



**OLIVINE**

**California E-Bus to Grid Integration Project  
(CEC EPC-16-065)**

EPIC POLICY + INNOVATION COORDINATION GROUP  
TRANSPORTATION ELECTRIFICATION WORKSTREAM  
MEETING#1 SEPTEMBER 30, 2020, 10 AM – 11:30 AM

## PROJECT OVERVIEW

# California E-Bus to Grid Integration Project



Antelope Valley Transit Authority serves the communities of Lancaster and Palmdale, CA, with an Authority mandate to fully electrify the fleet.

## Goals

- Implement VGI of a fully built out electrified public transit fleet
- Participate in CA wholesale electricity markets
- Quantify the value of VGI to fleet owners

## Challenges

- Fleet operations schedule did not leave much opportunity for VGI at full build out
- Charge control system was not capable of dynamic control to enable VGI

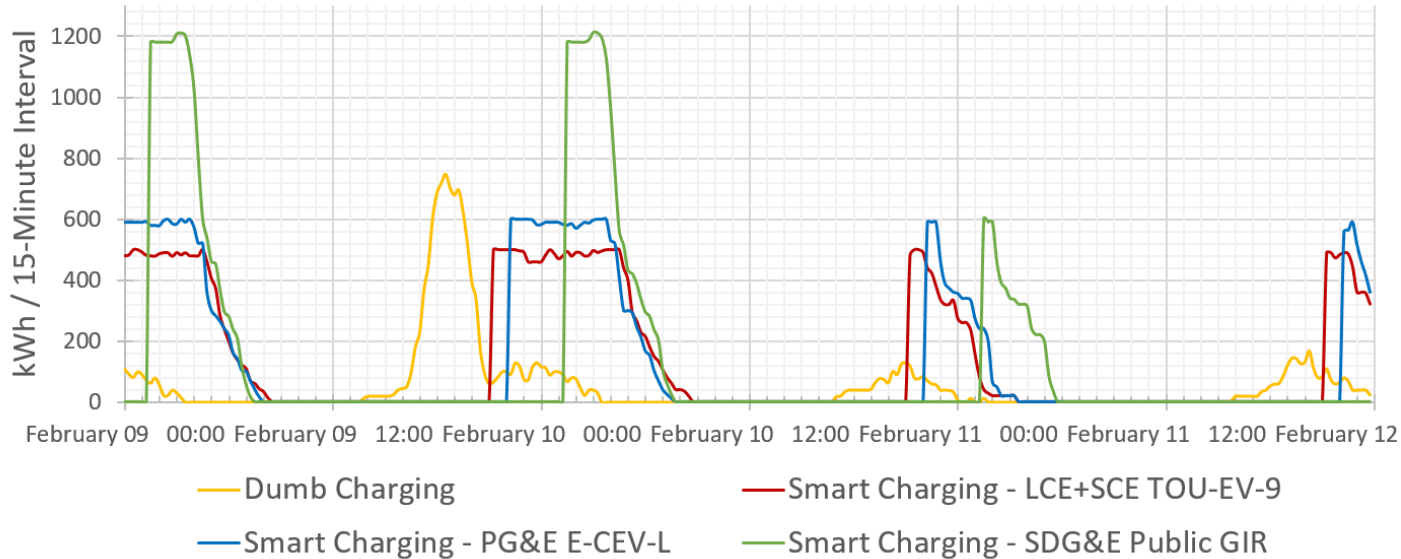
## Innovations

- E-fleet Energy Model: Minute-by-minute simulation of fleet operations, energy use, and charging
- Market Valuation Model: Assesses VGI opportunities and cost impacts; built on the E-fleet Energy Model

## PROJECT OVERVIEW

# Smart Charging Under Different Utility Rates

### Simulated Depot Load Profile Under Different Charging Strategies

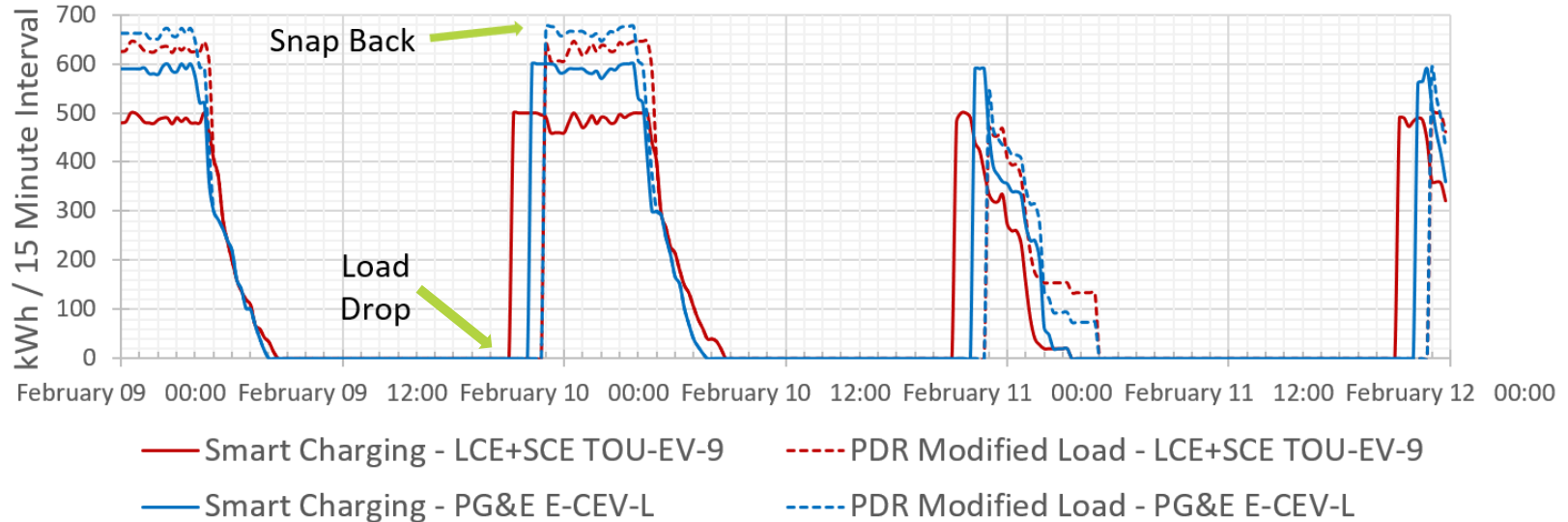


Rate Tariff	% Savings in year 10
LCE+SCE TOU-EV-9 & TOU-EV-8	<b>49%</b>
PG&E E-CEV-L	<b>53%</b>
SDG&E Public GIR	<b>15%</b>

Note: Years Modeled: 2019-2029. SCE Demand Charge Holiday modeled for 5 years, followed by linear restoration of the Demand Charge.

# V1G DR as Energy Resource Under Different Utility Rates

## Simulated Depot Load Profile on Days With PDR - Energy Events



Based on CAISO wholesale day ahead energy / 2018 – Four consecutive days of PDR events triggered by market prices.  
Note the load drop between 9-11pm, and subsequent snap back starting at 11 pm.



## Non-Wires Alternatives

### Energy Management Systems (EMS) & Services Requirements

- Be engaged during early planning stages & part of interconnection
- Reliably forecast coincident charging needs for the given application
- Provide confidence to the LSE that load will be managed within the forecasted envelope
- Bring together technology teams

### Infrastructure Upgrades

- Most applications will likely require a transformer upgrade
- Optimize the upgrade so that it is not oversized, IE assuming all vehicles are charging simultaneously
- Feeder upgrades may be avoided with an EMS, but outcome will vary case-by-case

**A system integration team can help make resilient technology choices**



## Non-Wires Alternatives

### Understand Your Fleet Duty Cycle

- When is your fleet plugged in?
- Do those times align with grid support opportunities?
- How much energy is available for VGI?
- How much energy is needed for fleet operations and when?

### Systemic Barriers

- Demand charge holidays
  - May seem punitive as fleets are trying to build out, but once capacity factors near 1, demand charges should work as designed
  - Demand charges are a reasonable tool to encourage adoption of EMS
- Vehicle, Charger, and Communications

### Customer Barriers

- EMS not a priority for M/HD operators in early stages of EV deployment
- Emergency charging concerns may force larger infrastructure investments
- Range anxiety





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