

Delta CleanTech: how Canada is driving innovation in emissions reduction

Canada has set an ambitious target for emissions reduction and implemented an aggressive regulatory regime to support this goal. The current objective is to slash emissions 30% by 2030, to levels below what they were in 2005. To incentivize this, Canada's carbon tax is planned to increase to \$170/tonne by 2030. By Jeff Allison, President, Delta CleanTech Inc.

The carbon tax is established as a federal floor nationally, but individual provinces have the authority to tax carbon more aggressively should they elect to do so. Due to this planned increase, it is increasingly important to adopt a CO2 emissions reduction strategy for any large CO2 emitter in Canada.

Both the federal and provincial governments have also established CO2 grants funded from those carbon taxes that will be used to reduce the cost of the capital expenditure (CapEx) of CO2 capture projects.

The Canadian Minister of Natural Resources announced in August 2021 that the federal budget will include \$319 million in R&D money for carbon capture and utilization technology investments.

Further driving this shift is increased interest in environmental, social, and governance (ESG) which has also grown in importance to companies, investors, and consumers. ESG is focused on finding financial opportunities that take into account the ethical impact and sustainability of the project.

A March 2021 report from EY highlighted that 2019 saw a record inflow into ESG funds, up 4x from 2018. 2020 levels then further increased again to twice that of 2019 levels.

The Greenhouse Gas Reporting Program (GHGRP) in Canada estimated that there are 1,066 emitters that produce 10 to 50 kt of CO2 per year, meaning that in Canada alone, there could be north of \$32 billion of investment in carbon capture technology in the coming years.

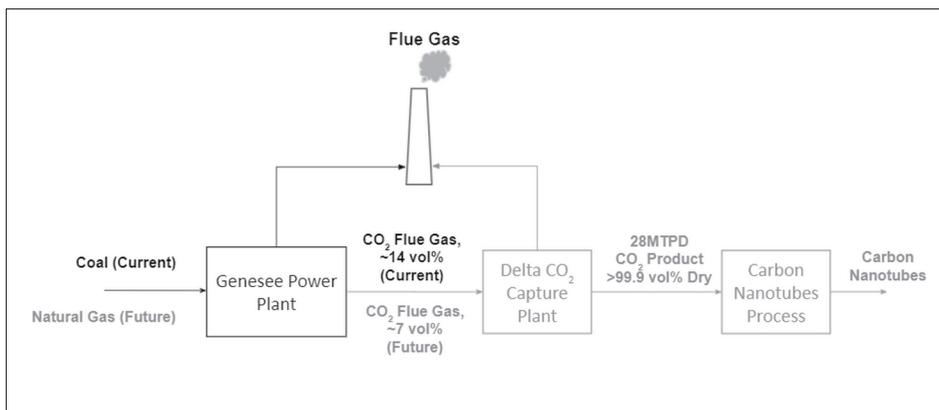
Coal-fired power plants are heavy emitters, and at present, there are four provinces that operate these plants: Alberta, Saskatchewan, New Brunswick, and Nova Scotia. Stricter emissions requirements over the next few years will eventually require coal-fired power plants to be shut down or be retrofitted with carbon capture and storage technology. In Alberta, most coal plants are projected to be converted to run on natural gas.

Delta CleanTech's off-the-shelf oilfield technology, fabricated in a factory setting, is used



Jeff Allison, President, Delta CleanTech Inc.

to reduce CapEx costs and enable a quick set-up, while also easing the transition from coal to natural gas.



Delta CleanTech designed a flexible CO2 capture plant able to accommodate variable CO2 contents and flue gas rates for Capital Power - a world first

Recent Project: Dual-Design of Delta CleanTech CO2 Capture Plant to store CO2 Permanently with Nano Carbon-Tubes

Capital Power is a growth-oriented North American wholesale power producer with a strategic focus on sustainable energy headquartered in Edmonton, Alberta. It builds, owns, and operates high-quality, utility-scale generation facilities that include renewables and thermal.

They have also made significant investments in carbon capture and utilization to reduce their impact and are committed to being off coal in 2023.

Capital Power sought to utilize its captured CO₂ to make carbon nanotubes, which can be added as an additive to cement to enhance its strength and other properties or be used in advanced carbon fibers.

However, the company sought a flexible CO₂ capture plant that could both accept the current flue gas from its coal-fired power plant, while also being able to be configured to easily accept the future flue gas from the natural gas firing once implemented.



Delta's modularly designed, commercially ready, CO₂ capture unit

Delta CleanTech has approached this problem by providing its Low-Cost Design Post-Combustion CO₂ capture technology (LCDesign®).

To achieve the same CO₂ production capacity, the challenge lies in how to deal with the different compositions of each flue gas. The coal-fired flue gas has a high CO₂ concentration, which means that the required flue gas volume would be small, while the natural gas-fired flue gas has a smaller CO₂ concentration, making the required flue gas volume three times higher than in the coal case.

Delta CleanTech used multiple design tools including its process design PDOEngine® to invent a solution that is able to accommodate both scenarios of variable CO₂ contents and flue gas rates. This is the first design of its kind with this functionality in the world.

With this technology, both plants can match the operating data with less than ±5% average absolute deviation. The plant will process a slip stream from the flue gas stream and then send the off-gas back to the flue gas stack while the captured CO₂, which contains more than 99.9 mol% dry, which is suitable for manufacturing carbon nanotubes.

A detailed design engineering study is currently being carried out and it is expected to be operational in 2022.

An August 2021 Market Research Future report forecasted that the carbon nanotube

market alone could be worth nearly \$19 billion (USD) by 2028.

Captured CO₂ would traditionally be used for enhanced oil recovery, sequestration, chemicals manufacturing (i.e. urea), or on a smaller scale, used for dry ice or food-grade CO₂ utilizations. But today, many new technologies have emerged to utilize captured CO₂, such as the production of methanol/ethanol, the injection of CO₂ into concrete to make it lighter and stronger, the production of bioplastics, and more.

Applications for Sequestered CO₂: COSIA Carbon XPrize competition

Delta CleanTech was selected to supply captured carbon to participants in the NRG COSIA Carbon XPrize competition, which recently named CarbonCure out of Nova Scotia, as the competition winner. That five-year global competition challenged companies to develop breakthrough technologies to transform carbon emissions into usable products.

The competitors were judged on how much carbon they used and the resulting net value of the products created. CarbonCure injects captured CO₂ during concrete fabrication to chemically convert it to a mineral. Its technology is in use at more than 300 plants around the world.

The installation of Delta CleanTech's technology for this project occurred at the Enmax Sheppard natural gas-fired power plant in Calgary, Alberta. Delta Cleantech's construction partners built and commissioned the CO₂ capture plant which included integrated solvent reclaiming technology. This plant was the first in the world to be recognized ISO Certified for its process design and technology solutions.

Delta's post-combustion CO₂ capture technology has been perfected over the past 15 years and is considered to be a cutting-edge, commercially available carbon capture technology that can handle any kind of flue gas – from natural gas turbines to coal plants, and from hydrogen-generating units to refineries.

Delta CleanTech also recently completed a highly-anticipated listing on the Canadian Securities Exchange (CSE: DELT). The clean energy investment community is recognizing the value that Delta CleanTech is bringing to the CO₂ capture market globally.

More information

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