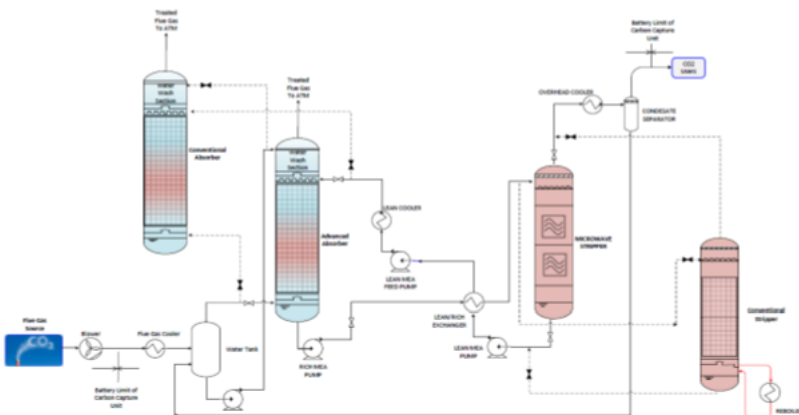


Amine Intensification

Amine processing is a well-established carbon capture technology used in industry for decades. While generally effective, the process lacks efficiency, which impacts operating costs, energy footprint, water requirements, throughput, and the net zero equation. The primary objective of this project is to develop a de-risked and scaled solution to overcome these inefficiencies experimentally. Applying this knowledge to existing and new amine-based carbon capture units and improving their effectiveness, efficiency, and adoption will significantly impact industrial decarbonization. Previously, InnoTech Alberta set up a lab-scale configuration and leveraged learnings from the carbon capture unit at Alberta Carbon Conversion technology Center (ACCTC) to run different process scenarios that allow optimization to be tested both by stage and as an integrated multi-stage process. Significant efficiencies were observed at the lab scale, warranting a third-party engineering techno-economic analysis to de-risk the scaling from lab scale to pilot scale.



Schematic of the proposed one time per day CO2 capture unit



RECIPIENT:
InnoTech Alberta



PARTNERS:
NRCAN
Suncor
Cenovus



TOTAL BUDGET:
\$5,000,000



AI FUNDING:
\$1,000,000



PROJECT DATES:
JUN 2024 –
SEP 2026



PROJECT TRL:
Start: 5
End: 8

APPLICATION

The technology is introducing three separate improvement concepts which each of them can be integrated into an existing CO₂ capture operation or they can be implemented in a new CO₂ capture project independently or in combination, including:

- 1- High efficiency adsorption tower: high-efficiency mass transfer product helps to reduce capital costs.
- 2- Water Lean Solvent (WLS): the regeneration of the WLS will have lower energy requirements, reducing carbon footprint.
- 3- Microwave Regeneration System (Strripper Tower): microwave heating has the potential to be more energy efficient than direct conductive heating.

CLEAN ENERGY

CLEAN TECHNOLOGY

CARBON CAPTURE UTILIZATION AND STORAGE (CCUS) AND HYDROGEN

PROJECT GOALS

One of the most compelling aspects of this process is its potential to significantly reduce the capital and operating costs associated with capturing CO₂. By achieving a 75% reduction in energy requirements compared to conventional amine-based processes, the Amine Intensification Process presents a substantial cost-saving opportunity for industries striving to reduce their carbon footprint.

This process aligns with global efforts to transition to sustainable energy sources by electrification of the process. Its energy-efficient approach not only reduces operational costs but also contributes to a more sustainable energy consumption pattern, appealing to environmentally conscious industries. Industries utilizing the innovation can demonstrate their commitment to carbon intensity reduction and sustainability, enhancing their brand image and positioning them as leaders in their respective sectors.

With tightening regulations and emission reduction targets, the Amine Intensification Process offers a proactive solution for industries to comply with environmental standards and avoid potential penalties.



1 Student Trained



2 Patents



100 Project Jobs



1000 Future Jobs



3 Publications



**3 New
Products/Services**



**0.073 kt/yr Project
GHGs Reduced**



**4158 kt/yr Future
GHGs Reduced**

BENEFITS TO ALBERTA

The proposed project serves as a beacon of alignment with Alberta vision and goals to reach to Net Zero by 2050. By addressing pressing challenges in CCUS technology, we exemplify the principles of clean innovation, collaboration, and environmental stewardship championed by Alberta. As the project progresses, it embodies the very essence of fostering a lower-emission future, strengthening Alberta's economy, and positioning the province as a hub of technological advancement. Through our project, we contribute significantly to Alberta's vision of a sustainable, innovative, and prosperous future for Alberta and its residents. Some of the studied benefits are:

- Economic Benefits
- Environmental Benefits
- Social Benefits
- Job Creation and building innovation capacity benefits

CURRENT STATUS

JUN 2025

This project is currently in the detailed engineering phase and fabrication of the 1 TPD test skid. Testing of the test skid is planning for early 2026.