Electric Vehicle Fleet Modelling Project

2013 Summary Report

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fleetcarma

Fraser Basin Council

Introduction

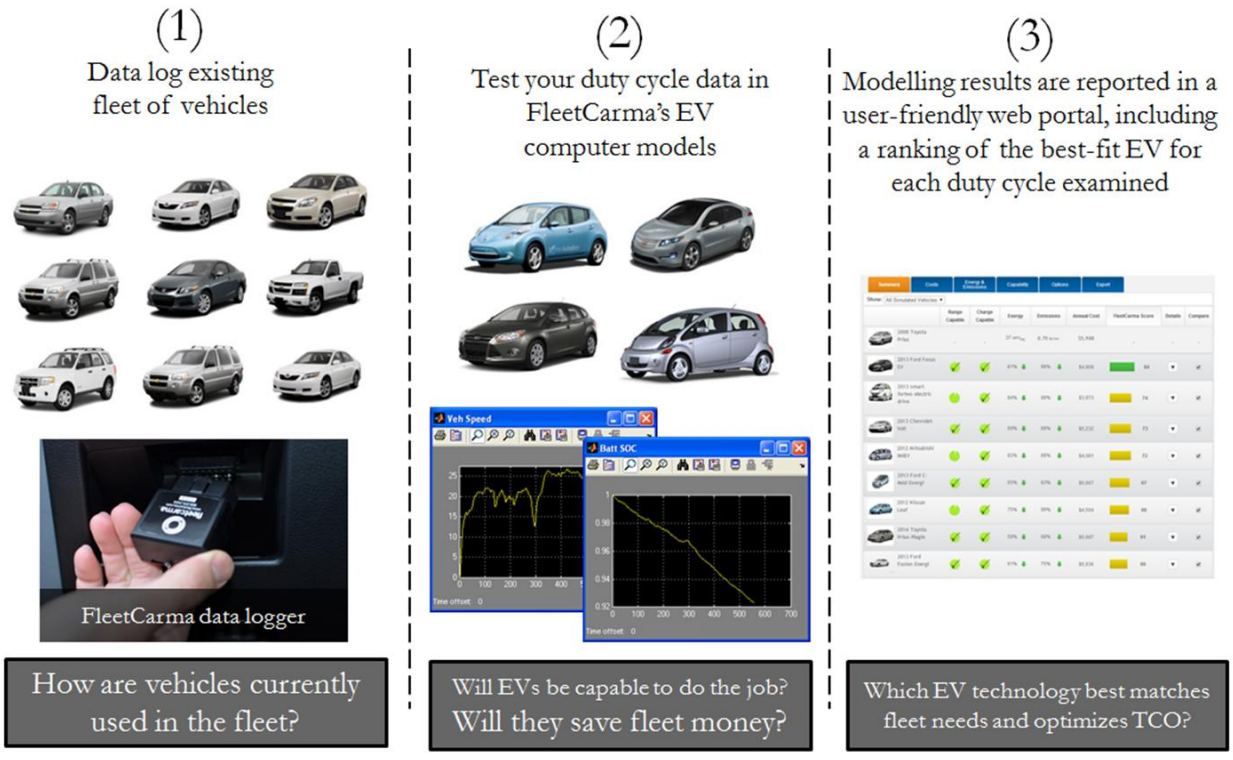
As part of the Plug In BC program, Fraser Basin Council and FleetCarma, with funding made available from the Ministry of Environment in British Columbia, organized an innovative electric vehicle (EV) adoption program with nine fleet operators in the province of B.C.

This document has been prepared to share some of the key elements and results of the program so that it could benefit those who participated and other fleet operators that are interested in electric vehicle adoption.

The purpose of the program was to provide an EV suitability assessment service to help fleets make the business and environmental case for electric vehicle adoption. This comprehensive fleet analysis performed by FleetCarma (www.fleetcarma.com), informs organizational decision making in terms of the ability to cost-effectively integrate electric vehicles into specific fleet needs and duty cycles.

The project involved Fraser Basin Council recruiting interested fleet partners with the aim to closely analyze and match fleet requirements and future needs with the capabilities and recommended uses of various electric vehicle makes and models. The EV suitability assessment technology and process provided by FleetCarma starts with data logging current fleet vehicles and then uses data collected every second to 'drive' virtual plug-in vehicles models and simulate various EV adoption scenarios for fleet managers. The FleetCarma data logger is a simple-to-install device, about the size of your thumb, that easily clips on to the vehicle's diagnostics port. The entire logging and modelling process took about one month and the end result was a series of online reports on the business case for plug-in vehicles in each of the existing duty cycles throughout the fleet portfolio. In the end, this EV modelling tool rapidly determined which particular EV make and model would be (i) range and charge capable for each driver in the fleet, and (ii) the most cost-effective EV to replace the existing vehicle from a total life-cycle cost perspective.

The FleetCarma EV Suitability Assessment Technology and Process



The Fleet Partners

This program included a wide-variety of fleet operators including large, medium, and small municipal fleets, an airport, private companies, transit and harbour authorities, and university campuses. The following is a list of the nine participating fleets in this program in 2013.

- BC Transit
- City of Victoria
- Great Victoria Harbour Authority
- Thompson Rivers University
- Town of Ladysmith
- University of British Columbia
- Van Houtte Coffee Inc.
- Vancouver International Airport
- Village of Burns Lake

The Baseline Results

Across the nine fleet partners, FleetCarma provided data loggers for more than 120 baseline vehicles. The fuel consumption for the baseline vehicles varied from 6.0 L/100km to 34.9 L/100km, while the average fuel consumption across all of the existing fleet vehicles studied was 18.3 L/100km.

The utilization of the vehicles varied considerably as well. In some cases, fleet vehicle usage was estimated to be as low as 901 km/year and as high as 69,642 km/year. The average utilization in this sample of fleet vehicles was 9,212 km/year.

In BC, many fleet operators also off-set their greenhouse gas (GHG) emissions with financial contributions of $20/tonne of CO2e to carbon off-setting programs. So, in the evaluation of the benefits of EV adoption for many of the fleets participating, this was also included in the analysis. The existing fleet vehicles emitted an average of 469 grams of CO2e/km, with a range as wide as 184 grams of CO2e/km to 1,071 grams of CO2e/km.

The Objective of the EV Model Scenarios

The objective of the EV fleet modelling was two-fold. For the Battery Electric Vehicles (BEVs) that solely run on grid-supplied electricity, the models identified if the daily utilization of the current vehicle would be sufficiently high to ensure short payback periods on the electric vehicle, while also ensuring that if replaced with an all-electric vehicle that they would have enough electric driving range each day (range capable) and enough time to fully charge each night (charge capable).

In the case with the Plug-in Hybrid Electric Vehicles (PHEVs), the models identified the duty cycles that maximized electric driving as a proportion of total utilization to ensure efficient operation that minimized payback timelines within a reasonable period for the fleet operators.

The Modelling Results

The modelling results focused on three key areas for each fleet operator: (1) Is there an electric vehicle option that would be both range capable (have enough electric driving range throughout every day it would be needed) and charge capable (have enough time to fully charge the vehicle overnight), (2) Is there a business case to convert the application to an electric option, and (3) what is the quantifiable environmental benefits of conversion for the organization.

Across all the fleet operators in the program, 81% of their duty cycles where found to have sufficient time to fully charge the best-matched EV every night with a Level 2 (240 volt, 30 amp) charging station. Meanwhile, only 6% of the duty cycles would have not been range capable for the all-electric vehicles assessed in the models. These results helped fleet managers in the program determine how to mitigate risks of range issues by knowing where to deploy BEVs where they would be range capable and ensuring that they deploy electric vehicles in applications that allowed sufficient time to fully charge.

Although the results varied considerably from one application to the next, the modelling indicated that the financial benefit of electrifying their fleet applications would be approximately $15,968/vehicle over a seven year service life, while potential reductions in fuel usage and life-cycle GHG emissions by 94% and 95%, respectively.

Across all fleets, the pilot program estimates an opportunity for $1,964,148 in financial savings and 3,526,915 kg of CO_2 savings by selecting the optimal powertrain and EV model for each duty cycle assessed.

Additional Resources

For more information FleetCarma on fleet and EV resources, including more whitepapers, eBooks, and webinars, visit: www.fleetcarma.com/en/resources

Or contact:

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For more information on additional electric vehicle programs coordinated by Fraser Basin Council, please visit:

www.fraserbasin.bc.ca/ccaq_plug_in_bc.html

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