a scoping document and requests ideas on how to overcome these challenges.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/341995/Final_Version_Policy_Scoping_Document_PSD.pdf

October 1, 2014. GCCSI and UCL London have published Legal Liability and Carbon Capture and Storage: a comparative perspective. The report focuses on the storage aspect of the CCS process. The liability of the storage sites is where the most distinctive liability challenges occur, primarily due to the long timeframes required for post-closure monitoring.
http://www.globalccsinstitute.com/publications/legal-liability-and-carbon-capture-and-storage-comparative-perspective

October 24, 2014. MicroMarket Monitor has released a number of reports forecasting the carbon capture market in Asia, Europe and the Americas.
The Americas Carbon Capture and Sequestration Market is expected to reach $2.6 Billion in 2019.
http://www.micromarketmonitor.com/market/americas-carbon-capture-sequestration-5472901772.html
The Asia-Pacific CCS market is expected to reach $914.9 million by 2019. Pre-combustion technology, the largest technology in this region, will account for $460.0 million in 2019.
http://www.micromarketmonitor.com/market/asia-pacific-carbon-capture-sequestration-9786205662.html
Europe's CCS market was $69.5 million in 2013 and is forecasted to reach $862.4 million by 2019.
http://www.micromarketmonitor.com/market/europe-carbon-capture-sequestration-1790927418.html

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CCS Project News

July 7, 2014. The White Rose CCS project at Drax power station in the UK, has been awarded a €300 million euro grant from the European Commission's NER300 programme in addition to £100 million from the UK government.
http://in.reuters.com/article/2014/07/08/drax-group-eu-funding-idINL6N0PJ2K320140708

July 15, 2014. The University of Kentucky has entered into an agreement with Sinopec to develop technologies to capture, utilize and store 1 Mt/yr CO_2 from a coal-fired power plant in Dongying, China.
https://ees.as.uky.edu/kentucky-china-collaborate-large-scale-carbon-capture-project

July 24, 2014. An Illinois appeals court upheld a 2012 state mandate to require utilities to purchase FutureGen 2.0's electricity for 20 years.
http://www.globalccsinstitute.com/news/ill-court-requires-utilities-buy-power-carbon-capture-plant

August 8, 2014. Brown Coal Innovation Australia (BCIA) is to provide AU$650,000 for CCS research at the Loy Yang power station in Victoria, Australia.
http://www.worldcoal.com/news/power/articles/World-Coal-funding-for-Victorian-carbon-capture-project-coal1179.aspx

August 25, 2014. A $19.5 million testing facility at Kentucky Utilities E.W. Brown Generating Station near Harrodsburg in Kentucky is under construction.
http://www.globalccsinstitute.com/news/project-kentucky-coal-plant-catch-carbon-dioxide

August 29, 2014. The EPA has approved 4 CO_2 injection well permits for the $1.65 billion FutureGen 2.0. These are the first Class VI injection well permits that the EPA has awarded only for the storage of CO_2.
http://www.pennenergy.com/articles/pennenergy/2014/09/epa-oks-futuregen-plan-for-carbon-capture-and-storage.html

September 5, 2014. NRG and JX Nippon have broken ground on the Petra Nova project in Texas. The $1 billion, 240 MW retro-fit project will capture 1.6 Mt/yr of CO_2 for EOR when it is completed in 2016.
http://www.reuters.com/article/2014/09/05/usa-carbon-capture-idUSL1N0R600I20140905

September 5, 2014. HECA CCS project in Kern County California looks like it might be placed on hold as HECA's owner SCS Energy and Occidental have not finalized the agreement to sell its CO_2 to Oxy for EOR in nearby Elk Hills.
http://www.bakersfieldcalifornian.com/business/kern-gusher/x552954144/Oxy-spinoff-delays-proposed-energy-plant

September 6, 2014. Dubai Electricity and Water Authority (DEWA) has shortlisted 8 international developers for its 1,200 MW Hassyan Clean-Coal Power Project which is expected to be operating by 2020.
http://www.arabianbusiness.com/dubai-s-dewa-shortlists-8-for-clean-coal-power-project-563639.html#.VDM0K75_chc

September 24, 2014. Leucadia National Corporation has announced it will not proceed with further development of the Lake Charles project. This is a result of final estimates of the cost of completion of the project.
http://www.globalccsinstitute.com/project/lake-charles-ccs-project

September 26, 2014. The US EPA has approved the Class VI well sequestration permit for the Archer Daniels Midland Company's Decatur project allowing injection of 1.1 Mt/yr.
http://yosemite.epa.gov/opa/admpress.nsf/0/AFBC8ABBA5C91E3685257D5F0050AC84

October 1, 2014. SaskPower has launched its CCS project at Boundary Dam power station in Saskatchewan, Canada. The $1.21 billion retrofit successfully started capturing 90% of its CO_2 emissions (1 Mt/yr) most of which will be sold to Cenovus Energy for EOR.
http://www.reuters.com/article/2014/10/01/canada-carboncapture-idUSL2N0RW1D620141001

October 2, 2014. Kemper IGCC costs have increased an additional $59 million bringing the current project cost to $5.6 billion. The start date has been pushed to mid-2015.
http://www.sunherald.com/2014/10/02/5834076/another-59-million-added-to-cost.html

October 22, 2014. Skyonic has opened a new $125 million carbon capture facility at a Capitol Aggregates cement plant in San Antonio, Texas. The 0.075 Mt/yr of captured CO_2 will be sold to other industries for utilization.
http://www.cleantechnology-business-review.com/news/skyonic-opens-125m-carbon-capture-and-utilization-facility-in-texas-221014-4413451

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International Regulatory News

EU. July 8, 2014. The European Commission has announced the €1 billion raised through the sale of carbon credits will finance 19 projects that address climate change.
http://www.euractiv.com/sections/energy/carbon-market-pays-eu89m-fund-french-projects-303440

UK. July 14, 2014. The UK government's climate change advisor announced in a report that the UK will fail to meet its 2025 carbon target without taking new emissions-reductions steps. The UK is on track to reduce CO_2 emissions in 2025 by 21-23% and not its target of 31%.
http://www.bloomberg.com/news/2014-07-14/u-k-will-miss-co2-target-without-new-measures-adviser.html

Australia. July 17, 2014. The Australian Parliament has repealed the carbon tax. The Australian Senate voted 39 to 32 to revoke the AU$24.15 ($22.60) tax per metric ton of CO_2.
http://www.foxnews.com/world/2014/07/17/australian-parliament-votes-to-scrap-controversial-carbon-tax/

UK. July 27, 2014. Renewable energy projects in the UK will now compete for a budget of over £200 million a year, as part of the government's reforms to the electricity market. A further £50 million is planned for an auction round in 2015. There is also a potential £1 billion in the budget up to 2021 that could be accessed by CCS projects.
http://www.carboncapturejournal.com/ViewNews.aspx?NewsID=3492

Japan. July 28, 2014. Japan and Mexico have signed a deal known as the Joint Crediting Mechanism (JCM) to let companies in Japan earn carbon credits by investing in technologies, products, systems, services, and infrastructure to cut greenhouse gas (GHG) emissions in Mexico.
http://www.reuters.com/article/2014/07/28/japan-mexico-carbon-idUSL6N0Q32DT20140728

California and Mexico. July 30, 2014. California and Mexico have signed a bilateral pact aimed at advancing cross-border investments in clean energy.
http://www.bloomberg.com/news/2014-07-30/california-mexico-sign-agreements-to-cooperate-on-clean-energy-climate.html

UK. August 7, 2014. The UK government, with a combined $1.7 billion in CCS investments, wants to lead the world CCS development. The British government will allocate over £200 million to renewable energy projects, including CCS projects, as a part of its reforms to the electricity market.
http://www.upi.com/Business_News/Energy-Resources/2014/08/07/UK-aims-to-lead-world-in-carbon-capture-development/9731407417829/

UN Climate Leadership Summit. September 22, 2014. Ahead of the UN Climate Leadership Summit on September 23, 2014 in New York, 74 countries, 23 subnational jurisdictions, 11 cities and over 1,000 businesses signed their support for carbon pricing through a series of initiatives announced at the Summit. These countries are together responsible for 54% of GHG emissions and 52% of world GDP.
http://www.worldbank.org/en/news/feature/2014/09/22/governments-businesses-support-carbon-pricing

Norway. October 8, 2014. Norway announced that it has put on hold plans to fund its own full-scale CCS plant. It will instead commit up to 125 million Norwegian crowns ($19.3 million) to co-operate on a CCS project in the European Union.
http://af.reuters.com/article/energyOilNews/idAFL6N0S324M20141008

EU. October 15, 2014. European government officials have approved a proposal to delay by 2 years the final investment decision deadlines for the first round of NER300 programme recipients from 2014 to 2016. Seven EU countries had asked for this delay as they are struggling to comply with the EU's 2.1 billion euro ($2.7 billion) scheme to cut GHG emissions. This news will assist some projects especially the second round of NER300 who now have until 2018 for final investment decisions and 2020 for activation. However the viability of some of the first round of NER300 projects winners will not be known for another two years, and those on the NER300's waiting list are now less likely to get funding.
http://www.reuters.com/article/2014/10/15/eu-renewables-ner-idUSL6N0SA48320141015

Canada. October 20, 2014. The government of British Columbia introduced bill 20 2014, the Greenhouse Gas Reporting and Control Act. If passed, the bill will require the province's LNG

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Federal CCS Regulation News and Updates

July 15, 2014. The House Appropriations Committee today approved the fiscal year 2015 Interior and Environment Appropriations bill. The legislation includes funding for the EPA.
http://appropriations.house.gov/news/documentsingle.aspx?DocumentID=387928
Previously Senate Minority Leader Mitch McConnell (R-KY) tried to add language to the bill that would block the EPA's new proposed regulations on carbon emissions for existing power plants. This move was unsuccessful and was not included in the final bill.
http://www.exchangemonitor.com/PDFs/GHG-vol-9-no-24.pdf

July 20, 2014. Congressman Chris Van Hollen (D-MD) introduced H.R. 5271 the Healthy Climate and Family Security Act of 2014. This bill would establish a declining carbon cap to reduce overall emissions. It would also establish a carbon permit auction to the first sellers of fossil fuels into the US market and to return these auction proceeds to the American public in the form of a Healthy Climate Dividend.
http://vanhollen.house.gov/media-center/press-releases/van-hollen-introduces-the-healthy-climate-and-family-security-act-of

July 30, 2014. Several senators, led by Sen. Joe Manchin (D-W.Va.), introduced legislation to reauthorize the Export-Import Bank, which is set to expire on September 30, 2014. The five-year reauthorization package would incrementally increase the Bank's spending authority to $160 billion from $140 billion over a four-year period.
http://www.manchin.senate.gov/public/index.cfm/2014/7/manchin-bipartisan-group-of-senators-introduce-legislation-to-reauthorize-export-import-bank
Initially Sen. Manchin had included a provision in the reauthorization bill to block the guidelines the Export-Import Bank had implemented in December 2013 which would prevent US funding for construction of coal-fired power plants overseas unless they include CCS. However Sen. Manchin will now introduce this provision as a separate amendment.
http://thehill.com/policy/energy-environment/213892-manchin-drops-coal-provision-from-ex-im-bank-bill

August 5, 2014. Sen. John Walsh (D-MT) introduced S.B. 2776. This legislation is aimed to incentivize the commercial availability of power plants with CCS and would fund up to 10 CCS units in 10 years.
http://www.globalccsinstitute.com/news/walsh-bill-would-fund-10-ccs-plants

International Regulatory News
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facilities to meet an emissions intensity standard of no more than 0.16 tonnes of CO_2 equivalent per one tonne of LNG produced. The bill will repeal and replace the existing Greenhouse Gas reduction (Cap and Trade) Act and operate in addition to the $30/tonne of carbon tax that is payable on all combustion fuel GHG emissions in the province.
http://www.mondaq.com/canada/x/349532/Environmental+Law/BC+Will+Regulate+GHG+Emissions+From+LNG+Facilities+Through+Bill+22014+The+Greenhouse+Gas+Industrial+Reporting+And+Control+Act

EU. October 24, 2014. EU leaders have agreed to cut GHG emissions by 40% by 2030, compared with 1990 levels.
http://www.bbc.com/news/world-europe-29751064

Finland. October 27, 2014. Finland is currently in the process of adopting a new climate change act which will require the country to cut down its CO_2 emissions by 80% by 2050 relative to 1990 levels. According to a report of a parliamentary committee, a delay in the commercialization of CCS would put the country at risk of missing its 2050 emission reduction target.
http://bellona.org/news/climate-change/2014-10-ccs-will-crucial-component-finlands-2050-climate-strategy

Images:
ADM's Decatur Page 1: http://news.thomasnet.com

This newsletter was constructed using information from internet searches. The websites used have been cited.

For more information, questions and comments please email javedan@mit.edu. Thank you.