

VIA Motors On-Road Analysis Results



Photo: VIAMotors.com

www.inl.gov



Shawn Salisbury

VSATT Meeting

October 14, 2015

INL/MIS-15-36910

Project Overview

- VIA Motors deployed ~150 VTRUX pickup trucks and vans to government and utility fleets
 - Nation-wide deployment, specific fleets unknown
- EPRI designed and instrumented data loggers
- Vehicle data provided to INL for analysis and reporting
- Data collection period December 2014 – June 2015

Vehicle Specifications

- Based upon 2014 Chevrolet Silverado 1500 and 2014 Chevrolet Express 2500
 - Van available in passenger, cargo, and utility configurations

Payload Capacity

Truck: 1000 lbs
Van: 2800 lbs

Export Power

120V and 240V
up to 14.4 kW

Electric Generator

Truck: 115 kW
Van: 110 kW



Photo: VIAMotors.com

Battery Pack

23 kWh Li-ion
Liquid Cooled

Electric Drive

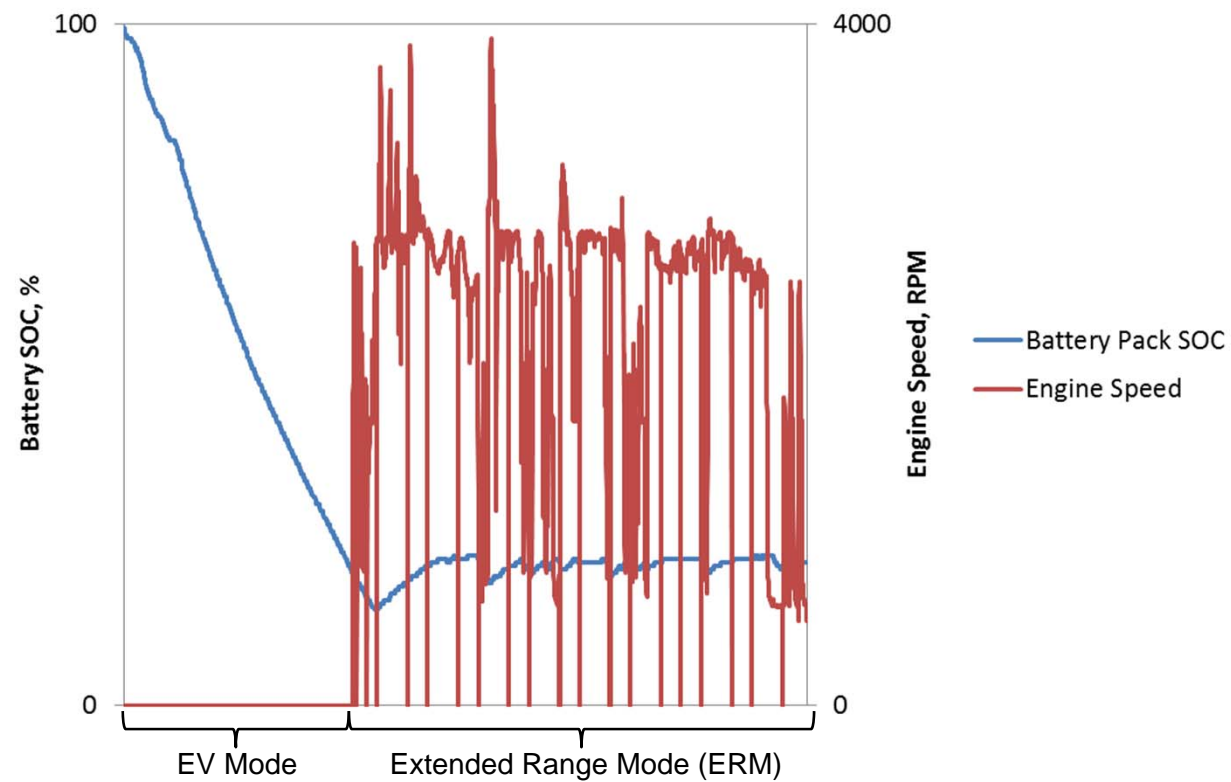
Motor
190 kW

Gasoline Engine

Truck: 4.3L V6
Van: 4.8L V8

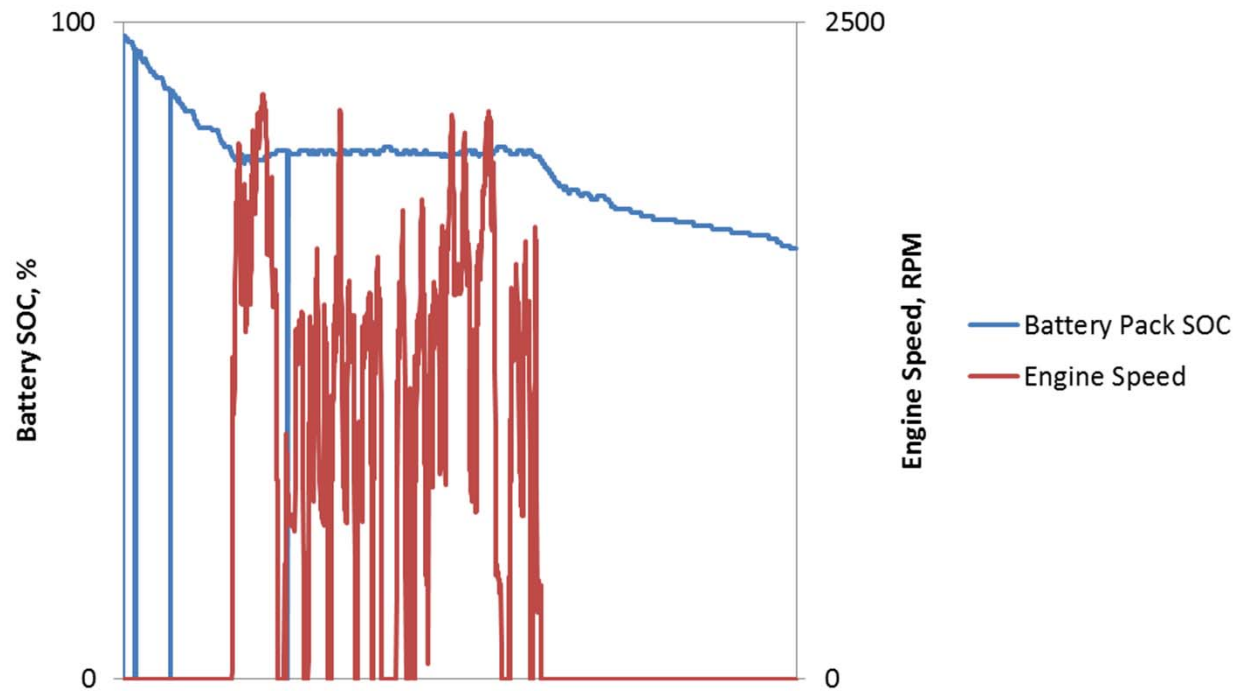
Normal Vehicle Operation

- Traditional EREV control strategy



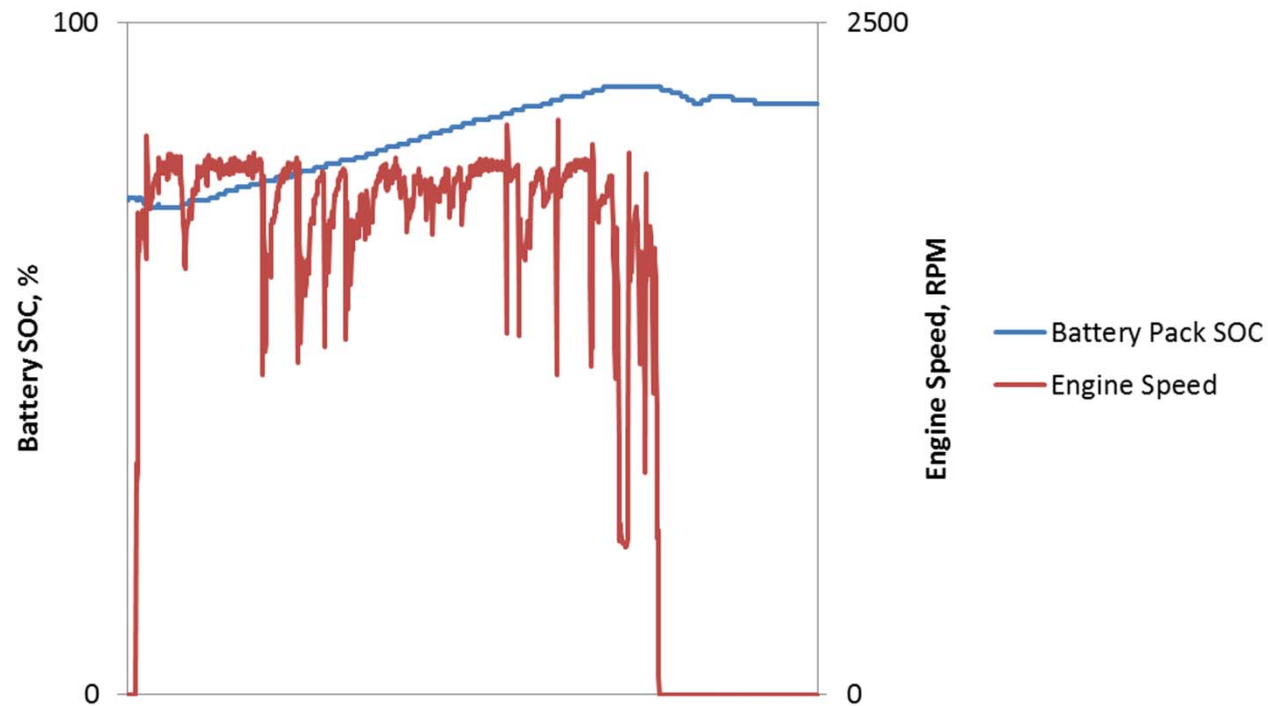
Battery “hold” mode

- Driver can put vehicle in “hold” mode to conserve battery energy
 - Manually selected by driver



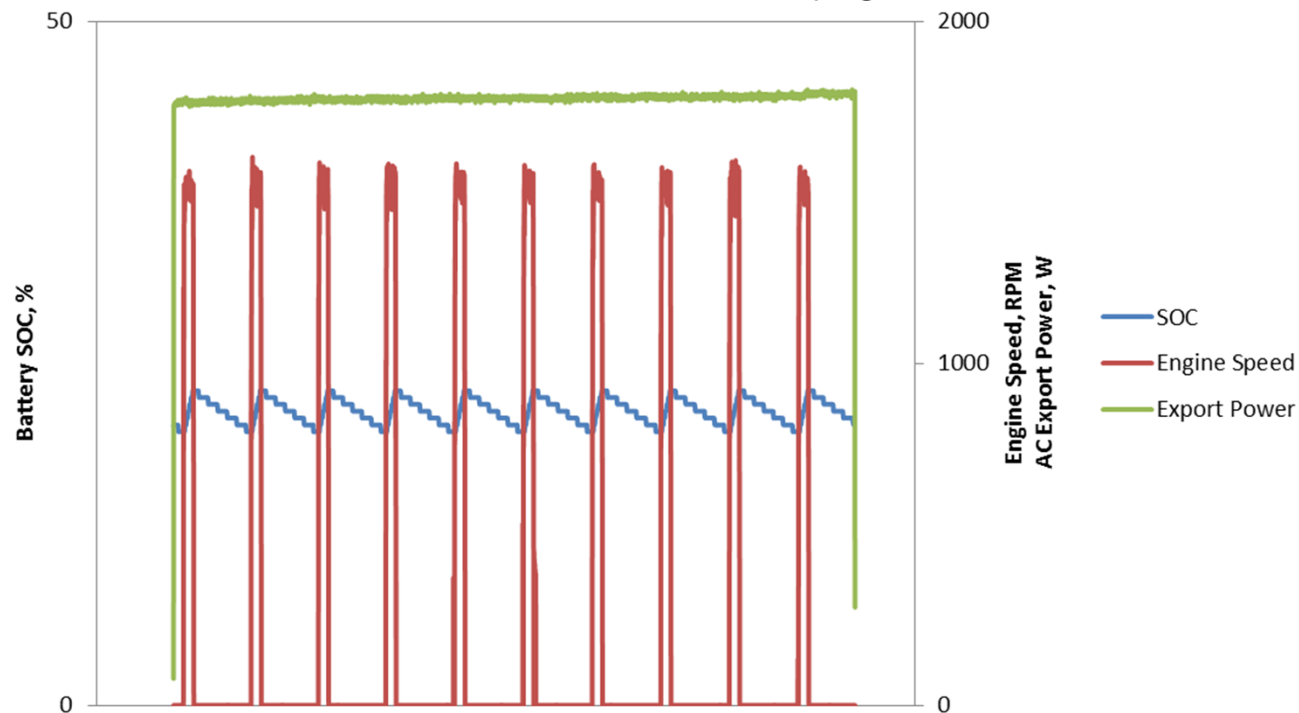
Charging on-the-fly

- Can use engine to charge the battery while driving
 - Manually selected by driver



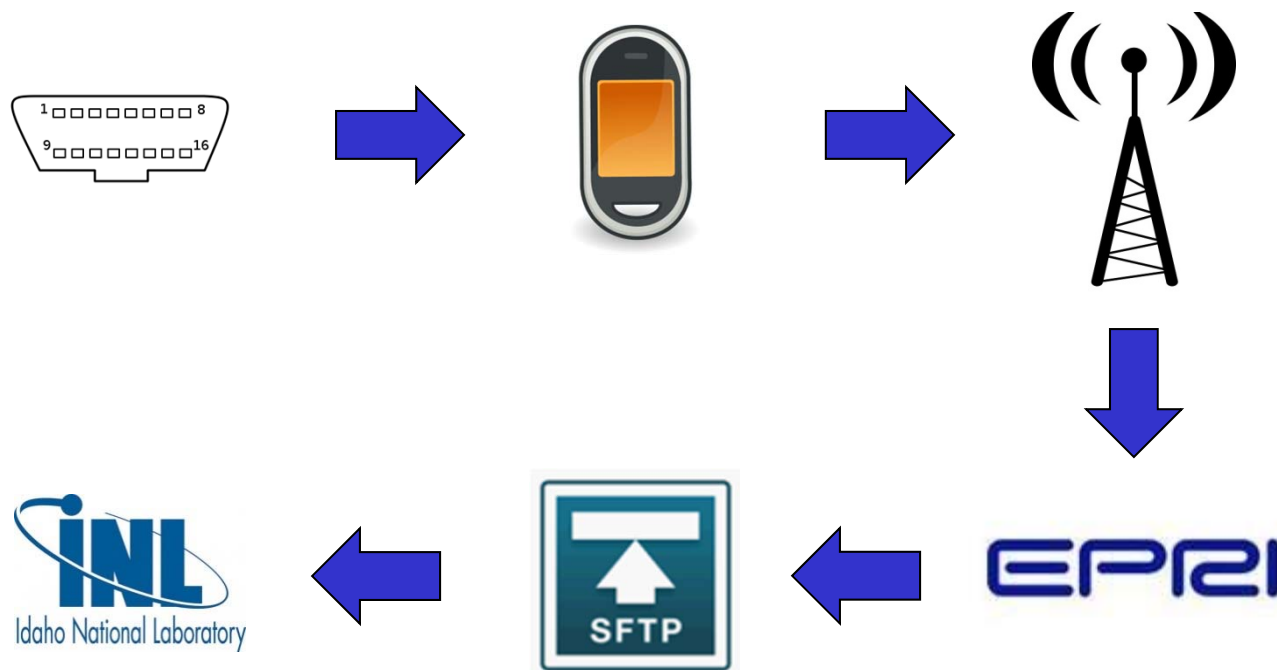
Export Power Function

- Vehicle can be used as a mobile electricity generator



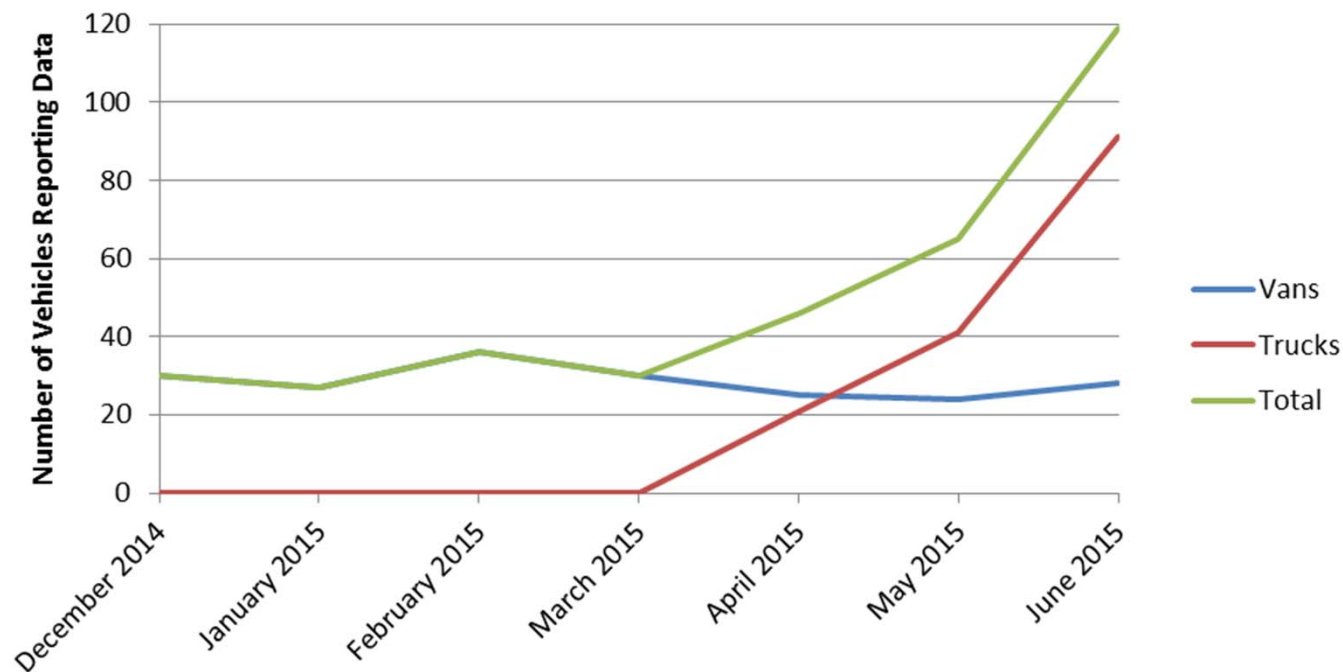
Data Collection Method

- EPRI designed a low-cost data logger based on an Apple iPhone
- iPhone locked in glove compartment for entirety of data collection period



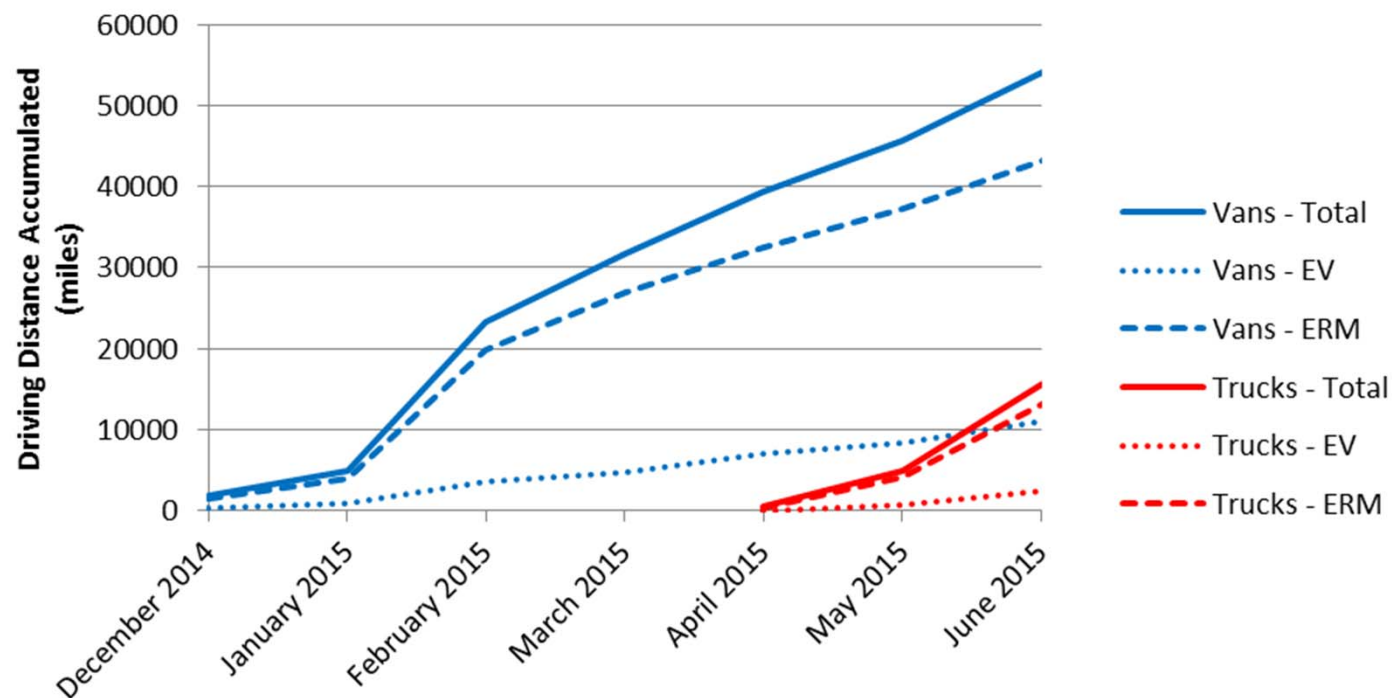
Results: Vehicles providing data

- First trucks delivered in April 2015
- Not every vehicle reported data each month



Results: Mileage accumulation

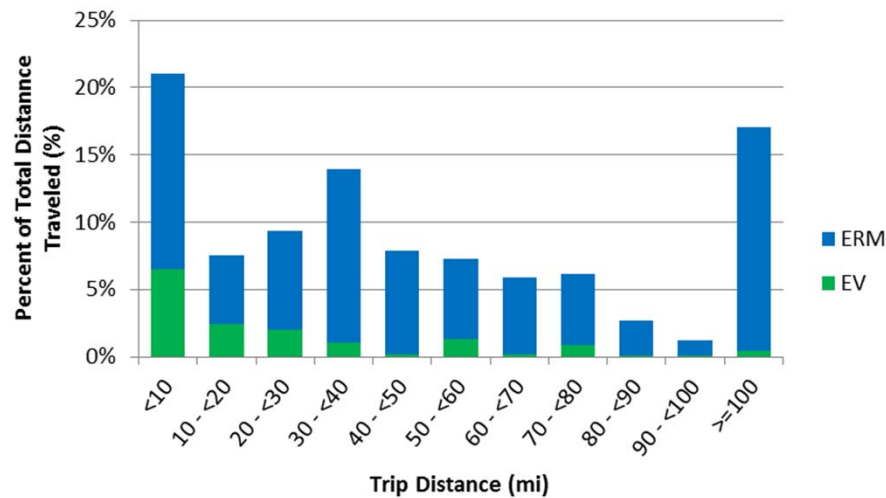
- Data received for ~70,000 miles of driving
 - 13,500 miles in EV mode
- Data set used is a subset of total miles driven
 - Data accounts for ~60% of miles indicated by odometers



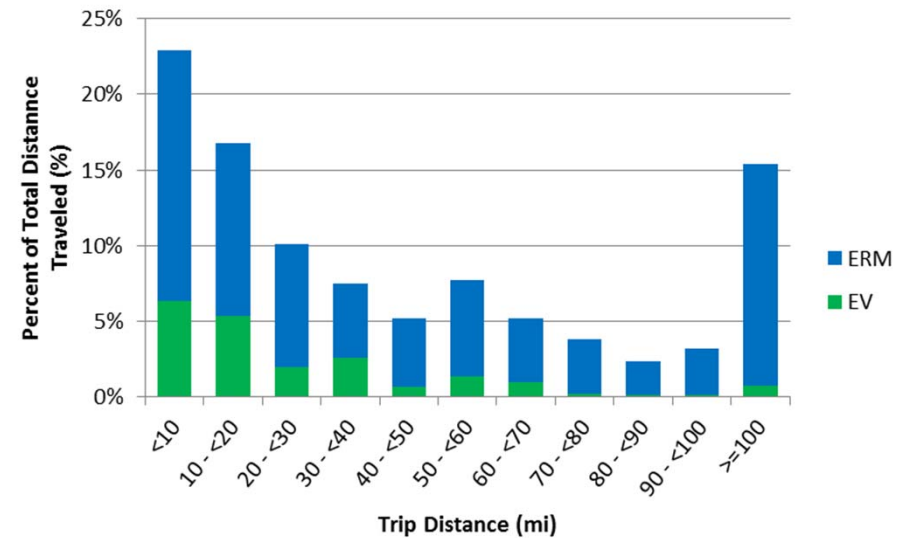
Results: Trip distance distribution

- Most common trips <10 miles
- Some vehicles being used for very long trips

Percent Distance Traveled By Operating Mode:
Trucks



Percent Distance Traveled By Operating Mode: Vans



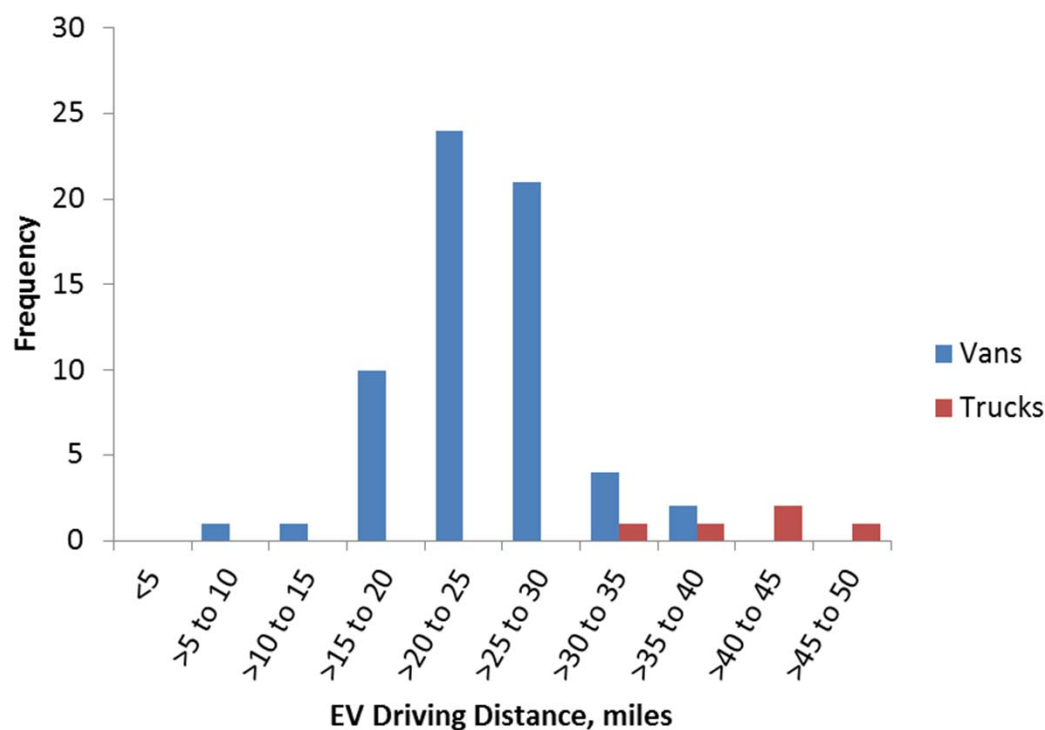
Overall fuel and energy consumption

Operating Mode	Overall Operation		EV Operation		ERM Operation	
Vehicle Type	Vans	Trucks	Vans	Trucks	Vans	Trucks
Total Distance Driven, miles	54170	15579	11053	2363	43117	13216
Fuel Economy, MPG	16.5	18.4	--	--	13.2	15.6
Electric Energy Use, DC Wh/mile	126	72	640	523	-5	-8

- Base vehicle EPA rated fuel economy
 - 2014 Silverado: 20 mpg combined
 - 2014 Chevrolet Express: 13 mpg combined
- Overall equivalent observed fuel economy
 - Trucks: 17.6 mpge*
 - Vans: 15.4 mpge*
- EV equivalent observed fuel economy
 - Trucks: 58.0 mpge*
 - Vans: 47.4 mpge*

Results: EV Driving Range

- Driving events that started with 100% SOC and ended in ERM
 - Represent many different conditions/use cases



Future Analysis

- Get data into format that is easy to analyze
- Find and fix issues with data
 - Lots of quality assurance checking required
- Understand inconsistencies in collected data
 - Charging and export power data does not always make sense
- Determine how to deal with incomplete data

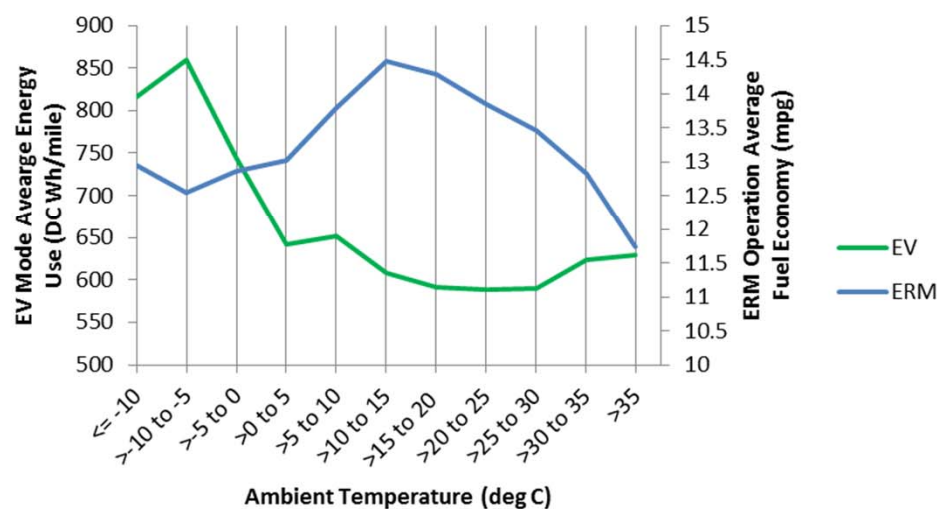
Will publish overall fleet summaries for trucks and vans



Energy use at temperature

- No cold weather driving for trucks
 - Began reporting in April
- Most efficient at mild temperatures: 10 to 20 deg C
- Extreme temperatures less efficient

Average Energy Use at Different Ambient Temperatures: Vans



Average Energy Use at Different Ambient Temperatures: Trucks

