Commercial Electric Vehicle Working Group (CEVWG)

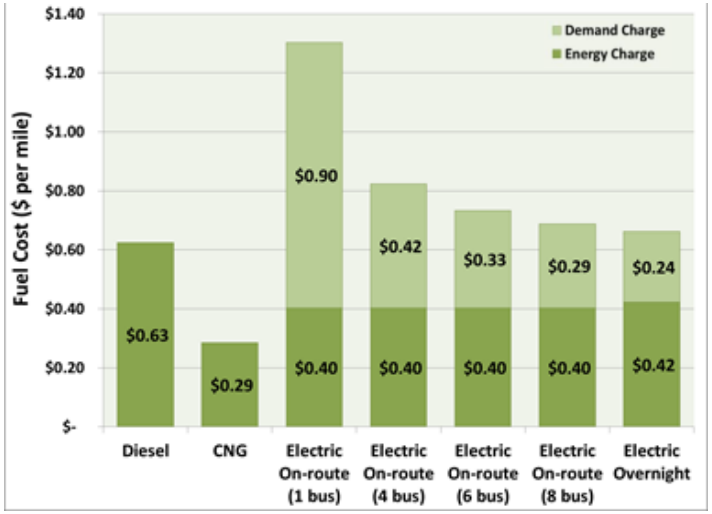
CALSTART Briefing – November 14, 2016

Background

The business case for Medium and Heavy Duty (MHD) EVs depends on charging rates and infrastructure availability

- Commercial fleet operators face major demand charge and capital investment hurdles

Fuel Cost Per Mile for Diesel, CNG, and Electric Transit Buses (with Demand Charges @ $20/kW)



Source: CALSTART. Based on analysis in *CALSTART (2015). Electric Truck & Bus Grid Integration: Opportunities, Challenges & Recommendations.* Here the diesel price is updated to $2.50/gallon (versus $4.50) and the federal subsidy of $1.00/DGE for CNG price is incorporated.

1 CALSTART (2015). "Electric Truck, Bus Grid Integration: Opportunities, Challenges, and Recommendations"

CEVWG Overview

Objectives

- Understanding of MHDV electrification costs and impacts
- Identification of win-win paths for fleets, tech providers, and utilities

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Key Topics[1]

- **Infrastructure:** Public investment in power supply and EVSE
- **Rates:** Demand charges and energy prices
- **Innovative Approaches:** Storage, DG, DR, and control strategies

Members

1 For background, see: CALSTART (2015). "Electric Truck, Bus Grid Integration: Opportunities, Challenges, and Recommendations"

CEVWG Overview

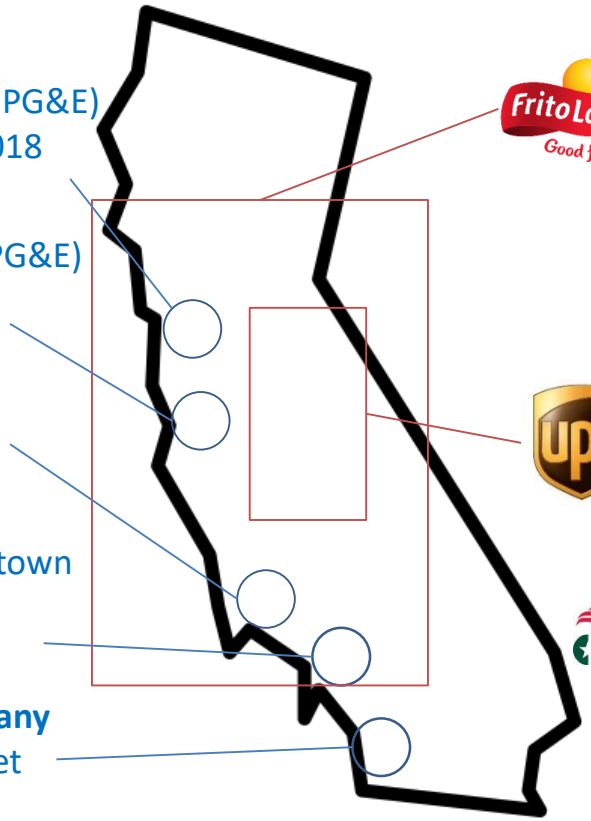
Valley Transportation Authority
500 buses in Santa Clara County (PG&E)
- 5-10 MHD EVs planned for 2018

Monterey-Salinas Transit (MST)
123 buses in Monterey/Salinas (PG&E)
- 1 MHD EV (trolley)

Santa Barbara MTD
107 buses in Santa Barbara (SCE)
- 14 MHD EVs (trolley)

Foothill Transit
332 buses in SG Valley and downtown LA (SCE)
- 17 MHD EVs

San Diego Airport Parking Company
Urban and long-range shuttle fleet (SDG&E)



Frito Lay
Torrance, City of Industry, Sylmar, Manteca, Alameda, San Jose, Brisbane, Fairfield (PG&E & SCE)

UPS
Sacramento, Bakersfield, Ceres, and Fresno (PG&E & SCE)

AmeriPride LINEN & UNIFORM SERVICES
Throughout California

Lessons Learned[1]

	What We Have Heard	Implications
Infra-structure	In order for fleets to electrify MHD vehicles, they **require significant new power supply upgrades** that can cost tens or even hundreds of thousands of dollars, which most fleets are not equipped to finance.	**Public investment and utility-supported programs to install sufficient power supply are needed** to promote timely MHD electrification in accordance with California's climate goals.
Demand Charges (DC)	Despite the high efficiency of EVs compared to ICEVs, **demand charges (DC) increase fleet electricity costs** by multiple factors; can cause fleets to jump tiers; and bring new complexity, risk, and changes to operations	In order for electrification to be cost-effective for fleets, DCs need to **give fleets some combination of a lower ceiling on DCs, turnkey solutions to manage DCs, and/or bigger carrots for smoothing loads and moving off peak.**
Energy Storage	Commercial storage offerings exist to help shave peak demand, but fleet electrification **services are not standardized and have not yet been tested** in the high penetration cases that are called for by SB 350.	Active control strategies are typically cost-effective for peak shaving compared to storage, but **opportunities may be limited; also, and more case study data is needed** for using storage with higher-penetration fleets.

1 CALSTART synthesis of survey and discussions with CEVWG members. Does not represent endorsements.

Potential Solutions[1]

Electric Utility Regulation

CPUC & CEC

- Allow **comprehensive rate-basing** (public investment) for MHD electrification up to the meter
- Provide **additional rebates/ incentives for EVSE** behind the meter
- Eliminate or minimize **demand charges outside of peak hours** (~4-9 pm)—or provide a comparable benefit
- Provide **rate incentives that are responsive** to specific MHD duty cycles

Vehicle/Fuel Regulation & Incentives

ARB & CEC

- In addition to addressing charging issues, continue to provide in**centives that decrease the first cost of vehicle purchases**
- Continue and expand **incentive funding for the "beachhead" MHD EV sectors**, namely, transit, shuttle, last-mile, MSF, and yard
- Continue, increase, and stabilize support for **incentives like LCFS that defray operating costs** (distinct from capital costs), which is especially important for transit agencies

All Agencies

- Support **incentive funding for novel demand management and grid-integration** pilots, e.g. with storage and DG for peak shaving
- Support additional power upgrade needs with **private and public finance according to best-fit time horizons and risk profiles**
- Consider establishment of a **private/public "green bank" that lends upfront infrastructure costs** which are paid back over time in line with the recurring operational cost reductions

1 Suggestions for discussion based on CALSTART survey and dialogue with CEVWG members. Does not represent endorsement by members.

Issues for Further Consideration[1]

1. The Rate Design principle of "efficiency" promotes energy conservation. However, the **use of electricity for vehicles, as opposed to electricity for stationary power, should be *encouraged*** (and treated separately), not discouraged.

2. The Rate Design principle of "fairness" is often interpreted to mean that costs should be allocated based on cost causation, and hence **utilities seek to avoid shifting costs from one customer to another, which appears to constrains options for reducing demand charges.**

3. SB 350 and SB 32 call for a migration of MHDVs to electrification at an extremely rapid pace in the context of CPUC rulemaking. **Success with MHD EV regulations will depend on the timely rollout of major new programs.**

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Contact

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Appendix

Select MHD EV Charging Typologies[1]

	Fleet Orientation		Charging Requirements	
	Ownership	**Class**	**Available Charging Times**	**Target Charging Locations**
People Movement				
1. Urban Transit (e.g. Foothill)	Public	M&H	Long (evening to morning)	In-depot (fixed routes)
2. Urban + Rural Transit (e.g. MST)	Public	M&H	Long (evening to morning) and intermittently on route	In-depot (mostly fixed routes), but some on-route may be needed
3. Shuttle (e.g. SD Airport Parking)	Private	M	Short, unpredictable; high utilization around the clock	In-depot (mostly fixed routes), and on-route as needed
Goods Movement				
4. Last mile (e.g. Frito Lay)	Private (some MNCs)	M	Long (evening to morning)	In-depot (mostly fixed routes), but unknown routes require some on-route
5. Multi-Source (e.g. Ikea)	Private	H	Long (evening to morning) and intermittently on route	In-depot (mostly fixed routes), but unknown routes require some on-route
6. Yard (e.g. Port of LA, SFO)	Private	M&H	Short, because of high utilization	In-depot, because tethered to facility
7. Local Highway (e.g. 1-710 drayage)	Private	H	Long (evening to morning)	In-depot, because of mostly fixed routes, and on-route as needed

1 From survey and informal discussions with members