Educating and growing the Carbon Capture, Conversion and Sequestration sector

Naoko Ellis

About the projects

The climate emergency necessitates an immediate and continued response to reduce greenhouse gas (GHG) emissions. The goal to reduce GHG emissions is clearly aligned when considering the UBC Climate Action Plan, Metro Vancouver’s climate strategy, and national reduction targets from the Intergovernmental Panel on Climate Change (IPCC). However, significant GHG reduction is difficult to attain especially when targeting eventual net zero GHG emissions. UBC has successfully reduced its GHG emissions, achieving the goal of 67% below 2007 levels through implementing conservation and supply side measures via programs such as the building tune-up program and reduced natural gas consumption at the Campus Energy Centre. Meeting further reduction goals, however, becomes increasingly challenging and requires synergistic solutions that engage with the problem from different angles and at different scales (e.g., technological solutions, policy mechanisms, or the social license to adapt). Carbon Capture and Conversion (CCC), a potential GHG reduction solution, is an active area of both technological and policy research at UBC, but dissemination of results and wider impact has yet to go beyond the academic realm.

Positioning the CERC Carbon cluster at the core, we are developing an ecosystem for research, teaching and implementation around CCC at UBC that becomes the foundation for rich connections between various disciplines, researchers, students, industry sectors, governments, and stakeholders to start generating and answering questions to progress CCC technology development and deployment.

Project Highlight:

A new micro-carbon capture and conversion is being installed on campus to learn about this type of technology and its respective impacts.

The Team:

- Naoko Ellis, Professor, CHBE and IRES
- Sergio Berretta, Adjunct Professor, CHBE
- James Montgomery, Energy conservation engineer, Energy and Water Services
- Justin Krawetz, Research Assistant
- Kasun Hewage, Professor, UBCO School of Engineering
- Jason White, Mechanical technical specialist, Building Operations
- Tony Bi, Professor, CERC Director, CHBE

"There are very few plug-and-play solutions in this field. We must integrate Carbon Capture and Conversion technologies into systems to deliver solutions."
As an example of the deployment and investigation of novel CCC technologies, in 2021, UBC Campus as a Living Lab funding [https://sustain.ubc.ca/research/cll-fund-competition/cll-competition-award-recipients] has funded the installation of a Clean O2 CARBiN-X system on campus to capture and convert CO2 from a natural gas boiler in the Pharmaceutical Science building to usable soap products. This is demonstrating the feasibility of a micro-CCC system, which can produce valuable revenue generating products.

As an example of our efforts for creating a CCC ecosystem, we have started a webinar series on Carbon Capture and Conversion [https://sustain.ubc.ca/carbon-capture-and-conversion-webinar-series] generating interests from industry, government, investors, and academics.

- May 27, 2021: Discussion of large scale carbon capture implementations and future challenges in the field
- June 24, 2021: Discussion of small scale carbon capture implementations and future challenges in the field
- Sept 23, 2021: The state of carbon capture research
- Oct 28, 2021: How can market development impact the future of carbon capture?

As an example of our efforts to spread CCC facts and knowledge, led by CANMET Energy, NRCan on the National Carbon Capture, Utilization and Sequestration (CCUS) Assessment Framework, we are working on generating data to map out the national industrial hubs and clusters for CCUS. This tool will identify regional connections of industrial hubs, CO2 storage opportunities, transportation infrastructure, and policy and regulatory requirements.

The CERC Carbon cluster is also working with Metro Vancouver through their Climate 2050 - a climate strategy for the Metro Vancouver region [http://www.metrovancouver.org/climate2050].

UBC Chemical and Biological Engineering offers a course on Carbon Capture, Conversion and Sequestration Technologies (CHBE 488 and 588) as technical elective course to both Undergrads and Graduate students. The course is based on case studies work with small-to-medium enterprises (SMEs) in the CCC field. For more information, please visit: https://www.chbe.ubc.ca/cccs/