

Integrated CO2 Capture and Utilization in Advanced Nanoparticle Production at a Calgary Natural Gas Plant

Carbon Upcycling Technologies (CUT) has developed a technology to incorporate waste CO₂ from a natural gas power plant to generate an enhanced fly ash product that improves the performance of concrete which further reduces the CO₂ footprint of the concrete industry. The product, called EFA-100, enhances the strength by up to 40% and reduces cement use by over 10%, thereby reducing the overall carbon footprint of concrete. The use of this technology in Alberta will reduce the carbon intensity of concrete use in Alberta and create jobs in the clean technology and low-carbon sector.



RECIPIENT:
Carbon Upcycling
Technologies



PARTNERS:
LafargeHolcim, Carbon
XPRIZE, Repsol, Burnco,
NRCan, NRC-IRAP, NGIF



TOTAL BUDGET:
\$5,650,000



AI FUNDING:
\$1,800,000
(CCITF)



PROJECT DATES:
NOV 2018 –
NOV 2020



PROJECT TRL:
Start: 6
End: 9

APPLICATION

The Carbon Upcycling technology enables significant reduction in the carbon intensity of concrete with improved strength and curing performance. The technology has been successfully tested through the Carbon XPRIZE demonstration, and Carbon Upcycling won the "X-Factor Award in recognition of its performance during the competition. The technology will be used by concrete manufacturers to improve their products and the platform technology can be expanded to additional sectors including battery materials and plastics.

ALBERTA INNOVATES CLEAN RESOURCES

CLEAN TECHNOLOGY

CARBON CAPTURE AND UTILIZATION / CCUS

PROJECT GOALS

The long-term goals of the project are to commercialize technologies that can be deployed at concrete manufacturing facilities which will result in reduced GHGs of the sector and create jobs in clean energy.

The objectives of the project are

- Demonstrate, at a commercially viable scale, the integrated capture of CO2 emissions with the production of advanced materials
- Validating the use of carbon-derived advanced materials in the concrete, plastics and battery industries
- Cost-effective and rapid reduction of Alberta GHGs in the concrete and construction sector
- Job creation in the clean technology sector
- Utilize CO2 captured from exhaust stacks to generate useful products.

BENEFITS TO ALBERTA

- Concrete Industry
 - Over 100M tonnes of CO2 reduction in less than 10 years at 10% market adoption rate of the concrete additive
 - Development of an emerging advanced material and clean technology sector in Alberta
 - Meeting corporate environmental performance goals
 - Introduction of new low-carbon products
 - Risk mitigation for possible future carbon tax increases
- Construction Industry
 - Availability of low carbon intensity products to improve environmental performance of buildings and structures
 - Meeting corporate environmental performance goals
 - Receive credits from applicable programs (e.g. LEED and others)
 - Introduction of new low-carbon products to end users



2 Publications



2 Students
Trained



3 Patents



3 Project Jobs



25 Future Jobs



1 New
Product/Service



1 Commercial-
Ready Company



100 T/yr Project
GHGs Reduced



100 MT/yr Future
GHGs Reduced

CURRENT STATUS

July 2021

The project has successfully concluded with CUT's successful demonstration at commercial scale of its technology. CUT intends to have its reactors installed at partner facilities for commercial-scale carbon capture and utilization to generate valuable products. CUT has been recognized by the Carbon XPRIZE with the X-Factor Award to recognize the novelty and innovation of its product. CUT is also a recipient of the Solar Impulse Label.

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