Methodology and Assumptions

1.1 Determining the number of capture plants

In order to accurately estimate the impact of carbon capture development on supply chains, it is necessary to first estimate how many capture plants are likely to be built. For this study, we assessed Canadian carbon capture, utilization and storage (CCUS) projects announced as of December 2024 from Global CCS Institute (GCCSI) and International Energy Agency (IEA). From the number of projects, predictions were made as to how many capture facilities will proceed past the final investment decision (FID) stage.

It should be noted that the following types of projects have been excluded from the study:

(i) Capture facilities that are operational,
(ii) Capture facilities that are under construction,
(iii) Capture facilities that have been paused or cancelled, and
(iv) Transportation, storage or utilization projects

A probabilistic model using Oracle Crystal Ball was employed to provide a more realistic estimate of the number of carbon capture plants likely to be built in the time frame. Five cases were produced where the probability of whether the projects will proceed past FID were assumed to be 15%, 20%, 35%, 50%, and 70% of the total announced projects.

1.2 Determining the capture capacity

The capture capacities for the majority of planned projects have not been announced yet. For these projects, capture capacities were assumed to be 50% of the facility's publicly reported emissions. The rationale behind this assumption is outlined below:

- Facilities with multiple, scattered flue gas sources may opt for a phased approach. This involves constructing an initial, smaller-scale capture plant as a first phase or demonstration project before committing to a larger, site-wide capture solution. Any subsequent expansion phases are considered outside the timeframe of this study.
- Small facilities with emissions around 1-1.5 million tonnes per annum (Mtpa) may want to reduce emissions for the whole plant, whereas large emitting facilities (5 Mtpa and above) may opt to reduce only 10-20% of their total emissions.

Capture capacities for projects that have announced their planned capture rates were honoured and used directly in the model.

Table 1 below shows the number of capture plants and carbon dioxide (CO_2) capture amounts generated by the probabilistic model.

Table 1 Probabilistic Model Results

		%Projects with Positive FID				
Crystal Ball Results	**Unit**	**15%**	**20%**	**35%**	**50%**	**70%**
Number of capture plants	facilities	7	9	16	22	31
CO_2 Captured	Mtpa	5.5	7.3	13.0	18.7	26.0

1.3 Determining the start year for capture plants

The start year, referring to the year operations commence, for each capture facility was determined by considering the CCUS investment tax credit (ITC) policy timeline. To take advantage of the significant cost savings available for CCUS related equipment acquired by December 31, 2035, the current scenario assumed that many of the announced CCUS projects are to come online by 2035.

An opportunistic scenario was also included where the CCUS-ITC policy timeline is revised to allow companies to claim the CCUS-ITC upon purchasing equipment and demonstrating start of construction by December 31, 2035. This scenario would provide some flexibility for capture facilities to come online after 2035.

The total number of capture facilities remains the same between the two scenarios. The distribution of the start year for capture facilities for each scenario is outlined below in Table 2.

Table 2 Start Year Distribution of CCUS Projects

Distribution of Projects	**Scenario**	
	Current	**Opportunistic**
2030	5%	0%
2031	5%	0%
2032	5%	5%
2033	10%	5%
2034	25%	10%
2035	40%	15%
2036	5%	20%
2037	5%	20%
2038	0%	15%
2039	0%	5%
2040	0%	5%

1.4 Determining steel demand for carbon capture

All facilities were assumed to implement amine-based carbon capture, as it is a proven technology that would allow projects to be operational in the 2030-2040 timeframe.

Estimation of required steel mass for the capture plant was done using Aspen Capital Cost Estimator (ACCE). The scope for this study includes ducting from the existing stack, a quencher, an amine-based capture system, a compression & dehydration system, and all associated auxiliary equipment. Note that the steel estimate for heat rejection may vary vastly between different systems. In this study, a hybrid cooling system (i.e., cooling towers and air-cooled heat exchangers) was used to estimate the average of different cooling arrangements.

Based on our steel demand analysis, we established a correlation between steel demand and the capture capacity.

1.5 Determining labour demand for carbon capture

The estimation of on-site construction labour demand was done using ACCE as well as our in-house data and correlated with plant size. The construction schedule was assumed to span 3 years, with a labour distribution profile of 10%, 60%, and 30%.

Operations and maintenance (O&M) labour demand were assumed to be constant per plant regardless of size. The number includes the operator and maintenance workforce.