

HEAVY-DUTY TRANSPORTATION ELECTRIFICATION WORKGROUP MEETING

November 14, 2016



Importance of Transportation Electrification (TE)

- Reduce criteria pollutant emissions
 - Immediate health benefits
- Reduce greenhouse gases
 - Climate protection
- Flexible use of renewable energy
 - Electricity can be generated from solar, wind, hydro, renewable natural gas, and other renewable sources
 - Hydrogen can be produced from renewable natural gas, solar, and other renewable sources
- Most fuel-efficient vehicle technologies
 - Reduce dependence on fossil fuels
 - Less energy for more miles

ARB role in SB 350 Coordination

- Clean Energy & Pollution Reduction Act of 2015 (SB 350)
- Promote widespread transportation electrification across the State
- Ensure clean technologies and programs are within the reach of all residents
- Increase understanding of barriers and opportunities for increased clean transportation access for low-income residents
- Evaluate impact on emissions and energy demands
 - Coordination with CEC and CPUC
- Today's focus on heavy-duty fleet deployments

First Utility/Transit Workgroup Meeting

- Held on April 8, 2016 at ARB
- Discussed barriers, challenges, and opportunities for heavy-duty transportation electrification
- Improve communication with fleet owners and utilities, and other stakeholders
- Meeting summary presented at CPUC workshop on April 29, 2016
- Contributes to air quality, and other goals
- Supports ARB programs and regulatory strategies

Outreach and Communication

- Opportunities to improve information sharing among ARB, utilities, and fleet owners
- Transit agencies would like a dedicated liaison at the utility who understands transit electrification
- ARB willing to facilitate information sharing between fleets and utilities
- Plan to continue transportation electrification workgroup meetings

Prior ARB Comments

Electricity Rate Structure

- Long term zero emission bus deployment strategies influenced by electricity price signals
- Temporary rates without demand charges are useful for transit fleets to get familiar with electric bus operation
- Existing rates have uncertainty with 5 minute demand charge option for electric vehicles
 - Issue for fast charging strategies
- Need statewide policies ensuring clarity and predictability for electricity cost

Note: ARB comments made at April 29, 2016 CPUC Workshop

Prior ARB Comments

Third Party Energy Storage

- Can reduce demand charges
- Could be managed by fleet
 - Optimize for avoiding demand charges
 - Adds financing and operational complexity
- Potential for utility ownership and/or operation
 - Gain ability to manage daily grid fluctuations
 - Peak shaving and excess renewable
 - Could share cost benefits with fleet
 - Could result in rate payer benefits
 - More zero emission vehicles and air quality benefits

Note: ARB comments made at April 29, 2016 CPUC Workshop

Prior ARB Comments

General Issues

- Clarify that hydrogen production and compression is in scope of transportation electrification efforts
- Explore opportunities for utilities to own and operate charging or hydrogen infrastructure
- Utility collection of LCFS could reduce fleet administrative burden

Battery Electric Usage Comparison



| | | | |
|------------------|------------|------------|------------|
| Annual Mileage: | 11,000 mi | 25,000 | 35,000 mi |
| Avg. efficiency: | 0.3 kWh/mi | 1.0 kWh/mi | 2.1 kWh/mi |
| Annual energy: | 3,300 kWh | 25,000 kWh | 73,500 kWh |
| Car equivalent: | 1 | 7.6 | 22.3 |

TE Issues and Questions

- Can project approval process be streamlined?
 - Standardized application for common project types?
- What light duty policies should be same for heavy duty?
- How are mixed light duty/heavy duty fleets treated?
 - What separates light duty from heavy duty?
- Are on-board auxiliary systems included in scope of TE?
 - Hoteling, electric power take-off, other
 - Transportation refrigeration units (on truck vs on trailer)
- What are opportunities for statewide commonality?
- How to explore synergies with energy storage, on-site renewable generation, and utility resource planning?

Additional Information

Advanced Clean Transit

www.arb.ca.gov/msprog/bus/bus.htm

Advanced Clean Local Trucks

www.arb.ca.gov/msprog/actruck/actruck.htm