Research project title

Reducing Transportation Impacts through Fuel Improvements in Metro Vancouver

Organizational Sustainability Goal or Operations Plan objectives

Integrated Air Quality and Greenhouse Gas Management Plan (2011)

Goals and Strategies:

- Goal 1: Protect public health and the environment
  - Strategy 1.1 Reduce emissions of and public exposure to diesel particulate matter
  - Strategy 1.4 Reduce air contaminant emissions from cars, trucks, and buses
- Goal 3: Minimize the region’s contribution to global climate change
  - Strategy 3.1 Reduce emissions of short-lived climate forcers
  - Strategy 3.3 Reduce the carbon footprint of the region’s transportation system


Air Quality & Climate Action: Improve air quality by mitigating threats.

- Strategic Direction 2.1 Identify the key threats to the region’s air quality and their sources, and pursue appropriate means for reducing or eliminating identified threats.
- Work with stakeholders who support improved regional air quality.

Outline scope of project, why it is of value to Metro Vancouver, and describe how and when the scholar’s work will be actionable

Metro Vancouver’s regional inventories of criteria air contaminant and greenhouse gas emissions have consistently identified fossil fuel internal combustion engines in on-road vehicles and non-road equipment as a dominant emissions source in our region. Two key regional approaches to reducing emissions from on-road vehicles and non-road equipment are:

1) replacement of older high emitting vehicles with newer fossil fuel burning vehicles that have higher efficiency engines and advanced emissions controls, and
2) replacement of internal combustion engines through electrification of vehicles.

However, both of these approaches rely on incremental changes over long periods of time, meaning that short term emissions benefits may be small. A third emissions reduction option, with the potential for more immediate impacts, is the improvement of the fuels burned in existing internal combustion engines. A variety of research evidence suggests that there may be significant potential for emissions reductions associated with switching between fossil fuel options, reformulated and synthetic fossil fuels, and synthetic biofuels. Moreover, these emission reduction benefits have the potential to be realized over the full life cycle of the fuels, from well to wheels.
In order to identify the potential benefits of improved fuels within the region, Metro Vancouver Air Quality & Climate Change staff have undertaken the preparation of a “Policy Green Paper”, which has the working title: “Reducing Transportation Emissions through Fuel Improvements in Metro Vancouver”. The objective of this Sustainable Region Scholars project is to develop material that would form the basis of two key sections in the proposed Green Paper. The scholar will be expected to conduct a review of the state of the art on improved fuels for transportation, and their impact on transportation emissions, as well as explore policy and regulation that could be used to motivate a transition to improved fuels. The focus is on fuels that could replace conventional gasoline and diesel, with particular emphasis on on-road vehicle applications.

The aim is to produce a comprehensive report with the following elements:

(a) a technical review of existing and near-term future options for improved fuels, and their impact on emissions (including GHGs, common air contaminants, and hazardous air pollutants); and

(b) a synthesis of standards, regulations, policies and programs that can be used to mandate/incentivize the adoption of improved fuels, with illustrative case studies from Canada and other jurisdictions.

The scope of work is expected to include, but will not be limited to, the following areas:

- Fuel Switching: Gasoline and Diesel to LNG/CNG or propane (not direct substitution: modifications or new engine technology needed)
- Improvements in Existing Fossil Fuels: Gas-to-Liquid diesel/gasoline, etc. (direct substitution for existing fuels); Ultralow sulphur fuels
- Renewable Liquid Fuels: Biodiesel, ethanol, etc.

The scholar’s work will be actionable by Metro Vancouver immediately, allowing staff to develop a set of potential policy options that could be applied to effect fuel improvements within Metro Vancouver. With the contribution from the Sustainable Region Scholar, completion of the “Reducing Transportation Emissions through Fuel Improvements in Metro Vancouver” Policy Green Paper is expected in the fourth quarter of 2016.

**Deliverables**

- A research strategy, outlining the approach for searching available literature, and the manner in which search results will be organized and systematically reviewed. This is to be delivered within three weeks of the project kickoff.
- A final report, containing a summary of completed work with recommendations, complemented by a final presentation to key stakeholders within Metro Vancouver.
- An annotated spreadsheet cataloguing all publications identified during the research, with brief comment on their applicability and rationale for their inclusion or exclusion in the final report.

**Project timeline**

The successful candidate will work directly with the project lead to determine the project timeline based on the Scholar’s schedule and commitments.

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1 A “green paper” is an early-stages report on a proposed policy or new idea, and is designed to stimulate thinking and discussion among interested parties without requiring a commitment to action.
The Scholar will work remotely; however regular check in meetings will be arranged with the project lead, which may be in person or via teleconference.

As needed, the Scholar will visit Metro Vancouver offices for the purpose of key meetings or delivering any presentations.

**Scholar skillset/background required/preferred**

- Educational background in engineering, resource management, environmental studies, or planning
- Experience with environmental regulatory and policy analysis is highly desirable
- Technical familiarity with engine technology and emissions assessment is preferable
- Excellent research and writing skills
- Ability to work independently and prioritize tasks.