Two Green Leaves

Carbon capture cost trends

Projections through 2035

Historical data, case studies & projections

22 July 2025

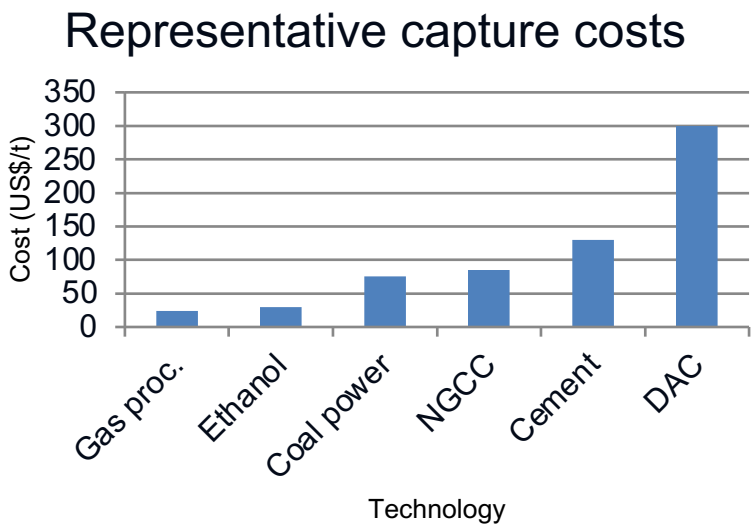
Agenda

1. Cost landscape across sectors
2. Lessons from operating projects
3. Cost drivers & policy signals
4. Projections & break-even analysis
5. Inflection points & recommendations

[1] [2] [3]

Cost landscape across sectors

High-concentration streams (gas processing, ethanol) ≈ US$20–40/t
Power (coal, NGCC) ≈ US$60–90/t; cement & steel vary widely
Direct air capture currently >US$600/t
Costs driven by CO_2 concentration and plant scale



[4] [5] [6] [7]

Lessons from operating projects

Sleipner (gas processing) CAPEX ~$300M; OPEX ~$0.75M/yr; 1 Mt/yr captured

Quest (hydrogen) CA$790M CAPEX; CA$30–35M OPEX; ~1 Mt/yr; cost ≈ CA$102/t

BD3 & Shand (coal power) BD3 cost CA$1.47B; 50% capture system; Shand reduces capture cost 67% to ~$45/t

Petra Nova (coal power) Capture plant US$637M + pipeline US$300M; auxiliary gas plant cuts cost 25–30%

Illinois CCS (ethanol) US$207M project; pure CO_2 stream; low operating cost

[8] [9] [10] [11] [12] [13] [14]

Cost drivers & policy signals

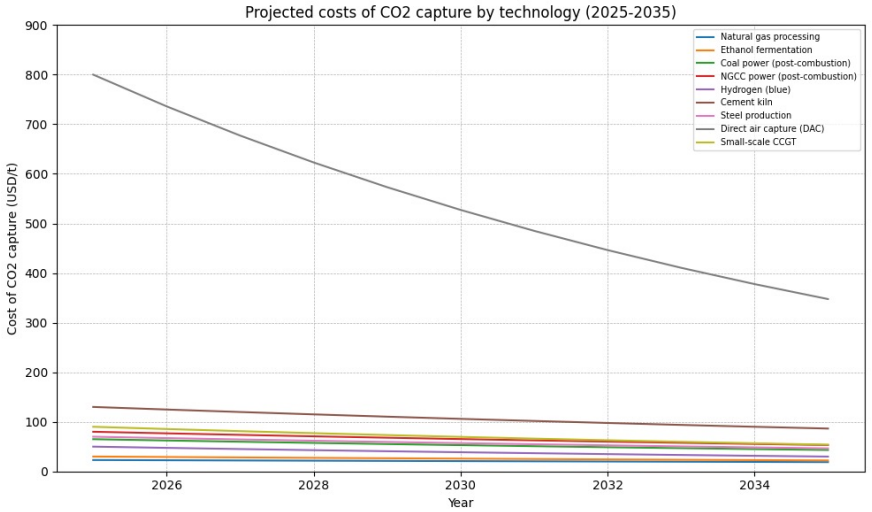
CAPEX share rises as plant size falls (37% → 59%)
Energy & solvent costs dominate OPEX; waste heat reduces costs
Raising cost of capital (5→15%) increases capture cost 30–65%
Average European CCS cost ≈ US$198/t — higher than carbon prices

§45Q: $85/t storage, $60/t EOR, $130/t DAC
270+ projects announced after IRA enhancements
Small-scale projects often uneconomic under current incentives

[15] [16] [17] [18] [19] [20] [21]

Projected cost trends

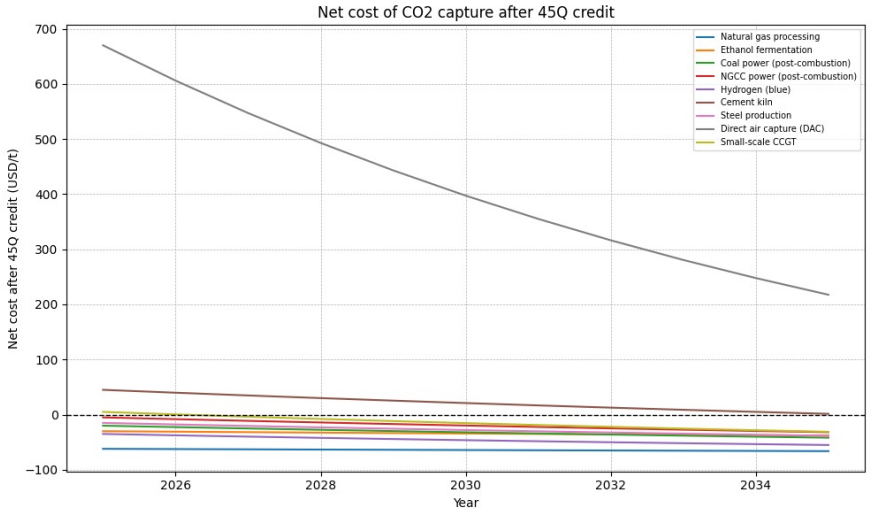
High-concentration sources remain low-cost (<US$40/t)
Power & industrial capture decline to ~US$40–60/t by 2035
Cement & steel fall slowly; remain above US$80/t
DAC declines but stays >US$300/t under optimistic learning



[22] [23] [24] [25]

Break-even analysis under §45Q

Many high-concentration sources break even immediately
Small-scale CCGT breaks even around 2027
Cement & DAC remain far above credit levels
Policy design (credit value & duration) determines viability



[26] [27]

Inflection points & recommendations

Second-generation capture: 67% cost reduction (Shand)
Advanced solvents: water-lean & enzymatic systems yield US$28–44/t
Target high-concentration sources first; build infrastructure
Support cement & steel with tailored incentives and innovation
DAC needs R&D and credible removal accounting
Mitigate financing risk via long-term contracts & low-cost capital

[28] [29] [30] [31] [32]

Conclusion

Capture costs span from ≈US$20/t (gas processing) to >US$600/t (DAC)
Case studies show large learning potential when scaling & integrating waste heat
§45Q makes many projects economic, but cement, steel & DAC need more support
Policy must combine incentives, innovation & infrastructure to reach 2035 goals

[33] [34] [35]