

Assumptions & Methodology

- EPDM is based on an algorithm for each compliance activity, which multiplies the unit cost by certain variables from the project type profiles and by the factors appropriate for the project type to produce a project level cost with the following assumptions:
 - Project type “Large Saline Non-waivered”;
 - Regulatory alternative 3 (RA3).
 - Periodicity of activities is taken from EPA -Apndx B. EPDM does not include activities for which application factor is 0.
- EPDM multiplies the project level cost for each compliance activity to produce an annual rule cost for each compliance activity in each of the 30 years in the analysis period.
- EPDM calculates these annual estimates in non-discounted dollars and in present value and annualized dollars discounted at both 5 percent and 10 percent.

Result

Disc Rate 5%

Disc Rate 10%

Items	Annuitized Cost	Unit Cost (\$/tCo2)	Items	Annuitized Cost	Unit Cost (\$/tCo2)
Geologic Site Characterization Unit Costs (SC)	524,165		Geologic Site Characterization Unit Costs (SC)	815,902	
Injection Well Construction (IW)	14,217,253		Injection Well Construction (IW)	16,088,722	
Well Operation (WO)	11,191,277		Well Operation (WO)	11,193,530	
Monitoring during Injection (IM)	5,812,079		Monitoring during Injection (IM)	5,440,412	
Corrective Action (CA)	255,620		Corrective Action (CA)	289,268	
Mechanical Integrity Tests (MI)	56,315		Mechanical Integrity Tests (MI)	55,533	
Closure & Post Injection Care (CPIC)	171,386		Closure & Post Injection Care (CPIC)	174,268	
Financial Assurance (FA)	400,000		Financial Assurance (FA)	400,000	
Sub Total Without Leakage	32,628,095	3.435	Sub Total Without Leakage	34,457,636	3.627
Subsurface leakage	24,407		Subsurface leakage	24,407	
Atmospheric leakage	629		Atmospheric leakage	629	
Sub Total With Leakage	32,653,131	3.437	Sub Total With Leakage	34,482,672	3.630

Learnings

- Assuming perfect market, sequestration (non-leaky) cost at the margin is equal to the abatement costs which in turn should be the optimal carbon tax
- For leaky CO₂ sequestration, we expect a higher carbon tax OR subsidies than the marginal cost of the technology
- Results reported here is site specific and dependent on the trade-offs between discounting, leakage rate, and the individual cost module
- The impacts of leakage on sequestration cost from individual site looks small. However, aggregation at the national level may not be ignored both in absolute as well as economic value terms

Learnings

- Sensitivity
 - Discount rate 5 & 10 percent
 - Cost increase by 6 per cent
- Marginal sequestration costs (the cost of sequestering an additional ton of carbon) rise with the discount rate
- As the chosen discount rate rises, estimated future costs will have a smaller and smaller effect on the present value of costs.
- Leaving aside the embedded uncertainties, what really matter are the demonstration of the EPDM methodology and also the order of magnitude of the results, rather than the numbers themselves.

Additional Work

- EPDM being expanded to include Capture and Transport cost

Storage Options	Capacity (GtC)	Transport & Storage Costs (\$/tC stored)	Transport & Storage Costs (\$/tCO ₂ stored)	Representative Value (\$/tCO ₂ stored)	Remarks
Depleted Oil & Gas Fields	25-30	5-70	1.3 - 19	12.0	
Active Oil Wells (EOR)	Low	(30)-(15)	(8.1) - (4)	7.2	Net Benefit
Enhanced Coal Bed Methane	5-10	(95)-70	(25.8) - (19)	26.5	Net Benefit
Deep Aquifers	1-150	5-45	1.3- 12.2	8.0	
Ocean (Global)	1000-10000	10-50	2.7 - 13.6	9.7	
Carbonate Storage (no transport)	Very High	110-370	30 - 100.8	77.5	

- Assuming CO₂ transport cost 3.5 \$/t CO₂
- Source: Author's extrapolation from Anderson and Newell, 2003

