NARUC Electric Vehicles State Working Group

FLEXIBLE INTERCONNECTION

JULY 15, 2025, 3:00 - 4:30 PM ET

Welcome

EV SWG Chair

Commissioner Katherine Peretick, Michigan Public Service Commission

EV SWG Vice Chair

Commissioner Milt Doumit, Washington Utilities and Transportation Commission

EV Commission Staff Leads

Steve Olea, Arizona Corporate Commission

Benjamin Baker, Maryland Public Service Commission

NARUC Staff

Danielle Sass Byrnett

Agenda

Feel free to enter questions into chat at any time

3:00 PM	**Welcome and Announcements: Commissioner Peretick** • Agenda review • Announcements
3:10 PM	**Speakers:** Tom Ashley, Voltera Alex Portilla, PG&E Roger Salas, SCE
4:00 PM	**Member Discussion**
4:30 PM	**Adjourn**

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Fleet Interconnection

NARUC EV Working Group

July 15, 2025

Introduction to Voltera

Voltera invests in, develops, constructs, and operates EV charging infrastructure tailored to meet the needs of electrifying fleets and businesses – aimed at enabling speed and scale in the transition to electrification.

Voltera is backed by EQT's private-equity infrastructure fund and supported by a first-of-its-kind commercial debt facility.

Voltera's team boasts decades of experience across the EV charging landscape. We package our expertise in real estate, software, hardware, facility operations, and security into a contract that allows customers to operate efficiently on their own terms.

Voltera launched in 2022 and has delivered 8 EV charging sites totaling 228 charging stalls and 22MW of charging capacity across key U.S. regions.

Voltera Charging Sites – Operating & In Development

Heavy Duty Sites – Open

Light & Medium Duty Sites – Open or Scheduled for 2025 Go-Live

Future Sites –

In Development or Being Explored

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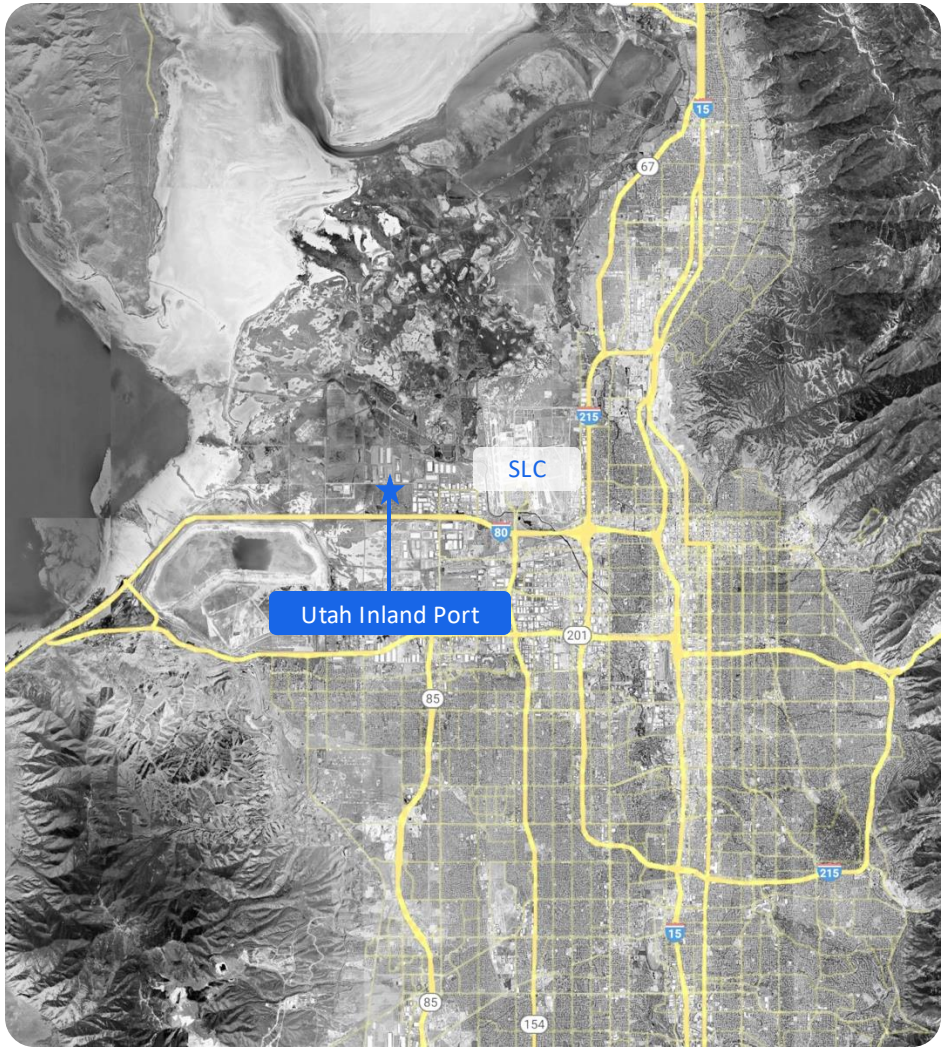
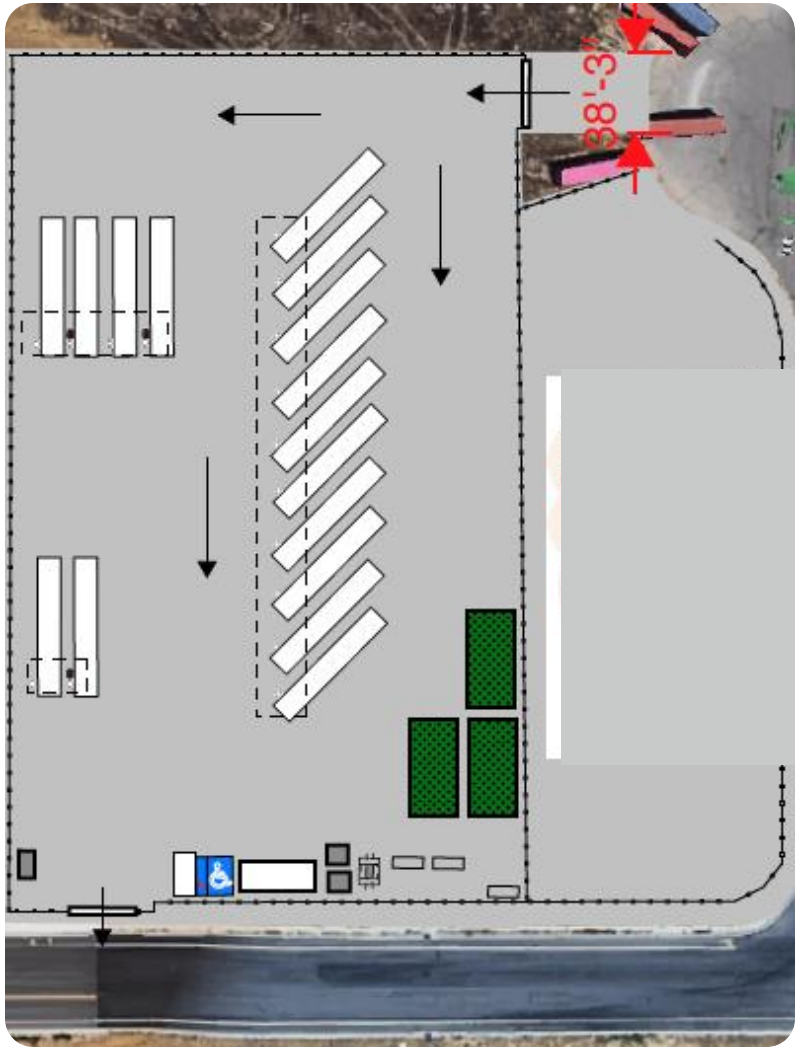
Utah Inland Port, Salt Lake City, UT





Project Overview

1. Minimum 10 350kW DCFC charging stalls; 3 dual-capacity MCS chargers (all pull-through)
2. Vehicle Type: Class 8 Trucks
3. Delivery Target: Q2 2027

Site map depicts:

- 10 350 kW DCFC stalls (center)
- 3 dual-capacity MCS chargers, with 2 stalls per charger (left)
- Battery storage (bottom right)

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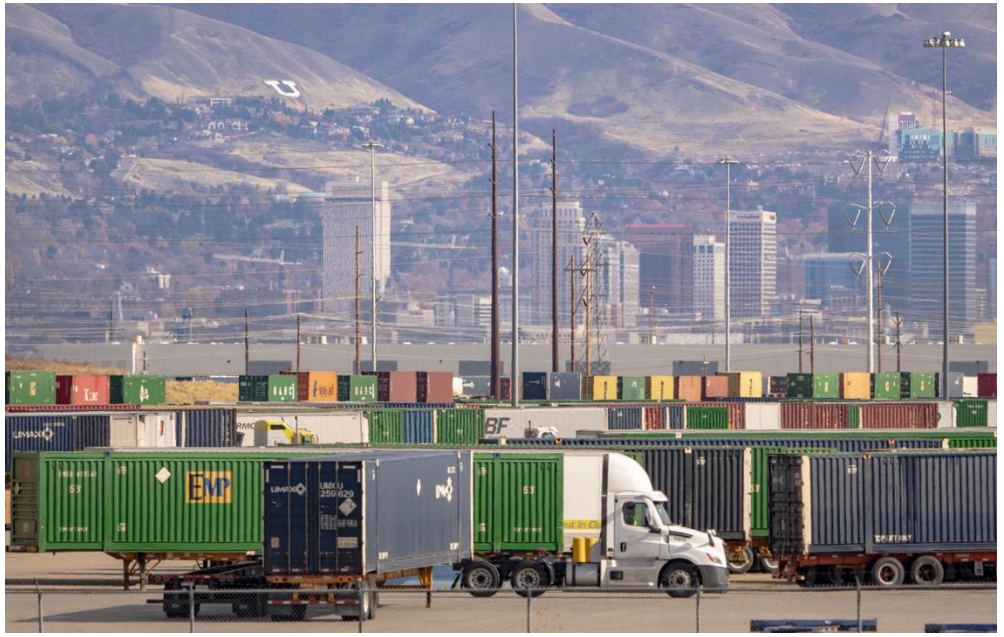
U.S. DOE SuperTruck Charge Concept – Utah Inland Port

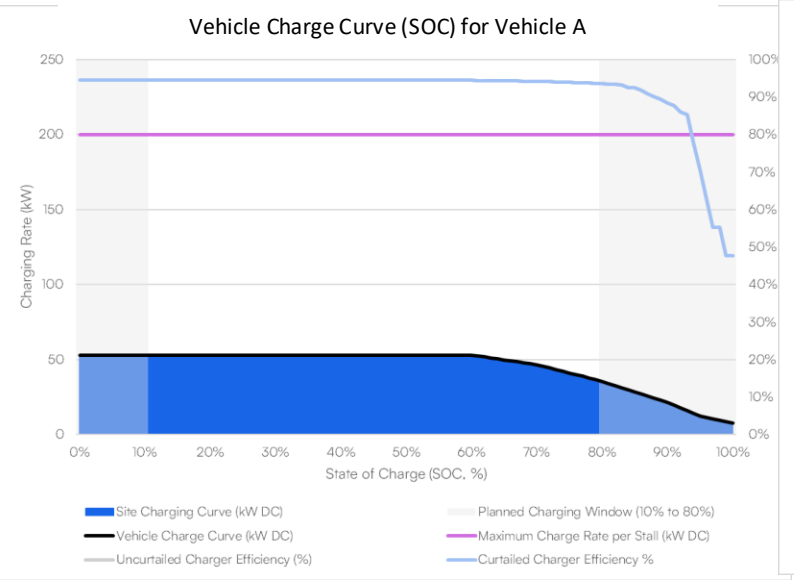
Voltera partnered with Utah State University's ASPIRE Center and partners on an application for the DOE's SuperTruck Charge Grant Program. The project was selected to receive $22 million and would build the state's first dedicated charging station for MHD truck operations.

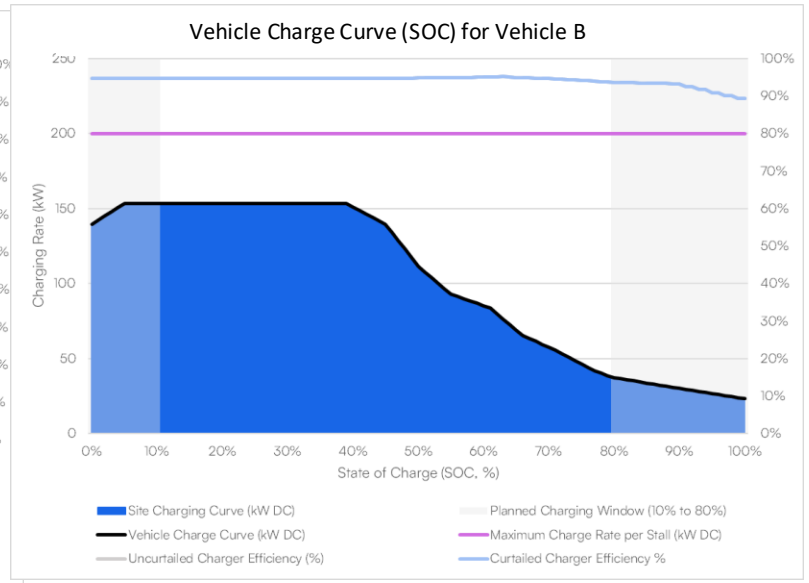
- **Scope:** 10 DC fast chargers (DCFC), interoperable megawatt charging system (MCS)/DCFC equipment (3 MCS chargers and 9 DCFC chargers combined), solar + BESS
  - Project includes megawatt in-road wireless charging
  - 9 MW of concurrent charging and 12 MW of installed EV charging capacity; grid solutions will maintain power to draw less than 4.5 MW from the grid
  - Many of these technologies only pencil out with funding support.
- This project would be complimented by the Utah Inland Port's $110M Clean Ports Program award.

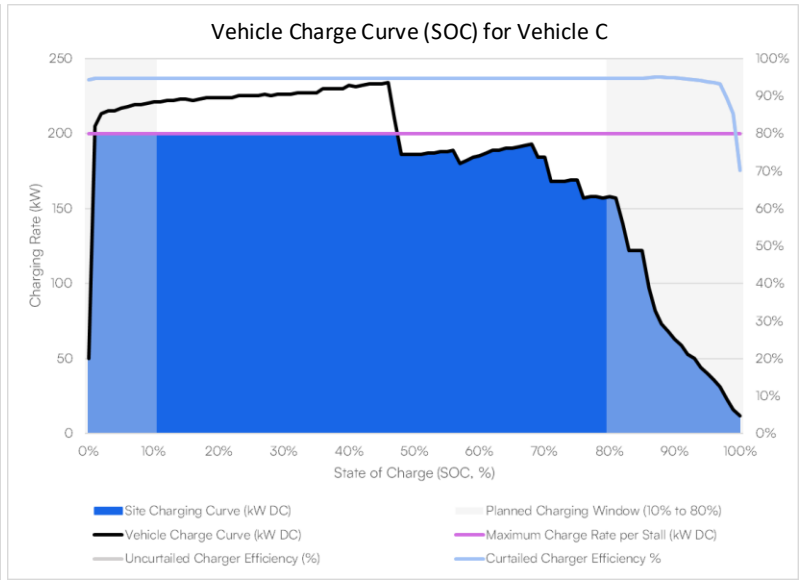


Utah Inland Port via Salt Lake City Tribune

Charge Curve Comparison







Vehicle	Vehicle A	Vehicle B	Vehicle C
Maximum Charge Rate (kW)	53	154	234
Average Charge Rate (10%-80%, @ 200 kW peak) (kW)	50	94	190
Energy (10%-80%) (kWh)	60	61	54
Charge Time (mins)	65	38	15 (16 @ 200 kW)
Minimum Cycle Time (mins)	1.41	0.83	0.35

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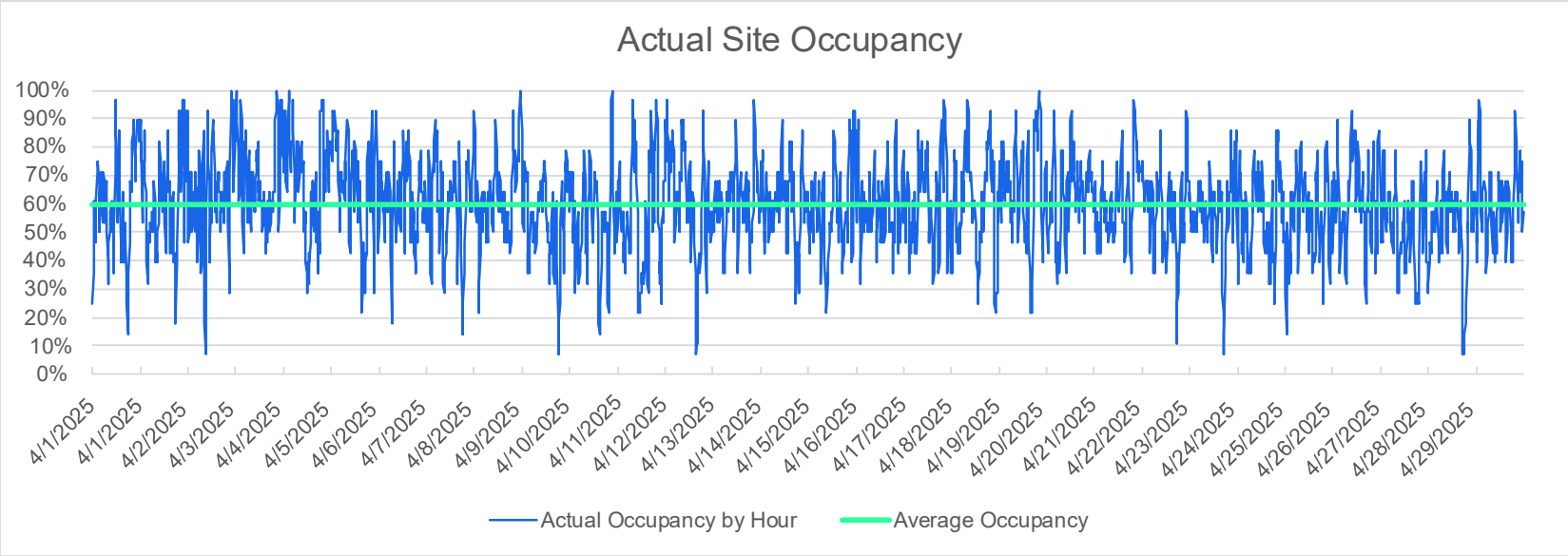
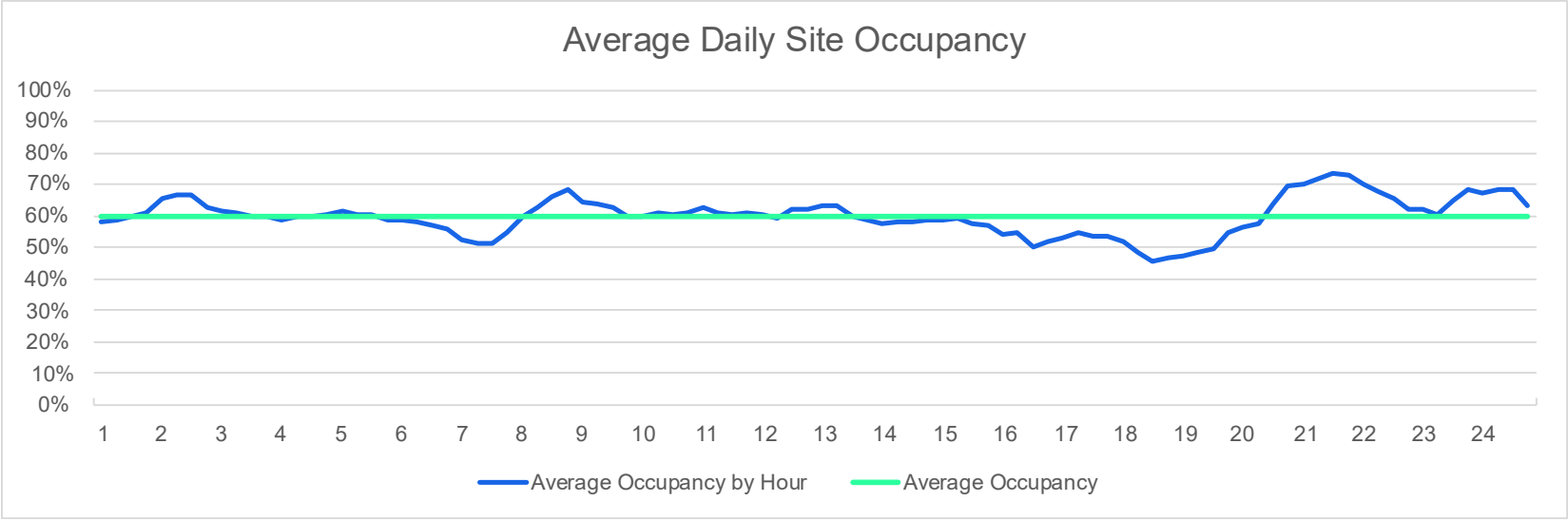
Daily Load Profile





Actual Site Occupancy from a sample 28 stall site. Occupancy is measured as a stall with a charging vehicle in each 15 minute window.

Note that there are several hours throughout the month where the site is 100% occupied with charging vehicles.

Average Occupancy by hour from the above data, which can be used to extrapolate energy usage and energy profiles.

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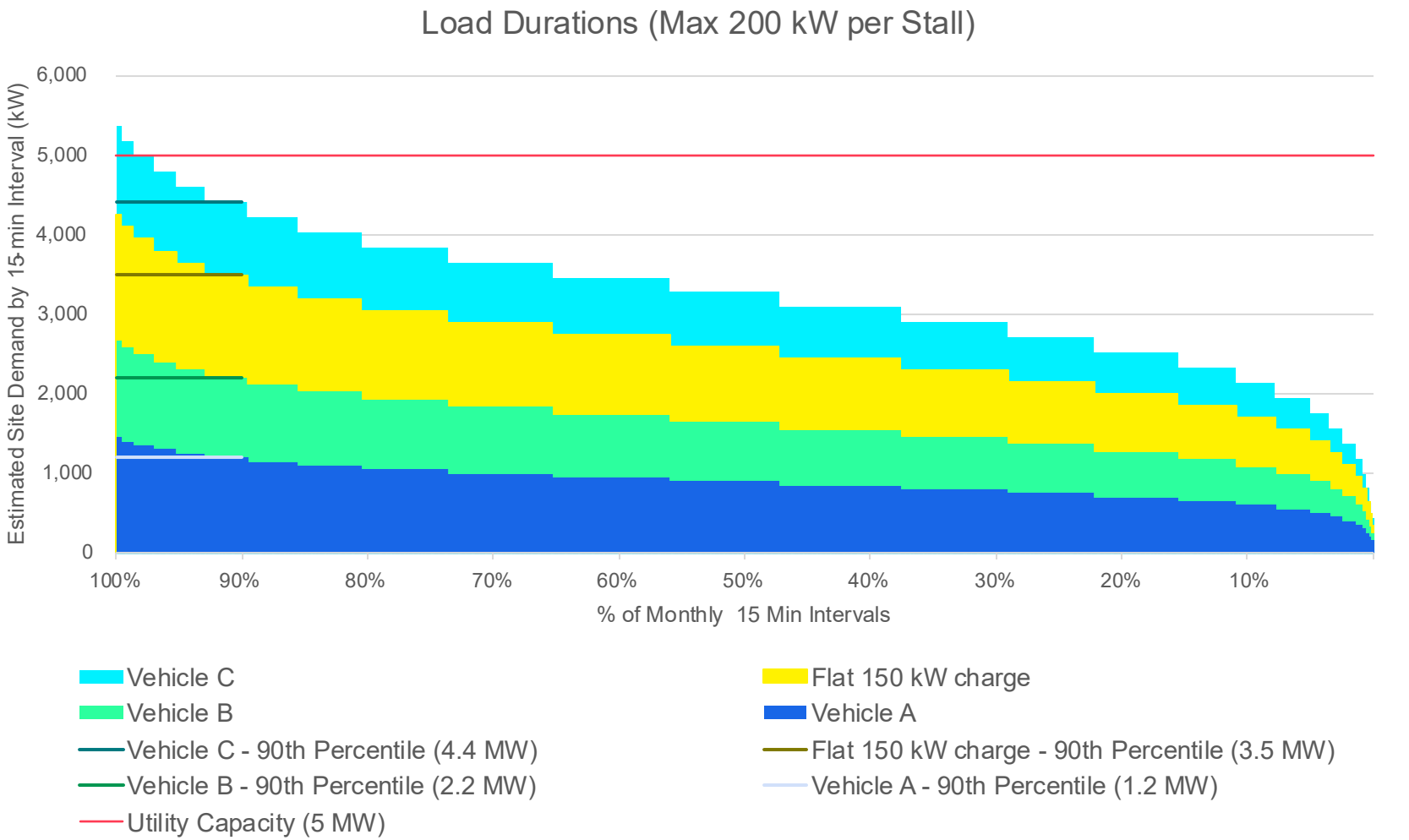
Load Durations



The chart at left shows the estimated % of monthly hours that the overall charging load is at, or below the indicated kW load.

Voltera will use a charge management system to ensure site loading does not exceed 5 MW (2.5 MW on each transformer)

The 90th percentile has also been shown for each vehicle type (i.e. the load which the site is at, or under for 90% of the monthly hours).

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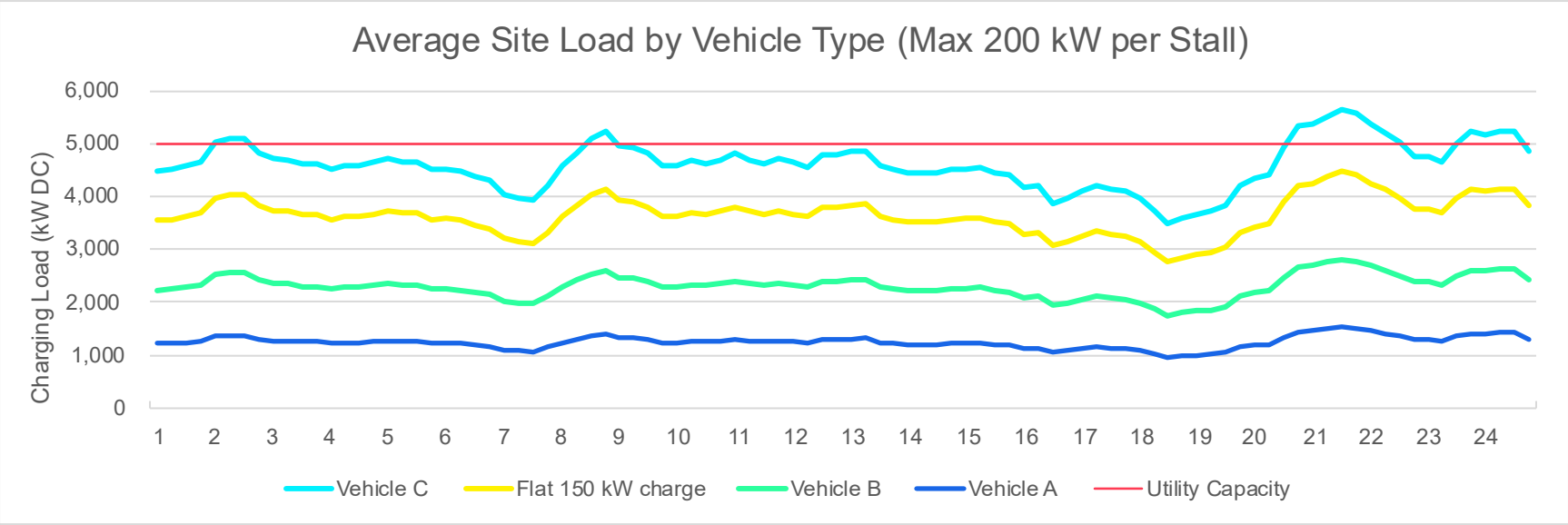
Daily Load Profile



Vehicle	Monthly Estimated Energy Use (kWh)
Flat 150 kW Charge (mixed fleet, Year 3+)	2,626,000
Vehicle A (Year 1 and 2)	899,000

The chart shows the average site load based on the load profile from the previous slide. Note that the site will have higher peaks when the site is 100% occupied and vehicles are charging at full load. Any loads above the utility threshold will be curtailed to limit maximum total site import power below the capacity of the utility feed.

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Thank You!

Tom Ashley
Vice President, Government & Utility Relations
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PG&E Flexible Service Connection

Program Overview

July 2025

PG&E | Clean Energy Technology Platforms

Grid Research Innovation & Development

Building the grid of the future, today.

PG&E's Flexible Service Connection Concept

Flexible Service Connection is a bridge solution that aims to allow customers with controllable loads to connect to the system without waiting for a service upgrade

Customer Value

Quicker connections

- Avoid Long Wait Times
- More Available Energy
- Improved Utility Partnership

Distribution Value

Improved customer experience

- Unlock Available Capacity
- Higher Grid Utilization
- Operational Flexibility

Energy System Value

Support industry goals

- Timely Energization
- Cost Effectiveness
- Manage Grid Constraints

Real World Example of Potential Benefits

Hour of the Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
1	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
2	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
3	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
4	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
5	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
6	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
7	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
8	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
9	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
10	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
11	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
12	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
13	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
14	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
15	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
16	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
17	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
18	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
19	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
20	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
21	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
22	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%
23	71%	71%	71%	20%	20%	20%	20%	20%	20%	20%	71%	71%

STATUS QUO: Planning Limits for 3.8MW EV Charging Station

Hour of the Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
5	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
6	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
7	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
10	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
11	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
12	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
13	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
14	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
15	100%	100%	100%	100%	100%	100%	100%	100%	87%	100%	100%	100%
16	100%	100%	100%	100%	100%	100%	89%	94%	83%	100%	100%	100%
17	100%	100%	100%	100%	100%	100%	75%	83%	71%	100%	100%	100%
18	100%	100%	100%	100%	100%	100%	59%	68%	64%	100%	100%	100%
19	100%	100%	100%	100%	100%	100%	63%	66%	56%	100%	100%	100%
20	100%	100%	100%	100%	100%	100%	64%	66%	59%	100%	100%	100%
21	100%	100%	100%	100%	100%	100%	75%	76%	73%	100%	100%	100%
22	100%	100%	100%	100%	100%	100%	85%	87%	84%	100%	100%	100%
23	100%	100%	100%	100%	100%	100%	85%	94%	88%	100%	100%	100%

FLEX CONNECT: Can Support Full Request ~90% of the time on Average

Key Takeaway – If a customer can reduce consumption for 3 months during 3-11PM we can serve their full load request

Flexible Service Connection Operations

24hr ahead DER customer import limits (aka Dynamic Operating Envelope)

Enabling customers with eligible loads to connect sooner by dynamically managing consumption based on grid availability

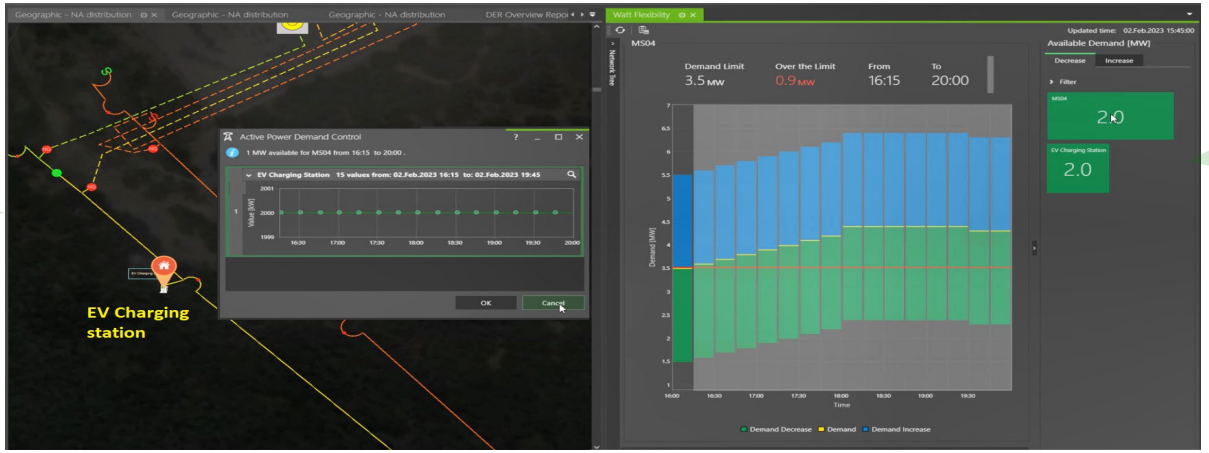
Customer and DER data

Flexible service parameters

Network connectivity data

Historical data

Weather data



Determine dynamic site limit

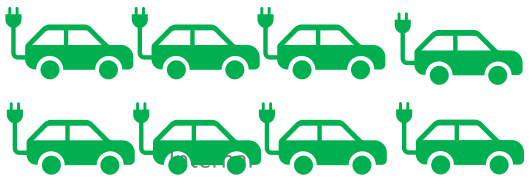
Detect feeder loading capacity constraints

Re-calculate flexible capacity

IEEE 2030.5 Dynamic Operating Envelope

Telemetry

Dynamic site limits



Flex Connect Benefits Report Example – June 2025

Site Details

Site Name: Pepsi Bottling Company

Asset Type: EV Charging (Tesla Semi-Trucks)

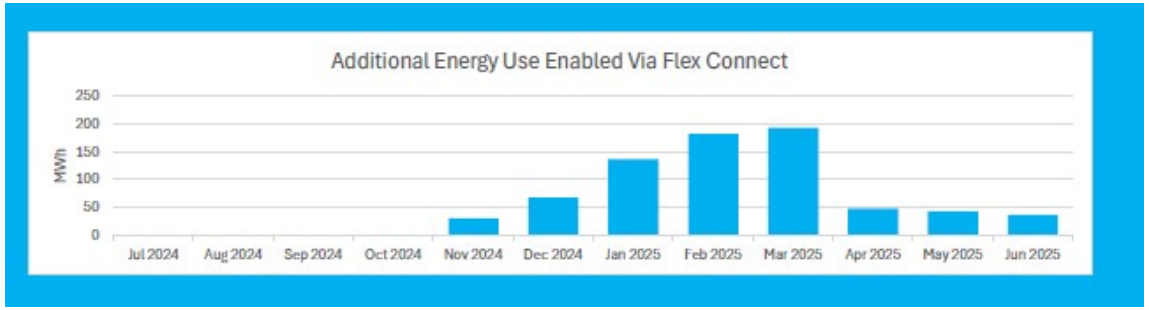
Flex Connect Start Date: 11/13/2024

Requested Capacity: 4.5 MW Charging

Existing Constraint: 1 MW Limit 07:00-22:00 daily**
3 MW Limit 22:00-07:00 daily**

Flex Connect Participation Highlights

	This Month	Since Inception
	+37 MWh	+738 MWh
	18.3k miles (est)*	369k miles (est)
	2.5 MW Average Limit Increase	2.2 MW Average Limit Increase
	88% Time with Added Capacity	86% Time with Added Capacity



Customer Journey for participation in Flex Connect

In 2025 PG&E is working to standardize customer engagement and site evaluation processes based on initial learnings

1 Identify

Customer identifies a site and PG&E checks eligibility

2 Evaluate

PG&E evaluates suitability for Flex Connect & provides Customer with historical site analysis

3 Agree

Customer evaluates benefits and agrees to program terms

4 Build

Customer contracts with aggregator and controls vendors

5 Deploy

PG&E supports Customer with testing and commissioning

6 Operate

Customer automatically adheres to PG&E day-ahead hourly limit schedule

Utility vs Customer Responsibilities

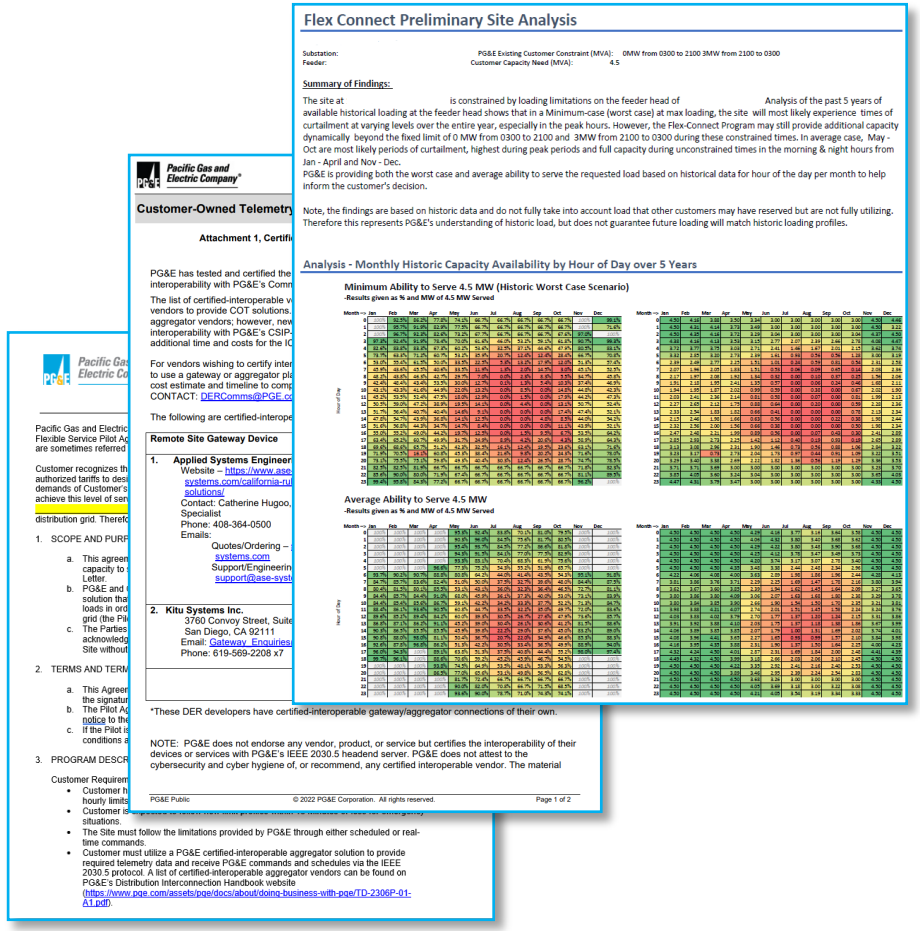
1) Preliminary Site Analysis
2) Aggregator Approved Vendor List
3) Customer Participation Agreement

PG&E

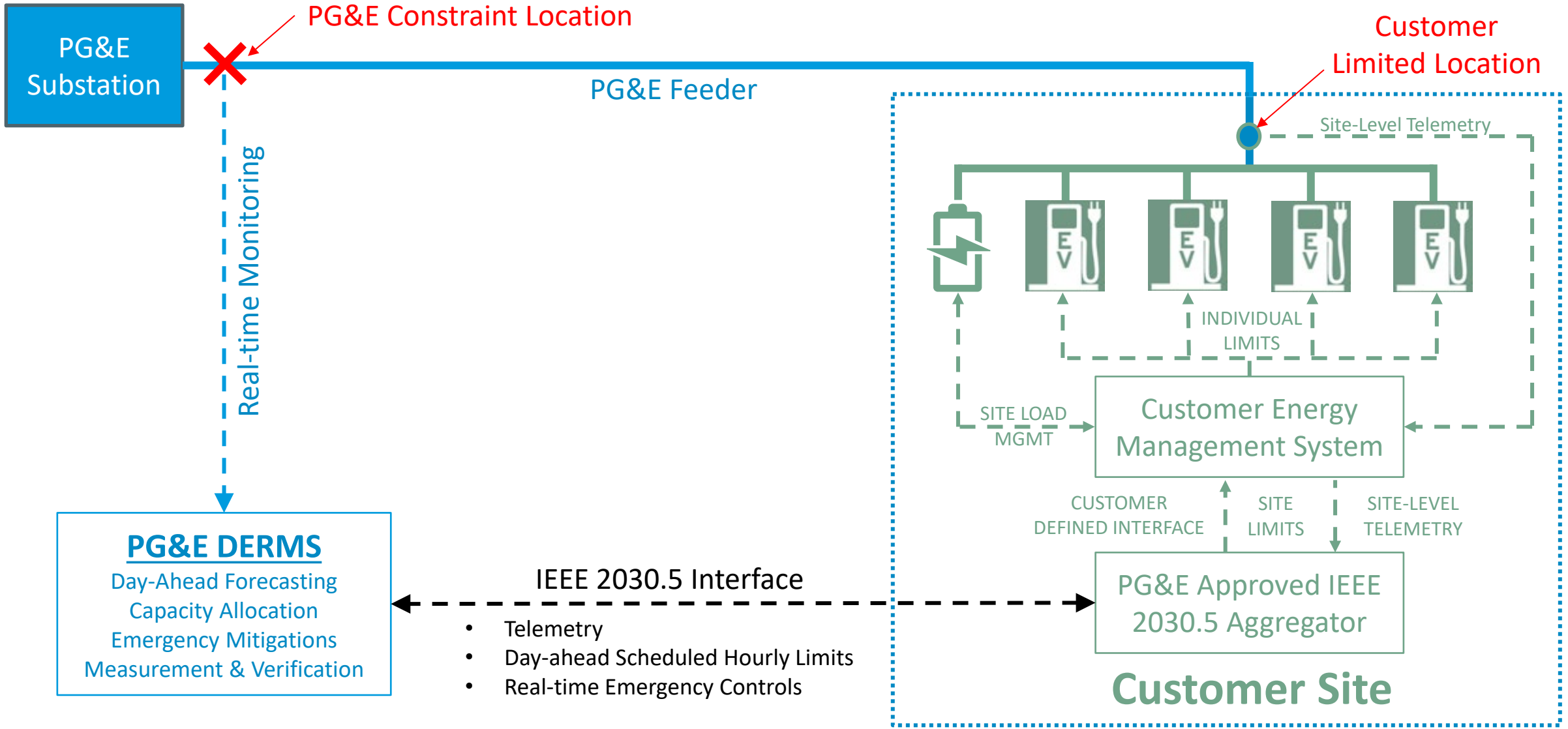
- Site analysis
- Testing and commissioning
- Automated day-ahead schedule w/ hourly limits
- On-going technical and program support

Customer

- Signed agreement
- Site control system & metering
- Aggregator integration
- Telemetry
- Single Line Diagram & Description of Operations



Illustrative Site Configuration



Agility is required to rapidly iterate toward a future end state

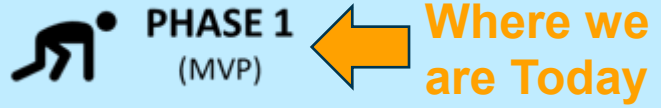
Capabilities, technology and processes are still being developed and require validation and further evaluation prior to scaling

Key Customer considerations:

- Value vs cost
- Customer experience impacts
- Local site technology readiness and timing
- Ability to adhere to dynamic limits

Key Utility considerations:

- PG&E technology and DERMS readiness – Forecasting, dispatching, and integrations with 3rd-party and internal systems
  - Key enhancements based on initial deployment already identified
  - Geographic expansion of DERMS capabilities
- Building confidence in customer-owned solutions and ensuring failsafes and contingencies
- Operational integration process maturity
- “Next-customer” considerations



Thanks for listening

Alex Portilla | alex.portilla@pge.com

Grid Research Innovation & Development

Building the grid of the future, today.

Customer Site Considerations

Ideal Site

- Existing site, or in service in 2025, or
- Long lead time for available grid capacity (2+ yrs)
- Flexible loads or local generation

Program Limitations

- Not all capacity constrained sites will be suitable for the initial pilot
- Pilot is limited to constraint at the feeder head or substation bank level

Load Control Management Systems (LCMS)

Roger Salas P.E., MSEE
Generation and MG Principal Manager

Discussion Topics

- LCMS Pilot and background
- Requirement for participating in the LCMS pilot
- Challenges to implement LCMS
- Pilot eligibility requirements
- LCMS pilot schedule and early findings
- Advancement in LCMS technology

LCMS Use Case As Bridging Solution

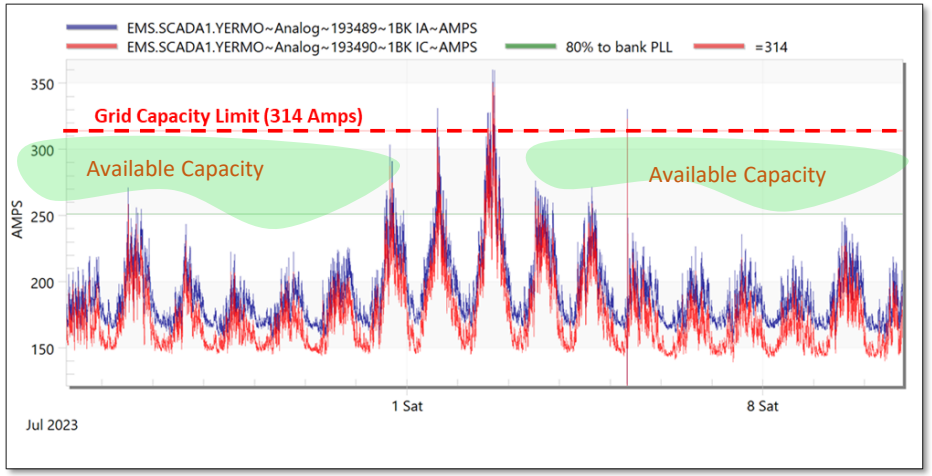
Faster Service Energization

Background

- Continued increase in electrical demand, much which is flexible(e.g., charging stations) is causing constraints in certain areas of the grid
- Grid upgrades to remove the constraints can take years to complete, which prompts utilities to start the planning and designing of grid upgrades much earlier
- These constraints can extend the energization of new projects, to limit the energization timeline, SCE proposed and received PUC approval for this LCMS pilot

LCMS Pilot

- While grid upgrades are completed, the service can be energized if power control functions are used to limit power usage (Load Control Management Systems- LCMS)
- Using LCMS technology will allow faster service energization, will allow for maximum utilization of grid assets, and will provide good customer service while traditional infrastructure are built
- LCMS is highly depending on load profiles and will not be option in all cases



An LCMS can be used to allow the flexible load (e.g., charging station) to use more capacity outside the peak period

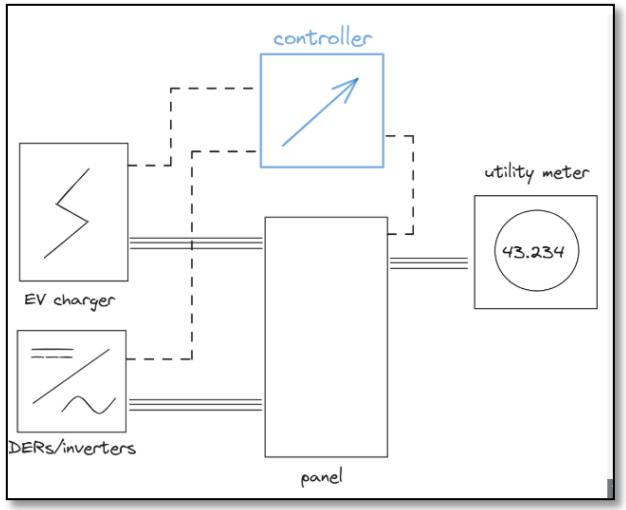
LCMS Pilot Research and Goals

LCMS Pilot Goals

- Energize our customer electrical service ahead of grid upgrades without causing grid safety events
- Test functionality with a variety of customer types and LCMS integrator types
  - 15 projects in the two-year pilot (not firm)
  - 3 different LCMS integrators (not firm)
- Develop and test certain functionality in the communications-based LCMS
  - Telemetry
  - Bi-directional Communication

Power System Control Research Activities

- Determine if load control technology is sufficiently mature to use in grid safety and reliability applications
- Test the functionality of power control to operate as intended and does not create grid safety issues
- Test the process by which technology's performance can be verified and accepted by SCE's engineering and operations departments
- Research and test the operability and responses from customer for real time grid contingencies



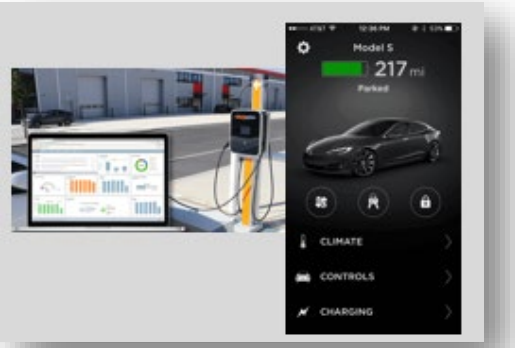
Eligibility For Participating In The Pilot

- Customer must have submitted the complete energization load request to SCE
- SCE engineering has determined that SCE cannot meet the energization timelines due to distribution grid capacity limitations
- SCE engineering analysis has determined that partial capacity is available (based on peak values or time of day profile values)
- Customer agrees to enter the LCMS pilot with the capacity as determined by SCE engineering
- Customer agrees to install a power control system (PCS) that SCE approves to limit power import as determined by the engineering studies
- Customer agrees with the terms and conditions of the LCMS pilot agreement and signs the agreement
- Once grid distribution grid upgrade is completed, the LCMS pilot agreement will be terminated, and SCE will provide the full capacity as requested by the customer
- As telemetry and bi-directional communication functionality becomes available, this will be become a requirement to participate in the pilot.

Challenges in Implementing LCMS

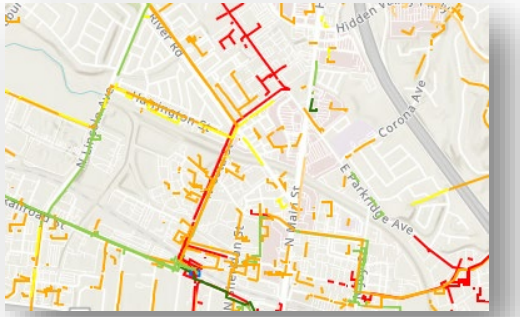
Technology Challenges

- There are no national standards for testing and certifying LCMS equipment
- SCE participated in the development of UL3141. The standard was published in October 2024 and anticipated to be used after May 2025. While the standard were developed, SCE evaluated and accepted LCMS for system that meet SCE's technical requirements.



Operational Challenges:

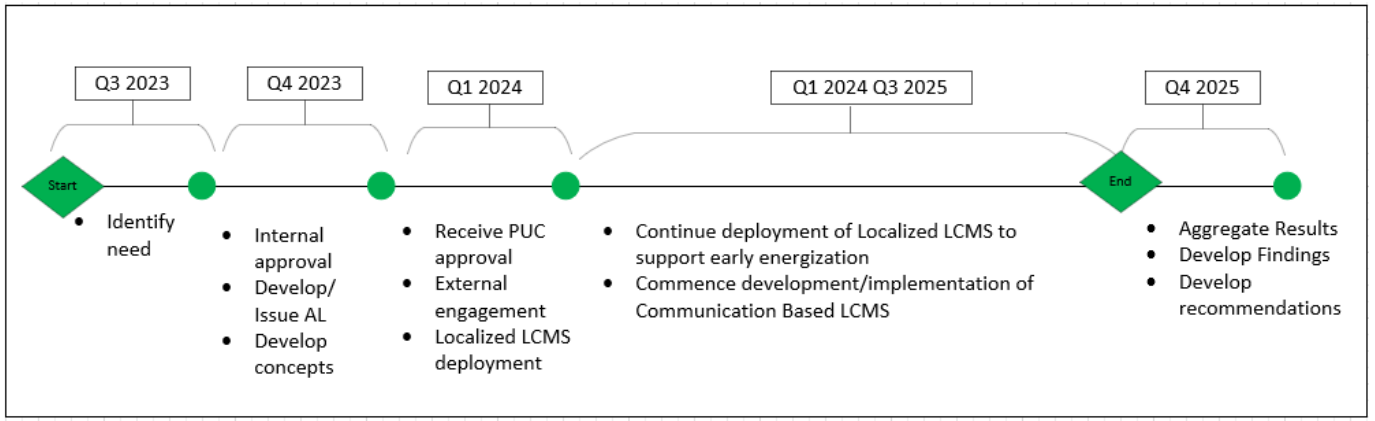
- No established operating procedures for operating the grid when using LCMS technology
- SCE developed operational procedures
  - What actions are taken in real time if LCMS fails?
  - How are real time operations coordinated with facilities that employ LCMS control?



Legal/Regulatory Challenges

- Currently no established regulatory procedures to accept this type of technology in the planning and operation of the distribution system
- SCE filed and received CPUC approval to implement an LCMS and related LCMS agreement via Advice Letter 5138-E/E-A, which we are using for pilot participants

SCE Pilot Updates and Early Findings

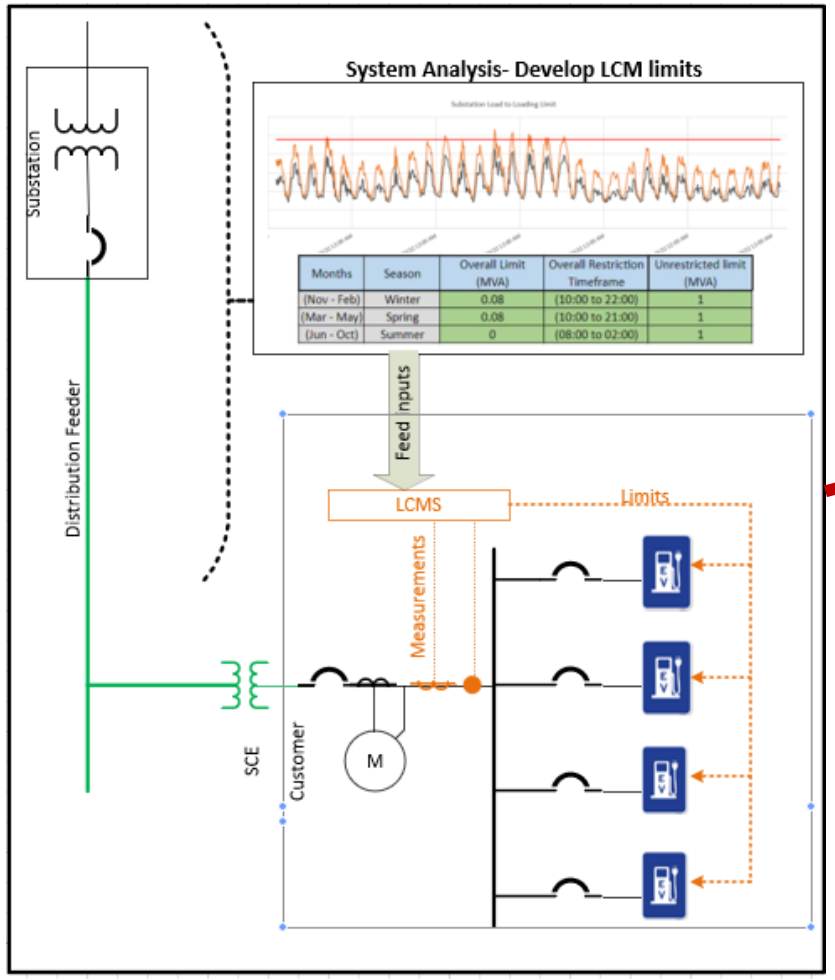


- 6 Load projects have been energized using LCMS technology
  - 5 EV charging stations one non-EV
- 2 of the 6 projects have exited the pilot, grid upgrades completed, full capacity provided
- 3 more projects have LCMS agreement and waiting to be energized
- 4 different integrators (LCMS controls systems) have been used
- Early finding show that customer's load control systems have operated as intended (not exceeding their approved limits)
- Customer have been generally accepted the limits if that allows the project to be energized faster
- With UL3141 having been released in October 2024, SCE will be requiring the use of UL3141 NRTL certified devices for new LCMS projects after May 2025
- Currently in progress development technical requirements for communication-based LCMS

Advancing LCMS Technology

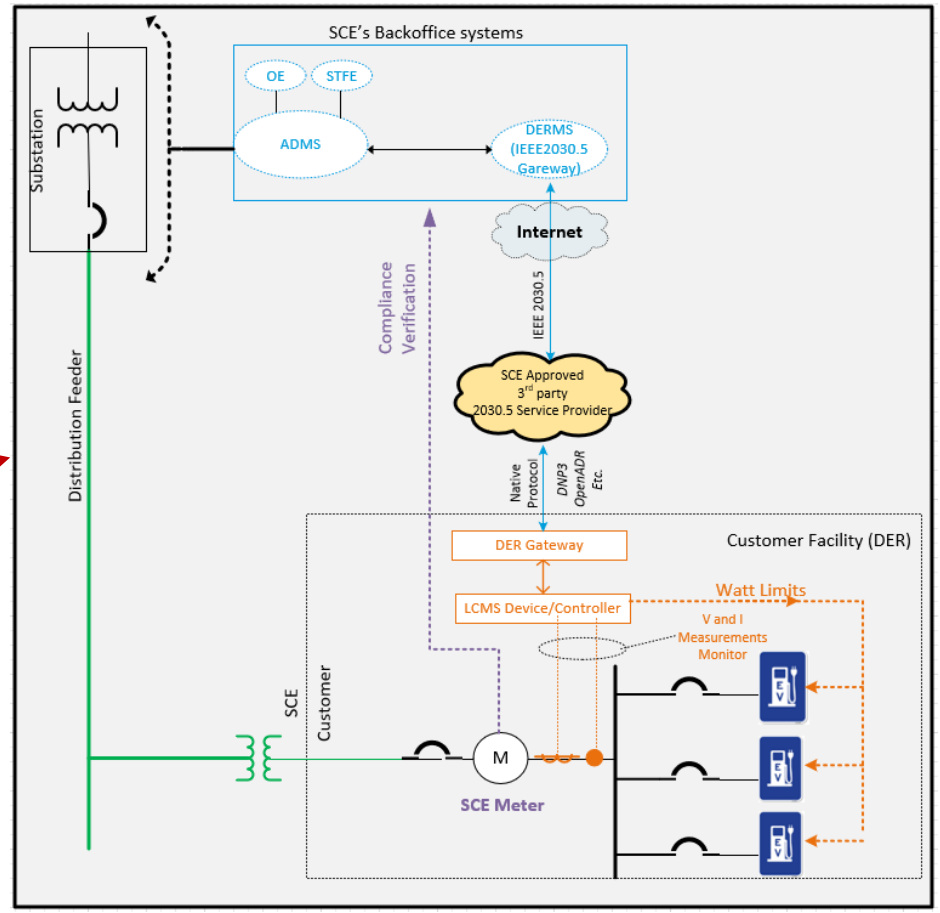
Currently Being Deployed

- Localized LCMS at the facility
- Limits are programmed into the local control
- No real time communication to SCE



Future of LCMS

- Limits provided via communication
- Back provided via static table for loss of comm
- Provides real time operational information for grid operations
- Likely provide higher level of capacity



Member Discussion Questions

- Please share any work your commission or utilities have done to consider implementing flexible interconnection.
  - If there has not been consideration at your commission, do you think there is value / a need for a program like this?

Next EV SWG Meeting: **August 26**, 3:00-4:30 pm ET via Zoom

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