

## Abstract

This study seeks to explore the feasibility of employing a **direct air capture** (DAC) plant that runs on natural gas as a fuel source to capture 1Mt carbon dioxide (CO<sub>2</sub>) from the atmosphere per year and then store it in a natural gas reservoir.

### Mission behind Carbon Capture

- ✓ Eliminating CO<sub>2</sub> from air is crucial to **prevent** greater than 2°C of warming by 2100 [1].
- ✓ Emissions Reduction Plan to **reduce** emissions by 40-45% from 2005 levels by 2030 in Canada [2].
- ✓ Rising carbon taxes push firms to **invest** in negative emissions tech.
- ✓ Canada's Net-Zero Emissions Accountability Act aims for **net-zero** emissions by 2050 [2].

### Market Insight and Trends

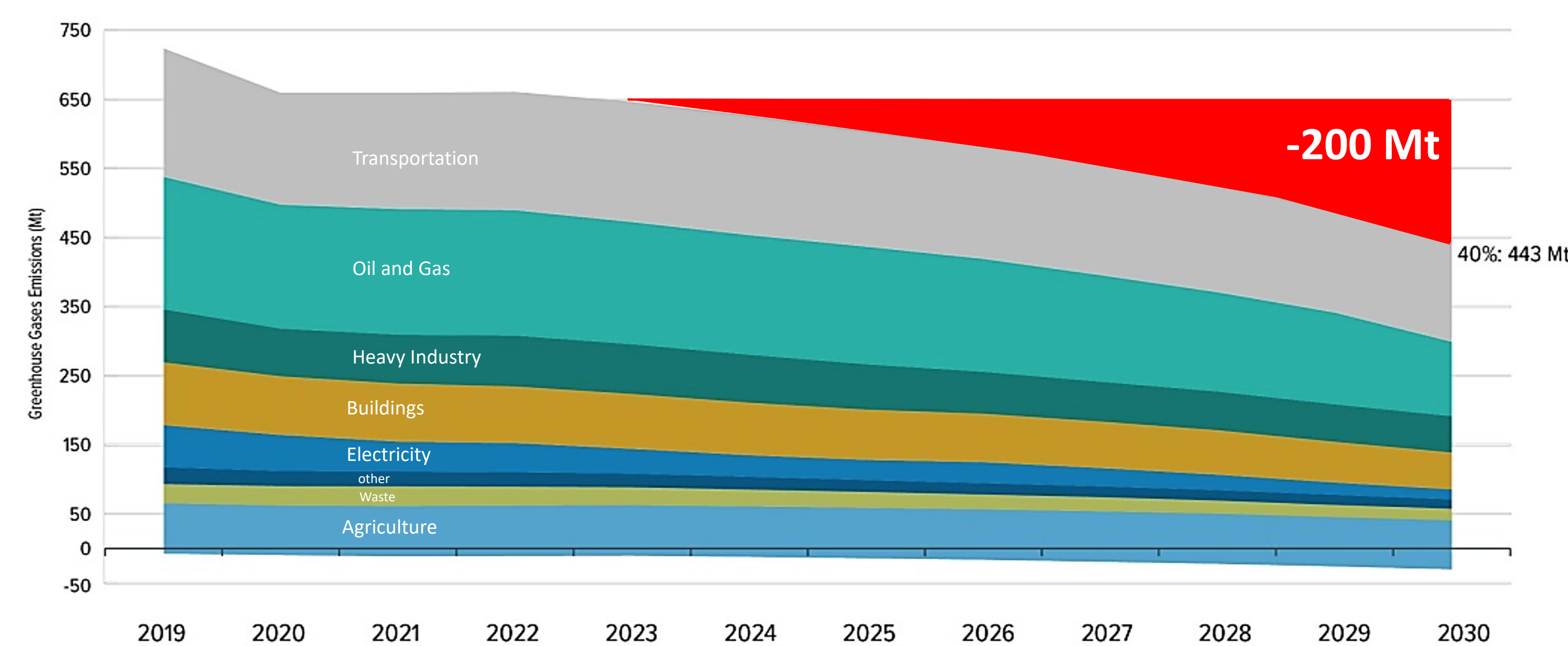
- ✓ Carbon Engineering **captures** 500K tons/year, scalable to 1M tons/year [4].
- ✓ 1PointFive targets 100 DAC facilities by 2035, with potential capacity of 1M ton/year [4].
- ✓ In the past year, US Department of Energy launched a 5-year program to spend \$3.5B on 4 regional DAC hubs [5].
- ✓ ACTL can transport 14.6 million tons of CO<sub>2</sub> annually, equivalent to capturing emissions from over 2.6 million cars [7].
- ✓ Quest, a Shell project, will cut Canada's CO<sub>2</sub> emissions by 1 million tons annually with just 3 wells [8].
- ✓ Companies such as Microsoft and Airbus have purchased up to 500,000 carbon credits in a year [6].

### Overall Feasibility

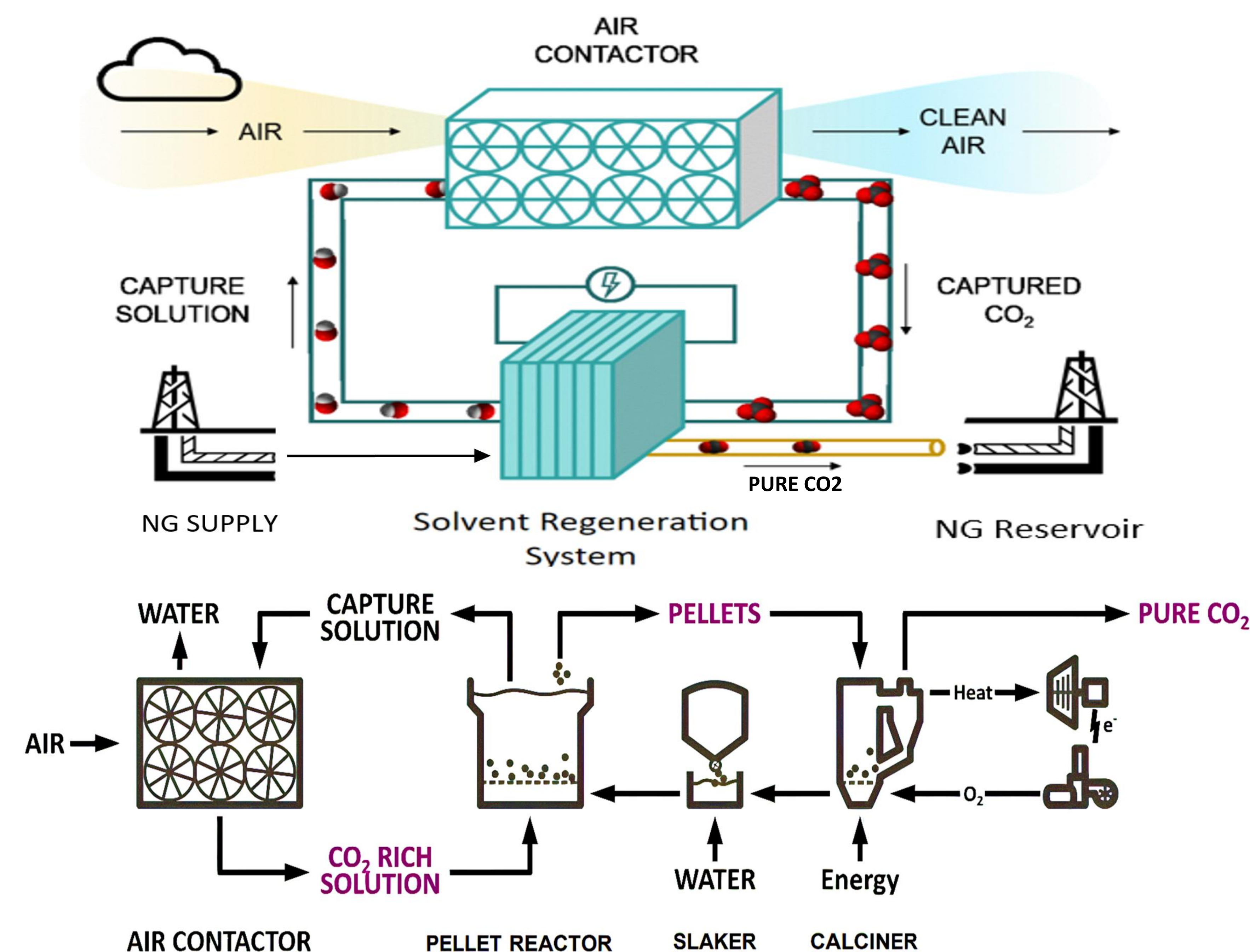
- ✓ 60% CAPEX will be covered by the federal government [9].
- ✓ Gas prices are CAD\$2.85/mmbtu [3].
- ✓ Payback period: <5 years.

### Why DAC?

Canada 2030 Emission Reduction Plan [2]



### How to DAC?



### Why choose a Liquid Solvent System

Pressure	Temperature	CO <sub>2</sub> Capture Performance	Energy Requirement
✓	X	✓	✓
Pressure Drop	Process Type	Land Use	Economic Feasibility
✓	✓	✓	✓

### Process Conditions

Natural Gas	CO <sub>2</sub> Capture Rate	Chemical Makeup
17 tons/hr	1 Mt CO <sub>2</sub> /yr	3 tons/hr

### Reservoir Injection Properties

Storage Rate From DAC	Number of Wells	Well Life Time
1.4 Mt CO <sub>2</sub> /yr	4 wells	122 years

### Acknowledgements

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### References

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