Urban energy systems: Transportation/Buildings

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Transportation provides the mobility that connects communities and supports the economy, which handles trillion of dollars in goods each year in Canada alone. To continue supporting the vast Canadian landscape, more vehicles, and increasing trade, the transportation sector must innovate to mitigate its environmental impact, which accounted for 25% of all GHG emissions in 2019.

Our goal:
The transportation theme at the UBC Clean Energy Research Centre is at the forefront of this transformation, focusing on solutions at every scale, from a provincial level down to the performance of an engine cylinder with initiatives such as:

- The BC-SMART Consortium to develop strategies that decarbonize long distance transportation and accomplish the goals set out by the CleanBC plan to reduce province-wide emissions
- Investigating the feasibility of mobile energy hubs by using electric vehicles as energy storage systems to stabilize the electric grid in urban communities
- Developing new ways to measure emissions more accurately in marine vessels that use natural gas and developing strategies to mitigate them
- Creating a portable emissions measurement system to understand the real-world emissions of a semi-truck that uses diesel and hydrogen co-combustion
- Developing optical sensors that help characterize the in-cylinder combustion properties in novel fuel systems that inject natural gas directly into the engine cylinder
- The wide scope of research aims to reduce the environmental impact from transportation with a diverse set of solutions.

Feature Projects

- Visual Characterization of a Pilot-Ignited Direct-Injection Natural Gas Combustion
- Developing a Strategy to Decarbonize Long-Distance Transportation in British Columbia
- Feasibility of Mobile Energy Hubs for Urban Communities
- Real-World Emissions from Hydrogen Substitution with a Heavy-Duty Diesel Truck
- Characterization and Mitigation of Methane Emissions in Real-World Conditions of a Marine Vessel

Challenges and Opportunities

Government and industry are engaged with ongoing projects to ensure that the innovations in transportation are valuable and relevant. Government policy is a necessary driver in several projects, including:

- Public investment to implement mobile energy hubs
- Low carbon fuel standards from the substitution of diesel with hydrogen or the use of oleochemicals as biofuels
- NOx, SOx, and energy efficiency regulations in marine transportation

In turn, the partnership between UBC and industry drive innovation to bring viable, cost-effective solutions to market. A challenge to reducing emissions in the transportation is to find realistic solutions to industrial mobility. For instance, solutions that are effective for urban transportation may not be viable for long-distances, or solutions that work for road transportation may be ineffective for rail, marine, or air transportation. The transportation sector is diverse and needs an equally varied set of solutions to lower its impact on the environment.

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