Regulation for Underground Storage of CO_2 Passed by U.S. States

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ABSTRACT

This working paper reviews the legislation that has been passed by US states in the last few years addressing the issue of underground storage of CO_2. The major issues covered by the legislation include: liability, the establishment of a storage fund, pore space ownership, CO_2 ownership, unitization, primacy, and interstate issues. This paper documents how the states have treated these issues.

1. OVERVIEW

Carbon Capture and Sequestration (CCS) was identified by the International Energy Association (IEA) in its Technology Road Map in 2011[1] as the only technology currently available that can mitigate greenhouse gas (GHG) emissions from large-scale fossil fuel usage in fuel transformation, industry and power generation. Its use, therefore, is necessary in order to achieve the CO_2 emission reduction target and climate goals by 2050.

Many factors are currently obstructing the deployment of CCS projects worldwide. These include financial issues, public acceptance and the delay in the establishment of regulatory frameworks. It is necessary for a robust and comprehensive regulatory framework to be in place prior to the commencement of CCS pilot and demonstration projects. The lack of a regulatory framework can result in an environment of uncertainty and as a result projects may become delayed and even cancelled.

Several states in the U.S. over the past several years have passed CCS regulatory legislation. This includes legislation that covers capture, transportation, injection and storage of CO_2. To date nine states have passed regulation that addresses the underground injection of CO_2. This working paper summarizes the main issues addressed and how their treatment varies between states.

2. KEY ISSUES

Although each of the nine states has passed slightly different legislation, they do address similar issues related to storing CO_2 in the subsurface. We have identified seven main areas addressed by the legislation. These seven areas are:

- ***Liability***: How long the operator is responsible for the site post closure.
- ***Storage Fund***: A fund established for the long-term management and monitoring of CCS storage sites.
- ***Pore Spac***e: Who owns the pore space into which the CO_2 is injected.
- ***Unitization***: What percentage of landowners is required to agree to the project before it can proceed.
- ***CO_2 ownership***: Who owns the CO_2 after it is injected into the ground.

[1] http://www.iea.org/publications/freepublications/publication/name,39359,en.html

- ***Primacy***: Which subsurface rights have primacy (i.e., mineral rights vs. CO_2 storage rights).
- ***Inter-state boundary issues***.

The following table summarizes the different state legislation and which topics they cover. Some states have multiple pieces of legislation. For example, Wyoming has passed five bills which address underground injection of CO_2. This table covers all the main issues which have been included in the legislation passed by each state.

	Liability	Storage Fund	Pore space owner	CO_2 owner	Unitization	Primacy	Inter-state
Montana	X	X	X	X	X	X	
Wyoming		X	X	X	X	X	
North Dakota	X	X	X	X	X		
Oklahoma				X		X	
Kansas	X	X					
Illinois	X						
Louisiana	X	X		X			
Texas (onshore)		X		X		X	
Texas (offshore)	X	X					
West Virginia						X	X

2.1 Liability

Six states have addressed the issue of long-term liability and transfer of site ownership to the state post-injection.

- Montana (SB 498, 2009)
- Texas (HB 1796, 2009)
- North Dakota (SB 2095, 2009)
- Illinois (SB 1704, 2007)
- Louisiana (HB 661, 2009) and (HB 1220, 2008)
- Kansas (HB 2418, 2010)

Five states, Montana, Texas, North Dakota, Illinois and Louisiana all will assume liability of the CO_2 storage site in some form and at a defined period of time. The operator(s) are required to monitor the site and CO_2 up and until the site is transferred to the state. The amount of time required varies from 0 years to never. Note that the EPA Class VI CCS well permit requires a

50-year post-injection monitoring timeframe, although the EPA has outlined that this 50 year monitoring period is potentially adjustable.

State assumes liability on well closure (0 years)

Two states will assume responsibility for the CO_2 injection site on well closure. These are Illinois (SB 1704, 2007) and Texas offshore (HB 1796, 2009). In Illinois this bill is specifically for the FutureGen project where the State of Illinois assumes liability for all the CO_2 injected, both during the injection process and afterwards. It is therefore not an indication that Illinois will assume liability on closure for all future CCS projects in Illinois.

In offshore Texas, (HB 1796, 2009) at the completion of the offshore project, the CO_2 liability is transferred from the operator to the Texas School Land Board's permanent school fund. The operator however is liable for the CO_2 until the site is closed and the title handed over to the State. (The Texas School Land Board is a government department that manages the sale and mineral leasing of the Permanent School Fund lands. This is half of the public land from which the profits have been earmarked to finance public schools). It is interesting to note that Texas does not have any legislation for onshore liability transfer.

State assumes liability after 10 years

Two states assume the CO_2 liability after 10 years: North Dakota (SB 2095, 2009) and Louisiana (HB 661, 2009). Both of these states set the minimum at 10 years and require a certificate of well closure, project completion and proof of well integrity since the well closure occurred. In Louisiana's legislation, if the operator cannot show that that the reservoir has mechanical integrity, then the state can assume ownership of the storage site but not the liability. Louisiana's legislation also states that it "does not assume liability by the mere act of assuming ownership of the facility" (HB 661, 2009). The monitoring of the site is to be solely covered by the *CO_2 Geologic Storage Trust Fund* (see section 2.2). However if this Fund is to run out after the transfer of ownership to the state, then the storage site could potentially end up neither being the state's liability or the operator's[2].

State assumes liability after 30 years

Montana (SB 498, 2009) has the longest of all the individual States liability transfer policies with a 30-year transfer liability. Montana has broken the liability transfer into two steps. A certificate of completion can be issued to the project 15 years after the project has finished and there is demonstration that no leakage or movement of the CO_2 out of the storage reservoir has occurred. An additional 15 years after the issuance of the certificate of completion has been issued (a total of 30 years since the injection finished) the liability of the injection project can be transferred to the State.

[2] Analysis of Carbon Capture and Sequestration Pore Space Legislation: A Review of Existing and Possible Regimes . *E.Aldrich, C. Koerner.* Boise State University ScholarWorks http://scholarworks.boisestate.edu/cgi/viewcontent.cgi?article=1005&context=pubadmin_facpubs

State will not assume liability

Kansas initially indicated that it would assume liability for the CO_2 injection site upon closure in HB 2419 (2007), although it didn't specifically outline the process. However, HB 2418 (2010) specifies that the state of Kansas would not be liable or responsible for any CO_2 injection well or storage site.

2.2 Storage Fund

Six states have passed legislation for the establishment of funds for the long-term management and monitoring of the CCS sites. Each of these states will be looked at briefly with regards to the establishment of their storage funds and where the money will come from. In all cases the money which is earmarked to these funds is from the project itself. The money may come from a variety of fees: project application fees, well permitting fees, annual well operating fees, the well closure fee and if assigned, the amount per metric ton of CO_2 injected. The following will briefly look at each of the following six states and the legislature which has created the establishment of their CO_2 storage fund:

- Montana (SB 498, 2009)
- Wyoming (HB 17, 2010)
- Texas offshore (HB 1796, 2009)
- Texas onshore (SB 1387, 2009)
- Kansas (HB 2419, 2007)
- North Dakota (SB 2095, 2009)
- Louisiana (HB 661, 2009)

Kansas

Kansas's legislation (HB 2419, 2007) defines that the *Carbon Dioxide Injection Well and Underground Storage Fund* is to be used for all expenses, including permitting, regulatory oversight, and long term monitoring. The fees for this fund have been established at $0.05/ metric ton of injected CO_2. In addition to this fee the commission is allowed to collect penalties for the release of CO_2 from properties and facilities of up to $10,000 per violation per day. Kansas has a storage facility permit application fee of $4,500 plus $100/well with an annual fee of $1000/well[3].

Louisiana

Louisiana's (HB 661, 2009) created a *CO_2 Geologic Storage Trust Fund*. It has not defined the fee per metric ton of CO_2 injected, but it has defined that the operator must pay the fee for a minimum of 120 months with a maximum of $5 million for each operator. The legislation also addresses damage payments for the operator. It caps the payment at $500,000 for a major injury.

3 K.A.R. 82-3-1119 http://www.kcc.state.ks.us/conservation/cons_rr_062513.pdf

Wyoming

Wyoming's (HB 17, 2009) legislation is solely for the establishment of the *Geologic Sequestration Special Revenue Account*. This fund is to be used for the measurement, monitoring and verification of the geologic sequestration sites following the site closure certification, release of all financial assurance instruments and termination of the permit. The fees are to be paid by the permit holders of the CCS site and this fee may either be per ton of injected CO_2 or as a lump sum closure fee. The fee per metric ton of CO_2 injected has not yet been determined.

North Dakota

North Dakota's legislation (SB 2095, 2009) has established two funds for CCS projects. One is a short-term administrative fund for use by the commission during the permitting, construction, operating and pre-closure phases of the project. The other fund is for the long term monitoring and management of the closed CCS site. The operators will have to pay per ton of CO_2 injected for storage. The North Dakota Industrial Commission in 2010, defined that operators need to pay $0.01/ metric ton injected into the short term administrative fund and $0.07/ metric ton into the long term monitoring fund[4].

Texas- Onshore and Offshore

Texas onshore legislation (SB 1387, 2009) has created the *Anthropogenic Carbon Dioxide Storage Trust Fund* to cover long term monitoring and expenses of CO_2 injection and storage sites. The Railroad Commission is in charge of this fund and stipulates a $75,000 application fee with $50,000/year for each well post injection and pre-closure. (SB 1387, 2009) has also defined a $0.10/ metric ton of CO_2.

Texas offshore legislation (HB 1769, 2009) grants the Texas School Land Board to oversee the offshore CCS sites that are within 12 miles of the coast. This legislation creates the *Texas Emissions Reduction Plan Fund* and the School Land Board is authorized to set fees for CO_2 storage. However the exact details of how much is to be paid into this fund and how it to be used is left for later legislation.

Montana

Montana's legislation (SB 498, 2009) allows the operator the option of setting up a fund for long-term site management. The operator has the option of not setting up a fund if they are willing to accept the liability of the project indefinitely. If the operator(s) choses to hand over the liability 30 years after well closure, then the company has to pay into the *Geologic Storage Reservoir Program Account*. This fund is authorized to cover the monitoring and management of the site after it has been transferred to the state. The amount for the operator to pay into the fund has not been set.

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4 Analysis of Carbon Capture and Sequestration Pore Space Legislation: A Review of Existing and Possible Regimes . E.Aldrich, C. Koerner. Boise State University ScholarWorks http://scholarworks.boisestate.edu/cgi/viewcontent.cgi?article=1005&context=pubadmin_facpubs

2.3 Pore Space Ownership

Three states have legislation that specifically addresses pore space ownership with respect to CCS:

- Montana (SB 498, 2009)
- Wyoming (HB 89, 2008)
- North Dakota (SB 2139, 2009)

All three states have defined that that the subsurface pore space is property of the surface owner. Montana (SB 498, 2009) and Wyoming (HB 89, 2008) allow transfer of pore space as a separate property from the surface. In comparison North Dakota (SB 2139, 2009) defines that the pore space belongs to the owner and that the title to the pore space may not be severed from the owners of the overlying property, although leasing is allowed.

2.4 CO_2 Ownership

CO_2 ownership post injection ties into long-term liability and who owns and is responsible for the CO_2 once it is in the ground. Six states have specifically addressed the ownership of CO_2 post injection:

- Montana (SB 498, 2009)
- Wyoming (HB 58, 2009)
- Texas onshore (SB 1387, 2009)
- Oklahoma (SB 610, 2009)
- Louisiana (HB 661, 2009)
- North Dakota (SB 2095, 2009)

Montana, Wyoming, Texas, Oklahoma and North Dakota have all defined that the project operator is responsible and owns the CO_2 up to and until the liability is transferred to the state. Louisiana (HB 661, 2009) further defines that although the project operator has CO_2 ownership, it is possible to transfer the CO_2 ownership when the CO_2 is in the storage facility. It is clearly outlined in all legislation that the pore space owner is not responsible to the injected CO_2.

2.5 Unitization

CCS follows the same unitization legislative framework as that observed by the oil and gas industry. Unitization provides for the exploration and development of an entire geologic structure or area by a single operator so that site development may proceed[5]. Three states have currently passed legislation that addresses unitization:

- North Dakota (SB 2095, 2009)
- Wyoming (HB 80, 2009)

[5] http://www.blm.gov/mt/st/en/prog/energy/oil_and_gas/reservoir_management/unitization.html

- Montana (SB 498, 2009)

These three states are the states which have already defined CCS pore space legislation as seen previously in section 2.3. The occurrence of oil and gas production in these states gives an indication as to why they have specifically addressed unitization and pore space legislation with regards to CCS. The unitization legislation which has been passed by these states varies slightly. There is a small range of requirement of percentage of owner approval between 60- 80% of the pore space. The following briefly discusses these differences.

Unitization at 60%

Both Montana (SB 498, 2009) and North Dakota (SB 2095, 2009) have ruled that unitization may occur when owners of 60% of the pore space consent to the CCS project. In Montana, once the operators have signed approval by owners of 60% of the pore space, they can apply for to the Montana Board of Oil and Gas Conservation to have the site operated as a unit.

Unitization at 80%

Wyoming (HB 80, 2009) requires approval by owners of 80% of the pore space before submitting to the Wyoming Oil and Gas Conservation Commission for unitization. However under this percentage may be dropped to 75% on special circumstances.

2.6 Mineral Rights Primacy

Five states have passed legislation regarding primacy of subsurface minerals and mineral rights with regards to CCS. These are:

- Wyoming (HB 89, 2008) and (HB 57, 2009)
- Texas onshore (SB 1387, 2009)
- Oklahoma (SB 610, 2009)
- Montana (SB 498, 2009)
- West Virginia (HB 2860, 2009)

All legislation defines that mineral rights have primacy over CCS. Wyoming's legislation (HB 57, 2009) states that the existence of minerals in the subsurface takes precedence over the occurrence of pore space. Texas legislation (SB 1387, 2009) defines that a CCS permit may only be issued if it is shown that CCS will not endanger or injure any oil, gas or other mineral formations. In Oklahoma (SB 610, 2009), the Corporation Commission will determine if the chosen CCS site is suitable and if it will impact any existing mineral resources.

2.7 Interstate Issues

Interstate issues are important and may play an increasingly complex issue when large volumes of CO_2 are injected into the subsurface and that plume begins migration into neighboring states. Currently only West Virginia (HB 2860, 2009) has passed legislation that addresses the possibility of interstate interaction with regards to CO_2 storage. However West Virginia's bill (HB 2860, 2009) only allows cooperation with interstate agencies for the purpose of formulation

and creation of interstate agreements. It does not begin to delineate all the issues associated with interstate CO_2 storage.

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3.2 State Legislation

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4. APPENDIX

Table 1. State Legislation, Bill number, year passed and what the bill covers.

State	Bill and year	What it cover
Montana	SB 498 (2009)	Liability, Pore space, Storage fund, Unitization, Primacy, CO_2 ownership
Wyoming	HB 57 (2009)	Primacy
-	HB 17 (2010)	Storage fund
-	HB 58 (2009)	CO_2 ownership
-	HB 80 (2009)	Unitization
-	HB 89 (2008)	Pore space, Primacy
Texas (offshore)	HB 1796 (2009)	Storage fund, Liability
Texas (onshore)	SB 1387 (2009)	Storage fund, Primacy, CO_2 ownership,
Oklahoma	SB 610 (2009)	Primacy, CO_2 ownership
Kansas	HB 2419 (2007)	Storage fund
-	HB 2418 (2010)	Liability
North Dakota	SB 2095 (2009)	Liability, Storage fund, CO_2 ownership, Unitization,
-	SB 2139 (2009)	Pore space
Illinois	SB 1704 (2007)	Liability (FutureGen)
West Virginia	HB 2860 (2009)	Primacy, inter-state boundary
Louisiana	HB 661 (2009)	Liability, CO_2 ownership, Storage fund
-	HB 1220 (2008)	Liability