Managing Long Term Liability Associated with Carbon Storage

Elements of a Potential Policy Framework

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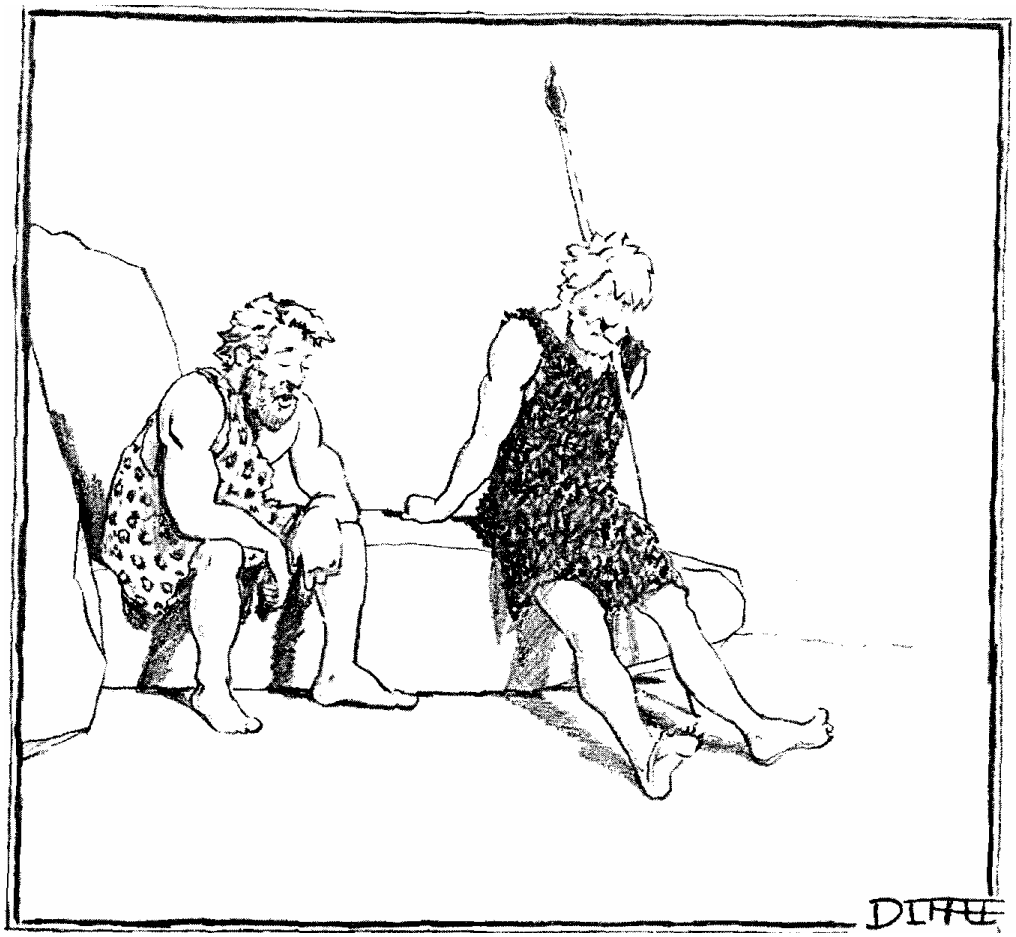
Discussion Predicates

- Narrowly focus on the long-term or post closure liability associated with storage – for the moment, accept that satisfactory rules for siting and operation will be developed (we will revisit this presumption at the end of the discussion)
- Consider at least two sets of projects: an initial round of pilot projects (potentially including some commercial scale facilities) and commercial deployment

Several Efforts to Address LT Liability Underway (alphabetically)

- Illinois FutureGen
- IOGCC
- MIT / de Figueiredo
- Texas FutureGen
- UIC Class V, II, I
- ZEP

These Provide A Good Start



"Org discovered fire, and Thorak invented the wheel. There's Nothing left for us."

Common Themes

1. How to demonstrate public benefit?
2. How to avoid moral hazard in siting and operation of storage facilities?
3. How to ensure adequate funding and structure for long term MMV, remediation, and liability?
4. How to integrate with climate policy?

Public Benefit

- Important Considerations:
  - Will CCS provide low cost carbon controls?
  - Will CCS provide near term flexibility?
  - Will CCS provide a significant source of reductions?
  - Will CCS provide other benefits?
- Potential Policy Elements
  - Targets for CCS
    - volume or # of facilities
    - cut off dates
    - Cost reduction goals
  - Targets for energy security
    - spending on alternatives / efficiency
  - (Targets for other technologies?)

Moral Hazard

- Important Considerations:
  - Incentives for good baseline, modeling, siting, operation and MMV
  - Ability to independently assess project risk during operational life
- Policy Elements:
  - Eligibility requirements
    - All permitted facilities or distinguish based on criteria
  - Compliance demonstration
    - Permit requirements
  - Containment demonstration
    - Baseline, approved subsurface model, MMV during operational life, model calibration
    - steps and number of years after closure before migration

Funding and Implementation

- Important Considerations:
  - LT Monitoring, Measurement, Verification costs?
  - Remediation costs?
  - Cost of damages?
- Policy Elements:
  - Sources of funding
    - Per ton charges?
    - Other fees?
    - Government contribution?
  - How much
    - Government set levels of coverage?
    - Government set limits on liability?
  - Who collects / administers
    - 3rd party / public corporation
    - Interaction with EPA in oversight
    - Process for resolving damage claims?

Climate Policy

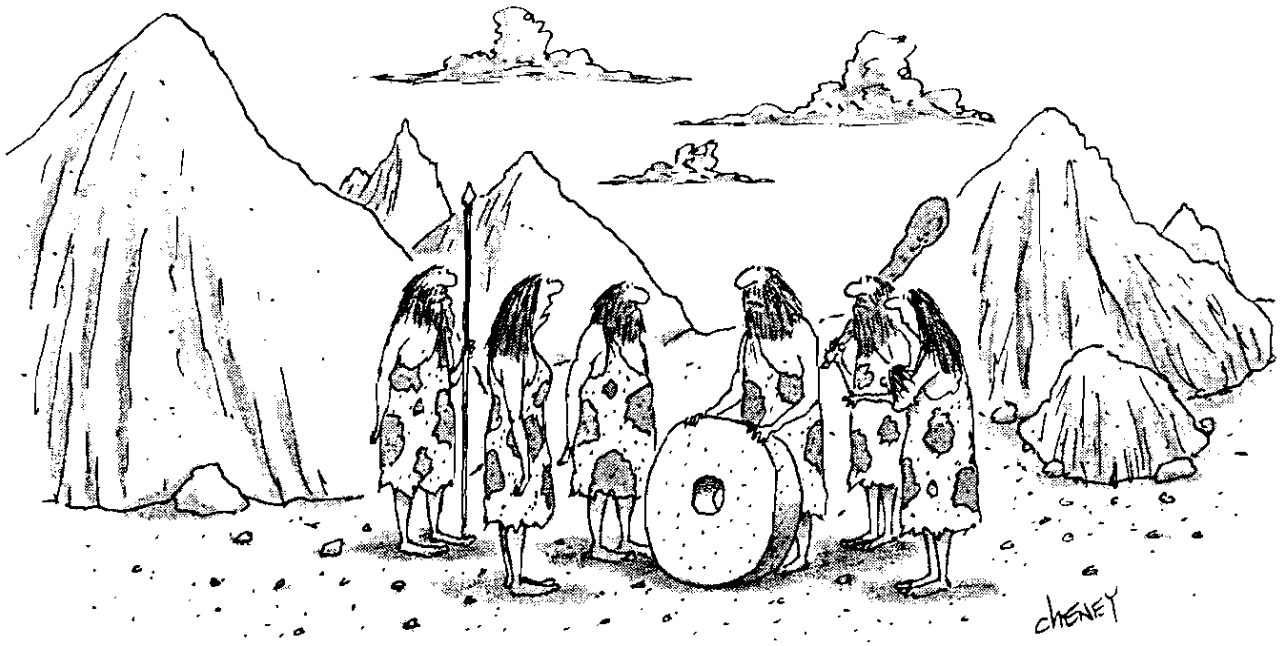
- Considerations:
  - How is the environment held harmless?
  - What are the implications for private companies?
  - What are the national inventory implications?
- Policy Elements:
  - Leakage
    - Use fees or tons to offset expected leakage during a certain period of time
    - Create "rentable" reductions like forestry credits
    - Allow some kind of hedging
  - National Inventory Implications
    - When does leakage become like a natural source?
  - Timing

Framework Elements	Mark de Figueiredo PhD Thesis[1] / MIT Future of Coal
Public Benefit	▪ Current mechanisms do not adequately address the issue. ▪ 6 lessons suggest that problems would include poor siting; perverse incentives for operators; the potential for insufficient funding to cover MMV, remediation and damages
Moral Hazard	▪ Public corporation assumes liability ▪ Storage facilities only ▪ Assumes permitting new Class VI (and Class V) addressing siting, AOR, injection standards, unintended problematic migration ▪ Contingent on compliance and containment demonstration, abandonment allowed in 10 years.
Funding / Admin	▪ Creation of a CO_2 Storage Fund for MMV, orphaned wells, compensation, remediation ▪ Source of funds: per ton levy, interest/revenue from investing fund, limited reimbursement from operators in specific cases ▪ Projects operational by 2020 and/or research projects exempt from levy and potential liability ▪ Office of Special Masters in US Fed Court to decide claims for damages thru no fault system ▪ 5-yr statute of limitations on claims (claims must be filed w/in 5yrs of happening at any time post closure)
Climate Policy	▪ Annual credit award net of leakage during operations ▪ Leakage determination through direct measurement or modeling ▪ Surrender projected leakage amount – 10 yrs post closure

[1] From de Figueiredo, M.A., "The Liability of Carbon Dioxide Storage," M.I.T. Ph.D. Dissertation, January (2007), found at: http://sequestration.mit.edu/bibliography/policy.html

Prog.	Public Benefit	Moral Hazard	Funding	Climate Policy
Illinois	State focus on economics and climate change	Only one to two FutureGen sites eligible. Holds operator liable for all activity up to injection, requires permits.	State funding and administration. Transition upon injection.	
IOGCC	Importance of CO2 as commodity and climate change mitigation	Assumes state based regulatory programs, would require financial assurance during operational life	States would create storage trust fund funded perhaps by a per ton levy. Fund would assume liability 10 years post closure.	
MIT	Concern about perverse incentives, inadequate funding for future damages	Requires permit under new Class VI (or V), containment demo.	Creates public corporation funded by per ton levy, investment returns, potentially reimbursement by operator under specific conditions. 10 yr transition post closure.	Requires surrender of allowances equal to modeled/measured and projected leakage
Texas	State focus	Only FutureGen site eligible.	State funding and administration. Transition upon injection.	
UIC	Research value	Detailed regulatory requirements aimed at preventing harm to USDWs	Requires private financial assurance. Allows for closure. Allows for state assumption.	
ZEP	To kickstart zero emission technology commercialization	Considering compliance and containment demos	Mostly under development but presumes states will be able to assume liability after an appropriate closure period.	

Our Challenge



"Nice, but we'll need an environmental-impact study, a warranty, recall bulletins, recycling facilities, and twenty-four-hour customer support."

Discussion Questions

Thinking about post-closure liability and the possibility of a two-tiered approach…

- Do we have the right list of primary issues / questions / functions for a LT liability management program?
- What are the critical policy elements that should be considered in a comprehensive framework for LT liability management?
- Should there be special treatment of research projects? How structured if so?
- Is there agreement regarding any of the specific policy options?

Framework Elements	Secondary Questions	Examples of Structural Options/ Decisions	Unresolved Challenges
Public Benefit ▪Targets for CCS ▪(Targets for other technologies?) ▪Other	▪Cost reductions? ▪Near term flexibility? ▪Significant amount of reductions? ▪Other benefits?	▪Volume, # facilities, cut off dates ▪Cost reductions targets ▪Energy security targets ▪(spending targets?)	▪Just a research phase or open to commercial deployment?
Moral Hazard ▪Eligibility requirements ▪Compliance demonstration ▪Containment demonstration ▪Timing	▪Incentivize good baseline, modeling siting operation and MMV? ▪Create ability to adapt based on information gained during operational stages?	▪Option: All permitted facilities ▪Option: Base on criteria (state/ federal) (storage/Enhanced Recovery) (research/commercial) ▪Requirement to maintain permit through life of project ▪Requirement for baseline, approved subsurface model, periodic MMV during operational phase, model calibration) ▪Containment demonstration: steps and number of years after closure before migration into LT post closure regime	▪What happens is there is a problem with a facility – does it still enter program? ▪When is a facility really closed? (ie when is operator off the hook?) ▪Is UIC framework expandable or is a new program required? ▪Will requirements be uniform or regional? ▪What happens if someone does not comply for decommissioning and is going out of business?
Funding / Admin ▪Sources of funding ▪How much ▪Who collects ▪Who Administers	▪What will be the cost of LT MMV ▪What will be the cost of remediation ▪What will be the cost of damages	▪Option: per ton charge paid by emitter/injector ▪Option: government limits on liability ▪Option: government contribution to fund ▪Create 3rd party entity to collect and manage funds ▪Interaction with EPA in oversight ▪Process for resolving damage claims	▪Do costs overwhelm economics of projects?
Climate Policy ▪Leakage ▪National inventory ▪Timing	▪How is the environment held harmless? ▪What are the implications for private companies? ▪What are the national inventory implications?	▪Option: use fees or tons to offset expected leakage ▪Option: create “rentable” reductions like forestry ▪Purchase options or hold certain level of insurance ▪Implications for vintaging? ▪Implications for cross-border issues	▪When does a project receive credits in a carbon regime? ▪Are they bankable and if so, subject to revocation?