

## Impact of Alberta Emission Reduction Policies on the Feasibility of CCUS at a Natural Gas Power Plant

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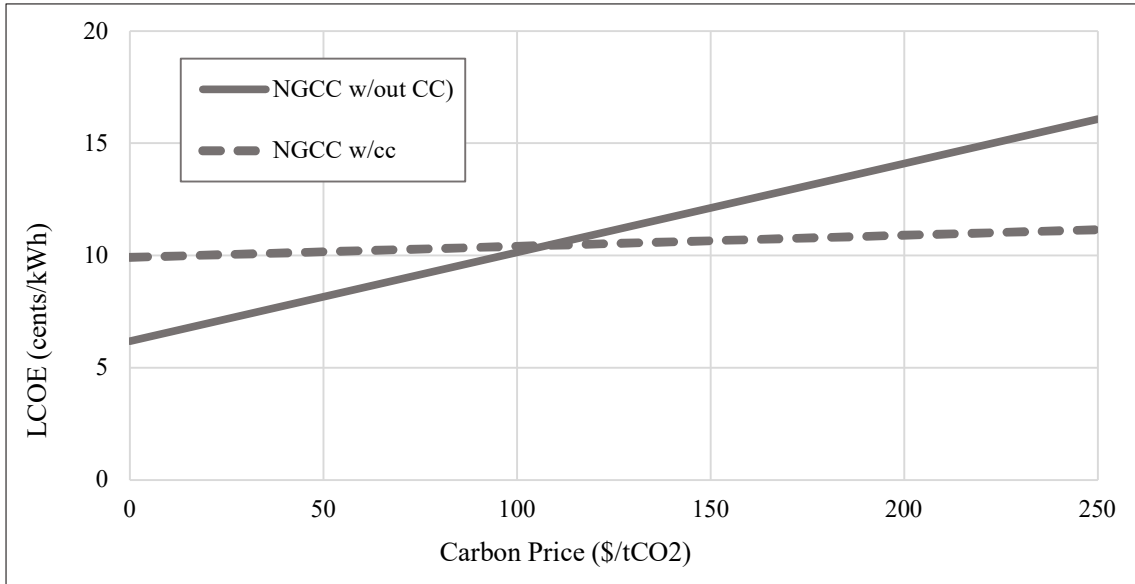
This study illustrates how current and future carbon management policies, such as carbon pricing and TIER, may impact the addition of a post combustion carbon capture facility to the Cascade power plant and the neighboring Indigenous communities relying on its success. Carbon Capture, Utilization and Storage (CCUS) typically extracts carbon dioxide (CO<sub>2</sub>) from an emission source for utilization and permanent storage. Cascade is a 900-megawatt (MW) natural gas combined cycle (NGCC) power plant in Alberta supported by the Indigenous Communities Syndicate, comprising six First Nation communities. It is scheduled to be in operation by 2023.

CCUS is an important technology to meet Canada's Paris Agreement obligation and net-zero ambition by 2050. As current renewable energy sources are insufficient to meet Alberta's near-term electricity demands, Alberta will continue to rely on fossil-based sources of electricity, such as natural gas for the near to mid-term.

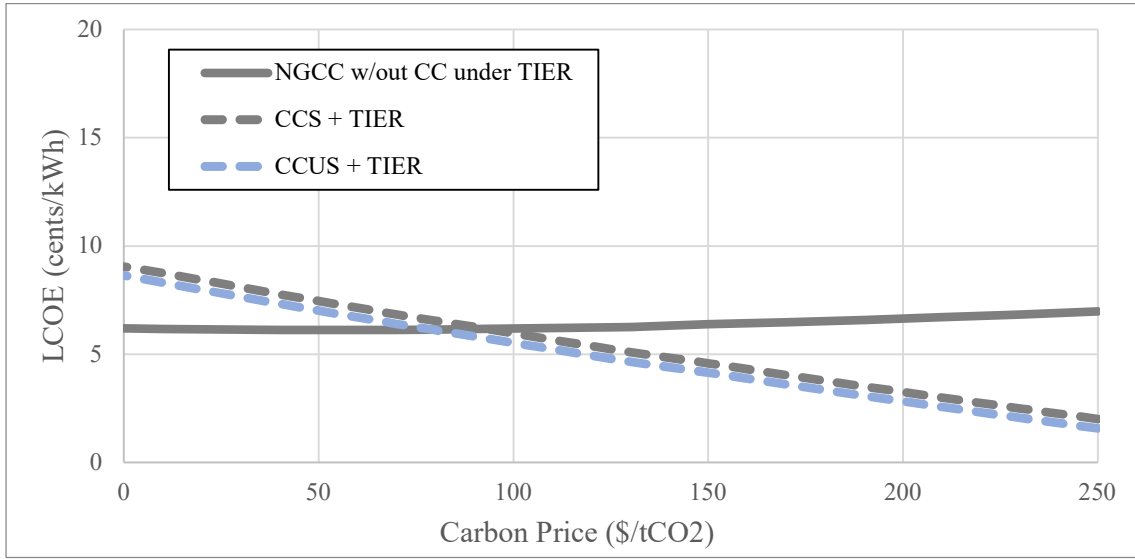
The most significant barrier to CCUS implementation is the high cost associated with carbon capture technology. In this study, the levelized cost of electricity (LCOE) with and without carbon capture is shown to differ by 2.5-3 cents per kWh, assuming no TIER emissions credits are earned. However, as the carbon tax exceeds \$105/tonne<sub>CO2</sub>, Cascade's LCOE will be lower with CCUS and TIER (Fig.1). With the current TIER benchmark of 0.37 tCO<sub>2</sub>/MWh, the LCOE model shows the carbon price needs to be \$75/tonne<sub>CO2</sub> before it is beneficial to implement CCUS at Cascade, whereas it shows \$90/tonne<sub>CO2</sub> to make CCS beneficial (Fig.2). This highlights the importance for firm benchmarks within TIER for natural gas electricity generation so that facilities like Cascade can plan ahead accordingly. Rapid changes to the benchmark structure could negatively impact these facilities and their investors. Therefore, clarity and consultation with the electricity facilities is needed before future adjustments take place.

### FOOTNOTES:

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**Figure 1:** Graph illustrating the effect that the federal carbon price will have on LCOE at two NGCC facilities (with and without carbon capture, CC) without participation in the TIER system. Therefore, a facility faces the full cost of the carbon price for all emissions.



**Figure 2:** Graph illustrating base case (NGCC w/out CCS, operating with TIER credits) compared to a NGCC facility with CCS (depleted oil and gas reservoir or saline aquifer disposal) and CCUS (EOR).

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