energetics
Clean Energy Consulting

CADMUS

FINAL EVALUATION REPORT CALIFORNIA INVESTOR-OWNED UTILITY TRANSPORTATION ELECTRIFICATION PRIORITY REVIEW PROJECTS

Presentation Outline

- Introduction
- Program Summary
- Large Investor-Owned Utility (IOU) PRPs
  - San Diego Gas and Electric
  - Southern California Edison
  - Pacific Gas and Electric
- Small Multi Jurisdictional IOU PRPs
  - PacifiCorp
  - Liberty Utilities
  - Bear Valley Electric Service

IOU Priority Review Projects (PRPs)

$50M+ investment approval for six 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
- CPUC Decision 18-09-034 approved 7 small IOU PRPs
  - $6.1M for 4 Liberty Utilities pilots
  - $0.6M for 1 Bear Valley Electric Service (BVES) pilot
  - $0.4M for 2 PacifiCorp pilots
- Energetics selected as 3rd party evaluator (Oct 2018)
  - Team includes Cadmus Group, National Renewable Energy Laboratory, Idaho National Laboratory, and DAV Energy

CPUC directed IOUs in Fall 2016 to propose up to $20M PRP portfolio each with a max of $4M per PRP by January 2017

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 vehicles utilizing the charging EV charging infrastructure
Public Access Stations	• Installed EV charging infrastructure that will serve a broad array of vehicles
Electrification Promotions	• Strategies to address education- and awareness-related barriers to EV adoption

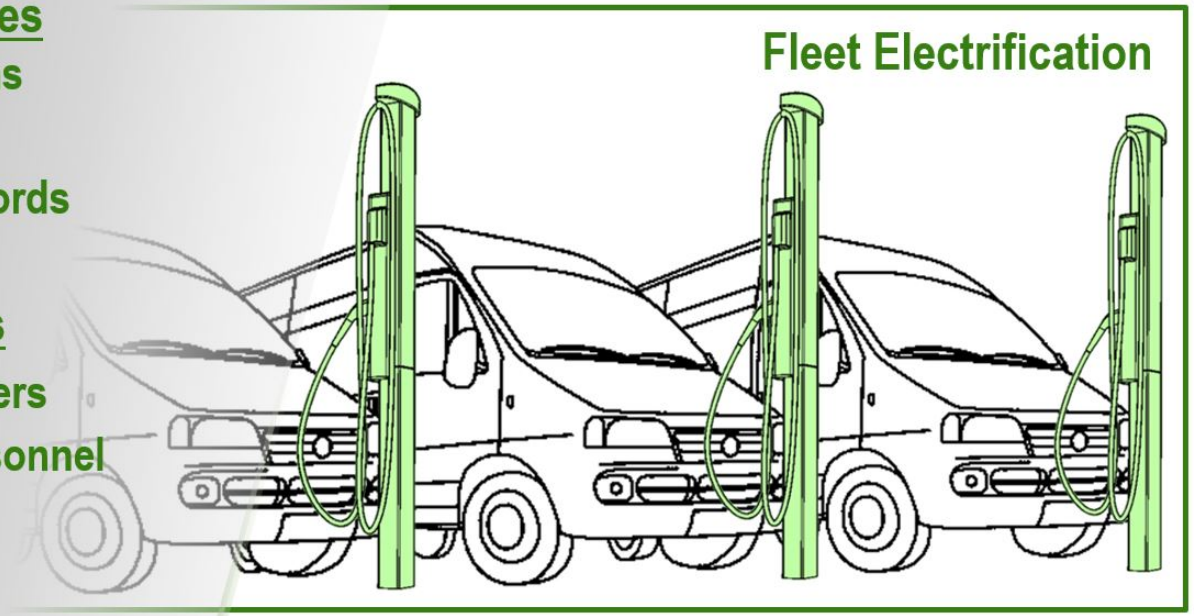
PRP Group 1 – Fleet Electrification

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) – **$2.8M**
Port Electrification (SDG&E) – **$2.4M**
Port of Long Beach Rubber Tire Gantry Crane (SCE) – **$3M**
Port of Long Beach Terminal Yard Tractor (SCE) – $0.45M
Idle Reduction Technology (PG&E) – **$1.7M**

Priority Review Project (MHD Infrastructure)
Charge Ready Transit Bus (SCE) – **$4M**
Medium/Heavy Duty Fleet Customer Demo (PG&E) – **$3.4M**
Electric School Bus Renewables Integration (PG&E) – **$2.2M**
Green Shuttle (SDG&E) – **$3.2M**
Fleet Delivery Services (SDG&E) – **$3.7M**

MHD – medium- and heavy-duty vehicle

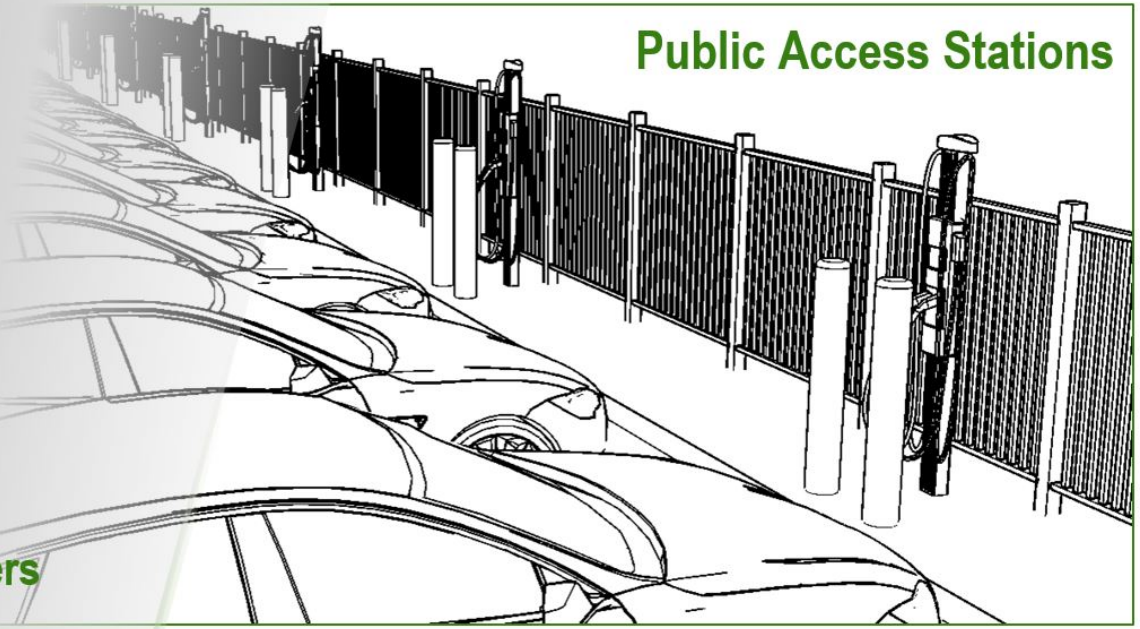
PRP Group 2 – Public Access Stations

Quantitative Data Sources

- Charging Stations
- Smart Meters

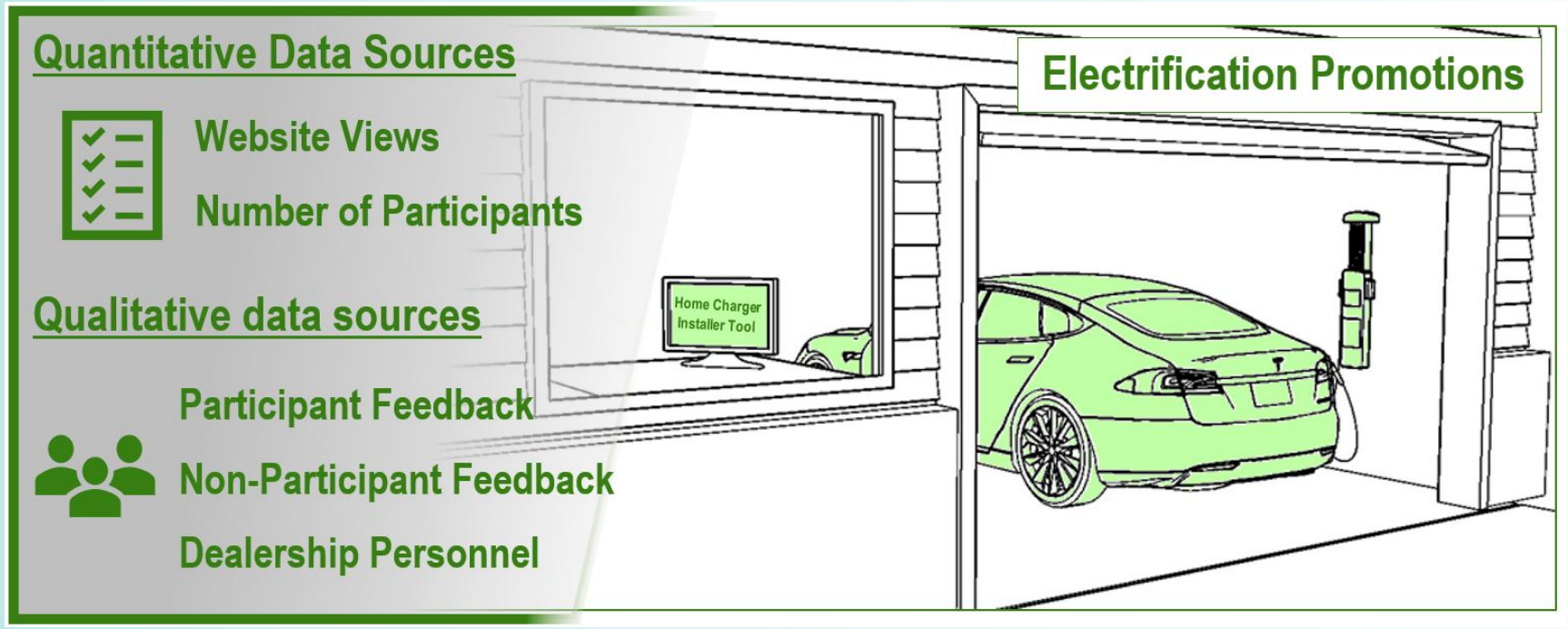
Qualitative data sources

- Drivers
- Site Hosts
- Local Business Owners



Priority Review Projects
Urban Charge Ready DCFC (SCE) – **$4M**
Electrify Local Highways (SDG&E) – **$4M**
DCFC Project (Liberty) – **$4M**
Destination Make Ready (BVES) – $0.6M

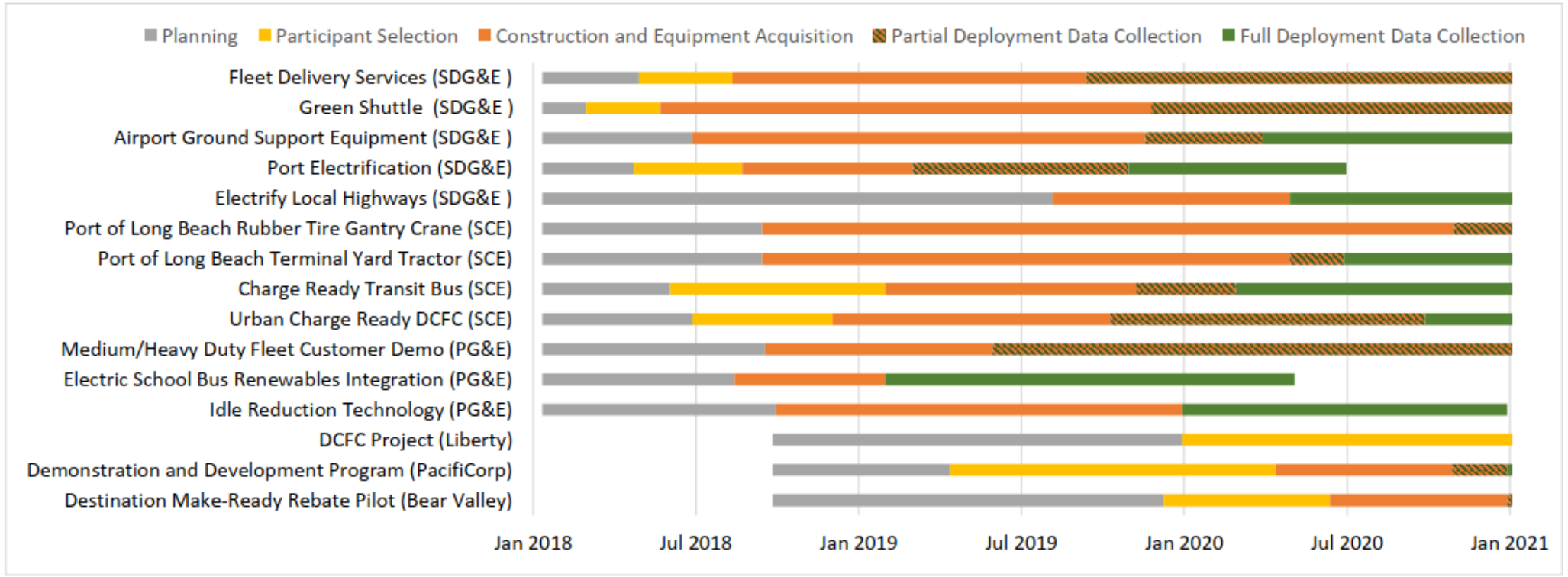
PRP Group 3 – Electrification Promotions

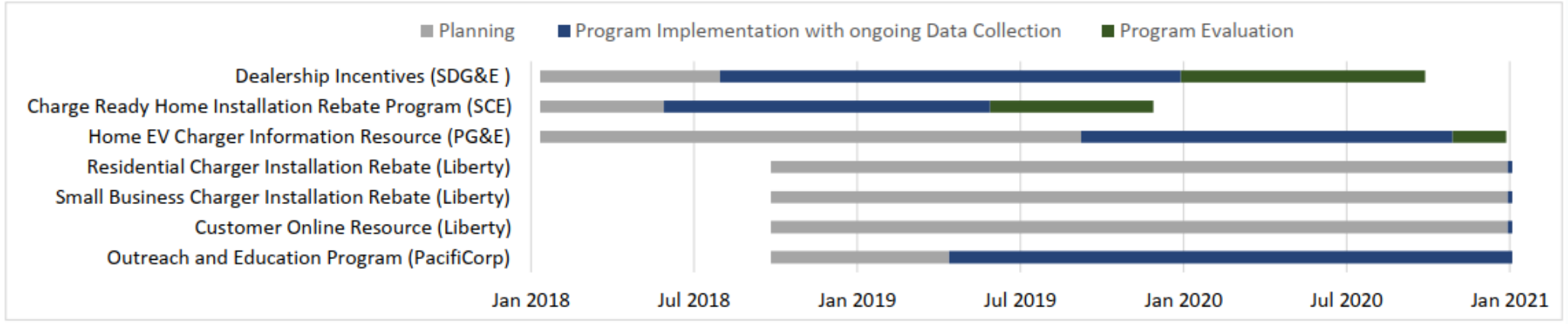


Priority Review Project
Charge Ready Home Installation (SCE) – **$4M**
Home EV Charger Information Resource (PG&E) – $0.2M
Dealership Incentive (SDG&E) – **$1.8M**
Outreach and Education Program (PacifiCorp) – $0.2M

Priority Review Project
Demonstration and Development Program (PacifiCorp) – $0.3M
Residential Rebate Program (Liberty) – **$1.6M**
Small Business Rebate Program (Liberty) – $0.3M
Customer Online Resource (Liberty) – $0.3M

Utility PRP Timelines



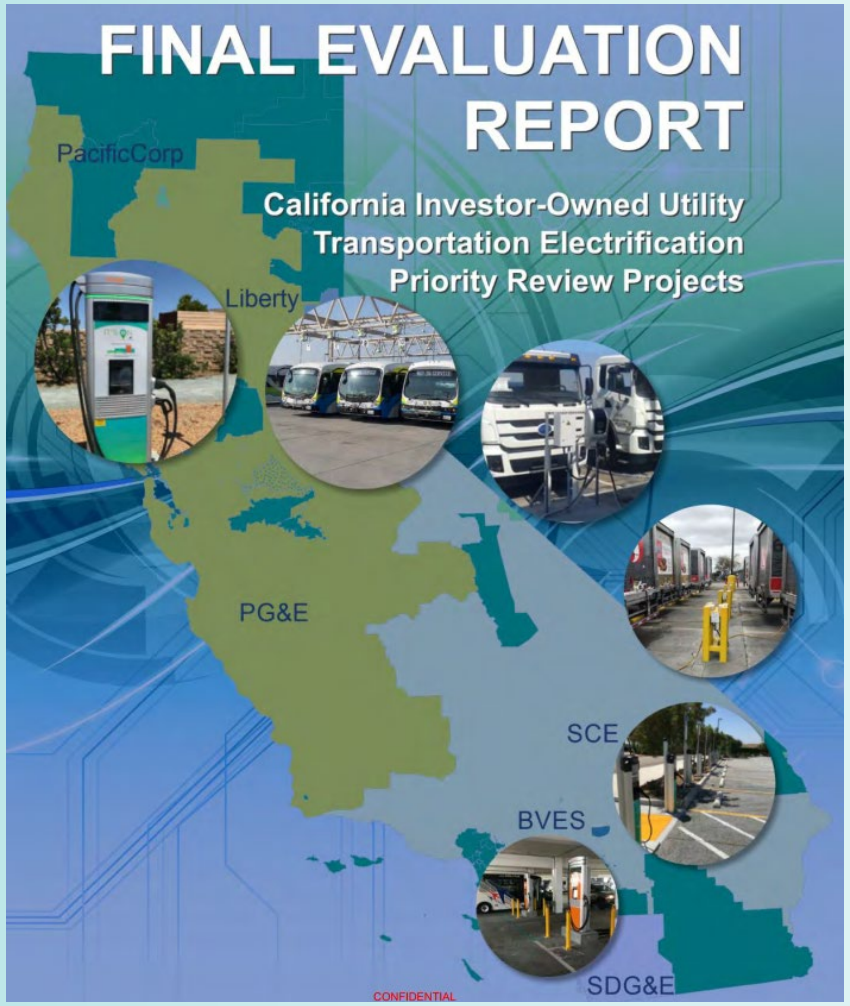


Key PRP Research Questions

- **What barrier(s) to electrification are being addressed, and what was the PRP's success at overcoming the barrier(s)?**
  - Since PRPs are pilots and unique (evaluating technology against a use case hypothesis), it can be difficult to compare PRPs based on common metrics
- 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?

Final Evaluation Report

Submitted to CPUC and shared with SB350 PRP service list by SCE on 4/22/2021



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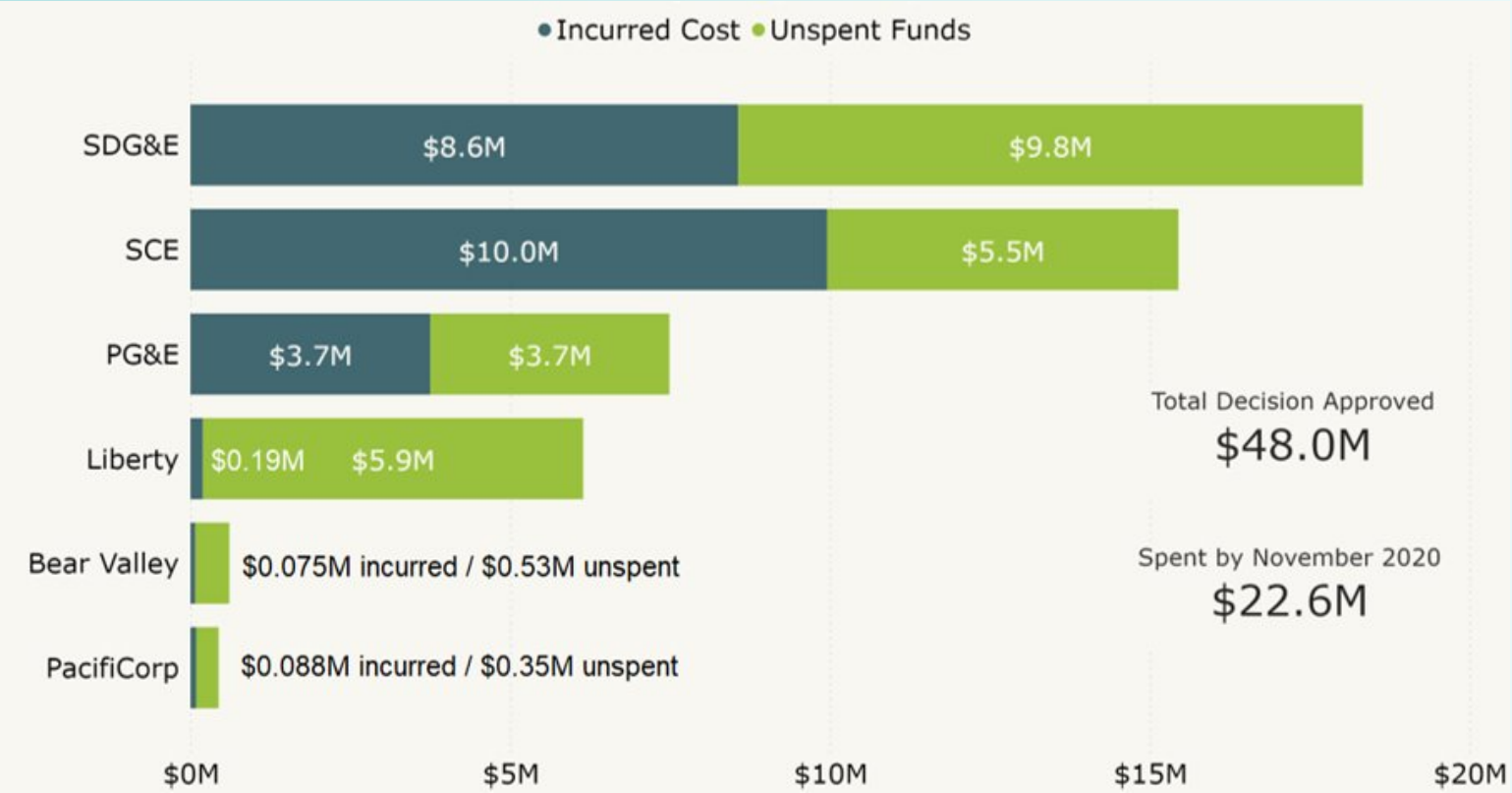
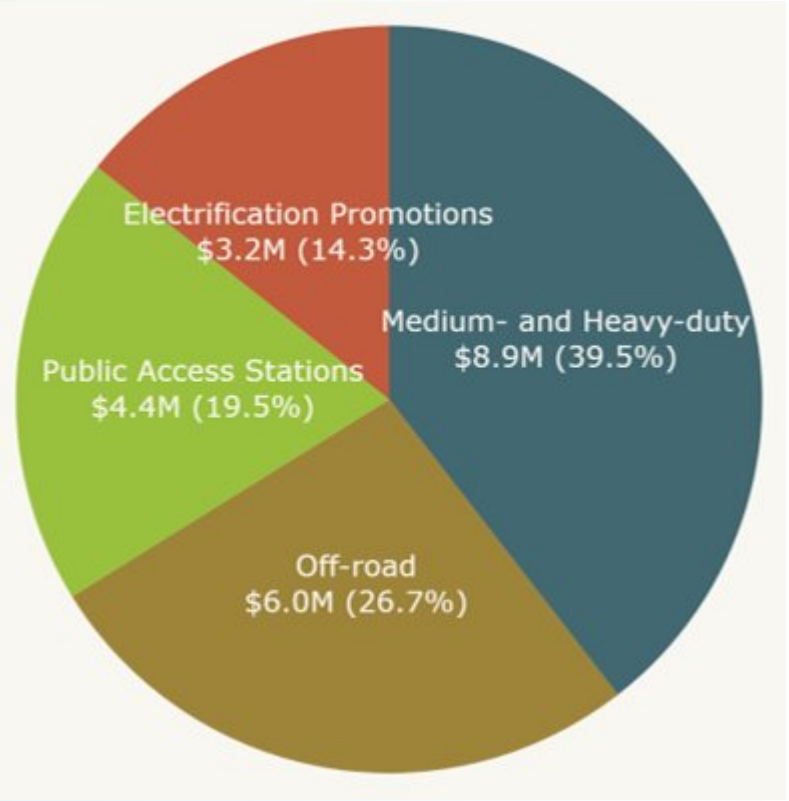
- Project Baseline
- Implementation Process
- Costs & Benefits
- Operational Impacts of Equipment
- Stakeholder and Customer Feedback

Conclusions & Recommendations

- Findings
- Lessons Learned
- Scale Up Potential

Program Budget and Spending

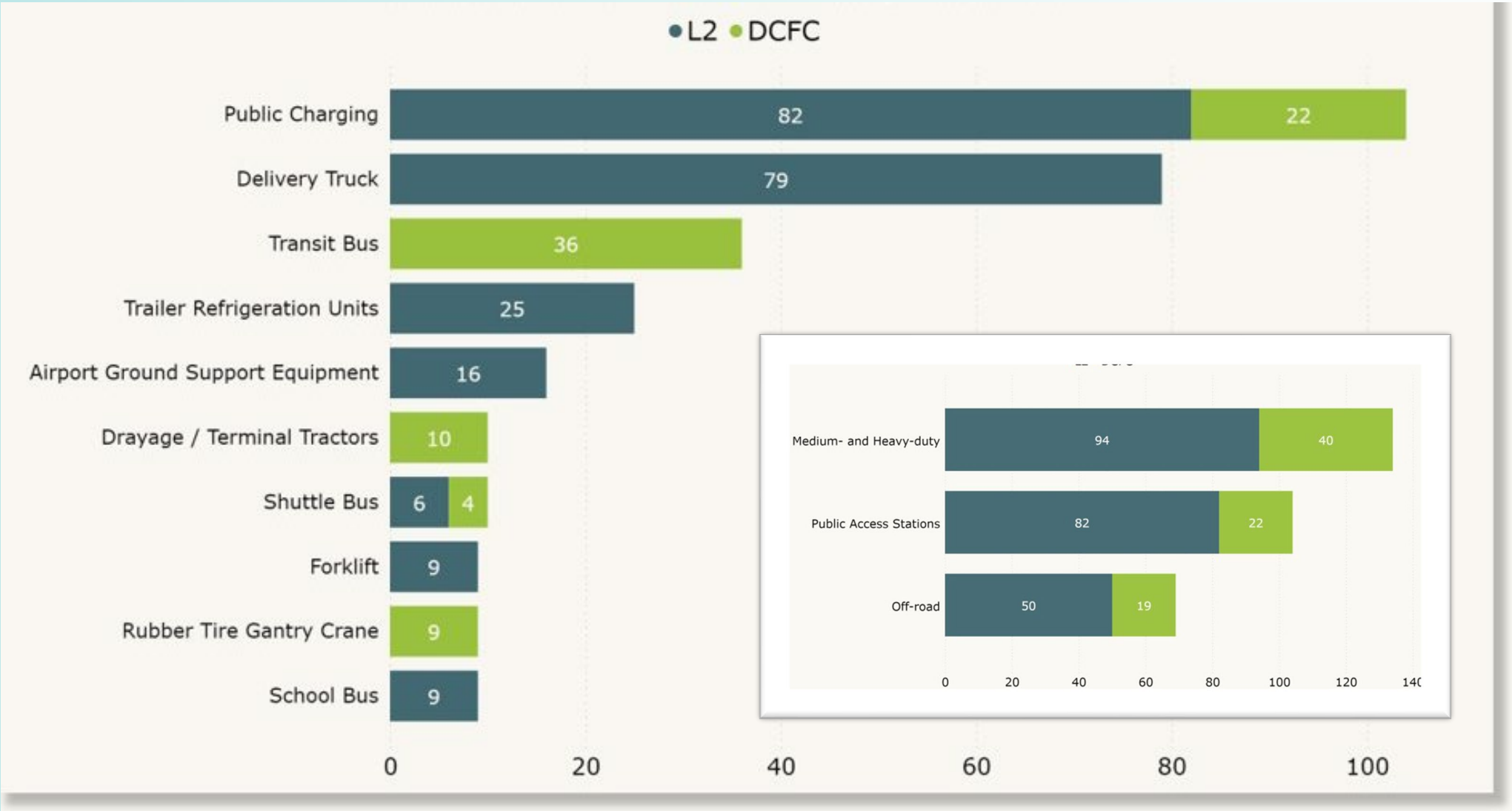




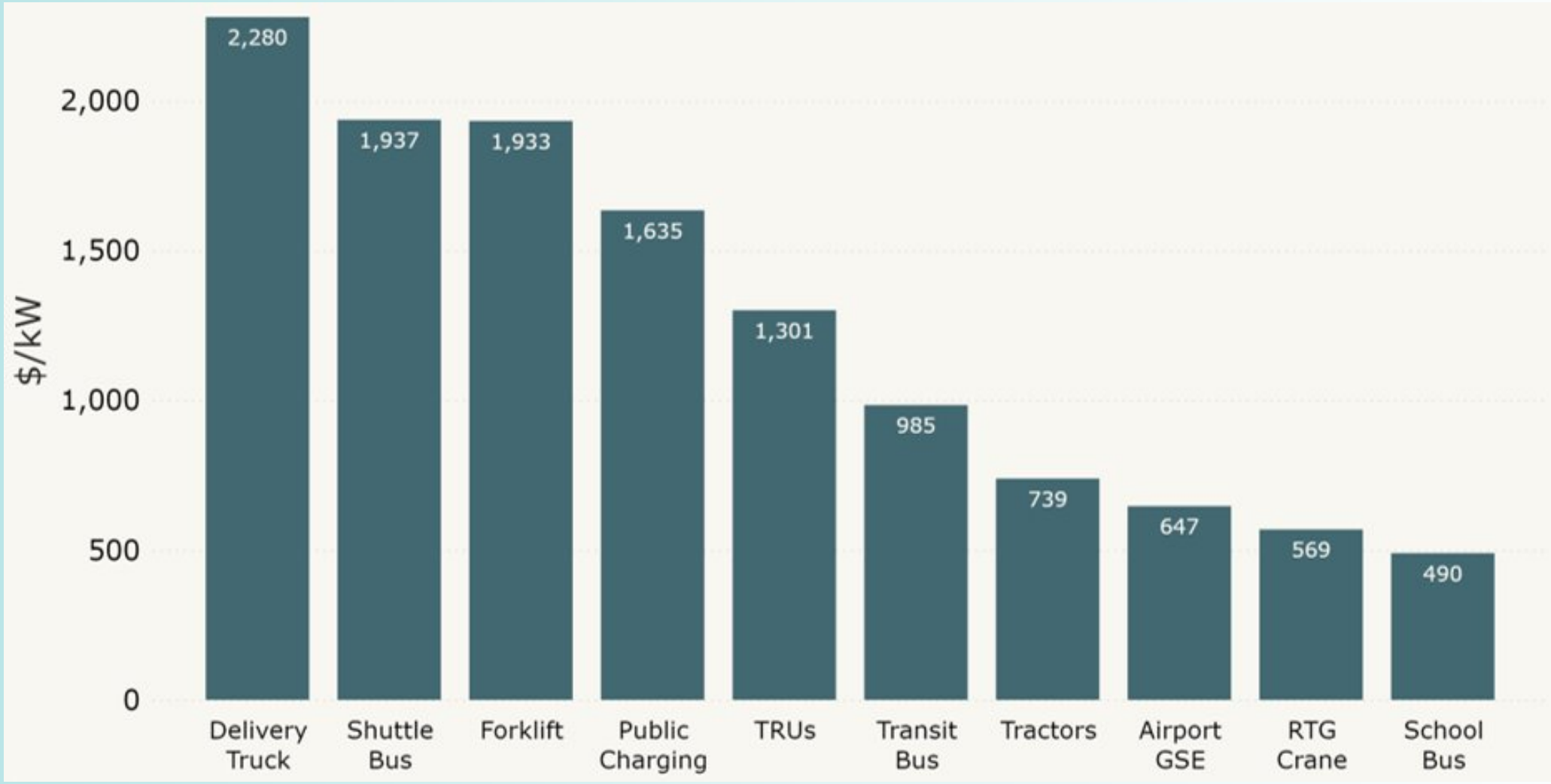
Unspent funding to be returned to ratepayers upon program completion

Charging Ports Installed

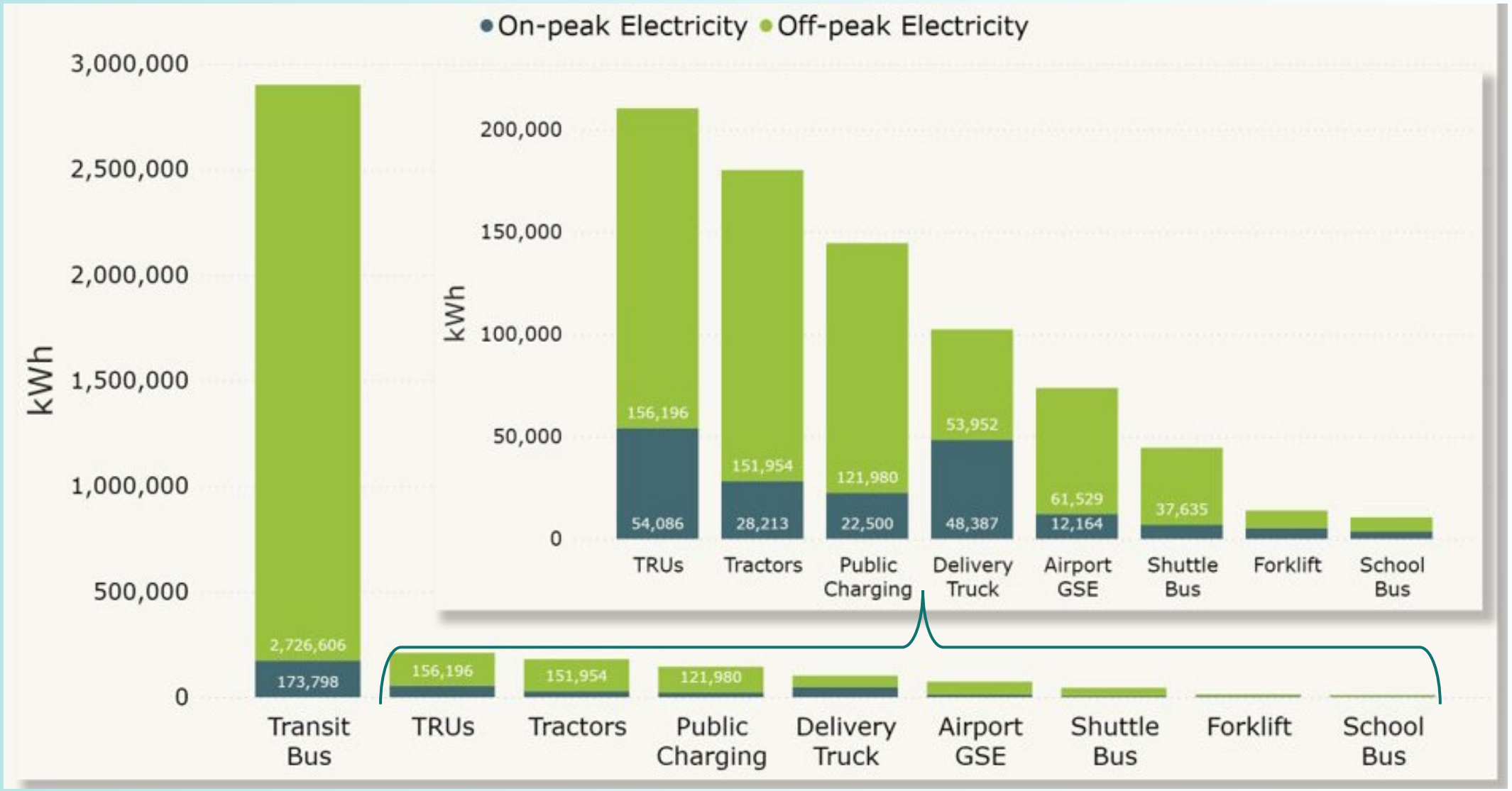
309 charging ports (81 DCFC)



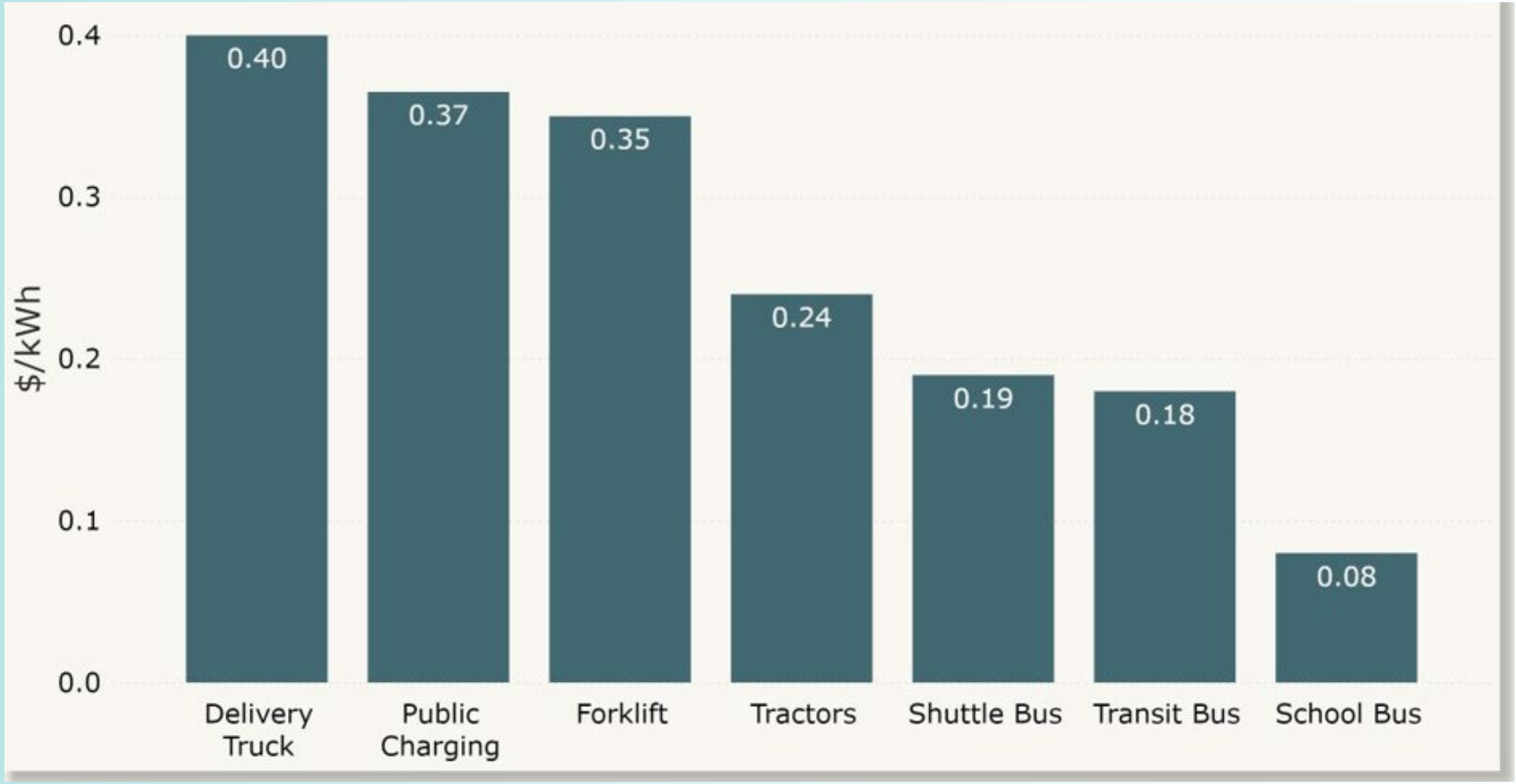
EV Charging Infrastructure Costs



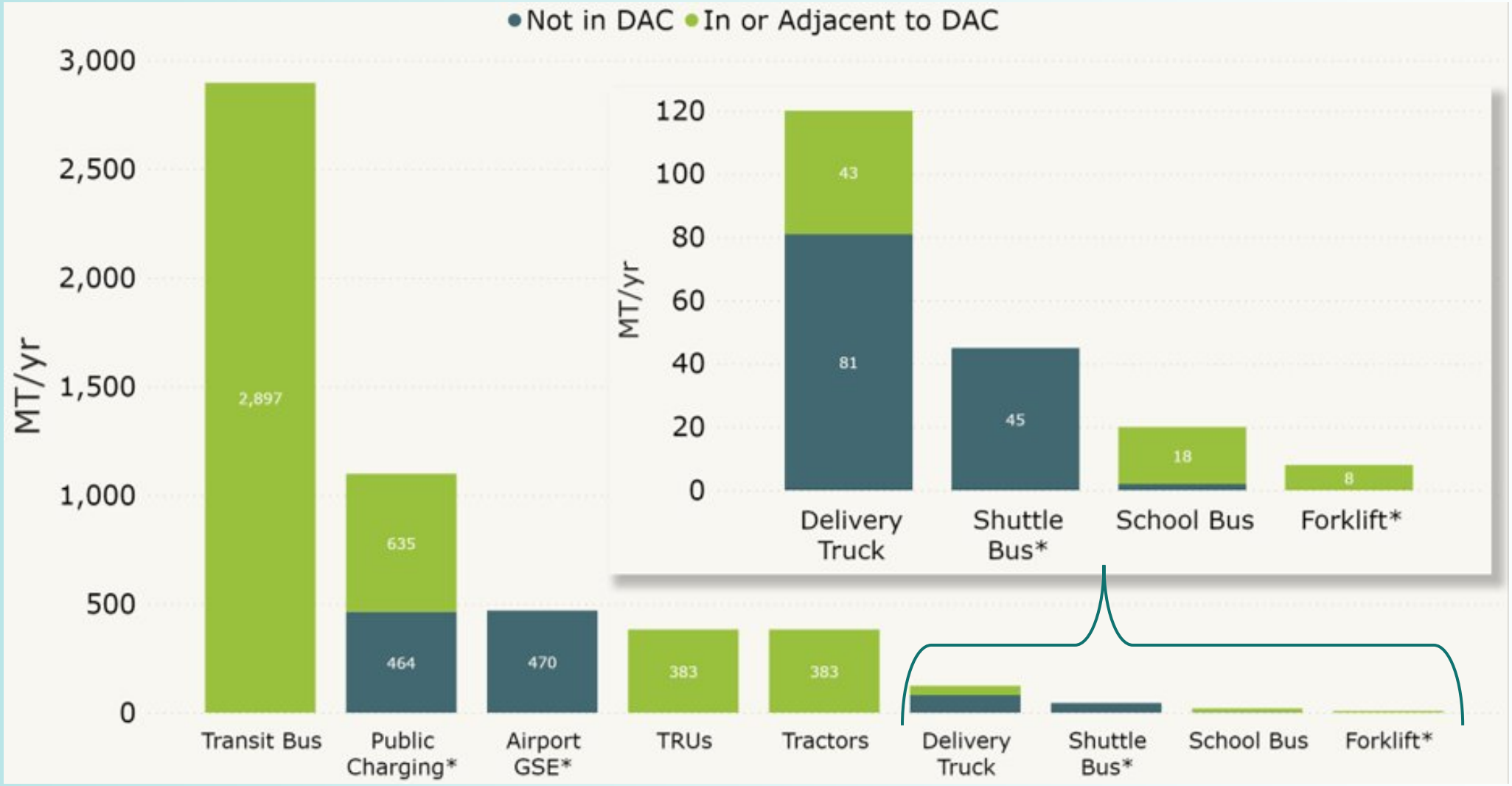
Energy Consumption



Average Energy Costs



Avoided GHG Emissions



Scale Up Potential

Application	Technology Maturity	Operational Applicability	Grid Integration Ability	Operational Cost Effectiveness	GHG Reduction per Investment	Market Size and Potential
Transit Bus						
	Driven by regulation, several manufacturers, regular routes with high utilization, overnight charging, and significant market size					
Airport Ground Support Equipment						
	Mature products, history of successful use, overnight charging with daytime renewable energy charging opportunity					
Public Charging for Light-duty EVs						
	Mature vehicle/charger technologies with incentives, grid management via fees, large future benefit potential by serving more EVs					
Trailer Refrigeration Units						
	Upcoming regulation, existing eTRU technology, limited charge scheduling opportunities, significant benefits and market size					
Delivery Truck						
	Emerging technology with limited vehicle availability, good fit for shorter routes, overnight charging, significant market size					
School Bus						
	Emerging technology, charge management challenge, renewables charging opportunity, low use/benefits, significant market size					
Shuttle Bus						
	Emerging technology, good fit for short routes, overnight L2 (low use) and DCFC with daytime charging (high use), limited benefits					
Forklifts						
	Mature products, history of successful use, overnight charging, relatively low energy use/benefits/market size					
Drayage/Terminal Tractors						
	Emerging technology, limited product offerings, high power DCFC without charge management ability, potential benefits					
Rubber Tire Gantry Crane						
	New technology application, implementation challenges, grid-tied with no buffering, significant benefits, small market size					

1 – significant vehicle or charging technology deployment challenges, 4 – minimal deployment challenges

1 – not a good fit for electrification, 4 – very good fit for electrification

1 – no flexibility in avoiding on-peak charging, 4 – significant opportunity for off-peak charging

1 – minimal operational energy savings, 4 – operational energy savings cover significant portion of charging infrastructure costs

1 – less than 200 MT of CO_{2e} emissions reduction annually per $1M of charging infrastructure investment, 4 – more than 1,000 MT of CO_{2e} emission reduction annually per $1M of charging infrastructure investment

1 – less than 1,000 vehicles/equipment in California suitable for electrification, 4 – more than a million vehicles suitable for electrification

Evaluation Findings & Lessons Learned

- Make-ready planning, design, and construction activities were well executed
- Many PRP schedules were extended by 12 months or more
- Incentive programs fell short of spending their budget due to eligibility and application requirements
- Electrical infrastructure upgrades are required for significant fleet electrification; utilities are necessary partners for infrastructure support
- Advising fleets on EV technologies and charging solutions increases TE program success
- Periodic review of fleet operational performance increases project benefits
- Electricity rates are a key factor in total cost of ownership. Variable rates provide opportunities for significant cost savings if customers can manage their charging patterns.
- Statewide vehicle purchase incentives (CARB HVIP), charging infrastructure funding (utility make-ready programs), and fueling credits (CARB LCFS) are needed for most vehicle applications to ensure a successful transition to ZEVs over the next decade.

COVID-19 Pandemic Impact

The stay-at-home orders significantly impacted most PRPs, especially private driver behavior at public charging pilot locations. DCFCs were intended to support regional travel and multi-unit resident charging in DACs; L2 chargers were intended to support daily commuters.

San Diego Gas & Electric PRP Portfolio

MHD (Off-road Infrastructure)

Airport Ground Support Equipment (SDG&E) – **$2.8M**

Port Electrification (SDG&E) – **$2.4M**

MHD Infrastructure

Green Shuttle (SDG&E) – **$3.2M**

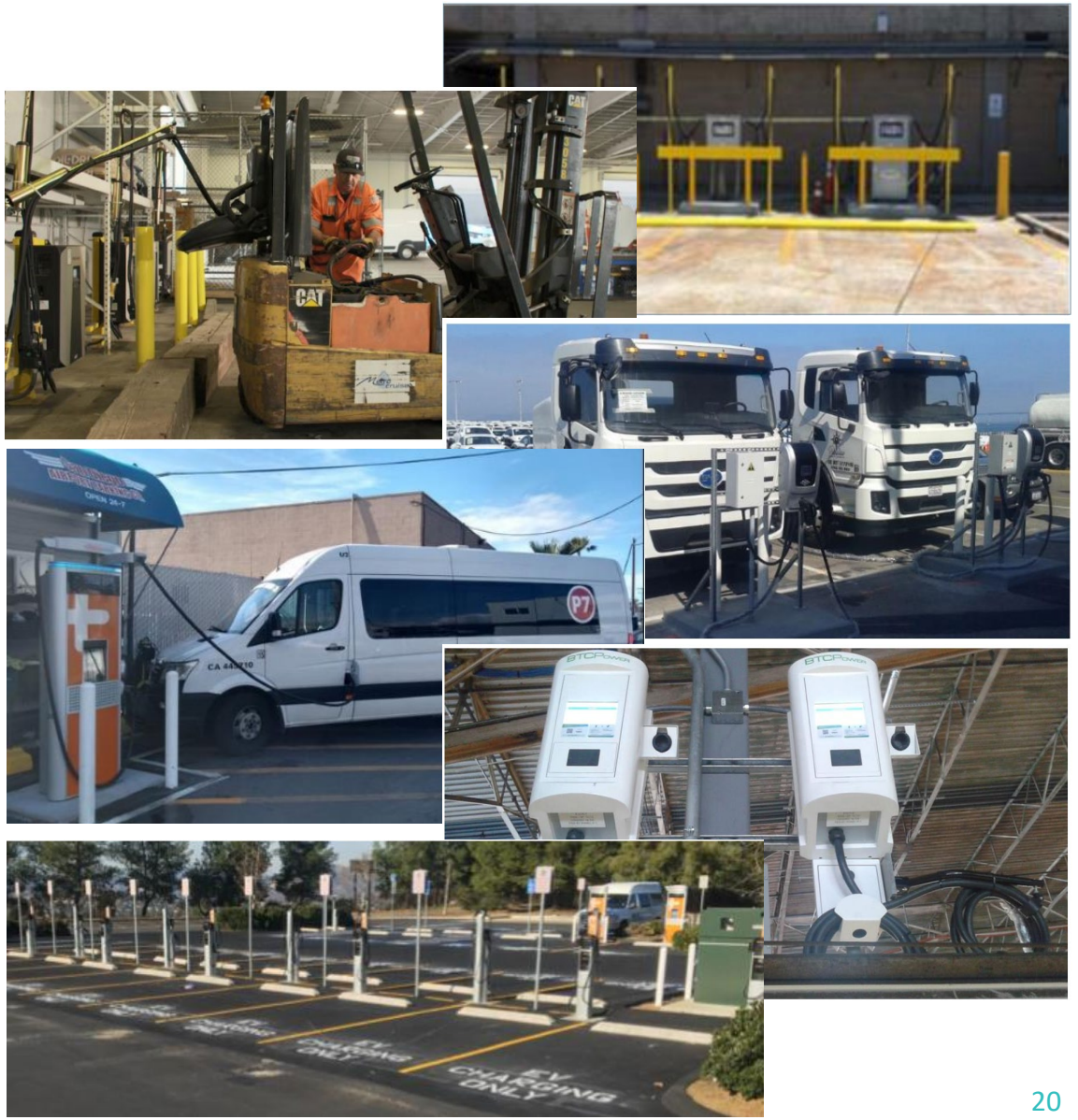
Fleet Delivery Services (SDG&E) – **$3.7M**

Public Access Stations

Electrify Local Highways (SDG&E) – **$4M**

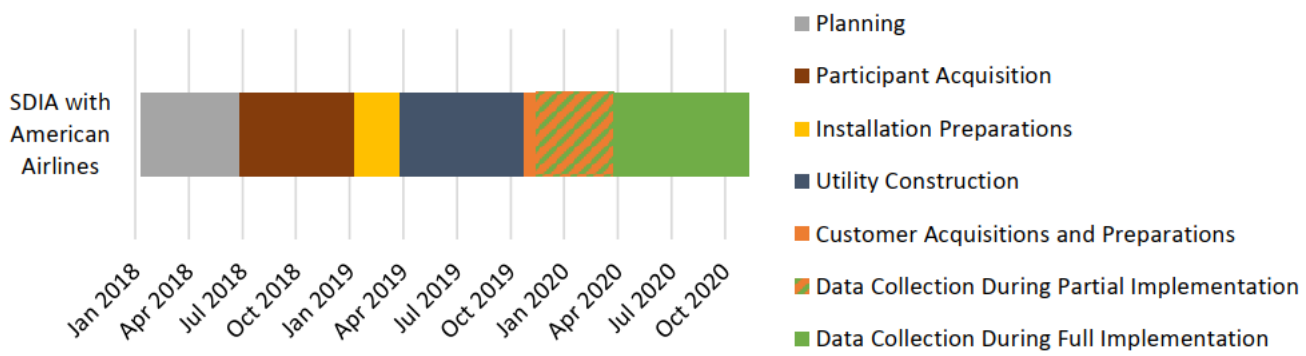
Electrification Promotions

Dealership Incentive (SDG&E) – **$1.8M**



Airport GSE – Overview

Objectives
Phase I – Retrofit 16 existing GSE-specific charging ports with utility owned EV chargers on the air side of terminal
Collect and analyze data to understand GSE charging load patterns
Phase II – Install up to 45 additional charging ports for new eGSE



Key Results
Budget: Approved **$2.8M**, Spent **$0.85M** (29%)
EV charging: 16 charging ports (8 DCFC EVSE)
EVs supported: 31 eGSE
Petroleum reduction: 19,318 GGE annually
GHG reduction: 470 MT CO_2 annually
DAC: SDIA is not in a DAC
Grid Impacts: 96 MWh annually (19% on peak)

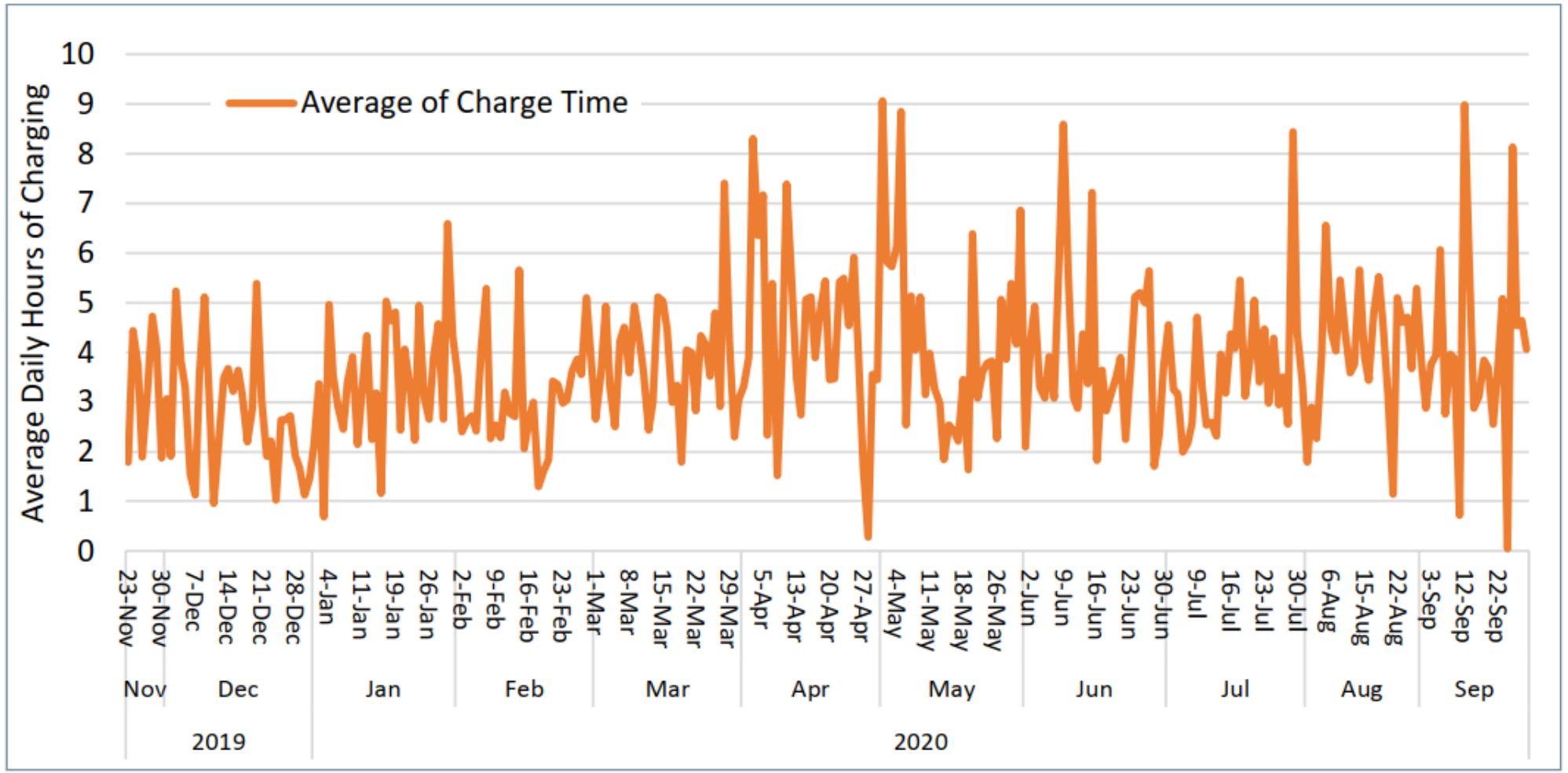
Airport GSE – Participant

Fleet	Chargers	Baseline and eGSE
San Diego International Airport American Airlines	Eight Webasto 10-40 kW PosiCharge ProCore	• 31 electric baggage tractors and cargo belt loaders • Gasoline GSE (baseline)

Terminal 2 Location	Configuration	Ports
Gate 23	3 dual-port chargers	6
Gate 25	3 dual-port chargers	6
Gate 35	2 dual-port chargers	4

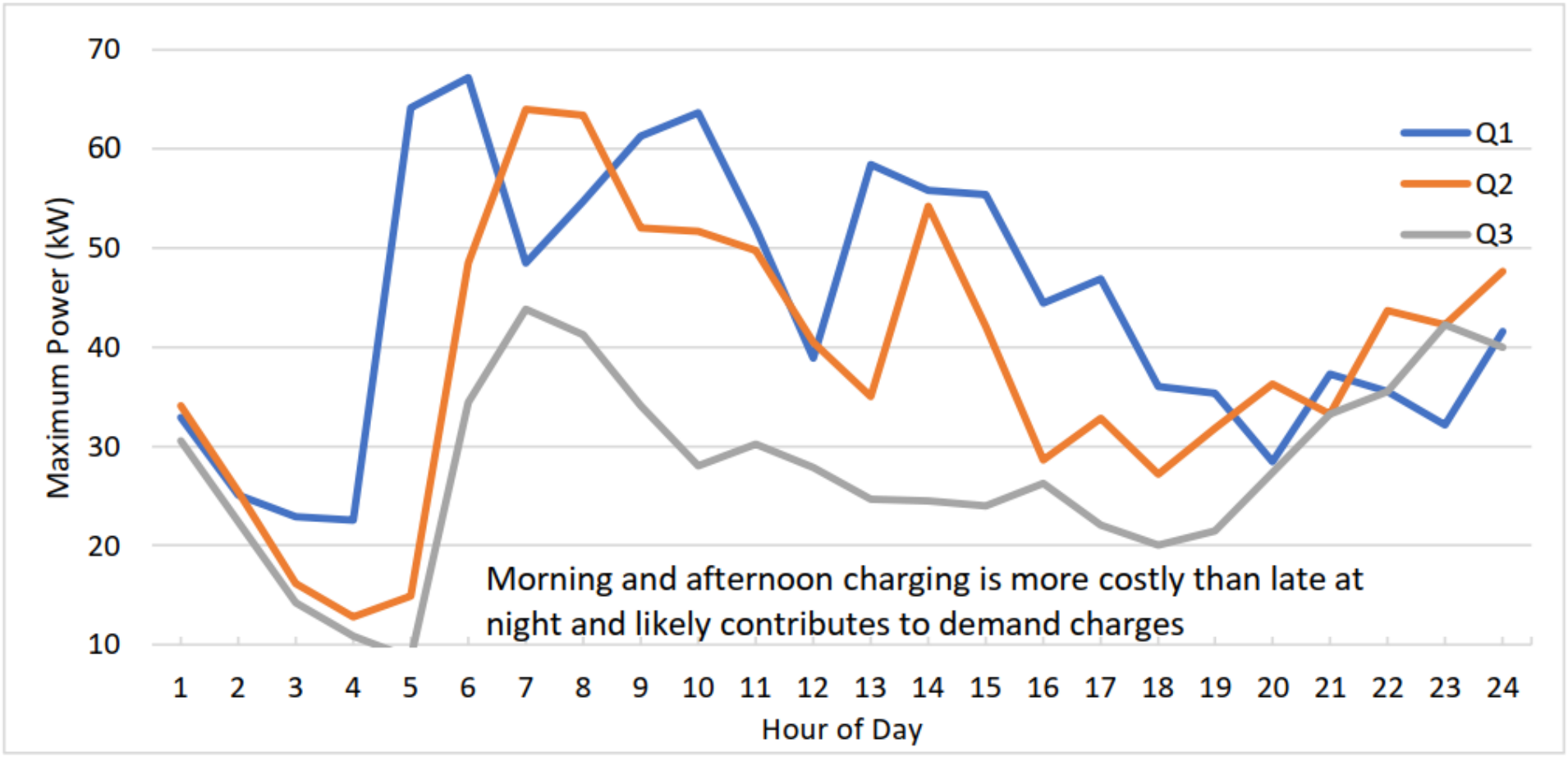
Airport GSE – Findings (1)

On average less than 5 hours per day charger use (opportunity to support additional eGSE)



Airport GSE – Findings (2)

Opportunity for shifting charging to lower cost periods (nighttime and daytime with onsite solar)



Airport GSE – Summary

Insights and Lessons Learned

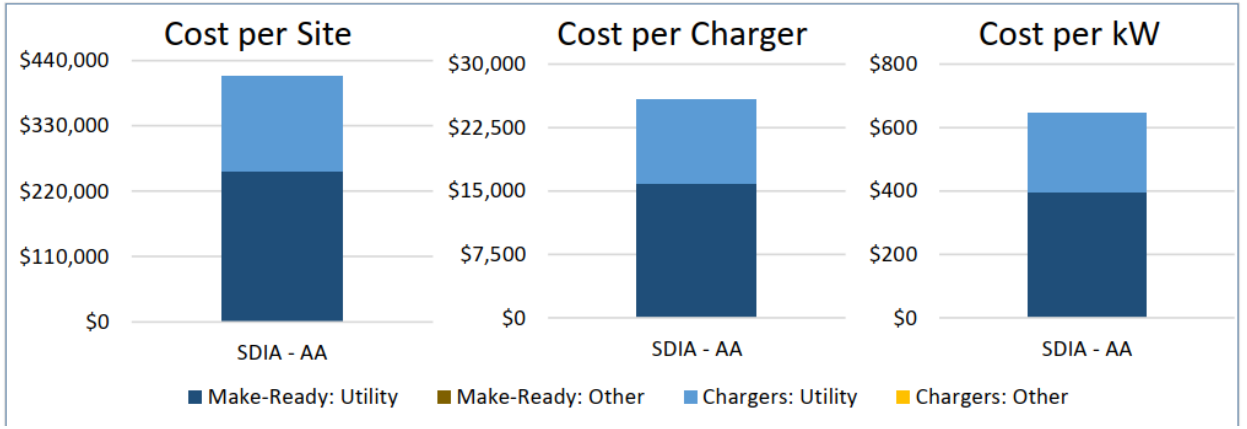
Timeline significantly extended; participation agreement between the utility and the SDIA took nearly a year to execute

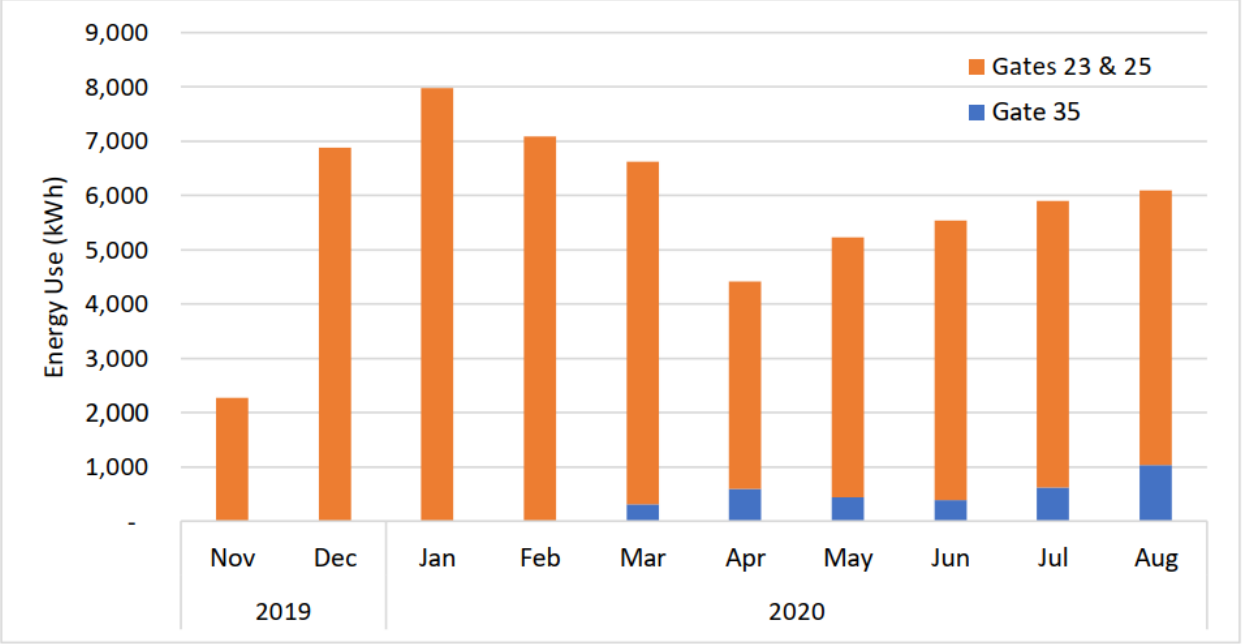
Utility challenges due to restrictions on access and control on the airside of the terminal (construction, maintenance & repair, data collection)

Redundancy in high use operation is important (old chargers were used during charger downtime)

Remote data access capability is important (single utility meter for airport; utility check meters installed and EVSP online portal developed)

Phase II not pursued due to airlines postponing new eGSE purchases (COVID-19 pandemic impact)



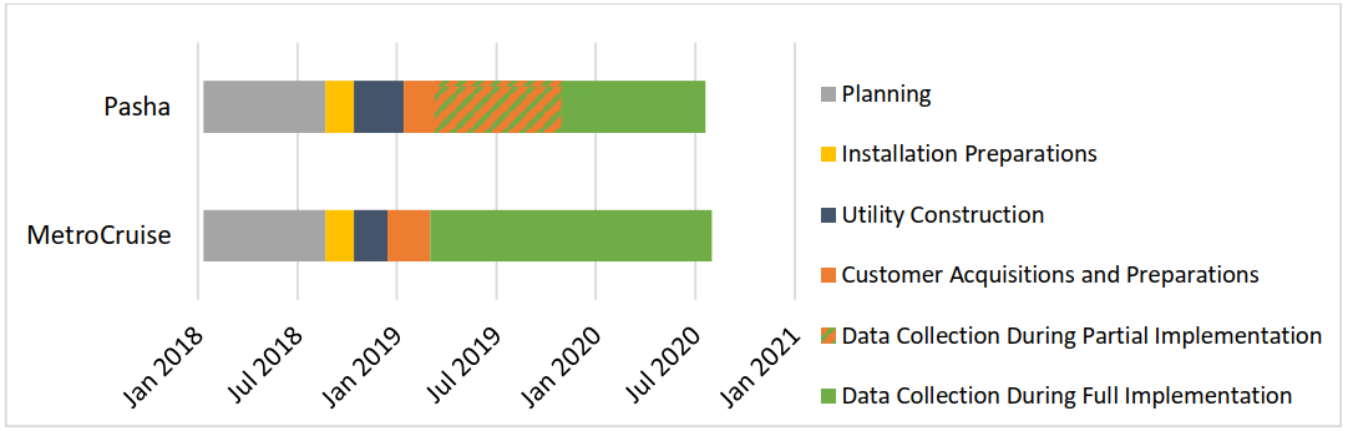


Port Electrification – Overview

Objectives

Install, operate, maintain, and own EV charging infrastructure, load research meters, and data loggers for 30–40 installations within the Port District tidelands

Obtain consumption, charging, and operational dataset to facilitate development of an optimized grid integration solution for electrification of MD/HD vehicle and forklift applications



Key Results

Budget: Approved **$2.4M**, Spent **$0.65M** (27%)

EV charging: 12 charging ports (12 DCFC EVSE)

EVs supported: 12 (9 forklifts, 3 Class 8 tractors)

Petroleum reduction: 4,000 GGE annually

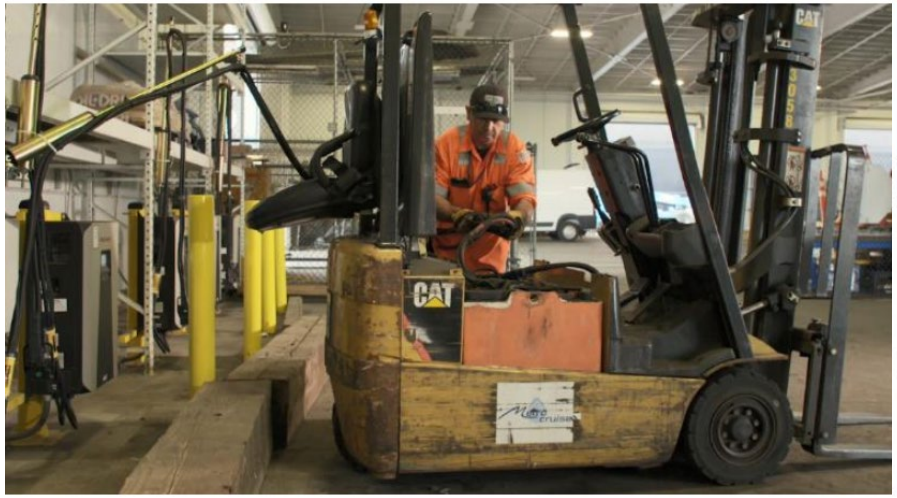
GHG reduction: 26.5 MT CO_2 annually

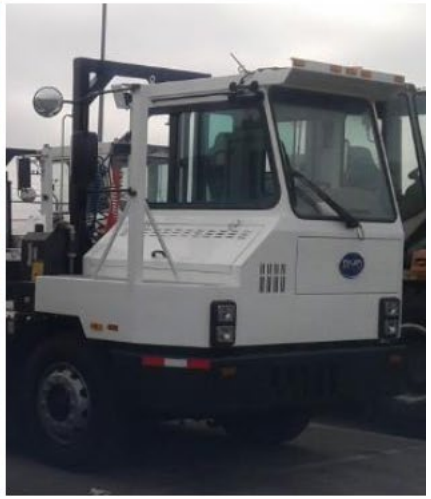
DAC: Pasha location is in a DAC

Grid Impacts: 54 MWh annually (54% on peak)

Port Electrification – Participants

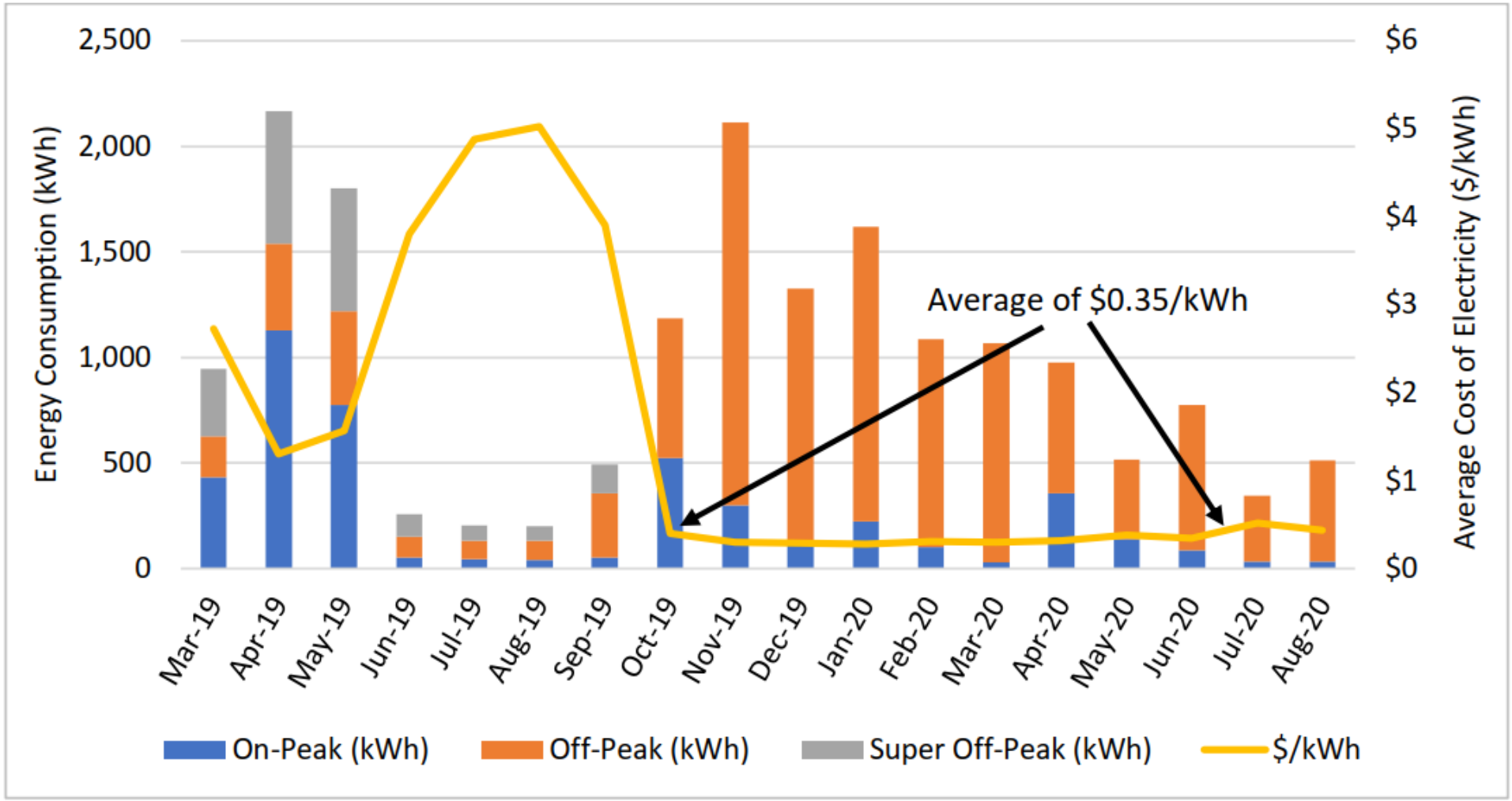
Fleet	Chargers	Baseline and EVs
Port of San Diego – Metro Cruise	Nine Webasto 10 kW PosiCharge ProCore SDG&E owned	• 9 existing electric forklifts • Propane (modeled baseline)
Pasha Automotive	3 BYD DCFC (40 kW, 80 kW, 120 kW) Pasha owned	• 1 BYD Class 8 Terminal Tractor (off-road) • 2 BYD Class 8 Trucks (on-road) • Diesel trucks and tractors (baseline)





Port Electrification – Findings (1)

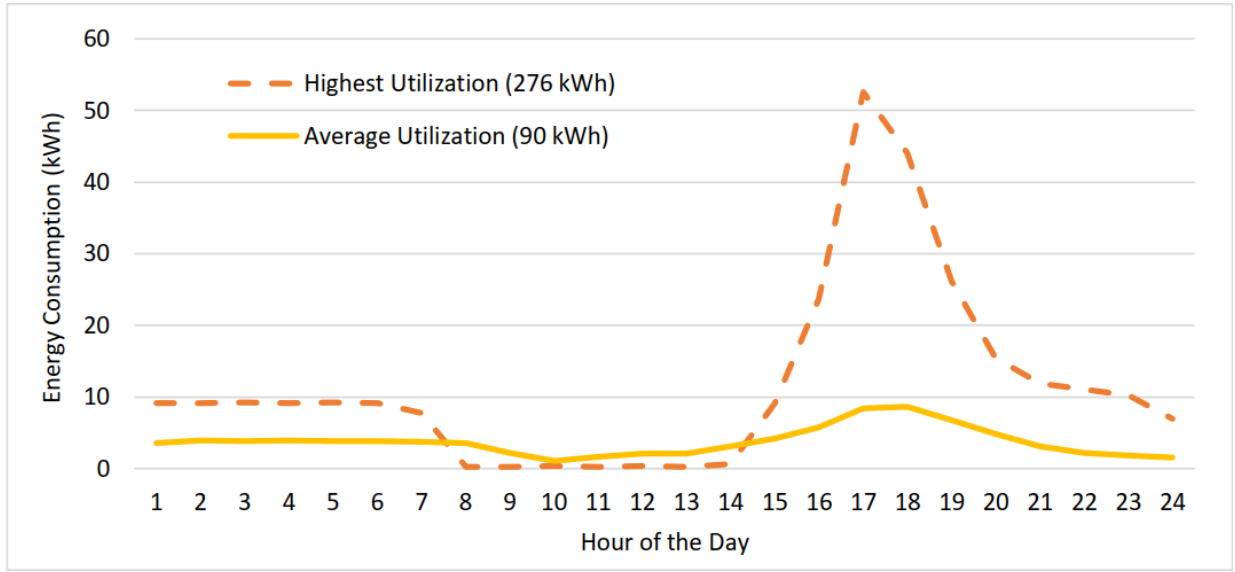
Utility rate with demand charges significantly increased the average energy costs (forklift data)



Port Electrification – Findings (2)

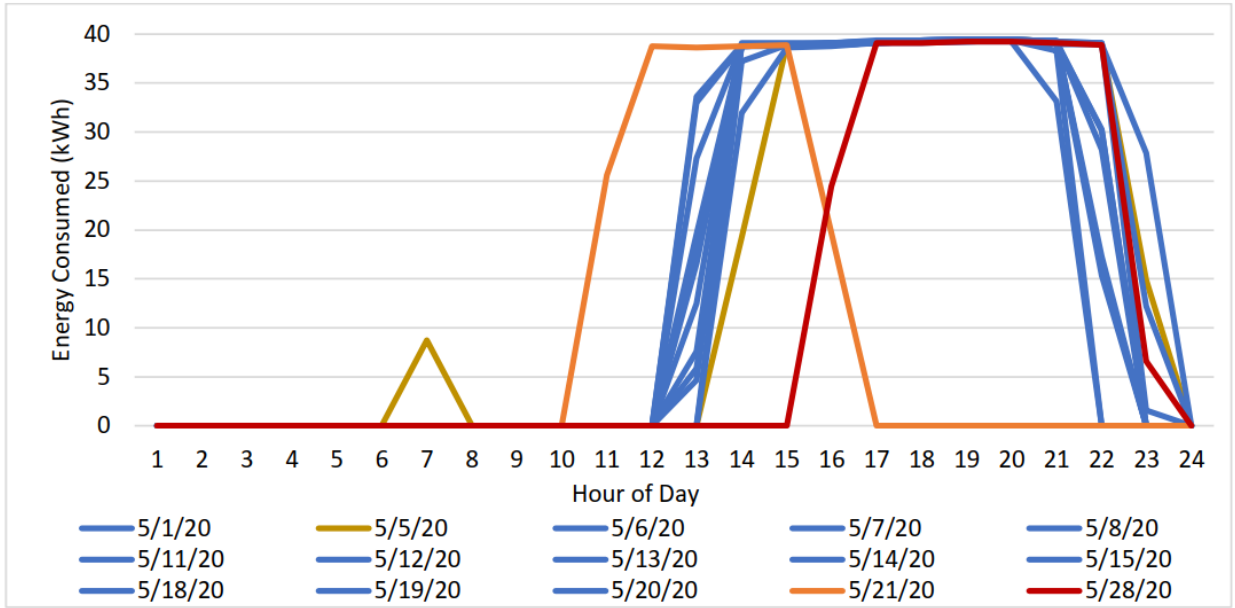
Forklifts

- Charging at the end of the shift
- Chargers have networking capability and energy management features but were not implemented yet



Drayage Truck

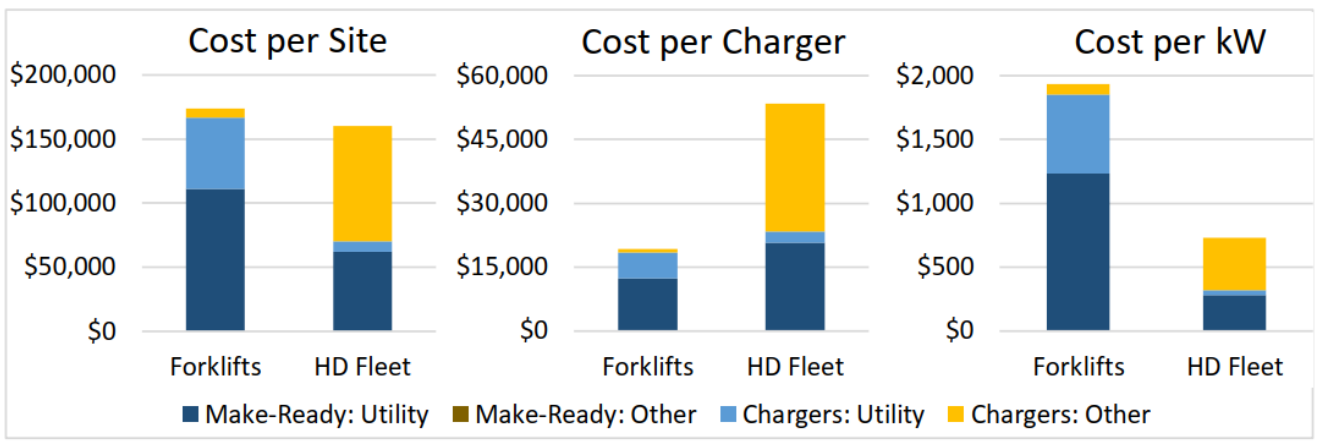
- Single month of consistent use (May 2020)
- Non networked charger
- Charging upon return to base
- Yard tractor (100 kW charger) and smaller battery drayage truck (80 kW charger) minimal usage



Port Electrification – Summary

Insights
Participants had a very positive experience with utility installing the charging infrastructure
Port operations and tenant locations regularly change which was a concern for several port tenants (they were uncomfortable committing to the program)
Larger battery capacity to provide a longer range between charges was critical for supporting truck operation and even longer range would be needed to electrify more of their regional fleet

Lessons Learned
Port construction can be challenging and costly (i.e., environmental costs)
Chargers were not equipped with any data collection (trucks) or remote download capabilities (forklifts)
The shorter-range drayage truck did not meet the minimum range needed (<80 miles daily)
The yard truck lacked functionality and ergonomics to operate onboard a roll-on roll-off cargo ship



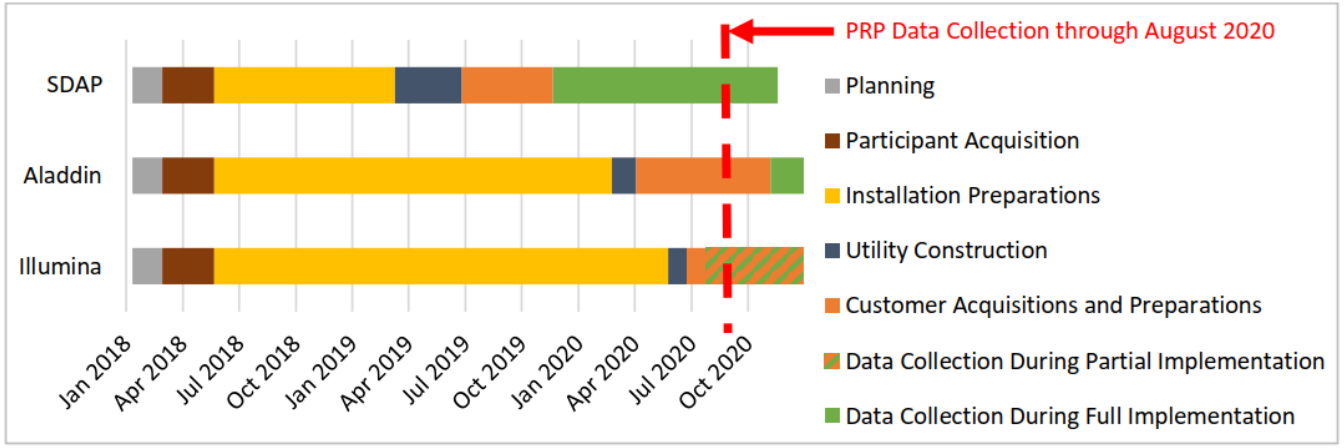
Green Shuttle – Overview

Objectives

Support fixed-route shuttle fleets by installing and owning DCFC and L2 EVSE at up to 5 sites and providing a grid-integrated rate

Can install solar and energy storage at one project location and investigate feasibility of additional EV drivers using the chargers

Utilization and location optimization & impact of the GIR



Key Results

Budget: Approved **$3.2M**, Spent **$1.4M** (46%)

EV charging: 12 charging ports (6 DCFC, 6 L2)

EVs supported: 2 + 10 delayed due to COVID-19 pandemic

Petroleum reduction: 2,889 GGE annually

GHG reduction: 0.9 MT CO_2 annually

DAC: 0% (adjacent to DAC only)

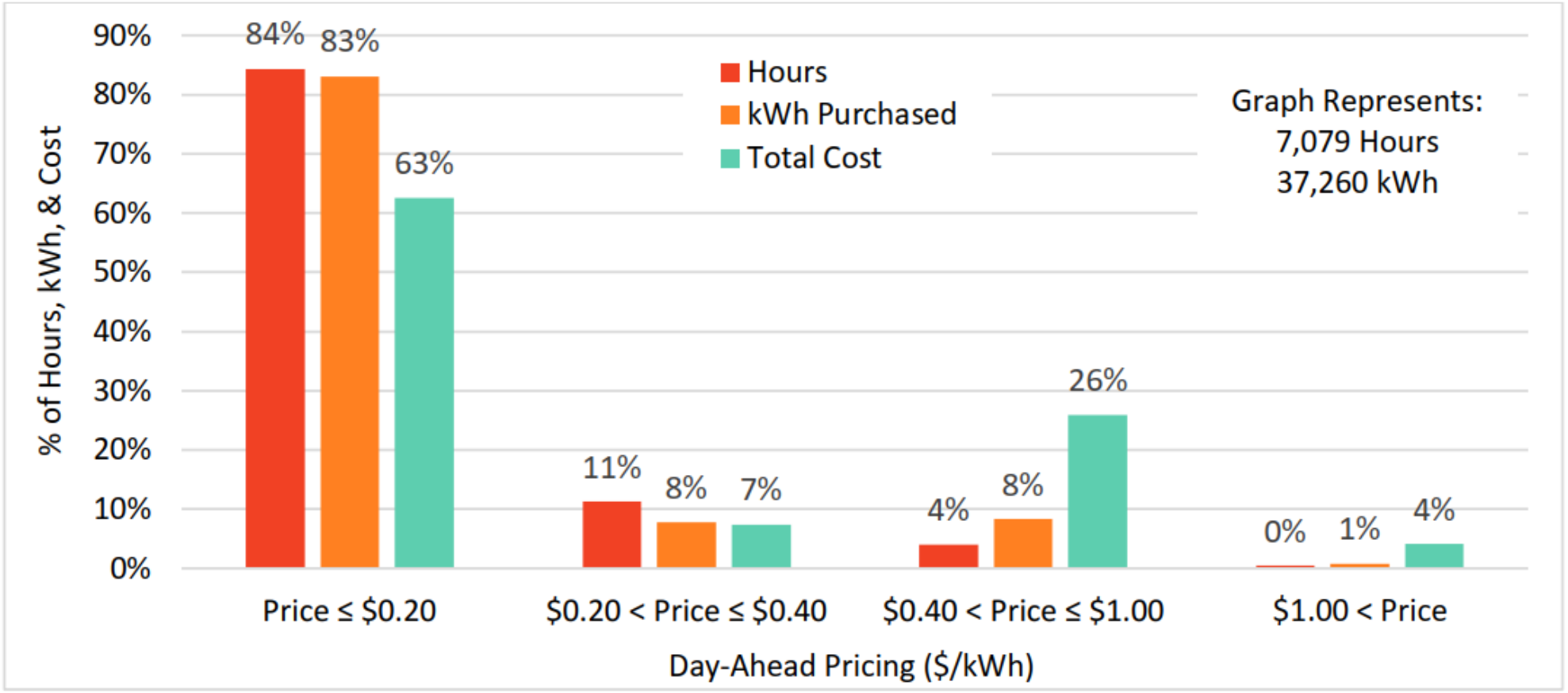
Grid Impacts: 37 MWh annually (2% on peak)

Green Shuttle – Participants

Fleet	Chargers	Baseline and EVs
San Diego Airport Parking Co.	2 ChargePoint CPE 250 62.5 kW EVSE SDG&E owned 125 kW pairing kit installed	• 2 25-foot GreenPower EV Star shuttles • Diesel Mercedes Sprinter, Ford Transit (baseline)
Aladdin (off-airport shuttle)	2 ChargePoint CPE 250 62.5 kW EVSE SDG&E owned	• 4 Briton (Lightning Motors Ford E450 EV conversion) • Propane Ford E450 Cutaway (baseline)
Illumina (workplace shuttle)	6 Greenlots (EVSP) BTC 17 kW L2 (EVSE) SDG&E owned	• 6 Briton (Lightning Motors Ford E450 EV conversion) • Propane Ford E450 Cutaway (baseline)

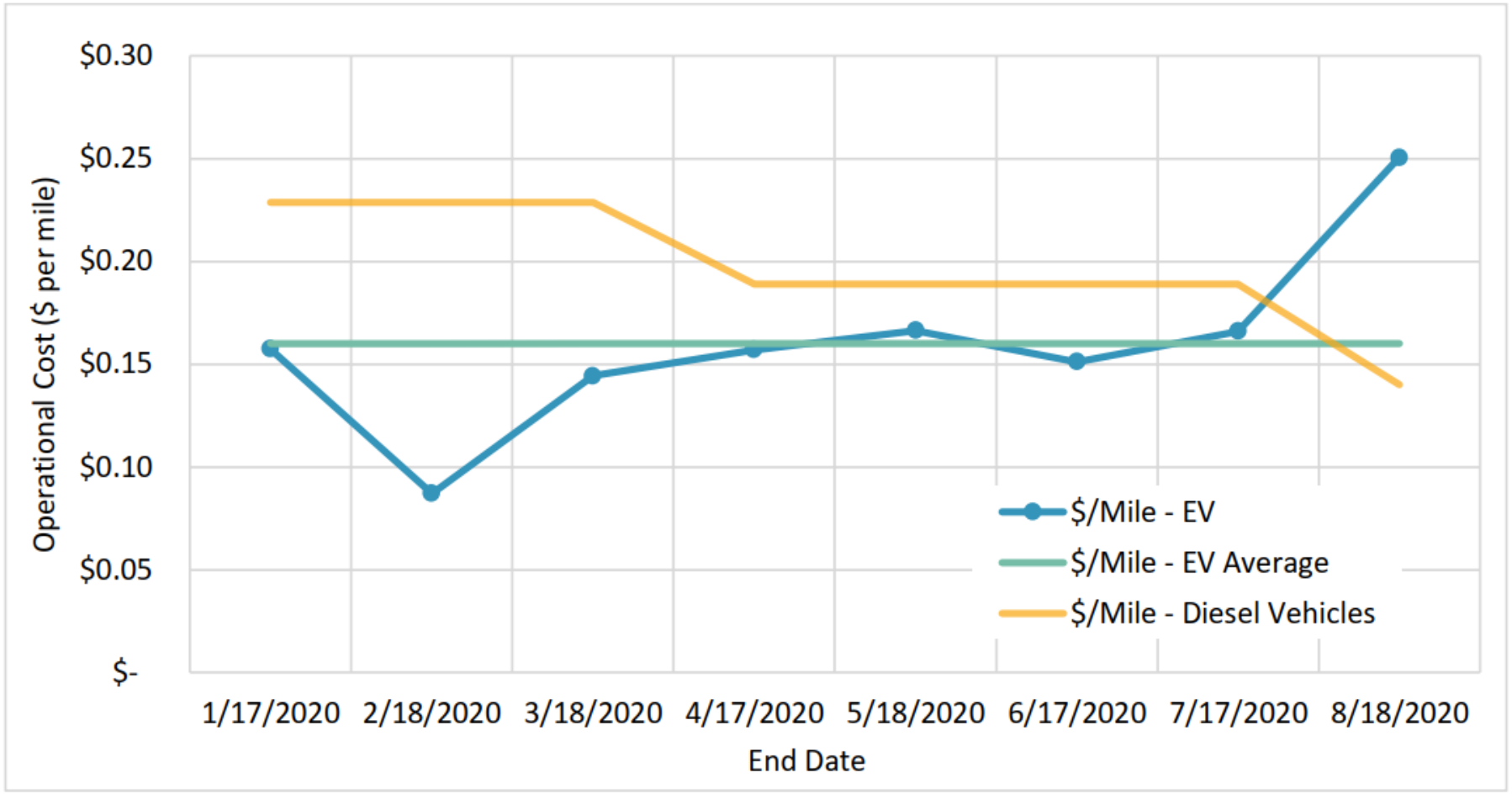
Green Shuttle – Findings (1)

83% of charging below $0.20/kWh but 30% of costs above $0.40/kWh



Green Shuttle – Findings (2)

EV operational costs below diesel but not avoiding high summer pricing can erase the benefit



Green Shuttle – Summary

Insights and Lessons Learned

Airport parking fleet operators required 2 DCFCs to support operation of 2 to 4 electric shuttles with daytime opportunity charging. The workplace charging site only needed L2 chargers, one for each electric shuttle, for overnight charging.

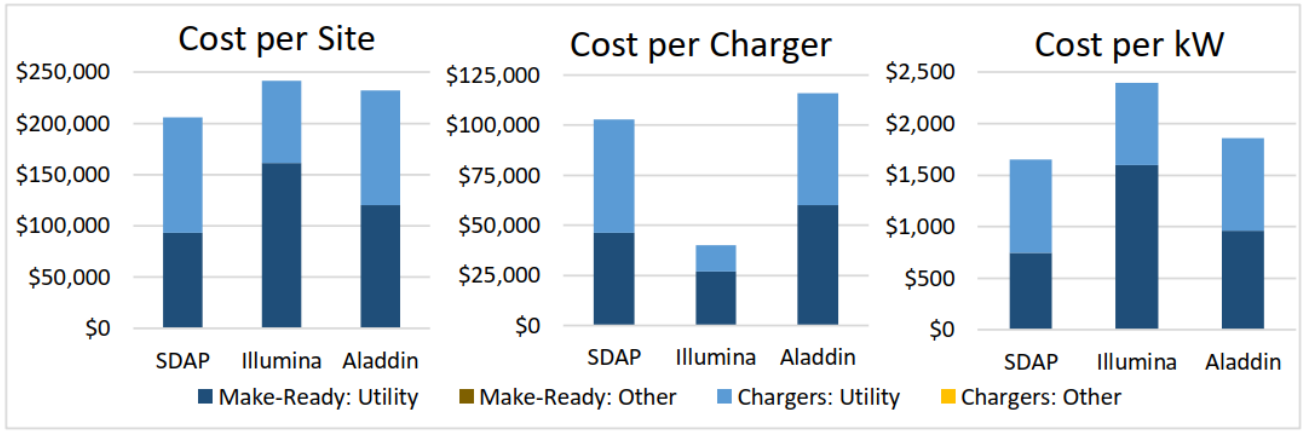
Most shuttle bus companies have private facilities that are not equipped to allow other EVs to charge

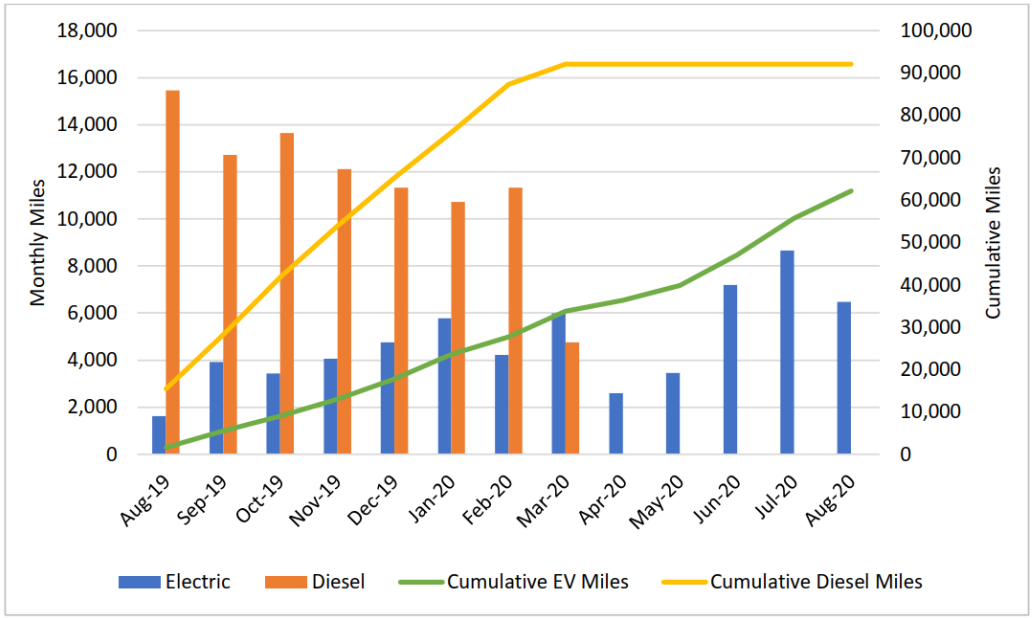
Electric shuttle bus options (Classes 2–4) are very limited, and there can be long lead times

GIR rate resulted in the lowest electricity cost ($0.20/kWh) among the five SDG&E PRPs

A load management plan was developed by SDAP, but only a rudimentary option was able to be used

All three fleets have converted or are in process of converting to 100 percent electric influenced by PRP



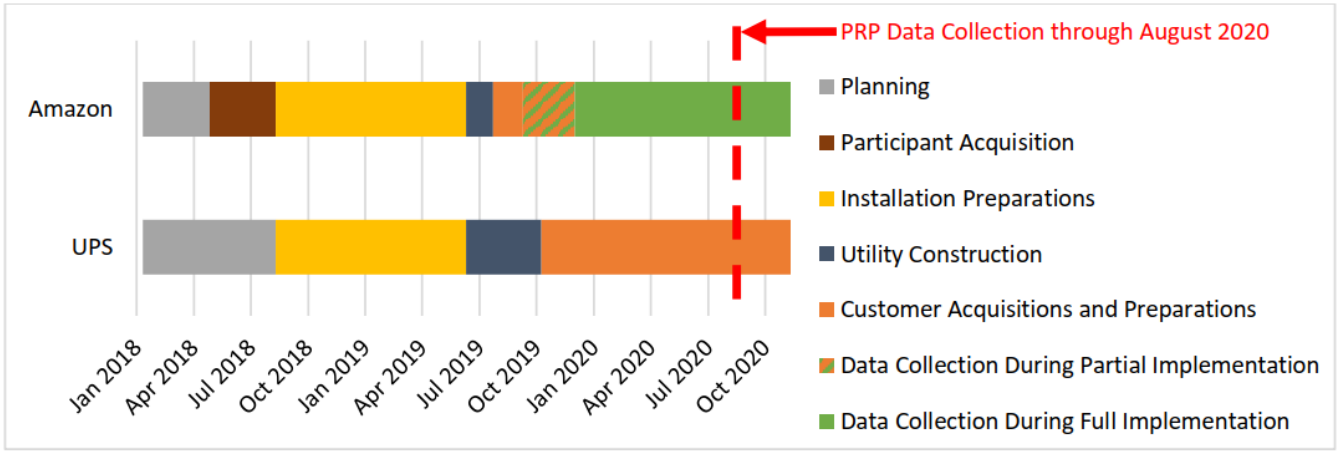


Fleet Delivery – Overview

Objectives

Provide utility owned charging infrastructure to support up to 90 medium-duty electric delivery vehicles at about six locations

Customers to use existing applicable time-varying rates that may include demand charges and encourage off-peak charging



Key Results

Budget: Approved **$3.7M**, Spent **$1.3M** (37%)

EV charging: 79 L2 charging ports

EVs supported: 15 (60 pending delivery)

Petroleum reduction: 16,670 GGE annually

GHG reduction: 124 MT CO_2 annually

DAC: 35% (Amazon location is in a DAC, San Marcos and San Diego are in SDG&E territory DAC)

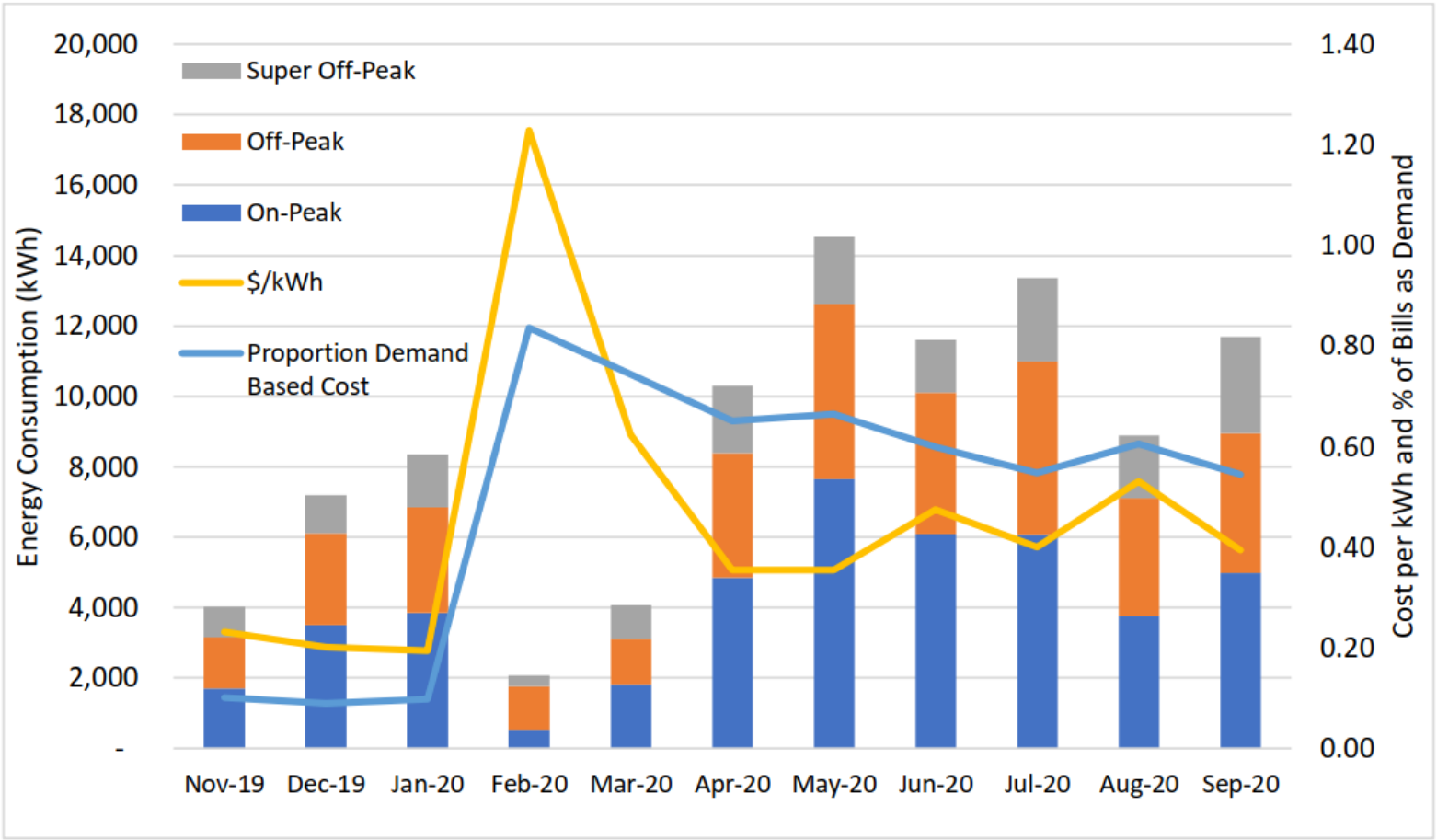
Grid Impacts: 182 MWh annually (53% on peak)

Fleet Delivery – Participants

Fleet	Chargers	Baseline and EVs
UPS	63 Greenlots (EVSP) BTC Power 17 kW L2 (EVSE) SDG&E owned 3 locations: San Diego (33), San Marcos (16), Chula Vista(16)	• Workhorse electric cutaway chassis • Diesel Workhorse Chassis
Amazon to support Delivery Service Providers (small businesses)	16 Greenlots (EVSP) BTC Power 17 kW L2 (EVSE) SDG&E owned National City location (in a DAC)	• Lightning Motors Ford Transit EV conversion • Gasoline and diesel Ford Transit and Mercedes Sprinter vans (baseline)

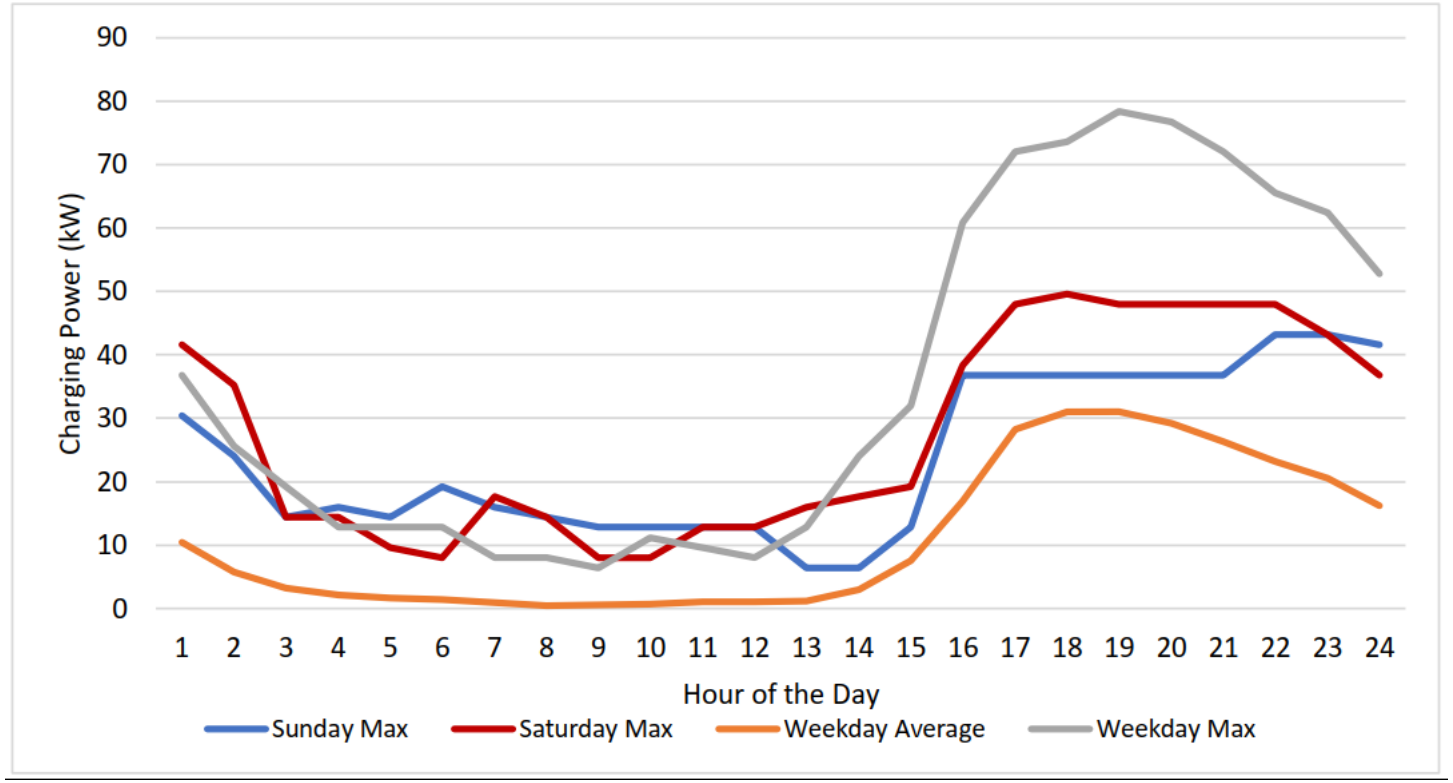
Fleet Delivery – Findings (1)

Utility rate with demand charges & significant on-peak time charging increased the average energy costs



Fleet Delivery – Findings (2)

Charging load curves during highest usage month show significant charging duration



Fleet Delivery – Summary

Insights & Lessons Learned

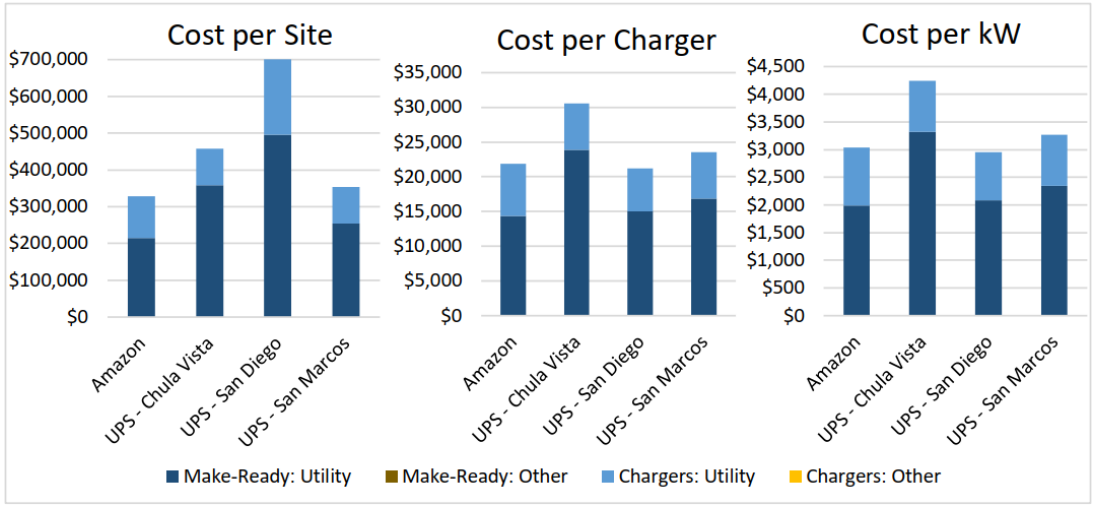
New product challenges
- EVs (60 for UPS) delayed more than 18 months
- EVSP over the air update issue
- EV on board charger limitation (6.6 kW)

EV adoption and participation for locally owned MBE/WBE delivery business fleets is challenging

A fleet dashboard to confirm vehicles begin and finish charging as planned would ensure vehicles readiness

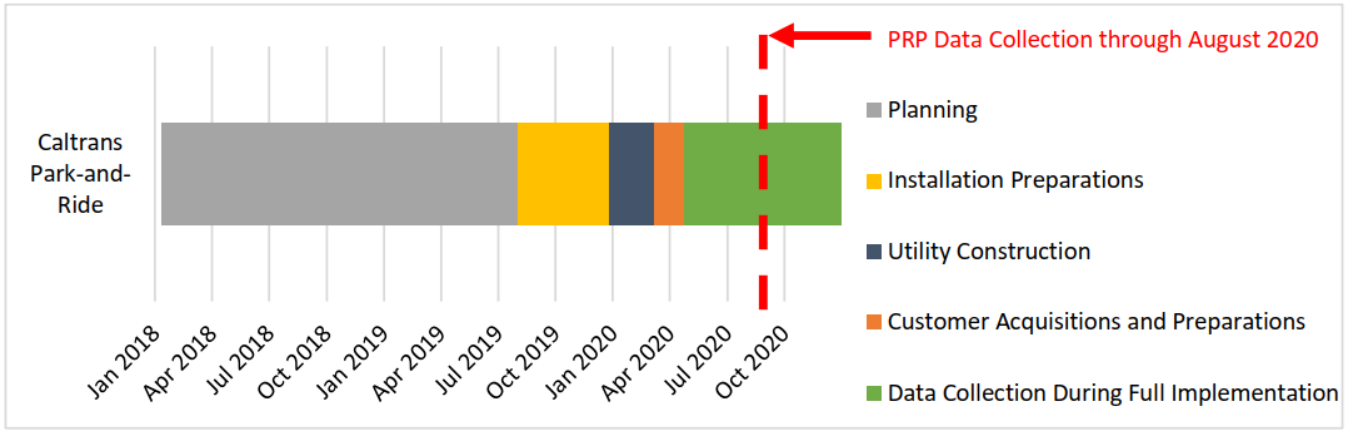
Given the likely electrical infrastructure upgrade requirements for significant fleet electrification, utilities are necessary partners for infrastructure support, as well as charging management plans

Customers involved in energy management practices may prefer to add chargers to existing utility meters instead of a new service



Electrify Local Highways – Overview

Objectives
Install, own, maintain, and operate 80 L2 and 8 DCFCs at four Caltrans-owned park-and-ride locations
Study charging patterns and share the usage data for modeling charging infrastructure at these sites
Test TOU pricing in the public domain, as well standards for public charging signage, rate display, and general retail EV fuel dispensers



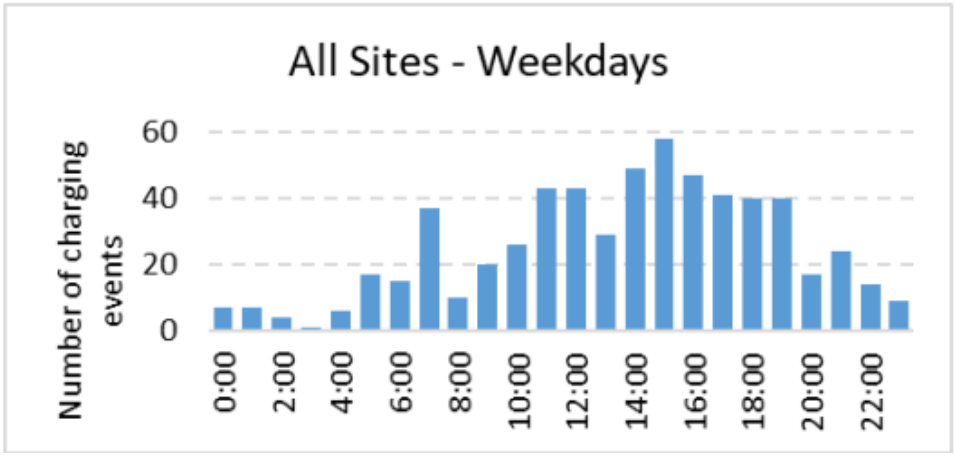
Key Results
Budget: Approved **$4.0M**, Spent **$2.5M** (62%)
EV charging: 80 L2 and 8 DCFC charging ports
EVs supported: public charging
Petroleum reduction: 6,800 GGE annually
GHG reduction: 65 MT CO_2 annually
DAC: 50% within DAC, additional 25% adjacent
Grid Impacts: 57 MWh annually (25% on peak)

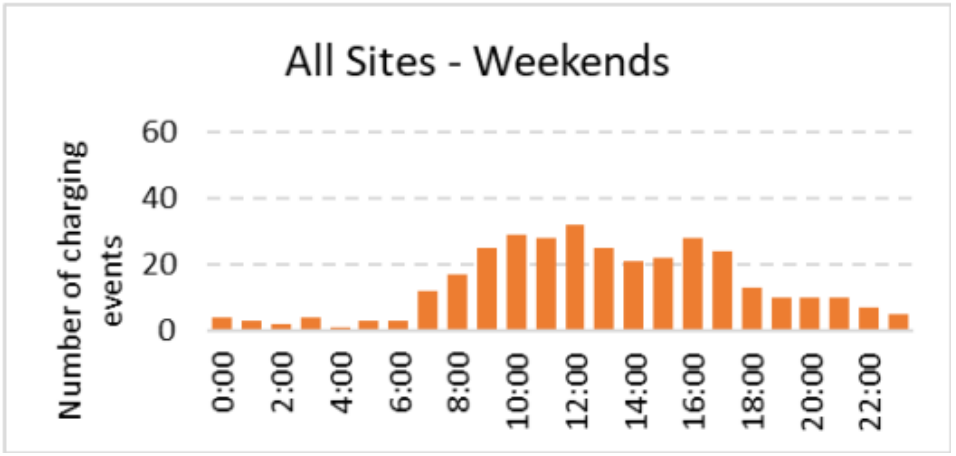
Electrify Local Highways – Participants

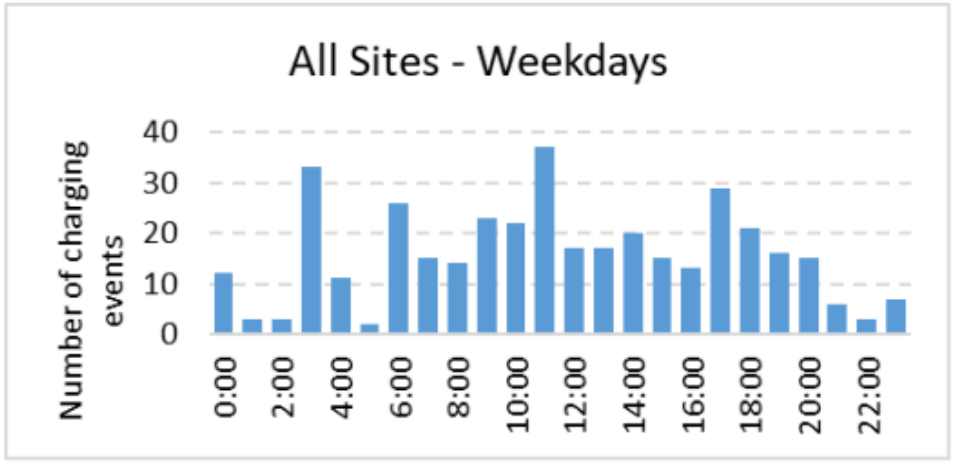
Site Host	Chargers	Utility Rate
CalTrans (Park-and-Ride Lots)	20 ChargePoint 6.6 kW L2 and 2 62.5 kW CPE 250 DCFCs at each location (SDG&E owned) 4 locations: Oceanside, National City, Chula Vista, and El Cajon	Residential EV TOU ($0.20-$0.59/kWh)

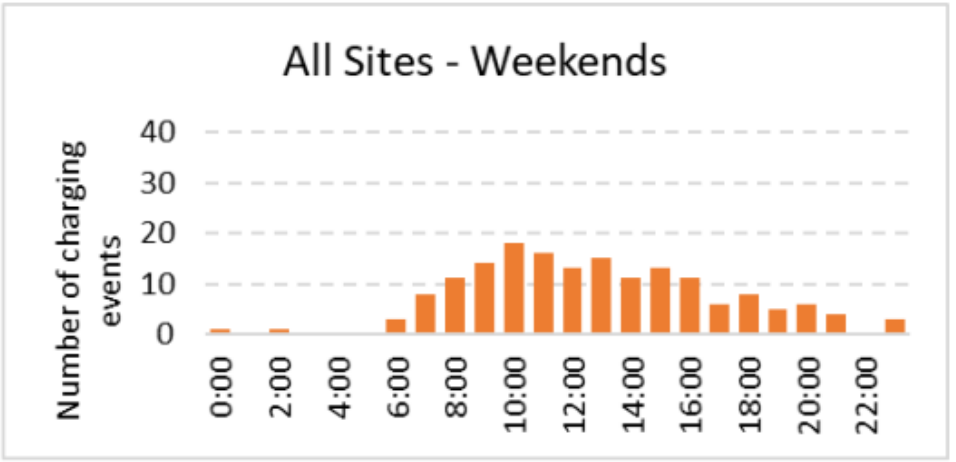
Electrify Local Highways – Findings (1)

Site usage: DCFC (top) & Level 2 (bottom)



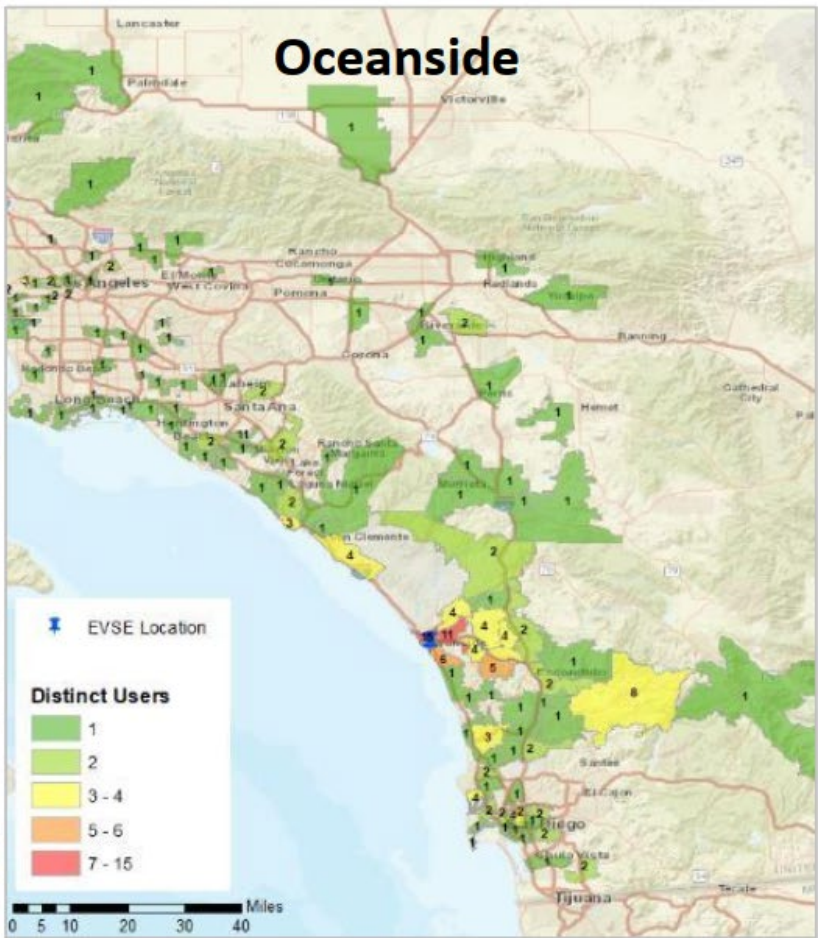






Electrify Local Highways – Findings (2)

ELH sites support local commuters and regional travel



Electrify Local Highways – Summary

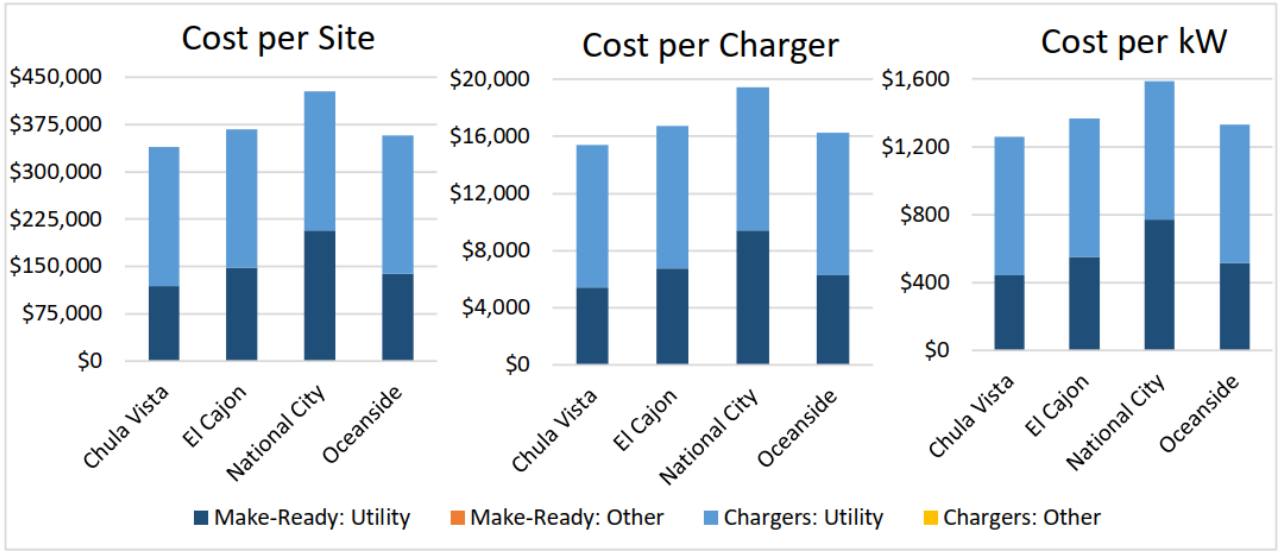
Insights & Lessons Learned

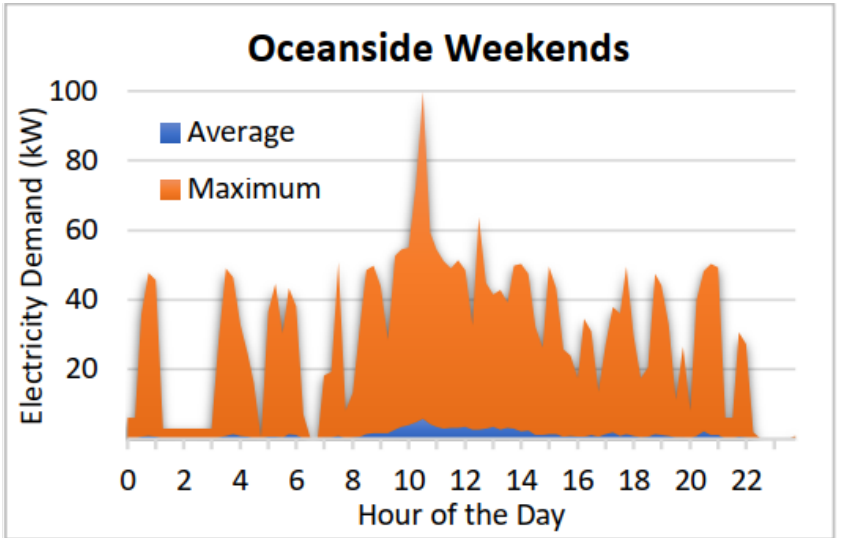
L2 EVSE utilization was extremely low (less than 1%), but this is a larger than usual installation with 20 L2 EVSE at one site and COVID-19 pandemic significantly disrupted commuting patterns which these chargers were designed to support. DCFC use was also low (about 2%), but has significantly increased (up to 6%)

Based on the user survey:

- While access to public charging stations impacts a customer's decision to purchase or lease an EV, other factors are more significant
- 8% would not drive an EV if public charging was not readily available; for 31% it was a motivating factor
- Station users are highly satisfied with their public charging station experience (92% satisfaction)

Greater access to chargers would allow the next vehicle to charge at a staging space sooner

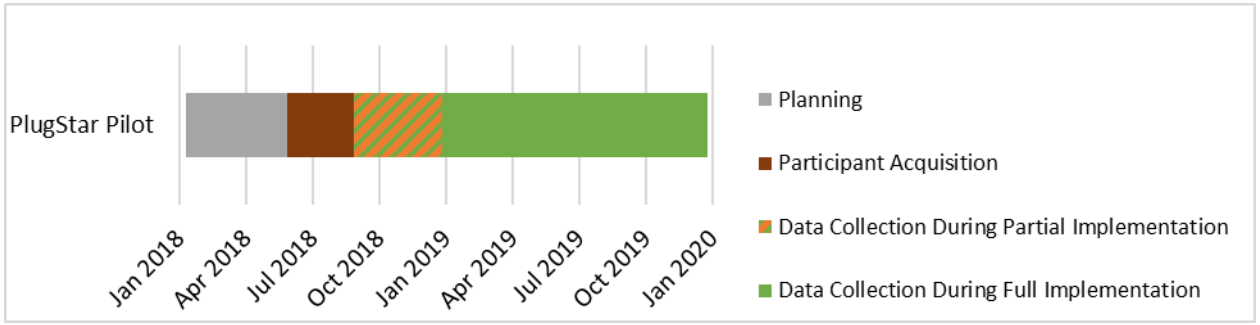




Dealership Incentives – Overview

Objectives
Emphasize plug-in vehicle sales in DACs
Educate dealerships and their salespeople on the benefits of driving electric and utility resources
Encourage new EV owners to sign up for SDG&E's residential EV time-of-use (EV-TOU) rates

Key Results
Budget: Approved **$1.8M**, Spent **$0.76M** (42%)
Incentive Claims: 357 (232 with trained salespeople, 125 with untrained salespeople)
Participating Dealerships: 15
Trained Staff: 92



Dealership Incentives – Participants

SDG&E selected Plug-In America (PIA), to run their turnkey program PlugStar

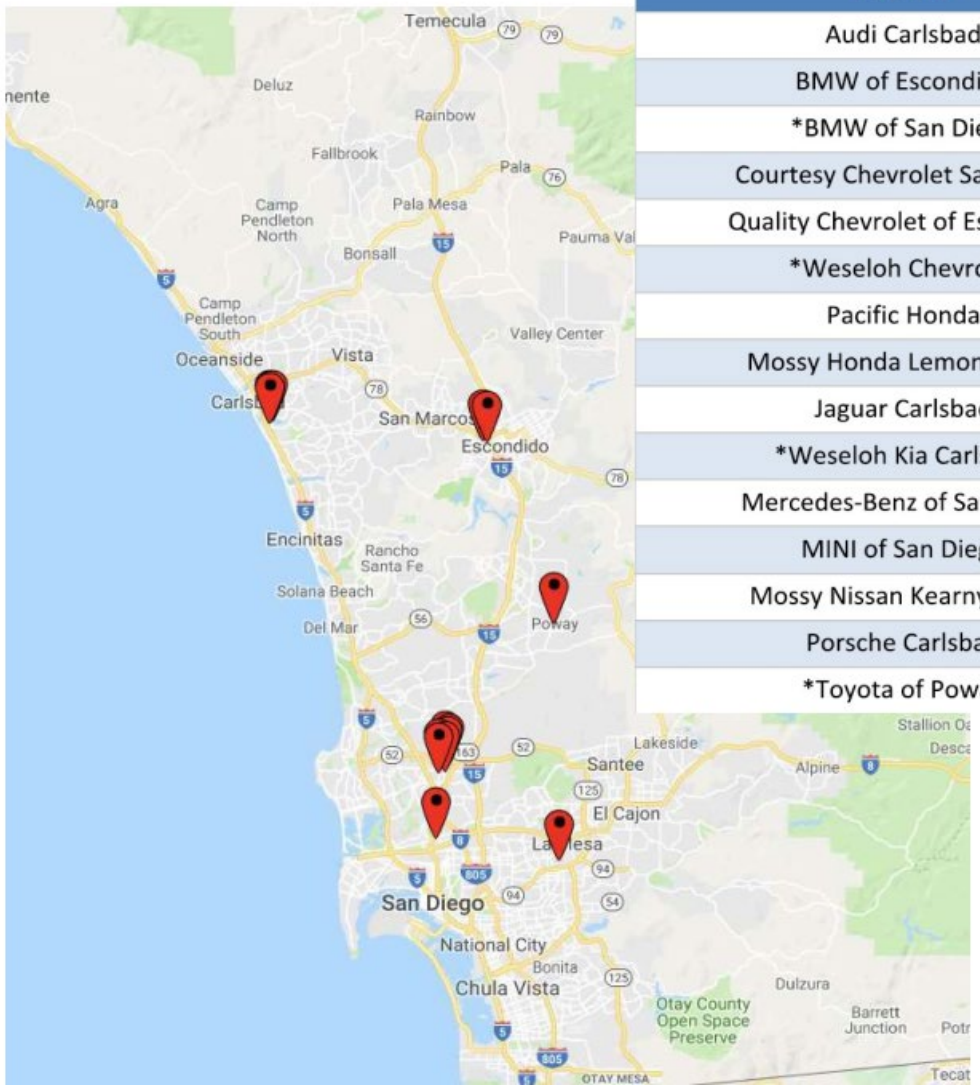
Improved the plug-in vehicle buying experience by informing shoppers through a **shopping assistant website**

Provided **training for dealership staff** (including information about charging, rates, and incentives) as well as a **plug-in vehicle sales tool**

Provided a bonus of **$500 per plug-in vehicle sold** (split between the dealership and the trained salesperson). Sales by untrained staff at certified dealerships resulted in half the incentive.

Dealerships participated in SDG&E's **promotional events** to drive plug-in vehicle sales.

In 2019, the PlugStar program was offered in several other market areas (Los Angeles, St. Louis, New Jersey, Sacramento, and Boston). Sacramento was the only other one to offer dealership incentives; the evaluation compared the results of these two programs.



DEALER
Audi Carlsbad
BMW of Escondido
*BMW of San Diego
Courtesy Chevrolet San Diego
Quality Chevrolet of Escondido
*Weseloh Chevrolet
Pacific Honda
Mossy Honda Lemon Grove
Jaguar Carlsbad
*Weseloh Kia Carlsbad
Mercedes-Benz of San Diego
MINI of San Diego
Mossy Nissan Kearny Mesa
Porsche Carlsbad
*Toyota of Poway

* Dealerships that participated in the initial pilot phase.

Dealership Incentives – Summary

Insights and Lessons Learned

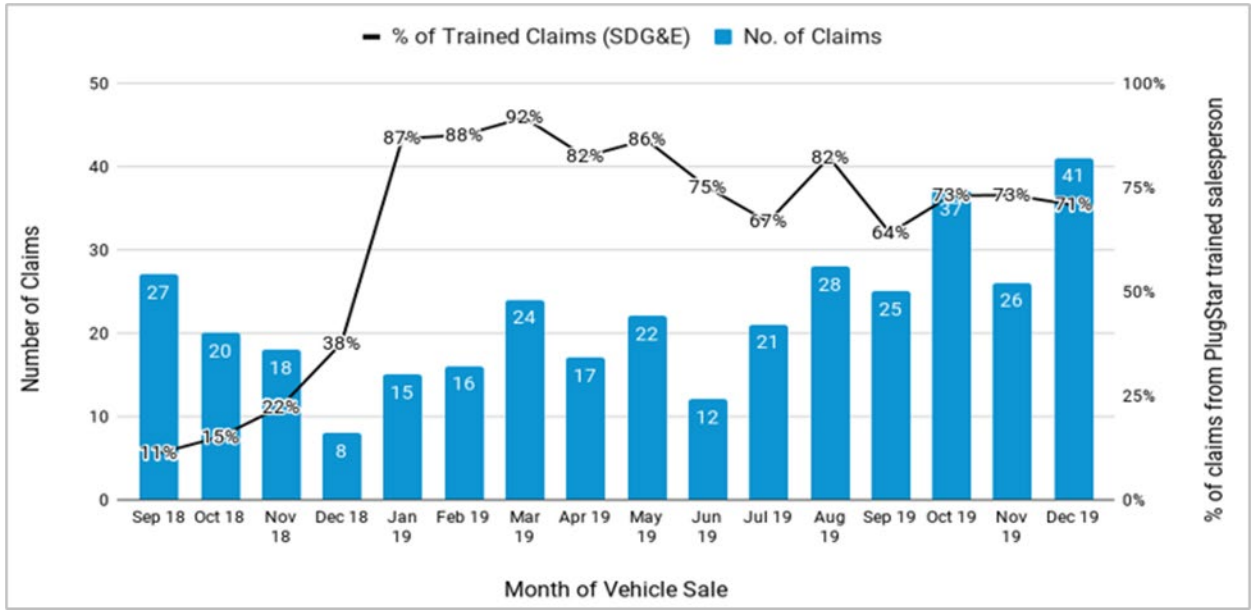
Dealers can be trained and motivated via monetary reward

Positive feedback from dealership staff and customers' high rating of participating dealerships, showed the education goals of the PRP were achieved

A better strategy or tools on how the dealership and utility could collaborate to encourage switching to the EV-TOU rate was needed

Market lift analysis of the impact from the PlugStar program on new plug-in vehicle sales in San Diego County was inconclusive

As a follow-on, the SDG&E Dealership Partner Network will support participating dealers with the tools and resources they need to increase EV sales and provide a positive customer experience



Decision **18-01-024 required the plug-in vehicle buyer or lessee to enroll in an EV-TOU rate before the dealership incentives could be paid**. This resulted in delays to process the incentives and limited the claims actually paid. Some customers were ineligible for EV-specific rates. A Tier 2 advice letter filed in February 2019 and approved on August 1, 2019, waived the EV-TOU enrollment requirement but modified the customer release form to allow for following up with purchasers or lessees for evaluation and education. While this was retroactive to March 14, 2019, more than two-thirds of the program period had elapsed before this was known.

San Diego Gas & Electric PRP Portfolio

MHD (Off-road Infrastructure)
Airport Ground Support Equipment (SDG&E) – **$2.8M**
Port Electrification (SDG&E) – **$2.4M**
MHD Infrastructure
Green Shuttle (SDG&E) – **$3.2M**
Fleet Delivery Services (SDG&E) – **$3.7M**
Public Access Stations
Electrify Local Highways (SDG&E) – **$4M**
Electrification Promotions
Dealership Incentive (SDG&E) – **$1.8M**

Questions specific to these PRPs?

Southern California Edison PRP Portfolio

Electrification Promotions
Charge Ready Home Installation (SCE) – **$4M**
Public Access Stations
Urban Charge Ready DCFC (SCE) – **$4M**
MHD (Off-road Infrastructure)
Port of Long Beach Rubber Tire Gantry Crane (SCE) – **$3M**
Port of Long Beach Terminal Yard Tractor (SCE) – $0.45M
MHD Infrastructure
Charge Ready Transit Bus (SCE) – **$4M**

Charge Ready Home Rebate – Overview

Objectives

Lower the cost of installing L2 home charging stations

Learn about L2 home charging needs, costs associated with home EV infrastructure upgrades, customer behavior after installing L2 home charging, and customer satisfaction with residential TOU rates

Program Timeline: May 30, 2018 – May 29, 2019

$500 for customers who enrolled in SCE's whole-home time-of-use (TOU) program

$1,500 for customers who installed a meter specifically for the EV charging station to participate in SCE's TOU-EV-1 rate (discontinued after February 2019)

Key Results

Budget: Approved **$4.0M**, Spent **$2.1M** (52%)

Applications

4,128 applications received

2,670 checks sent

Electric Vehicle Make

Within all applications received, EVs were…

- 71% Tesla
- 9% Chevrolet
- 6% Honda
- 4% BMW
- 11% Other

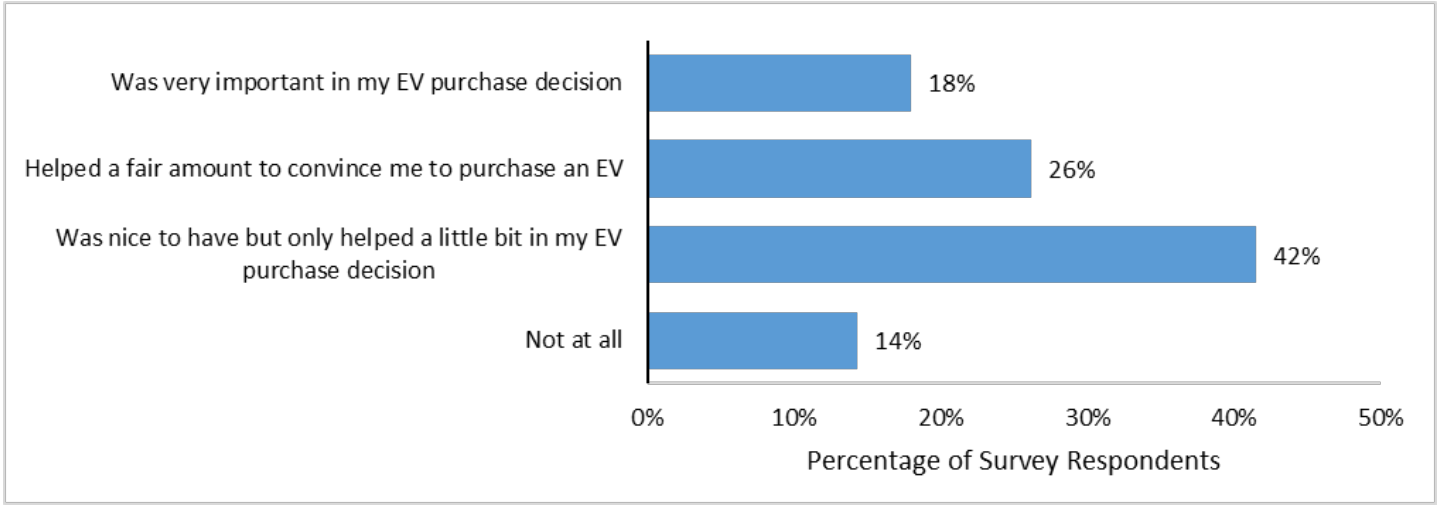
Disadvantaged Community Breakdown

of all applicants lived in DACs

Residence Type

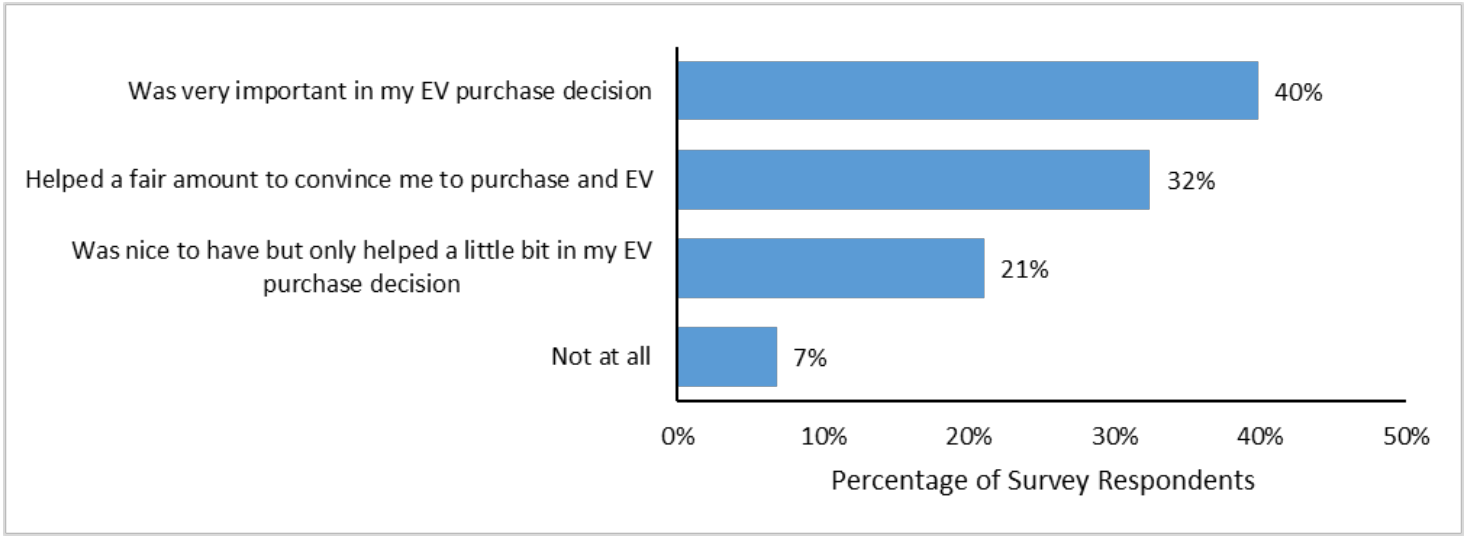
of all applicants lived in single family homes

Charge Ready Home Rebate – Findings (1)

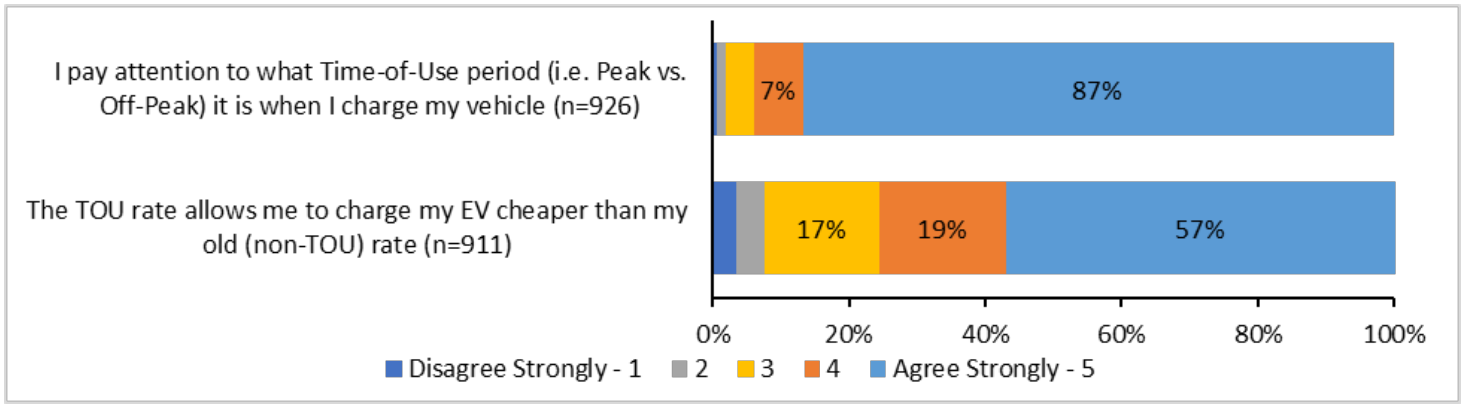


44% (474 out of 1,072) of respondents indicated the rebate **was important to** their decision to purchase an EV

93% of survey respondents (998 out of 1,071) indicated that the program had at least **some influence** over their decision to install an L2 home charging station

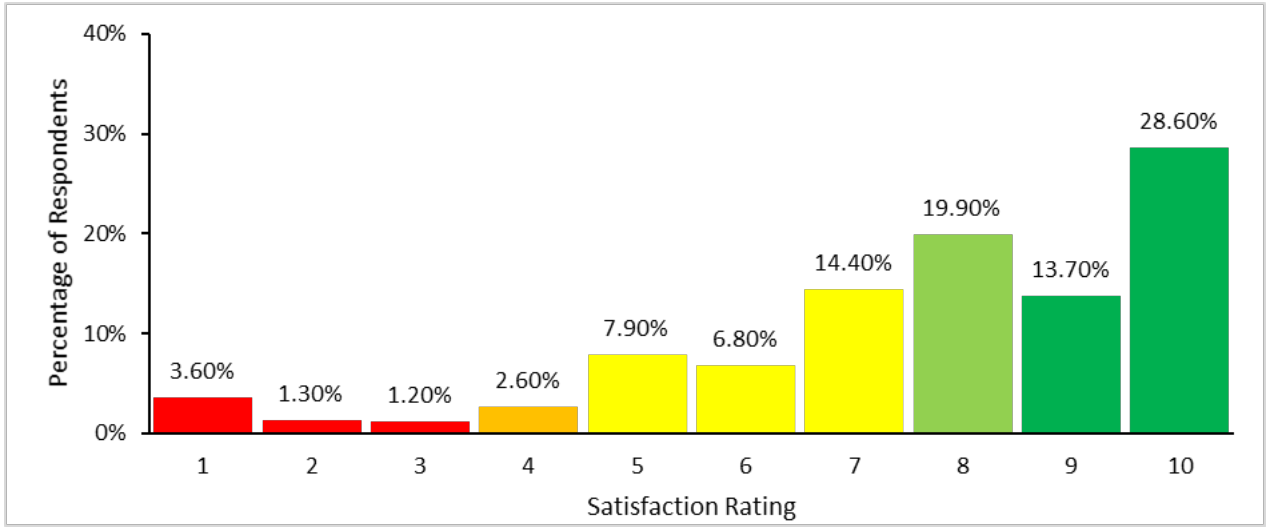


Charge Ready Home Rebate – Findings (2)



Most survey respondents (57%, 520 out of 911) strongly believed that enrolling in the TOU rate allowed them to **charge their EVs for less** than under their old non-TOU rate. Additionally, survey respondents reported that they **pay attention to the TOU period** (on-peak versus off-peak) when they charge their EVs

Survey respondents reported being satisfied with their TOU rates



Charge Ready Home Rebate – Summary

Insights and Lessons Learned

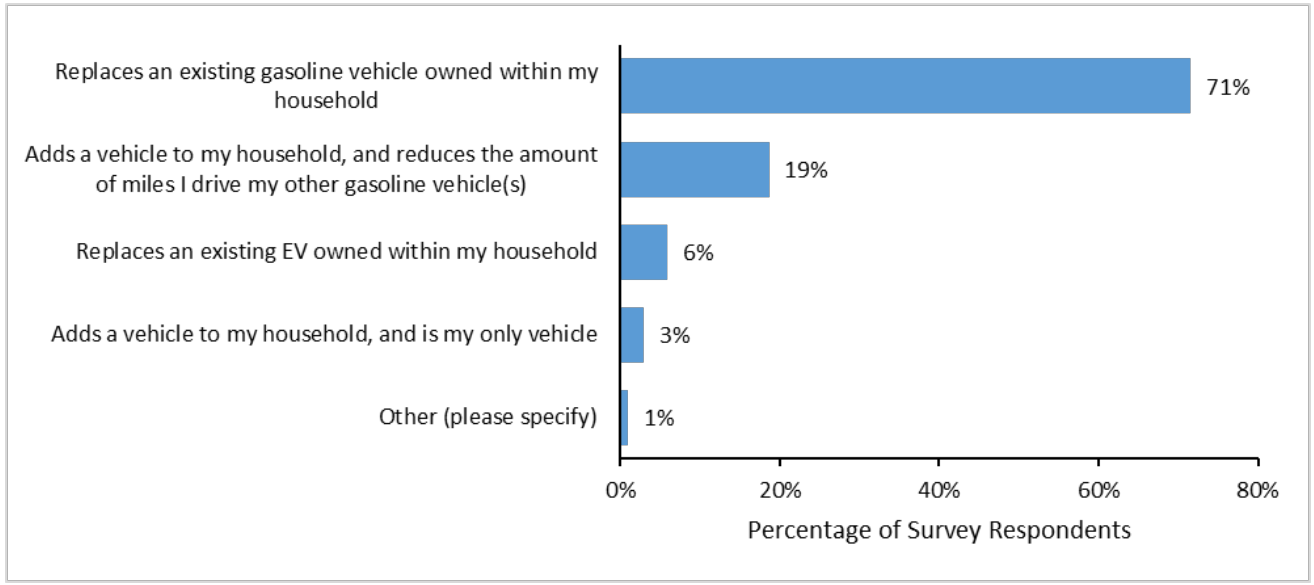
The program successfully reduced barriers to EV adoption by providing a financial rebate for home charging infrastructure, which resulted in **positive impacts for participants**

The program **requirements may have limited participation** (proof of a waiver for HOA permission or city permitting, separate receipt for the charging station, C-10 license numbers on electrician invoices, six-month time restraint on purchase/lease date of a new EV)

More early engagement for electricians or MUD managers might have resulted in more champions for the program

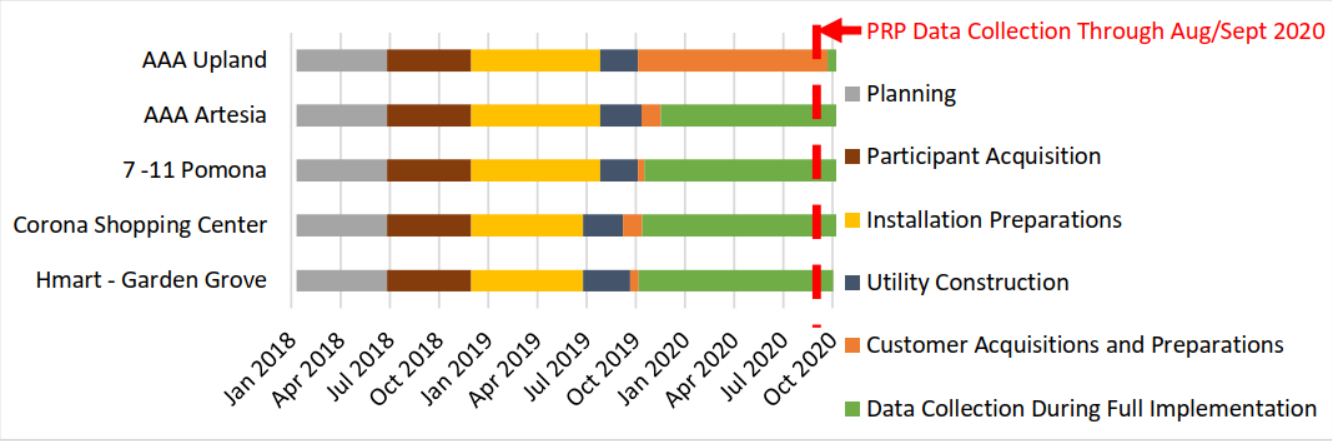
Insights and Lessons Learned

The implementer **struggled to engage individuals living in DACs and/or MUDs**, despite targeted marketing efforts. With the program requiring an applicant to have a dedicated parking spot for the EV for 24 months and to switch to a TOU rate, two items that many MUD residents cannot ensure, most of the individuals in DACs or MUDs who might have been interested in buying EVs were ineligible for this program.



Charge Ready DCFC – Overview

Objectives
Deploy utility-owned make-ready infrastructure for 5 sites with up to 5 DCFC in urban areas nearby MUDs in or near a DAC
Provide an incentive to deploy EV chargers
Provide commercial EV rate to minimize operating costs of EVs. Participating sites must be public access but can set charging fees.



Key Results
Budget: Approved **$4.0M**, Spent **$1.7M** (43%)
EV charging: 14 DCFC EVSE (50 – 125 kW)
EVs supported: public charging
Annual petroleum reduction: 8,800 gal of gasoline
Annual GHG reduction: 80 MT of CO_2
DAC: 43% of DCFCs in a DAC, 15% electric miles
Grid Impacts: 88 MWh annually (10% on peak)

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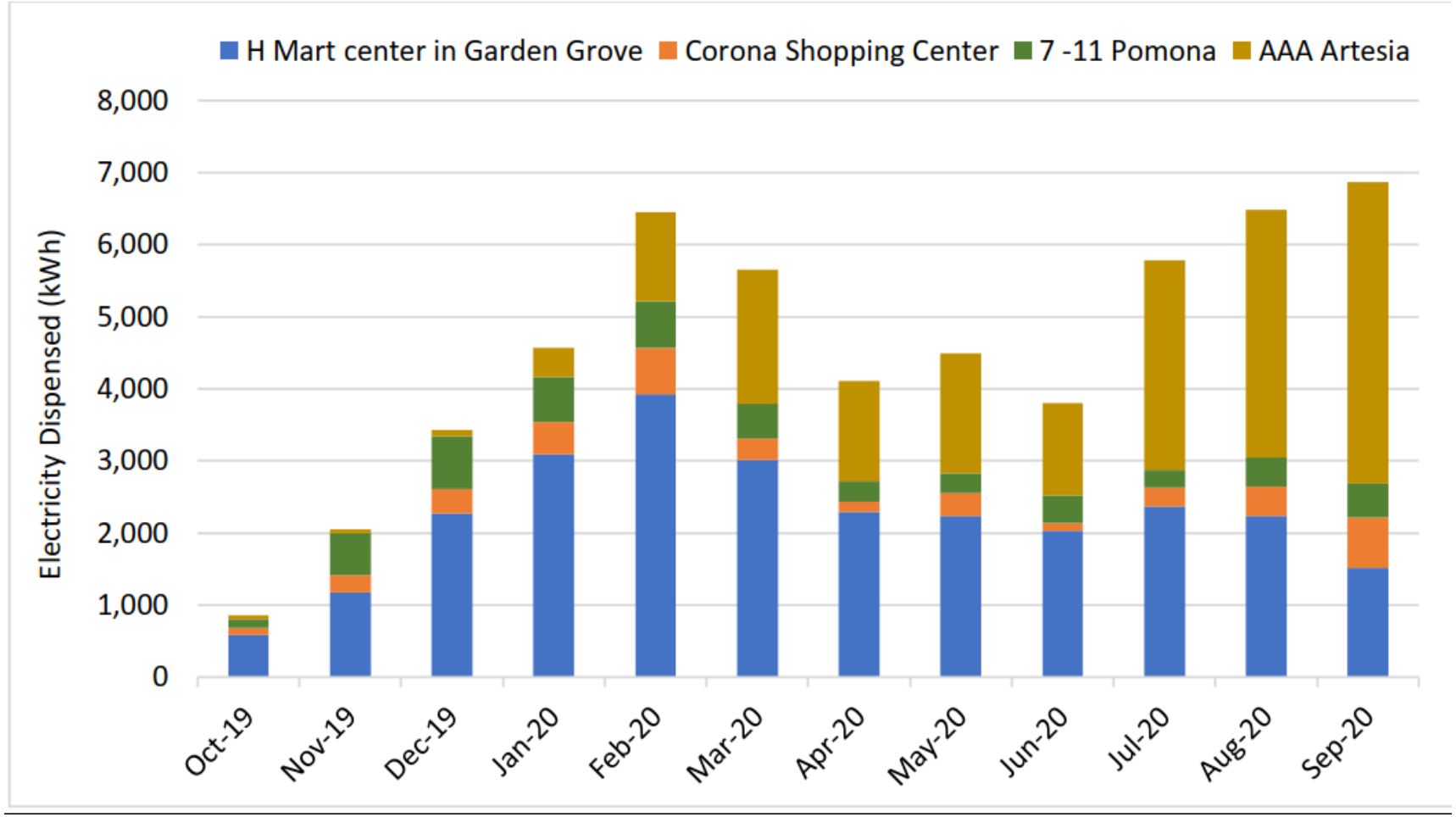
Charge Ready DCFC – Site Hosts

Site	Chargers	Location Characteristics
1 – Corona Sun Square (DAC)	Four 62.5 kW ChargePoint CPE 250	Several nearby MUDs, retail outlets and restaurants
2 – H Mart center in Garden Grove	Four 62.5 kW ChargePoint CPE 250	Surrounded by restaurants, retail and nearby MUDs Proximity to I-5
3 – AAA Upland (DAC adjacent)	Two 62.5 kW ChargePoint CPE 250	Nearby mobile home park, retail, and a few restaurants
4 – AAA Artesia (DAC adjacent)	Two 62.5 kW ChargePoint CPE 250	Nearby MUDs, a large mall, and several restaurants Proximity to I-5
5 – 7-Eleven Pomona (DAC)	Two 62.5 kW ChargePoint CPE 250 (chargers paired for 125 kW output)	Nearby MUDs and restaurants



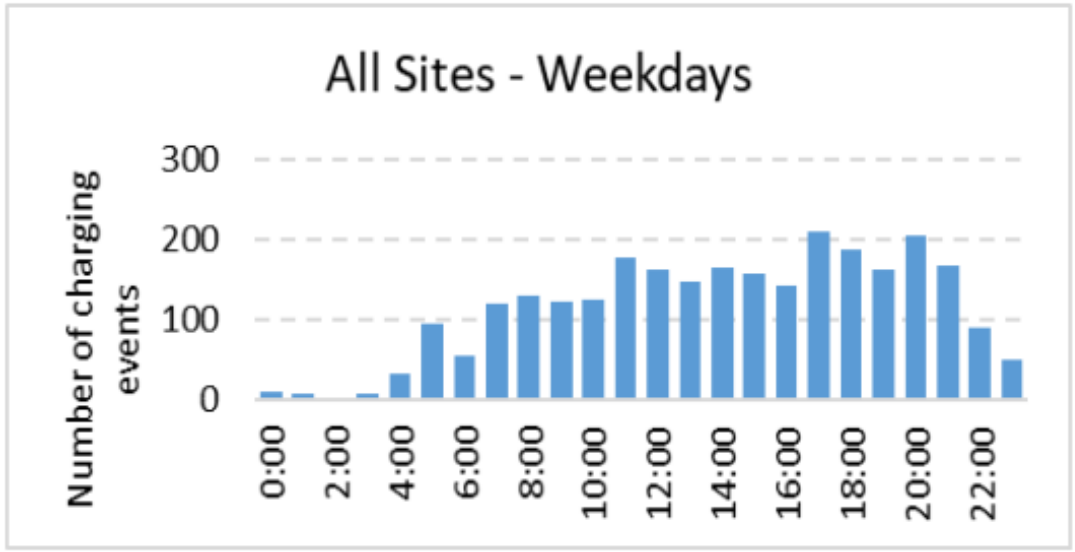

Charge Ready DCFC – Findings (1)

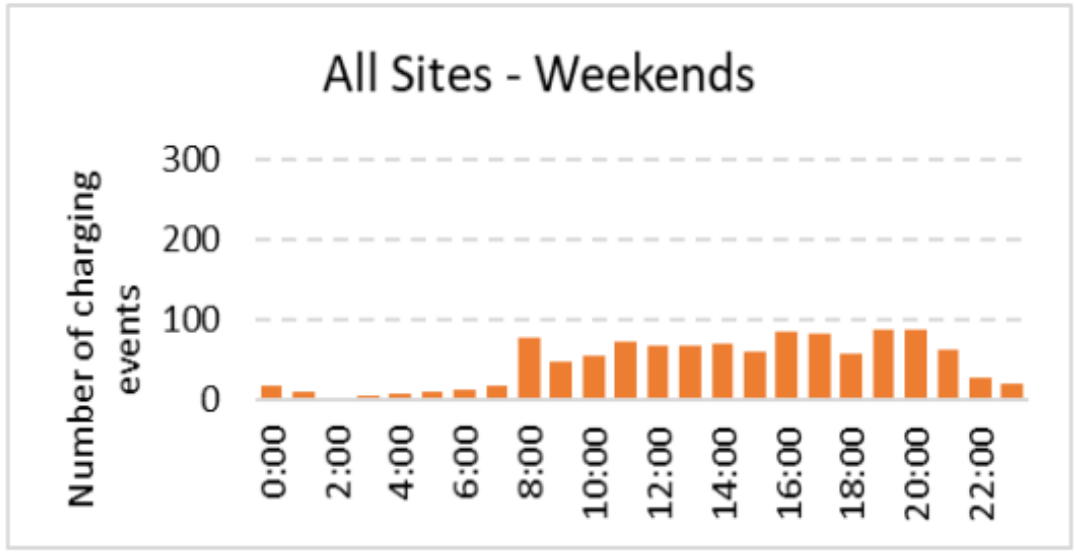
Increasing electricity use over first 5 months, a significant COVID-19 impact over next 6 months



Charge Ready DCFC – Findings (2)

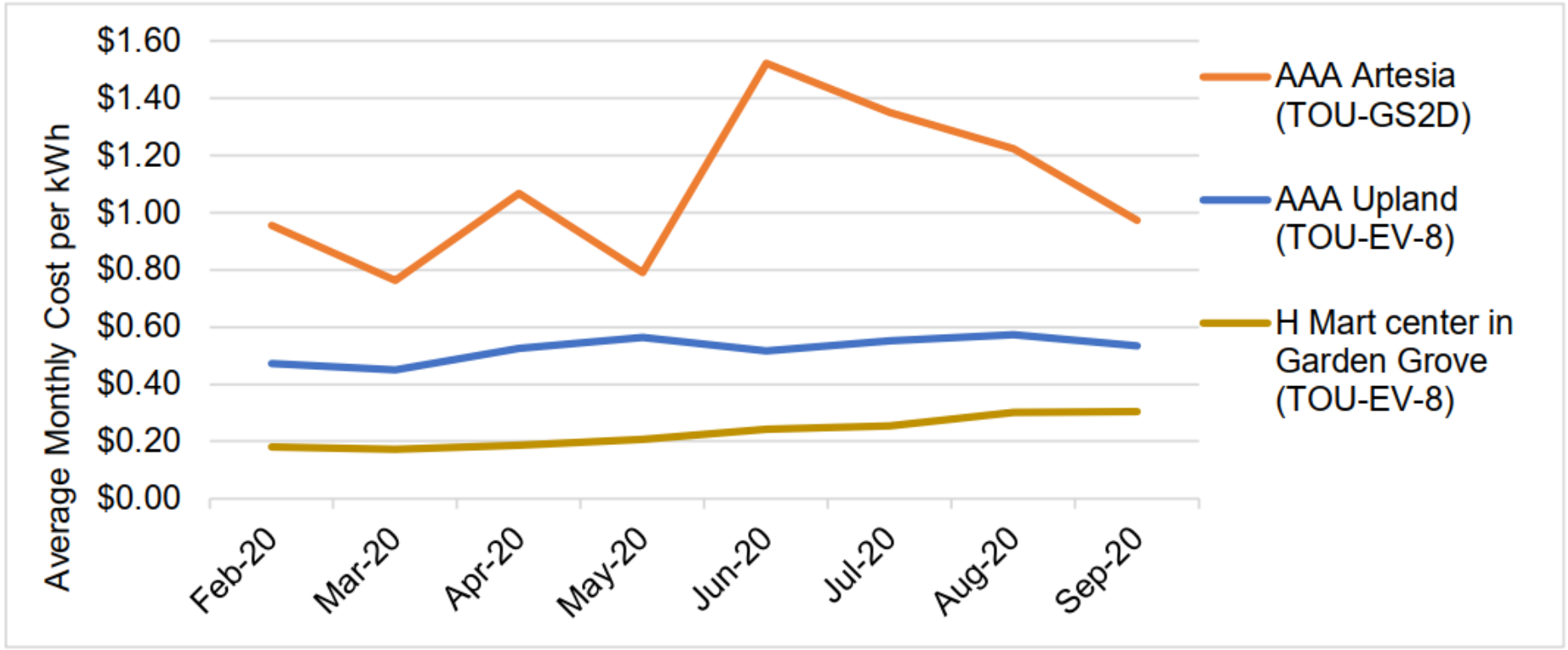
Consistent usage during the day including during on-peak time period (4-9 pm)





Charge Ready DCFC – Findings (3)

Commercial EV rate results in much lower electricity costs due to no demand charges



Charge Ready DCFC – Summary

Insights and Lessons Learned

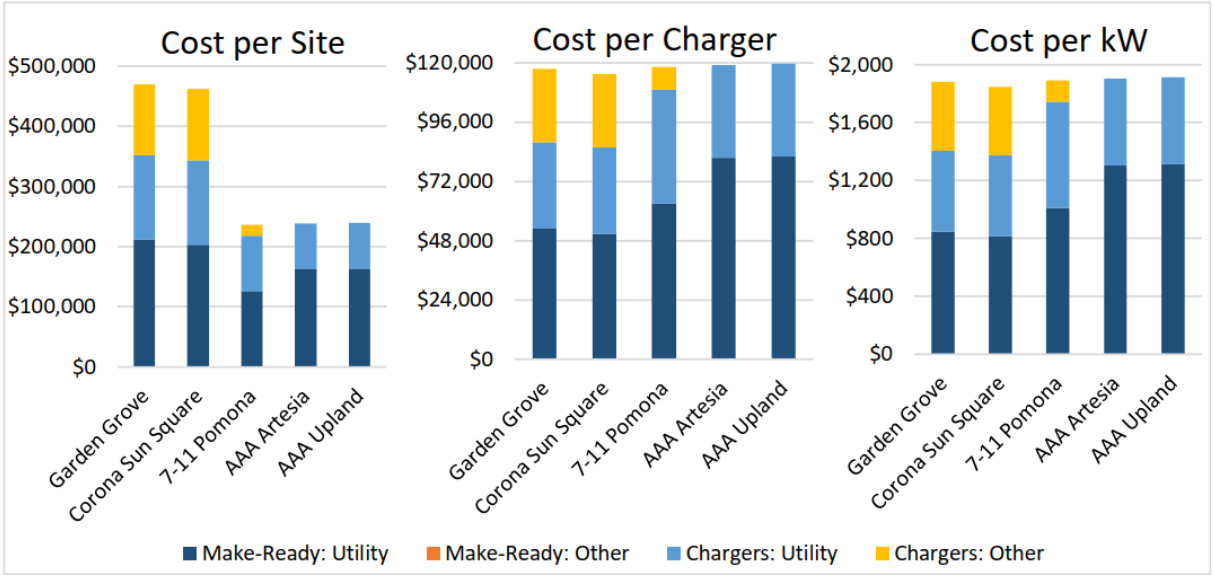
DC fast charger use was low (about 2.5%), but it has significantly increased over time and for certain locations (24% for AAA Artesia). The utilization over the project period was similar to the SDG&E ELH pilot at 2%, but that project only had its best utilized week reaching 14% (compared to 24%).

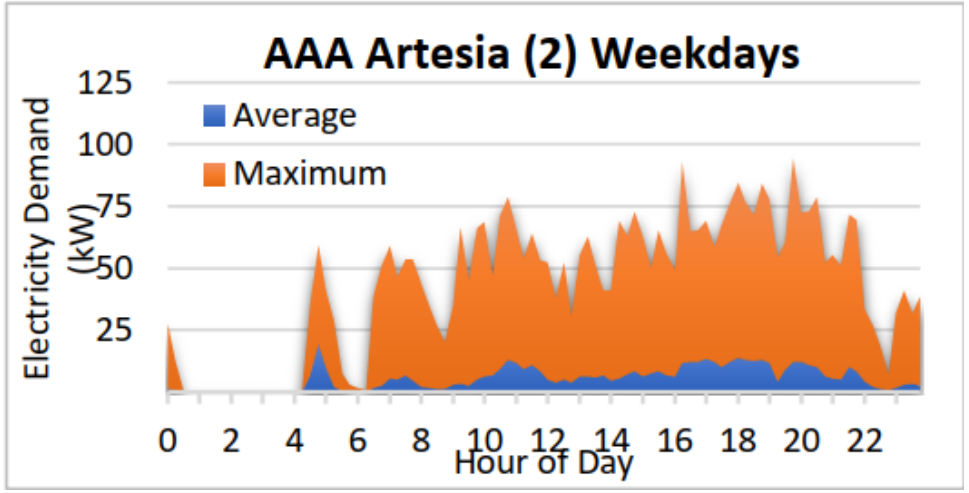
Make-ready incentive and a rebate that often covered the full cost of the station attracted site host interest

Based on driver survey responses:

- 31% don't charge at home likely because they do not have home charging; 16% don't reside in a single-family home with a dedicated parking space
- 8% would not drive an EV if public charging was not readily available; for 36% it was a motivating factor

Site host interest indicates 3-4 DCFC per site (not 10 as planned) for community-based installations



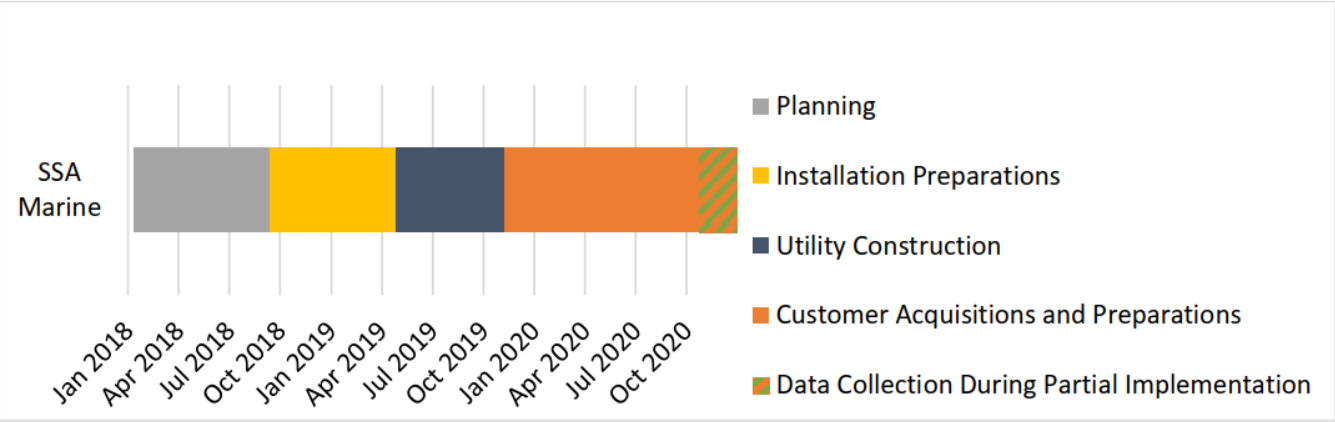


POLB Rubber Tire Gantry – Overview

Objectives

Deploy make-ready infrastructure to serve nine cranes at the Port of Long Beach
Stevedoring Services of America (SSA) Marine Terminal J

Design, install, own, and maintain the electric infrastructure, including two new distribution substations that will serve nine new electric motorized RTG cranes



Key Results

Budget: Approved **$3.0M**, Spent **$2.3M** (76%)

EV charging: 9 grid-tied (4 kV) eRTG connections

EVs supported: 9 RTGs

Annual petroleum reduction: 194,400 gallons of diesel (projected)

Annual GHG reduction: 1,601 MT of CO_2 (projected)

DAC: 100% DAC adjacent

Grid Impacts: 795 MWh annually (6% on peak) (projected)

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POLB Rubber Tire Gantry – Participant

Fleet	Chargers	Baseline and Electric Buses
Stevedoring Services of America (SSA) POLB Marine Terminal J	Grid-connection mechanism tied to a high-voltage utility connection (4,000 V)	• 9 electric grid-tied RTG conversions (Cavotec vendor) • 9 diesel 1,000 hp generator set RTGs (baseline)

POLB Rubber Tire Gantry – Summary

Status Update:

- No data collected during evaluation
  - CEC grant reporting
- Significant delays with guidance system
- 1st eRTG entered service in November 2020
- 2nd eRTG conversion completed and entered service in April 2021
- 3rd out of 9 eRTGs started conversion at the end of April 2021

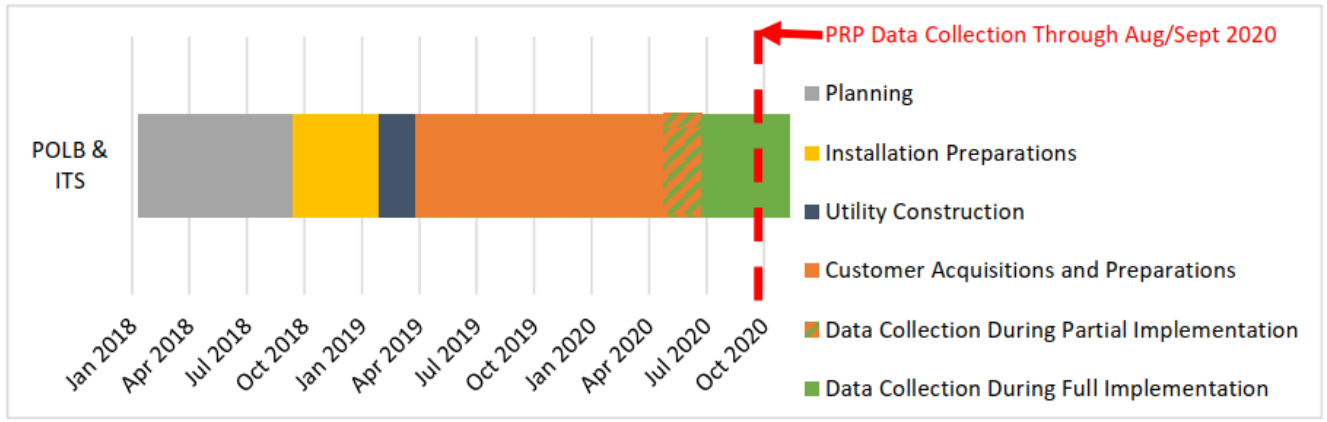
Insights and Lessons Learned
Customers tend to be very cautious when working on equipment that is critical to their operations
Undertaking such a significant project requires grant funding but acquiring and managing the funding lengthens the project timeline
Lengthy construction on an active terminal causes logistical challenges for tenant operation
Phasing in a project of this complexity or coordinating with other terminal development plans could reduce the risk
Because of timing issues, implementation complexity, and costs to electrify RTGs, SSA is considering alternatives (i.e., hybrid systems or fuel cells) for complying with upcoming zero-emissions regulations

POLB Terminal Yard Tractor – Overview

Objectives

Deploy make-ready infrastructure to serve charging stations for new electric yard tractor at the Port of Long Beach Marine Terminal G

Design, install, own, and maintain the electric infrastructure that will accommodate 20 EVSE



Key Results

Budget: Approved **$0.45M**, Spent **$1.6M** (362%)

EV charging: 7 DCFC (100-200 kW)

EVs supported: 7 Terminal Tractors

Annual petroleum reduction: 17,000 diesel gallons

Annual GHG reduction: 177 MT of CO_2

DAC: 100% DAC adjacent

Grid Impacts: 158 MWh annually (10% on peak)

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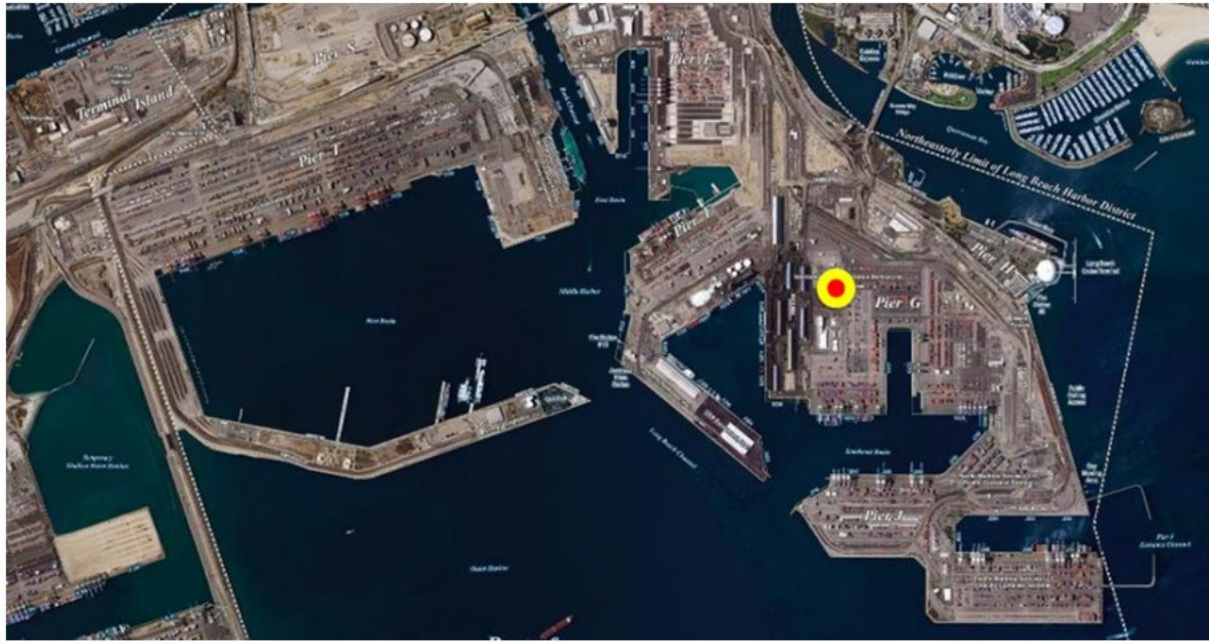
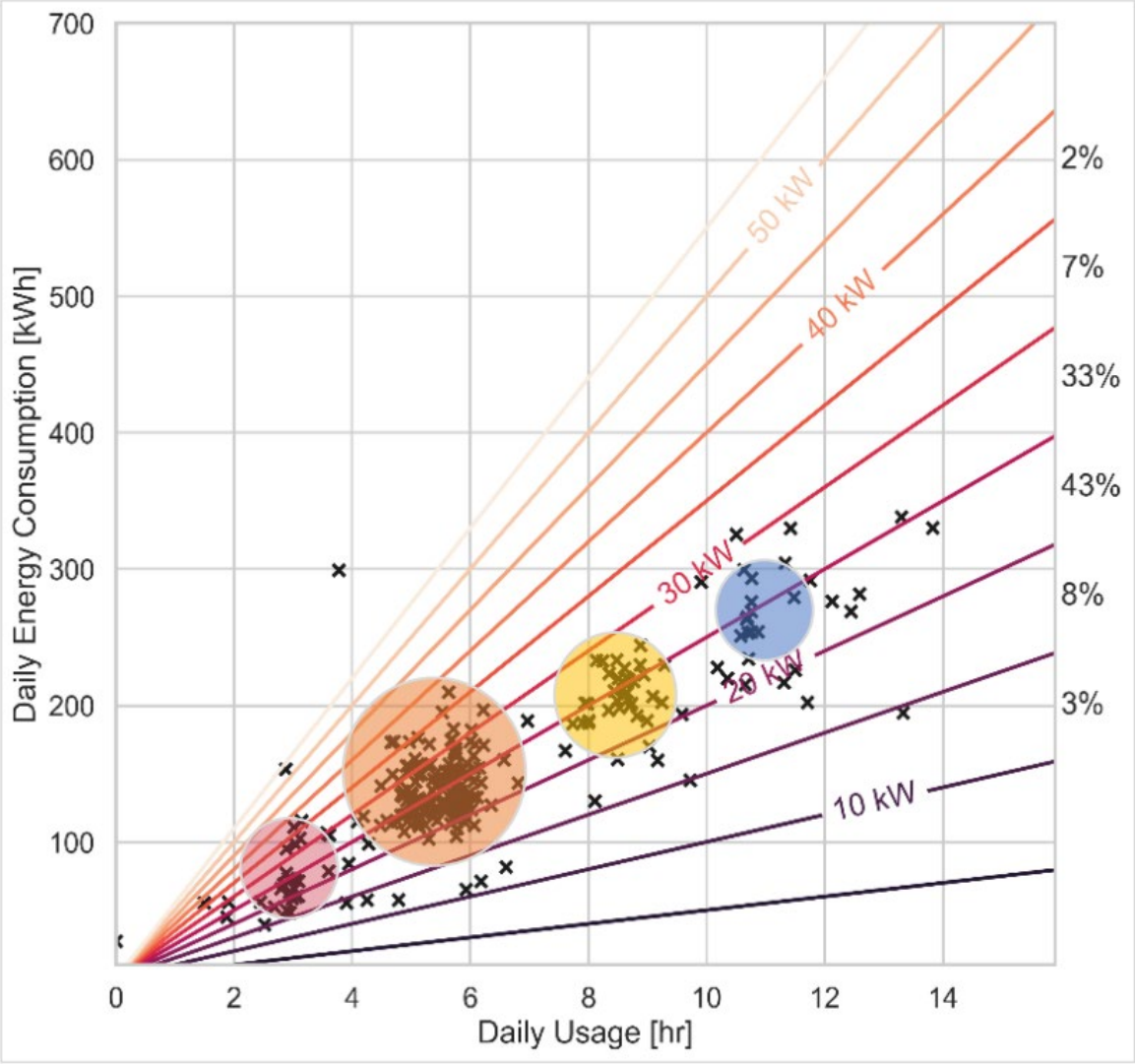
POLB Terminal Yard Tractor – Participant

Fleet	Chargers	Baseline and Electric Buses
International Transportation Service, Inc. (ITS) POLB Marine Terminal G	6 200 kW BYD DCFC 1 100 kW Cavotec automated DCFC	• 7 BYD Class 8 Terminal Tractors • 130 diesel Kalmar and Ottawa tractors (baseline)



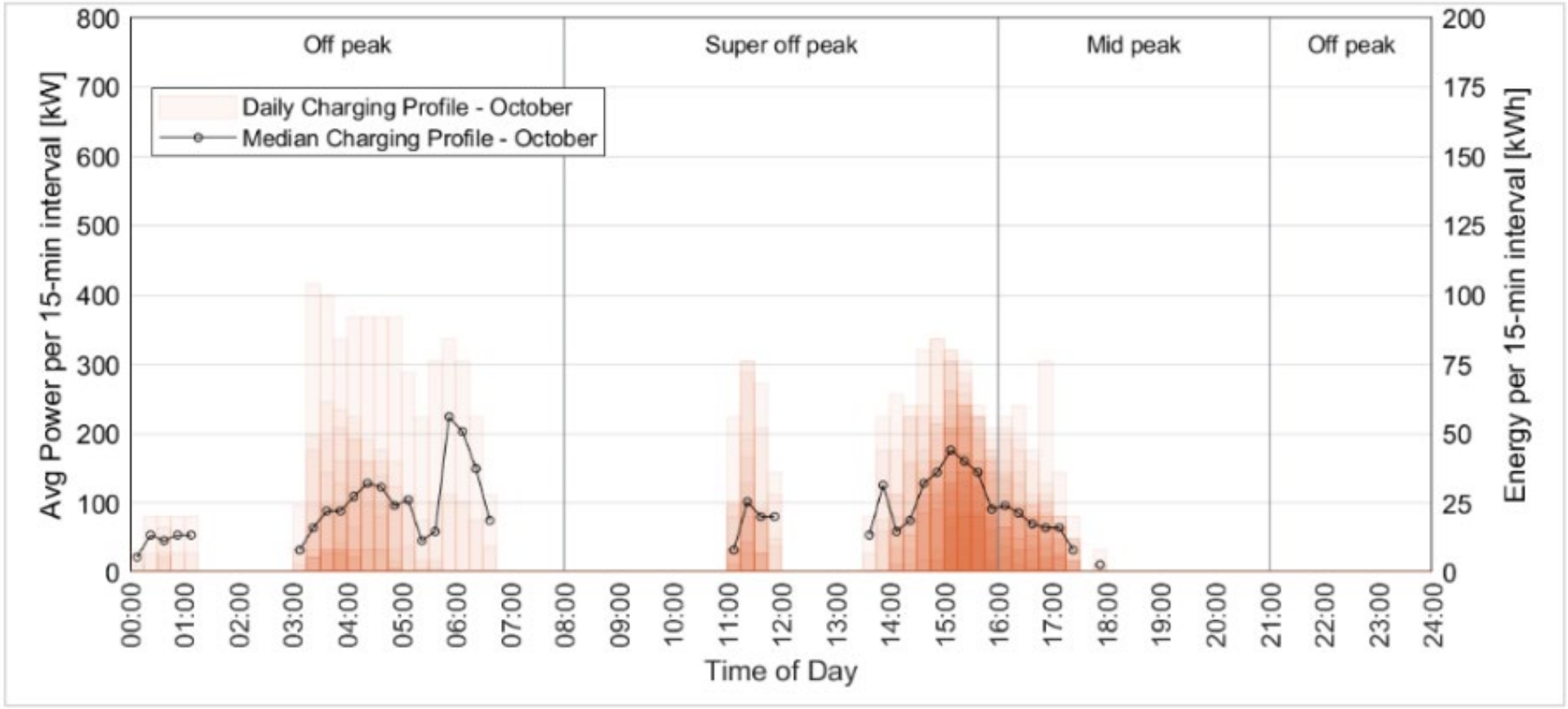
POLB Terminal Yard Tractor – Findings (1)

Four distinct operating durations in support of rail service



POLB Terminal Yard Tractor – Findings (2)

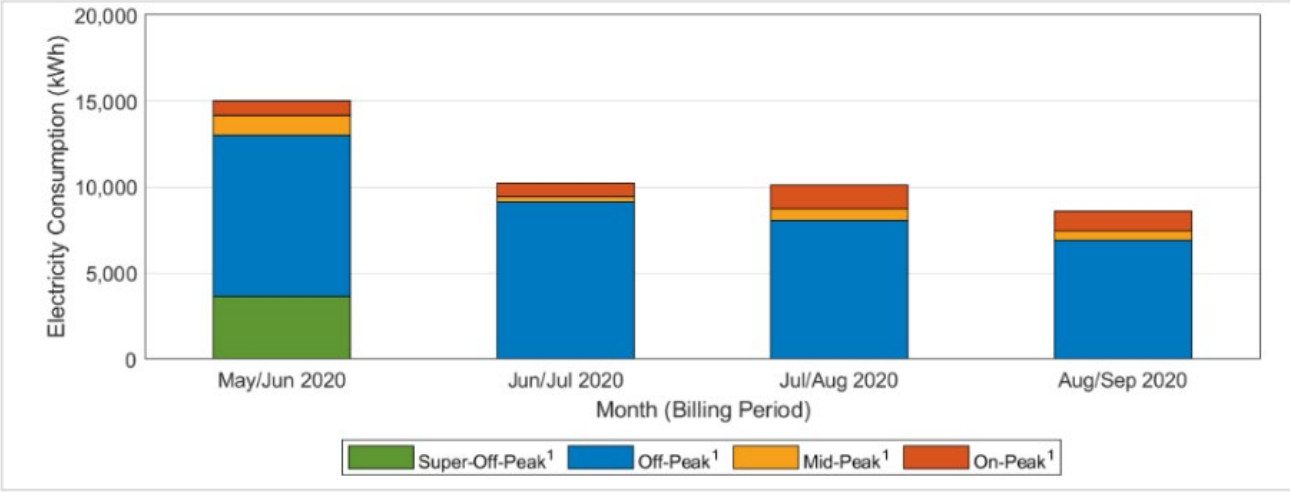
Two shift rail operation with charging during break and after each shift



POLB Terminal Yard Tractor – Summary

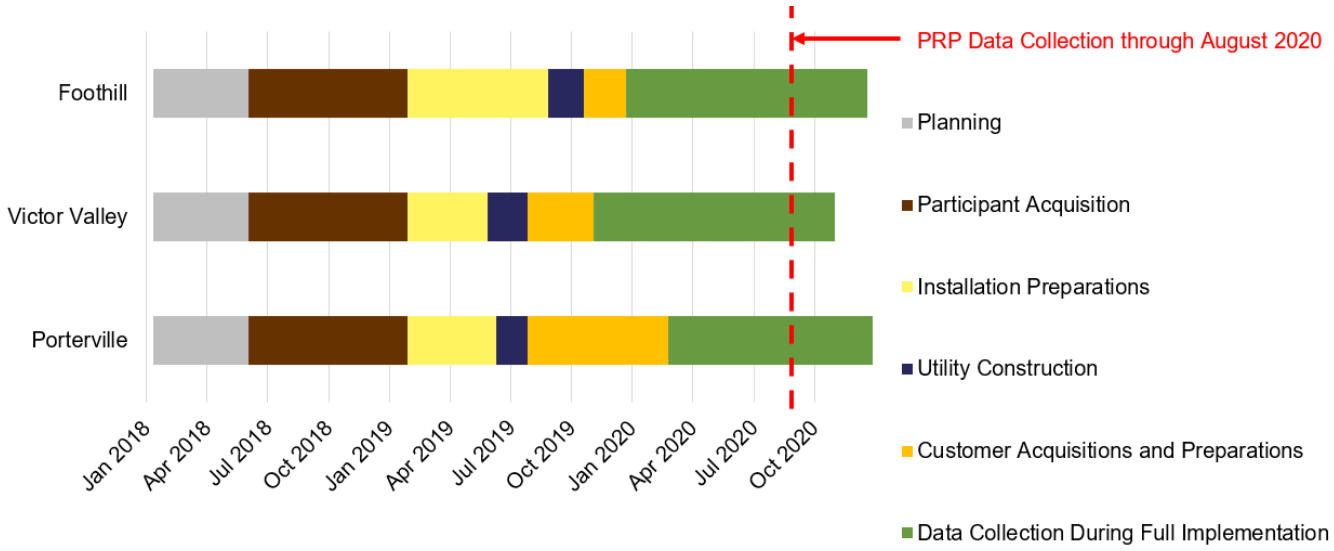
Insights and Lessons Learned
SCE installed 480 V charging station infrastructure terminating in seven fused service disconnect make-ready positions. Also installed ducts and structures to support an additional 13 future EVSE installations.
Early commercial product challenges (EVs and EVSE) contributed to sporadic and low utilization rates for much of the relatively short data collection period
Field certification of charging equipment that is not already NRTL-listed can add significant complications
Utility needs to account for the customer-side infrastructure costs and include them as part of their initial estimates when supporting grant funded demonstration projects. This was inadvertently omitted from the initial application (recorded to Shareholder O&M account).

Insights and Lessons Learned
Electricity prices of $0.18–$0.22 per kWh on a commercial EV-TOU rate. On-peak high pricing during summer accounted for approximately 30% of costs.
Railroad operation support is a heavier duty cycle than supporting the cargo ships which represent the majority of operations at the ports. This project suggests that tractor electrification can have significant impacts on diesel fuel consumption.



Charge Ready Transit – Overview

Objectives
Deploy utility-owned make-ready infrastructure to serve expected growth in EV charging
Provide an incentive to deploy EV chargers
Provide commercial electric vehicle rate to minimize operating costs of EVs



Key Results
Budget: Approved **$4.0M**, Spent **$2.1M** (52%)
EV charging: 30 depot DCFC EVSE (62–200 kW)
EVs supported: 31 transit buses
Annual petroleum reduction: 336,143 DGE of CNG
Annual GHG reduction: 1,443 MT of CO_2
DAC: 38% of electric bus miles
Grid Impacts: 2,340 MWh annually (5% on peak)

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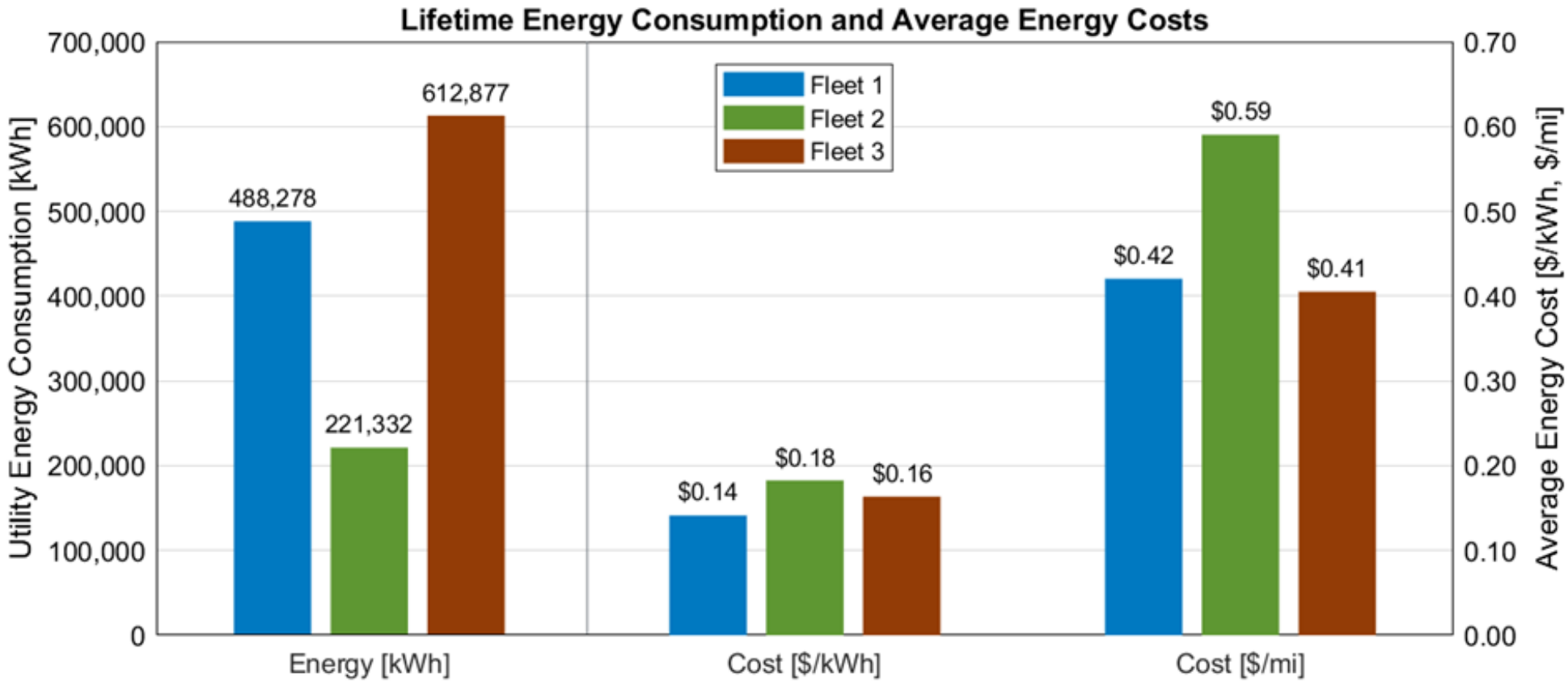
Charge Ready Transit – Participants

Fleet	Chargers	Baseline and Electric Buses
1 – Victor Valley Transit Authority	Seven 62.5 kW CPE 250 ChargePoint (500 kW transformer)	• 64 bus fleet with 23 routes • Natural gas 40-foot buses (baseline) • 7 New Flyer Xcelsior EX 40-foot electric buses
2 – Porterville Transit	Ten 200 kW BTC Power (2.5 MW transformer)	• 20 bus fleet with 9 routes • Natural gas 35-foot buses (baseline) • 10 GreenPower EV350 40-foot electric buses
3 – Foothill Transit	Twelve 60 kW Proterra V2G, one 125 kW (1 MW transformer)	• 373 bus fleet (16 electric previously) with 39 routes • Natural gas 40-foot buses (baseline) • New Flyer Xcelsior EX 40-foot electric buses

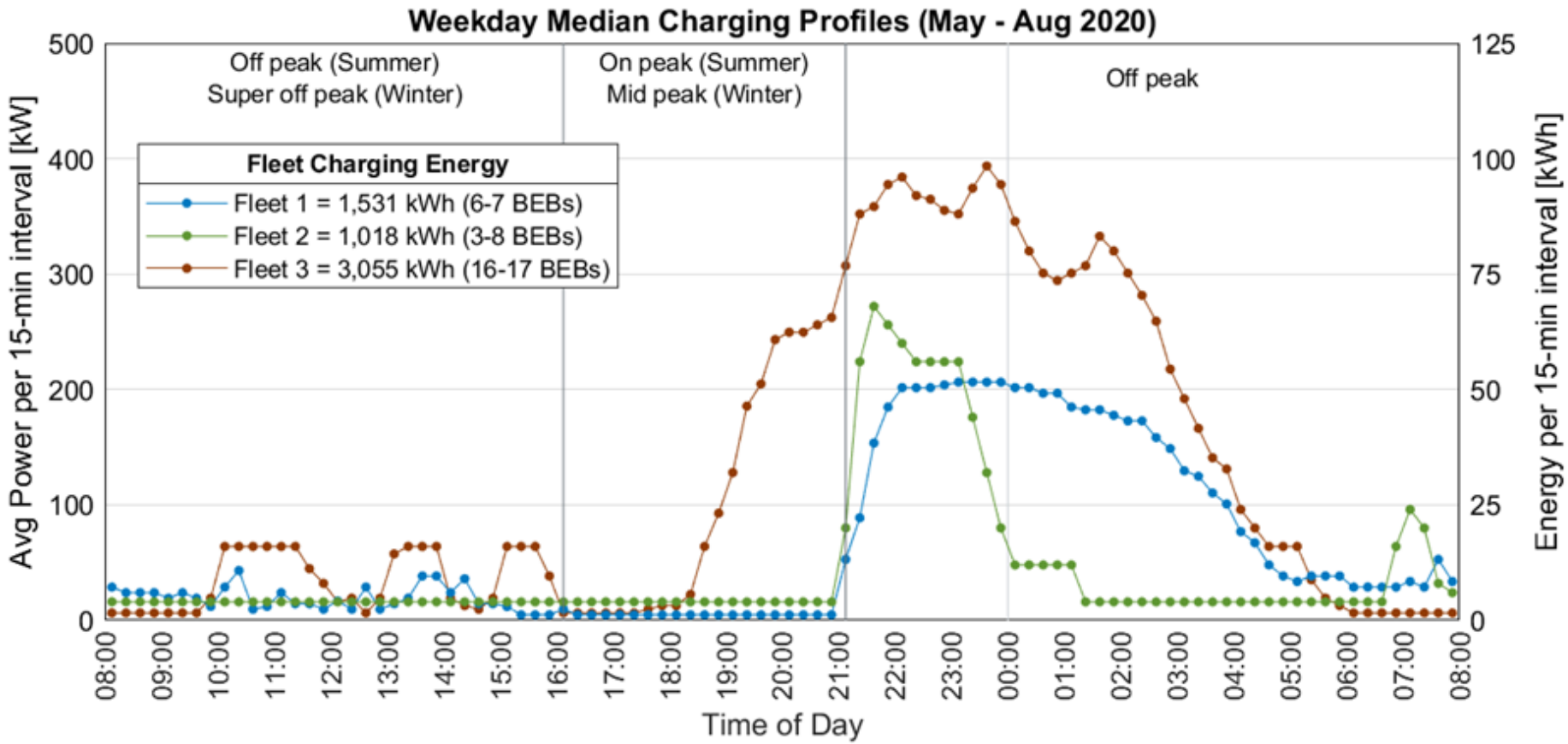
Charge Ready Transit – Findings (1)

High Energy Use + Low Electricity Rates = Lower Operational Fuel Costs



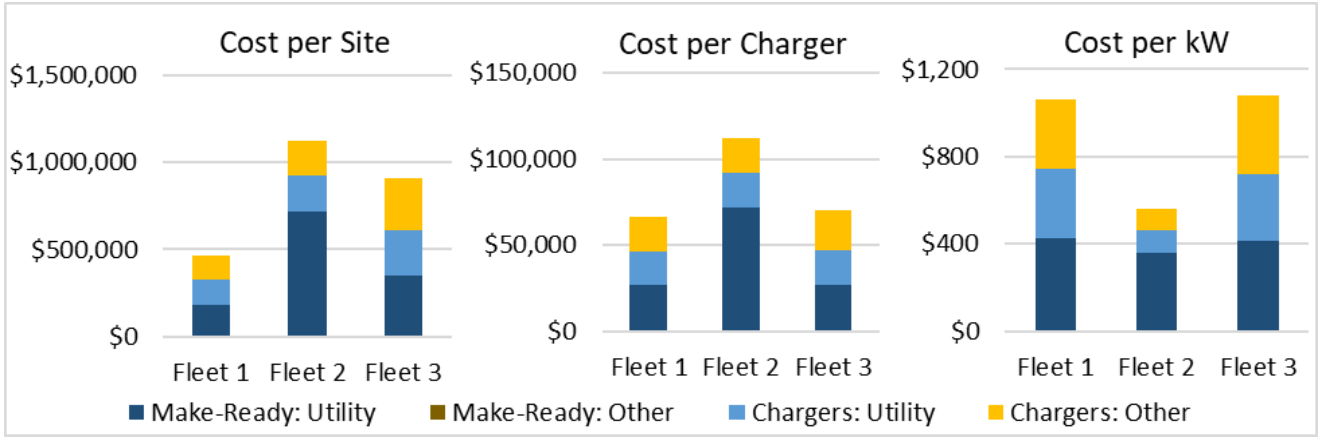
Charge Ready Transit – Findings (2)

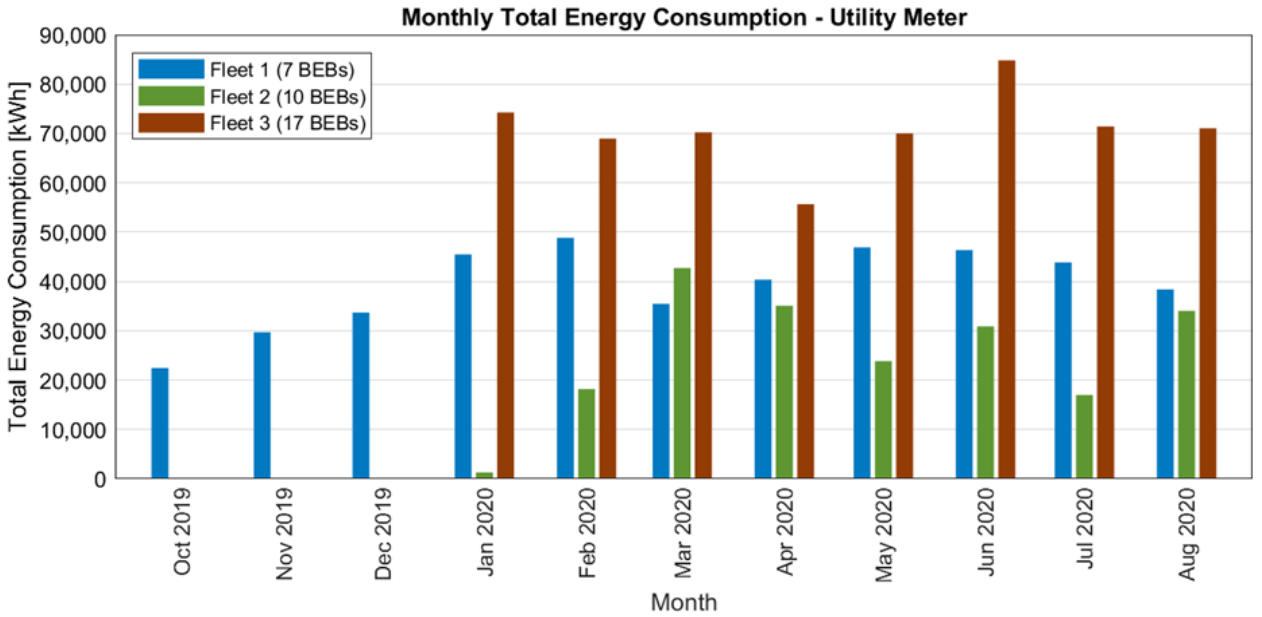
Fleets are sensitive to electricity costs and charge after on peak time period (4-9 pm)



Charge Ready Transit – Summary

Insights and Lessons Learned
Make-ready construction planning, design, and execution went smoothly
2 of 3 transit fleets experienced good availability of buses (one experienced technology readiness issues)
Energy management software can be very effective. Manual management is not sustainable.
Commercial EV rate provided very low average rate
Direct access to EVSP and EV telematics data provided a richer and more reliable data than fleet records
EVSE power rating (>50 kW) might not be the limiting factor for charging speed (i.e. EV BMS limitations)
Battery capacity (~460 kWh) and bus efficiency (~2 kWh/mile) do not reflect real bus range (130-150 mi)
Depot chargers for routes < 150 miles per day (buses with <500 kWh). High-power charging on route or hydrogen fuel cell bus alternatives for 100% ZEV fleet.





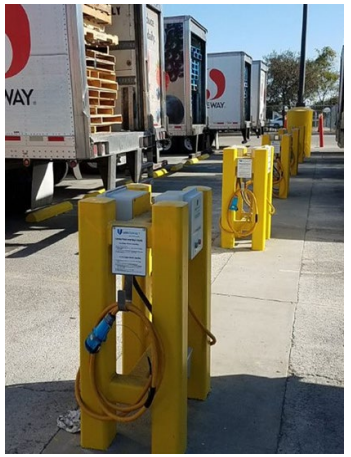
Southern California Edison PRP Portfolio

Electrification Promotions
Charge Ready Home Installation (SCE) – **$4M**
Public Access Stations
Urban Charge Ready DCFC (SCE) – **$4M**
MHD (Off-road Infrastructure)
Port of Long Beach Rubber Tire Gantry Crane (SCE) – **$3M**
Port of Long Beach Terminal Yard Tractor (SCE) – $0.45M
MHD Infrastructure
Charge Ready Transit Bus (SCE) – **$4M**

Questions specific to these PRPs?

Pacific Gas and Electric PRP Portfolio

MHD (Infrastructure)
Medium/Heavy Duty Fleet Customer Demo (PG&E) – **$3.4M**
Electric School Bus Renewables Integration (PG&E) – **$2.2M**
MHD (Off-road Infrastructure)
Idle Reduction Technology (PG&E) – **$1.7M**
Electrification Promotions
Home EV Charger Information Resource (PG&E) – $0.2M



MHD Customer Fleet Demo – Overview

Project Partner: San Joaquin Regional Transit District (SJRTD)

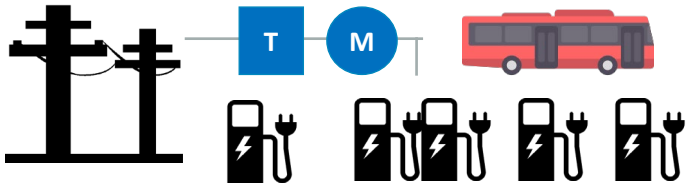
- Located in and serves a **Disadvantaged Community**
- Existing fleet of **17 electric buses**
  - 12 Proterra legacy electric buses (49 to 62-mile range) using 500 kW pantograph overhead **extreme fast chargers (XFC)**
  - 5 new electric buses with 251-mile range joined the fleet in 2018
- PRP installed infrastructure and evaluated three test phases at three sites:
  - **Site 1** (Regional Transportation Center) installed **(5) 60 kW depot chargers**
  - **Site 2** (Downtown Transit Center) installed **charge management software** to control XFCs
  - **Site 3** (Union Transfer Station) installed new overhead fast charger (RTD funded) and **battery electric storage system (BESS)**
- SJRTD plans for an **all-electric bus fleet** by 2025

Insights and Lessons Learned	
PRP Budget	$3,355,000 ($1,021,554 spent through 10/2020, 30%)
Implemented	5 buses operating, test sites 1 and 2 operational
Annualized Utilization	22,069 miles/bus/year
Petroleum Reduction Annually	23,546 diesel gallons
Avoided GHG Emissions Annually	245 MT CO_2
Annual Grid Impact	240 MWh (39% on peak)
DAC Impact	100% of vehicle operation

MHD Customer Fleet Demo – Test Phases

- **Test 1:** Five 60 kW **overnight depot chargers**

Site 1: RTC

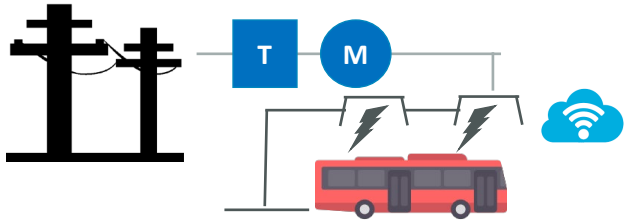


1. Can the new long-range e-buses be fully charged every night at the depot and meet their daily route needs?
2. Can fueling $/mile be reduced through different charging protocols, and how does this compare with diesel hybrids on the same route?

Complete

- **Test 2: Demand Management Software** with XFC

Site 2: DTC

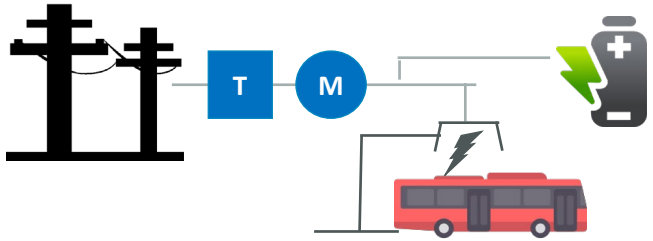


1. Can demand management software reduce operation costs for legacy e-buses relative to uncontrolled charging and still meet route needs?

Complete

- **Test 3:** 500 kWh* **battery energy storage system** with XFC

Site 3: UTS

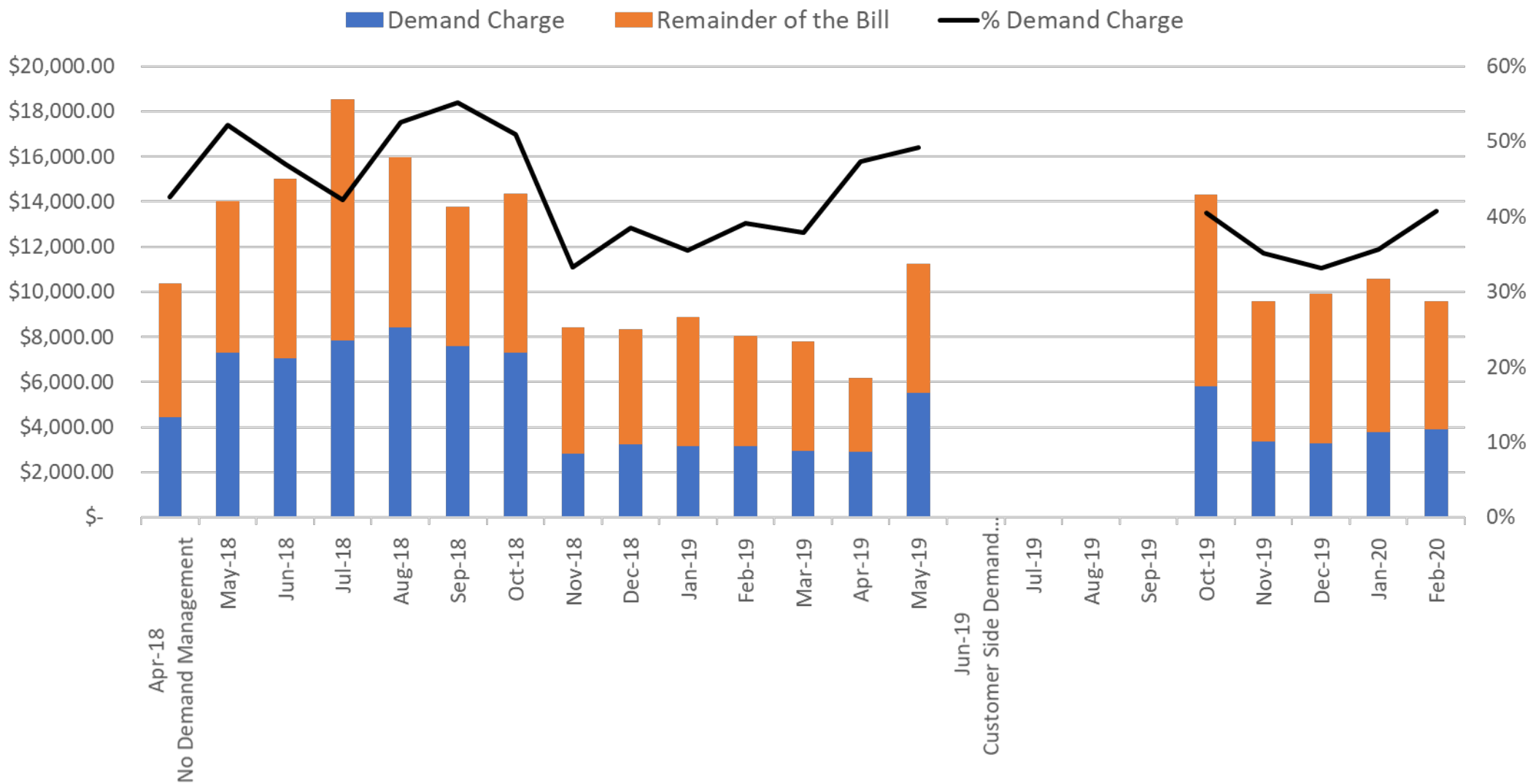


1. To what extent can the BESS reduce charging costs?
2. Do the additional savings make a BESS economical for this application? In what scenarios might it offer benefits?

Incomplete

MHD Customer Fleet Demo – Insights

Test 2: Demand Charges at DTC



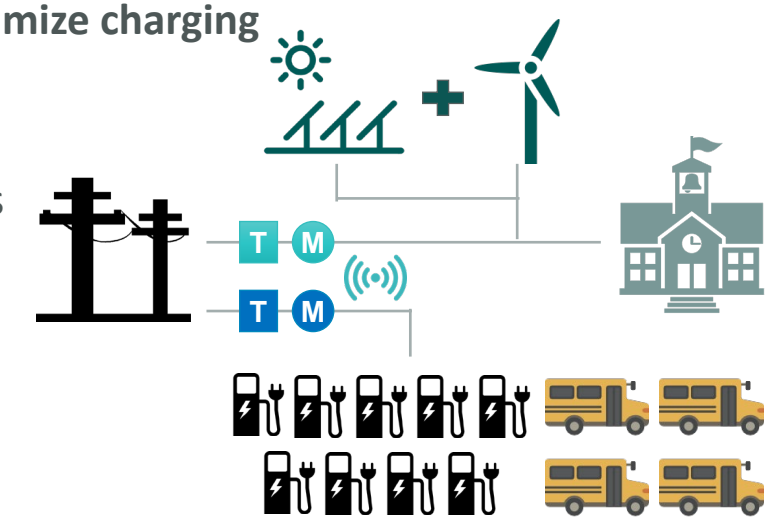
MHD Customer Fleet Demo – Summary

Insights and Lessons Learned
Limited technology availability and compatibly issues in a growing industry can cause challenges for fleet managers and operators
Battery energy storage systems are costly and may require extra time to plan and install
Utility and transit agency partnerships are key to project success
Open access to charge management software improves the evaluation data collection process and increases transparency for operations staff
Implementing charging management protocols for multiple generations of electric buses and mixed EVSE is complex and requires sophisticated management

Electric School Bus Renewables Integration – Overview

Project Partner: Pittsburg Unified School District (PUSD)

- K-12 school district, serving 13 school sites, including 8 elementary schools
- Located in and serves a **Disadvantaged Community**
- Current fleet of **4 electric buses,** (2) eLion, (2) Blue Bird
- **~200 kW** onsite wind and solar renewable generation
- Built **Learning Center** for students
- Installed (**9) Level 2** chargers, 19 kW each, ~180 kW total load
- Charge management software to **optimize charging** for cost and GHG reductions
- Architecting **novel communications design** to integrate onsite renewables



Insights and Lessons Learned

PRP Budget	$2,209,500 ($1,332,369 spent, 60%)
Implemented	1 to 3 buses concurrent, test phases 0, 1, and 2 demonstrated, phases 3 and 4 modelled
Annualized Utilization & Performance	3,572 total miles, 2.96 kWh/mile
Petroleum Reduction Annually	714 diesel gallons
Avoided GHG Emissions Annually	6.3 MT CO_2
Annual Grid Impact	10.6 MWh (30% on peak)
DAC Impact	89% of vehicle operation

Electric School Bus Renewables Integration – Pilot Phases

Phase 1: Static schedules
May 2019
• Minimize PUSD bill based on existing rate structure and support route service with fixed, pre-determined charge schedules. • Demonstrate technical system integration.

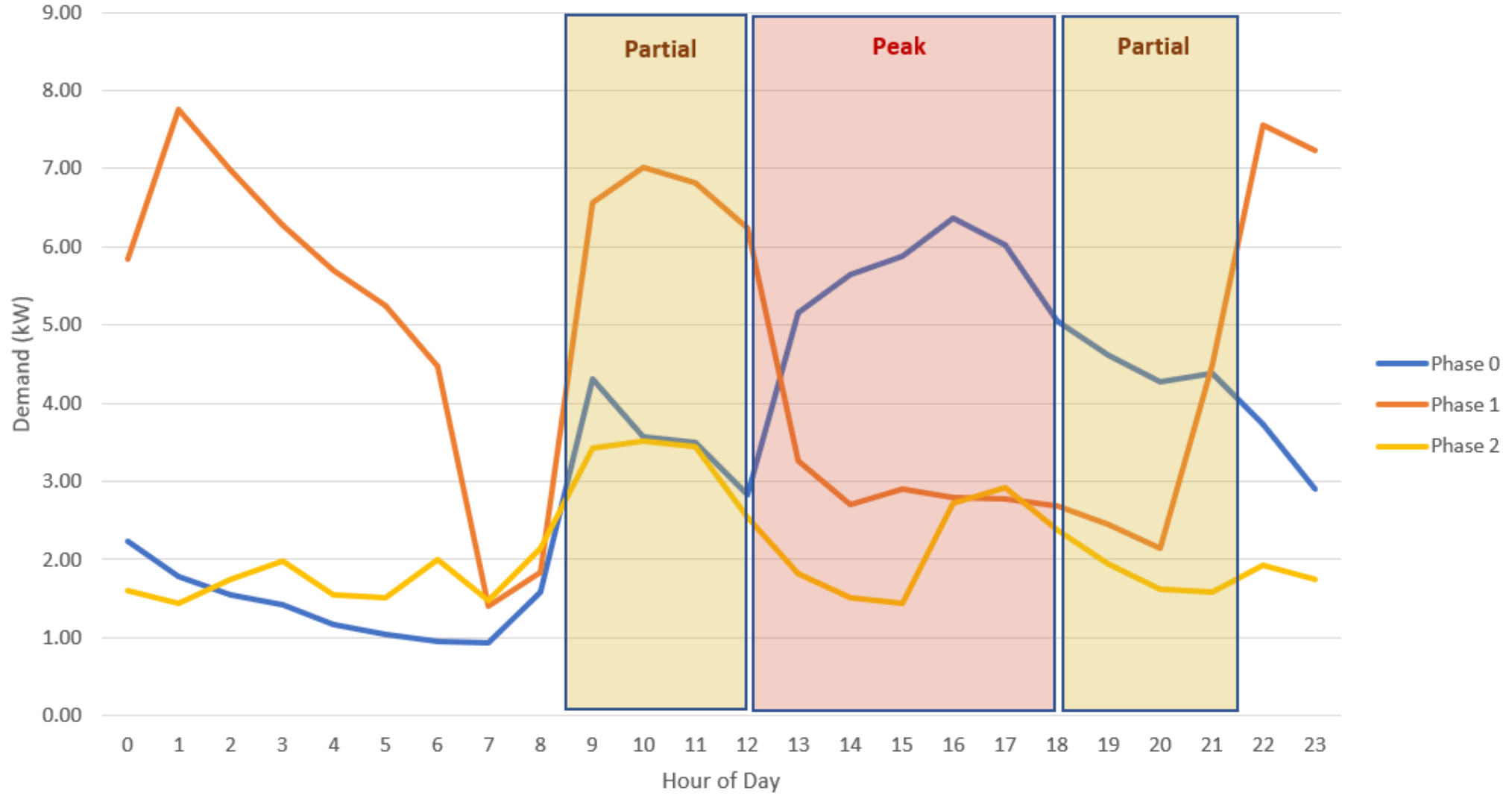
Phase 2: Excess Supply Pilot (XSP)
Aug 2019 – Nov 2019
• Demonstrate system's ability to deliver load-increase events with PG&E's XSP program. • Capture value of consuming green energy from the grid during wholesale overgeneration.

Phase 3: Renewable Self-Consumption
Dec 2019 – Jan 2020
• Demonstrate the system's ability to dynamically maximize local renewable powering of e-school bus fleet. • Minimize PUSD bill while maximize onsite renewable consumption.

Phase 4: Renewable Optimization
Jan 2020 – Apr 2020
• Demonstrate the system's ability to combine wholesale and local renewable generation to maximize green energy for the e-school bus fleet

Electric School Bus Renewables Integration – Findings

Load Profiles: Pilot Phases 0, 1, and 2



Electric School Bus Renewables Integration – Innovations

1. Feasibility of combining **low-cost, non-networked EVSE and DER technologies** for dynamic charge management functions
2. Feasibility of dynamic signaling to provide grid services and renewables integration

Effects of Managed Charging Protocol	Phase 0	Phase 1	Phase 2
Average Electric Fuel Cost ($/kWh)	$0.21	$0.17	$0.02

Carbon Intensity Per Mile	Industry Average	Phase 0	Phase 1	Phase 2	Entire Pilot
	(Diesel)	(Electric)	(Electric)	(Electric)	(Electric)
GHG Emissions (kg CO2e/mile)	1.54	0.97	0.68	0.87	0.86

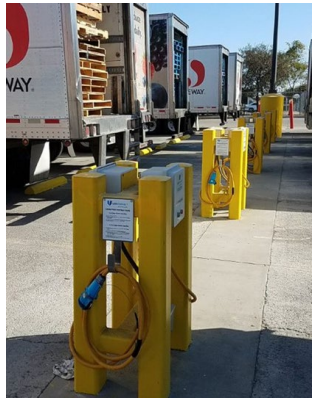
Electric School Bus Renewables Integration – Summary

Insights and Lessons Learned
Capacity of initial buses, project delays, and COVID-19 resulted in low utilization
Bus battery management systems are not designed for delayed power and advanced charge management
Contracting, constructing, and implementing test protocols with schools may require extra time
Electric school buses have potential to reduce fleet TCO due to the large fuel and O&M savings
Commercial BEV rate design is effective in motivating desired charging behavior and consumption patterns but does not align well with XSP participation

Idle Reduction Technology – Overview

Project Partner: Safeway Albertson's Food Distribution Service Center (Tracy, CA)

- Located in and serves a **Disadvantaged Community**
- **2.2 million square feet, ~300 loading dock spaces and >400 staging spaces**
- Current fleet of **780 trailers** and 280 trucks with electric standby transport refrigeration units (eTRUs) capable of running on diesel or electricity
- Added (25) 15-17 kW SafeConnect connection ports for trailers with eTRUs
  - 10 eTRU ports at staging areas
  - 15 eTRU ports at loading docks
- Plan of **360 eTRU ports** now, with total of 550 – 600 eTRU ports expected

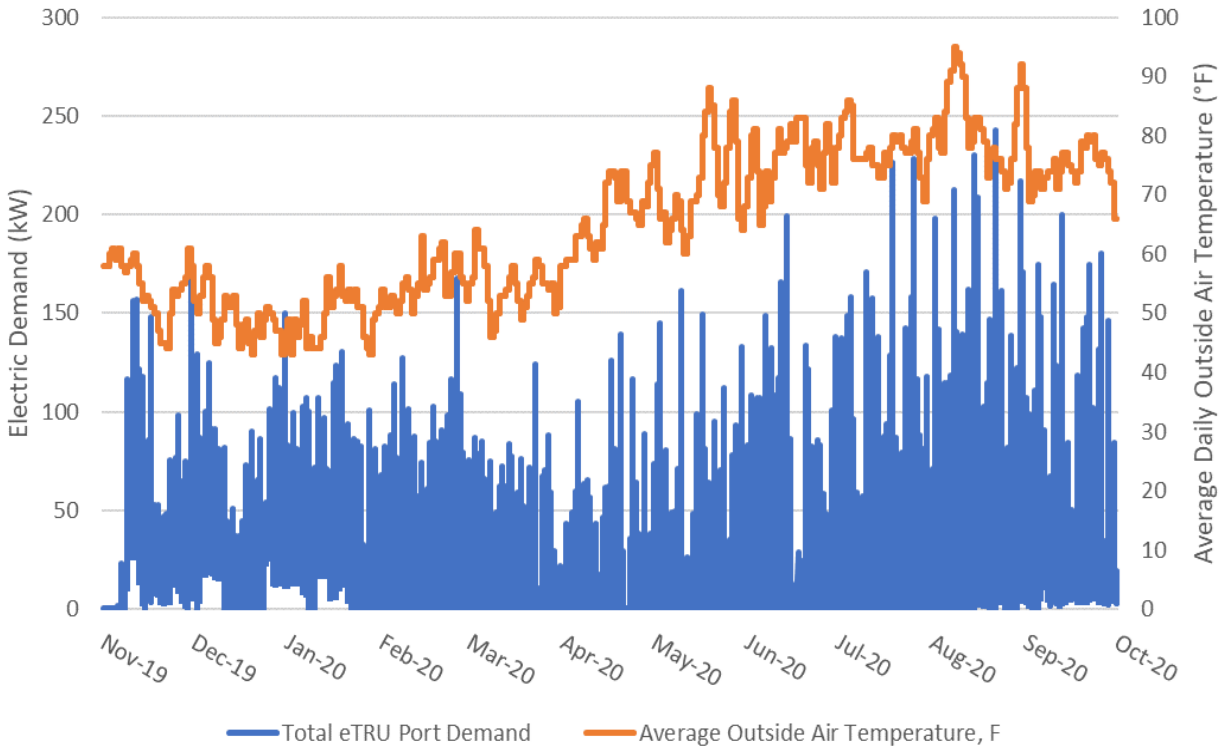


Insights and Lessons Learned

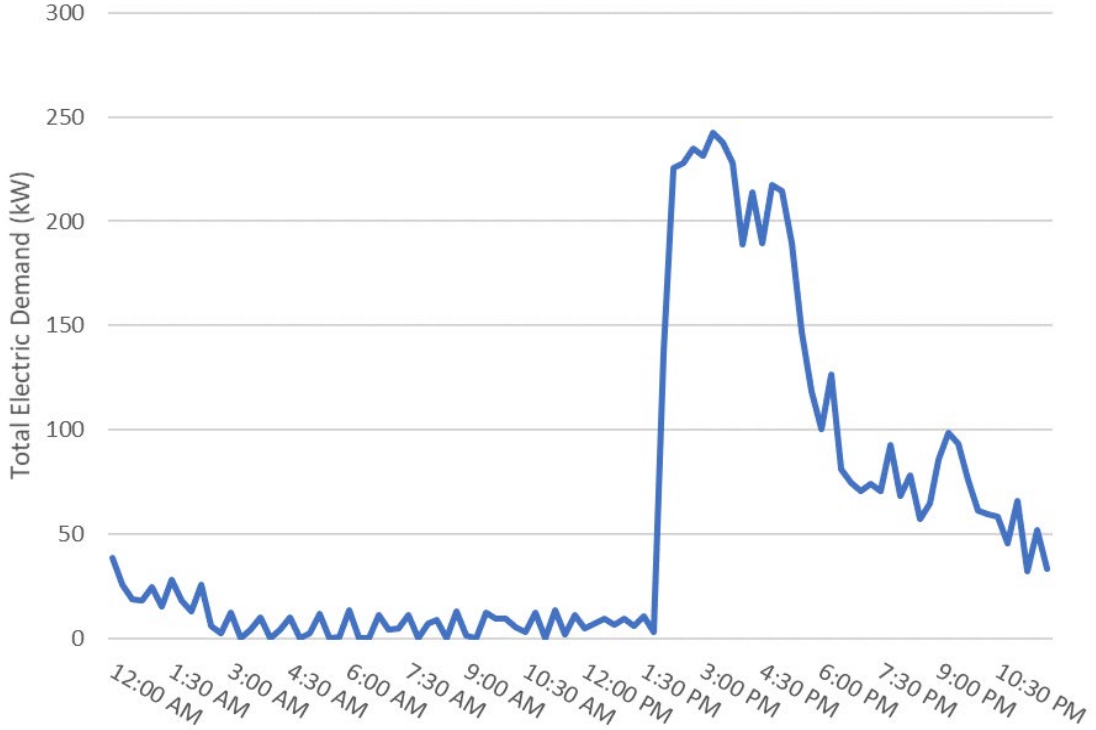
PRP Budget	$1,719,400 ($599,675 or 35% spent)
Charging Infrastructure	25 SafeConnect ports, 15-17 kW each (total = 425 kW)
Average Port Utilization	11.9% utilization (1,039 hours/year)
Petroleum Reduction Annually	22,089 diesel gallons
Avoided GHG Emissions Annually	246 MT CO_2
Annual Grid Impact	210 MWh (26% on peak)
DAC Impact	100% of equipment operation

Idle Reduction Technology – Findings

Albertsons Tracy Total eTRU Port Demand



Total eTRU Port Demand on Peak Day: 8/29/2020



Idle Reduction Technology – Summary

Insights and Lessons Learned
Benefits and challenges of working with private-sector facilities and fleets
Consider legacy electrical switchgear equipment condition
Lack of standardization in eTRU technology
Individual eTRU port data collection is logistically challenging and expensive
Site operations resulted in eTRU port utilization differences at loading docks vs staging areas
Site operator and truck driver education and training are needed to increase utilization

Home Charger Information Resource (HCIR) Program

HCIR Program Overview
Web-based EV research tool for customers
$500k for tool development after initial T2AL approval
Scaled back to $200k based on market research with another T2AL to only be a resource linking to external tools

Evaluation Methodology
PG&E staff interviews (November 2019 and September 2020)

Lessons Learned
Ability to adapt in a rapidly changing market, while reflecting customer needs, is essential for any innovative customer-oriented program

Pacific Gas and Electric PRP Portfolio

MHD (Infrastructure)
Medium/Heavy Duty Fleet Customer Demo (PG&E) – **$3.4M**
Electric School Bus Renewables Integration (PG&E) – **$2.2M**
MHD (Off-road Infrastructure)
Idle Reduction Technology (PG&E) – **$1.7M**
Electrification Promotions
Home EV Charger Information Resource (PG&E) – $0.2M

Questions specific to these PRPs?

Small Multi Jurisdictional Utilities PRPs

Public Charging Stations
DCFC Project (Liberty) – **$4M**
Demonstration and Development Program (PacifiCorp) – $0.3M
Destination Make Ready (BVES) – $0.6M

Electrification Promotions
Residential Rebate Program (Liberty) – **$1.6M**
Small Business Rebate Program (Liberty) – $0.3M
Customer Online Resource (Liberty) – $0.3M
Outreach and Education Program (PacifiCorp) – $0.2M

Outreach and Education Program

Program Overview

- $140k budget ($59k spent through end of 2020)
- Three modes of customer engagement and participation
  - Targeted mailing campaign, community events, and a technical assessment
- Outreach and Ride and Drives (April 2019 start, Forth Mobility contractor)
- Technical Assessments (May 2019 start, C2 Group contractor)
  - 4 commercial customer requests, 1 customer assessment
- On-site and in person events suspended in 2020 due to the COVID-19 pandemic

Evaluation Methodology

- Program data review (outreach events)
- Utility and contractor staff interviews (Nov 2019 & Oct 2020)
- Residential online survey (Feb 2020, 73 responses)
  - Focused on customer awareness, interest, motivation, and perceived barriers of EVs and EVSE

Demonstration and Development Program

Program Overview

- $270k budget ($15k spent through end of 2020)
- EV workshop aimed at driving interest in the program (Nov 2019)
- Grant applications (Q2 2019 start, Nexant contractor)
  - 5 Quarterly applications cycles (2019/2020)
  - 3 applications in 2019, one approved ($71k)

Evaluation Methodology

- Program data review (grant applications)
- Utility and contractor staff interviews (Nov 2019 & Oct 2020)

PRP Successes and Lessons Learned

- COVID-19 impacted the two programs, limiting outreach and possibly increasing the barrier to participation in the Demonstration and Development program
- **Continued efforts will be required to mitigate customer concerns and increase awareness**

  PRPs began to address awareness and informational barriers regarding EV ownership for residential customers and on a more limited basis charging station installations for commercial customers
- **Developing complementary programs leverages limited resources**

  With limited internal resources, developing complementary programs allows staff to expand customer awareness, reduce perceived barriers, promote technical knowledge through on-site and virtual assessments, and provide financial support to commercial customers who want to install charging infrastructure.
- **Programs must be designed to meet customers where they are on their journey**

  Rural customers are not as far along in their EV journey as customers in other areas of the state. This sentiment was supported by survey responses, 83% indicating they agree that utility should do more EV customer education.

DCFC Project

Program Overview

- $4M budget ($116k spent through end of 2020)
- Site host provides make-ready infrastructure for the installation of EVSE
  - Utility rebate (up to 50 percent of the EVSE base cost) if site host owns the EVSE
  - Site hosts that opt out of EVSE ownership pay a participation fee (50% of base EVSE cost)
  - Utility EVSE ownership limited to 35 percent of charging ports
- CLEAResult contracted for online application portal development (PowerClerk)

Evaluation Methodology

- Program data review
- Utility and contractor staff interviews (Nov 2019 & Oct 2020)

DCFC Project

Program Status

- Tier 2 Advice Letters
  - Approved for use of small commercial customer rate with no demand charges as a temporary rate for DCFC infrastructure installed
  - Request for proposal to calculate EVSE base cost to be used to calculate the rebate and participation amounts for all PRPs installing infrastructure
- Online pre-application site launched in Aug 2019
- Working with one site, City of Portola (no agreement signed yet)
- Unable to conduct planned in-person meetings and site visits in 2020, as these were suspended because of the COVID-19 pandemic.
- Projecting the 5 to 9 sites selected to complete construction by Q3 2024

Rebate Programs

Residential Rebate Program Overview

- $1.6M budget ($24k spent through end of 2020)
- Incentivize EV adoption by offsetting the costs of installing residential EVSE
  - First 1,000 qualifying residential customers will receive rebates of up to $1,500
  - Rebate covers permitting, installation, equipment, and service upgrades
- 10-year participation agreement (networked and charging session data)
- Agree to time-of-use (TOU)-EV rate.

Small Business Rebate Program Overview

- $0.3M budget ($17k spent through end of 2020)
- Similar in design to Residential Program with 2 exceptions:
  - Owning or leasing an EV is not required
  - Public access to charging stations must be provided. A rebate of up to $2,500
- Up to $2,500 rebate for the first 100 qualifying small commercial customers

Rebate Programs

Program Status

- The materials for the programs have been developed, including the online application intake and management portal and the Participant Program Handbook.
- The marketing strategy for the programs was being finalized at the end of 2020 and will be ready for deployment when the program is opened. Most initial marketing efforts will be online because of the COVID-19 pandemic.
- The application activity in the residential rebate program will peak in early 2023, and the final projects (of the 1,000-project target) will be completed in Q4 of 2023
- The application activity in the small business rebate program will peak in the middle of 2022, and the final projects (of the 100-project target) will be completed in Q2 of 2023

Customer Online Resource

Program Overview

- $0.24M budget ($27k spent through end of 2020)
- Provide opportunity for residential customers to learn about EVs and for commercial customers to learn about rebates for charging stations
- The residential and small business rebate programs then provide financial support to residential and commercial customers interested in installing charging infrastructure

Program Status

- Contracted with Clean Power Research in 2019 to develop a customized version of their EV savings tool, WattPlan
- The resource will be offered throughout the term of residential and small business rebate programs

PRP Successes and Lessons Learned

- While PRPs are not yet fully deployed, utility has **successfully coordinated marketing and outreach efforts across the PRPs and with local ongoing efforts**

  Liberty will encourage customers to utilize WattPlan, developed under the Customer Online Resource, where, along with information about current vehicle rebates, customers will find details on the residential and small business charger rebate programs

- **Developing complementary programs leverages limited resources**

  With limited internal resources, launching all 4 related PRPs simultaneously allows staff to expand customer awareness, reduce perceived barriers, promote technical knowledge, and provide rebates to residential and small business customers who want to install charging infrastructure.

PRP Successes and Lessons Learned

- **Ten-year data sharing and network service requirements for the residential rebate program presented a significant challenge**

  Customer costs to maintain network subscription would likely exceed rebate value. Negotiating with selected EVSPs for direct access to customer data to alleviate fees.

- **Utility staffing has proven to be a challenge**
  - PRP project manager departure and 8-month delay to hire replacement because of COVID-19 pandemic-related hiring challenges
  - Competing interests for limited staffing resources (management, design, and construction teams), to support several ongoing EVSE installation programs

Destination Make Ready

Program Overview

- $607,500 budget ($75k spent through end of 2020)
- Install, own, and operate the make-ready infrastructure for up to 50 L2 chargers
- 10-year charger operational requirement with EV-TOU rates
- BVES conducting outreach
- Center for Sustainable Energy contracted for program implementation

Evaluation Methodology

- Program data review
- Utility and contractor staff interviews (Nov 2019 & Oct 2020)

Destination Make Ready

Program Status

- Dec 2019 launch with a community outreach and electrical contractor and commercial customers meetings
  - 7 entities expressed interest, 4 in the application process; 3 site visits
  - Engaging the City of Big Bear on 2 sites (no applications yet)
- Engaging with electrical contractors to advise them of installation best practices, working with EV service providers on commissioning process, and assisting interested customers with the application process.
- Additional information mailers targeted to commercial properties because COVID-19 pandemic restrictions are preventing any direct customer engagement (i.e., in-person workshops, education and outreach events)

Destination Make Ready

Successes and Lessons Learned

- BVES has successfully developed all required program materials and launched the program for applications in December 2019
- Customer concerns about limited EVs in the region (lack of four- or all-wheel drive capabilities), loss of parking with installation of EV chargers, and customer participation costs
- The pandemic has increased the cost barrier to EV adoption, as many commercial customers, especially small businesses, are dealing with COVID 19's impact and do not consider installing EV chargers a priority
- Anticipating to install the first commercial EV charging site in 2021 and to complete the last installations by the end of 2022

Small Multi Jurisdictional Utilities PRPs

Public Charging Stations
DCFC Project (Liberty) – **$4M**
Demonstration and Development Program (PacifiCorp) – $0.3M
Destination Make Ready (BVES) – $0.6M

Electrification Promotions
Residential Rebate Program (Liberty) – **$1.6M**
Small Business Rebate Program (Liberty) – $0.3M
Customer Online Resource (Liberty) – $0.3M
Outreach and Education Program (PacifiCorp) – $0.2M

Questions specific to these PRPs?

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Thank You

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