CO_2 Capture, Utilization and Storage: A Canadian Snapshot

Why carbon capture, utilization and storage matters

Stabilizing atmospheric temperature below a 2°C increase will require halving global greenhouse gas (GHG) emissions by 2050, achieving net-zero emissions by 2055-2080, and pursuing net-negative emissions thereafter.[1]

Most credible scenarios to achieve this rate of decarbonization require widespread deployment of carbon capture, utilization and storage (CCUS).[2]

Canada is among the leading countries in CCUS technology development, large-scale demonstration and commercialization.

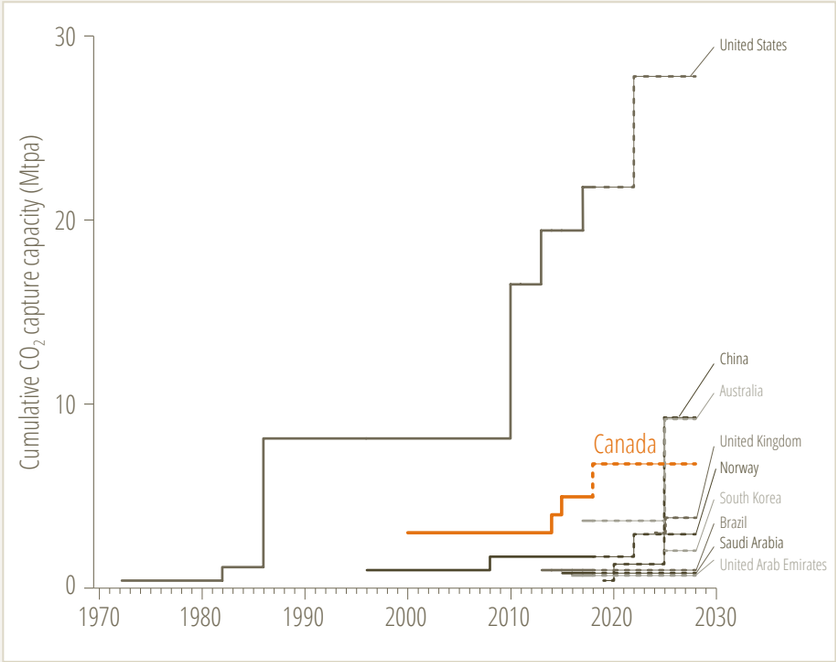

Figure 1: Global growth in large-scale carbon capture projects[3]

$800 billion market for CO_2 utilization

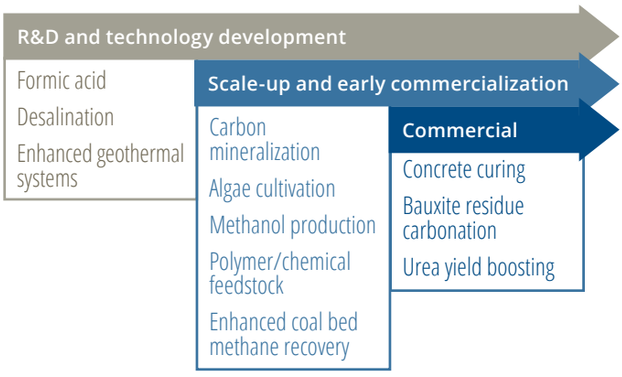

Figure 2: Carbon utilization pathways and their technological maturity[4]

The global market for CO_2-based products could grow to the same physical scale as the global oil industry today, generating US$800 billion in value annually.[5] The emergence of an industry of this scale is among the most exciting economic opportunities of our time.

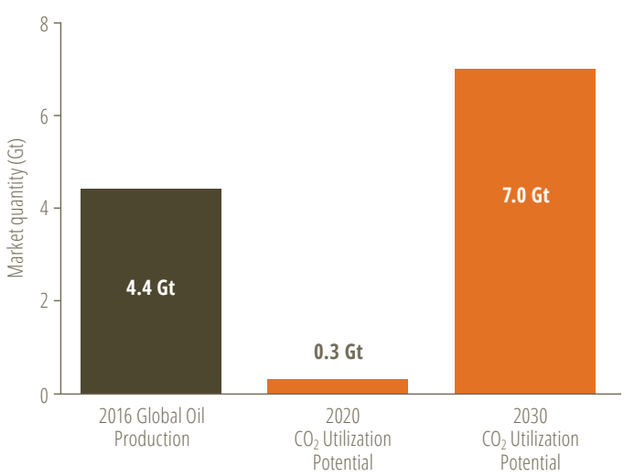

Figure 3: CO_2 utilization market potential[6,7]

Competitive positioning of Canada's CO_2 utilization technology and market

Canada spends a comparatively-high portion of its energy-related public research, development and demonstration (RD&D) budget on CCUS.

As a member of Mission Innovation, Canada seeks to double its 2014-15 funding for clean energy and clean technology development to $775 million by 2020.[8]

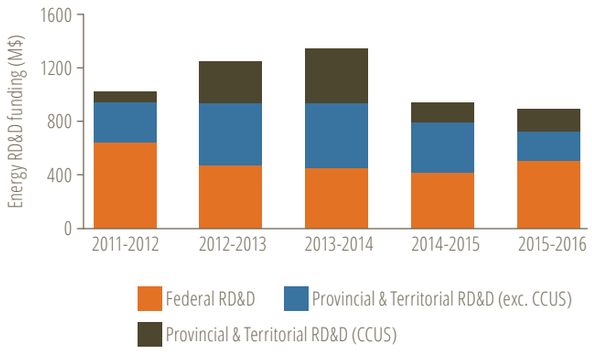

Figure 4: Canadian public investment in CCUS as a portion of energy RD&D funding[9]

Of the global pool of 181 active CO_2 utilization projects at pilot and commercial levels, 10 are in Canada. The country is home to 12% of the CO_2 mineralization and CO_2-to-solid projects, as well as 6% of the CO_2-to-fuel projects. Canada is also one of the top nations in terms of the number of patents filed, placing fourth behind the U.S., China and the European Patent Office.[10]

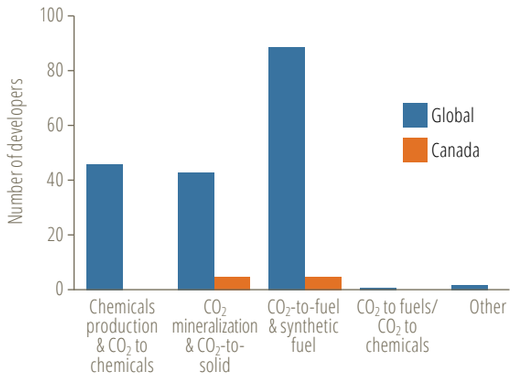

Figure 5: 2018 Canadian share of active technology developers, by carbon utilization pathway[11]

By 2035, carbon utilization has the potential to store approximately 22% (165 Mtpa) of Canada's annual GHG emissions, based on 2017 levels. This could generate C$8.2 billion per year in avoided emissions alone (at a carbon price of C$50/t).

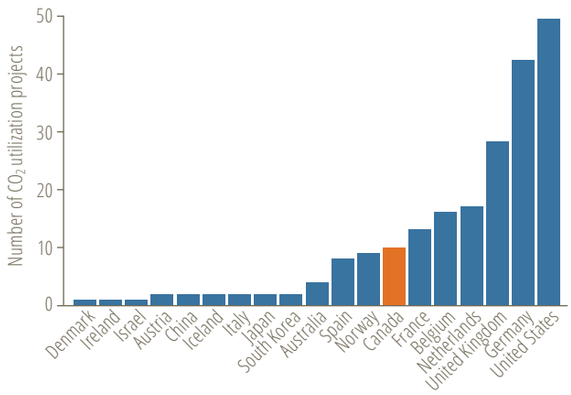

Figure 6: Canada is a leader in carbon utilization, based on the global distribution of carbon utilization projects by country[11]

Endnotes

1. Bataille et al., 2018, https://www.sciencedirect.com/science/article/pii/S0959652618307686
2. Shell SKY Scenario: https://www.shell.com/energy-and-innovation/the-energy-future/scenarios/shell-scenario-sky.html
3. Graph includes only large-scale facilities based on the data from Global CCS Institute: https://www.globalccsinstitute.com/projects/large-scale-ccs-projects
4. Pembina Institute CCU factsheet: https://www.pembina.org/reports/ccu-fact-sheet-2015.pdf, and Ecofys: https://www.ecofys.com/files/files/pluto-eng-2016-assessing-use-of-co2-natural-sources-turkey.pdf
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