Q4 2019 Clean Transportation Program Advisory Council Meeting

January 29, 2020

Together, Building a Better California

Agenda

Safety/ Introductions	**9:00 – 9:10**
EV Charge Network	**9:10 – 10:10**
• **Program Update**	
• **Lessons Learned**	
BREAK	**10:10 – 10:25**
EV Schools	**10:25 – 11:00**
• **Program Overview**	
• **Proposed Rebate Structure**	

EV Charge Network:
Update

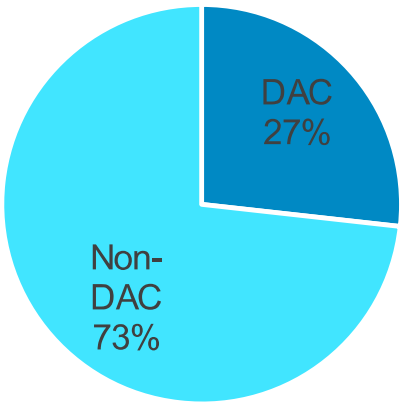
Overall Progress Update

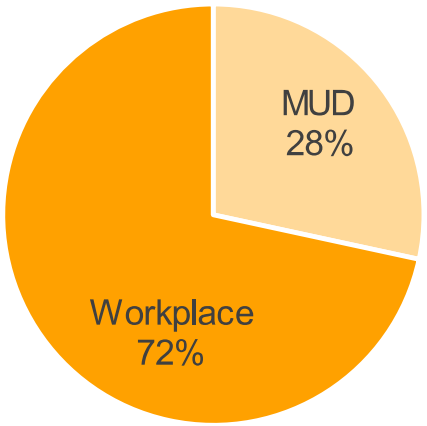
Status as of 12/31/2019

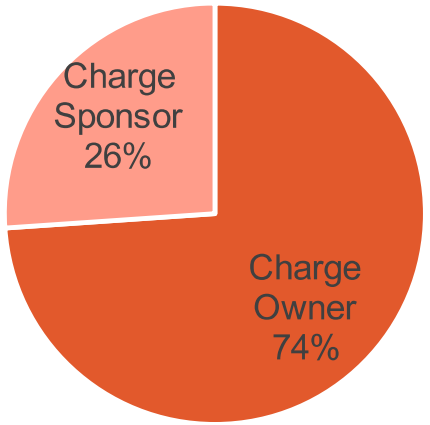
	Ports	Sites
Submitted	15,758	819
Viable	4,894	204
Final Design	3,349	161
Construction substantial complete	2,293	116
Activated	1,769	98

- **Customer acquisition** complete: application portal closed Q2 2019
- **Site eligibility** complete: all customer agreements in place*
- **Final design** at steady capacity, with aim of completing 4,500 final designs by Q1 2020
- **Construction** at steady capacity, with aim of constructing 200-250 ports/month

Installed port portfolio[1]



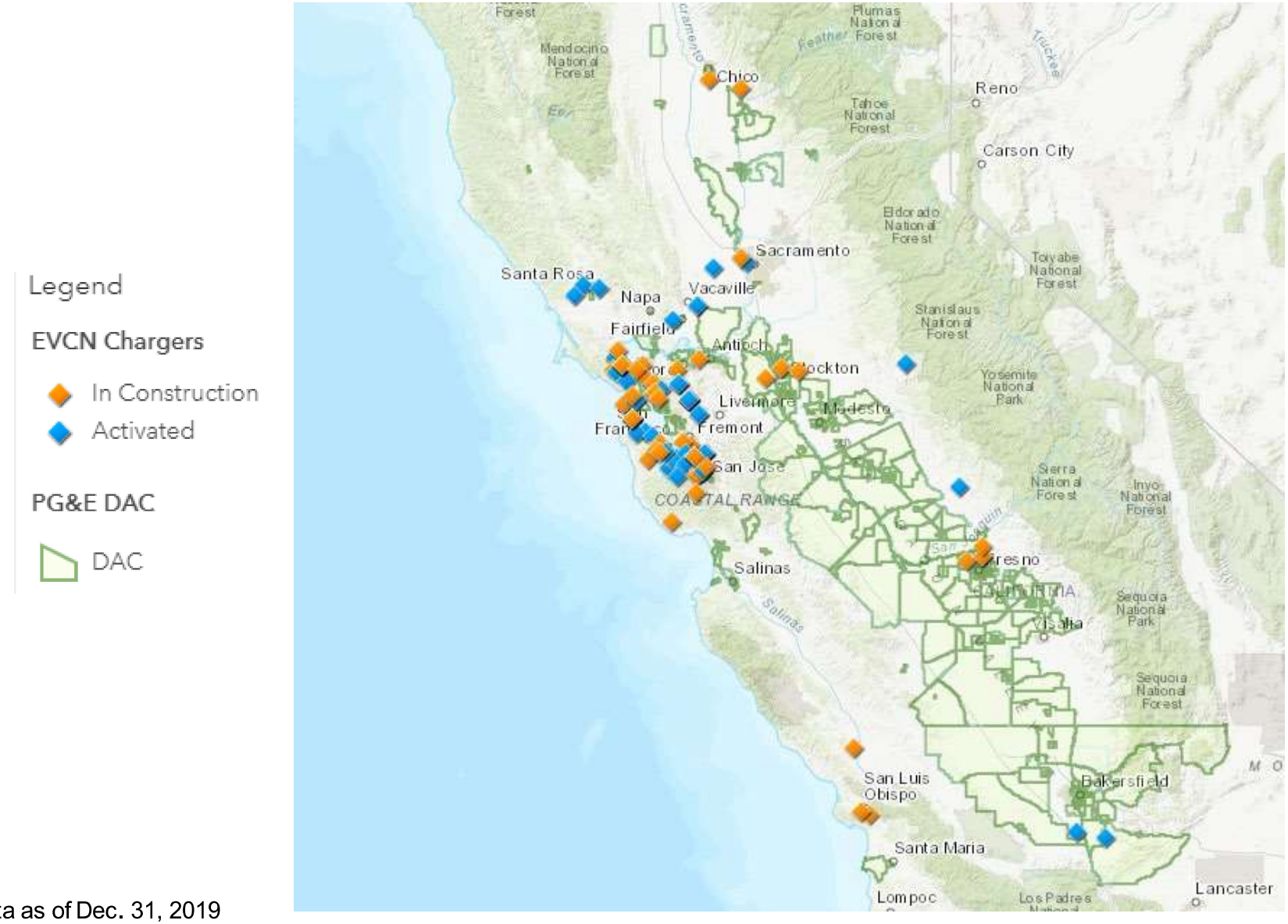




Notes: Data as of Dec. 31, 2019. *If projects are canceled in Final Design, additional projects may be selected from waitlist and result in customer agreements

EVCN Construction and Activation Map

- Activated sites and sites in construction updated on public map
- Sites are summarized by zip code to maintain site host anonymity



Note: Data as of Dec. 31, 2019

EV Charge Network:
Lessons Learned

Behind-the-meter Design Template

PG&E PROJECT # 31455992
ELEMENTS
INSTALLATION OF ELECTRIC VEHICLE LEVEL 2 CHARGING EQUIPMENT
1600 TRAVION CT. FAIRFIELD, CA 94533

SITE INFORMATION

EV SITE ADDRESS:
1600 TRAVION CT.
FAIRFIELD, CA 94533

PROPERTY OWNER:
FAIRFIELD EQUITY FUND LP
1600 TRAVION CT.
FAIRFIELD, CA 94533

CONTACT:
NIA STOCKBRIDGE
(559) 292-9212

POWER COMPANY:
PG&E

COUNTY:
SOLANO COUNTY

LATITUDE (NAD83):
38° 15' 30.74" N
38.2585395°

LONGITUDE (NAD83):
122° 2' 28.41" W
-122.0412254°

APPLICABLE CODES

ALL WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES:

2016 CALIFORNIA BUILDING CODE
2016 CALIFORNIA ELECTRICAL CODE
2014 NATIONAL ELECTRICAL CODE

IN THE EVENT OF CONFLICT, THE MOST RESTRICTIVE CODE SHALL PREVAIL

PROJECT TEAM

LEAD CIVIL ENGINEER:
DAVID MOWRY
(559) 326-1400
DMOWRY@BCF-ENGR.COM

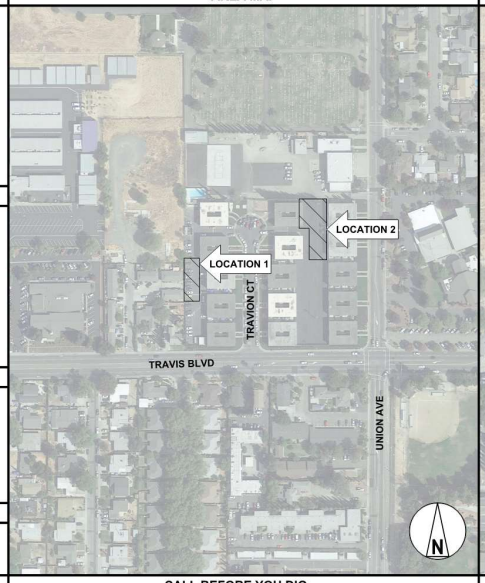
LEAD ELECTRICAL ENGINEER:
BRIAN DUFFY
(559) 326-1400
BDUFFY@BCF-ENGR.COM

PG&E PROJECT MANAGER
GERALD CABRERA
(925) 639-4505
G1CK@PGE.COM

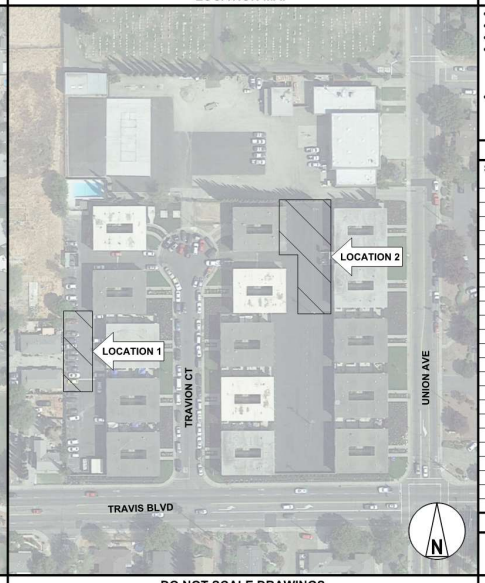
FLOOD HAZARD AREA NOTE

THIS SITE IS LOCATED IN SHADED FLOOD ZONE "X". AREA OF MINIMAL FLOOD HAZARD.

AREA MAP



LOCATION MAP



PROJECT DESCRIPTION

- INSTALL (20) LEVEL 2 CHARGING PORTS
- INSTALL (2) UTILITY METERS
- EACH EV STALL IS ASSIGNED TO A SPECIFIC UNIT/RESIDENT
- CBC 11B-228.3.2 EXCEPTION #1: EVCS NOT AVAILABLE TO THE GENERAL PUBLIC AND INTENDED FOR USE BY A DESIGNATED VEHICLE OR DRIVER SHALL NOT BE REQUIRED TO COMPLY WITH CBC SECTION 11B-228.3.2
- CBC 11B-228.3.2 EXCEPTION #2: IN PUBLIC HOUSING FACILITIES, EVCS INTENDED FOR USE BY ONE EV OWNER OR OPERATOR AT THEIR RESIDENCE SHALL NOT BE REQUIRED TO COMPLY WITH SECTION 11B-228.3.2

DRAWING INDEX

SHEET NO:	SHEET TITLE	REV NO:
T1.0	TITLE SHEET & PROJECT DATA	0
T2.0	GENERAL NOTES	0
T2.1	GENERAL NOTES	0
C1.0	OVERALL SITE PLAN	0
C1.1	DEMOLITION SITE PLAN - LOCATION 1	0
C1.2	DEMOLITION SITE PLAN - LOCATION 2	0
C1.3	ENLARGED SITE PLAN - LOCATION 1	0
C1.4	ENLARGED SITE PLAN - LOCATION 2	0
E1.0	ELECTRICAL PLAN - LOCATION 1	0
E1.1	ELECTRICAL PLAN - LOCATION 2	0
E1.2	SINGLE LINE DIAGRAM - LOCATION 1	0
E1.3	SINGLE LINE DIAGRAM - LOCATION 2	0
E2.0	ELECTRICAL DETAILS - LOCATION 1	0
E2.1	ELECTRICAL DETAILS - LOCATION 2	0
E2.2	ELECTRICAL DETAILS	0
E2.3	COMMUNICATION DIAGRAM - LOCATION 1	0
E2.4	COMMUNICATION DIAGRAM - LOCATION 2	0
S1.0	EQUIPMENT DETAILS	0
S2.0	PRECAST & CIP FOUNDATION FOR HOCKEY PUCK METER PANEL	0
S3.0	PRECAST & CIP FOUNDATION FOR EV CHARGERS	0
R1.0	REFERENCE DRAWINGS	0
R1.1	REFERENCE DRAWINGS	0
R2.0	TITLE 24 DOCUMENT	0

ZONING INFORMATION

PERMITTING JURISDICTION: CITY OF FAIRFIELD
ZONING DISTRICT: RH - HIGH DENSITY RESIDENTIAL

CONTRACTOR NOTE

CONTRACTOR SHALL COMPLETE INSTALL PER THE SIGNED AND THE SEALED SET OF DRAWINGS. ANY NECESSARY DEVIATIONS FROM THE DRAWINGS MUST BE SUBMITTED THROUGH AN RFI REQUEST PROCESS WITH ENGINEERING FOR AN APPROVAL PRIOR TO CONTRACTOR PROCEEDING WITH A DEVIATION OF THE SIGNED AND SEALED SET OF DRAWINGS.

CALL BEFORE YOU DIG

UNDERGROUND SERVICE ALERT
UTILITY NOTIFICATION CENTER OF CALIFORNIA
811 OR 1-800-227-2600

3 WORKING DAYS UTILITY NOTIFICATION PRIOR TO CONSTRUCTION

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK.

ENGINEER OF RECORD

CIVIL
DAVID MOWRY
PE # 54,414
BLAIR CHURCH & FLYNN
CONSULTING ENGINEERS

ELECTRICAL
BRIAN DUFFY
PE # 22220
BLAIR CHURCH & FLYNN
CONSULTING ENGINEERS

PACIFIC GAS AND ELECTRIC COMPANY
P.O. BOX 997300
SACRAMENTO, CA 95899-7300

Blair, Church & Flynn
CONSULTING ENGINEERS

PROJECT NO:	EVSH000413510
DRAWN BY:	BO CAMPBELL
CHECKED BY:	ROBERT FRANCIS

REV	DATE	DESCRIPTION
0	11/20/2019	ISSUED FOR PERMIT

11/20/2019 Date Signed

11/20/2019 Date Signed

PG&E ACCEPTANCE STAMP
ACCEPTED
ENGINEERING DEPARTMENT
By:Steven Ng on 11/21/2019

PG&E PROJECT # 31455992
ELEMENTS
1600 TRAVION CT.
FAIRFIELD, CA 94533

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
T1.0

Behind-the-meter Design Template

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R1.0	REFERENCE DRAWINGS	0
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R2.0	TITLE 24 DOCUMENT	0

ZONING INFORMATION

PERMITTING JURISDICTION: CITY OF FAIRFIELD
ZONING DISTRICT: RH - HIGH DENSITY RESIDENTIAL

Drawing Organization

- Title Sheets
- Civil Sheets
- Electrical Sheets
- Structural Sheets
- Reference Sheets

Behind-the-meter Design Template

PROJECT DESCRIPTION
• INSTALL (20) LEVEL 2 CHARGING PORTS • INSTALL (2) UTILITY METERS • EACH EV STALL IS ASSIGNED TO A SPECIFIC UNIT/RESIDENT • CBC 11B-228.3.2 EXCEPTION #1: EVCS NOT AVAILABLE TO THE GENERAL PUBLIC AND INTENDED FOR USE BY A DESIGNATED VEHICLE OR DRIVER SHALL NOT BE REQUIRED TO COMPLY WITH CBC SECTION 11B-228.3.2 • CBC 11B-228.3.2 EXCEPTION #2: IN PUBLIC HOUSING FACILITIES, EVCS INTENDED FOR USE BY ONE EV OWNER OR OPERATOR AT THEIR RESIDENCE SHALL NOT BE REQUIRED TO COMPLY WITH SECTION 11B-228.3.2

EV ADA Exemption

- **Provide ADA EV Exemption on the First Title Sheet**
- **California Building Code 11B-228.3.2**

Hockey Puck Meter Panel – Front and Back

Customer Side

- 600A Main Breaker
- 40A Branch Breakers
  (up to 32 of them)

PG&E Side

- Hockey Puck meter
- Incoming Service Cables

Pre-cast EV Base (by OldCastle)

Pre-cast EV Base (by OldCastle)

Pre-cast EV Base (by OldCastle)

Load Management

Two Main Load Management Techniques:

1. Panel Level Load Management

2. Pedestal Level Load Management
   (or Circuit Level Load Management)

Panel Level Load Management

Source of image: ChargePoint

Panel Level Load Management

Source of image: ChargePoint

Panel Level Load Management

Source of image: ChargePoint

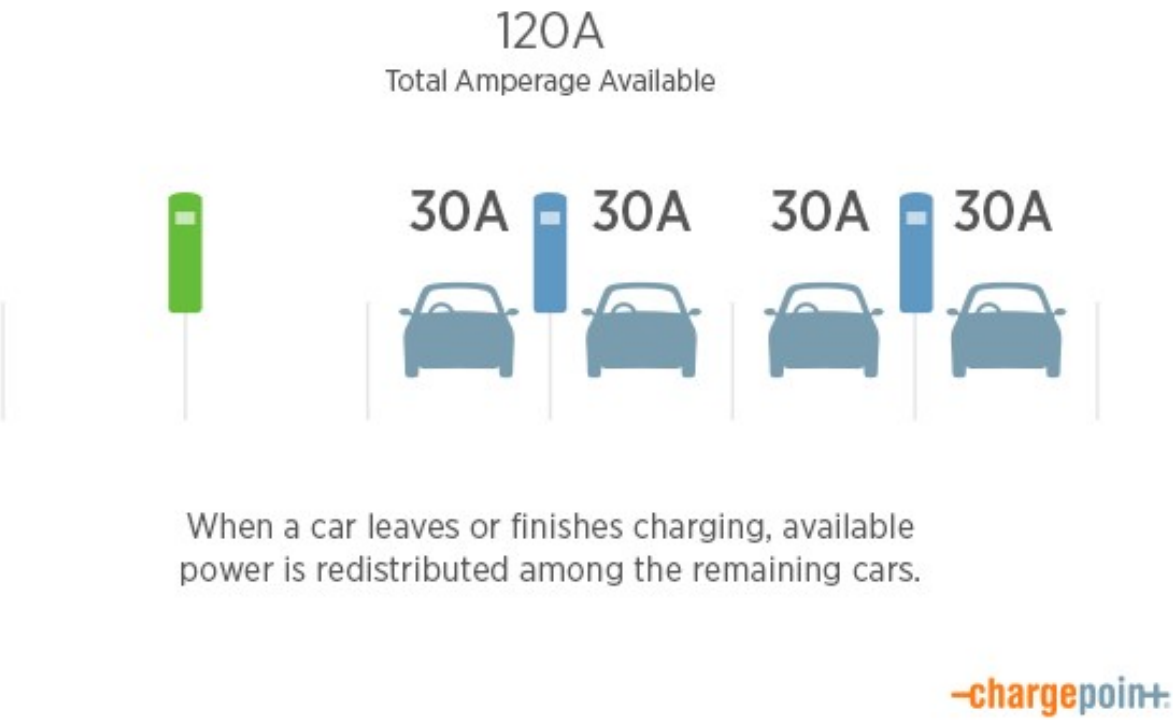
Panel Level Load Management

Source of image: ChargePoint

Panel Level Load Management

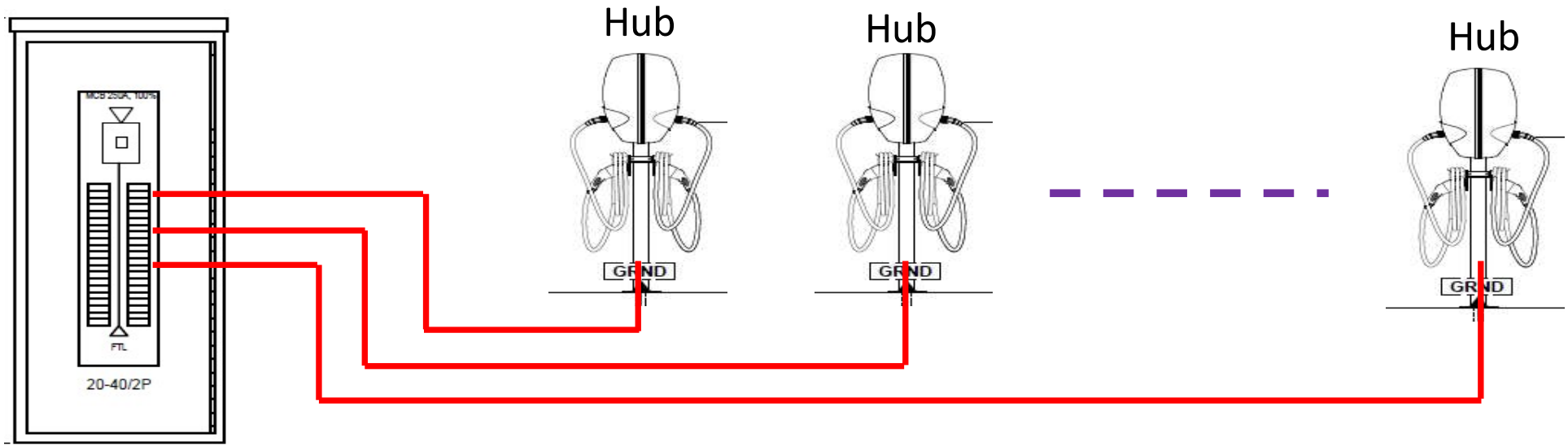
Panel Level Load Management in-practice:

- Successfully installed at large Multi-Unit Dwelling (MUD) complexes
- Example: Installed ~100 chargers with ~45% capacity
- Resulted reasonable deployment cost and acceptable customer charging experience



Source of image: ChargePoint

Pedestal Level Load Management



Share 6.7 kW (or 32A) of power between the 2 chargers at the same pedestal

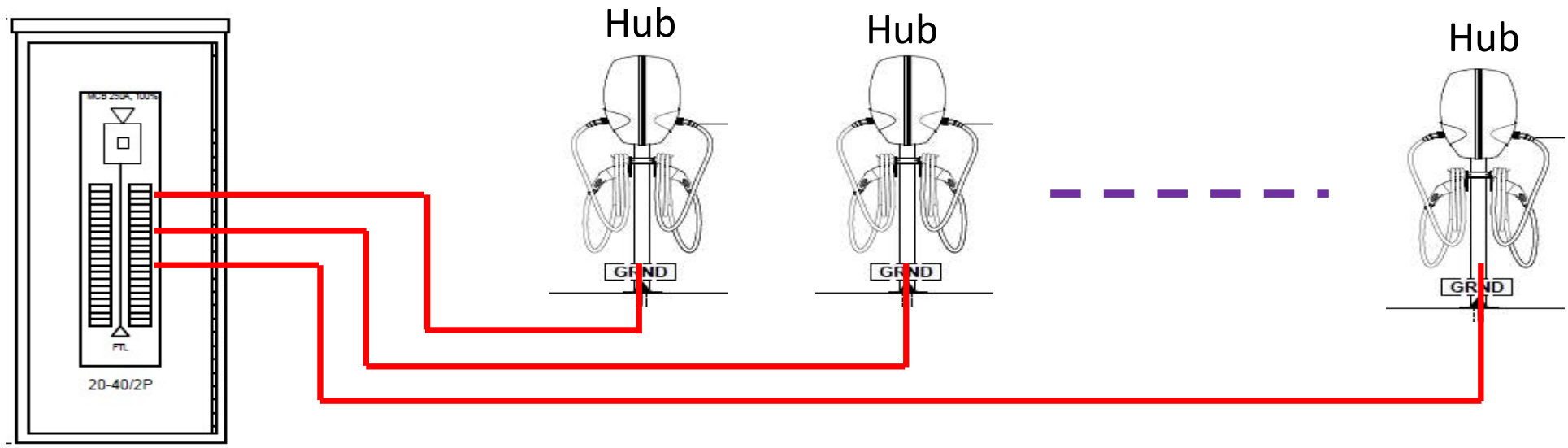
- Use a single 40A branch circuit for each dual port charger location
- Pull only one set of (2) #6 and (1) #8 AWG THWN-2 CU from breaker panel to each of the dual charger location
- Use POWER LIMIT feature to limit the power draw to 6.7 kW (or 32 amps) for the 2 chargers on the same pedestal

Source of image: EV Box

Pedestal Level Load Management

Pedestal Level Load Management in-practice:

- Successfully installed at EVCN site
- Reduce # of 40A breakers by half
- Reduce the utility power requirement by half



- **If only one charger on the pedestal is used, the EV will receive the full 32A**
- **If both chargers on the pedestal are used, each EV will receive half power, 16A**

Source of image: EV Box

Load Management – Case Study (MUD)

- On average, each EV needs 30-50 miles of charging each day.
- On average, Level 2 charger (7.2 kW max) provides 25 miles of RPH (Range Per Hour)
- MUD customers typically connect the EV at night for charging from 11 pm to 7 am.
- Under the worst case when all chargers are connected with the 50% load management implemented, it takes 4 hours to provide 50 miles of charging range.
- All EV will be fully charged when the car is used at 7 am.
- During the day time hours, it is expected most of EV are out. It is expected the user will receive full 32A power during day time use.

Load Management – Heavy Commuter

- Hey! I am a heavy commuter and need **100** miles of charging each day.
- Under the worst case when all chargers are connected with the 50% load management implemented, it takes 8 hours to provide 100 miles of charging range.
- From 11 pm to 7 am, that's exactly 8 hours.
- My EV will be fully charged when I pick up the car at 7 am in the morning.
- I am happy.

Break

Together, Building
a Better California

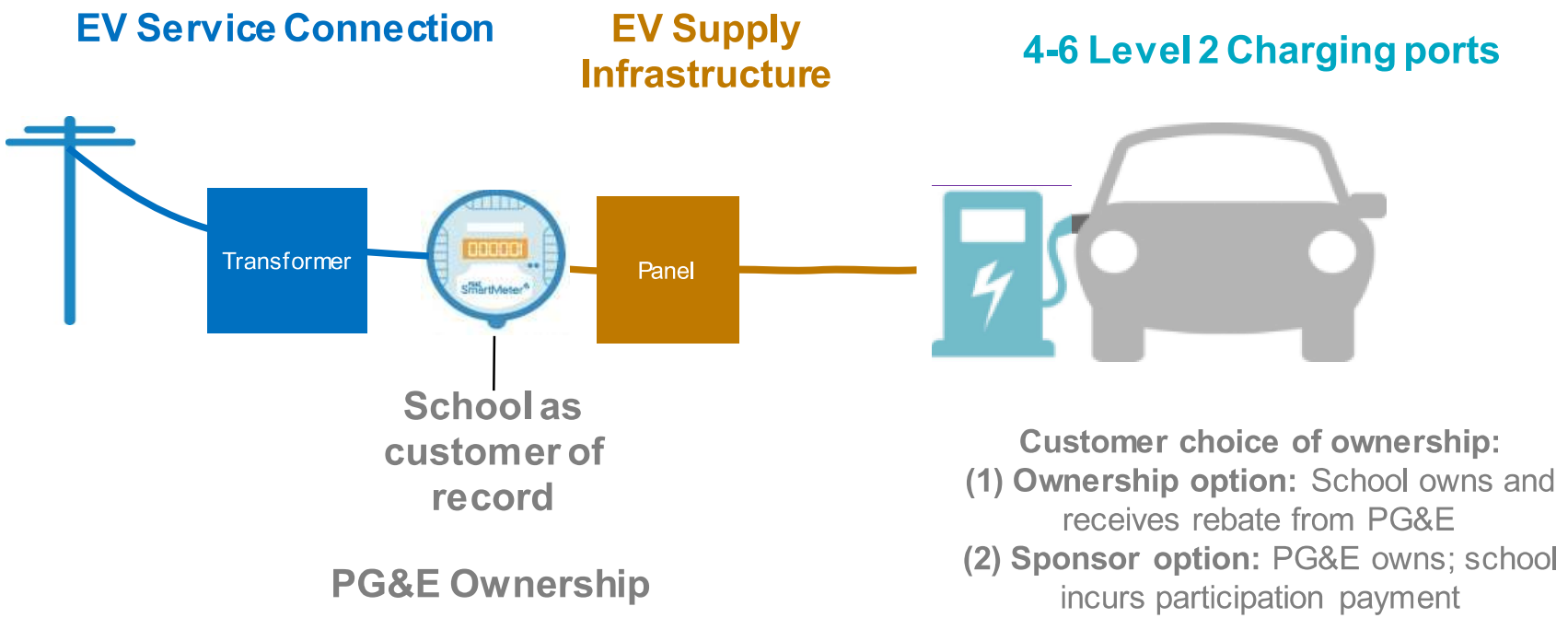
EV Schools

EV Charge Schools

Program Summary:

- **Scope:** 20 campuses, 80-120 ports
- **Time/Budget:** 2-year, ~$5.8M
- **Sites:** Lower and Higher Education–4-6 charge ports per site
- **Incentives:** Rebates or participation payment based on site ownership

EV Charge Schools Site Design



EV Charge Schools Proposed and Modified Rebate

PG&E Proposed Rebate Structure

PG&E proposed a rebate/participation structure similar to EV Charge Network

Ownership option:

- Site owns the charger receives rebate **equal to the base cost of charger**
- Site host pays ongoing network/maintenance costs

Sponsor option:

- PG&E owns the charger, site host pays a participation payment
- PG&E pays ongoing network/maintenance costs

CPUC Modified Rebate Structure

CPUC adjusted rebate structure to provide higher incentive for site host ownership

Ownership option:

- Site owns the charger receives rebate **equal to the cost of the charger and ongoing network/maintenance costs**
- Site host pays ongoing network/maintenance costs

Sponsor option:

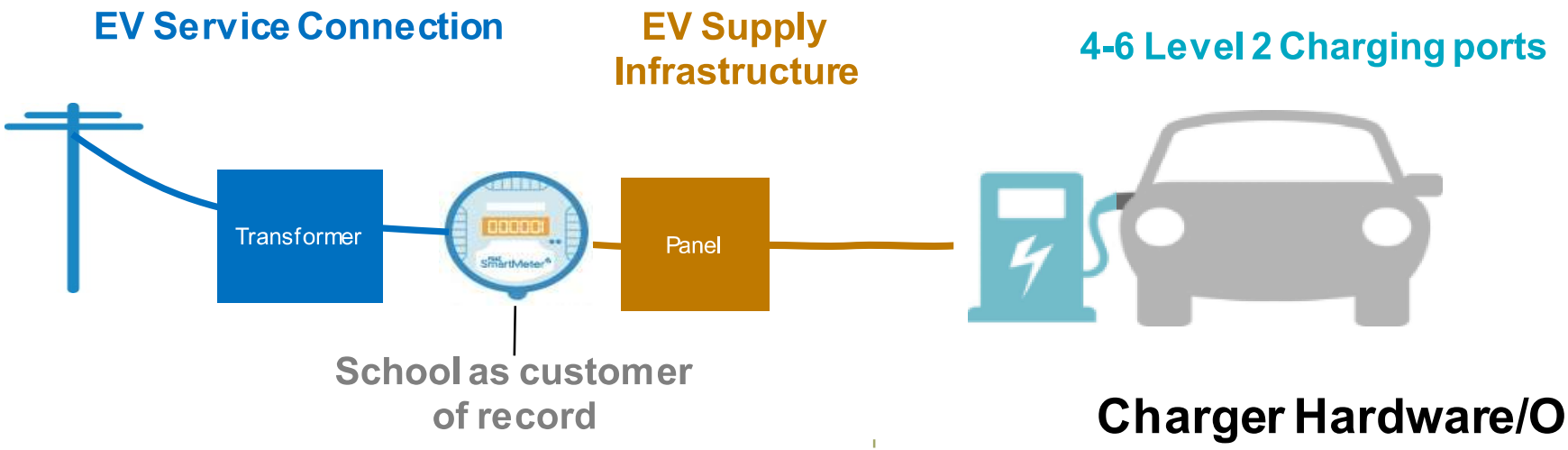
- PG&E owns the charger, site host pays a participation payment
- PG&E pays ongoing network/maintenance costs

CPUC directs utilities to determine how the site host rebate will be calculated and distributed

EV Charge Schools Rebate Structure

Make Ready

- PG&E responsible for design and construction of EV Service Connection & Supply Infrastructure (Make-Ready)
- PG&E covers full cost of the infrastructure



Charger Hardware/O&M

- Site Host responsible for charger hardware, ongoing operation and maintenance
- PG&E provides upfront rebate includes one-time charger cost and 8-year cost of network and maintenance

EV Charge Schools Rebate Structure

Site Host Rebate Calculation:*

Rebate Cost Data

- Hardware, network and maintenance is consistent with equipment from EV Charge Network
- PG&E will leverage cost from EVCN RFP/RFQ to develop rebate amount
- Standard warranties will be included in cost of charger hardware

Next Steps

- File a tier-3 Advice Letter with rebate calculation and supporting documentation

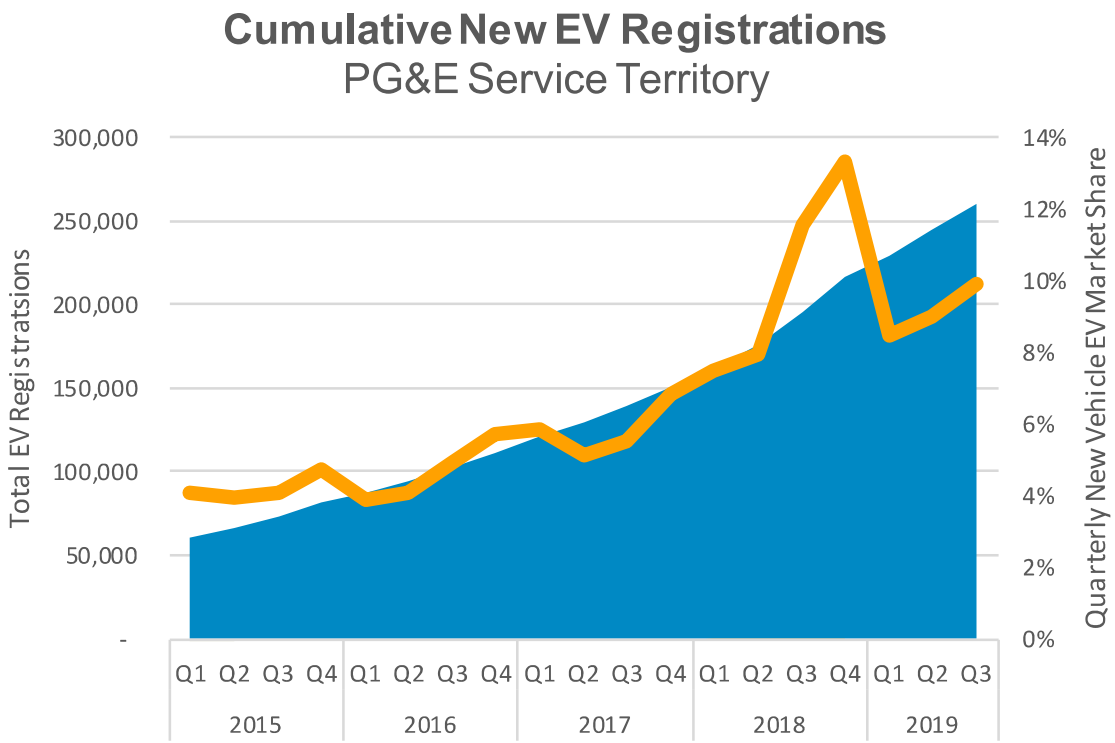
**Aligned with SCE and other IOUs*

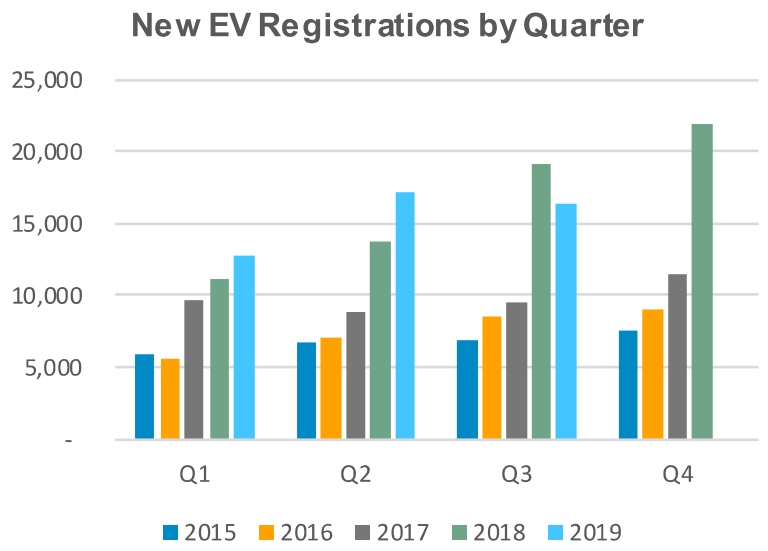
Appendix

EV Market Update

Q4 2019 EV Market Update

270,557 **EVs registered** in PG&E service territory, through November of 2019





Source: EPRI, Based on external registration data through Nov 2019

EV Charge Network

Summary of Ports and Installation Time

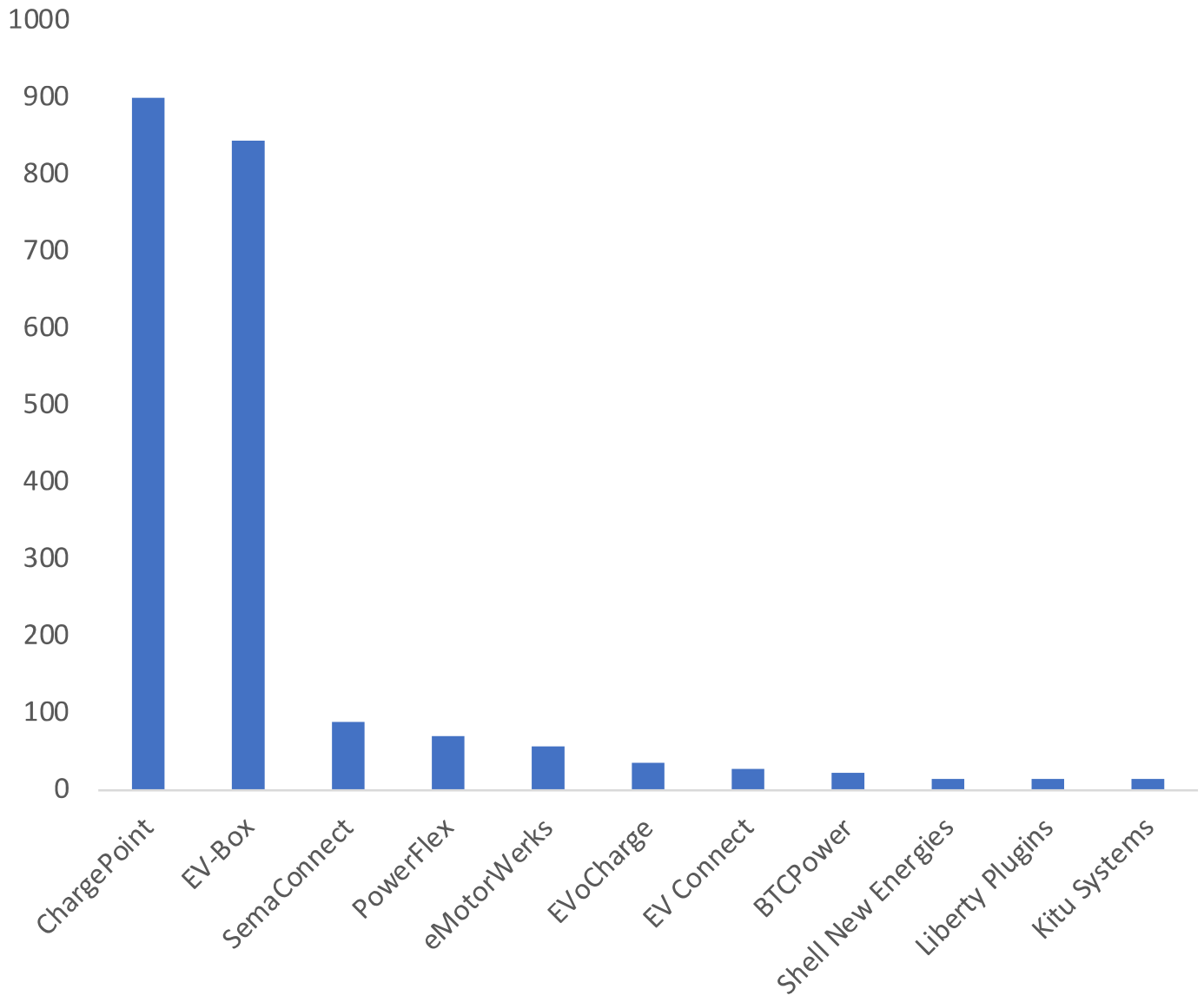
Port Approvals and Installations *Cumulative and averages for EV Charge Network program through Q4 2019*	
Number of total ports approved	4894
Number of ports installed	2293
Average number of ports approved per site	24
Average number of ports installed per site	19

Average site construction and charger installation time *Averages for EV Charge Network program through Q4 2019*	
Average Q4 total construction duration (in days)	46
Average Q4 total charger installation time* (in days)	6.2

*This is the duration of the installation of the chargers on top of the make-ready infrastructure.

Note: Data as of Dec. 31, 2019

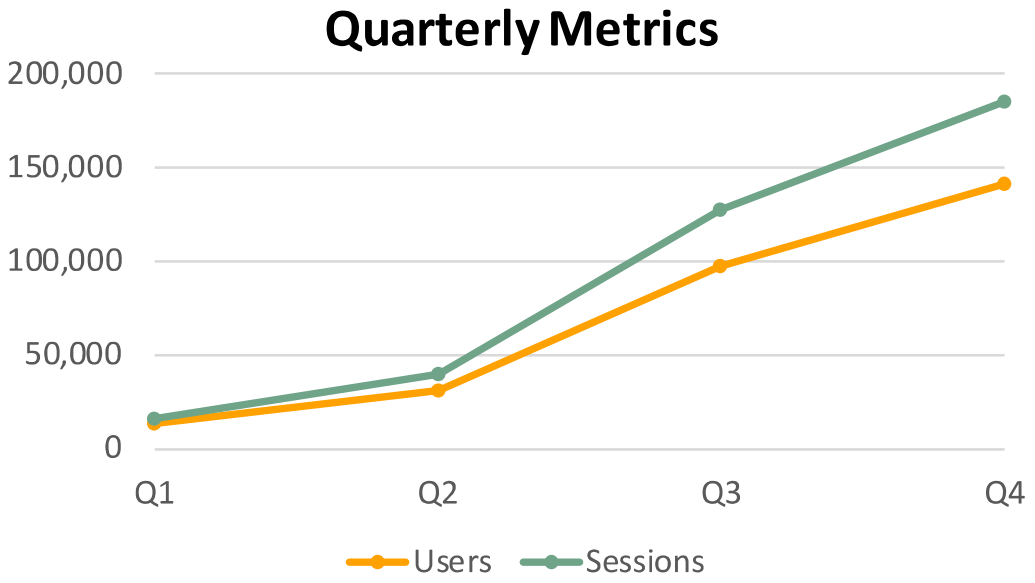
Installed Ports per Primary Vendor

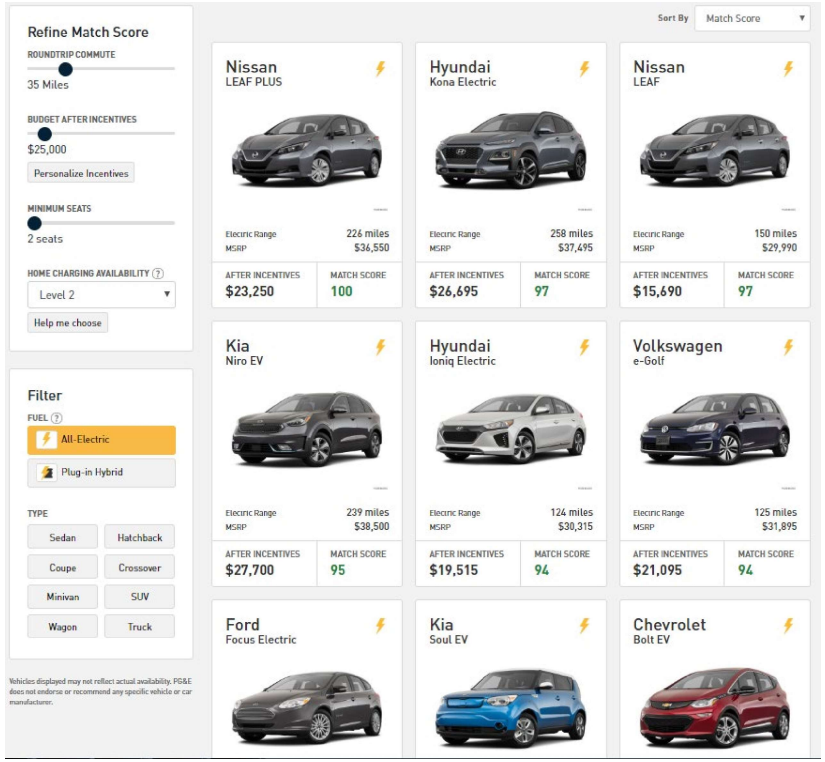


Note: Data as of Dec. 31, 2019

EV Savings Calculator ev.pge.com

PG&E tool	2019 unique users	2019 total sessions
Solar calculator comp.	n/a	~35,595 *
EV Savings Calculator	**141,000**	**185,000**



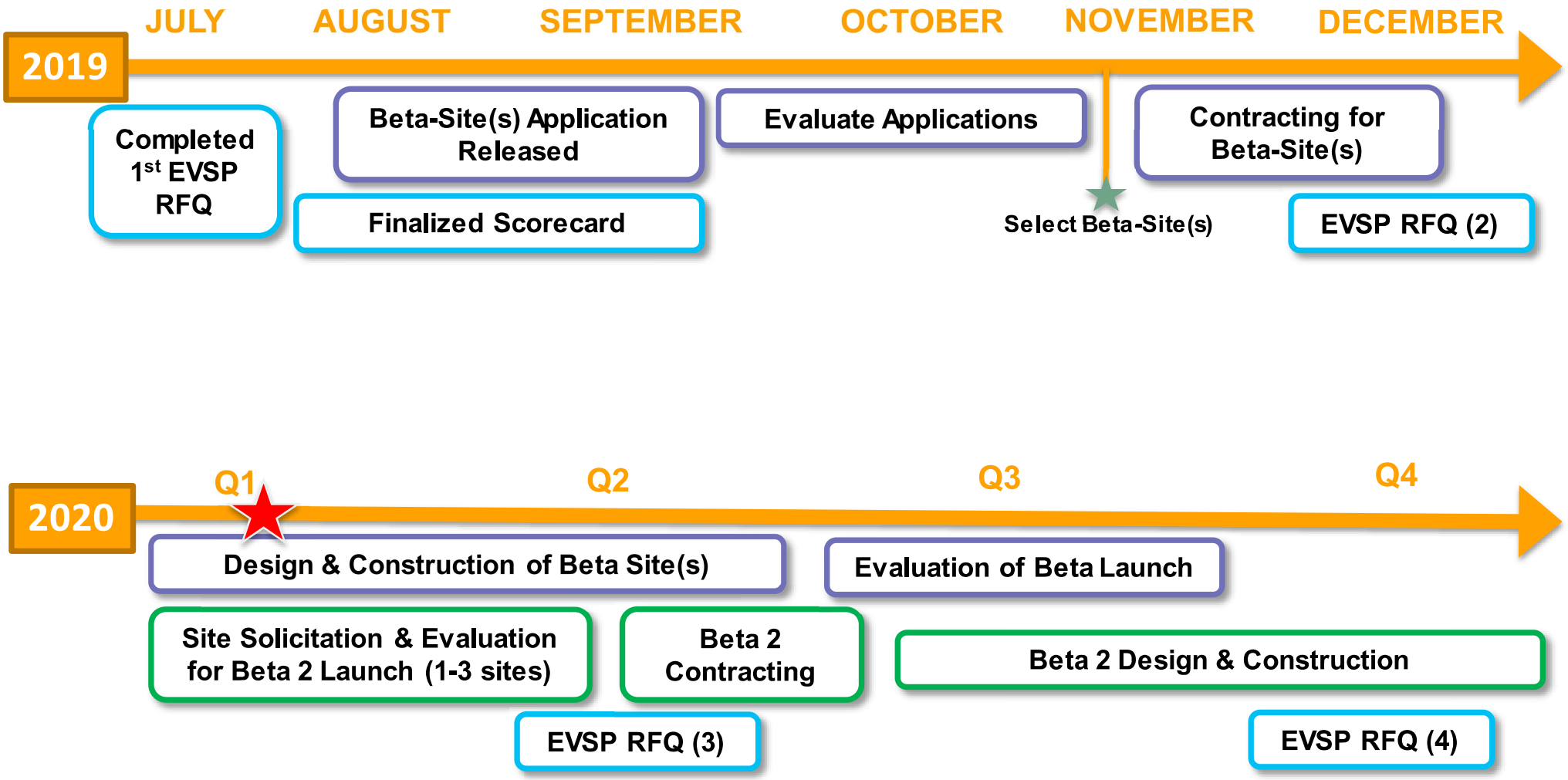


- >5,800 total hours of engagement in 2019

*There is no active marketing campaign for the solar calculator

EV Fast Charge & EV Fleet

EV Fast Charge Timeline



Updated list of qualified EVSPs for Fast Charge

Four new vendors qualified in January as EVSPs

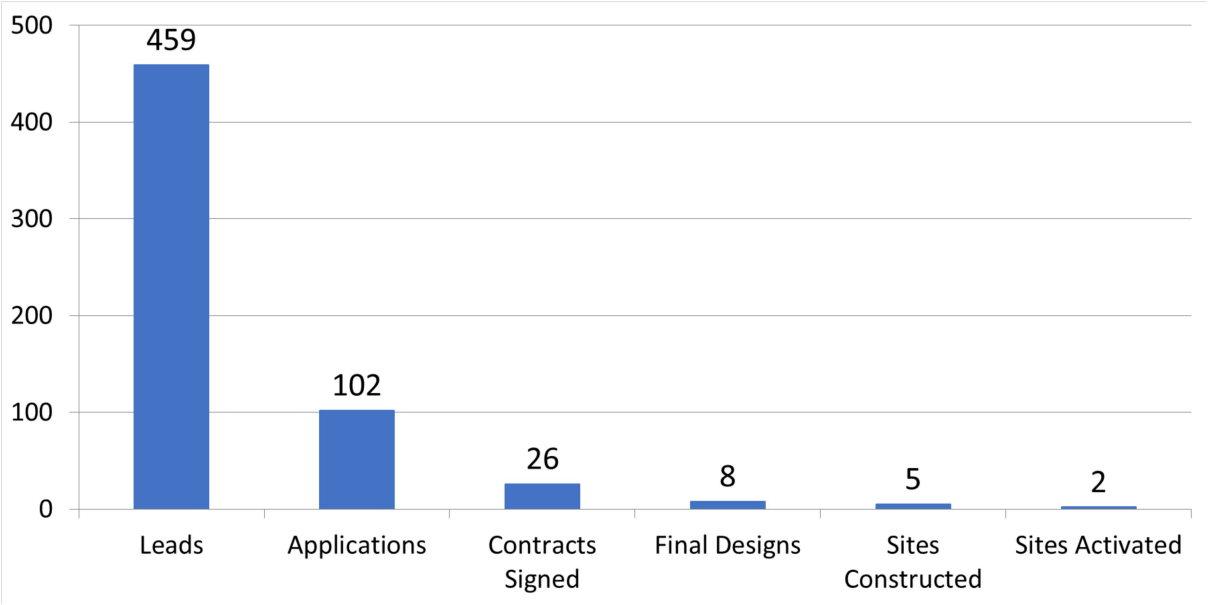
Qualified in June 2019

Vendor	Hardware Used
chargepoint	ChargePoint
EVgo	ABB BTC
evconnect	ABB BTC EFACEC TRITIUM
EVGATEWAY	BTC TRITIUM
greenlots	ABB EFACEC TRITIUM
TRITIUM	TRITIUM
VERDEK	ABB EFACEC TRITIUM
VOLTA	ABB

Qualified in December 2019

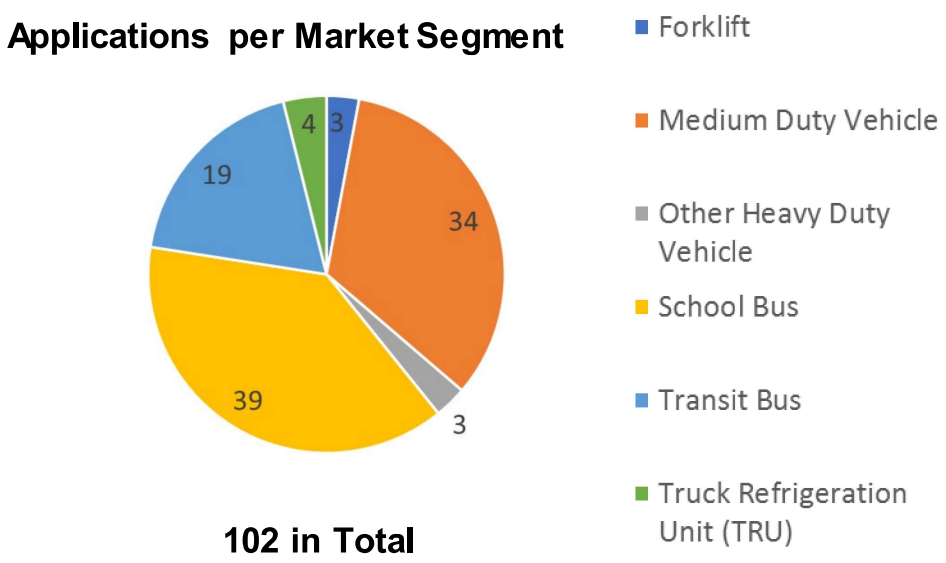
Vendor	Hardware Used
Enel North America	Tritium
National Car Charging	ChargePoint
Oasis Charger Corp dba JuiceBar	Efacec Tritium
Siemens Energy, Inc.	Tritium

EV Fleet Application Pool



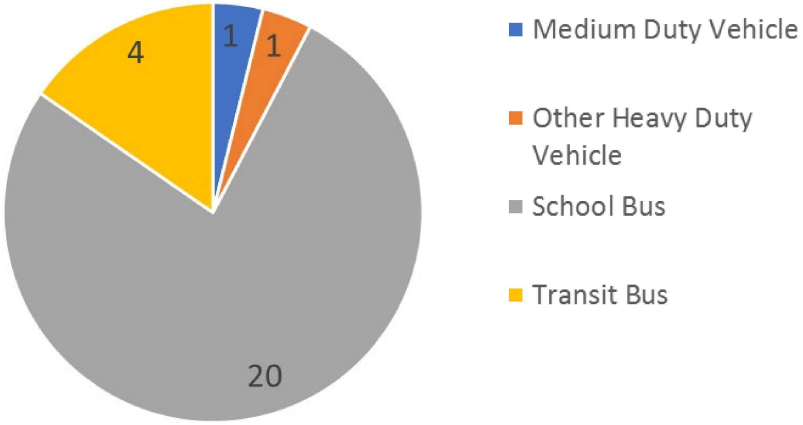
Highlights

- As of Q4 2019, PG&E has contacted 459 leads to increase participation in the program
- Of those, 102 have submitted applications, 26 have signed contracts, and 5 have construction complete
- The below pie charts give a breakdown of the applications per market segment and the number of vehicles estimated to be procured by these customers



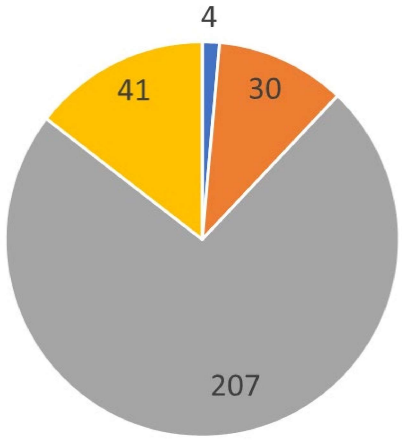
EV Fleet Signed Contracts

Contracts per Market Segment



26 in Total

Contracted Vehicles per Market Segment



282 in Total

HIGHLIGHT

We are currently experiencing more success with Schools since many of them receive Grants which provide important financial support towards their electrification goals