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Understanding the Industry Baseline Cost and Schedule Performance Norms of CCS Projects

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Abstract

Success of CCS projects is critical if the emissions reductions targets set by countries or companies are to be met. However, relatively few CCS projects have been completed to date. This leaves a huge knowledge gap in the industry resulting in unrealistic performance targets, and significant cost growth and schedule slip as projects progress. This presentation intends to address this knowledge gap around cost and schedule by providing metrics based on real projects, both completed and in development.

The analysis presented here is based on a database of 48 CCS projects collected directly from individual project teams. Public source information does not contribute in any way to our database or analysis. We break the CCS value chain into the four components: capture, compression and dehydration, transport, and storage. The objective of this research was to aggregate available CCS project data and establish cost and schedule norms across the core scope elements of CCS projects. Metrics are presented for both the overall CCS asset and individually for each component. This should help inform strategic decision-making, challenge assumptions, and add rigor to internal project target validations.

Our analysis shows that a typical CCS project, including all components from capture to injection, spends approximately $420 million in CAPEX per MTPA capture capacity. Nearly half of this CAPEX cost is associated with the CO2 capture scope, with compression & dehydration making up half of the remaining CAPEX, and the remainder split between transport and storage. These splits, however, are highly influenced by the scope characteristics.

There is a strong relationship between the total annual OPEX and the capture capacity ($Pr < 0.002$). Larger the project's capacity, higher the annual operational costs. We also see economies of scale here. Larger the project's capacity, lower the operating cost per ton captured. While the total OPEX does not vary significantly with the feedstock concentration, we do see a difference in OPEX/MTPA. Projects with lower feedstock concentration have a significantly higher OPEX/MTPA compared to projects with higher feedstock concentration ($Pr < 0.07$). Another key observation is that as the capacity of a CO2 capture facility increases, the ratio of OPEX to TOTEX becomes

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greater. Increasing focus on operational cost should lead to greater benefit for larger facilities.

These baseline performance norms and insights on key performance drivers can help users establish cost and schedule expectations in the early planning stages.

Keywords: Carbon Capture; Capital Projects; Cost; Schedule; CAPEX; OPEX