



Legal and Regulatory Aspects of CCS

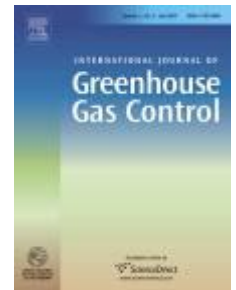
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Phases of a CCGS Operation

1. Capture of CO₂ at large stationary sources
2. Transportation of CO₂ by pipeline or ship
3. Injection of CO₂ through wells (active operational phase)
4. Post-injection (passive, monitoring phase)



Current Barriers to CCS Deployment

- Technological
- Economic and financial
- Public attitude and acceptance
- *Policy, legal and regulatory*



Legal and Regulatory Barriers

to CCGS Deployment: Why?

- Applicable laws not developed with CCS in mind
- Different legal and regulatory entities are involved
- Existing regulatory framework may be applicable to the active, short-term phases of CCGS, but not for long-term
- The legal and regulatory framework has yet to be set, only in incipient stage in some jurisdictions



Type of Policy, Legal and Regulatory Issues

1. Protection of Intellectual Property (IP), particularly capture technology, and technology transfer
2. Jurisdictional
3. Property issues (storage)
4. Regulatory (storage)
5. Liability (storage)

Intellectual Property



1. Protection of Intellectual Property through patents, trade secrets, etc. – usually private companies, multinationals, developed economies
2. Access to IP to develop economy and protect the environment – developing economies
3. How to balance private, national and global interests?



Types of Jurisdictional Issues

Who has jurisdiction over what and whose or what laws apply:

- Territorial jurisdiction
- Organizational jurisdiction
- Constitutional jurisdiction



Territorial Jurisdiction

- International agreements (in force or being negotiated, e.g. London Convention and OSPAR)
- National jurisdiction, including territorial waters
- Sub-national jurisdiction (state or provincial in federal nations)
- Transborder movement (intended, as in pipelines, or unintended, as in plume migration)



Organizational Jurisdiction

Competition between, different mandates, and different philosophies and approaches of:

- Development/Energy ministries/departments – “you can do it unless explicitly forbidden” 😊
- Environment ministries/departments/agencies, which tend to be more restrictive – “you can’t do it unless explicitly allowed” ☹️



Constitutional Jurisdiction in Federal Nations

Issue of overlap, differences and precedence
between federal/national and state/provincial:

- Natural resources versus waste disposal
- Air, water, subsurface
- Sea, subsea

Various level of government have different, sometimes
overlapping jurisdiction over various parts of the CCGS
chain



Differences between Policy, Legal, Regulatory and Liability Aspects

1. Policy: What governments (should) do to encourage or discourage a particular activity
2. Property (Legal): The right to engage in a particular lawful activity on your property
3. Regulatory: Permission to engage in that particular activity if certain conditions are being met
4. Liability: Who is responsible in case of failure



Where are the Stumbling Blocks?

1. Capture and transportation are industrial processes that are active only during the operational stage of a CCS project and that are extensively regulated, with precedents and analogues from other industries
2. ...



Where are the Stumbling Blocks?

1. ...
2. Injection: process extensively regulated, at least in certain jurisdictions, and that model can be adapted and/or adopted
3. *Storage: long term, unregulated process as yet, with analogues in some jurisdictions*



Policy Issues

- 1) Treatment of CO₂ under existing laws:
 - Many environmental laws and treaties were enacted before climate change and greenhouse gases became a concern
 - Is CO₂ covered under existing laws?
 - Is the treatment of CO₂ appropriate?
 - How existing laws and treaties affect CCGS?



Policy Issues

2) Classification of the CO₂ injection stream:

- Commodity (if it is produced from the ground or traded)?
- Greenhouse gas?
- Pollutant?
- Contaminant?
- Waste?
- Hazardous waste?
- Toxic substance?

Depending on classification, it will be treated differently and it will be subject to more or less stringent controls and regulations, regardless of CO₂'s intrinsic characteristics, which may pose an unreasonable barrier to CCS implementation



Policy Issues

- 3) Incentivization of CCGS through any combination of the following:
- Setting a carbon price
 - Limiting CO₂ emissions
 - Requiring that CCGS is part of certain industrial facilities (old and/or new)
 - Subsidizing CCGS (e.g., tax credits)

Property/Ownership Issues



- 1) Ownership of subsurface rights: the right to use the land for various purposes, including storage of various substances, including wastes (subject to applicable regulations)
 - State, Crown, government
 - Free holders
- 2) Ownership of surface rights: access and construction of facilities, third party access, trespassing
- 3) Right to give or deny to others rights to engage in a particular activity, subject only to the State's right of eminent domain

Property/Ownership Issues



4) Severed estates in the case of split rights to petroleum, natural gas and/or coal

5) Large footprint of CCGS operations during the active and passive stages of storage, covering land own by different owners (state/crown and free holders)

→ *Unitization and/or expropriation, where legislation exists*

Property/Ownership Issues



- 6) Ownership of the pore space and mineral rights
 - Lessees of mineral rights (PNG) usually do not own the pore space and do not have the right to inject/dispose of CO₂ except when used as part of a mineral extraction process (enhanced oil or gas recovery)

- 7) Granting of CO₂ disposal/storage rights (in Alberta)
 - Under *Mines and Minerals Act*?
 - Under the *Water Act*?
 - Under a new, currently nonexistent act?

Property/Ownership Issues



- 8) Granting by the Crown/State/Free Holder of rights to dispose/store CO₂
- Finite and scarce resource (storage/pore space)
 - Permanent disposal of rights, unlike mineral leases
 - Current lack of charges for granting these rights
 - Competition and priority between storage/disposal rights and other mineral rights, co-optimization of resources
 - Fossil fuel production for energy security and revenue, vs
 - CO₂ storage for greenhouse gas emission reduction

Property/Ownership Issues



- 9) In the case of CO₂ storage/disposal in oil and gas reservoirs without the express objective of enhanced recovery:
- Acquisition of mineral rights to the incremental hydrocarbon recovery that will likely be triggered by the CO₂ storage operation
 - Lack of charges for the grant of these rights

Property/Ownership Issues



- 10) In the case of CO₂ storage/disposal in deep saline aquifers (in Alberta):
- Relinquishment/return to the land owner of the rights to any mineral (e.g., oil and/or gas) resources discovered during the exploration, characterization and implementation stages of a CO₂ storage/disposal operation

Property/Ownership Issues



11) Current storage/disposal rights (in Alberta):

- For fluid wastes (industrial, municipal)
- For oilfield waste
- For natural gas
- For “fluid mineral substances” obtained from a mineral by processing or otherwise (e.g., acid gas)

→ *There is no legislation for allowing storage/disposal of CO₂ originating from other industrial processes and sources such as power plants*

Property/Ownership Issues



12) Surface rights

- The operator must obtain separate consent from the surface owner, or
- Obtain right of entry from the Surface Rights Board (in Alberta) or equivalent regulatory body, including compensation
- SRB (in Alberta) has authority regarding access for mineral rights, energy conservation and linear access (pipelines, transmission lines and telephone lines). It may cover wells drilled for enhanced recovery or acid gas disposal, but not necessarily for the storage of CO₂ from an industrial source



Regulatory Issues

- Purpose of CO₂ injection
- Origin, type and level of impurities in the CO₂ stream (H₂S, NO_x, So_x, etc.)
- Application and permitting/approval process
- Operational and post-operational monitoring and remediation (the *“what?”* and *“how often?”*)



CO₂ Injection Purpose

- For enhanced hydrocarbon recovery and natural gas storage schemes: under energy/mineral production laws (in Alberta under the *Oil and Gas Conservation Act*)
- For disposal/storage purposes: in most jurisdictions most likely there is no regulatory framework (in Alberta *EUB Directive 65, Section 4* deals with acid gas disposal, and *EUB Directive 51* deals with well classification and requirements, including specifically CO₂ and acid gas injection)



Regulatory Status

- Some North American jurisdictions, like Alberta and Texas, have already in place a regulatory framework for CO₂ transportation and injection, for both enhanced oil recovery and acid gas disposal, that can be adapted and/or adopted for the operational phase of CCGS (in Alberta, CO₂ is explicitly listed among allowed injection fluids in Class III injection wells!)
- There is need for the development of a post-operational (post-injection) regulatory framework

Alberta's Regulatory Framework for Acid Gas Disposal



- The applicant must have the right to dispose in the requested formation
- Disposal will not impact hydrocarbon recovery
- The disposed fluid will be confined to the injection formation
- The owners of offset wells within a specified distance from the disposal well have no objections
- The applicant satisfies containment and isolation requirements, including well construction and abandonment

Location of Acid-Gas Injection Sites in Canada



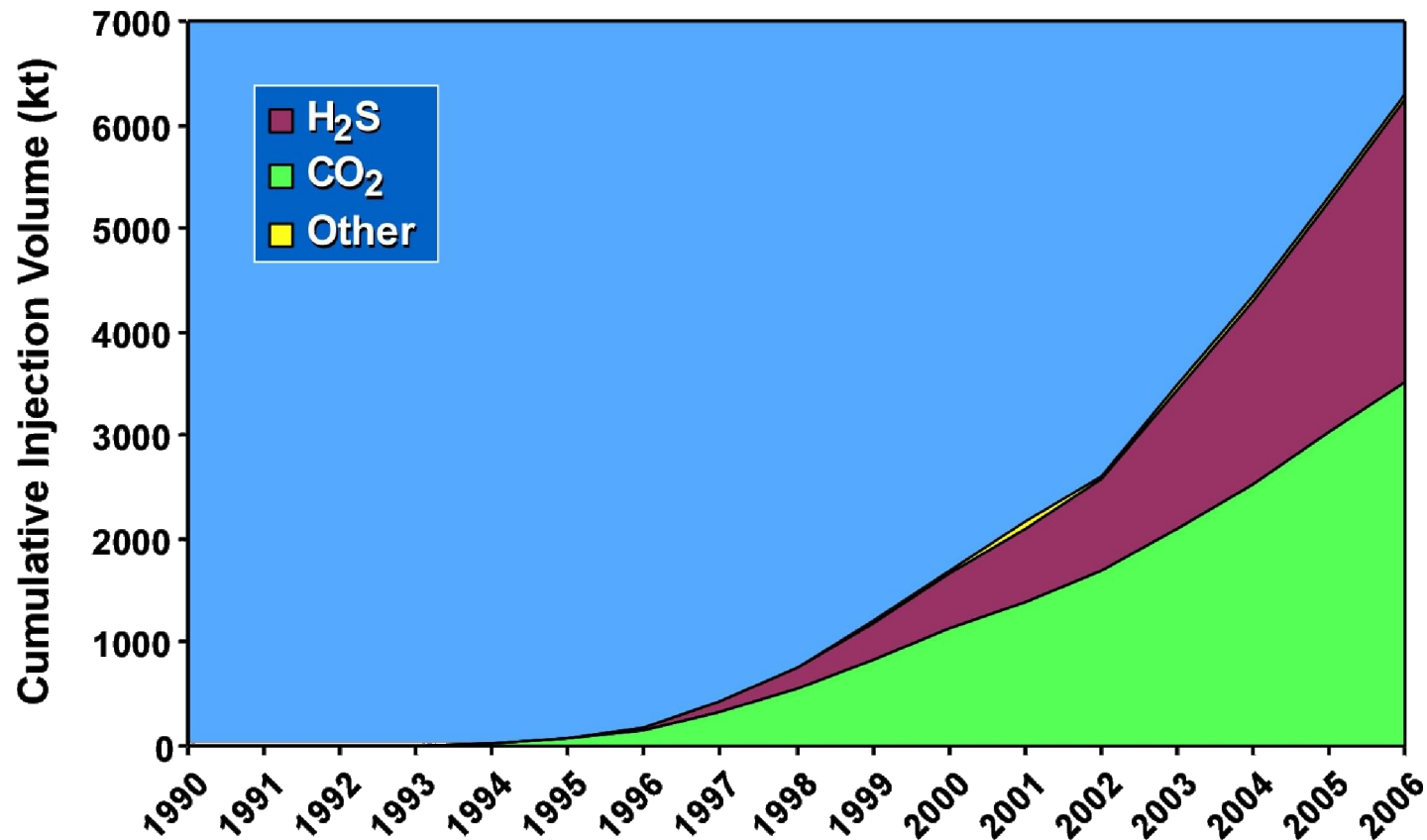


Average Composition of Acid Gas Injected in Western Canada





Cumulative Amount of Acid Gas Injected in Western Canada



Concerns Expressed in Alberta



- Preference by public for acid gas injection rather than flaring or other forms of sulphur recovery
 - Potential for flaring and/or atmospheric emissions in the event that the injection facility is shut down for whatever reason
 - Potential for contamination of groundwater resources
 - Whether other operators now and in the future will know about the existence, location and extent of an acid gas disposal scheme (hence, by extension, of a CCGS scheme)
- ➔ *Need for proper records and registry of such schemes*

Regulatory Framework for Abandonment in Alberta



- *Abandonment*: permanent dismantlement of the licensed facility so it is permanently incapable of its licensed use
- Subsurface abandonment regulated by EUB under the *Oil and Gas Conservation Act* (EUB Directive 20: Well Abandonment addresses groundwater protection and zonal isolation)
- Surface abandonment, including land reclamation and decontamination, is regulated by Alberta Environment
- ➔ *Need for coordination between responsible agencies*
- No post-abandonment monitoring required



Liability along the CCGS Chain

- Liability during CO₂ capture, transportation and injection is well covered by existing legislation and practices
- *Post-operational liability needs to be established*



Types of Liability Issues

- 1) Legal Liability by operator or another party to those who suffer harm as a result of the CCGS operation, particularly slow or catastrophic leakage
- 2) Remedial Liability by the operator to take remedial action in case of leakage
- 3) Credit/Accounting Liability that may accrue for atmospheric release of CO₂ in a emission-constrained national and international framework

Credit Liability Issues



1) Credit allocation during the CO₂ storage process

- CO₂ emitter (e.g., power plant)
- pipeline operator
- field and well owner and operator

Reverse analogy with the oil and gas industry:

- *upstream (exploration and production),*
- *midstream (gathering and pipelines), and*
- *downstream (refineries and gas stations)*

2) Third party transfer of credits and/or liability during and/or after the active injection phase as a result of merger, acquisitions and/or bankruptcy



Legal and Remedial Liability Issues

- 1) Long term liability after cessation of injection (the “*who?*”), individually or joint
 - Operator
 - Credit owner
 - Land owner
 - The State

- 2) Third party transfer of liability during and/or after the active injection phase as a result of mergers, acquisitions and/or bankruptcy



Legal and Remedial Liability Issues

- 3) Liability purpose (the *“what?”*)
 - Monitoring
 - Remediation in case of leakage
 - Financial indemnification in case of harm to third party

- 4) Longevity of the liable party

Long Term Liability



5) Long term ownership

- “Orphan” sites
- Ultimate transfer to the state (what level of government in federal nations: federal or state/provincial?)

The state of Texas and Illinois passed legislation to undertake liability for FutureGen, is this setting a precedent?

In France abandoned wells are taken over by the state, in North America operators are liable for abandoned wells in perpetuity!

Abandoned Well Leaking Brine and Gas near Peace River, Alberta



Who will take care of an orphan CCGS site?



Natural Gas Seepage at Hot Pots, northern Alberta, Canada



Who will take care of a CO₂ leak?

Gas Bubbling at the Cap Welding of the Surface Casing



Who will take care of CO₂ leaks through wells?

Saskatchewan's Post-Closure of Mining Operations



- 1) Operator must advise of abandonment intent and submit a decommissioning and reclamation plan that must be approved by the Crown
- 2) After decommissioning and reclamation, the site enters a transition-monitoring phase at the expense and liability of the owner/operator
- 3) At the completion of the transition-monitoring phase, the operator may apply for release , and the site, after inspection, enters the *Institutional Control Program* whereby custodial responsibility is transferred to the Crown and the operator is released from further monitoring, maintenance and surface lease
- 4) Prior to entry in the Institutional Credit Program the operator must deposit sufficient funds to cover anticipated future monitoring, maintenance and remedial costs, funds to cover unforeseen events and a fee.

Note: Uranium mines in the province are the main driver of this legislation



IOGCC's Suggested Regulatory Framework for CO₂ Geological Storage

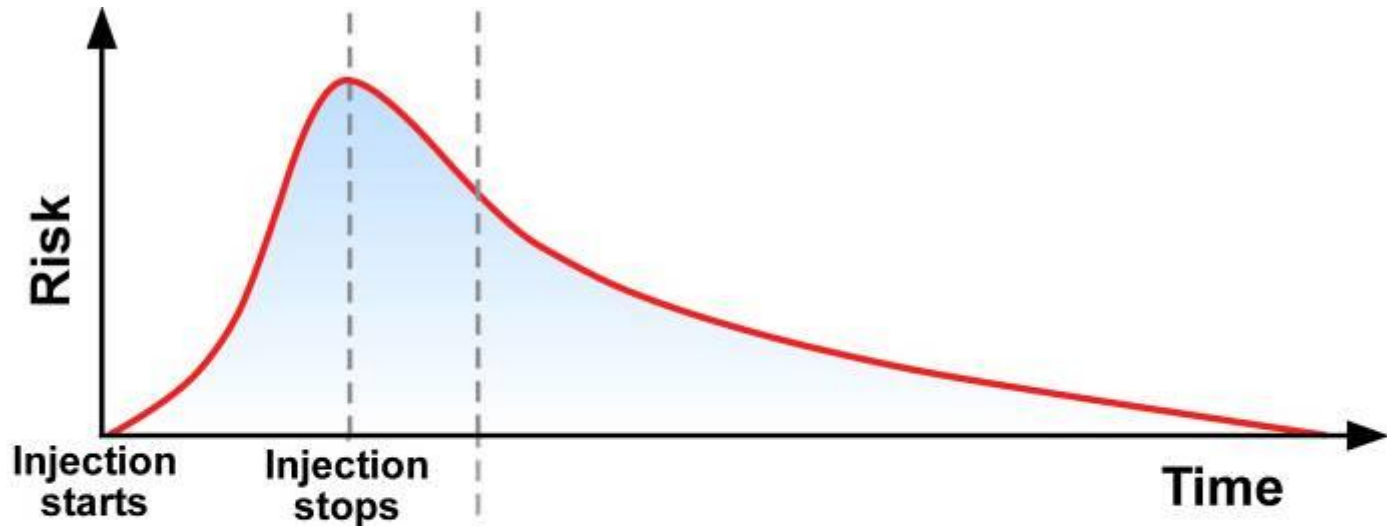
- 1) The States or Provinces should retain regulatory authority for CCGS
- 2) Existing regulatory framework for oil and gas production, including EOR, and for natural gas storage and acid gas disposal can be adopted/adapted for the active phases of CO₂ storage
- 3) The post-injection period should have a *Closure Phase* and a *Post-Closure Phase*
- 4) Before cessation of CO₂ injection, the operator should submit an abandonment and monitoring plan during the Closure Phase, which has to be approved by the regulatory agency
- 5) ...



IOGCC's Suggested Regulatory Framework for CO₂ Geological Storage

- 5) Prior to the end of the Closure Phase the operator should submit an abandonment and monitoring plan to the regulatory agency, which should be approved by the latter
- 6) The operator retains liability during the active and closure phases and for abandoned wells and facilities during these periods The regulatory agency takes over long term monitoring and liability for only those wells and facilities transferred to the regulatory agency at the end of the Closure Phase
- 7) Operational and performance bonds are released to the operator at the end of the Closure Phase
- 8) The CO₂ emitter pays into a fund for Post-Closure monitoring and remediation a set fee per tonne of stored CO₂

CCGS Operational Phases and Suggested Liability



Operational Period	Active	Closure	Post-Closure	
Monitoring Frequency & Resolution	High	Targeted	Decreasing	Low
Liability	Operator and/or Emitter		State Agency	



Concluding Remarks

- Current uncertainty about the legal and regulatory framework that will apply to CCS projects means that industry is unlikely to invest in the technology and financial institutions won't assume lending risks
 - ➔ Policy makers need to establish the legal framework
 - ➔ Regulators will establish the regulatory framework!