State Policy Actions to Overcome Barriers to Carbon Capture and Sequestration and Enhanced Oil Recovery

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Introduction

The development of Carbon Capture and Sequestration (CCS) and Enhanced Oil Recovery with Carbon Dioxide (CO_2-EOR) projects faces a wide range of barriers, but state-level policy can help overcome many of these challenges. In addition to establishing a regulatory framework for CCS and CO_2-EOR projects, states can provide incentives, financial or nonfinancial, to promote the development of CCS and CO_2-EOR. So far, states have adopted a diversity of policies that meet local expectations and needs. Additional state policies have been proposed, but not yet adopted.

This document lists the key regulatory and economic barriers CCS and CO_2-EOR projects must overcome, and lists examples of existing or proposed state-level policies to help in addressing each.

Regulatory Barriers

To enable CCS and CO_2-EOR development, states must establish regulatory authorities to oversee CO_2 injection, CO_2 transportation, and long-term ownership and management of sequestered CO_2. Approximately nine states already have active CO_2-EOR operations and have developed the necessary regulations to permit CO_2-EOR projects, but other states must expand their regulatory frameworks to accommodate CO_2-EOR. Regarding CCS, most states are only in the initial stages of setting up needed regulations and authorities. Going forward, there is a need for some states to adopt a more comprehensive framework for both CCS and CO_2-EOR, and at least in some states, to determine whether CCS and CO_2-EOR projects can be regulated under the same regulatory structure. For example, a state must decide whether or not to adopt additional requirements for long-term CO_2 storage that go beyond the requirements for business-as-usual CO_2-EOR operations. State regulatory issues can be broken into several categories, each of which is thoroughly described below:

1. Permitting CO_2 Injection and CO_2 Transportation
2. Defining and Establishing Ownership of Pore Space
3. Establishing Long-Term Liability for CO_2
4. Clarifying the relationship between CCS and CO2-EOR Regulations

Permitting CO_2 Injection and CO_2 Transportation

At the federal level, the U.S. Environmental Protection Agency's (EPA) Underground Injection Control (UIC) Program and the Greenhouse Gas Reporting Program (GHGRP) establish the regulatory requirements for underground CO_2 injection in the United States. These programs work in parallel to ensure that CO_2 injection does not endanger human health, drinking water resources, or the environment in general. These programs create common safety standards for CO_2 injection in all states, though states may adopt additional requirements.

Authorized by the Safe Drinking Water Act, the UIC Program establishes federal requirements for permitting CO_2 injection wells. States may apply to the EPA for primacy in administering the UIC Program and designate a state agency to permit and oversee projects that inject CO_2 underground. To receive a UIC

permit, the operator of a CO_2 injection project must demonstrate that CO_2 will not migrate from a reservoir and jeopardize drinking resources.

The UIC Program has established two well classes for CO_2 injection – Class II wells primarily for oil and gas projects (and therefore CO_2-EOR operations) and Class VI wells for CO_2 geologic sequestration. (See discussion below for situations where Class II wells could demonstrate geologic sequestration.) Existing commercial CO_2-EOR projects are Class II wells. When CO_2 is injected for EOR, it is recaptured and recycled again and again. For each injection, the majority of the CO_2 is brought back to the surface with the recovered oil, where it is separated from the oil and reused in future CO_2 injections. The CO_2 which remains in the oil reservoir cannot be recovered and is considered "incidentally stored."

In December 2010, the EPA promulgated Class VI rules to establish separate regulations for geologic sequestration apart from those that cover CO_2 injection for CO_2-EOR. Class VI wells were designed under the notion that CO_2 sequestration projects would handle very large volumes of CO_2 and inject CO_2 into relatively unfamiliar formations, such as saline aquifers. In contrast, CO_2-EOR wells have been well-studied and tested due to earlier oil production and exploration. Given these differences, Class VI wells therefore must meet more requirements than Class II wells.

While the requirements are different for Class II and Class VI wells, operators of each well class must consider the characteristics of the site where CO_2 is injected, constructing the injection well to prevent possible harm to drinking water resources and avoiding formations that contain transmissive faults or fractures. Operators must also monitor and assess ongoing CO_2 injections to ensure they are conducted safely.

In addition to UIC Program requirements, CO_2 injection well operators must follow the regulations of the EPA's GHGRP. Under the GHGRP, parties report CO_2 injection volumes directly to the EPA, instead of state agencies. GHGRP requirements are still relevant to states because of their connection to the UIC Program and their potential influence on state-level or federal-level policies involving GHG emissions. Operators of existing CO_2-EOR wells are likely to report under Subpart UU of the GHGRP, which requires operators to "report basic information on CO_2 received for injection."[1] In contrast, the operators of Class VI wells must report under the more rigorous Subpart RR of the GHGRP, though operators of Class II wells can opt to report under Subpart RR as well. Subpart RR requires an operator "to report basic information on CO_2 received for injection, develop and implement an EPA-approved monitoring, reporting, and verification (MRV) plan, and report the amount of CO_2 injected for geologic sequestration using a mass balance approach."[2] To claim federal Section 45Q Tax Credits for Carbon Sequestration, a party capturing man-made CO_2 for use in EOR must ensure that a CO_2-EOR operator meets the requirements of Subpart RR of the GHGRP.

Applying to the EPA for primacy to administer Class II and Class VI wells

Due to existing oil and gas production (and CO_2-EOR projects), many states already have applied for and have received primacy from the EPA to permit Class II wells. Currently, 34 states have primacy for Class II wells, while seven states share Class II permitting authority with the EPA. For the remaining states, EPA

retains primacy.[3] A state's oil and gas development agency is likely to retain the regulatory authority with primacy to issue Class II permits.

No state has applied for primacy to administer Class VI wells, but several states are in a dialogue with the EPA and could apply for Class VI primacy in the future.[4] Given the technical similarities in injecting CO_2 for enhanced oil recovery and for long-term geologic sequestration, states are likely to have the agency that administers Class II wells also administer Class VI wells. Certain states, however, may wish to adopt separate regulations or designate agencies to oversee different aspects of CO_2-EOR or CCS projects. For example, a state could designate an agency that oversees environmental or air quality to verify and monitor long-term CO_2 sequestration. Some states, like Texas, have split Class VI jurisdiction between environmental and oil and gas regulatory commissions.

Delays in selecting an agency to administer Class II and Class VI requirements or uncertainty regarding whether an agency can issue a permits for a CCS or CO_2-EOR project can undermine project development. States need to have a clear permitting pathway in place for CCS and CO_2-EOR project developers to consider initiating a project.

Examples of state action:

- Louisiana's Department of Natural Resources, Office of Conservation oversees CO_2-EOR injection in the state. (H.B. 661, 2009)

- Montana's Board of Oil and Gas Conservation was selected to regulate CO_2 injection (S.B. 498, 2009). The Board of Oil and Gas Conservation will seek primacy from the EPA to administer Class VI wells and consult with the Department of Environmental Quality and the Department of Natural Resources and Conservation in making rules regarding geologic CO_2 sequestration (S.B. 285, 2011).

- Oklahoma's Corporation Commission will oversee any facility that injects CO_2, which is operating under a Class II permit. The Oklahoma Department of Environmental Quality will oversee any CO_2 geologic sequestration facility not operating under a Class II permit (S.B. 610, 2009).

Identifying regulatory gaps and developing permitting and technical standard rules and regulations

Even if a state has received primacy to administer the UIC program, it may not have developed specific rules for how CCS or CO_2-EOR projects will be permitted or regulated. Promulgating these rules is just as important to CCS and CO_2-EOR project developers as having a clear permitting process. Some states have commissioned studies to determine if CCS or CO_2-EOR project operators would face difficulty in applying for a permit and if existing laws and regulations can accommodate CCS and CO_2-EOR activity.

Examples of state action:

- In 2010, the California Public Utilities Commission, the California Energy Commission, and the Air Resources Board released the findings of the California Capture and Storage Review Panel. The panel found that there were several regulatory gaps in existing California law, which made permitting "time-consuming and costly for CCS developers."

Designating an agency to oversee CO_2 pipeline construction, operation, and safety

Similar to CO_2 injection, states must comply with federal standards regarding CO_2 pipeline operations, and a state agency may be designated to oversee CO_2 pipeline safety. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration currently sets requirements for transporting CO_2 via pipeline, but states are responsible for issuing permits and implementing regulations for CO_2 pipeline projects. Agencies that oversee oil and natural gas pipelines are the most likely candidates to oversee CO_2 pipelines because CO_2 pipelines are technically similar to other pipelines and may be located adjacent to existing pipelines. These agencies also are likely to be familiar with right-of-way provisions in state law.

Examples of state action:

- Indiana (S.B. 22, 2006) directed the state utility regulatory commission to create a Pipeline Safety Division and revised the Indiana Code to include CO_2 among materials that are regulated by pipeline transportation regulations.

- South Dakota (H.B. 1129, 2009) added CO_2 to the list of materials transported via pipeline that are regulated by the Public Utilities Commission.

Authorizing or denying eminent domain for construction of CO_2 transportation networks and sequestration of CO_2

States may grant eminent domain powers for the construction of CO_2 pipelines, which enables pipeline companies to force the sale of access to land necessary for pipeline construction. A CO_2 capture facility and a CO_2 injection site may be located far away from each other, and existing infrastructure may be located in the path of the most economic route to build. Still, granting eminent domain may be a controversial decision on a local level, and communities may have reservations about a CO_2 pipeline being located nearby. A state may grant or prohibit eminent domain entirely under certain conditions.

Examples of state action:

- Kentucky (SB 50, 2011) states that construction companies can claim eminent domain when building CO_2 transmission pipelines.

- Oklahoma (SB 610, 2009) states that CO_2 sequestration facilities are not granted the right to use eminent domain.

The decision to grant eminent domain has frequently been tied to whether a CO_2 pipeline is a "common carrier," meaning that a pipeline is available for use by parties other than the pipeline's owner. A 2010 paper by the Interstate Oil & Gas Compact Commission (IOGCC) discusses the different approaches taken by three states – Texas, Mississippi, and Louisiana – regarding common carrier status and eminent domain:

- Texas allows for a CO_2 pipeline operator to choose between operating as a common carrier or a private carrier. Common carriers are granted the power of eminent domain, but must meet

obligations to make the pipeline available for use by other parties. A private carrier is not granted eminent domain power.

- Mississippi does not require a CO_2 pipeline operator to be a common carrier in order to exercise eminent domain, but it requires common carrier pipelines to be used for EOR or other hydrocarbon production within Mississippi. A private carrier CO_2 pipeline transporting CO_2 solely for geologic sequestration or to another state without supporting EOR in Mississippi therefore would not be eligible to use eminent domain.

- Louisiana permits a private carrier to use eminent domain power provided that CO_2 is transported for hydrocarbon production.

Additional permitting policies

States may take several other types of action to promote CCS and CO_2-EOR.

Examples of state action:

- Declare geologic storage to be in the interest of the public

    - States can declare geologic CO_2 sequestration to be in the public interest, which "can provide tools and authorities—up to and including eminent domain—that are otherwise unavailable to public utilities, which can enable and facilitate project development."[5]

    - A Midwestern Governors Association report found examples of such a policy in North Dakota, Louisiana, Oklahoma and West Virginia

- Set deadlines for technical reviews and hearing processes for CCS projects

    - Texas (HB 3732, 2007) requires the technical review of an application for the permitting of a clean energy project, including a CCS project, to be completed and a final order to permit or deny permitting within 9 months

- Create a state geologic storage utility to streamline the activities of CO_2 sequestration projects

    - According to a Clean Air Task Force proposal for state CCS policy, "a geologic sequestration utility would be a specialized, regulated utility that would commercialize injection (and, in some cases, transport) of carbon dioxide into brine aquifers. It would manage, and assume liability for, CO_2 disposal from power plants, manufacturers, and other stationary sources of CO_2."

Defining and Establishing Ownership of Subsurface Pore Space

CCS and CO_2-EOR projects inject CO_2 into underground geologic formations that have adequate permeability and pore space. Injected CO_2 migrates away from the point of injection into other subsurface

areas, which may be located under land owned by parties that did not inject the CO_2. In many states, the ownership of surface land automatically grants ownership of subsurface land. In some states, pore space has not been defined or clarified in a legal context or ownership of pore space has not been established and awarded to a specific party. Establishing ownership of pore space is essential for CCS and CO_2-EOR operations, which, without clear ownership rules, could face legal challenges to CO_2 injection or experience difficulties in receiving a permit. A pore space owner could be entitled to the economic benefit of sequestering CO_2 under his or her lands. A pore space owner also could object to CO_2 injection due to safety concerns or concerns about property values. Because of these potential conflicts, it is important that states clearly establish who owns the pore space where CO_2 is injected.

Ensuring existing law recognizes subsurface pore space as property and can establish an owner of pore space

Existing common law provides some guidance for how pore space ownership should be established.[6]

Examples of state action:

- The Interstate Oil & Gas Compact Commission (IOGCC) recommends that states create a regulatory structure providing clear rules on how ownership of subsurface pore space "will be recognized and protected as well as a process for assuring that the legal property right to store CO_2 is secured."[7]

A common option for pore space ownership is to recognize the owner of the surface land as the owner of the subsurface land.

Examples of state action:

- The IOGCC suggests that states identify "the surface owner as the person with the right to lease pore space for storage, while protecting other stakeholders from potential damage attributable to sequestration activities."[8]

The Midwestern Governors Association (MGA) also identified a Texas law, which was established to resolve possible conflicts of interest related to CO_2 sequestration.

Examples of state action:

- According to the MGA's report, "States that have a history of oil and gas may choose to provide language to protect the mineral estate from conflicting interests or impacts resulting from storage activities (see Texas as an example)." (Texas example – S.B. 1387)[9]

Determining rules for how ownership of pore space can be severed from ownership of surface land or how pore space can be acquired or aggregated with other claims

Allowing a landowner to sever ownership of pore space from the ownership of surface land can facilitate CO_2 sequestration agreements. Similar to a single oil, natural gas, or mineral reserve, a "unit" of subsurface pore space can encompass a wide area. Sometimes multiple parties can make claims to this unit of CO_2 sequestration pore space, and these ownership claims need to be aggregated so that a collective decision can be made regarding economic activity involving this unit of pore space. Unitization is the process whereby the ownership of a unit of the pore space can be recognized once a certain percentage (60 percent to 80 percent, for example) of ownership claims has been aggregated. Unitization therefore enables the ownership of a given unit of pore space to be established without requiring 100 percent of claims to the given unit be recognized. States usually prescribe a mechanism to compensate parties that do not consent to include their ownership interest through unitization.[10]

Examples of state action:

- Wyoming (HB 89, 2008) allows pore space owned by a surface owner to be severed.
- Wyoming (H.B. 80, 2009) prohibits the Wyoming Oil and Gas Conservation Commission from issuing orders regarding the beginning of carbon sequestration operations until "the plan of unitization has been signed or in writing ratified or approved by those persons who own at least eighty percent (80%) of the pore space storage capacity within the unit area."

Also, states may authorize the application of eminent domain to acquire necessary subsurface areas for CO_2 injection.

- Louisiana (H.B. 661, 2009) allows a project operator to acquire subsurface land via eminent domain.
- On the other hand, a state may prohibit severing the ownership of pore space from the ownership of surface land.
- North Dakota (S.B. 2139, 2009) prohibits pore space from being severed by the owner. S.B. 2139 explains that "undivided estates in land and clarity in land titles reduce litigation, enhance comprehensive management, and promote the security and stability useful for economic development, environmental protection, and government operations."

Establishing Regulations for the Long-Term Liability for CO_2

Establishing CO_2 ownership

States need to provide legal clarity regarding what party is liable for CO_2 once it has been injected in underground geologic formations. The common approach is to make the party injecting CO_2 liable for it during operations and to allow that party to transfer liability once CO_2 injection has ended. Providing clarity for how CO_2 liability can be transferred is essential for CCS and CO_2-EOR project developers, who may prefer for economic reasons to let another party assume liability for CO_2 sequestration.

Examples of state action:

- The Illinois (S.B. 1704) state government would assume ownership upon the injection of CO_2 captured from the FutureGen CCS project. State agencies would monitor, measure, and verify the permanent status of sequestered CO_2. Prior to injection, the project operator would own the captured CO_2.

- Texas (S.B. 1387, 2009) identifies the operator of a CO_2 geologic sequestration site as the owner of injected CO_2.

- Montana (S.B. 498, 2009) identifies the operator of a CO_2 geologic sequestration site as the owner of injected CO_2, but the title to the captured CO_2 can be later transferred to the state.

Assuming liability for injected CO_2

States can offer to assume liability for injected CO_2, which can act as an incentive for CCS or CO_2-EOR development. CCS and CO_2-EOR operators could face considerable costs in meeting requirements for CO_2 sequestration, and this guarantee of support can improve the economics of a CCS or CO_2-EOR project.

Examples of state action:

- Montana (S.B. 498, 2009) makes an operator liable for CO_2 during operations and until a certificate of completion has been issued. A certificate of completion may only be issued 15 years after the cessation of CO_2 injection. Once a certificate of completion has been issued, the Board of Oil and Gas Conservation will assume liability for the stored CO_2.

- Louisiana (H.B. 661, 2009) makes an operator liable for CO_2 during operations and transfers liability to the state 10 years after CO_2 injection is complete.

Establishing a CO_2 storage facility trust fund

Some states have created public funds to pay for a public entity to monitor CO_2 sequestration sites. Collecting fees from the operators of projects that sequester CO_2 is a common method to raise revenue for these trusts. Establishing a trust fund to pay for CO_2 sequestration monitoring is intended to create economies of scale and provide CO_2 sequestration monitoring services at a lower cost. Transferring CO_2 sequestration monitoring to a public agency also could increase the public's confidence that CO_2 sequestration will be managed with public safety in mind.

Examples of state action:

- Kansas (H.B. 2418, 2010) authorizes the State Corporation Commission to collect fees to put into a "carbon dioxide injection well and underground storage fund."

- Mississippi (S.B. 2723, 2011) created a Carbon Dioxide Storage Fund.

- Texas (S.B. 1387) authorizes the creation of the Anthropogenic Carbon Dioxide Storage Trust Fund as a special fund within the state treasury. The Railroad Commission of Texas may collect fees to deposit in the fund to cover the cost of permitting, monitoring, and inspecting geologic storage facilities.

Enacting financial requirements for long-term CO_2 management

CO_2 sequestration sites need to be managed in perpetuity, and federal law requires Class VI well operators to set aside financial resources to ensure there is sufficient funding for long-term CO_2 sequestration management. In July 2011, EPA released a guidance document regarding the financial responsibility requirements for Class VI CO_2 sequestration site operators. The guidance suggests several options to ensure financial responsibility including trust funds, letters of credit, surety bonds, escrow accounts, financial tests, and corporate guarantees. The EPA authorizes state agencies to make the final determination for how financial responsibility rules will be applied in certain states.

Examples of state action:

- Wyoming (H.B. 17, 2010) requires an operator to have public liability insurance to receive a permit for geologic CO_2 sequestration. Wyoming also has a requirement for an operator to obtain bonding or other financial assurance to faithfully comply with state regulations on CO_2 sequestration.

Clarify the relationship between CCS and CO_2-EOR Regulations

As discussed previously, the EPA's Underground Injection Control Program (UIC) and Greenhouse Gas Reporting Program (GHGRP) provide federal regulatory requirements for CCS and CO_2-EOR. State agencies may apply for primacy from the EPA to administer the UIC Program's Class II and Class VI wells and determine state-level permitting requirements. Beyond permitting, states may seek to clarify the relationship between CCS and CO_2-EOR regulations. For example, a state may declare that CO_2-EOR operators do not have to meet Class VI or any additional state-level requirements for geologic sequestration just for the purposes of conducting CO_2-EOR operations. A state may also recognize CO_2 injected for EOR as being simultaneously sequestered geologically, though that recognition may not necessarily carry over to other states or at the federal level due to different requirements for determining geologic sequestration. In addition, states may specify rules regarding how a Class II well may transition to a Class VI well provided that all federal Class VI requirements are met. (see Federal Register pp. 77244-77245).

Clarifying that Class II wells do not have to meet Class VI standards

To avoid regulatory uncertainty at the state level, certain states have specified that CO_2-EOR operations do not have to meet Class VI requirements in order to perform CO_2-EOR operations.

Examples of state action:

- Louisiana's Geologic Sequestration of Carbon Dioxide Act (H.B. 661, 2009) declares "Nothing in this Chapter shall prevent an enhanced oil and gas recovery project utilizing injection of carbon dioxide."

- West Virginia (H.B. 2860, 2009) does not intend for legislation regarding CO_2 geologic sequestration to "to impede or impair the ability of an oil, natural gas or coalbed methane operator to inject carbon dioxide through an approved enhanced oil, natural gas or coalbed methane recovery project and to establish, verify, register and sell emission reduction credits associated with the project."

Creating rules to allow Class II wells to transition to Class VI wells

Once CO_2 injection for the purposes of EOR ceases, CO_2 injection solely for geologic CO_2 sequestration may continue, but an operator must first meet federal requirements to obtain a UIC Class VI permit. Certain states have specified rules or authorized state agencies to specify the rules that would allow a Class II well to become a Class VI well (and meet Class VI requirements).

Examples of state action:

- Louisiana (H.B. 661, 2009) authorizes the Office of Conservation to "approve conversion of an existing enhanced oil or gas recovery operation into a storage facility, if necessary, taking into consideration prior approvals of the commissioner regarding such enhanced oil recovery operations."

- North Dakota (S.B. 2095, 2009) directs its Industrial Commission to allow a CO_2-EOR project to convert to a CO_2 geologic sequestration project. S.B. 2095 requires a converted CO_2-EOR project to meet the criteria of CO_2 sequestration projects, but further specifies "if during the conversion process unique circumstances arise, the commission, to better ensure that the chapter's objectives are fulfilled, may waive such provisions and may impose additional ones."

Recognizing CO_2 injected for EOR as geologically sequestered

CO_2 injected for EOR is recycled multiple times. Each time, the majority of the CO_2 will be brought back to the surface with the oil, separated from the oil, and re-injected for additional EOR. Upon each injection, however, a portion of injected CO_2 stays within the reservoir and cannot be recovered, becoming "incidentally" stored. Given the potential for incidental CO_2 storage within an oil reservoir, a state may wish to recognize CO_2 injected for EOR as being simultaneously geologically sequestered. The requirements for demonstrating geologic sequestration can vary among states, so one state's recognition of geologic sequestration may not be applicable in other states. Similarly, geologic sequestration may not necessarily be recognized at the federal level depending on the UIC well class or GHGRP Subpart that a given EOR project is reporting under.

- Mississippi (S.B. 2723, 2011) authorizes its Oil & Gas Board to issue an "order recognizing the incidental sequestration of carbon dioxide that is occurring during its enhanced oil or gas recovery project without requiring the project to qualify as a geologic sequestration facility or otherwise be subject to the provisions of this chapter."

- Oklahoma designated its Conservation Commission to verify and certify CO_2 sequestration from the injection of CO_2 into geologic formations (S.B. 629, 2001). This legislation was passed with an eye toward quantifying the amount of CO_2 sequestered in geologic formations (EOR or non-EOR

projects) so operators in Oklahoma could participate in any carbon dioxide emission trading system that would be created in the future (see S.B. 629 legislative intent). Rules authorizing the Conservation Commission to establish and administer a carbon sequestration certification program were adopted in July 2009.

- North Dakota (S.B. 2095, 2009) directs its Industrial Commission to establish rules and procedures for determining the amount of CO_2 that has been or is being stored in an EOR project for the purposes of "carbon credits, allowances, trading, emissions allocations, and offsets, and for other similar purposes."

- Texas (S.B. 469, 2009) directs its Bureau of Economic Geology to verify that the CO_2 capture projects claiming the state's available franchise tax credits for clean energy projects are successfully sequestering captured CO_2 through EOR and meeting applicable regulatory requirements.

Economic Barriers

The development of CCS and CO_2-EOR projects is constrained by the high cost, risk, and uncertainty associated with investing in carbon capture technology. Carbon capture has been deployed on a commercial-scale with several industrial processes (natural gas processing, fertilizer production, hydrogen production, and synthetic natural gas production), yet not with electricity generation (though the first commercial-scale projects are under construction) or other emissions-intensive industrial processes (for example, cement production and steel manufacturing). States can incentivize CCS and CO_2-EOR projects by offering direct financial assistance or by enacting policies that will indirectly provide an economic benefit for CO_2-EOR. States can also fund continued research and development of numerous aspects of CCS and CO_2-EOR.

Direct Financial Support for CCS/CO_2-EOR Activity or Individual Projects

Direct financial support to a CCS or CO_2-EOR project can take many forms. A state can provide grants, issue off-take agreements (explained below), or issue bonds to finance a given CCS project or CO_2 infrastructure. From the perspective of a CCS or CO_2-EOR project developer, a state can be a reliable partner whose support can offset the risks of a given project. From a state's perspective, providing support to an individual project can generate economic development that will create jobs and economic growth. Direct support to an individual project may be difficult if the public perceives the government to be picking a winner or showing preferential treatment.

State-level investment in CCS or CO_2 infrastructure

States can authorize infrastructure authorities to issue bonds, make grants or loans, plan and coordinate infrastructure, or participate in infrastructure development (own, construct, maintain, or operate infrastructure).

Examples of state action:

- The North Dakota Pipeline Authority and the Wyoming Pipeline Authority can provide grants, loans, and bonding authority to CO_2 pipeline projects.

Long-term off-take agreements

States can authorize long-term off-take agreements from a CCS facility. Long-term off-take agreements are contracts that guarantee a buyer will purchase the output, or off-take, from a given project. Providing a guaranteed revenue stream to a CCS project can help it to obtain financing.

Examples of state action:

- The Indiana Finance Authority will purchase substitute natural gas (SNG) under a thirty year contract with Indiana Gasification project that will capture carbon from SNG production. The off-take agreement includes a provision for the contract price to adjust to price fluctuations.[11]

- Under Illinois's Clean Coal Portfolio Standard (S.B. 1987, 2009), utilities must enter into long-term purchasing agreements with a new clean coal plant that meets certain qualifications.

Provide grants and initiate programs for clean coal technology development

States can promote CCS and CO_2-EOR development by including them under state economic development initiatives and other targeted development programs.

Examples of state action:

- Illinois has included clean coal development under several initiatives and has given state agencies direction to pursue clean coal projects. Illinois agencies that will work on clean coal issues include the Illinois Finance Authority, the Coal Demonstration Program, the Illinois Coal Revival Program, High Impact Business Designation, and the Southern Illinois University Clean Coal Review Board

Tax Incentives (Reductions, Credits, Abatements, Exemptions)

Tax incentives can be important measures to support CCS and CO_2-EOR projects. From the perspective of a state government, tax incentives offer certain benefits. For example, tax credits usually can only be claimed once investments have been made or production has begun. In addition, providing tax incentives does not require the government to pick and choose particular projects; those who qualify for tax credits can claim them. From the perspective of project developers, tax incentives can improve the financial outlook of a project and can be claimed more easily than a grant or rate recovery from a public service commission.

Examples of state action:

- Corporate tax/Franchise tax

- Texas (H.B. 469, 2009) provides up to $100 million in franchise tax credits for three in-state projects that sequester at least seventy percent of CO_2 emissions and a fifty percent reduction in the recovered oil tax rate for enhanced oil recovery projects that use anthropogenic CO_2. Such projects may claim franchise tax credits equal to up 10 percent of a project's capital costs. In 2013, H.B. 2446 extended eligibility for franchise tax credits to natural gas electricity generation projects meeting the previously-adopted requirements for CO_2 capture. (According to the state of Texas, "the Texas franchise tax is a privilege tax imposed on corporations, including banking corporations and limited liability companies, that are chartered in Texas. The tax is also imposed on non-Texas corporations that do business in Texas."

- Property tax

  - Montana (H.B. 3, 2007) provides property tax abatements for new investment in CCS equipment and facilities. Property tax abatements could equal up to fifty percent of the taxable value for facilities and equipment involved in capturing, transporting and sequestering carbon dioxide.

  - Texas (H.B. 3896, 2001) provides local property tax deferrals for periods consistent with the development of a large clean energy project, including CCS projects.

- Sales tax

  - Mississippi (H.B. 1459, 2009) sets the state income tax rate at 1.5 percent for income from sales of naturally occurring and anthropogenic carbon dioxide used in for enhanced oil recovery or permanent sequestration in a geologic formation.

- Severance tax

  - North Dakota (S.B. 2034, 2009), Oklahoma (Oklahoma Code, Title 68), and Wyoming (Title 39-14-201) exempt oil produced from EOR using anthropogenic CO_2 from state severance taxes.

  - Texas (H.B. 469, 2009) authorized an additional 50 percent reduction of the severance tax rate (for cumulative seventy-five percent severance tax reduction) on oil produced from EOR using anthropogenic CO_2 captured from a source within the state.

Cost Recovery

States can allow power companies to pass on the cost of investing in new electricity generation infrastructure to rate payers. Cost recovery can be a major source of funding, sometimes for hundreds of millions of dollars of investment in a project. From the perspective of project developers, however, cost recovery can be an uncertain process, especially for CCS technology, which is relatively more expensive and more uncertain than electricity generation sources. There is no guarantee that a state's public service commission, which normally reviews cost recovery applications, will be able to justify the cost of a CCS project. This is especially true if

there is no state or federal requirement for using an alternative energy source or emissions control technology.

Examples of state action:

- In 2010, the Mississippi Public Service Commission authorized Mississippi Power to recover investment costs for the Kemper IGCC power project through its rate payers.[12] In January 2013, due to cost overruns experienced during the construction of Kemper IGCC, the Public Service Commission and Mississippi Power agreed to cap rate payer recovery at $2.4 billion. Certain environmental groups repeatedly have challenged in court the Public Service Commission's decision to permit cost recovery.

Include CCS in Portfolio Standards

Many states have renewable portfolio standards or alternative portfolio standards, which require electric utilities to generate a certain percentage of their electricity from renewable or clean energy sources. Including power generation with CCS in these standards can incentivize investment in CCS projects and can help justify the decision to pass investment costs through the rate payers.

Examples of state action:

- Ohio's alternative portfolio standard (S.B. 221, 2008), which mandates that the state generate twenty-five percent of its electricity from alternative energy resources by 2025, includes clean coal technologies that capture or control CO_2 emissions as an eligible energy source.

- Massachusetts's alternative portfolio standard (S.B. 2768, 2008), which requires the state to generate twenty percent of its electricity with alternative energy resources by 2020, includes coal with CCS as an eligible source of electricity generation.

- Illinois's Clean Coal Portfolio Standard (S.B. 1987, 2009) sets a goal for the state to generate twenty-five percent of its electricity from clean coal facilities by 2025 by requiring utilities and retail supplies to purchase up to five percent of electricity from clean coal facilities.

Support CCS and CO_2-EOR research, development and demonstration

CCS technology has not been demonstrated in commercial-scale power generation and certain industrial processes. States can award grants to support additional research, development, and demonstration. They also can provide financing for certain components of a CCS project, such as an engineering study. A state can also fund research on the state's EOR or CO_2 sequestration potential and make this information available to the public.

Examples of state action:

- Fund Front End Engineering Design (FEED) studies[13]

- Illinois's Clean Coal Institute

- Assess CO_2 Sequestration Potential
  - Model a state's geology and oil and gas production sites for CO_2 sequestration potential
  - Pennsylvania (H.B. 2200, 2008) requested the state Department of Conservation and Natural Resources of the Commonwealth conduct a study to determine suitable geologic formations for carbon sequestration within the state and assess the risks to humans and the environment of a possible state network for CO_2 sequestration.

- Address the multiple aspects of CCS and CO_2-EOR comprehensively
  - Texas (S.B. 1387) authorized the Bureau of Economic Geology of the University of Texas at Austin to prepare a report for the legislature on potential requirements for CO_2 storage in different geologic formations and possible requirements for regulations.

- Support research and development and research and development partnerships
  - See page 4 of NETL's Factsheet on Unconventional Fossil Energy Resource Program for examples of existing research and development projects for CO_2-EOR (Factsheet: NETL Factsheet on Unconventional Fossil Energy Resource Program)

Appendix A: Selected Links and Resources:

CCS: Think Tank and Academic Perspective

- Center for Climate and Energy Solutions, CCS Fact Sheet: http://www.c2es.org/technology/factsheet/ccs
- World Resources Institute, CCS Project: http://www.wri.org/project/carbon-dioxide-capture-storage
- Clean Air Task Force, The Role of CCS Technology in Attaining Global Climate Stability Targets, a Literature Review: http://www.catf.us/resources/whitepapers/files/200802-CCS_Review.pdf

CCS: State Perspective

- Southeast Regional Carbon Sequestration Partnership, CCS Legislation in the US: http://www.secarbon.org/files/CCS_Legislation_2011.pdf
- Midwestern Governors Association, Key Components of a State-Level Statutory & Regulatory Framework to Support Deployment of CCS in the Midwest: http://www.midwesterngovernors.org/CCS/MGA_CCSTF_Regulatory_Framework_Components_MAY_2011.pdf
- National Conference of State Legislatures: CCS in the States: http://www.ncsl.org/issues-research/energyhome/carbon-capture-and-storage-in-the-states.aspx
- Interstate Oil and Gas Compact Commission, Storage of Carbon Dioxide in Geologic Structures, A Legal and Regulatory Guide for States and Provinces: http://iogcc.publishpath.com/Websites/iogcc/PDFS/2008-CO2-Storage-Legal-and-Regulatory-Guide-for-States-Full-Report.pdf
- Interstate Oil and Gas Compact Commission, A Policy, Legal, and Regulatory Evaluation of the Feasibility of a National Pipeline Infrastructure for the Transport and Storage of Carbon Dioxide: http://www.sseb.org/downloads/pipeline.pdf
- California CCS Home Page: http://www.climatechange.ca.gov/carbon_capture_review_panel/index.html

CCS: Federal Perspective

- EPA CCS Home Page: http://www.epa.gov/climatechange/ccs/
- DOE CCS Home Page: http://fossil.energy.gov/programs/sequestration/index.html
- President's CCS Task Force: http://www.whitehouse.gov/administration/eop/ceq/initiatives/ccs

CCS: International Perspective

- International Energy Agency, CCS Model Regulatory Framework: http://www.iea.org/ccs/legal/model_framework.pdf
- International Energy Agency, A Policy Strategy for CCS: http://www.iea.org/papers/2012/policy_strategy_for_ccs.pdf
- CCS Association: http://www.ccsassociation.org/

CO_2-EOR

- National Enhanced Oil Recovery Initiative, Carbon Dioxide Enhanced Oil Recovery: A Critical Domestic Energy, Economic, and Environmental Opportunity: http://neori.org/publications/neori-report/
- National Enhanced Oil Recovery Initiative: http://neori.org/
- University of Wyoming Enhanced Oil Recovery Institute: http://www.uwyo.edu/eori/

Technical Considerations

- Clean Air Task Force, Perspectives on Monitoring of Saline and EOR Geologic Carbon Injection and Sequestration Sites: http://www.catf.us/resources/publications/view/139
- National Energy Technology Laboratory CCS Site: http://www.netl.doe.gov/technologies/carbon_seq/index.html

Appendix B: Policy Actions Listed by State

Below is a list of the policy actions noted above organized by state. A more complete list of state actions can be found here: http://www.ccsreg.org/bills.php

California

- Identify regulatory gaps / Develop permitting and technical standard rules/regulations: In 2010, the California Public Utilities Commission (CPUC), the California Energy Commission (Energy Commission), and the Air Resources Board (ARB) released the findings of the California Capture and Storage Review Panel. The panel found that there were several regulatory gaps in existing California law, which made permitting "time-consuming and costly for CCS developers."

Illinois

- Establish CO_2 ownership: The Illinois (S.B. 1704) state government would assume ownership upon the injection of CO_2 captured from the FutureGen CCS project. State agencies would monitor, measure, and verify the permanent status of sequestered CO_2. Prior to injection, the project operator would own the captured CO_2.
- Long-term off-take agreements: Under Illinois's Clean Coal Portfolio Standard (S.B. 1987, 2009), utilities must enter into long-term purchasing agreements with a new clean coal plant that meets certain qualifications.
- Provide grants and initiate programs for clean coal technology development: Illinois has included clean coal development under several initiatives and has given state agencies direction to pursue clean coal projects. Illinois agencies that will work on clean coal issues include the Illinois Finance Authority, the Coal Demonstration Program, the Illinois Coal Revival Program, High Impact Business Designation, Southern Illinois University Clean Coal Review Board
- Include CCS in portfolio standards: Illinois's Clean Coal Portfolio Standard (S.B. 1987, 2009) sets a goal for the state to generate twenty-five percent of its electricity from clean coal facilities by 2025 by requiring utilities and retail supplies to purchase up to five percent of electricity from clean coal facilities.
- Fund Front End Engineering Design (FEED) studies: Illinois's Clean Coal Institute

Indiana

- Designate an agency to oversee CO_2 pipeline construction, operation, and safety: Indiana (S.B. 22, 2006) directed the state utility regulatory commission to create a Pipeline Safety Division and revised the Indiana Code to include CO_2 among materials that are regulated by pipeline transportation regulations.
- Long-term off-take agreements: The Indiana Finance Authority will purchase substitute natural gas (SNG) under a thirty year contract with Indiana Gasification project that will capture carbon from SNG production. The off-take agreement includes a provision for the contract price to adjust to price fluctuations.

Kansas

- Establish a CO_2 storage facility trust fund: Kansas (H.B. 2418, 2010) authorizes the State Corporation Commission to collect fees to put into a "carbon dioxide injection well and underground storage fund."

Kentucky

- Authorize or deny eminent domain for construction CO_2 transportation networks and sequestration of CO_2: Kentucky (SB 50, 2011) states that construction companies can claim eminent domain when building CO_2 transmission pipelines

Louisiana

- Apply to the EPA for primacy to administer Class II or Class VI wells: Louisiana's Department of Natural Resources, Office of Conservation will oversee CO_2-EOR injection in the state. (H.B. 661, 2009)
- Authorizing or denying eminent domain for construction of CO_2 transportation networks and sequestration of CO_2: Louisiana permits a private carrier to use eminent domain power provided that CO_2 is transported for hydrocarbon production (IOGCC report, 2010).
- Determine rules for how pore space can be acquired or aggregated with other claims: Louisiana (H.B. 661, 2009) allows a project operator to acquire subsurface land via eminent domain.
- Assume liability for injected CO_2: Louisiana (H.B. 661, 2009) makes an operator liable for CO_2 during operations and transfers liability to the state 10 years after CO_2 injection is complete.
- Clarify that Class II wells do not have to meet Class VI standards: Louisiana's Geologic Sequestration of Carbon Dioxide Act (H.B. 661, 2009) declares "Nothing in this Chapter shall prevent an enhanced oil and gas recovery project utilizing injection of carbon dioxide."
- Create rules to allow Class II wells to transition to Class VI well: Louisiana (H.B. 661, 2009) authorizes the Office of Conservation to "approve conversion of an existing enhanced oil or gas recovery operation into a storage facility, if necessary, taking into consideration prior approvals of the commissioner regarding such enhanced oil recovery operations."

Massachusetts

- Include CCS in portfolio standards: Massachusetts's alternative portfolio standard (S.B. 2768, 2008), which requires the state to generate twenty percent of its electricity with alternative energy resources by 2020, includes coal with CCS as an eligible source of electricity generation.

Mississippi

- Authorizing or denying eminent domain for construction of CO_2 transportation networks and sequestration of CO_2: Mississippi does not require a CO_2 pipeline operator to be a common carrier in order to exercise eminent domain, but it requires common carrier pipelines to be used for EOR or other hydrocarbon production within Mississippi. A private carrier CO_2 pipeline transporting CO_2 solely for geologic sequestration or to another state without supporting EOR in Mississippi therefore would not be eligible to use eminent domain. (IOGCC report, 2010)
- Establish a CO_2 storage facility trust fund: Mississippi (S.B. 2723, 2011) created a Carbon Dioxide Storage Fund.

- Recognizing CO_2 injected for EOR as geologically sequestered: Mississippi (S.B. 2723, 2011) authorizes its Oil & Gas Board to issue an "order recognizing the incidental sequestration of carbon dioxide that is occurring during its enhanced oil or gas recovery project without requiring the project to qualify as a geologic sequestration facility or otherwise be subject to the provisions of this chapter."
- Sales tax reduction: Mississippi (H.B. 1459, 2009) sets the state income tax rate at 1.5 percent for income from sales of naturally occurring and anthropogenic carbon dioxide used in for enhanced oil recovery or permanent sequestration in a geologic formation.
- Allow cost recovery: The Mississippi Public Service Commission has authorized the Kemper IGCC power project to recover $2.88 billion in investment costs through rate payers. It recently denied the Kemper IGCC project's request to pass on cost overruns through rate payers. In addition, environmental groups are challenging the Public Service Commission's decision to permit cost recovery. The uncertainty could delay the Kemper IGCC project, which is already under construction.

Montana

- Apply to the EPA for primacy to administer Class II or Class VI wells: Montana's Board of Oil and Gas Conservation will regulate CO_2 injection (S.B. 498, 2009). The Board of Oil and Gas Conservation will seek primacy from the EPA to administer Class VI wells and consult with the Department of Environmental Quality and the Department of Natural Resources and Conservation in making rules regarding geologic CO_2 sequestration (S.B. 285, 2011).
- Establish CO_2 ownership: Montana (S.B. 498, 2009) identifies the operator of a CO_2 geologic sequestration site as the owner of injected CO_2, but the title to the captured CO_2 can be later transferred to the state.
- Assume liability for injected CO_2: Montana (S.B. 498, 2009) makes an operator liable for CO_2 during operations and transfers liability to the state following operations.
- Property tax abatement: Montana (H.B. 3, 2007) provides property tax abatements for new investment in CCS equipment and facilities. Property tax abatements could equal up to fifty percent of the taxable value for facilities and equipment involved in capturing, transporting and sequestering carbon dioxide.

North Dakota

- Determine rules for how ownership of pore space can be severed from ownership of surface land: North Dakota (S.B. 2139, 2009) prohibits pore space from being severed by the owner. S.B. 2139 explains that "undivided estates in land and clarity in land titles reduce litigation, enhance comprehensive management, and promote the security and stability useful for economic development, environmental protection, and government operations."
- Create rules to allow Class II wells to transfer to Class VI well: North Dakota (S.B. 2095, 2009) directs its Industrial Commission to allow a CO_2-EOR project to convert to a CO_2 geologic sequestration project subject to the UIC Program's requirements. S.B. 2095 requires a converted CO_2-EOR project to meet the criteria of CO_2 sequestration projects, but further specifies "if during the conversion process unique circumstances arise, the commission, to better ensure that the chapter's objectives are fulfilled, may waive such provisions and may impose additional ones."

- Recognizing CO_2 injected for EOR as geologically sequestered: North Dakota (S.B. 2095, 2009) directs its Industrial Commission to establish rules and procedures for determining the amount of CO_2 that has been or is being stored in an EOR project for the purposes of "carbon credits, allowances, trading, emissions allocations, and offsets, and for other similar purposes."
- State-level investment in CCS or CO_2 infrastructure: The North Dakota Pipeline Authority can provide grants, loans, and bonding authority to CO_2 pipeline projects.
- Severance tax exemption: North Dakota (S.B. 2034, 2009) exempts oil produced from EOR using anthropogenic CO_2 from state severance taxes.

Ohio

- Include CCS in portfolio standards: Ohio's alternative portfolio standard (S.B. 221, 2008), which mandates that the state generate twenty-five percent of its electricity from alternative energy resources by 2025, includes clean coal technologies that capture or control CO_2 emissions as an eligible energy source.

Oklahoma

- Apply to the EPA for primacy to administer Class II or Class VI wells: Oklahoma's Corporation Commission will oversee any facility operating under a Class II permit, while the Oklahoma Department of Environmental Quality will oversee any CO_2 geologic sequestration facility not operating under a Class II permit (S.B. 610, 2009).
- Authorize or deny eminent domain for construction of CO_2 transportation networks and sequestration of CO_2: Oklahoma (SB 610, 2009) states that private operators are prohibited from using eminent domain
- Recognizing CO_2 injected for EOR as geologically sequestered: Oklahoma designated its Conservation Commission to verify and certify CO_2 sequestration from the injection of CO_2 into geologic formations (S.B. 629, 2001). This legislation was passed with an eye toward quantifying the amount of CO_2 sequestered in geologic formations (EOR or non-EOR projects) so operators in Oklahoma could participate in any carbon dioxide emission trading system that would be created in the future (see S.B. 629 legislative intent). Rules authorizing the Conservation Commission to establish and administer a carbon sequestration certification program were adopted in July 2009.
- Severance tax exemption: Oklahoma (Oklahoma Code, Title 68) exempts oil produced from EOR using anthropogenic CO_2 from state severance taxes.

Pennsylvania

- Model a state's geology and oil and gas production sites for CO_2 sequestration potential: Pennsylvania (H.B. 2200, 2008) requested the state Department of Conservation and Natural Resources of the Commonwealth conduct a study to determine suitable geologic formations for carbon sequestration within the state and assess the risks to humans and the environment of a possible state network for CO_2 sequestration.

South Dakota

- Designate an agency to oversee CO_2 pipeline construction, operation, and safety: South Dakota (H.B. 1129, 2009) added CO_2 to the list of materials transported via pipeline that are regulated by the Public Utilities Commission.

Texas

- Authorize or deny eminent domain for construction CO_2 transportation networks and sequestration of CO_2: Texas allows for a CO_2 pipeline operator to choose between operating as a common carrier or a private carrier. Common carriers are granted the power of eminent domain, but must meet obligations to make the pipeline available for use by other parties. A private carrier is not granted eminent domain power (IOGCC report, 2010).
- Cap the time period for technical reviews and hearing processes for CCS projects: Texas (HB 3732, 2007) caps the technical review period at 9 months for clean energy projects, including CCS.
- Establish CO_2 ownership: Texas (S.B. 1387, 2009) identifies the operator of a CO_2 geologic sequestration site as the owner of injected CO_2.
- Recognizing CO_2 injected for EOR as geologically sequestered
- Franchise tax credit: Texas (H.B. 469, 2009) provides a franchise tax credit for three in-state projects that sequester at least seventy percent of CO_2 emissions and a fifty percent reduction in the recovered oil tax rate for enhanced oil recovery projects that use anthropogenic CO_2. Natural gas electric power projects with CCS were made eligible for the franchise tax credit in 2013 (H.B. 2446, 2013) (According to the state of Texas, "the Texas franchise tax is a privilege tax imposed on corporations, including banking corporations and limited liability companies, that are chartered in Texas. The tax is also imposed on non-Texas corporations that do business in Texas." (See: http://www.window.state.tx.us/taxinfo/franchise/franfaq.html)
- Property tax deferral: Texas (H.B. 3896, 2001) provides local property tax deferrals for periods consistent with the development of a large clean energy project.
- Severance tax reduction: Texas (H.B. 469, 2009) reduces its severance tax rate by eighty percent for oil produced from EOR using anthropogenic CO_2.
- Support CCS and CO2-EOR research, development and demonstration: Texas (S.B. 1387) authorized the Bureau of Economic Geology of the University of Texas at Austin to prepare a report for the legislature on potential requirements for CO_2 storage in different geologic formations and possible requirements for regulations.

West Virginia

- Clarify that Class II wells do not have to meet Class VI standards: West Virginia (H.B. 2860, 2009) does not intend for legislation regarding CO_2 geologic sequestration to "to impede or impair the ability of an oil, natural gas or coalbed methane operator to inject carbon dioxide through an approved enhanced oil, natural gas or coalbed methane recovery project and to establish, verify, register and sell emission reduction credits associated with the project."

Wyoming

- Determine rules for how ownership of pore space can be severed from ownership of surface land: Wyoming (HB 89, 2008) allows pore space owned by surface owner to be severed.
- Determine rules for how pore space can be acquired or aggregated with other claims: Wyoming (H.B. 80, 2009) prohibits the Wyoming Oil and Gas Conservation Commission from issuing orders regarding the beginning of carbon sequestration operations until "the plan of unitization has been signed or in writing ratified or approved by those persons who own at least eighty percent (80%) of the pore space storage capacity within the unit area."
- Establish financial requirements for long-term CO_2 management: Wyoming (H.B. 17, 2010) requires an operator to have public liability insurance to receive a permit for geologic CO_2 sequestration. Wyoming also has a requirement for an operator to obtain bonding or other financial assurance to faithfully comply with state regulations on CO_2 sequestration.
- State-level investment in CCS or CO_2 infrastructure: The Wyoming Pipeline Authority can provide grants, loans, and bonding authority to CO_2 pipeline projects.
- Severance tax exemption: Wyoming (Title 39-14-201) exempts oil produced from EOR using anthropogenic CO_2 from state severance taxes.

Endnotes

[1] Environmental Protection Agency (EPA), 2010, Fact Sheet for Geologic Sequestration and Injection of Carbon Dioxide: Subparts RR and UU: http://www.epa.gov/ghgreporting/documents/pdf/2011/documents/Subpart-RR-UU-factsheet.pdf

[2] Ibid.

[3] Environmental Protection Agency, "UIC Program Primacy" http://water.epa.gov/type/groundwater/uic/Primacy.cfm

[4] CO_2 Capture Project, 2012, "Regulatory Challenges and Key Lessons Learned from Real World Development of CCS Projects" http://www.co2captureproject.org/reports/regulatory_study.pdf

[5] Midwestern Governors Association (MGA), 2011, Key Components of a State-Level Statutory & Regulatory Framework to Support Deployment of CCS in the Midwest: http://www.midwesterngovernors.org/CCS/MGA_CCSTF_Regulatory_Framework_Components_MAY_2011.pdf.

[6] Ibid.

[7] Interstate Oil and Gas Compact Commission (IOGCC), 2007, Storage of Carbon Dioxide in Geologic Structures, A Legal and Regulatory Guide for States and Provinces: http://iogcc.publishpath.com/Websites/iogcc/PDFS/2008-CO2-Storage-Legal-and-Regulatory-Guide-for-States-Full-Report.pdf.

[8] Ibid.

[9] Midwestern Governors Association, Key Components of a State-Level Statutory & Regulatory Framework to Support Deployment of Carbon Capture and Storage (CCS) in the Midwest http://www.midwesterngovernors.org/CCS/MGA_CCSTF_Regulatory_Framework_Components_MAY_2011.pdf

[10] Derman, 2008, "Unitization": http://corporate.findlaw.com/business-operations/unitization.html.

[11] State of Indiana, Dec. 16, 2010, Press Release, State reaches agreement on plans to build SNG facility, bring jobs to southern Indiana: http://www.in.gov/ifa/files/121610_SNG_Release.pdf

[12] Mississippi Public Service Commission, June 30, 2010, Annual Report: http://www.psc.state.ms.us/executive/pdfs/2010/2010%20ANNUAL%20REPORT.pdf.

[13] Midwestern Governors Association (MGA), 2011: Key Components of a State-Level Statutory & Regulatory Framework to Support Deployment of CCS in the Midwest: http://www.midwesterngovernors.org/CCS/MGA_CCSTF_Regulatory_Framework_Components_MAY_2011.pdf.