

Carbon Engineering Introduction

Carbon Neutrality Workshop

PRESENTED BY Geoff Holmes DATE Dec 11, 2019





CE's Direct Air Capture technology is proven and has been demonstrated and operational since 2015.

Trajectory & Projects

- 1. Newport Pilot Plant (operational since 2015)
 - Complete end-to-end direct air capture & Air to Fuels™ production
 - Achieved technology demonstration with existing equipment and proven supply chains
- 2. Newport Innovation Center (FEL-2 completed in Q1 2019)
 - Complete end-to-end air to fuels production with CO₂ accumulation
 - Integrated 24/7/365 operation.
 - Extended use for optimization and technology innovation.
- 3. The West Texas Direct Air Capture Project "Commercial Validation Plant" (FEED in 2019)
 - 500,000 1,000,000 tonnes-CO₂ per year for EOR.
 - Will achieve permanent sequestration of atmospheric CO₂.
 - Targeted to generate 45Q tax credits and California LCFS credits.
 - Establishes DAC in an industrial-scale commercial operation.
 - Potential to expand to 12 M tonnes-CO₂ per year.
- 4. Future Commercial Plants (1,000,000+ t/d CO₂, and/or 2000+ bbl/d)

CE and Occidental's Texas DAC Project will establish the technology at industrial scale in a commercial market, opening the door for expansion and subsequent projects.



Oxy Low Carbon Ventures & Carbon Engineering begin engineering of the world's largest Direct Air Capture and sequestration plant

May 21, 2019

HOUSTON, Texas, and SQUAMISH, British Columbia – Oxy Low Carbon Ventures, LLC (OLCV), a subsidiary of Occidental, and Carbon Engineering Ltd. (CE), a Canadian clean energy company, today announced they are jointly proceeding with the engineering and design of the world's largest Direct Air Capture (DAC) and sequestration facility. The companies are evaluating a facility designed to capture 500 kilotonnes of carbon dioxide (CO₂) directly from the atmosphere each year, which would be used in Occidental's enhanced oil recovery (EOR) operations and subsequently stored underground permanently. The plant would be located in the Permian Basin.









EOR using atmospheric CO_2 can dramatically reduce the lifecycle carbon intensity of the produced Crude Oil and can also enable net carbon removal.

DAC-EOR for Permanent Sequestration



If the amount of CO2 injected and stored is equal to that produced when the oil is refined and used, the full process is carbon neutral and has enabled the oil to deliver energy for transportation. If more CO2 is injected than is produced from refining and use, then the process results in a net reduction of CO2 in the atmosphere.



Evidence is mounting that large-scale "carbon dioxide removal" will be needed to meet climate targets.

DAC-Sequestration: "Stand-alone" Negative Emissions



DAC-Sequestration: Carbon Balance

Emission Source	Natural Gas Power Generation
	t CO_2 e emitted / t CO_2 e captured
Life cycle upstream emissions from natural gas supply	0.054
Fugitive carbon dioxide emissions from natural gas combustion	0.016
Make-up chemicals and disposal	0.003
Spare parts and maintenance	0.003
Fugitive emissions from carbon dioxide compression and transport	0.0002
Geological leakage	0.015
DAC plant construction emissions, annualised	0.012
DAC plant Initial fill emissions, annualised	0.001
Total Emissions, Annualised	0.103
Net Carbon Balance (t-CO ₂ e sequestered / t-CO ₂ e captured)	0.9



Air to Fuels™: Clean Renewable Fuels



DAC can be co-located with renewable electricity in low cost global locations, so that CO2 and hydrogen can be synthesized into ultra-low carbon drop-in compatible diesel and jet fuels.



MORE INFORMATION CAN BE FOUND AT:

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