Impacts of Mileage Accumulation and Fast Charging on EV Range and Energy Usage - Part 3 -

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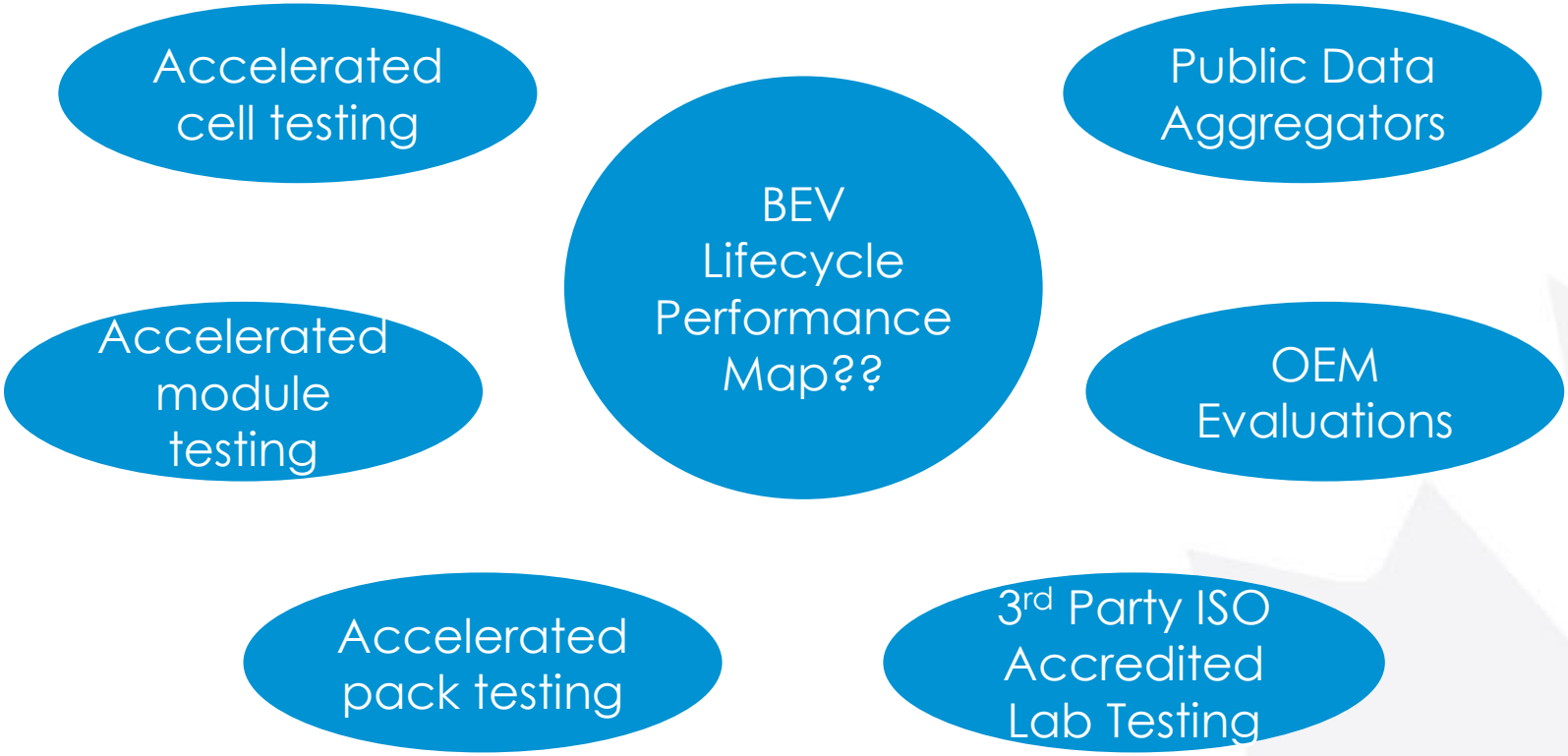
Inception

- What is the source of data on BEV durability?



Inception

- Who wants to know?
  - Federal/National Regulators
  - International Working Groups
    - United Nations Economic Commission for Europe Electric Vehicles and the Environment working group

Project Overview

- Answer the questions:
  - How does mileage accumulation and vehicle aging affect useable battery energy (UBE), full recharge energy (FRE) and energy consumption (ECdc) of a 2015 model year BEV?
  - How does fast charging (DCFC) affect UBE, FRE and ECdc of the same vehicle model?

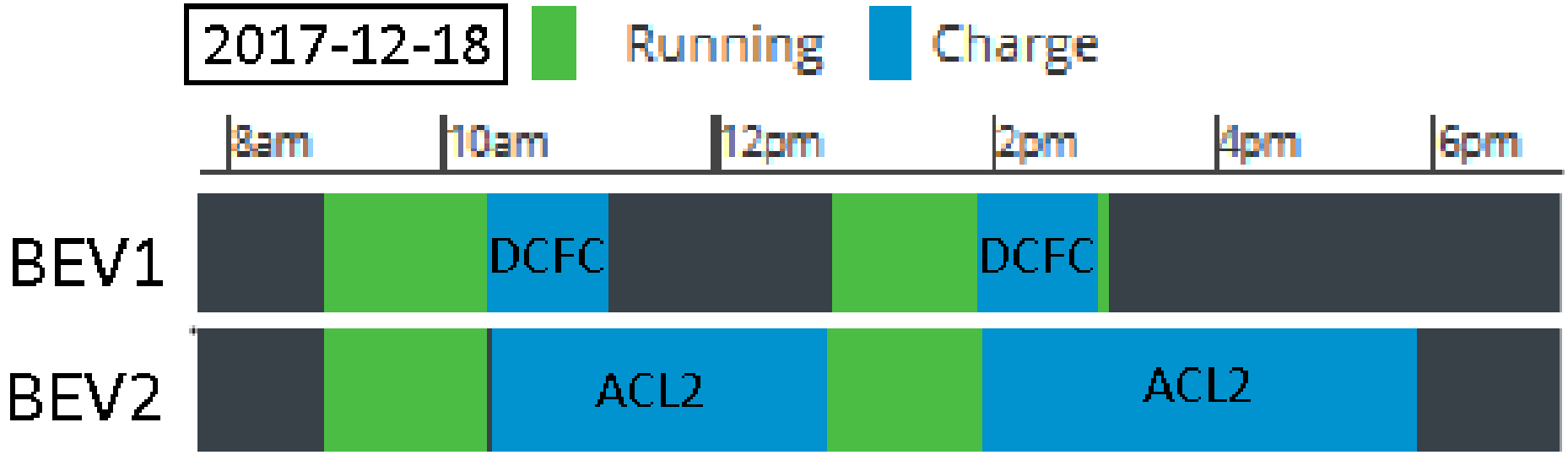
Project Overview

- Peripheral Questions:
  - Is durability an issue with BEVs?
  - Does cold climate affect durability?

Test Plan Overview

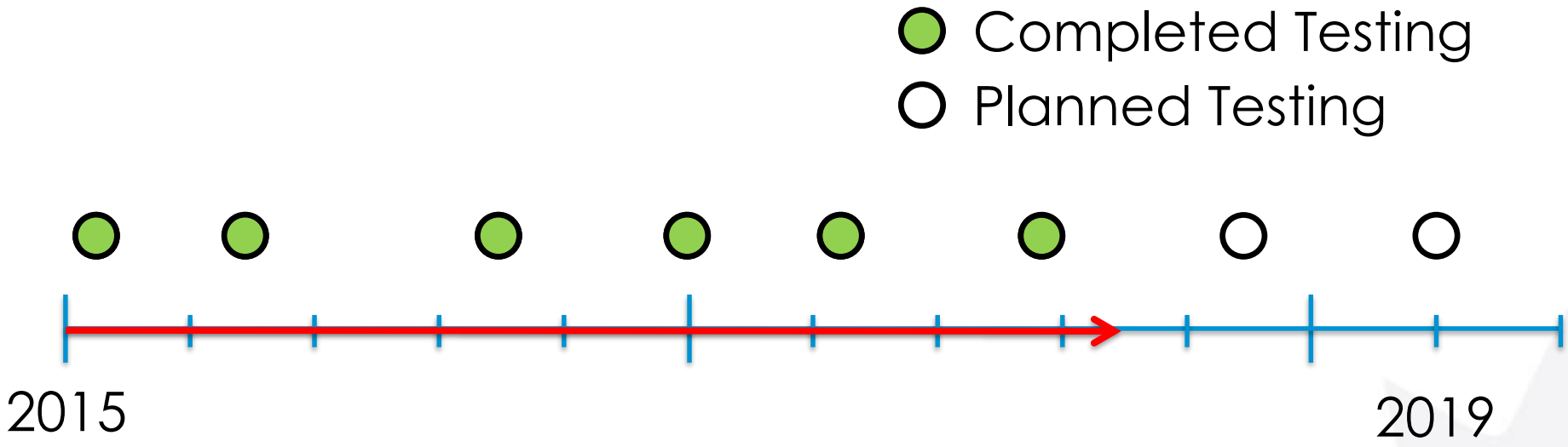
- Mileage accumulate 2 identical model BEVs over prescribed routes through all 4 seasons of the year
- Conduct chassis dynamometer testing (SAE J1634 method) every 15,000 km interval up to odometer readings of 105,000 km
- Report findings of mileage accumulation and in-lab testing at appropriate intervals

On-Road Route



	Ave. Dist. [km/year]	Ave. Speed [km/h]	Idle Time [%]
CVUS (2014)	15,894	40.9	22.0
BEV1	23,274	46.6	19.2
BEV2	23,970	46.5	19.5

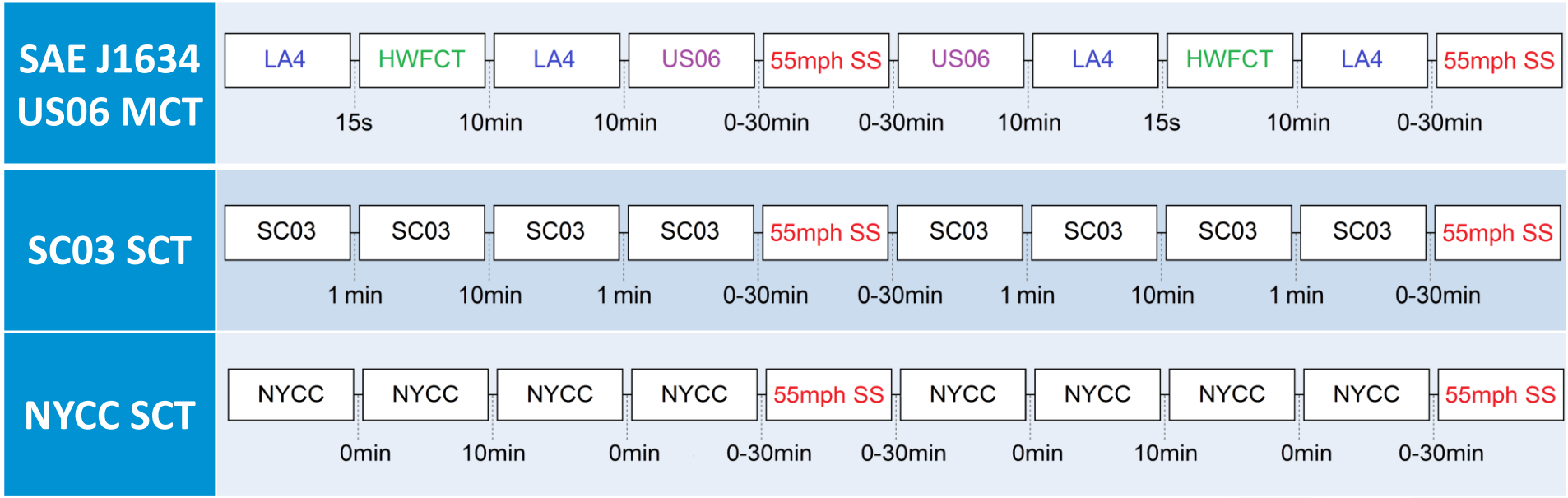
In-Lab Testing Matrix



Test Sequence	Ambient Temperature (°C)		
	35	25	-7
US06 MCT		3	3*
SC03 SCT	2		
NYCC SCT		2	2*

* Rounds 1 and 8 only

In-Lab Testing Matrix



Instrumentation

FleetCarma a GEOTAB company, 2018

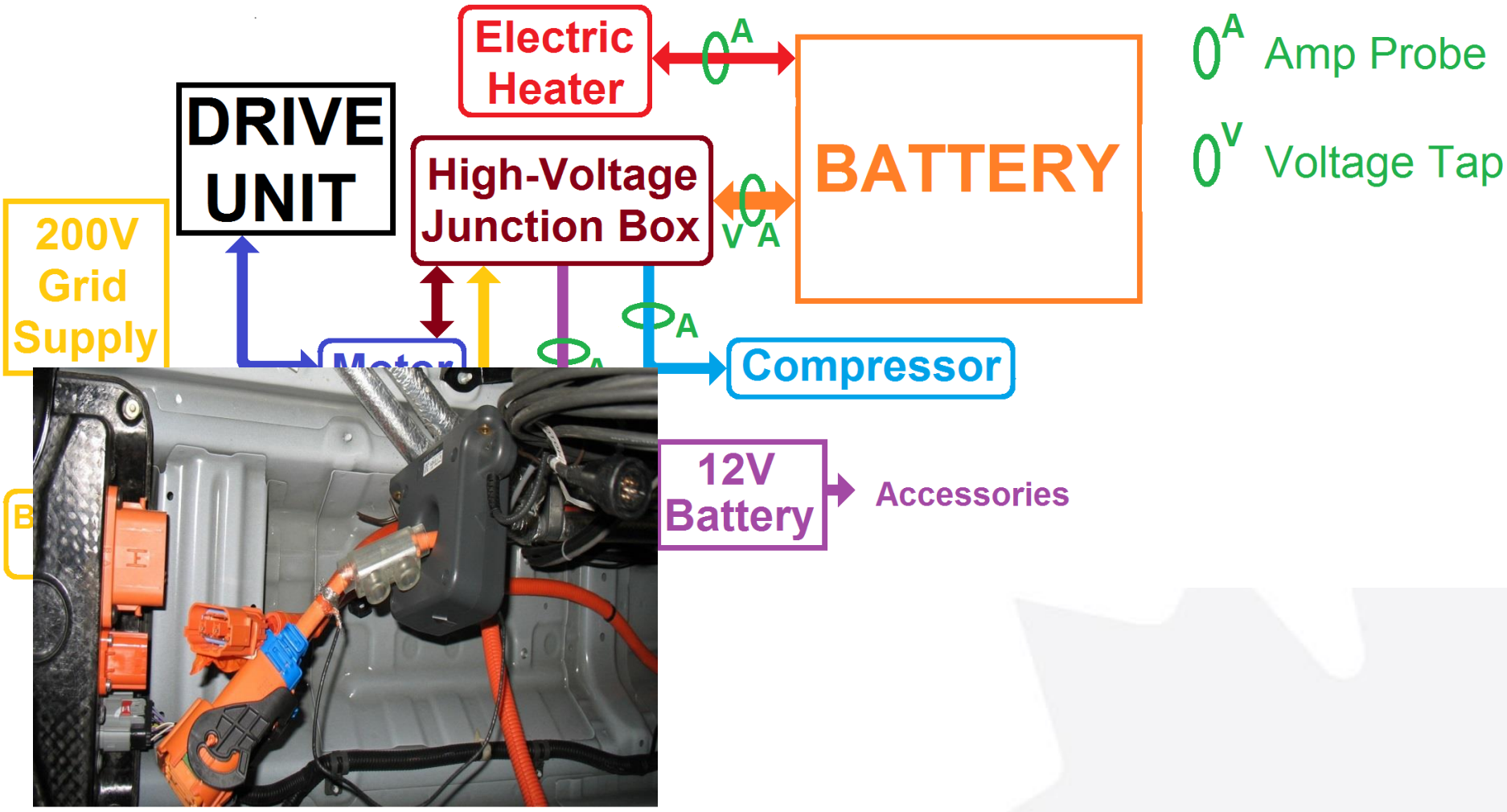
HIOKI E.E. Corp. 2018

HIOKI E.E. Corp. 2018

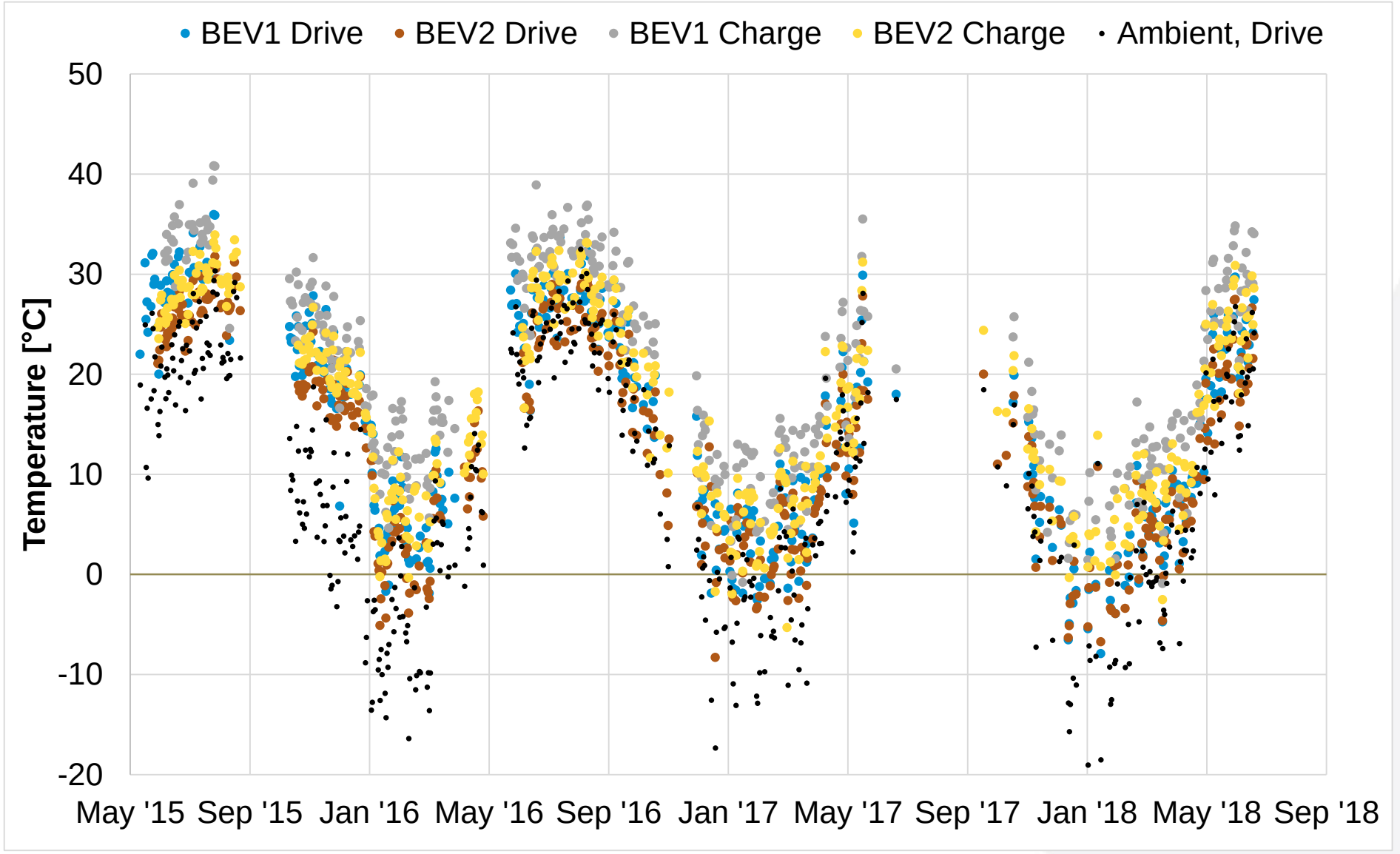
Graphtec Corp., 2018

OMEGA Engineering Inc., 2018

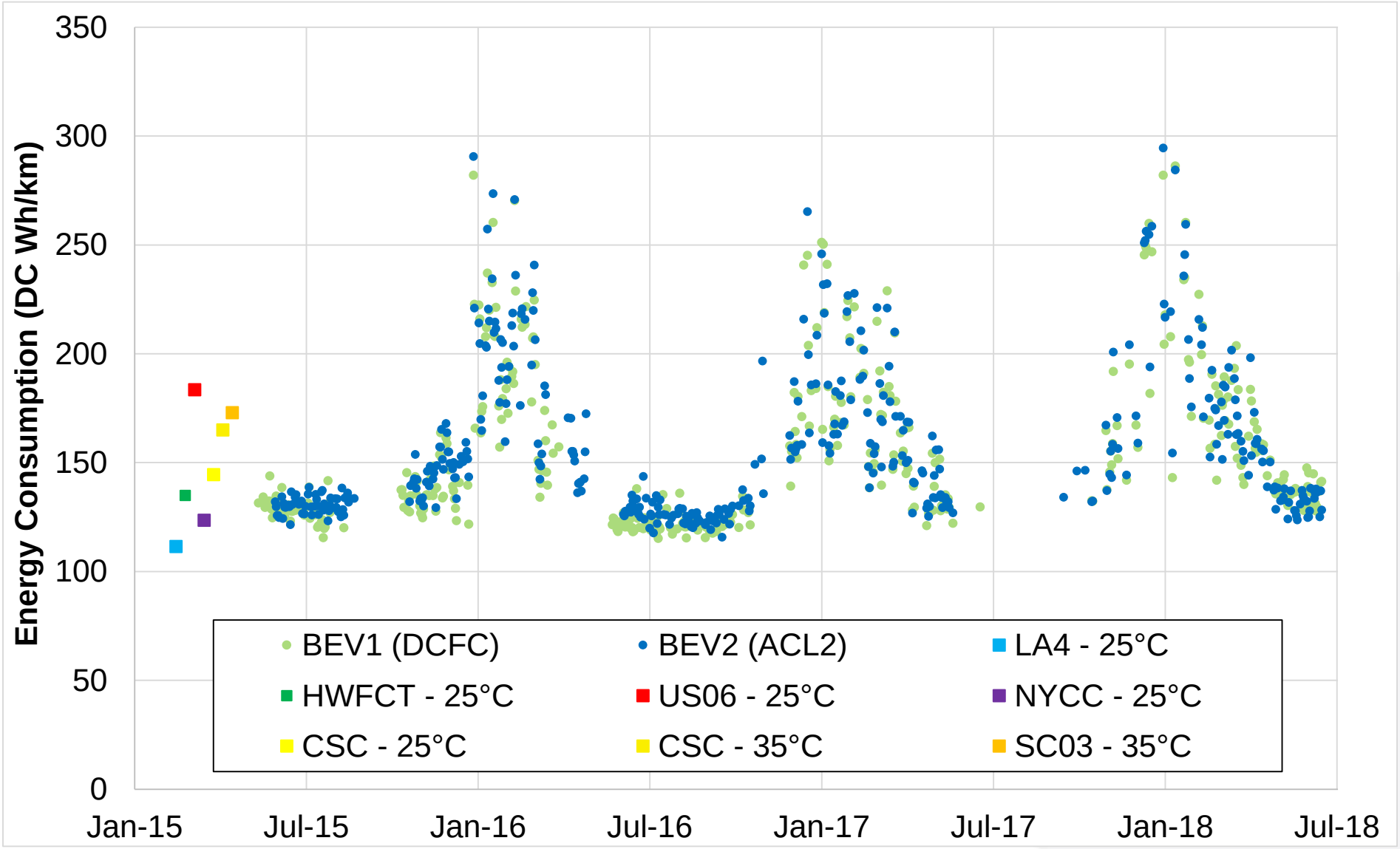
Instrumentation



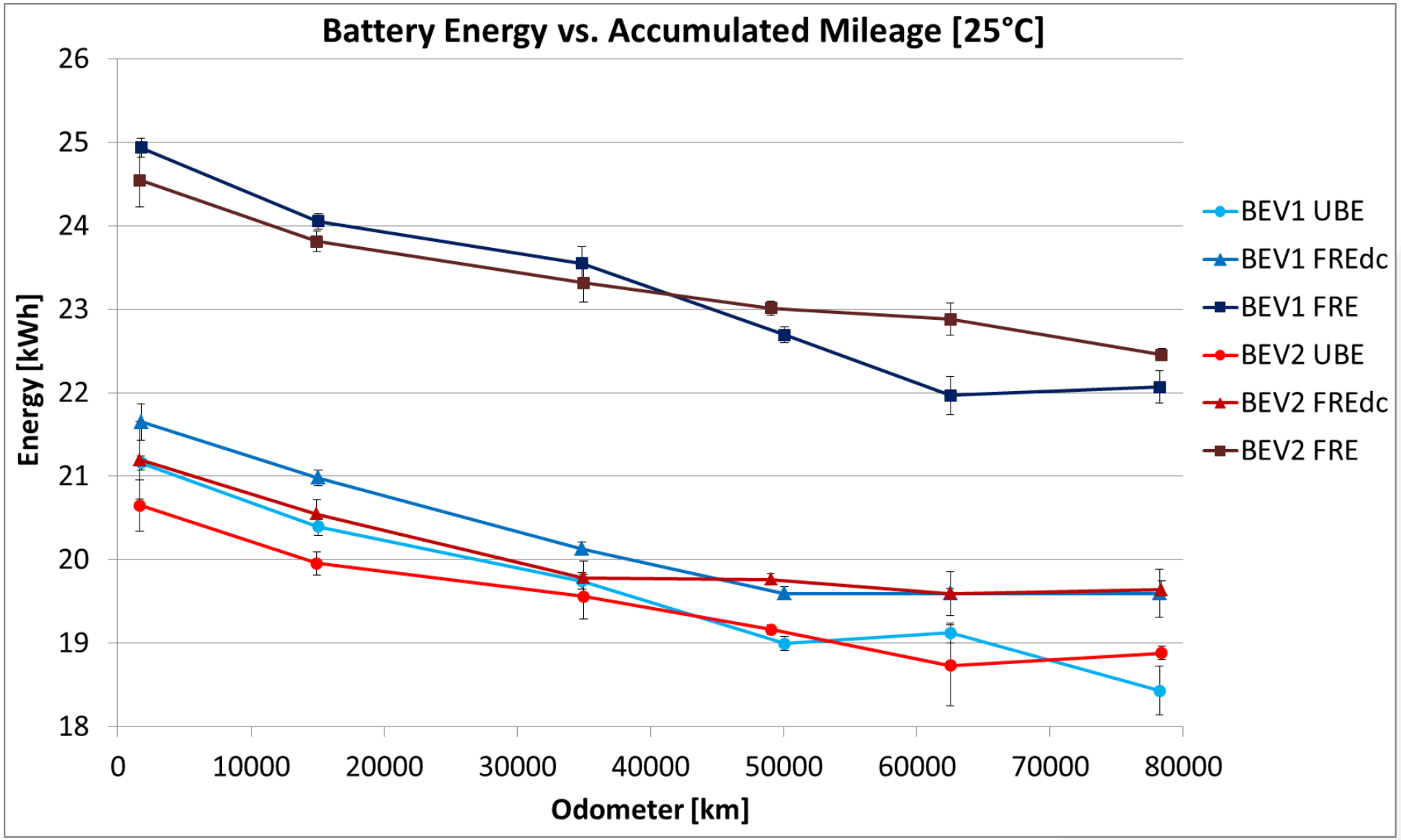
Results – On-Road Temperatures



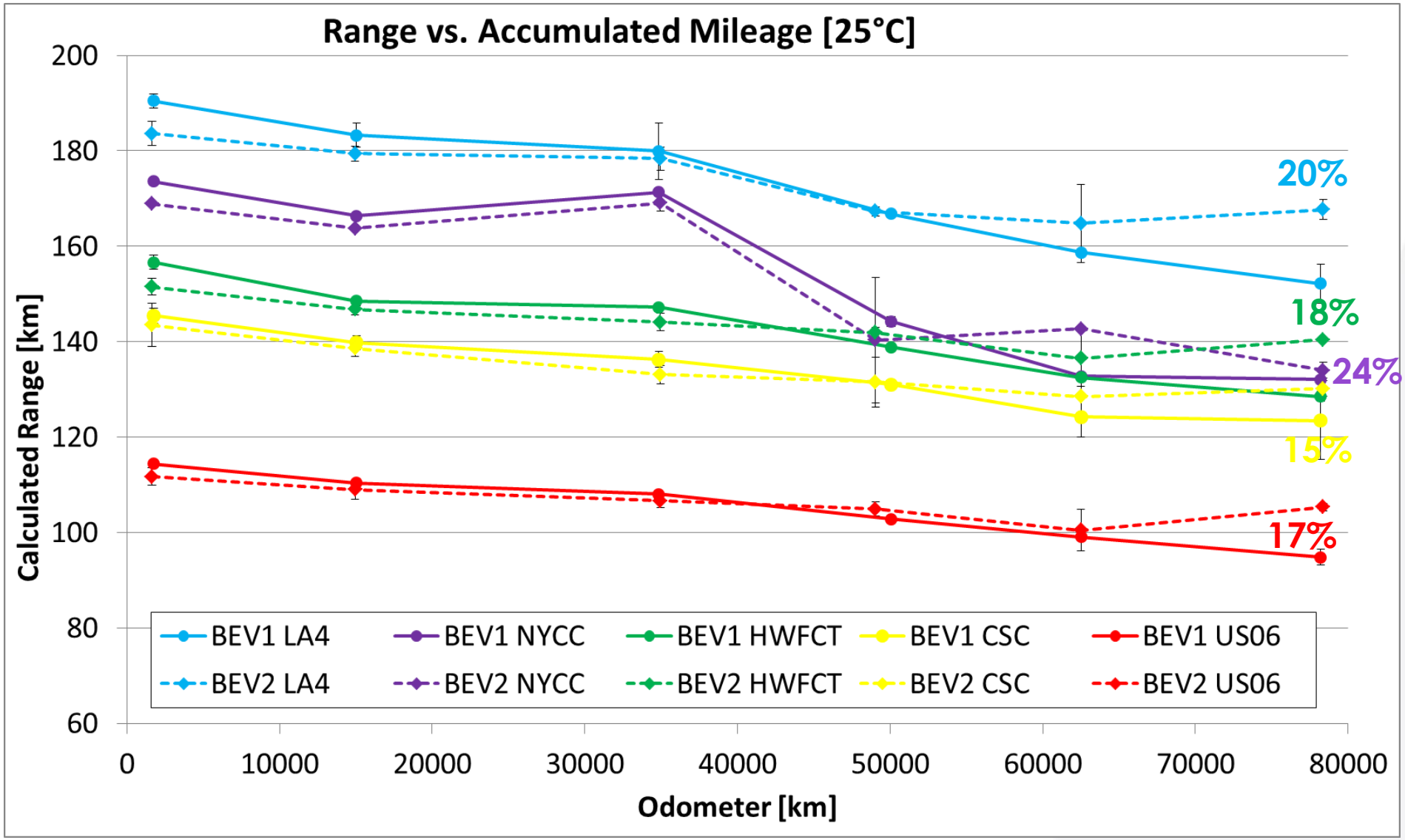
Results – ECdc (DC Wh/km)



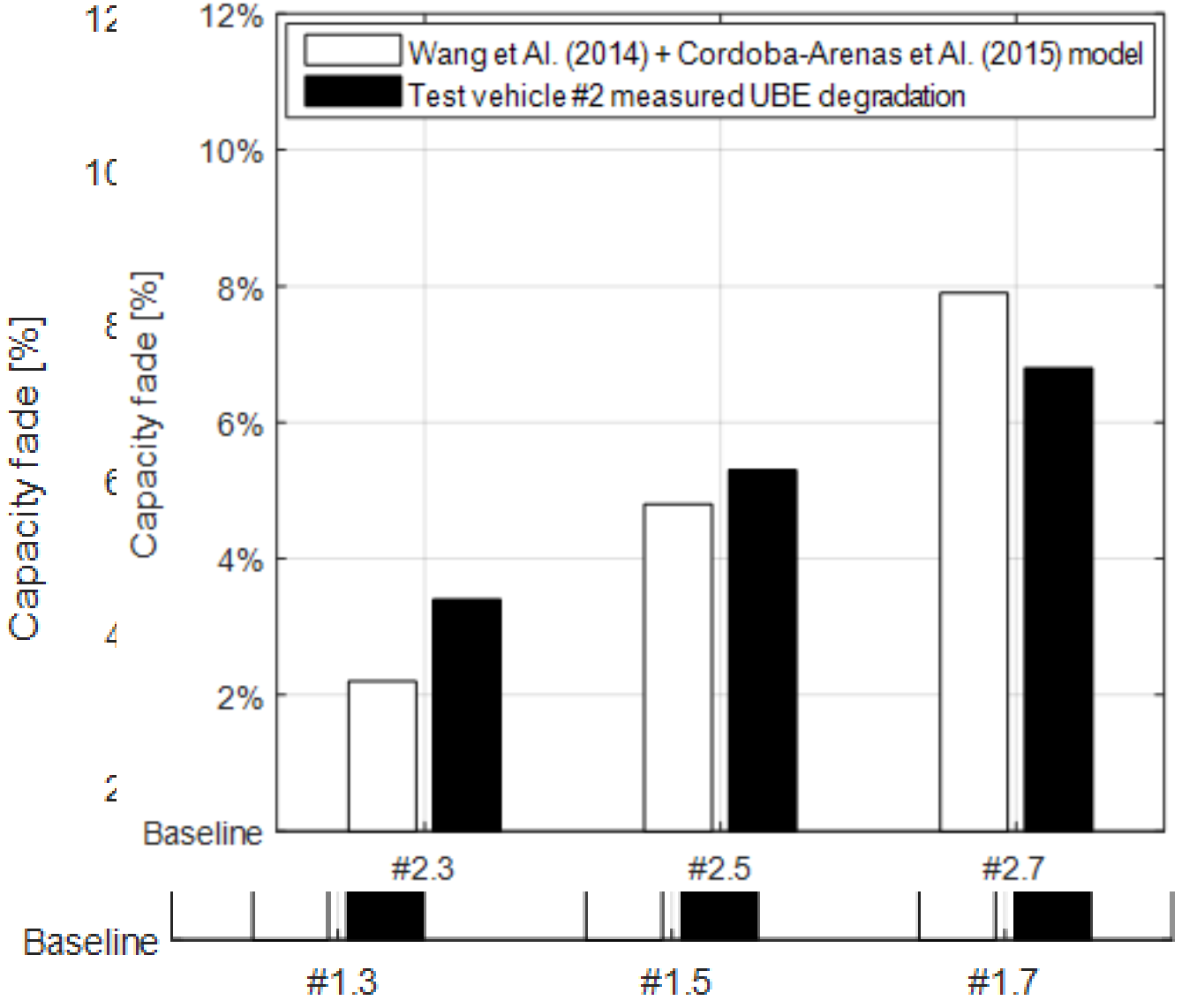
Results – Energy Metrics



Results – Ranges



Modelling Comparison



Regulatory Perspective

- When a BEV's performance (range) degrades over time, its ability to displace conventional fueled mileages descreases.
- There are no current regulations to maintain the range of a BEV over its life.
- The United Nations Ecomonic Commission for Europe (UN ECE) is exploring this subject.
- Model or test or both?

Next Steps

- This is the 3rd update on this study. At this time, two more rounds of in-lab testing and 21,000km of mileage accumulation remain to be completed
- The results are available and have been provided to organizations, such as the JRC, UNECE and other Government bodies to further their battery models, thermal models and regulatory investigations

Electric Vehicle Fleet Evaluation

Project Description

- Assessing the performance of an electric taxi fleet through collection and analysis of battery usage data and operational parameters during charging and driving events.

Milestones

- This year's work consists of the analysis of the suitability of electric vehicles for use in a taxi fleet, taking into account driving routes, vehicle driving range, potential battery degradation, and costs.
- A proposal for electric taxi infrastructure demonstration has been submitted to EVID by Hydro Ottawa, with partners including: TC, NRCan, ECCC, vehicle manufacturers, charger manufacturers, electricity distributers, taxi companies, road-side assistance providers, and battery technology developers.

Next Steps

- Complete analysis and report on the expected suitability of electric vehicles in a taxi fleet.
- Results of this year's work will be essential for guiding the 2019 deployment of an electric taxi fleet of up to 25 vehicles (if funded).

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