

A techno-economic analysis of the potential for the capture and transportation of carbon dioxide for utilization as an industrial feedstock in Nova Scotia

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Abstract:

Nova Scotia plans to become a major player in the global hydrogen market (Global Affairs Canada, 2023). The province wants to produce green hydrogen and green ammonia using renewable electricity (Everwind, 2023). Hydrogen, ammonia, and carbon dioxide are three precursors to products that will be essential for a sustainable future (Adeli, 2023): Methanol can be produced by combining green hydrogen and carbon dioxide (Sollai, 2023), a versatile chemical used in various applications, including sustainable aviation fuels (ExxonMobil, 2023). Fertilizers such as urea can be produced with ammonia from the combination of hydrogen and nitrogen (Mahdy, 2023).

Producing methanol and urea requires a source of carbon dioxide. Obtaining carbon dioxide while reducing emissions involves identifying current and potential future sources of CO₂ emissions; assessing the carbon capture technologies; and analyzing methods for transporting CO₂ from the sources to industrial facilities producing the value-added products.

With its green hydrogen and ammonia, Nova Scotia has an opportunity to develop green methanol and urea industries. This research project will analyze the economic feasibility of different carbon-capture technologies and methods of transporting CO₂ to industrial facilities for its utilization in Nova Scotia. We believe that Nova Scotians will gain from this research, as the capture of carbon dioxide will not only reduce the province's emissions, but its utilization will create employment opportunities and foster economic benefits.

Keywords: Green Hydrogen, Green Ammonia, CO₂ capture, CO₂ transportation, value-added products, economic growth.