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Carbon Capture and Storage: On Your Mark! Get Set! Go?

Legal and regulatory uncertainty will impact pioneer CCS projects – what can be done to help.

Introduction

The increase in atmospheric greenhouse gas (GHG) levels from industrialization and modernization is commonly believed to be the cause of global climate change. Carbon Dioxide (CO_2) is a GHG emitted to the atmosphere both by natural sources and as a byproduct of the use of fossil fuels for energy. Carbon capture and storage (CCS) is projected to be a powerful weapon in the climate change battle. CCS technology can capture CO_2 from power plants and industrial facilities and permanently store or "sequester" it deep underground thereby reducing the amount of CO_2 that otherwise would be placed in the atmosphere. Fossil fuel is the primary source of world-wide energy and is predicted to remain so for the foreseeable future. In 2008, former British Prime Minister, Tony Blair, stated:

> *"The vast majority of new power stations in China and India will be coal fired; not "may be coal fired"… So developing carbon capture and storage technology is not optional, it is literally of the essence."*[1]

Experts believe atmospheric GHG levels must peak and then decline over the next 10-20 years in order to avoid the most serious impacts of climate change. This means CCS must be ready for broad deployment beginning about 2020.[2] Unfortunately, most CCS research has occurred within the past 10 years and no full-scale, fossil-based power plant integrated with CCS exists in the world today. There is general consensus among scientists and policy makers that large scale demonstrations - sometimes called pioneer projects – must be built and operated in the near term in order to prove the technical and economic viability of CCS before broad deployment occurs.[3]

In April 2009, the United States Carbon Sequestration Council issued a paper discussing the need for a CCS legal and regulatory framework to provide certainty for developers of commercial scale CCS projects.[4] Work is ongoing at the international, federal, and state levels to develop a framework. For example, the Interstate Oil and Gas Compact Commission (IOGCC), with support from the Department of Energy (DOE), has conducted regulatory gap analysis and has produced model CCS rules and regulations that have been adopted by a number of states. DOE, the International Energy Agency, the

IOGCC and other organizations are also developing CCS best practices manuals. However, the complexity of climate change may make a final comprehensive set of rules years away. In the meantime, critically important pioneer projects may struggle.

Why is legal and regulatory certainty important for pioneer CCS projects? In the United States, a small number of projects are well into planning and preliminary design - many receiving grants, loans, tax credits and other forms of assistance from the federal government and the states. In providing support to these projects, the overarching government objective is to validate CCS technology at full scale in the near term so that it is ready in time for broad commercial deployment. A pioneer CCS project requires investment ranging from hundreds of millions of dollars for a retrofit application to multiple billions for a new plant. Even with government support, the majority of project cost is borne by the private sector. Power plants and industrial facilities are subject to numerous laws, regulations, and permitting requirements. Typically, a developer fully understands the rules and risks before embarking on a project and factors those considerations into its business decisions. However, the pioneer CCS developer is faced with a number of key legal and regulatory uncertainties that could cause delay, increase cost, and force developers to rethink their projects. Here we review some legal and regulatory activities currently underway at the federal and state levels and discuss interim steps that could assist pioneer projects.

Air Emissions

GHG emissions are not currently regulated at the national level in the United States. This may change.

Both the Waxman-Markey bill (HR. 2454) passed by the House, and the Kerry-Boxer bill (S.1733) before the Senate, would establish a "cap and trade" mechanism for GHGs. Under cap and trade, a national limit (cap) is placed on the annual emissions of GHGs. Companies receive permits (or allowances) that cap their individual emissions. If a company wishes to emit more, it must buy (trade for) additional allowances. Companies that reduce their emissions below permit levels have allowances to sell. Over time, the cap is lowered and companies either must reduce pollution or purchase more allowances from less polluting sources.

Notwithstanding pending legislation, the Environmental Protection Agency (EPA) is proceeding with GHG regulation under its Clean Air Act (CAA) authority. On December 7, 2009, EPA issued an "endangerment finding" concluding that six GHGs, including CO_2, may reasonably be anticipated to endanger the public health and welfare.[5] Various states and private entities have recently petitioned EPA to reconsider its endangerment finding and have sought judicial review of the finding. The finding was a prerequisite to EPA's proposed regulation of emissions from light duty vehicles and sets the stage for regulation of GHG emissions from large stationary sources. Once the vehicle regulation is final, it also triggers regulation of stationary sources under the CAA Prevention of Significant Deterioration (PSD) and Operating Permit (Title V) Programs. PSD applies to new major sources or major modifications at existing sources for pollutants, where the source is located in attainment areas or is unclassifiable with the National Ambient Air Quality Standards (NAAQS). EPA has proposed to initially limit PSD and Title V review to sources emitting over 25,000 tons of CO_2 equivalent emissions per year in order to reduce the number of regulated facilities to a manageable number.[6] PSD would apply to new sources with emissions over 25,000 tons and existing sources that increase emissions beyond a designated "significance" level. PSD permits require the use of Best Available Control Technology (BACT). BACT is determined by an analysis of the maximum degree of control that is achievable for a facility through application of available technology taking into account energy, environmental, and economic impacts and other costs. At present there is no consensus on what BACT means in the context of GHG emissions. A subcommittee of experts under the Clean Air Act Advisory Committee is preparing BACT

recommendations for EPA.[7] In addition to PSD, a new facility that exceeds the 25,000 ton threshold would need to include GHG emission information in its Title V operating permit application. An existing facility that exceeds the threshold would include the information when its operating permit is due for renewal

For now, developers may assume the CAA will govern projects that meet EPA's thresholds. That could change if superseding legislation prevents EPA from using its CCA authority to regulate GHG emissions or if pending legal challenges are successful. In its advanced notice of proposed rulemaking (ANPR) on regulation of GHGs under the CAA, EPA acknowledged that new legislation might be appropriate:

> *…the ANPR illustrates the complexity and interconnections inherent in CAA regulation of GHGs. These complexities reflect that the CAA was not specifically designed to address GHGs and illustrate the opportunity for new legislation to reduce regulatory complexity. However, unless and until Congress acts, the existing CAA will be applied in its current form.* [8]

Assuming EPA's authority remains unchanged, it is not clear if PSD for CO_2 will be applicable to projects already in the permitting process. It is also not clear how BACT will impact a project. Theoretically, BACT could force a developer to consider technology alternatives that do not demonstrate CCS, such as a natural gas combined cycle system instead of a coal based system with CCS. That might satisfy an immediate concern of the permitting authority but not advance the development of CCS. Uncertainty will continue for the foreseeable future until new legislation is passed and implemented or until EPA and the states work through the complexities of regulation under the CAA.

Underground Injection

With CCS technology, once CO_2 is captured from a plant, it is compressed, transported to a sequestration site, and injected underground. When CO_2 is compressed and pumped far enough underground, it remains a dense fluid that can be permanently stored in tiny voids, known as pore spaces, found in common types of rock and mineral formations. For decades, CO_2 has been safely transported for long distances through pipelines and injected underground as a means to increase production from oil and gas bearing formations. The CO_2 displaces the oil and gas from the pore spaces. Some pioneer CCS projects will use the captured CO_2 for enhanced oil recovery and perhaps enhanced gas recovery. Other projects will test large scale storage of CO_2 in deep saline formations and other formations. Saline formations are porous rock saturated with brine. They are found in many regions throughout the United States and have the potential to store great volumes of CO_2.

Substances injected underground are governed by the Safe Drinking Water Act (SDWA) and EPA's implementing regulations. The SDWA was enacted to prevent harm to drinking water sources. For the past several years, EPA and states with delegated authority have permitted pilot CO_2 storage projects as Class V experimental wells under EPA's Underground Injection Control (UIC) Program. However, EPA believed the existing federal regulations were not drafted with large scale, geological storage in mind. Accordingly, in July 2008, EPA proposed regulations that would create a new UIC well class (Class VI) for geological storage.[9] The regulations have not yet been finalized.

While EPA's proposed regulations may create a framework for the siting, monitoring and closure of CCS storage facilities, many questions remain to be resolved. These include: (1) the acceptability of scientific techniques to characterize and monitor the storage facility; (2) the impact that small amounts of hazardous substances in the CO_2 stream will have on permitting and liability; (3) the evidence required

to assure permitting authorities that a closed facility no longer presents a danger to drinking water supplies; and, (4) the relationship between CO_2 injection wells permitted under UIC Class II for enhanced oil or gas recovery and Class VI permitting requirements. Two provisions that result in considerable financial uncertainty for the CCS developer are found in Sections 146.85 and 146.93 of the draft regulation. Section 146.85 addresses financial responsibility that must be maintained by storage facility operators to cover the cost of remedial action, well plugging and post-injection monitoring. Financial responsibility is typically demonstrated through bonding mechanisms, letters of credit, trust funds, insurance, and other financial instruments. EPA plans to issue additional guidance on financial responsibility for Class VI wells. Financial responsibility is a pre-requisite for an injection permit and is calculated through an analysis of site geology, injection plans, and other project features. Under the proposed regulation, the amount may be adjusted periodically if the permitting authority considers the original amount to be inadequate. Section 146.93 establishes 50 years as the duration of the post-injection monitoring period but also provides the permitting authority discretion to extend (or shorten) the monitoring period based on project circumstances.

Another major risk for CCS project developers is liability for injury and damage caused by the storage or unintentional release of the CO_2. Commercial insurance products covering near term liability are only now becoming available. Insurance to protect against long-term liability - which may extend for hundreds of years after closure of a facility - may never be available.

Many of the uncertainties associated with underground storage will be resolved over time as experience is gained with CCS technologies and implementation of EPA's new regulation. Nevertheless, the near-term risk for pioneer projects is high. A few states have acted to reduce developer long-term liability risk. North Dakota, Montana and Louisiana have passed laws that allow for the transfer of long term liability to the states after a period of post-injection monitoring. In North Dakota, CO_2 title and liability resides with the storage site operator during the injection and pre-closure period. Once the state issues a certificate of project completion, title and liability transfer to the state. The certificate may not be issued until at least ten years after CO_2 injection ends.[10] Montana law similarly makes the storage site operator liable for harm during injection and through a post-injection monitoring period except that ownership of the CO_2 and liability cannot be transferred until 30 years after injection ends.[11] In Louisiana, title and liability may transfer to the state ten years after injection ceases (or such longer period established by rule) except that the release of liability is not applicable to the last owner or operator of the storage facility if a trust fund established by the law has been depleted to the extent that it is insufficient to cover liability. Louisiana law also sets limits on the amount of compensatory damages for non-economic loss that can be recovered from storage facility and pipeline owners, operators and CO_2 generators.[12] None of the states provides an absolute guarantee against long term liability since the storage site operator must comply with site closure rules to be relieved of liability. And none of the states covers liability during the injection and post-project monitoring period which could extend for 50 or more years. Montana and North Dakota laws both anticipate that the federal government will assume monitoring and management of the storage facilities at some point in the future.

For the FutureGen Project, Illinois law authorizes the state to indemnify the FutureGen Industrial Alliance for liability resulting from the storage, escape, release, or migration of CO_2 injected during the period of operation by the Alliance.[13] The state's assumption of storage liability substantially reduces project risk for the Alliance.

Access to Sequestration Sites

Although the United States has numerous locations where CO_2 may be stored, access to those sites is not always easy. Several states have taken action to help.

Historically, many deeds and land agreements were silent on ownership of pore space making it difficult for storage facility operators to obtain the rights needed to develop a facility. A few states have passed laws to clarify ownership thereby eliminating or reducing the time and cost associated with ownership disputes. Wyoming was the first, vesting title to pore space in surface owners unless otherwise addressed by prior agreement.[14] North Dakota and Montana followed Wyoming by presuming title to pore space belongs to the surface owner.[15] [16] North Dakota law goes a step further by creating a mechanism to "amalgamate" property interests if the storage facility operator cannot obtain the consent of all persons who own the storage reservoir's pore space. Amalgamation allows the state, acting through the North Dakota Industrial Commission, to include pore space owned by the non-consenting owners in the storage facility provided the non-consenting owners are equitably compensated.[17]

Louisiana law allows for the exercise of eminent domain authority by private entities to acquire rights necessary to develop underground storage facilities including the acquisition of surface and subsurface interests and rights necessary to lay and operate pipelines to transport of CO_2 to the storage facility. The authority cannot be exercised until the Louisiana Conservation Commissioner issues a certificate of public convenience and necessity and a public hearing is conducted in the parish where the storage facility is to be located. Use of the authority does not prejudice the rights of the surface and subsurface mineral owners to all other uses not acquired for the storage facility.[18]

A recent Texas law authorizes development of a CO_2 repository in state-owned offshore-submerged land in the Gulf of Mexico.[19] Offshore state and federal lands are believed to have the potential to safely store large quantities of CO_2. Once completed, Texas will earn revenue from the storage sites and Texas power plants and industrial facilities will have a reliable place to send CO_2 without the need to develop their own storage facility.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to consider the environmental impacts of their major actions and to give the public an opportunity to participate in the decision making process. Climate change is an emerging NEPA issue. In a December 29, 2009 letter to Senators Inhofe and Barrasso, the Chair of the White House Council on Environmental Quality (CEQ), Nancy Sutley, wrote:

> *Allow me to assure you that NEPA cannot be used to regulate greenhouse gas emissions. Rather, the Administration remains committed to comprehensive energy and climate change legislation to address such broader issues. Nonetheless, NEPA compels Federal agencies to consider environmental effects before undertaking significant actions or policies. CEQ sees no basis for excluding greenhouse gas emissions from that consideration. CEQ believes that it is appropriate and necessary to consider the impact of significant federal actions on greenhouse gas emissions and the potential for climate*

change to affect Federal activities evaluated through NEPA and different approaches for managing those effects. Accordingly, CEQ is considering responding to the petition you referenced by issuing guidance to agencies on this issue.

Pioneer projects receiving federal funds, loans, loan guarantees and permits undergo NEPA review. NEPA is fertile ground for environmental litigation. The potential exists that pioneer projects, which are trying to develop and test technology to combat climate change, may paradoxically become a battle ground for the climate change debate.

Utility Commission Uncertainty

Pioneer projects conducted by regulated utilities are subject to review and approval by the cognizant public utility commission. A regulated utility will conduct a project if it can recover costs through its electricity charges. Utility commissions must determine if the project cost is a prudent expense that should be passed along to the ratepayers. The commissions consider the need for additional power, alternative sources of the power, cost and other factors. Using today's technology, a CCS project may increase the cost of electricity by 35-75 percent when compared to a new facility without CCS.[20] This cost is expected to decrease as experience with CCS technology grows. Nevertheless, the current high cost of CCS technology, coupled with legal and regulatory uncertainty, will cause utility commissions to closely scrutinize proposed CCS project.

Observations

Interim action could be tailored to encourage and assist pioneer projects without prejudicing the final legal and regulatory framework for climate change, such as:

- Pioneer plants could be exempted from PSD for CO_2.
- Pioneer plants could be presumed to satisfy climate change considerations embodied in NEPA analysis.
- EPA and state regulators could continue to permit pioneer projects under the existing Class II and Class V rules where appropriate. The rules for EPA's new Class VI geological sequestration wells could be phased in as experience with CCS technology grows. Pioneer projects could transition to Class VI permits once a demonstration phase is complete and the facility owner elects to continue long term injection and storage operations.
- More jurisdictions could act to settle pore-space access and take additional steps to enable development of storage facilities and pipeline routes.
- Government owned lands could be made available for storage facilities.
- Liability concerns could be addressed through various options and combinations of options including: (1) a trust fund where storage facility operators pay a fee that would be used by the government to cover civil claims brought after a certificate of closure is issued; (2) government sponsored insurance or reinsurance; (3) indemnification similar to that authorized for nuclear plants under the Price-Anderson Act; and, (4) government assumption of risk in exchange for developer concessions such as higher CO_2 control rates, decommissioning of older facilities, or willingness to transfer technology.

- Additional federal and state incentives such as tax credits, loans, loan guarantees and grants would reduce the financial risk for pioneer project developers and make projects more acceptable from the utility commission perspective.

The knowledge to be gained from the work of the Carbon Sequestration Regional Partnerships and the pioneer projects is key to the success of CCS. Loss of many projects due to legal and regulatory uncertainty would be an unfortunate setback for climate change.

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[1] Speech by Tony Blair, June 27, 2008, Tokyo, Japan.
[2] See *Joint Statement of G8 Energy Ministers*, June 8, 2008, Aomori, Japan
[3] See Intergovernmental Panel on Climate Change, September 2005, *Special Report – Carbon Dioxide Capture and Storage, Technical Summary, Section §10*, Cambridge University Press; Massachusetts Institute of Technology, 2007, *The Future of Coal, Options for a Carbon Constrained World*; International Energy Agency, 2007, *Near-Term Opportunities For Carbon Capture and Storage*.
[4] United States Carbon Sequestration Council, April 2007, *WANTED: A Legal & Regulatory Framework for Carbon Capture and Storage (CCS)*
[5] Federal Register: December 15, 2009 (Volume 74, Number 239), Pages 66495-66546
[6] *Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule,* 74 FR 55292, October 27, 2009
[7] *Interim Phase I Report of the Climate Change Work Group of the Permits, New Source Review and Toxics Subcommittee, Clean Air Act Advisory Committee***,** February 3, 2010
[8] Advanced Notice of Proposed Rulemaking, *Regulating Greenhouse Gas Emissions under the CAA*, 73 Federal Register 44354, July 30, 2008
[9] Federal Register: July 25, 2008 (Volume 73, Number 144), Pages 43491-43541
[10] North Dakota Century Code §§ 38-22-16, 38-22-17
[11] Montana Code Annotated §§82-11-182, 82-11-183, Note: The permitting provisions of Montana law are conditioned on a delegation of authority from EPA.
[12] Louisiana Revised Statutes §30:1109
[13] Illinois Public Act 095-0018
[14] Wyoming Statutes §34-1-152
[15] North Dakota Century Code §47-31
[16] Montana Code Annotated §82-11-180
[17] North Dakota Century Code §§ 38-22-8, 38-22-10
[18] Louisiana Revised Statutes §§30:1104, 30:1108
[19] Texas House Bill 1796
[20] DOE Office of Fossil Energy, *Carbon Capture and Storage Overview*