| **DOCKETED** |
|-----------------|-----------------|
| **Docket Number:** | 16-TRAN-01 |
| **Project Title:** | SB 350 Transportation Electrification (Publicly Owned Utilities) |
| **TN #:** | 213900 |
| **Document Title:** | Presentation - Transportation Electrification: The PEV Market, Environmental Impact, and Future Technology by Dan Bowermaster |
| **Description:** | October 5, 2016 Workshop |
| **Filer:** | Patty Paul |
| **Organization:** | Electric Power Research Institute (EPRI) |
| **Submitter Role:** | Public |
| **Submission Date:** | 10/5/2016 9:09:44 AM |
| **Docketed Date:** | 10/5/2016 |
Transportation Electrification: The PEV Market, Environmental Impact, and Future Technology

Dan Bowermaster
Program Manager, Electric Transportation
dbowermaster@epri.com
Office: (650) 855-8524
Cell: (650) 701-5099

California Energy Commission
POU / IRP Workshop
Sacramento, California
October 05, 2016
What is Electric Transportation?

- Car
- Truck
- Bus
- Marine
- Airport
- Forklift
- Marine
- Motorcycle
- Scooter
Regulatory Push – California has mandated 1.5M ZEVs by 2025 (3.3M including seven other states)
Cumulative US PEV Sales to Date > 513,000
PEV Sales 2016 YTD Up 34% Over 2015
Moving beyond the hype cycle…

Focus on the real opportunity for electric transportation in the next 5 to 10 years

The Gartner Hype Curve

- Light-duty cars
- Electric buses
- Forklifts
Customer choice is increasing
~41 new PEVs coming in 2016-2020
Customer choice increasing with 41 PEVs announced to hit market from 2016 – 2020
The electric grid is clean and getting cleaner – 15, 70, 50
Electricity is also a clean transportation fuel

Reduction in GHG due to electrifying transportation through 2050

Improvements to air quality (human health) due to electrifying transportation through 2030
Transportation Electrification reduces California’s greenhouse gas emissions but needs to move faster

- In our more aggressive scenario the electricity sector and transportation sector can approach California’s targets, but there is still a significant gap
But what about those headlines that claim electric vehicles are bad for the environment?
Customer education - Charging is sometimes like getting gas, but more often like charging your phone or laptop.
PEV charging infrastructure is increasing
But most public charging networks remain fragmented
Utility charging infrastructure and market support
Current activities
To help the PEV market scale, need to make the complex both simple and easy for the customer

OVGIP Intends to Resolve Business and Operational Rules with Multiple Stakeholders

--- Interface to Customer can be Smart Phone APP, Website, In-Home Display, EVSE Display, or In-Vehicle Display.

OPEN VGI PLATFORM

Utility / Infrastructure Interface
- SEP 2/IEC/ISO 15118 / OpenADR 2.0b
- Data Analytics: Energy Use, Behavior, Customer Pref
- EVSE Network Interface
- Open API

Grid Services
- Aggregation
- Demand Response
- Renewable Balancing
- Measurement & Verification
- Demand Charge Mitigation
- Dynamic Pricing
- Phase 3 Extensions
- Frequency Regulation
- Energy / ISO Market Interface

Systems Coordination
- Privacy & Security

© 2016 Electric Power Research Institute, Inc. All rights reserved.
What’s next?
Now and in the future

▪ Autonomous driving
  – Tesla, Apple, Google

▪ High power charging
  – Current 50 kW; future 150 kW; goal 350 kW

▪ Long-distance (~200 mile) mass-market battery electric vehicles
  – Chevy Bolt
  – Tesla Model 3
  – Gen 2 Nissan LEAF

▪ Ownership Models / Transportation On-Demand
  – Car share / Lyft / Uber
Together...Shaping the Future of Electricity