

HB 50 Carbon Capture, Utilization, and Storage

Senate Resources Committee

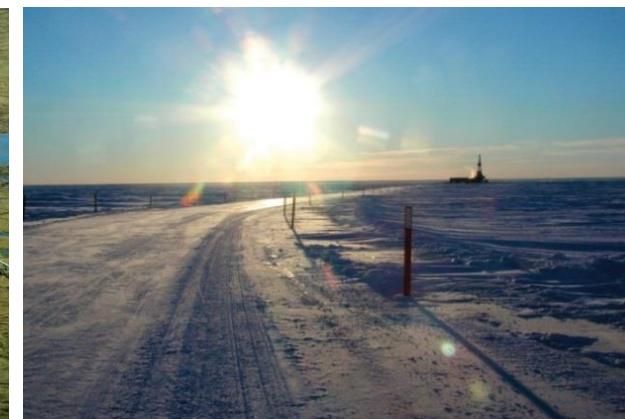


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EARLY TO MID-STAGE COSTS AND CHALLENGES



Assessment Needs – Source

Analysis of carbon emissions to determine technical feasibility of capture from an existing source such as a power plant or industrial process facility; or greenfield source such as hydrogen manufacturing.

Costs include initial engineering, economic analysis of expected revenues (tax credits), and capital and operating expenses

Assessment Needs – Sink

Initial analysis of geology to determine likely presence of a carbon sink that has the geological features (i.e., porosity, permeability, trap, and reservoir size) to hold the desired injection quantity.

Costs include geological literature studies, licensure of seismic and well data, and reservoir engineering preliminary evaluations

Site Control

- Possible competitive bidding for acreage
- Timeline for public processes
- Potential yearly payments prior to injection

Geologic Evaluation involves major costs, including:

Collecting seismic, extensive analysis, and permitting and drilling wells

\$10s of millions

Projects must undertake extensive work, and make huge capital outlays, prior to injecting the first ton of CO₂

Front-end Engineering & Design (FEED)

Preliminary engineering & design of facility

Final Investment Decision (FID)

Final Design

Construction and capital expense of *\$100s of millions of dollars*

CCUS 45Q VALUE CHAIN

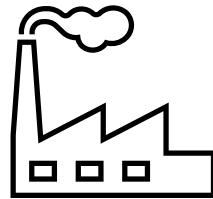


45Q Facts

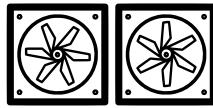
- Payable after injection commences for 12 years
- Cashable for first 5 years (all 12 years for non-profits)
- Transferable
- EPA/IRS require a monitoring, reporting, and verification plan (MRV)

Value Chain Key Points

- Major costs shown – other costs will apply
- Figures are for annual, per year values – does not mean a project will have a positive net present value or meet investment or development criteria



Capture



2. Capture costs

Higher with lower concentrations of CO₂

Power generation: \$50 – \$100/mt/yr
Assume: \$60

Cost of capture/yr: \$60 x 250,000 =
\$15,000,000

\$21,250,000 – \$15,000,000 =
\$6,250,000 remaining 45Q

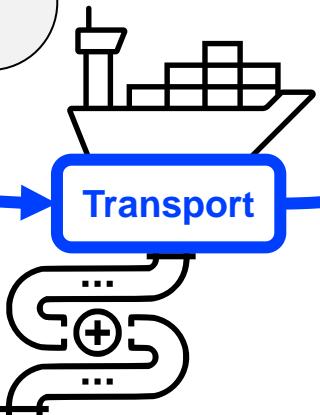
mt = metric ton
yr = year

1. Emitter Hypothetical Interior Power Plant

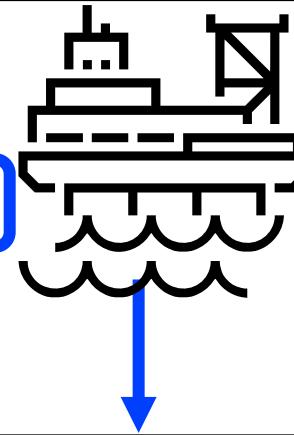
Emission: 275,000 mt/yr
Capture rate: Appx. 90%
45Q Tax Credit Available: \$85/mt/yr

275,000 mt/yr x 90% = 250,000 mt/yr
250,000 mt/yr x \$85/mt = **\$21,250,000 available 45Q credit per year**

The power plant continues to generate conventional revenue by selling electricity to power purchasers



Transport



Storage

3. Transportation Costs

Assume: strategically located, carbon transported a short distance to injection site

Transportation cost: \$5 – \$20/mt/yr
Assume: \$7

Transportation Cost per year: \$7 x 250,000 = \$1,750,000
\$6,250,000 – \$1,750,000 = \$4,500,000 remaining 45Q value

4. Injection/Operation Costs

Injection/Operating/Monitoring: \$5 – \$16/mt/yr
Does not include the fee to the state for the use of pore space.

Assume: \$5 per metric ton per year
Storage Charge: \$5 x 250,000 = \$1,250,000

\$4,500,000 – \$1,250,000 =
\$3,250,000 remaining 45Q

5. Storage Costs

Pore space costs: \$2.50 – \$10/mt/yr
Assume: \$2.50
Storage Cost/yr: \$2.50 x 250,000 = \$625,000

The State of Alaska harvests \$625k/year
\$3,250,000 - \$625,000 = **\$2,625,000 remaining 45Q value**



Hypothetical State Revenue Opportunities

1. Regional Power Facility

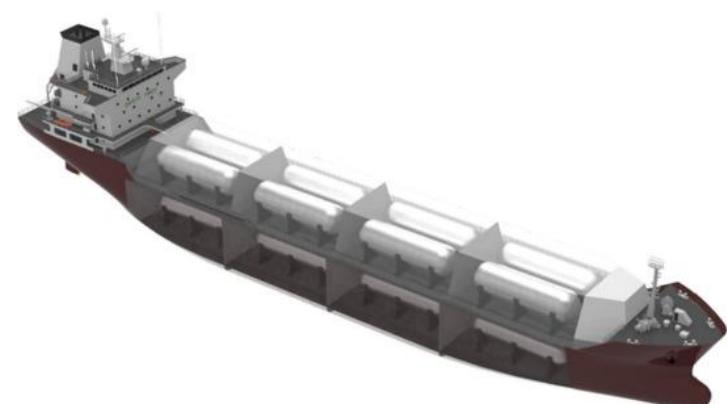
- 250,000 metric tons/year, \$2.50 metric ton/year
- 20-year life
- Acreage ~1200 acres during injection, \$20 acre/year



Chugach Electric Association, Inc. Southcentral Power Project

2. North Slope Emitting Facility

- 2,000,000 metric tons/year (50/50 EOR & Storage), \$2.50 metric ton/year (Storage)
- 20-year life
- Acreage ~10,000 acres during injection, \$20 acre/year



Conceptual design of CO₂ carrier.
Comparison of CO₂ liquefaction pressures for ship-based carbon capture and storage (CCS) chain. Int J Greenhouse Gas Control, 52 (2016)

3. CO₂ Import & Sequestration Facility

- 10,000,000 metric tons/year, \$2.50 acre/year
- 40-year life
- Acreage ~ 50,000 acres during injection, \$20 acre/year



Hypothetical State Revenue Opportunities

- Not all CO₂ emissions are feasibly captured – technology continues to rapidly develop
- Capital expenditures to retrofit existing facilities cannot be met by existing incentives in some cases
- Import of CO₂ is dependent on further development of shipping technology and infrastructure
- 45Q tax credits only available for projects capturing CO₂ in the US
 - \$60 per ton for Enhanced Oil Recovery
 - \$85 per ton for geologic carbon storage
 - \$180 per ton for geologic storage of carbon from Direct Air Capture



Hypothetical State Revenue Opportunities

Scenario 1 – Regional Power Facility	Scenario			Totals (years 1–66)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
					0	1	2	3	4	5	6	7	8	9	10
	Regional Power Facility CCUS														
	Acres Licensed/Leased				4,638	4,638	4,638	1,246	1,246	1,246	1,246	1,246	1,246	1,246	1,246
	CO ₂ Captured	250,000	ton/year							250,000	250,000	250,000	250,000	250,000	250,000
	45Q Credits	\$85.00	/ton	\$425,000,000						\$21,250,000	\$21,250,000	\$21,250,000	\$21,250,000	\$21,250,000	\$21,250,000
	CCUS Project Costs														
	Cost of Capture	\$60.00	/ton	\$300,000,000						\$15,000,000	\$15,000,000	\$15,000,000	\$15,000,000	\$15,000,000	\$15,000,000
	Transportation Cost	\$7.00	/ton	\$35,000,000						\$1,750,000	\$1,750,000	\$1,750,000	\$1,750,000	\$1,750,000	\$1,750,000
	Injection Cost	\$5.00	/ton	\$25,000,000						\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000
	<i>Total Project Costs</i>			\$360,000,000						\$18,000,000	\$18,000,000	\$18,000,000	\$18,000,000	\$18,000,000	\$18,000,000
	CCUS Project Operating Profit			\$65,000,000						\$3,250,000	\$3,250,000	\$3,250,000	\$3,250,000	\$3,250,000	\$3,250,000
	State Regulatory Costs														
	Carbon Storage Closure Trust Fund			\$7,500,000						\$625,000	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000
	AOGCC Regulatory Cost Charge			\$1,575,000						\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
	Cost of AOGCC Bonding			\$3,650,000						\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
	CCUS Project Gross Profit			\$52,275,000						-\$25,000	-\$25,000	\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000
	State Revenue														
	Exploration License	\$20.00	/acre	\$278,259	\$92,753	\$92,753	\$92,753								
	Carbon Storage Lease	\$20.00	/acre	\$49,842						\$24,921	\$24,921				
	Injection Fee	\$2.50	/ton	\$12,500,000								\$625,000	\$625,000	\$625,000	\$625,000
	Property Tax (local only)														
	Total State Revenues			\$12,828,101	\$92,753	\$92,753	\$92,753	\$24,921	\$24,921	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000
	CCUS Project Net Profit			\$39,446,899	-\$92,753	-\$92,753	-\$92,753	-\$49,921	-\$49,921	\$1,875,000	\$1,875,000	\$1,875,000	\$1,875,000	\$1,875,000	\$1,875,000
	State Revenue (% of gross profit)			24.54%											

These scenarios represent a “best case,” hypothetical scenario relying on assumptions believed to be reasonable, including market conditions in other jurisdictions, and maturely developed capture, transportation and sequestration technology. They are developed purely for high-level scoping purposes. The Alaska market development will likely include a range of different commercial and economic arrangements.



Hypothetical State Revenue Opportunities

Scenario 1 – Regional Power Facility	Scenario			Totals (years 1–66)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
					0	1	2	3	4	5	6	7	8	9	10
Regional Power Facility CCUS															
Acres Licensed/Leased				4,638	4,638	4,638	1,246	1,246	1,246	1,246	1,246	1,246	1,246	1,246	1,246
CO ₂ Captured	250,000	ton/year								250,000	250,000	250,000	250,000	250,000	250,000
45Q Credits	\$85.00	/ton	\$425,000,000							\$21,250,000	\$21,250,000	\$21,250,000	\$21,250,000	\$21,250,000	\$21,250,000
CCUS Project Costs															
Cost of Capture	\$70.00	/ton	\$350,000,000							\$17,500,000	\$17,500,000	\$17,500,000	\$17,500,000	\$17,500,000	\$17,500,000
Transportation Cost	\$7.00	/ton	\$35,000,000							\$1,750,000	\$1,750,000	\$1,750,000	\$1,750,000	\$1,750,000	\$1,750,000
Injection Cost	\$5.00	/ton	\$25,000,000							\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000
Total Project Costs			\$360,000,000							\$20,500,000	\$20,500,000	\$20,500,000	\$20,500,000	\$20,500,000	\$20,500,000
CCUS Project Operating Profit			\$15,000,000							\$750,000	\$750,000	\$750,000	\$750,000	\$750,000	\$750,000
State Regulatory Costs															
Carbon Storage Closure Trust Fund			\$7,500,000							\$625,000	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000
AOGCC Regulatory Cost Charge			\$1,575,000							\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
Cost of AOGCC Bonding			\$3,650,000							\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
CCUS Project Gross Profit			\$2,275,000							-\$25,000	-\$25,000	\$0	\$0	\$0	\$0
State Revenue															
Exploration License	\$20.00	/acre	\$278,259	\$92,753	\$92,753	\$92,753									
Carbon Storage Lease	\$20.00	/acre	\$49,842				\$24,921	\$24,921							
Injection Fee	\$2.50	/ton	\$12,500,000							\$625,000	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000
Property Tax (local only)															
Total State Revenues			\$12,828,101	\$92,753	\$92,753	\$92,753	\$24,921	\$24,921	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000
CCUS Project Net Profit			-\$10,553,101	-\$92,753	-\$92,753	-\$92,753	-\$49,921	-\$49,921	-\$625,000	-\$625,000	-\$625,000	-\$625,000	-\$625,000	-\$625,000	-\$625,000
State Revenue (% of gross profit)			563.87%												

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Hypothetical State Revenue Opportunities

Hypothetical Revenue Scenarios	Scenario	Totals	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
			0	1	2	3	4	5	6	7	8	9
Regional Power Facility CCUS	Regional Power Facility CCUS	\$12,828,103	\$92,753	\$92,753	\$92,753	\$24,921	\$24,921	\$625,000	\$625,000	\$625,000	\$625,000	\$625,000
	Exploration License		\$92,753	\$92,753	\$92,753							
	Development Lease					\$24,921	\$24,921					
	Injection							\$625,000	\$625,000	\$625,000	\$625,000	\$625,000
	Additional EOR Oil Revenue											
North Slope Facilities CCUS Project	North Slope Facilities CCUS Project	\$219,013,583	\$371,013	\$371,013	\$371,013	\$99,686	\$99,686	\$10,885,059	\$10,885,059	\$10,885,059	\$10,885,059	\$10,885,059
	Exploration License		\$371,013	\$371,013	\$371,013							
	Development Lease					\$99,686	\$99,686					
	Injection							\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000
	Additional EOR Oil Revenue							\$8,385,059	\$8,385,059	\$8,385,059	\$8,385,059	\$8,385,059
CO ₂ Import for Sequestration (10m)	CO ₂ Import for Sequestration (10m)	\$1,014,120,959	\$3,710,130	\$3,710,130	\$3,710,130	\$996,857	\$996,857	\$996,857	\$25,000,000	\$25,000,000	\$25,000,000	\$25,000,000
	Exploration License		\$3,710,130	\$3,710,130	\$3,710,130							
	Development Lease					\$996,857	\$996,857	\$996,857				
	Injection								\$25,000,000	\$25,000,000	\$25,000,000	\$25,000,000
	Additional EOR Oil Revenue											

Additional barrels of oil and revenue for North Slope facility assumes ½ of the CO₂ injected is for EOR purposes and other ½ is permanently sequestered.

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Royalty and Tax under Current Law and HB 50

Revenue Element	Current Law			HB 50 Changes Compared to Current Law
	Oil and Gas Production	Standalone Carbon Capture	Carbon Capture for Enhanced Oil Recovery	
Royalties	Royalties apply to oil and gas production on state land.	No state regulatory structure.	Royalties apply to oil and gas production on state land.	Creates regulatory structure for standalone carbon capture.
Production Taxes	Production tax applies to all production in state.	No impacts on production tax.	Ordinary and necessary, upstream, direct costs related to enhanced oil recovery are allowable lease expenditure deductions.	No changes.
Property Taxes	State property tax applies to all oil and gas infrastructure in the state, with credit for municipal taxes paid.	State tax does not apply; municipal taxes would apply.	Property used for carbon capture that has a primary use in oil and gas exploration, production, or pipeline transportation, including enhanced oil recovery, may be taxable under AS 43.56	No changes.
Corporate Income Taxes	C-corporations are subject to corporate income tax; most federal tax credits adopted by reference.			45Q tax credits not allowed against state tax.

QUESTIONS?



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