



FutureGen Issues with CCS Liability

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CCS Issues

- Waste vs. commodity
- Technology readiness
- Economic Viability
- Liability

CCS Issues – Waste vs. Commodity

- **Commodity** is defined as ‘something that is an **‘economic good’** or **‘useful or valuable’**
 - Implies that there is economic value and may be fungible. (e.g., oil, gas, grain, wholesale electricity)
- **Waste** is defined as **‘an unwanted byproduct’**.
 - Implies that it needs to be regulated in order to preclude further damage to the environment (e.g., scrubber sludge, nuclear waste, municipal solid waste)

CCS Issues – Waste vs. Commodity

CO₂ is neither a waste nor a commodity

It is not a commodity:

- Except in certain niches (Enhanced Oil Recovery), CO₂ does **not have value**.
- ‘Emission Credits’ are considered to have a value (they are really a cost)
- Calling CO₂ a commodity could lead to premature cap & trade protocol based on inappropriate economic extrapolations

It is not a waste:

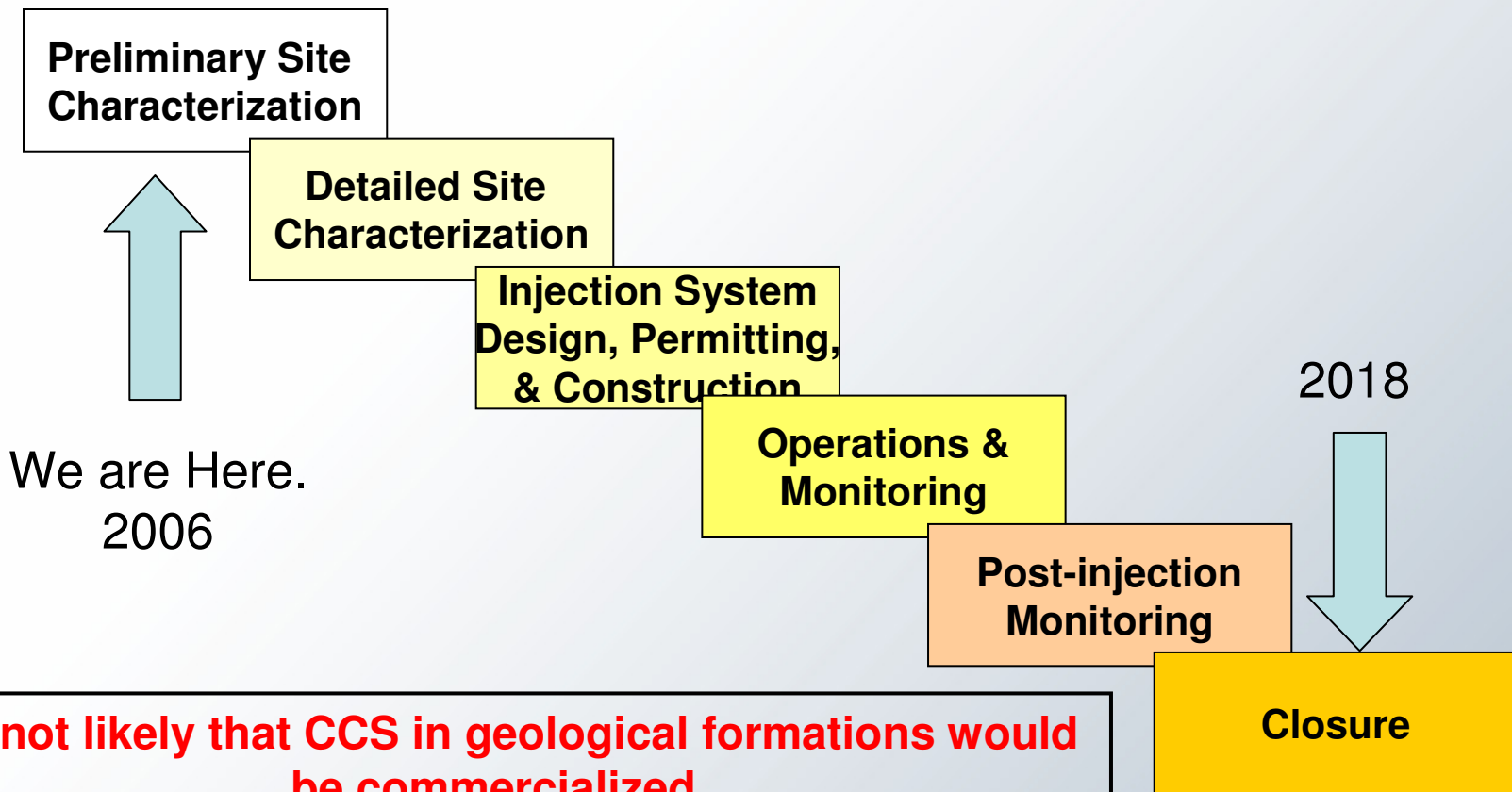
- CO₂ is benign and relatively inert. It should **not** be classified as a waste by the EPA.
- Becoming a regulated waste would likely
 - harm the EOR industry
 - become an added cost barrier to CCS deployment
 - become an added regulatory barrier to CCS deployment

Injection System Regulations

- Injection wells regulated by U.S. EPA, but primacy has been delegated to the States
 - Underground Injection Control (UIC) program of the Safe Drinking Water Act (SDWA) (40 CFR 124 and 146 to 148)
- Current regulations
 - Saline reservoir CO₂ injection likely to be classified as Class I non-hazardous category
 - However, US EPA is planning on Class V experimental status for CCS demos (applies to FutureGen?)
 - Includes requirement to demonstrate financial responsibility for closure

CCS Issues – Technology Readiness

Stages of FutureGen's FOAK Carbon Sequestration Project



It is not likely that CCS in geological formations would be commercialized before these tasks are completed

CCS Issues – Economical Viability

CO ₂ Capture?	Total Plant Cost \$/kW		Increase %	COE Mills/kWh		Increase %	Efficiency % HHV		Decrease %
	No	Yes		No	Yes		No	Yes	
SOA Sub-PC	1323	2358	78%	49.9	86.3	73%	36.3	23.9	34%
SOA Super-PC	1355	2368	75%	49.7	83.5	68%	38.5	26.9	30%
SOA IGCC	1557	1950	25%	56.9	70.5	24%	38.6	32.6	16%
Adv. IGCC	1315	1578	20%	46.9	56.7	21%	48.6	42.4	13%
Adv. IGFC	1210	1500	24%	39.8	48.3	21%	60	55	8%

DOE Data using Illinois #6 Coal and January 2006 dollars

CCS is not currently economically viable for coal technologies

CCS Issues - Liability

- Insurance (at a reasonable cost) needs actuarial database to quantify risk.
- Corporate risk-management departments have significant influence on project approvals
- CCS time frame is beyond most precedents
- Risk/reward elements not the same as for EOR
- Price-Anderson type of government umbrella is essential

FutureGen CCS Issues

State Level

- Asked states to take title to the CO₂ and indemnify the Alliance
 - Six states would not; no legislative authority
 - Texas agreed to take title , subject to legislative approval

Federal Level

- Alliance requested DOE to indemnify the Alliance concerning CO₂ sequestration
 - DOE has no legislative authority to do so.
 - Enabling legislation being considered by some congressional subcommittees

NOTE Request for indemnification is not due to lack of confidence in the safety of injection, but in recognition that:

- FutureGen is a FOAK demonstration
- Such indemnification will likely be required for early entrants in the future to commercialize CCS.