

# CO<sub>2</sub> 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.<sup>1</sup>

Most credible scenarios to achieve this rate of decarbonization require widespread deployment of carbon capture, utilization and storage (CCUS).<sup>2</sup>

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

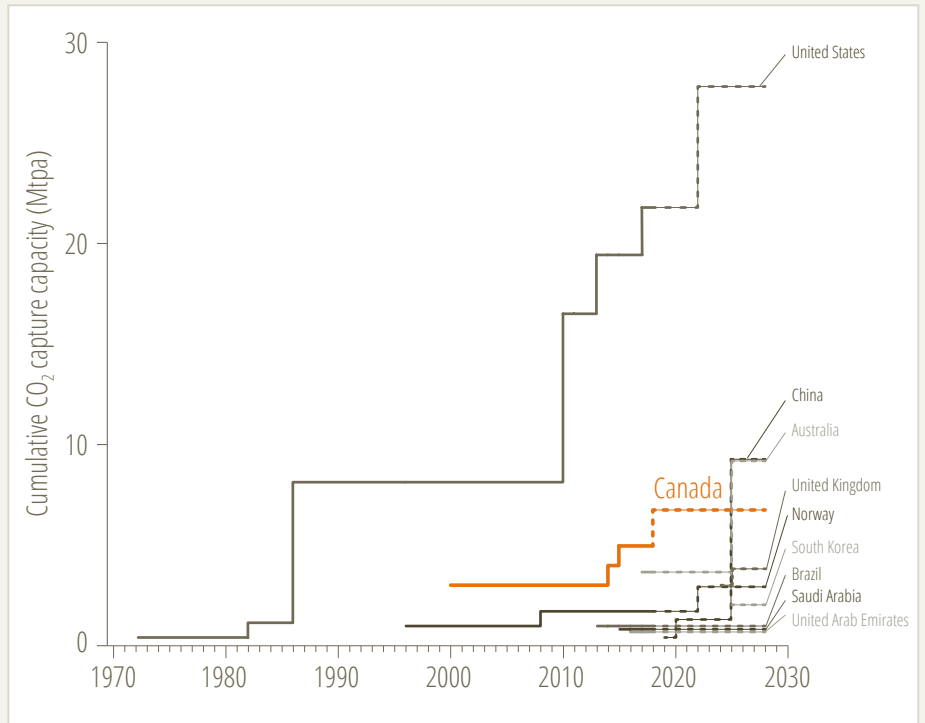


Figure 1: Global growth in large-scale carbon capture projects<sup>3</sup>

## \$800 billion market for CO<sub>2</sub> utilization

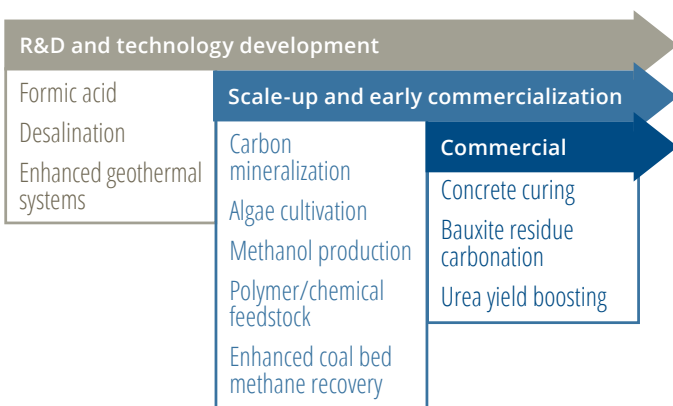


Figure 2: Carbon utilization pathways and their technological maturity<sup>4</sup>

The global market for CO<sub>2</sub>-based products could grow to the same physical scale as the global oil industry today, generating US\$800 billion in value annually.<sup>5</sup> The emergence of an industry of this scale is among the most exciting economic opportunities of our time.

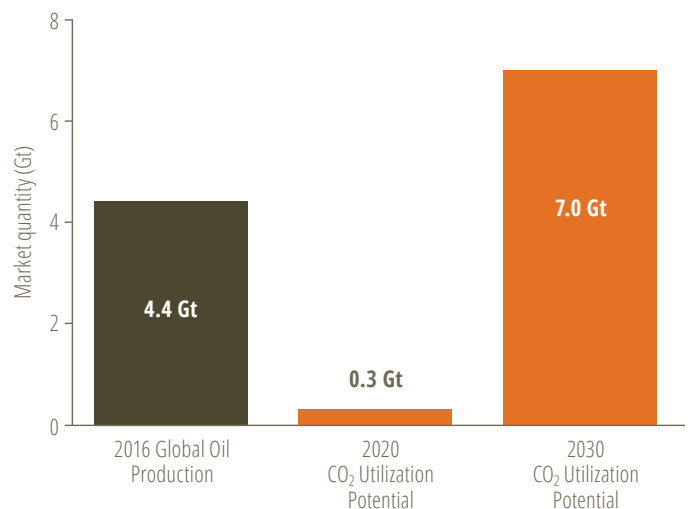


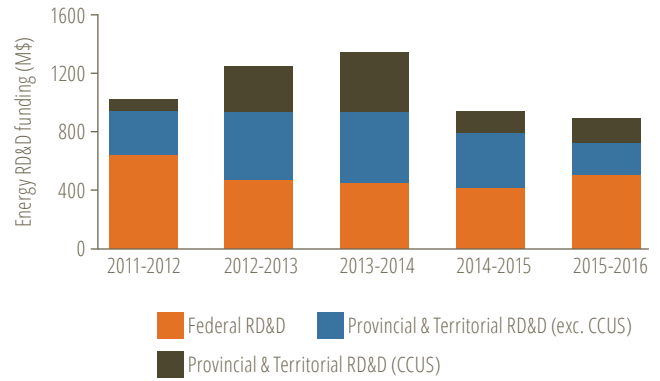
Figure 3: CO<sub>2</sub> utilization market potential<sup>6,7</sup>

# Competitive positioning of Canada's CO<sub>2</sub> utilization technology and market

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

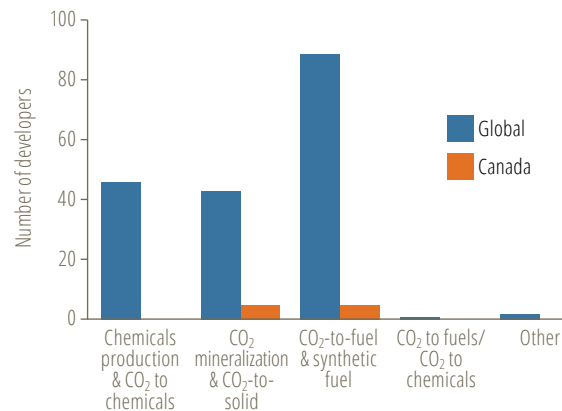
As a member of Mission Innovation, Canada seeks to double its 2014-15 funding for clean energy and clean technology development to \$775 million by 2020.<sup>8</sup>

Figure 4: Canadian public investment in CCUS as a portion of energy RD&D funding<sup>9</sup>



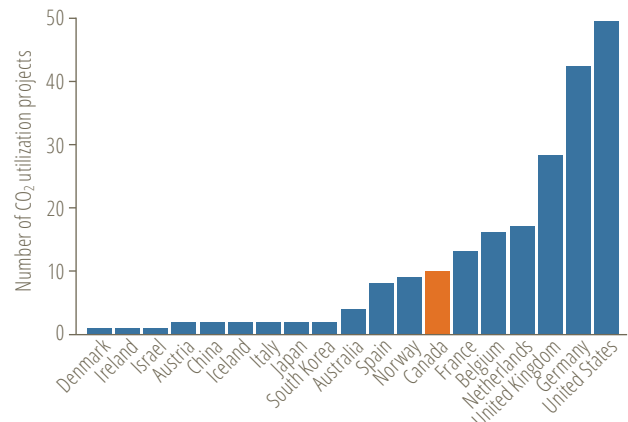
Of the global pool of 181 active CO<sub>2</sub> utilization projects at pilot and commercial levels, 10 are in Canada. The country is home to 12% of the CO<sub>2</sub> mineralization and CO<sub>2</sub>-to-solid projects, as well as 6% of the CO<sub>2</sub>-to-fuel projects. Canada is also one of the top nations in terms of the number of patents filed, placing fourth behind the U.S., China and the European Patent Office.<sup>10</sup>

Figure 5: 2018 Canadian share of active technology developers, by carbon utilization pathway<sup>11</sup>



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<sup>11</sup>



## Endnotes

- Bataille et al., 2018, <https://www.sciencedirect.com/science/article/pii/S0959652618307686>
- Shell SKY Scenario: <https://www.shell.com/energy-and-innovation/the-energy-future/scenarios/shell-scenario-sky.html>
- Graph includes only large-scale facilities based on the data from Global CCS Institute: <https://www.globalccsinstitute.com/projects/large-scale-ccs-projects>
- 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>
- [https://assets.ctfassets.net/xg0gv1arhdr3/27vQZEvrxaQiQEAsGyoSQu/44ee0b72ceb9231ec53ed180cb759614/CO2U\\_ICEF\\_Roadmap\\_FINAL\\_2016\\_12\\_07.pdf](https://assets.ctfassets.net/xg0gv1arhdr3/27vQZEvrxaQiQEAsGyoSQu/44ee0b72ceb9231ec53ed180cb759614/CO2U_ICEF_Roadmap_FINAL_2016_12_07.pdf)
- BP Statistical review of world energy: <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review/bp-stats-review-2018-full-report.pdf>
- The Global CO<sub>2</sub> Initiative, Global roadmap for implementing CO<sub>2</sub> utilization: [https://assets.ctfassets.net/xg0gv1arhdr3/27vQZEvrxaQiQEAsGyoSQu/44ee0b72ceb9231ec53ed180cb759614/CO2U\\_ICEF\\_Roadmap\\_FINAL\\_2016\\_12\\_07.pdf](https://assets.ctfassets.net/xg0gv1arhdr3/27vQZEvrxaQiQEAsGyoSQu/44ee0b72ceb9231ec53ed180cb759614/CO2U_ICEF_Roadmap_FINAL_2016_12_07.pdf)
- Natural Resources Canada: <https://www.nrcan.gc.ca/energy/resources/mission-innovation/18612>
- Natural Resources Canada: <https://www.nrcan.gc.ca/energy/facts/energy-economy/20062>
- Qui and Yang, 2018: <https://www.mdpi.com/2071-1050/10/3/877>
- SCOT - Smart CO<sub>2</sub> Transformation: <http://database.scotproject.org/projects>