

EV Suitability & Financial Benefit Assessment: Effectively accelerate electric vehicle adoption in fleet applications

Scott Lepold
Client Solutions
October 30th, 2018

fleetcarma[®]
A GEOTAB Company

FleetCarma, a Geotab Company, is an award-winning electric vehicle telematics company that has been providing solutions to manage and accelerate the transition to clean fleets, since 2007. A robust cloud platform with patented software and specialized hardware for electric vehicles are at the core of the company's global product offering. FleetCarma manages hundreds of active client engagements around the globe which include electric utilities, municipal and federal governments, military and commercial fleets and transportation research labs.

GEOTAB | fleetcarma

Fleets that are electrifying:



Motivators:

- Executive orders
- Council directives
- Emissions targets
- Purchase incentives
- Better technology

Challenges:

- Range
- Cost
- Infrastructure

The electric fleet vehicle market is rapidly evolving





Increasing EV adoption in fleets

fleetcarma®
A GEOTAB Company

Three common barriers to fleet electrification

RANGE



Will it have enough range to do the job?

COST

Government report says electric cars don't make economic sense

By Steve Mac Donald / May 8, 2015 / No Comments



SAVINGS MYTHS UNPLUGGED: A new report from the federal government shows just how long it takes for hybrids and electric vehicles to save you money.

Can we afford them?
What is my payback?

INFRASTRUCTURE

FleetNews NEWS FLEET TOOLS FLEET MANAGEMENT CARS SUPPLIES

Electric cars: Finding the right charging point, card, and cables

29/07/2015 in Environment



Format wars aren't a new phenomenon. The 1980s saw VHS versus Betamax, and the 1990s brought CD versus mini-disc, to name but two.

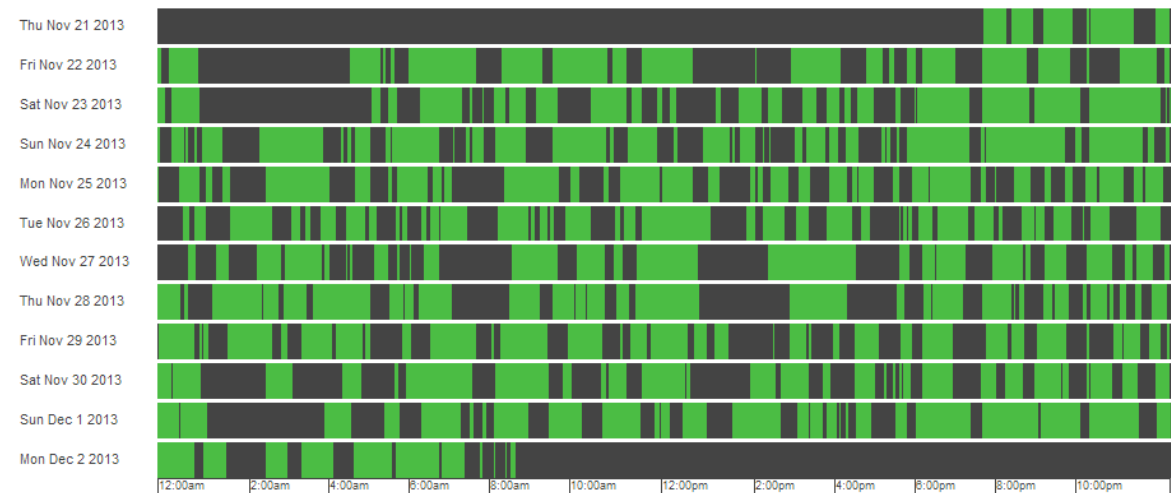
In both cases, a clear winner emerged and the unsuccessful rival disappeared into obscurity.

However, at the moment, at least, the

How do we deal with the charging infrastructure?

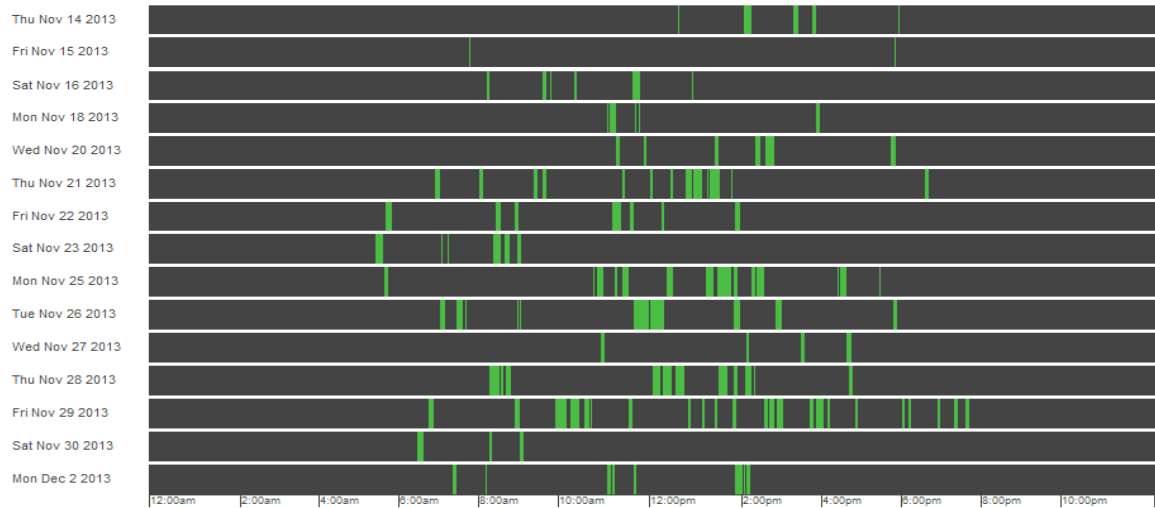
High utilization: range and charge capability a major concern

Daily Utilization



Low utilization: ROI and payback period a major concern

Daily Utilization



Overcoming barriers to fleet electrification

BARRIER	SOLUTION	RESULT
Range	<ol style="list-style-type: none">1. Replace the right vehicles in your fleet with the right electric vehicles2. Ensure your plug-in hybrids get plugged in. Ensure your battery electrics get driven.3. Match your infrastructure to your driving patterns and EV adoption roadmap.	Deployed correctly, electric vehicles will save money and emissions.
Cost		
Infrastructure		

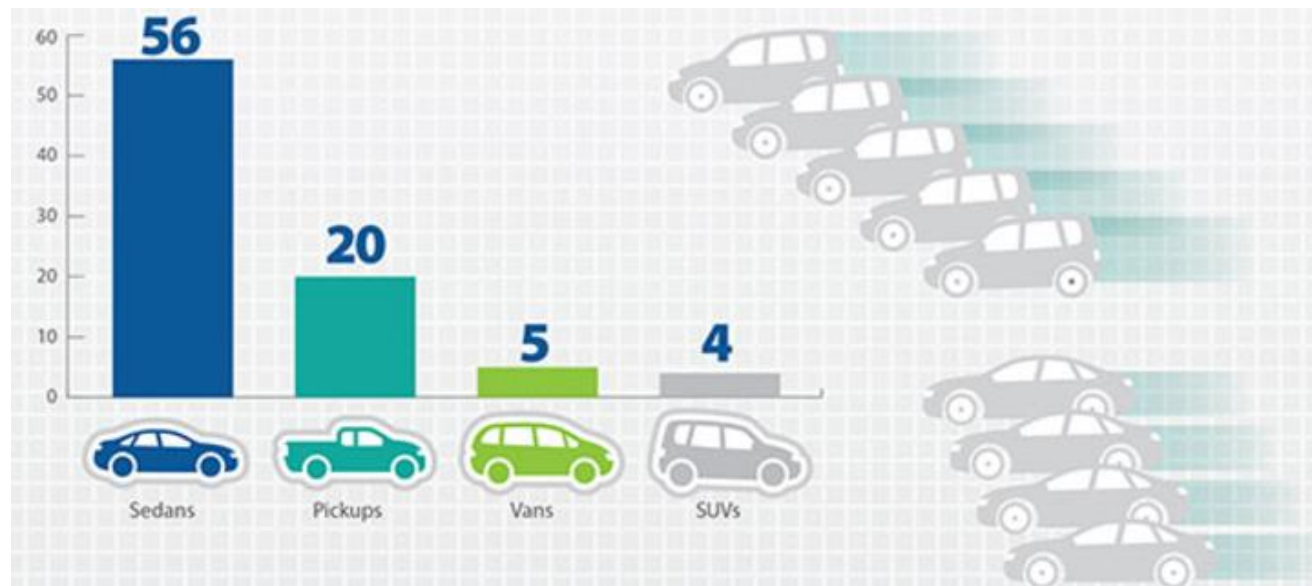
California Clean Fleet Project



Demonstrate the business case and operational suitability for electrifying 85 light-duty conventional vehicles across 8 public fleets in disadvantaged air quality communities across California



Fleet Benchmark to Evaluate EV Adoption Scenarios



Average Benchmark Vehicle Utilization



Daily driving distance:
23 miles



Fuel economy:
23 mpg



Engine-on time spent idling:
27%



27 PHEVs

Recommended

41 BEVs

Recommended

17 vehicles

Not recommended for replacement

**Baseline
vehicles**

VS.

**Recommended
replacements**

\$2,869,515

Projected lifetime
cost of ownership
21% reduction

\$2,253,867

301,353 gallons

Projected lifetime
fuel usage
70% reduction

89,456 gallons

5,243 tons of CO₂e

Projected lifetime
CO₂e emissions
57% reduction

2,259 tons of CO₂e

Leverage the right tools to transition to an electric fleet



Telematics Device



Modeling & Analytics Software

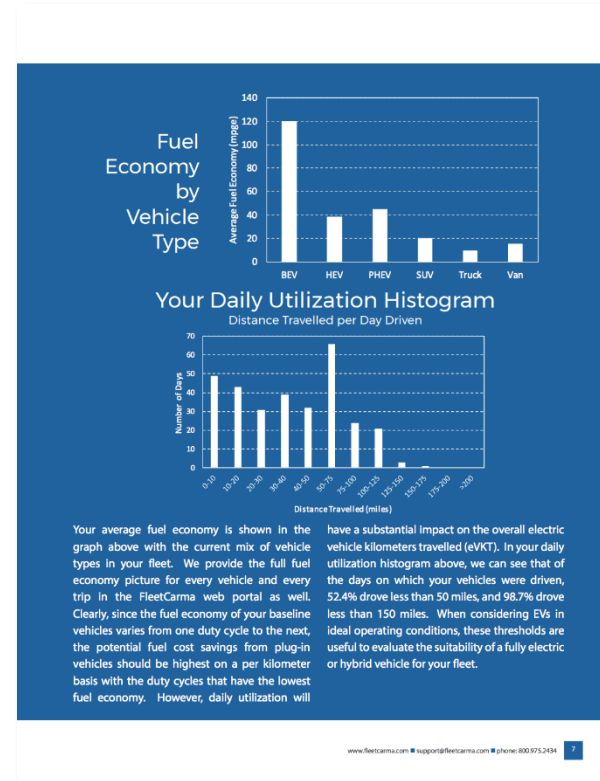
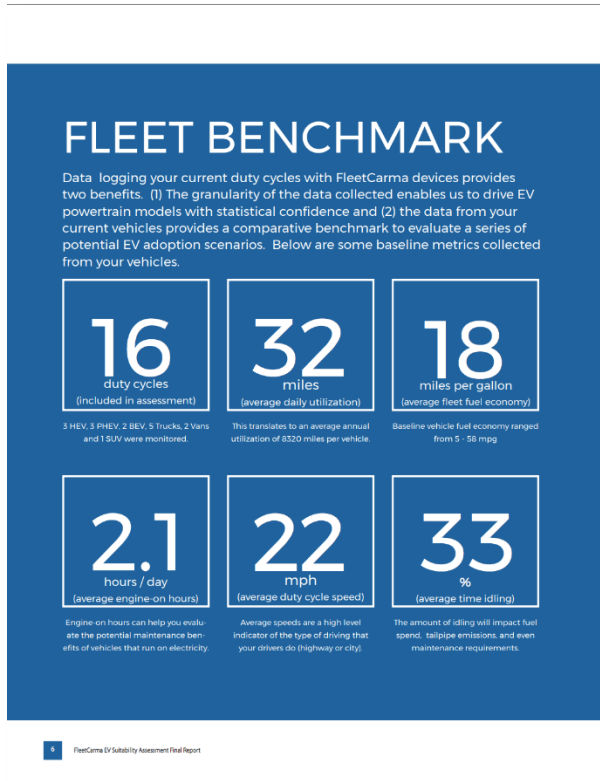


Dashboards



Custom Reporting

Benchmarking Fleet Performance



- Fleet, fleet segments, by vehicle
- Duty-cycle utilization and fuel economy
- Idling, idle fuel use, and driver behavior
- Engine-on and off hours, daily usage
- Daily histogram of vehicle use

Establish a starting point to measure progress on an annual basis.

Roadmap to Evaluate EV Adoption Risk & Reward

BEST FIT DUTY CYCLES FOR EVs

In the table below, all of the baseline vehicles are listed in order of highest savings potential to lowest according to their FleetCarma Recommended plug-in vehicle and their respective TCO Savings over the service life.

Unit ID	Vehicle Type	Recommended EV	TCO Savings
BE-6003	Volkswagen Tiguan 2015	Mitsubishi Outlander	\$43,073.86
BE-9784	Land Rover Freelander 2008	Mitsubishi Outlander	\$52,481.59
BE-470092	Volkswagen Tiguan 2014	Mitsubishi Outlander	\$33,426.51
BE-50006	Volkswagen T5 Diesel 2007	Mitsubishi Outlander	\$10,471.76
BE-21934	Volkswagen T5 Diesel 2005	Mitsubishi Outlander	\$3,015.62
BE-461610	Volkswagen Golf Variant Diesel	Volkswagen Golf GTE	\$40,005.05
BE-6005	Volkswagen Golf Variant Diesel	Volkswagen Golf GTE	\$26,434.77
BE-7224	Audi A3 2010	Volkswagen Golf GTE	\$7,142.54
BE-6001	Audi A3 2010	Volkswagen Golf GTE	\$2,772.44
BE-476270	Toyota iQ 2009	Volkswagen Golf GTE	\$761.42

- Target best-fit for real world duty cycles
- Predict the lifetime ROI of EV alternatives
- Calculate total fleet operational savings
- Fleet emissions reduction and fuel savings
- Determine charging infrastructure needs

Charging Infrastructure Recommendations

VEHICLE CHARGING INFRASTRUCTURE

To find out what to expect in terms of the charging needs of your new EVs, we looked at the amount of time your current vehicles spend parked overnight - their "dwell time".

Based on the recommended EV deployment on page 9, we estimated the amount of time each vehicle would need to charge at a Level 1 station versus a Level 2 station to determine the potential charging needs of your EV fleet. These requirements from the EV can then be combined with the dwell times for each of your current vehicles to determine the number and types of charging stations your fleet may require with this deployment. There are multiple strategies that can be employed when purchasing charging infrastructure to make sure you meet the needs of both your fleet drivers, budget, and organization. We offer four of these potential strategies below so

Current Dwell Time		Number of Vehicles
Short (< 4 hours)	4-7 hrs (Sedan)	11
	4-16 hrs (VIA)	
Medium	4-7 hrs (Sedan)	45
	4-16 hrs (VIA)	
Long	>7 hrs (Sedan)	20
	>16 hrs (VIA)	

that your organization can determine what will work best in your particular case. The options we consider here include Level 1 (wall outlet), Level 2 (charging station) Single Port, and Level 2 Dual Port. Dual port stations are generally more expensive, but do not require someone to move the plug from one vehicle to another when the first one has completed charging.

Infrastructure Scenario	Total Cost*	Charging Power Level	Number of Stations
1 - Low Cost	\$27,500	1	55
		2	11
2 - Plug Share	\$45,000	1	20
		2	18
3 - Power Share	\$99,500	1	20
		2	11 Single Port, 18 Dual Port
4 - Complete	\$165,000	1	0
		2	66

*We assumed Level 1 stations cost \$0 and Level 2 stations cost \$3,000 for single port and \$4,500 for dual port. Based on the incentives offered by the Ontario government, a \$500 rebate was also applied to the calculations.

www.fleetcarma.com ■ support@fleetcarma.com ■ phone: 800.975.2434

17

- Matches the charging infrastructure requirements to the EV recommendations and calculated dwell times.
- Provides initial costing estimates and explanations of charging technology options.

Calculate the total economic and environmental benefits

If all 25 of the baseline vehicles are replaced with the FleetCarma Recommended plug-in vehicle, the fleet will see the following total savings over a 7 year service life.

Fleet Savings (41%)

\$230,097

If all vehicles are replaced with the best fit plug-in vehicle, the fleet could save \$230,097 in total over the service life. This represents 41% of the fleet budget.

Emission Reductions (85%)

↓537 tonnes

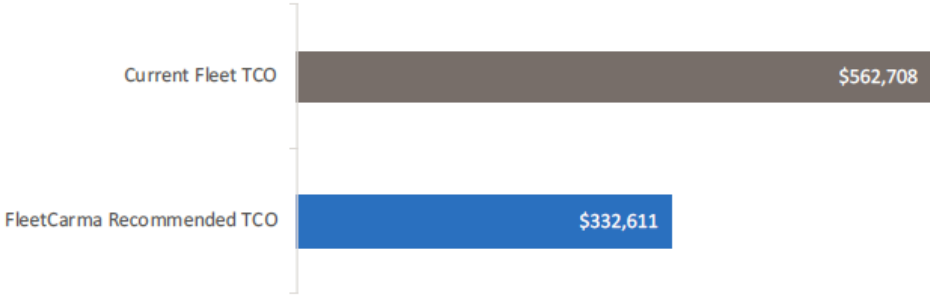
If all vehicles are replaced with the best fit plug-in vehicle, the fleet could realize a total emission reduction of 537 tonnes over the service life, representing an 85% reduction in CO₂ emissions.

Fuel Reduction (89%)

↓215,042L

If all vehicles are replaced with the best fit plug-in vehicle, the fleet could reduce gasoline consumption by a total of 215,042 litres over the service life, representing a 89% reduction in fuel.

When comparing your baseline vehicles to the optimal EV deployment scenario, it is clear that there is the potential for significant cost savings across the fleet.



Range Capability



Charge Capability



Thank you!



Scott Lepold,
Client Solutions

Scott works with fleet and sustainability managers to develop and implement various clean transportation initiatives aimed at reducing fuel use and costs through data-driven solutions.

Contact information:

slepold@fleetcarma.com or scottlepold@geotab.com

519-342-7385 ext. 407

GEOTAB | fleetcarma