The goal of this project is to design a novel Carbon Capture & Storage (CCS) plant which injects CO₂ emissions released from Enbridge’s Fort Nelson Gas Processing Plant into local saline aquifers. The Fort Nelson Gas Plant is the largest sour gas processing plant in North America and is located 21 km South of Fort Nelson. The proposed project integrates existing processes such as CO₂ conditioning, geothermal energy & methane extraction, oxyfuel combustion and CO₂ compression, liquefaction and infusion. Based on the International Energy Agency (IEA) estimates, 2500 operating CCS facilities with a capacity of 1.5 million tonnes of CO₂ per year (Mtpa) will be required by 2050 to meet the goals set in the 2016 Paris Climate agreement. This project aims to sequester 2.46 Mtpa, making it the largest project of its kind in Canada.

Environmental Assessment

The project’s aim to reduce CO₂ emissions from point sources brings positive environmental impacts to the surrounding community. Waste streams are minimal and safe disposal of by-products is considered.

Process Overview

1 Bcf/d raw natural gas

FORT NELSON GAS PROCESSING PLANT

CO₂, N₂ & H₂O

50 MW

CO₂ CONDITIONING

Increase in CO₂ concentration through MEA absorption and stripping process

CH₄ 0.19 Mtpa

CH₄ is combusted in a reactor to produce energy using pure oxygen fed from a cryogenic distillation column

OXYFUEL COMBUSTION

26 MW

CO₂ 0.45 Mtpa

High pressure CO₂ compression followed by cooling and infusion into brine

Brine

GEOTHERMAL PLANT

Binary plant which extracts geothermal energy and CH₄ for downstream combustion

44.9 Mtpa

CH₄ & Brine

SALINE AQUIFER

Sequestration in deep saline-filled reservoirs

infusion

Project Impact

2.46M tonnes
CO₂ sequestered annually

$123M
Current annual carbon tax savings

0 tonnes
Direct or indirect CO₂ emissions produced

3726 kW
Excess energy produced after sustaining operation

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Economic Analysis

CAPEX

$1.5B

OPEX

$335M

REVENUE

$435M

IRR = 10.06%
Based on assumptions

8 year construction period
25 year project lifespan
10% MARR

11% CAPEX financed through equity (issuance of common shares)

Federal & Provincial Funding comparable to Shell Quest Project

10 year loan schedule
5% interest rate

Carbon Savings: 50 $/tonne CO₂
Carbon Offset: 15 $/tonne CO₂