



Vancouver, Canada

May 31 – June 3, 2017/ *Mai 31 – Juin 3, 2017*

City of Vancouver – Green Fleet Plan

Sidwell, Amy^{1,4}

¹ City of Vancouver, Canada

⁴ amy.sidwell@vancouver.ca

1 Project Overview

In 2013 the City of Vancouver developed a Green Fleet Plan to reduce fleet asset based carbon dioxide (CO₂e) emissions. The objective of the plan is to reduce CO₂e emissions from these assets 30% below 2007 levels by 2020. This plan was developed in support of both the Greenest City 2020 Action Plan and Vancouver's internal Corporate Strategic Business Plan. Reducing CO₂e emissions reduces Vancouver's overall carbon dependency, enhances energy resilience, conserves energy and resources, and enhances the health of the ecosystem.

1.1 Project Scope and Fleet Composition

When the Green Fleet Plan was developed in 2013 the Vancouver fleet had approximately 4,800 units which are broken down by asset category in Table 1 below.

Table 1: Fleet Composition

Category	Quantity (units)
Light duty vehicles	1100
Heavy duty trucks	450
Heavy equipment	300
Small equipment	2200
Other (boats, trailers, shop equipment)	750
Total	4800

The scope of the initiatives identified in the plan were focused on the 1850 units in the light duty vehicles, heavy duty trucks, and heavy equipment categories, as these asset categories accounted for 97% of overall fleet emissions and additionally had significant opportunities for innovative technologies and operationally transformative practices to be employed that would assist in achieving the goal. The plan involves all departments with in-scope fleet assets, including, but not limited to, Engineering Services, Police Services, Fire & Rescue Services, and the Board of Parks and Recreation.

2 Innovation

When the Green Fleet Plan was presented Vancouver's fleet CO₂e emissions were 9.2% (1660 tonnes) below the 2007 baseline level of 18000 tonnes. The plan was therefore focused on 10 projects that would contribute towards the remaining 20.8% reduction (3740 tonnes) to get to the overall goal of a 30%

reduction. These projects, their anticipated CO₂e emission reduction and the project current status are shown in Table 2 below.

Table 2: Green Fleet Plan Projects & Status

Project	CO ₂ e Reduction (tonnes)	Project Status
1. Transition to lower emission diesel alternatives (i.e. biodiesel or renewable diesel)	745	5% & limited 20% biodiesel
2. Downsize 176 patrol vehicles and equip with idle reduction technology	660	126 replaced
3. Transform operational practices (route planning, trip elimination, right sizing)	610	Ongoing
4. Replace 115 gas light duty vehicles with electric drive units	460	33 replaced
5. General technology improvements (green ICE, ECM programming, cab heaters)	430	Ongoing
6. Increase utilization of GPS & telematics technology	290	220 of 1100 installed
7. Replace 60 diesel powered refuse collection vehicles with CNG powered units	230	34 replaced, completed fuel station & maintenance facility upgrades
8. Replace 12 heavy duty trucks with hybrid drive units	120	6 replaced
9. Replace 38 fire apparatus, including addition of auxiliary power units	115	26 replaced
10. Replace 90 light duty vehicles with hybrid drive units	80	48 replaced
Total	3740	

These projects reflect a diverse and multi-faceted approach to achieving the target. The projects can be categorized into 3 key innovation areas: fuel, technology, and operational transformation. Firstly, by increasing use of advanced lower emission fuels such as higher blends of biodiesel/ renewable diesel and compressed natural gas enables reductions using existing equipment and additionally diversifies the fuel supply to increase resiliency. Next, the City continues to replace end of life fleet units with innovative new powertrain and aftermarket technologies, including hybrid and electrified options and idle reduction systems. Finally, the organization has reviewed a number of key operational practices (i.e. travel routes, staging areas, idling statistics) to enable further reductions while maintaining or improving the way service is provided to residents of and visitors to Vancouver.

3 Lessons Learned

To date annual emissions have been reduced as much as 12.9% below 2007 baseline levels (2015). Primary learnings from the Green Fleet Plan are as follows:

1. Strong government and industry relations and support are instrumental to advance production and utilization of lower emission fuels and related powertrain technologies. A key future focus area is advancement of lower emission technologies for heavy duty trucks and heavy equipment.
2. Service level increases can significantly impact reduction achievements and require advance consideration to minimize effects. In 2016 annual emissions were 8.0% below baseline as there were a number of service level increases (e.g. glass separated recycling, refuse hauling and snow response). These impacts are planned to be offset in future years by other projects.
3. Isolation of project benefits is greatly improved with the addition of GPS and telematics to identify the source of emission reductions (i.e. technology, route, or operationally driven etc.).
4. Operational transformation to reduce emissions is greatly improved when the organization leadership and employees are jointly engaged in making improvements.