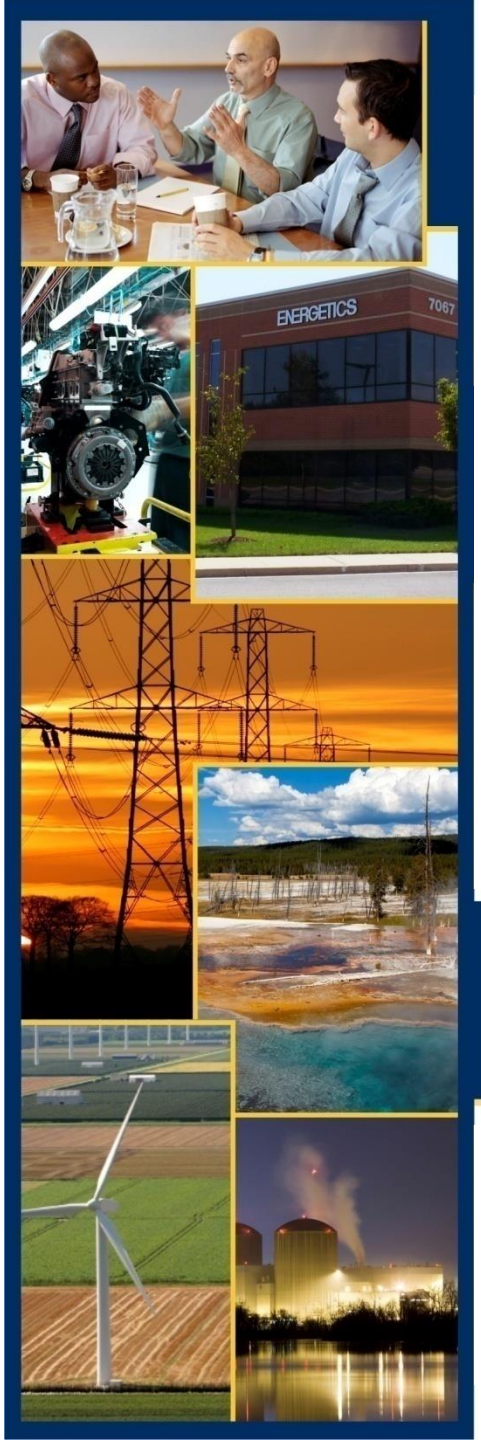


SB 350 Transportation Electrification Program Evaluation Process

May 9, 2019

IOU and Evaluator Perspective

Ziga Ivanic, Energetics

Agenda

1. *Introduction*
2. *Evaluation Methodology*
3. *CPUC Data Collection Template*
4. *Feedback and Insights*

IOU Priority Review Projects (PRPs)

$50M+ investment approval for 6 IOUs in 2018:

- CPUC Decision 18-01-024 approved 15 PRPs
  - $19M for 6 San Diego Gas and Electric (SDG&E) pilots
  - $16M for 5 Southern California Edison (SCE) pilots
  - $8M for 4 Pacific Gas and Electric (PG&E) pilots
- D. 18-09-034 approved 7 small IOU PRPs
  - $6.1M for 4 Liberty Utilities pilots
  - $0.6M for 1 Bear Valley Electric Service (BVES) pilots
  - $0.4M for 2 PacifiCorp pilots
- Energetics is leading 3rd party evaluation

PRP Groupings

The 22 PRPs are **diverse innovative deployment efforts** requiring tailored evaluation methods. For evaluation purpose they have been categorized into 3 groups.

Fleet Electrification	• Known (and potentially monitored) vehicles utilizing the charging infrastructure
Public Access Stations	• Installed electrical infrastructure that will serve a broad array of vehicles
Electrification Promotions	• Aim to address education and awareness barriers to EV adoption

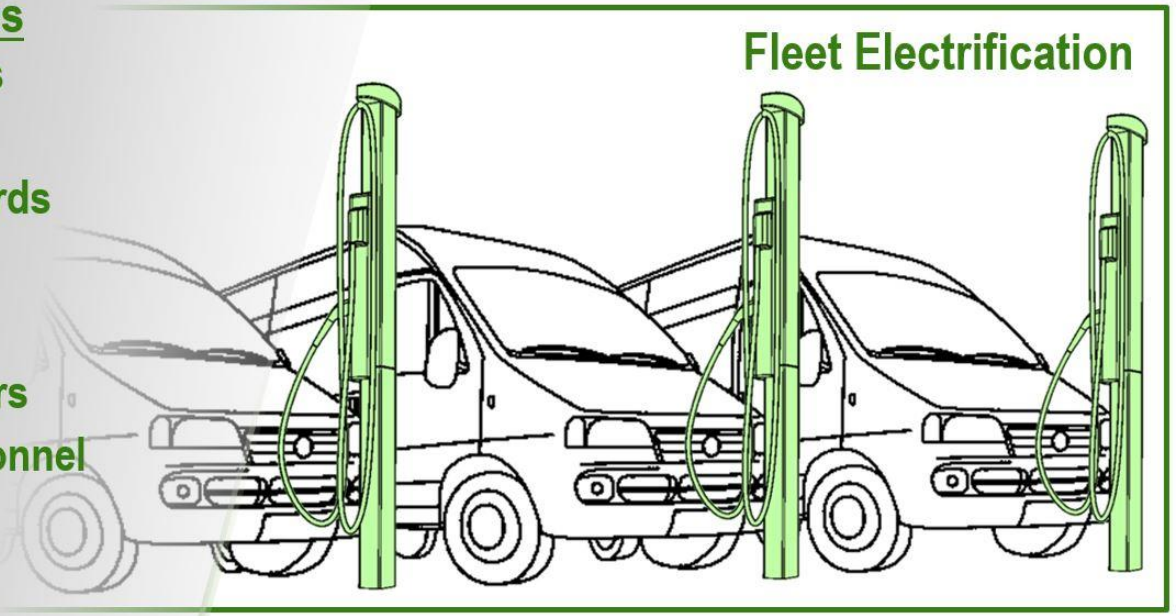
PRP Group 1 – Fleet Electrification

Quantitative Data Sources

- Charging Stations
- Smart Meters
- Operational Records
- Vehicles

Qualitative data sources

- Operation Managers
- Maintenance Personnel
- Drivers
- Customers



Priority Review Project (Off-road Infrastructure)
Airport Ground Support Equipment (SDG&E)
Port Electrification (SDG&E)
Port of Long Beach Rubber Tire Gantry Crane (SCE)
Port of Long Beach Terminal Yard Tractor (SCE)
Idle Reduction Technology (PG&E)

Priority Review Project (MHD Infrastructure)
Charge Ready Transit Bus (SCE)
Medium/Heavy Duty Fleet Customer Demo (PG&E)
Electric School Bus Renewables Integration (PG&E)
Green Shuttle (SDG&E)
Fleet Delivery Services (SDG&E)

MHD – medium- and heavy-duty vehicle

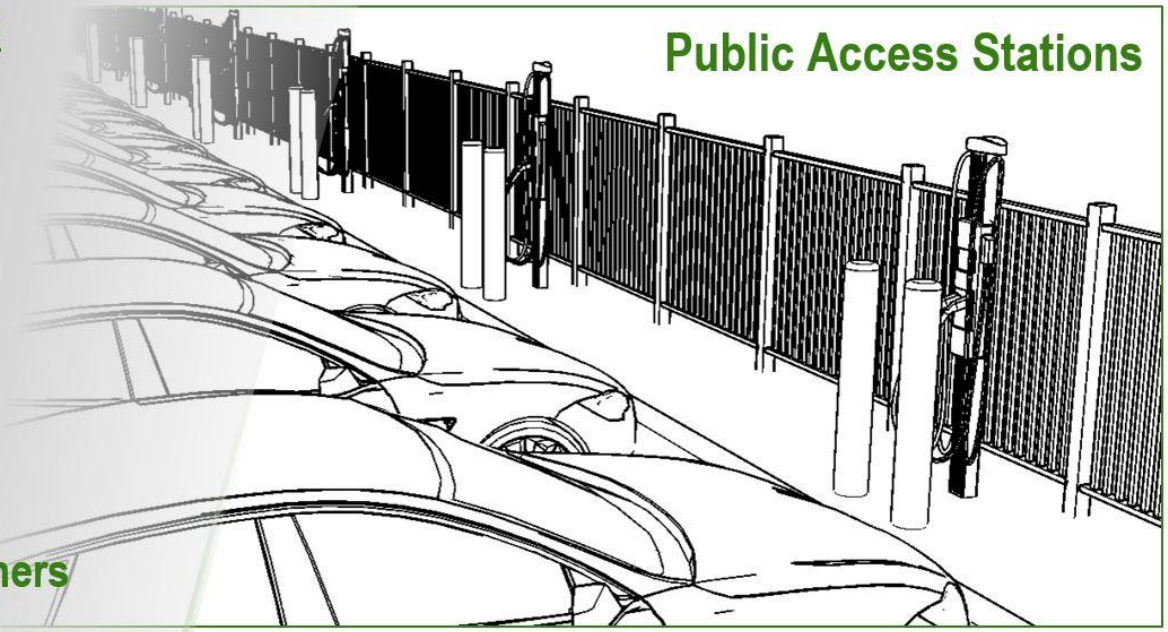
PRP Group 2 – Public Access Stations

Quantitative Data Sources

- Charging Stations
- Smart Meters

Qualitative data sources

- Drivers
- Site Hosts
- Local Business Owners



Priority Review Projects
Urban Charge Ready DCFC (SCE)
Electrify Local Highways (SDG&E)
Destination Make Ready (BVES)
DCFC Project (Liberty)

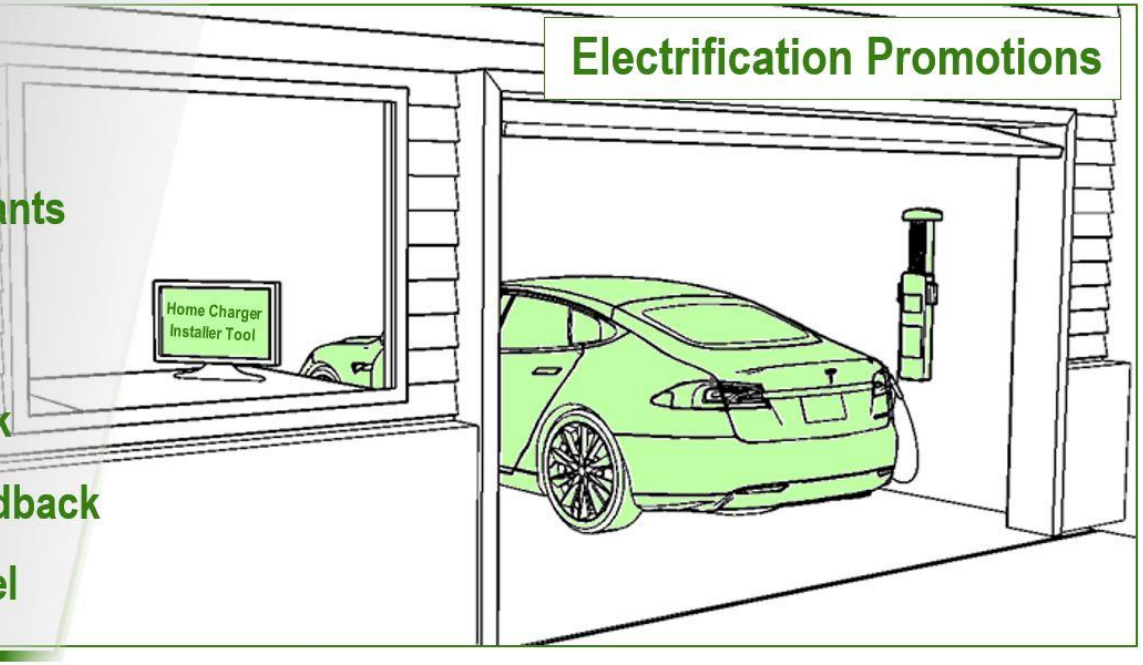
PRP Group 3 – Electrification Promotions

Quantitative Data Sources

- Website Views
- Number of Participants

Qualitative data sources

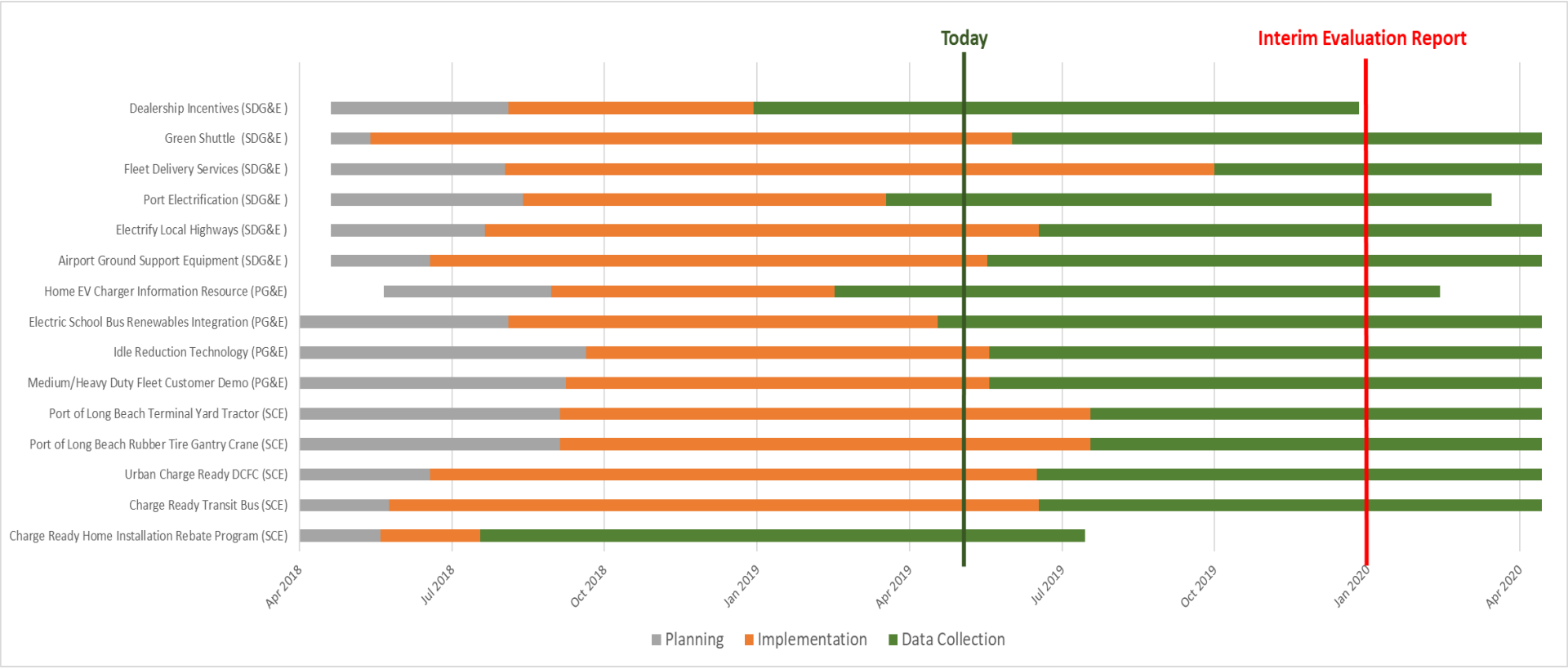
- Participant Feedback
- Non-Participant Feedback
- Dealership Personnel



Priority Review Project
Charge Ready Home Installation (SCE)
Home EV Charger Information Resource (PG&E)
Dealership Incentive (SDG&E)
Outreach and Education Program (PacifiCorp)

Priority Review Project
Demonstration and Development Program (PacifiCorp)
Residential Rebate Program (Liberty)
Small Business Rebate Program (Liberty)
Customer Online Resource (Liberty)

Current PRP Timelines



Data Collection Phase just starting for many PRPs

PRP Interim Evaluation Report planned for January 2020

Evaluation Objectives and Approach

- ***Determine the success*** of 22 unique PRP pilots based on CPUC Decision requirements and recommend if and how each PRP can be ***scaled for the future***.
- Assess each PRP to:
  - determine its impact on transportation electrification, petroleum use, air quality, and greenhouse gas emissions in California;
  - estimate its cost effectiveness; and
  - provide information about how each PRP can be scaled in the future.

Ratepayer Interests

Direct benefits (short- and long-term) consistent with both:

- Electrical Service – safer, more reliable, or less costly by:
  - Avoiding distribution system upgrades
  - Improving system utilization
  - Integrating renewable energy
- Any of:
  - Increasing travel energy efficiency
  - Decreasing air pollution impacts to health and environment
  - Decreasing energy related GHG emissions
  - Decreasing petroleum use
  - Jobs and economic benefits in Disadvantaged Communities (DACs)

Key PRP Research Questions

- **What barrier(s) to electrification are being addressed, and what was the PRP's success at overcoming the barrier(s)*?**
- What were the net impacts? (relative to the no-PRP scenario)
  - GHG and pollution reduction / Fossil fuel displacement / Participant changes in cost
- What were the co-benefits?
  - For disadvantaged communities (DACs) / Operations, maintenance, and fuel costs / Noise reduction and time savings / Health and safety
- What were the lessons learned?
  - What worked well / How could implementation be improved based on lessons learned / What innovations were made
- How could the project be scaled up? Under what timeline?
- What was the cause of any implementation delays and can these be avoided for future projects

*Since PRPs are pilots and unique (evaluating technology against a use case hypothesis), it can be difficult to compare PRPs based on common metrics

SB 350 CPUC Data Collection Template

Enable IOU reporting across SB350 TE projects in the same format for comparison and analysis

1. Project Metrics	2. Utility Project Costs
3. Customer Metrics	4. Hourly Metrics
5. Charging Station List	6. Charging Session Data

Project Metrics:

- ✓ Total direct costs
- ✓ # of EVSE/ports installed
- ✓ EVs served/adopted
- ✓ Emission reductions
  - ✓ GHG & criteria pollutants
- ✓ Petroleum displacement
- ✓ DAC impact
- ✓ EVSE utilization

Challenges with Data Access, Sharing, and Capture

- Large sets of charging session data will be generated (5 years of 15 minute interval data and other descriptive data elements)
  - Costly to capture and maintain (tracking and validation)
  - Data requirements may drive up project costs when non-networked stations could be adequate for use case
  - CPUC data template requiring charging session data was added post decision which approved budgets had not accounted for
  - Site usage characteristics may be more valuable than port by port usage characteristics and detailed charging session data by port
  - Unclear if all the data is necessary; should be driven by the evaluation methodologies
- Private fleet cost and operational data can represent a competitive advantage for fleets
  - Can be kept confidential by evaluator/CPUC; some might not share it

Challenges with Data Access, Sharing, and Capture

- Data accuracy and consistency varies among EV Service Providers (EVSP)
  - Even with networked chargers and online data portals there are costs associated with validation and translation for multiple EVSPs
- Vehicle operational data (i.e. telematics at trip level or at least mileage/hrs logs) provide helpful insights for total cost of ownership evaluation
  - Additional baseline information needed for comparison
  - Limited ability to collect MHD telematics
    - Some OEMs hesitant to share it & dataloggers are costly
- Challenge applying the template to non-infrastructure projects (but not applicable for current SRPs)
  - Residential programs not designed to require same level of detail as for business customers

Methodology Considerations

- Different approaches for different types of PRPs
  - Infrastructure pilots translate to standard review projects
  - Qualitative data (i.e. lessons learned) just as important as quantitative data
- Technology maturity can be a factor
  - Early production EV models
  - New high power EVSE and lack of charging standards for TRUs, GSE, and forklifts
  - Managed charging technology just being developed
- Measuring incremental EV adoption is a challenge
  - Difficult to get accurate EV sales data for a utility territory
  - Various aspects contribute to EV purchase decisions and differ for fleets vs. light duty passenger vehicles and between program designs
    - Policy / Technology / Infrastructure

TRU – trailer refrigeration unit; GSE – ground support equipment

Methodology Considerations

- PRPs might not achieve steady operational data until later in the 12 month data collection phase
  - Collected data not necessarily representative of true potential
  - Application of lessons learned would improve effectiveness
- The PRP results are not sole determinants of whether the use cases can be scaled up or that a commercial scale market exists for the utility services piloted
  - Significant additional market assessment based the PRP results is likely needed. The IOUs can enable the market, but cannot make or transform it.

Methodology Considerations

- PRP or SRP results might not reflect total potential benefits - $/metric (i.e. GHG, kW, EV) reduced could be misleading …
  - Some PRPs focused on improvements to operations (i.e. load management), and may not be well suited for these metrics
    - These PRPs may pave the way for future site hosts to adopt technologies, based on strategies for lowest operational costs considering different approaches
  - Projects installing make ready for more than actual EVSE deployed
    - Likely the case for SRP transit efforts as fleets have to plan for expansion to support 100% zero emissions fleet in the future; therefore, IOU infrastructure upgrades will likely be future proofed to some extent

IOU and Evaluator Contacts

Ziga Ivanic, P.E., PMP

3rd Party Evaluator Lead for IOU PRPs

Transportation Program Director

Energetics, a division of Akimeka, LLC

zivanic@energetics.com

Tracy Cheung

Principal Product Manager

Clean Transportation Strategy

Pacific Gas and Electric Company

Tracy.Cheung@pge.com

Ailsa Yew

Project Manager

eMobility Operations

Southern California Edison

Ailsa.Yew@sce.com

Praem Kodiath

EV Customer Analytics Manager

Clean Transportation

San Diego Gas and Electric

Pkodiath@semprautilities.com