SILICON VALLEY CLEAN ENERGY

"Watts For Lunch"

January 30th, 2019

Hosted By

Computer History Museum

Watts for Lunch

- Interactive SVCE updates
- Understand customer priorities
- Local peer networking
- Forum for learning/idea sharing
  - best practices
  - new technology, services
  - programs and incentives

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Attendee Intros . . .

allow myself to introduce . . . myself

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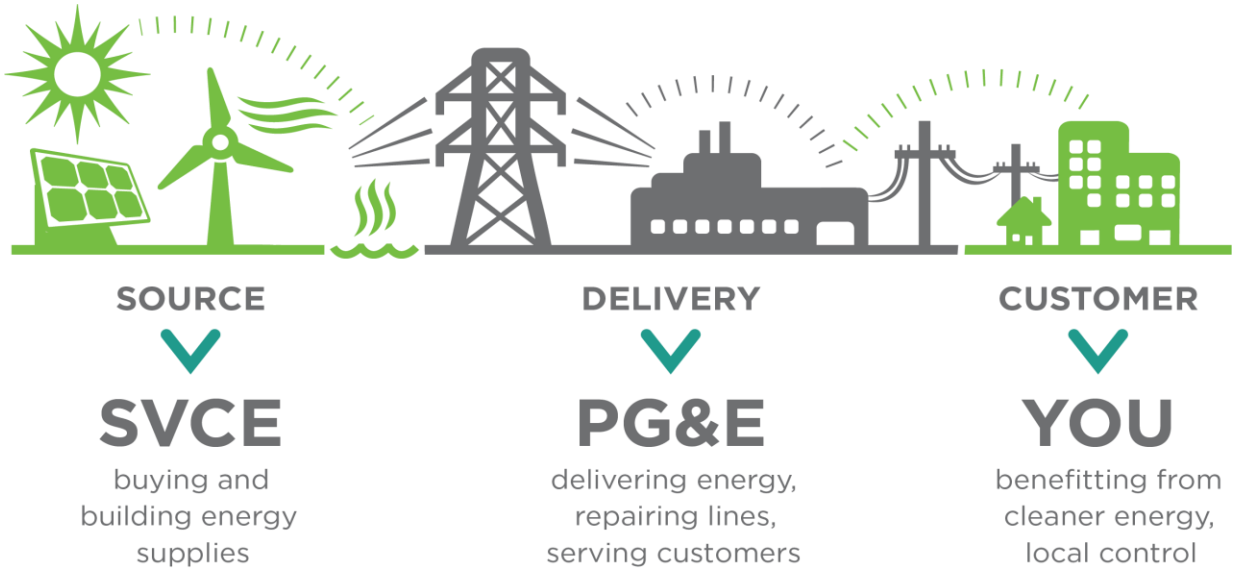
SVCE Mission



- Clean, carbon-free electricity at competitive prices
- Programs to support ongoing carbon emissions reduction via electrification of transportation and the built environment

SVCE Member Agencies

City of Campbell

City of Cupertino

City of Gilroy

City of Los Altos

Town of Los Altos Hills

Town of Los Gatos

City of Milpitas

City of Monte Sereno

City of Morgan Hill

City of Mountain View

City of Saratoga

City of Sunnyvale

Santa Clara County

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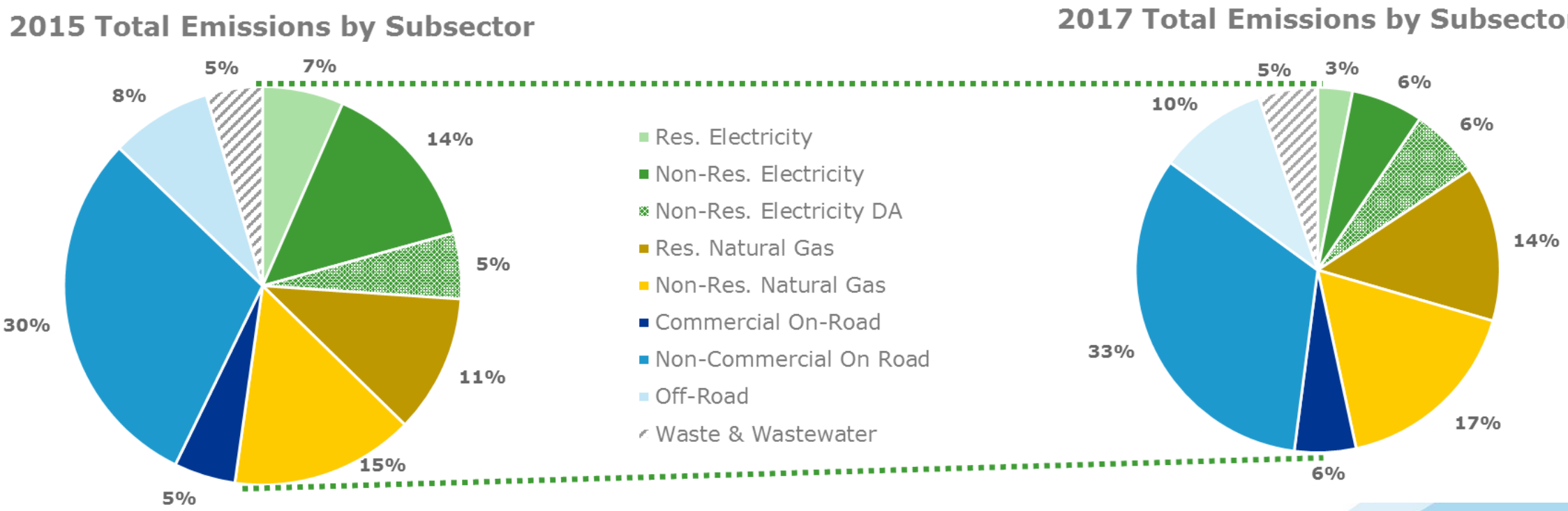
Today's Focus: Fleet Electrification



49% of local GHG emissions from transportation in 2017

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Source: SVCE GHG and Clean Energy Asset Inventory, July 2018

Today's Agenda

11:00 am	SVCE Intro And Host Welcome
11:10 am	Attendee Introductions
11:20 am	Lead in to Energy Storage – John Supp
11:30 am	"Watt Do You Think?" Interactive Polling
11:40 am	Simplifying the Transition to Zero-Emission Mobility – Sila Kiliccote
12:00 pm	Lunch and Networking
12:30 pm	Energy Management System for ZEBs – Gary Miskell and Christina Jaworski
12:50 pm	Fast Charging Hubs – Lars Peters
1:10 pm	Panel Discussion and Q&A with Speakers
1:30 pm	"Watt Do You Think?" Interactive Polling
1:40 pm	SVCE Update and PG&E DCFC Programs – Don Bray
1:55 pm	Wrap Up, Forthcoming Event Announcement
2:00 pm	Adjourn to Networking

John Supp

Account Services Manager

Charging Lead-in

What Will We See Today?

Interactive Polls

Speakers

Brief Intro to electric vehicles

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Fremont
Police Dept. unveil Tesla patrol car

Sacramento
New Electric Garbage Truck

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Electric Street Sweeper

Electric Ride-on Lawn Mower

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Electric Dump Truck
4x 1200 kW motors

Electric Ferries

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Work Vehicles

Semi’s

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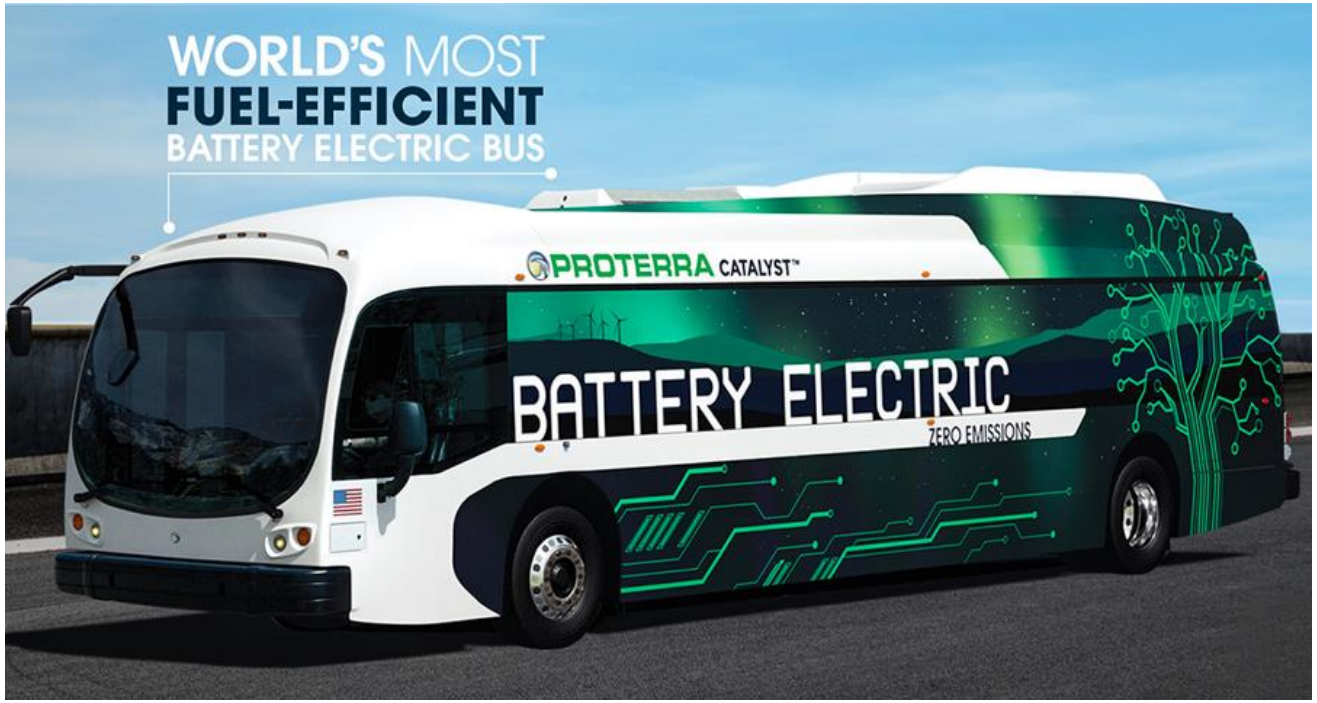
Buses



Personal Transportation

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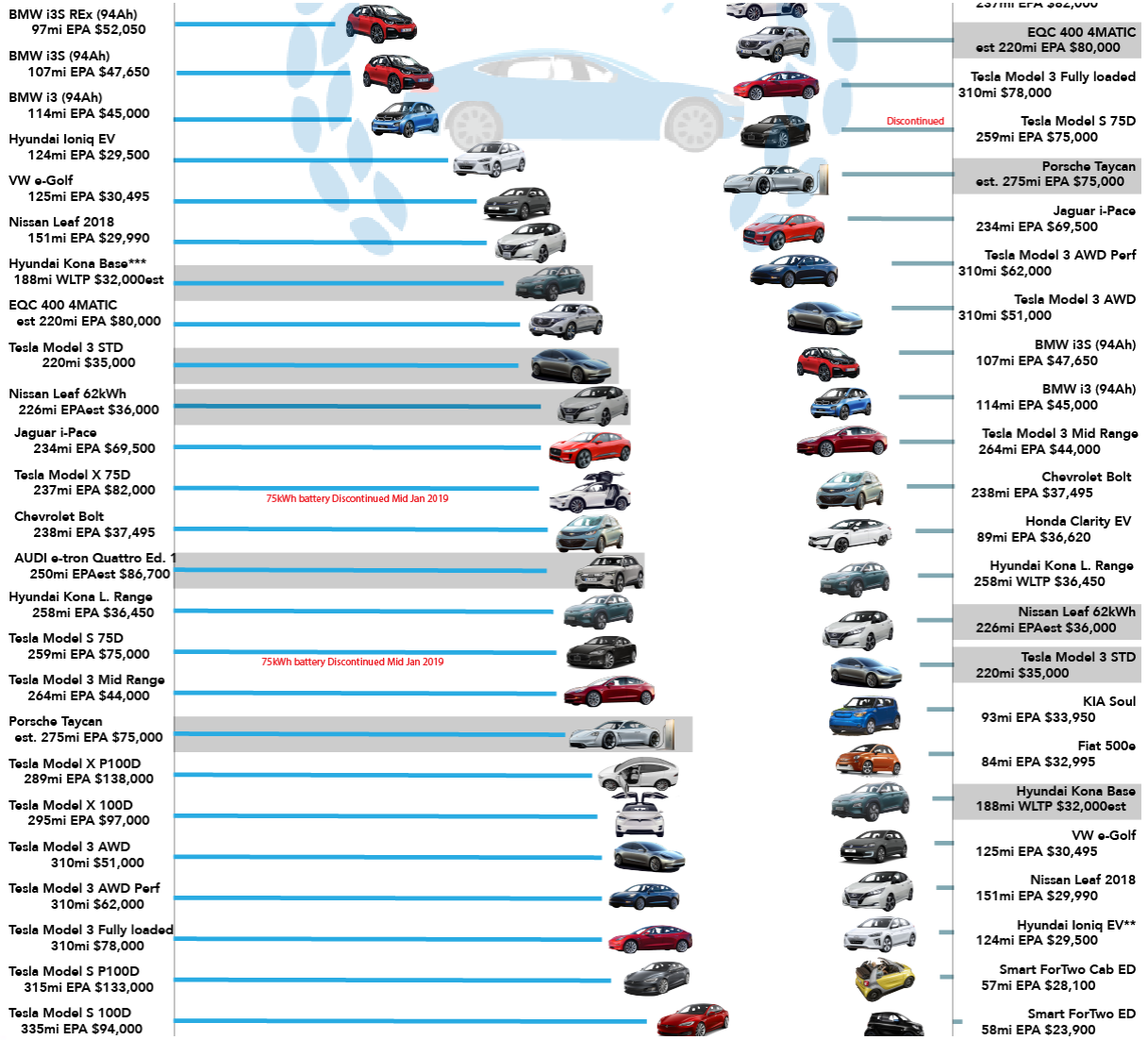

Cars

20+ current models of pure EVs

30+ current models of plug-in hybrids

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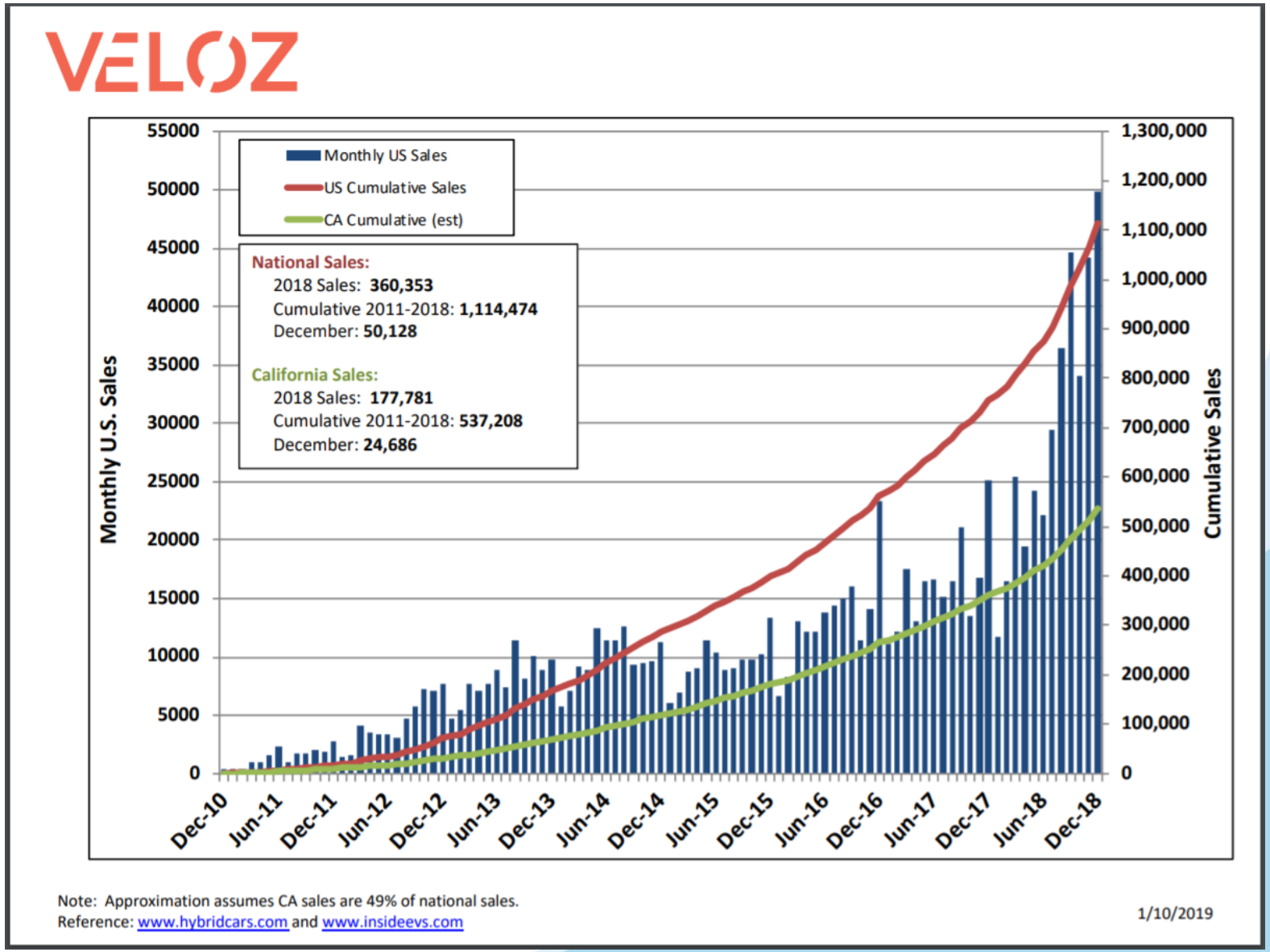
Electric car sales

More than 500,000 EV's in CA

1/3 of those acquired in 2018

Trend is increasing



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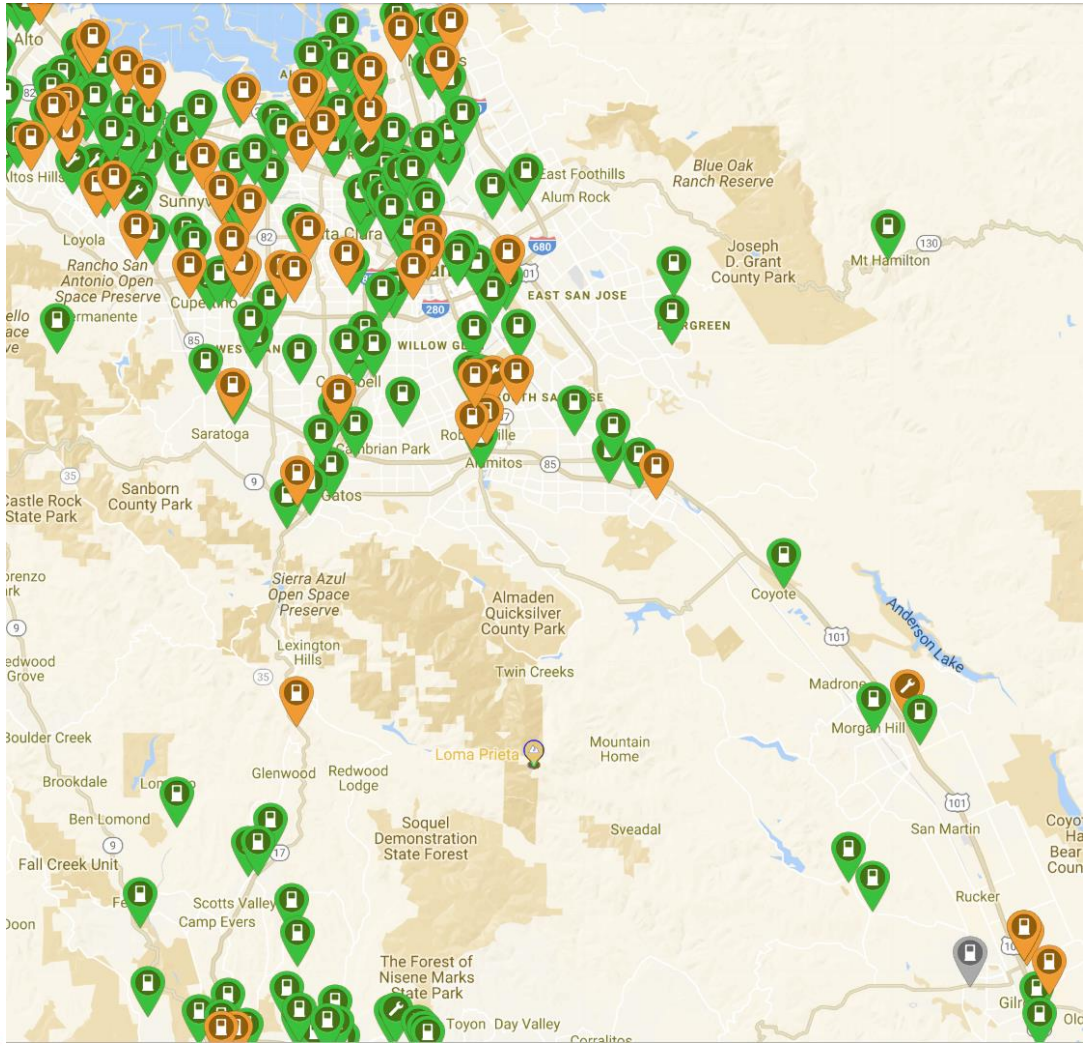
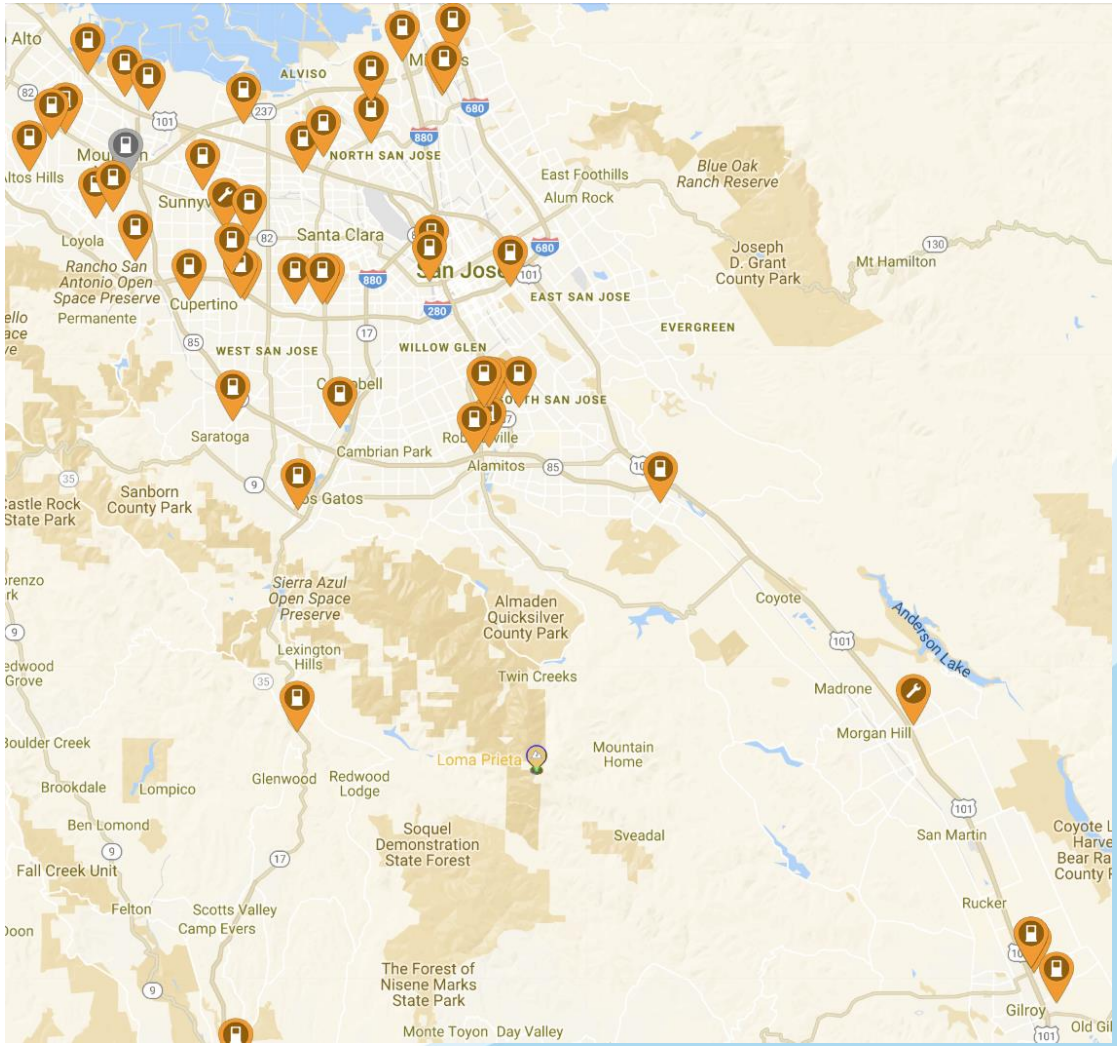
SVCE Territory
All public chargers



SVCE Territory
High Speed (Level 3) Chargers only



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Watt Do You Think?

Interactive polling provided through your smartphone!

Please navigate to:

www.zeetings.com/SVCE

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Sila Kiliccote

CEO and Co-Founder

eIQ Mobility

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MOBILITY
Zero-Emissions Mobility. Zero Risk.

CHALLENGE STATEMENT.

How might we simplify and accelerate the transformation to zero-emission mobility?

WHAT HAVE WE DONE?

Month / 1

Testing Customer Desirability

What do people want?

Month / 2

Determining Product/ Service Feasibility

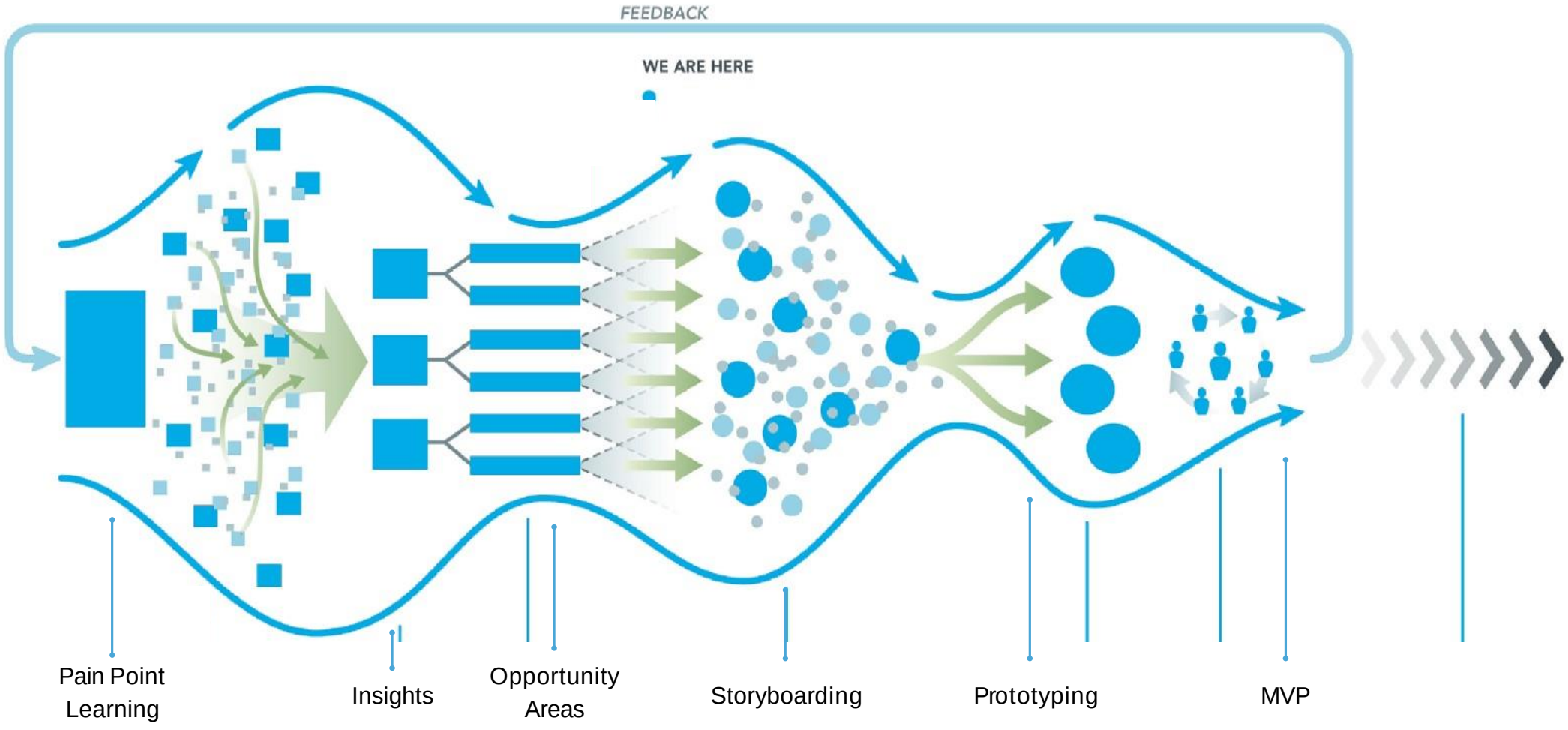
What should we build?
Can we build it?

Month / 3

Assessing Business Viability

Can we make money?

OUR PROCESS.


FEEDBACK
WE ARE HERE
Pain Point
Learning
Insights
Opportunity
Areas
Storyboarding
Prototyping
MVP

OVER 220 INTERVIEWS TO DATE

400+ Industry Connections

109 Pain Point Interviews

63 Storyboard Interviews

57 Prototype Interviews

23 In-Person China Interviews

SEGMENTS.

Utilities ***PG&E***	Charge Station Operator ***EVGo***	Incubent OEM ***GM***	Service and Tech Fleet ***Sunrun***
Fleet Management Companies ***LeasePlan***	Yellow Steel Fleet ***Ranger Construction***	Government and Municipality ***County of LA***	Hardware and Technology ***Tritium***
Food and Beverage ***PepsiCo***	Public Fleet Operation ***TransDev***	EV OEM ***Workhorse***	Contractor ***Black & Veatch***
Software Technology ***Bestmile***	Last Mile ***FedEx***	Bus Companies ***Proterra***	Ride Share ***Uber***

EXAMPLE PERSONAS.

Fleet Management Operation Executives

Fleet Manager

Facility Manager

Policy Manager

CFO / Finance Manager

Consultant

CEO / COO

Global VP Real Estate

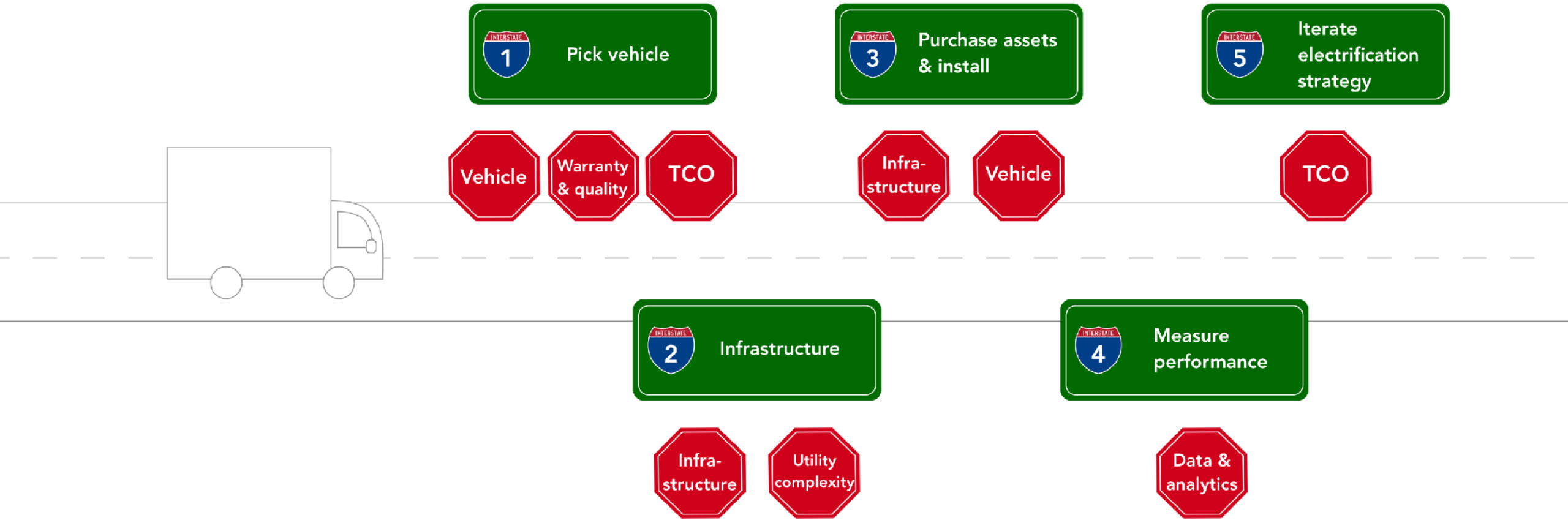
Sustainability Execs


Fleet Electrification is
EXTREMELY PAINFUL

INDUSTRY PAIN.

- Infrastructure & EV Supply Equipment (EVSE)
- Charging Costs
- Policy and Regulation
- Vehicles
- Warranty and Quality
- Data and Analytics
- Route Planning
- Total Cost of Ownership (TCO)
- Complexity
- Utility Complexity
- Grid Services (V2X-V2G)

HOW IT WORKS NOW.



LESSONS LEARNED IN CHINA.

ISSUES WITH ELECTRIFICATION.

Human Factors

Anxieties around range, charging, maintenance & availability of trained technicians are very real.

Vehicles

300/400 + EV manufacturers . Gov't incentives makes CAPEX equivalent.

Infrastructure & EV Supply Equipment (EVSE)

Low utilization of over 250k chargers. Charging site locations. Reliability of the charging infrastructure.

Drivers

Bus drivers like better reliability, simple charging & passenger satisfaction. Taxi drivers do not like the charging down time.

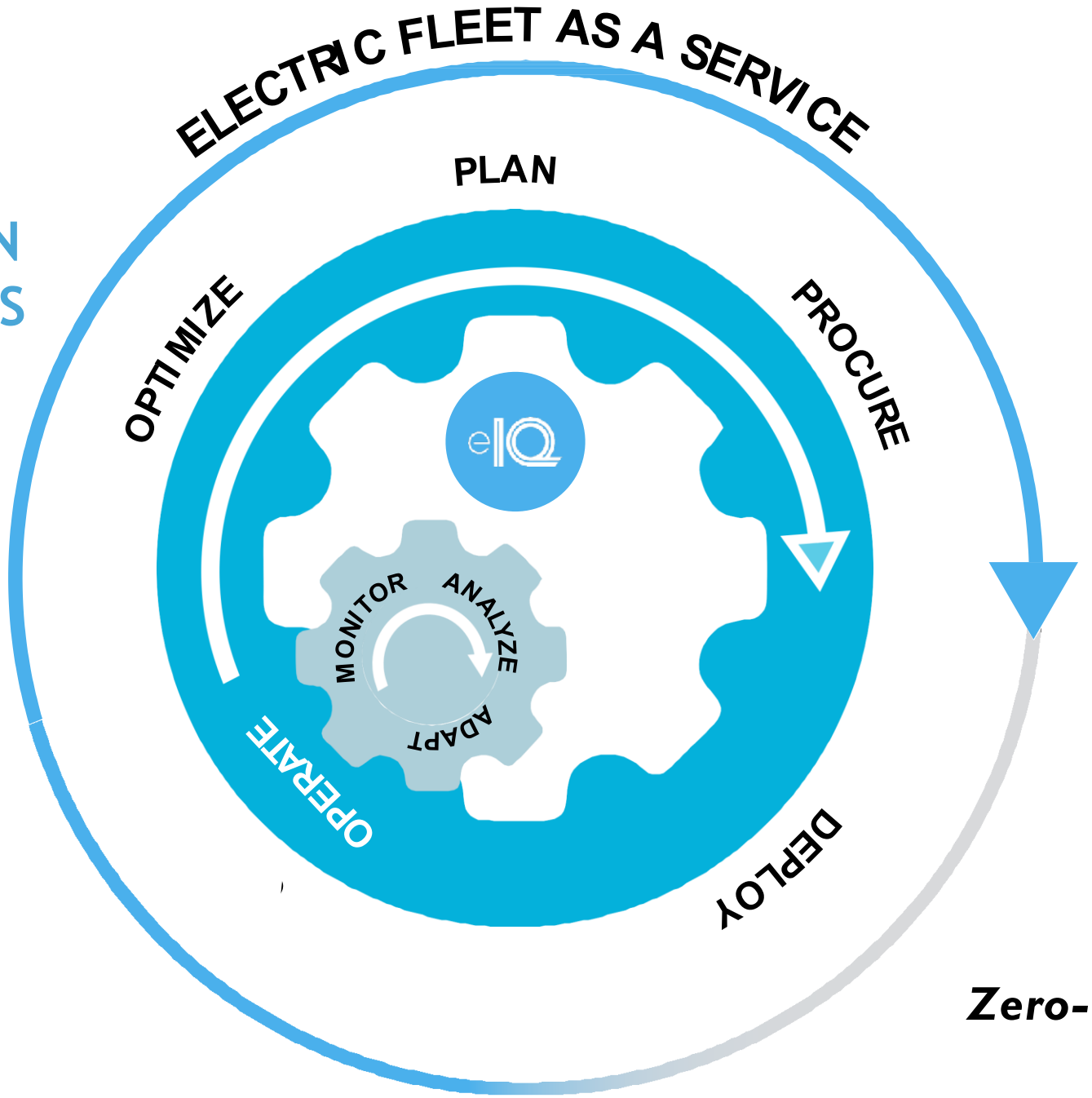
ISSUES WITH ELECTRIFICATION.

Data & Analytics	Sophisticated data platforms to collect, analyze & visualize.
Charging Costs	With low utilization rates, the fixed costs are high. Fully loaded cost of energy: 3-5X
Warranty & Quality	Quality of EVs is low but improving and the fleet industry is leasing instead of buying
TCO	Residual value of vehicles is low due to uncertainty.

ISSUES WITH ELECTRIFICATION.

Grid Services	No market for grid services in China
Route & Urban Planning	Lack of route and urban planning tools that include charging in route planning and scheduling
Policy & Regulation	Strong mandates & incentives that are nationally driven & deployed
Utility	SGCC and CSPG, are both mandated to increase EV adoption

eIQ IS THE SOLUTION FOR ZERO-EMISSIONS FLEETS.



Zero-Emissions Mobility.
Zero Risk.


Thank You
MOBILITY
Zero-Emissions Mobility. Zero Risk.

Get To Know Your Peers

Lunch is Served…

Presentations Resume @ 12:30

Valley Transportation Authority

Gary Miskell

Chief Information and Technology Officer

Christina Jaworski

Senior Environmental Planner

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VTA's Smart Charging Energy Management System for ZEB's

SV Clean Energy Watts for Lunch
ZEB Fleet Management

Gary Miskell, Chief Technology/Innovation Officer
Christina Jaworski, Senior Environmental Planner
Santa Clara Valley Transportation Authority
January 30, 2019

Valley Transportation Authority

VTA's Current and Proposed Fleet Electrification Plans

- Began operating five Zero Emission Buses (ZEB) in July 2018
- Using six 50 kW chargers that will soon be upgraded to 120 kW
- Planning to procure at least 30 additional ZEB's over the next 5 years
- More than 15 buses requires major upgrades to the bus yard utility infrastructure
- More than 35 buses requires major upgrades to neighborhood grid utility infrastructure


ZERO EMISSION
7502
SANTA CLARA VTA
Solutions that move
7502

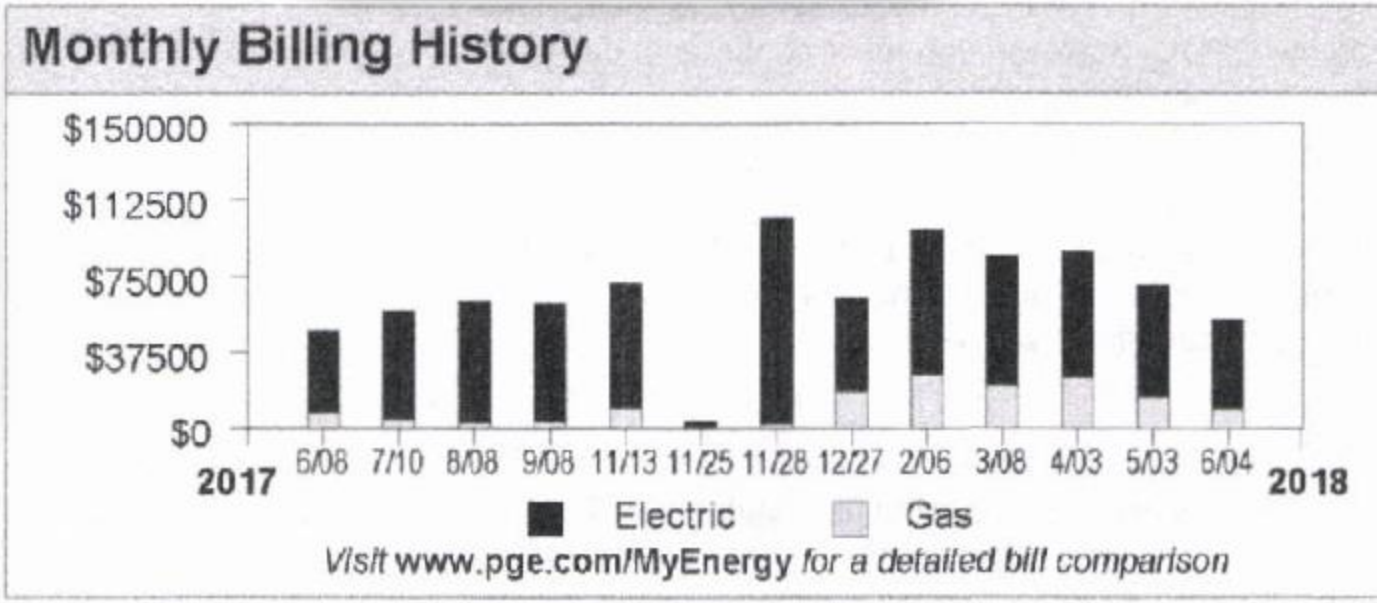
VTA Cerone Yard

Averaging $450K per year

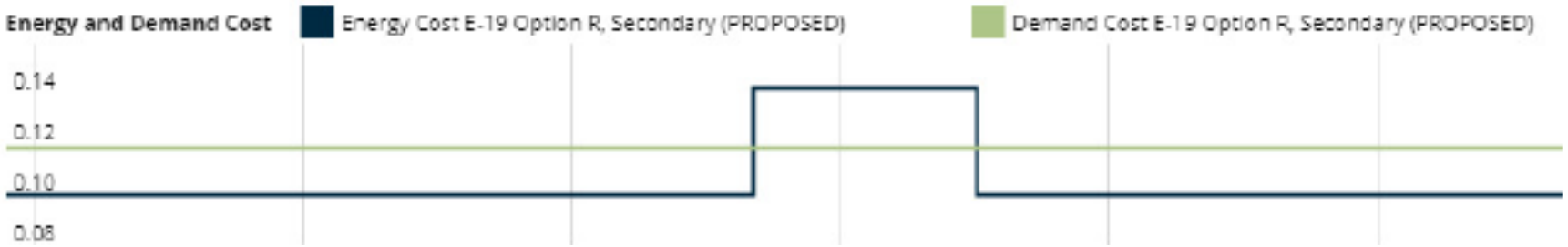
675 KWH Generator
650KWH Generator

960 KWH Solar

Maintenance
Mid Life Overhaul
Operations/Dispatch

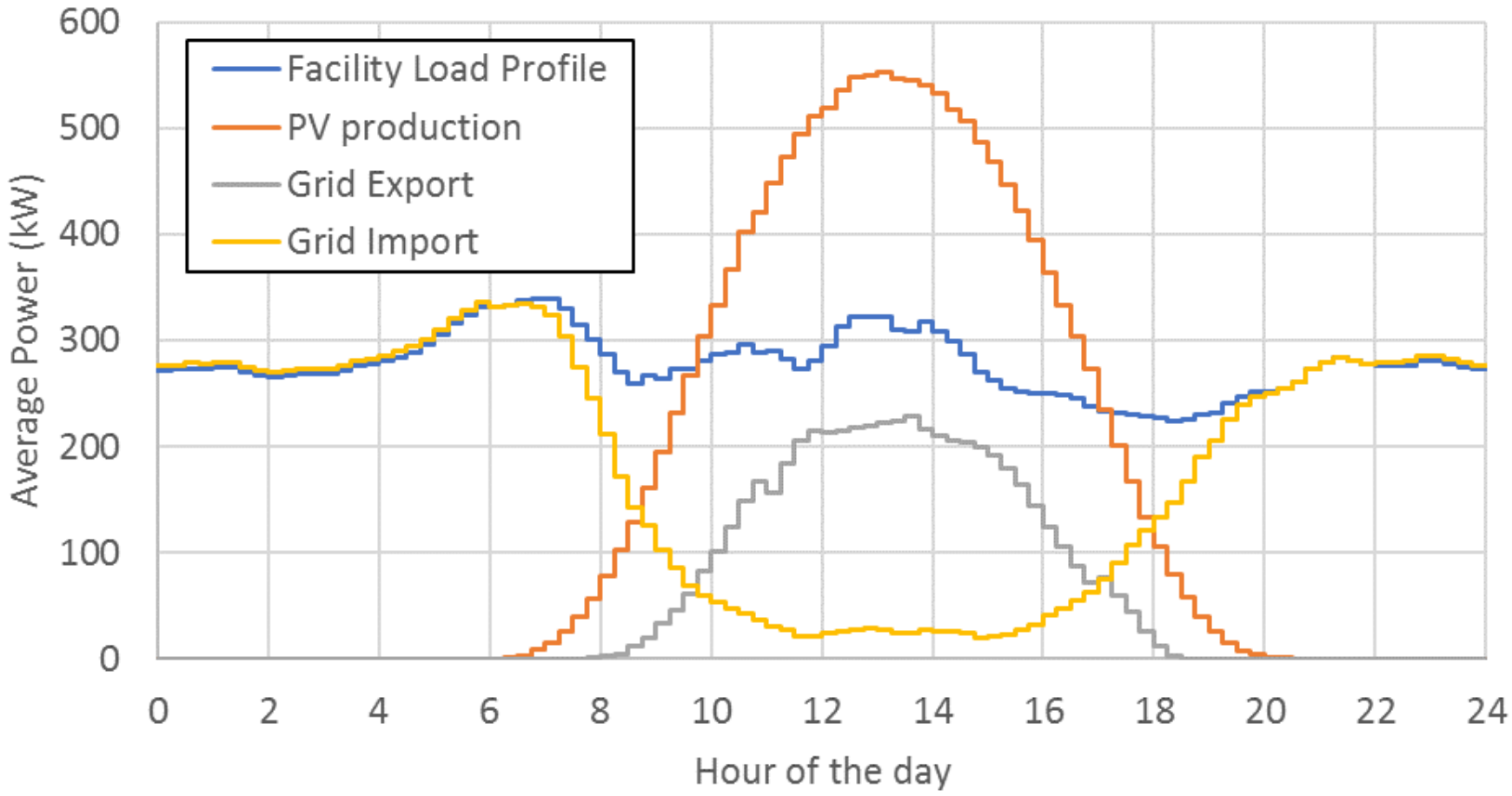


6 Smart Chargers



Look at PV production and usage at VTA Cerone bus yard

- Solar power almost completely covers the afternoon energy consumption, resulting in significant amount of export.



Vehicle to Grid Integration (VGI) Collaboration: PARTNERS

VTA working with Prospect Silicon Valley, and Bay Area tech companies to pilot a cutting-edge system that will **manage charging and energy consumption on electric buses** while **reducing the impact on the state's electricity grid**.

Funding from the California Energy Commission will serve as a major case study for transit agencies throughout the country

Connected & Making Real Time Decisions

PROSPECT Silicon Valley

Valley Transportation Authority

STATE OF CALIFORNIA ENERGY COMMISSION

CALIFORNIA ENERGY COMMISSION

NREL NATIONAL RENEWABLE ENERGY LABORATORY

CALSTART

Clever Devices

KISENSUM

chargepoint

CISCO

PG&E

PROTERRA

ENERGY SOLUTIONS

Trapeze

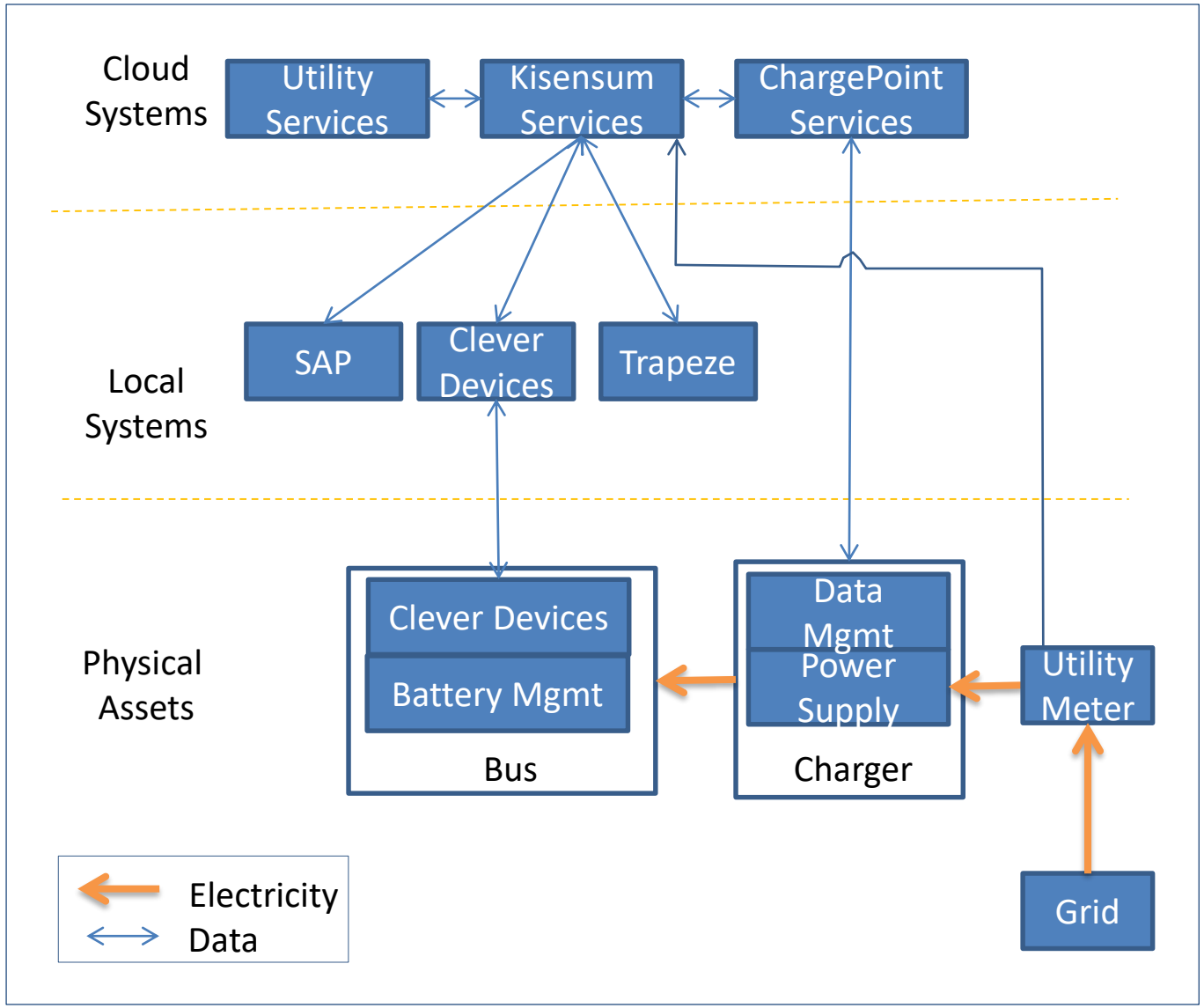
nova WORKFORCE DEVELOPMENT

ZNEAlliance

Solutions that move you

Primary Goals of the VGI Solution

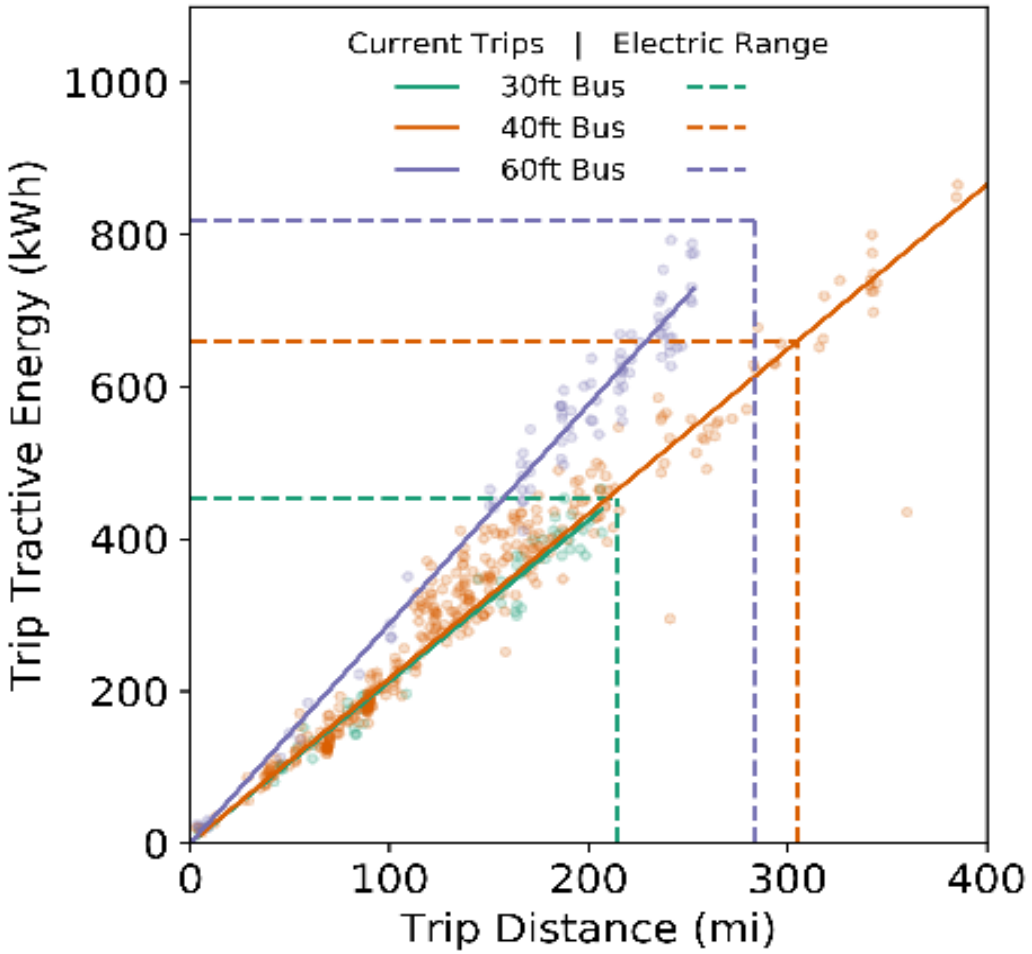
1. Ensure buses are charged and ready to go before pullout time
2. Provide visibility into charging process
3. Send alerts when issues in the charging process or during daily operation need to be addressed
4. Support the assignment of bus to block process
5. Minimize PG&E utility bill
6. Simulate Grid interactions with system
7. Simulate New Block & Charging Options



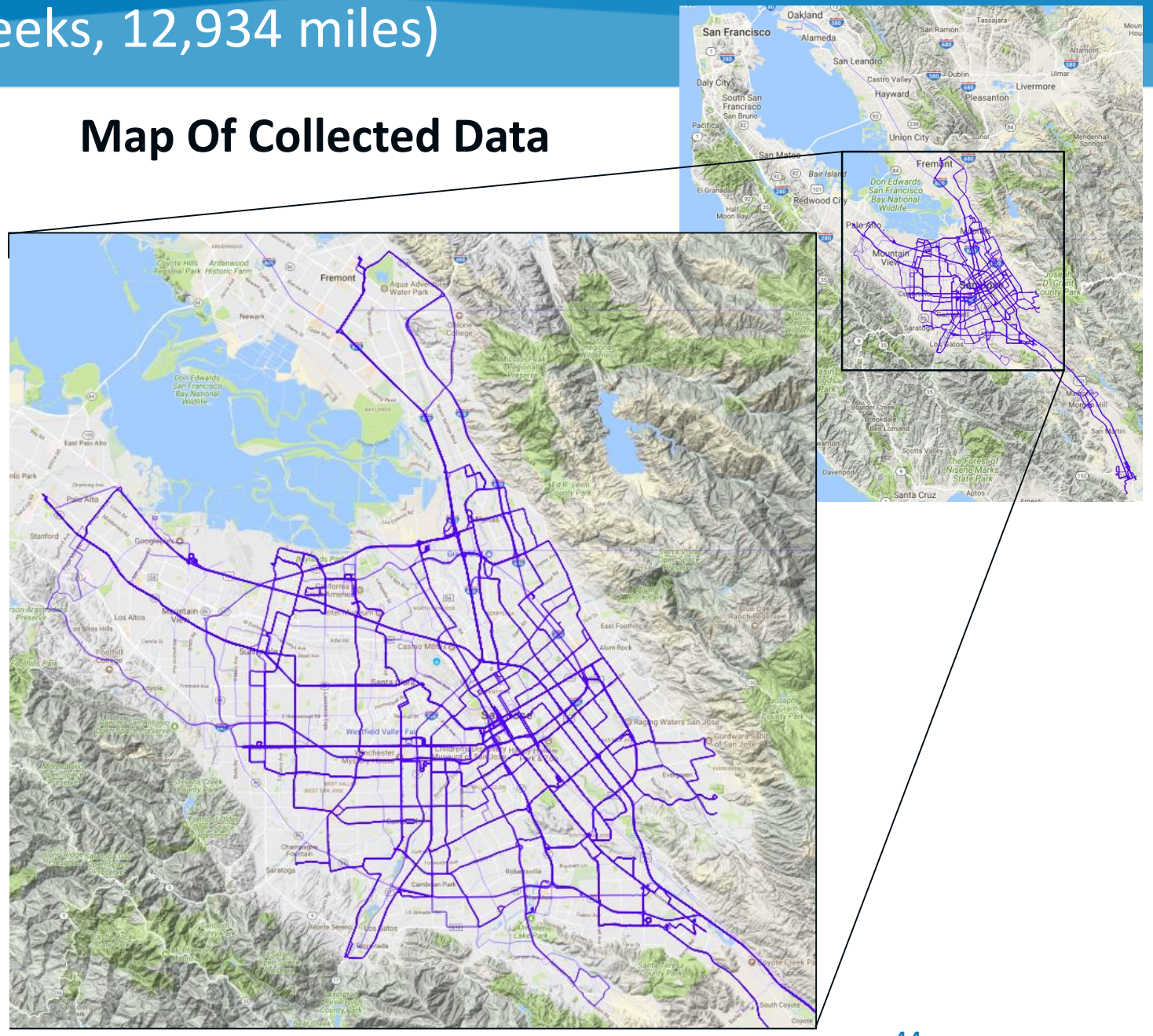
Data Collection (29 buses, 3 weeks, 12,934 miles)

Identify route energy requirements

- Some routes not suitable for electric buses with current technology



Map Of Collected Data



Characteristic bus trip patterns

- Created a set of characteristic bus trip patterns to explore the opportunities for current and future bus usage.
- Based on electric bus efficiency (~2kWh/mile) and usable energy capacity (350kWh), a bus can travel at most an average of 10.9 hours with one charge per day.

Start time	Hours of operation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Extra Early	8																								
Early	6																								
Early	8																								
Early	10																								
Late	6																								
Late	8																								
Late	10																								
Double	6																								
Double	8																								
Double	10																								
Full	11																								

So What is the Big Deal?

Data Flow & Connected Core Application

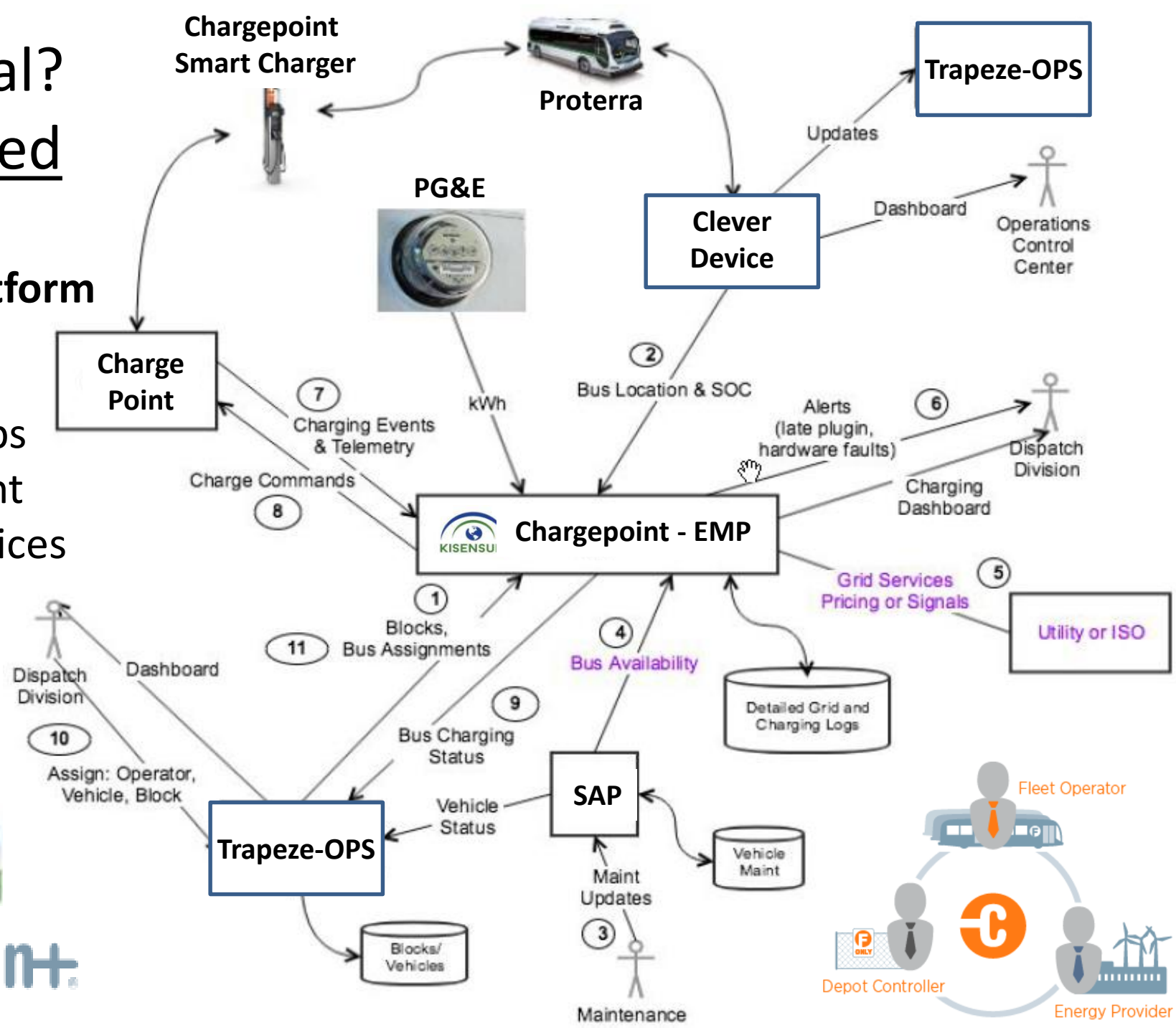
EMP = Energy Management Platform

Inputs

- Trapeze-FX
- Trapeze-Ops
- SAP
- ChargePoint
- Clever Devices
- Grid Signals
- Electric Meter
- Proterra Bus

Outputs

- Trapeze-Ops
- ChargePoint
- Clever Devices
- Operators



KISENSUM

chargepoint

Monitoring the Vehicle while in the Field

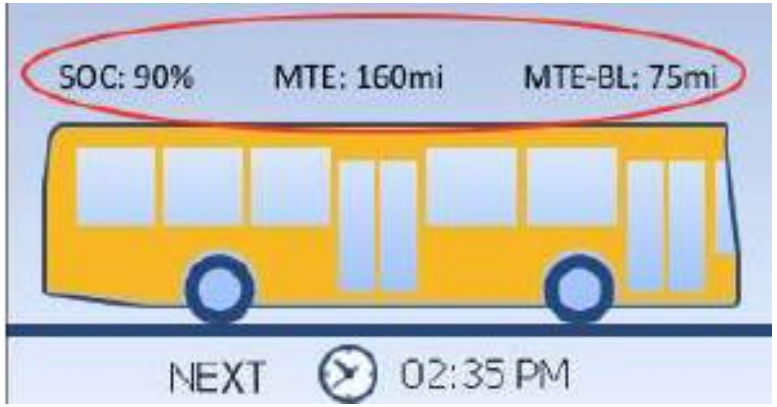
Clever Devices

PROTERRA

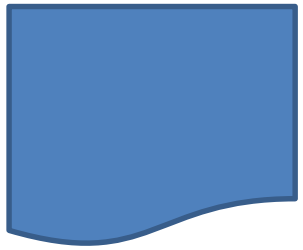
Fleet Schedule / monitoring

Fleet Manager
- Configuration Management
- Service Management
- Performance Management
- Performance History

On board system
- Interfaces to the Vehicle system
- Human Machine Interface HMI



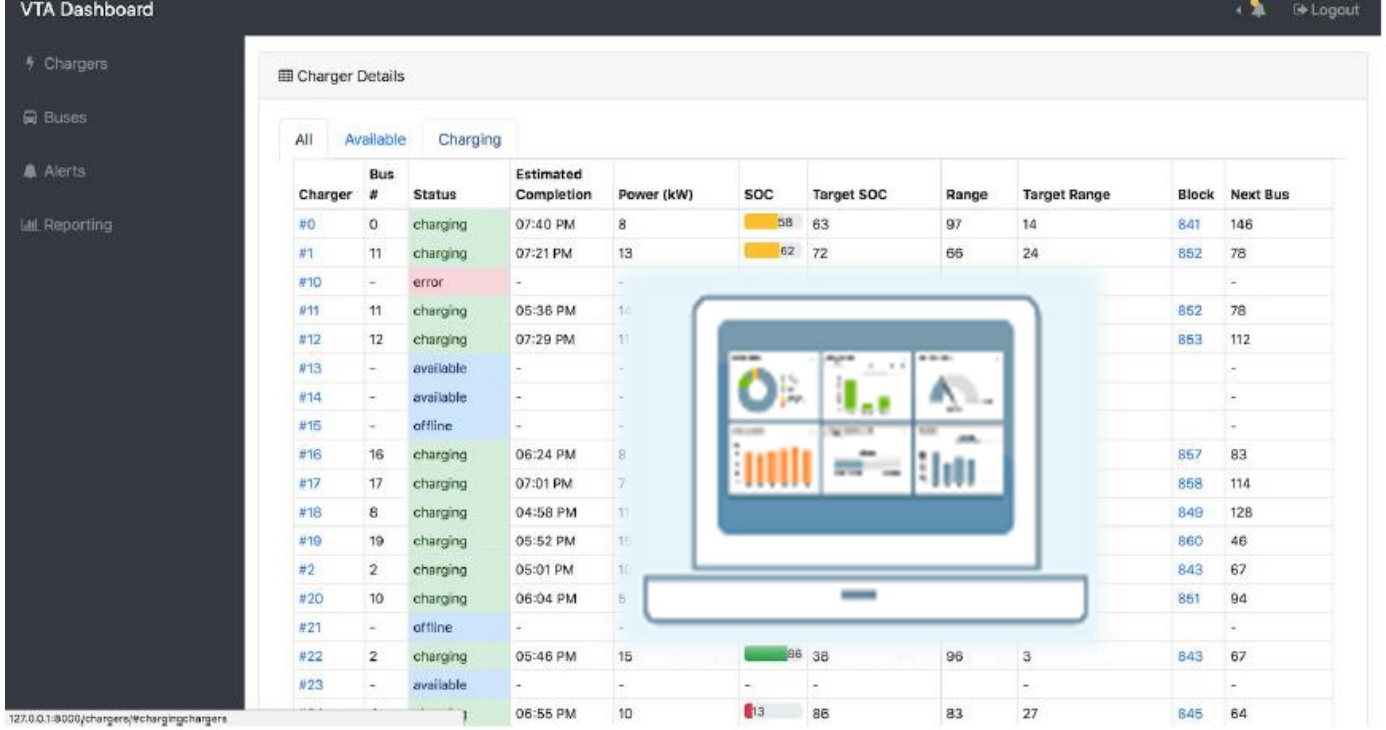
Business Intelligence & API's
- Reporting
- Data mining
- Integration to other applications



Electric Vehicle Monitoring System (EVMS) will communicate to all systems to report on EV usage and efficiencies.

What Are The Major Innovations?

- Creating charge plans that support more buses than charge stations
- Energy Management Platform that interoperates with VTA and Grid systems
- Dashboard and alerting system supporting vehicle Charging & operations
- Realtime cost minimization process through demand leveling and Time of use aware charging
- Performing Grid Service simulations while not jeopardizing the bus charging operations



Dashboard: Charger Status

Expanded Solar

Smart Microgrid + Second life Li-Ion Energy Storage

LEHIGH UNIVERSITY

Solutions that move you

Lars Peters

Director of Business Development, Public Agencies, and Utilities

evGO

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SVCE – WATTS FOR LUNCH

JANUARY 2019

LARS PETERS – DIRECTOR UTILITIES AND PUBLIC AGENCIES

Summary

- EVgo
- DCFC Evolution: Larger sites and faster speeds
- Market Acceleration: Rideshare and new EV models are changing the DCFC market
- The challenge

America's Largest Public Fast Charging Network

EVgo

Develop | Finance | Own | Operate

Fast Charging for 8 Years

- 1,000+ 50kW-350kW DC Fast Chargers
- 34 states, 66 markets, 90% of EV Pop.
- >50% share of DCFC in US, non-Tesla

Powering the EV Revolution

- 100,000+ customers
- Enabling 100M+ all-electric miles
- Growth: Over 90% YoY

Evolution of EVgo Charging Stations

Gen 1 Charging Station
20-50kW single charger + L2

Gen 2 Charging Station
50 kW
2-4 chargers

Gen 3 Charging Station/Plaza
50-150 kW
4-40 chargers

Up to 350 kW in corridors

Electric Ride Share: Big Shift in Usage, Access and Clean VMT

Ride Share: 5-7x VMT almost all DCFC

APR 12, 2018 @ 08:49 AM 1,332

EVgo, Maven Gig Make It Easier To Fast Charge A Chevy Bolt EV

Sebastian Blanco, CONTRIBUTOR

I started covering green cars before the Tesla Roadster was a thing FULL BIO

Opinions expressed by Forbes Contributors are their own.

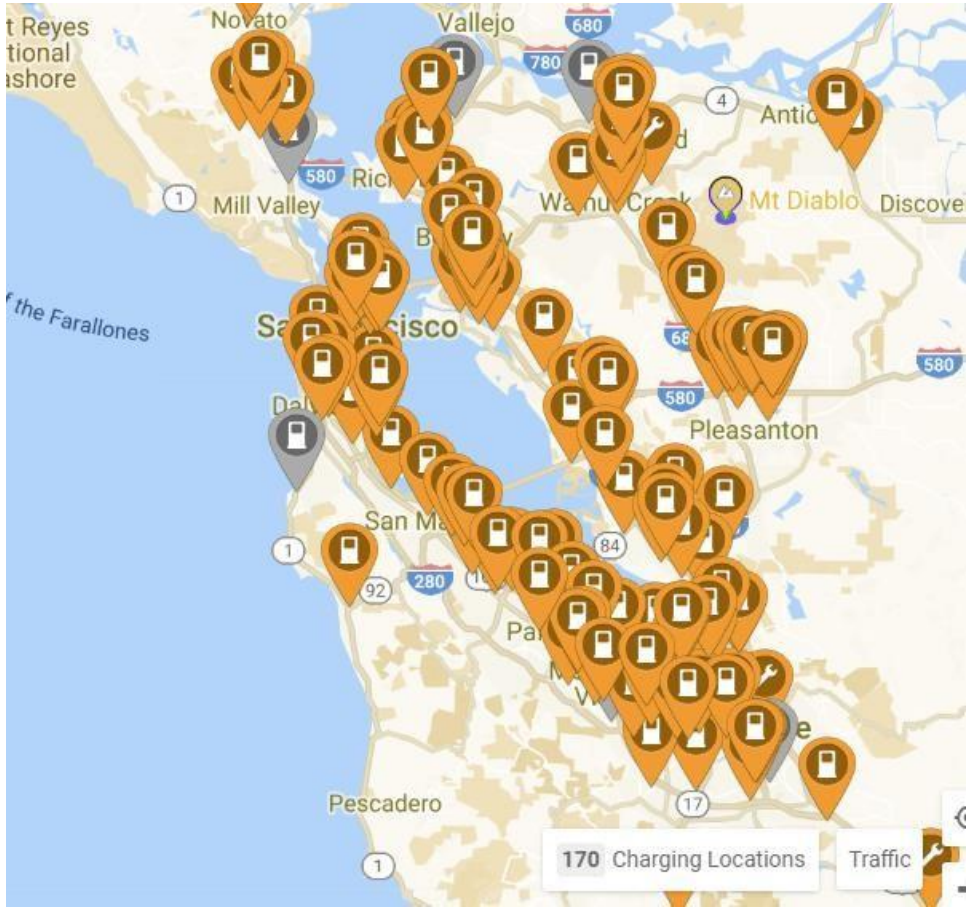
Maven Gig EVgo Bolt EV

Electrify Everything

DCFC is the standard for Medium- and Heavy Duty

The Challenge: 1,000 DCFC in the Bay Area by 2020

ICCT 2019 & Rideshare & MHD



Corporate campuses
- Employees without access to home charging
- Rideshare drop offs
- Caltrain shuttles
- Commuter buses

Public Agencies
- Visitors
- MUD
- Fleets

Retail
- Attract new customers
- Spent 4-10x on purchases

lars.peters@evgo.com

Let’s Discuss…

… as we pick the brains of our expert panel.

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Watt Do You Think?

Interactive polling provided through your smartphone!

Please navigate to:

www.zeetings.com/SVCE

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Don Bray

Director of Account Services and Community Relations

SVCE Update

2018 Community Benefits Summary

3.6 Billion kWh

Carbon-free energy delivered

266,500

Residential and business customers, a 97% participation rate

1.1 Billion Pounds

Carbon emissions avoided by providing clean energy

$16.5 Million

On-bill dollar savings for SVCE customers

$159,000

Cash payments to customers for generating extra solar energy

16.6%

Community-wide emissions reduction from 2015 baseline

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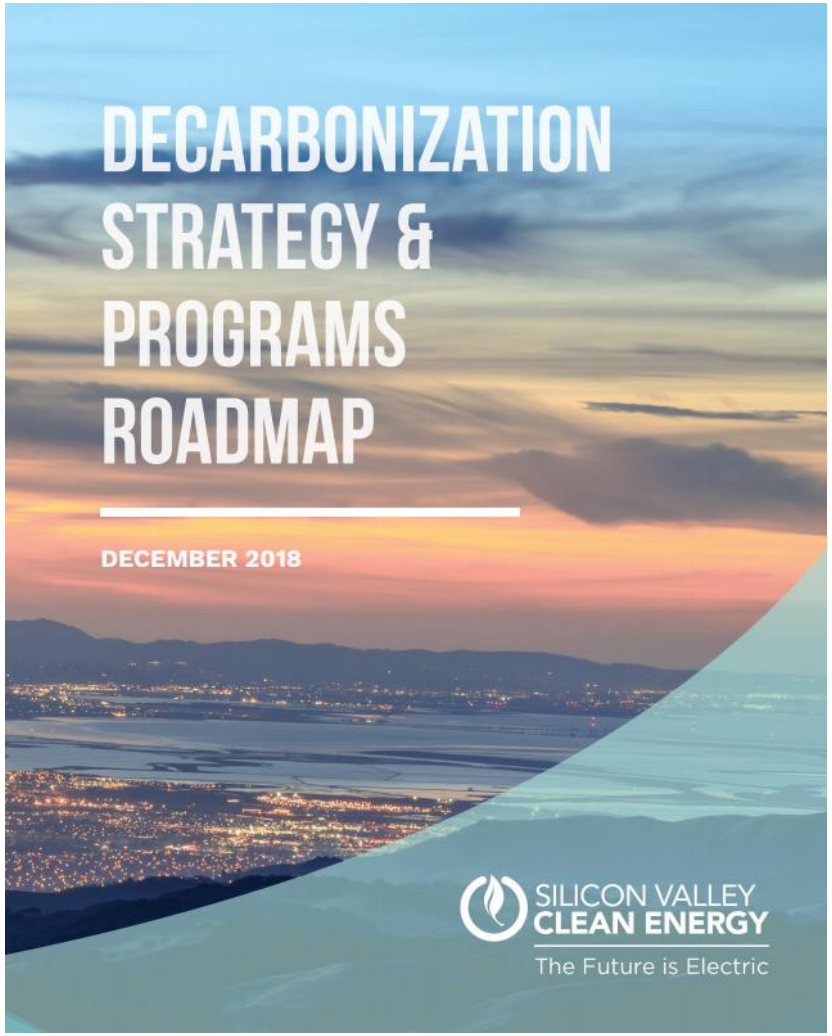
Decarb Strategy & Programs Roadmap



- Initial strategy and program plan to address SVCE GHG emissions goals:
  - **30%** below 2015 levels by 2021
  - **40%** below 2015 levels by 2025
  - **50%** below 2015 levels by 2030
- Consistent with member agency CAPs
- Re-visit goals annually based on GHG emissions inventory data

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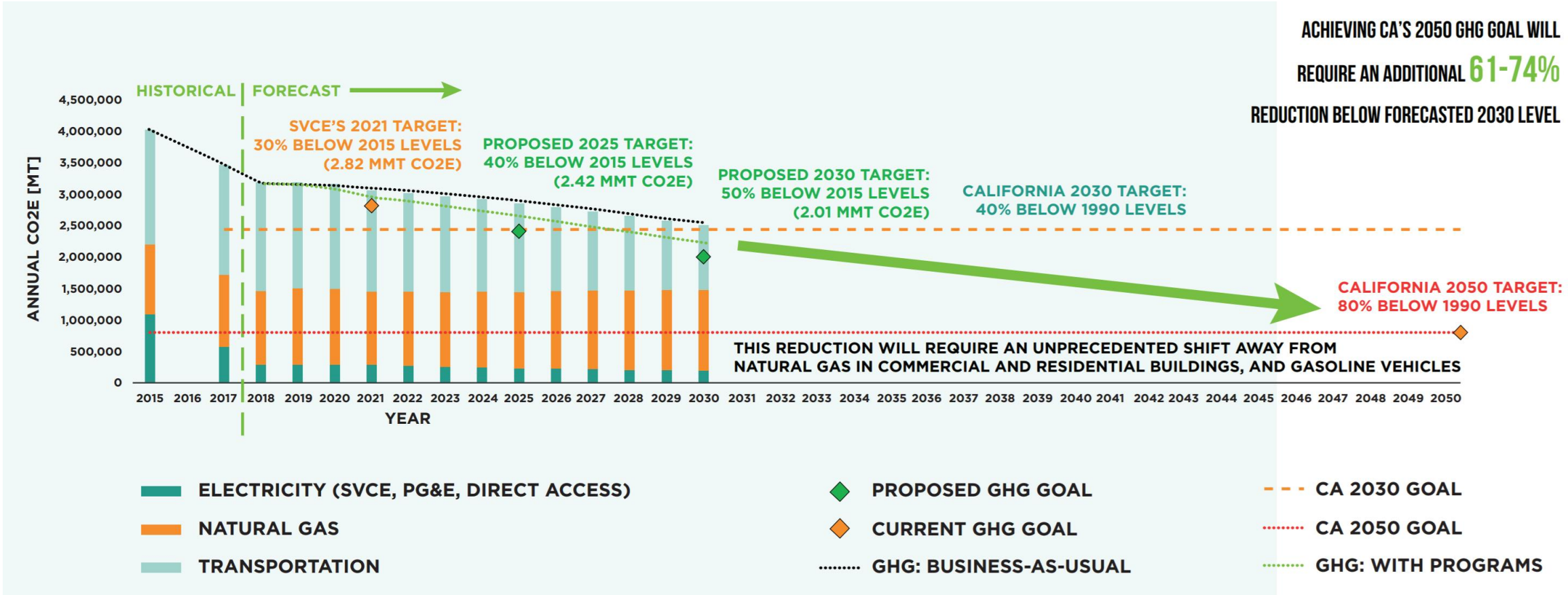
GHG Reduction Goals in Context . . .



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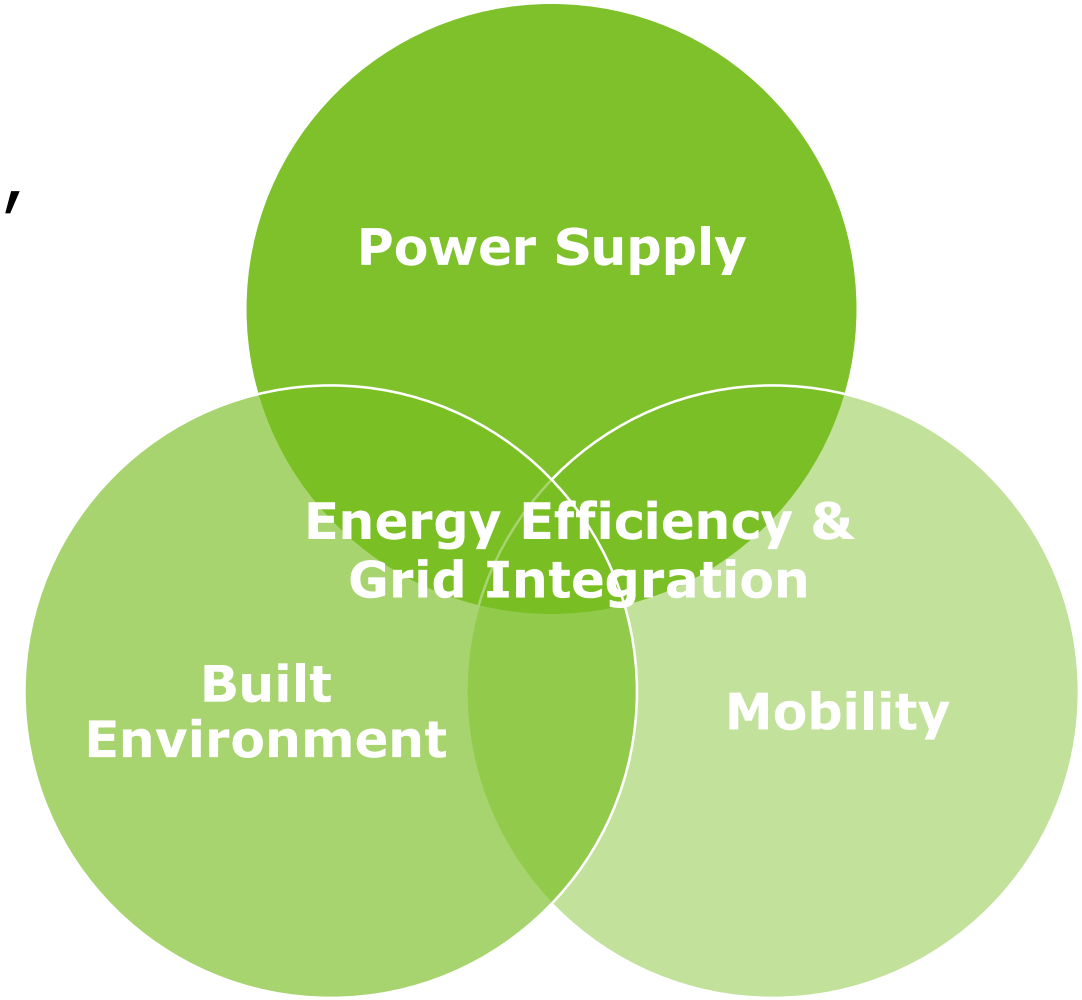
Overarching Program Strategy

- Procure & maintain a sustainable, affordable and carbon-free **power supply**
- Electrify the **built environment** and **mobility**
- Promote **energy efficiency** & successful **grid integration**



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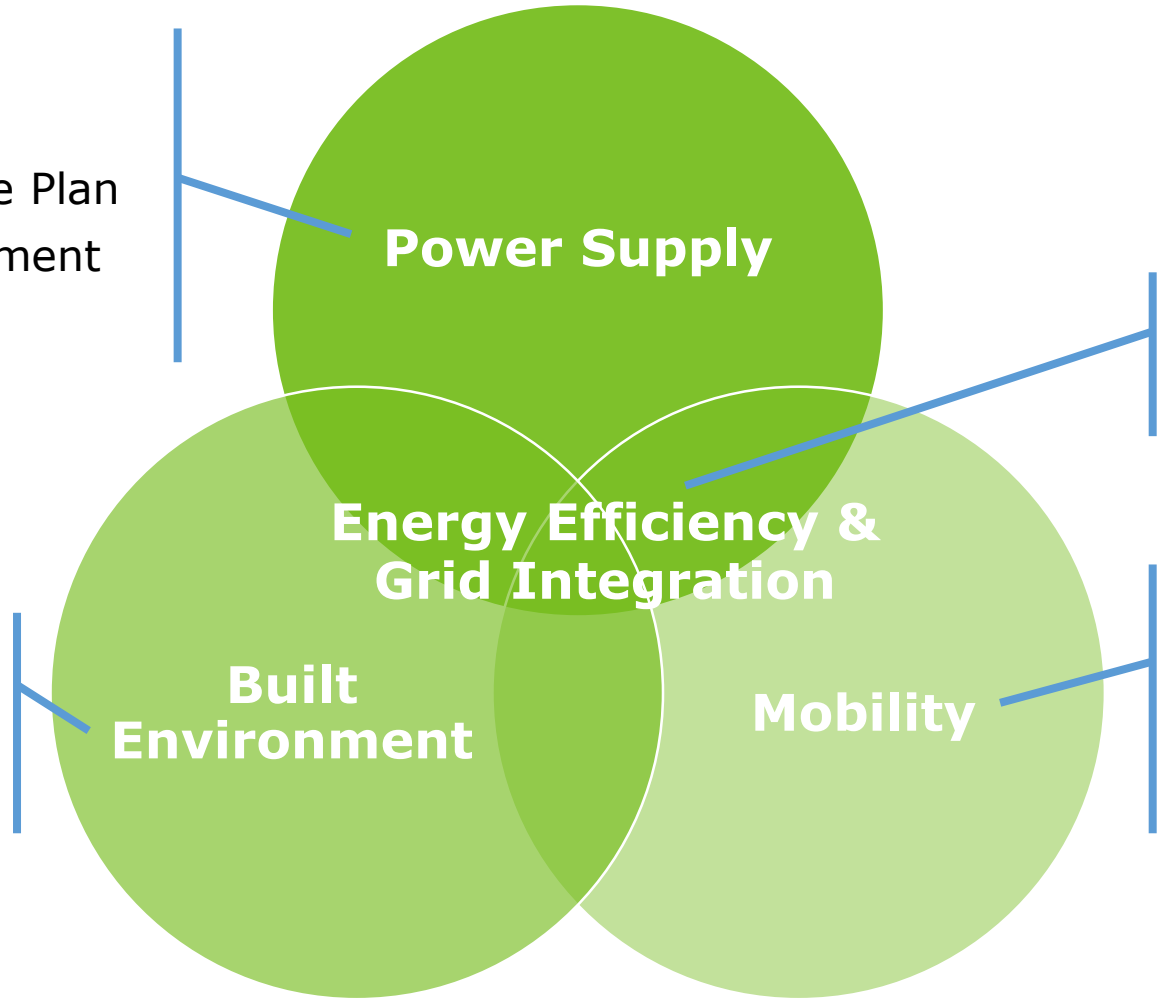
SVCE Programs Portfolio

Cross-Sector:

- **Innovation Partners**
- **Innovation Onramp**
- **Customer Resource Center**
- **Engagement Grants**

- **C&I Clean Power Offerings**
- Integrated Resource Plan
- Retail Rates Assessment
- Local Renewables



- **Virtual Power Plant**
- Non-SVCE Efficiency Programs

- **Reach Codes**
- **All-Electric Showcase Grants**
- **FutureFit HPWH**
- Streamlining Community-wide Electrification

- **EVSE Strategy & Joint Action Plan**
- **EV Fast Charge Depot Pilots**
- EV Incentives for Low-Income
- EV Charging for Multi-Unit Dwellings

Color = 2019 Priority

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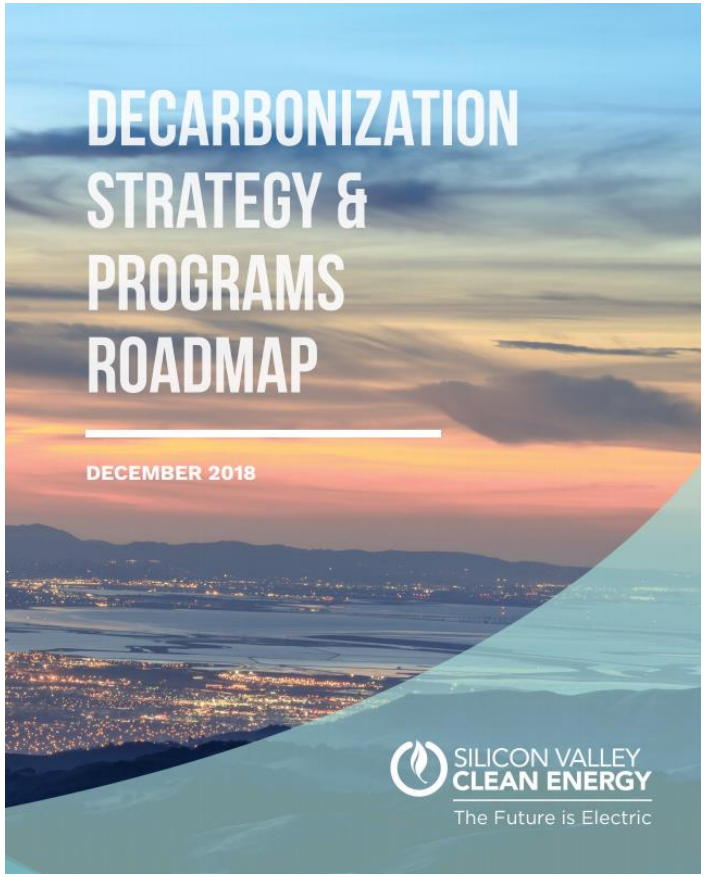
Approved Program Budgets

Program	FY19-FY20 Budget Request
C&I Clean Power Offerings	$150k in FY2019
Reach Codes	$400k in FY2019
All-Electric Showcase Grants	$1.5M over two-year period
FutureFit Heat Pump Water Heater	$325k over two-year period
EV Infrastructure Strategy & Plan	$200k in FY2019
EV Fast Charge Depots	$700k over two-year period
Innovation Partnerships	(combined with Innovation Onramp budget request)
Innovation Onramp	$1.2M over two-year period
Virtual Power Plant	$1.1M over two-year period
Customer Resource Center	$350k over two-year period
GHG emissions inventory update	$100k in FY2019
Total	**$6,025,000**



- Approved December 13, 2018 by SVCE BOD

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EVSE Strategy and Joint Action Plan

Work with member agencies and other local stakeholders to:

- determine current status of EVSE deployment, and future needs (e.g. 2025)
  - by use case and jurisdiction
  - for key enabling practices
  - critical barriers
- launch standing service-area EV/EVSE working group
- develop strategies for high-priority use cases, enabling practices (per 'DNZ')
- identify incentive/rebate programs, and plan for leveraging
- create detailed 'Joint Action Plan' for deployment, programs

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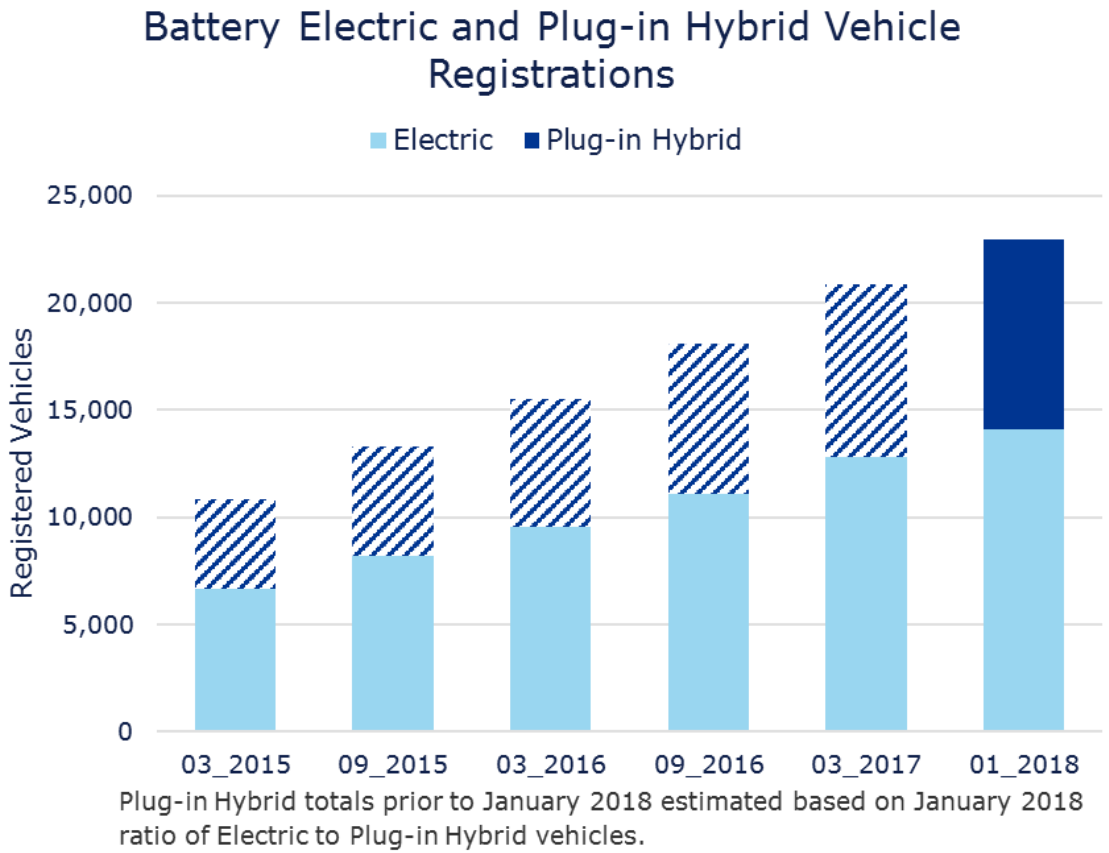
Growing EVSE demand . . .



- **Electric Vehicles have a double digit percentage growth rate every 6 months**

Existing PEV Fleet Distributed by *County*

County	New EV Adoption Rates (2012-2016)
Alameda	3.82%
Monterey	0.83%
San Francisco	1.77%
San Mateo	2.59%
Santa Clara	*5.25%*

Data sources: State of California Dept. of Motor Vehicles Motive Power Biannual Report

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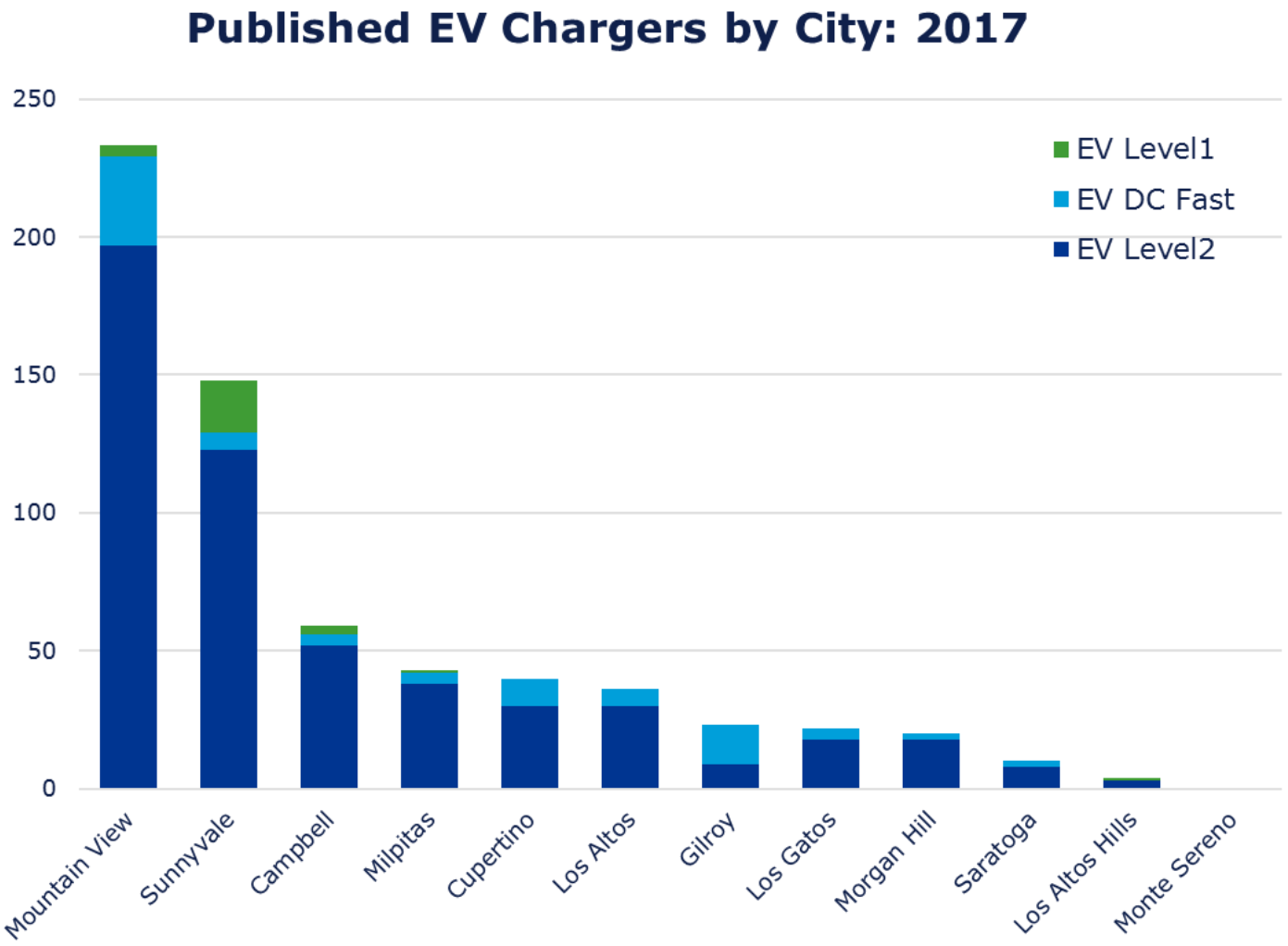
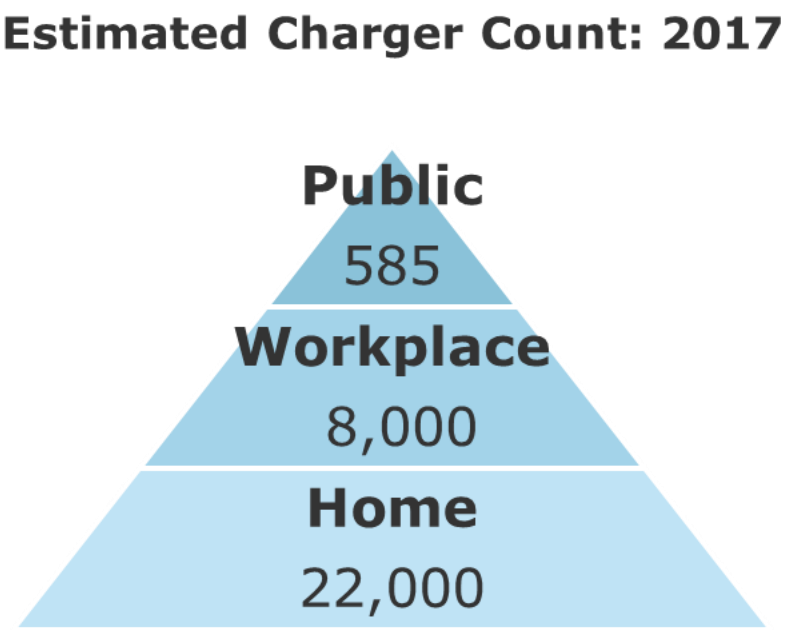
Understanding EVSE Deployment . . .





Note:
- EV Charging companies reference only 5-10% of their charging network are published publicly.

Data sources: U.S. DOE Alternative Fuels Data Center (AFDC), ChargePoint, EVgo

Images excerpted from 2018 SVCE GHG and Energy Asset Inventory Study

EVSE Use Cases

- An effective regional EVSE Strategy must consider what's needed to support a range of important charging use cases

Use Case	Levels	Charge
Fleet - Public/Private Transit	L3	100 kWh+
Fleet - Transportation Network	L3	50 kWh+
Corridor	L3	35 kWh+
Fleet - Public/Private Vehicles	L2	15 kWh+
Destination/Retail	L2	5 kWh+
Workplace - Large	L2	10 kWh+
Workplace - Small/Medium	L1, L2	10 kWh+
Multi Unit Dwelling (MUD)	L1, L2	10 kWh+
Single Family Residential	L1, L2	10 kWh+

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EVSE Enabling Practices

- Implementation of key enabling practices will help to accelerate regional deployment of EVSE

Enabling Practices	Example
Regional Coordination	Sustain a regional working group to focus on EVs
Funding Support and Incentives	Create a process or mechanism to streamline pursuit of grants
Education and Outreach	Provide resources online
Building/Zoning/Parking Codes	Require pre-wiring for EVSE in building code
Permitting	Streamline EVSE permitting process
Planning and Land Use	Integrate EV readiness into broader local planning efforts
Electric Rates	Deploy more beneficial EV electric rates through SVCE
Vehicle/Grid Integration (VGI)	Control EVSE to shift charging times to off-peak
Innovation	Support emerging technologies and pilots

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Available EVSE Funding and Resources

Examples:

- BAAQMD: $5M annually for public/private organizations in Bay Area
- PG&E: $130M over three years for L2 charging MUD and workplaces in CA
- PG&E: $236M over five years for medium- and heavy-duty EV fleet charging
- VW: $153M over next three years, targeting metro areas in CA (other funding also available through VW)
- CEC: $2M loan and financing program for small businesses and landlords
- CALeVIP*: ~$40M available annually

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CALeVIP Funding

Major program funded annual by California Energy Commission, and implemented by Center for Sustainable Energy (CSE)

- L2 and L3 chargers
- Estimated $40M in funding annually as a part of $200M program total
- SVCE plans to pursue an application:
  - partner with PCE and BAAQMD, among others
  - suggest matching funding
  - SVCE to submit a letter of intent
  - SVCE staff going to BOD in February with budget request
  - develop regional plan to submit with partners

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PG&E FleetReady Program

EVSE rebates for transit, school bus, and sites in disadvantaged communities; not to exceed 50% of charger cost

EVSE Rebate:

Power output	Rebate for eligible customers
Up to 50 kW	50% of the cost of EVSE, up to $15,000
51-150 kW	50% of the cost of EVSE, up to $25,000
150+ kW	50% of the cost of EVSE, up to $42,000

Infrastructure Incentives:

Incentive option

- All customers are eligible if they meet minimum eligibility criteria
- Customers owning the make-ready infrastructure will receive:
- An infrastructure incentive for the lesser amount of either 80% of the customer's costs – OR –
- Incentive amounts capped by sector:
  - **Buses = $9k / vehicle**
  - **TRU = $3k / vehicle**
  - **Other = $4k / vehicle**

Customers will be considered for additional infrastructure support based on site specific conditions and program objectives

PG&E owned option

- Sites that apply to FleetReady will also be reviewed for eligibility for PG&E ownership of make-ready
- Review will take into account site cost and number of vehicles deployed
- OEM partners and PG&E sales leads will be provided with guidelines regarding site characteristics making eligibility more probable (e.g. trenching distance, average power levels)

*Images from PG&E Oct 2018 presentation

PG&E FleetReady Program

Next Steps:

- Complete Beta
- Launch website
- Hold launch event
- Initiate charging station vendor RFQ
- Build online tools
- $236M program

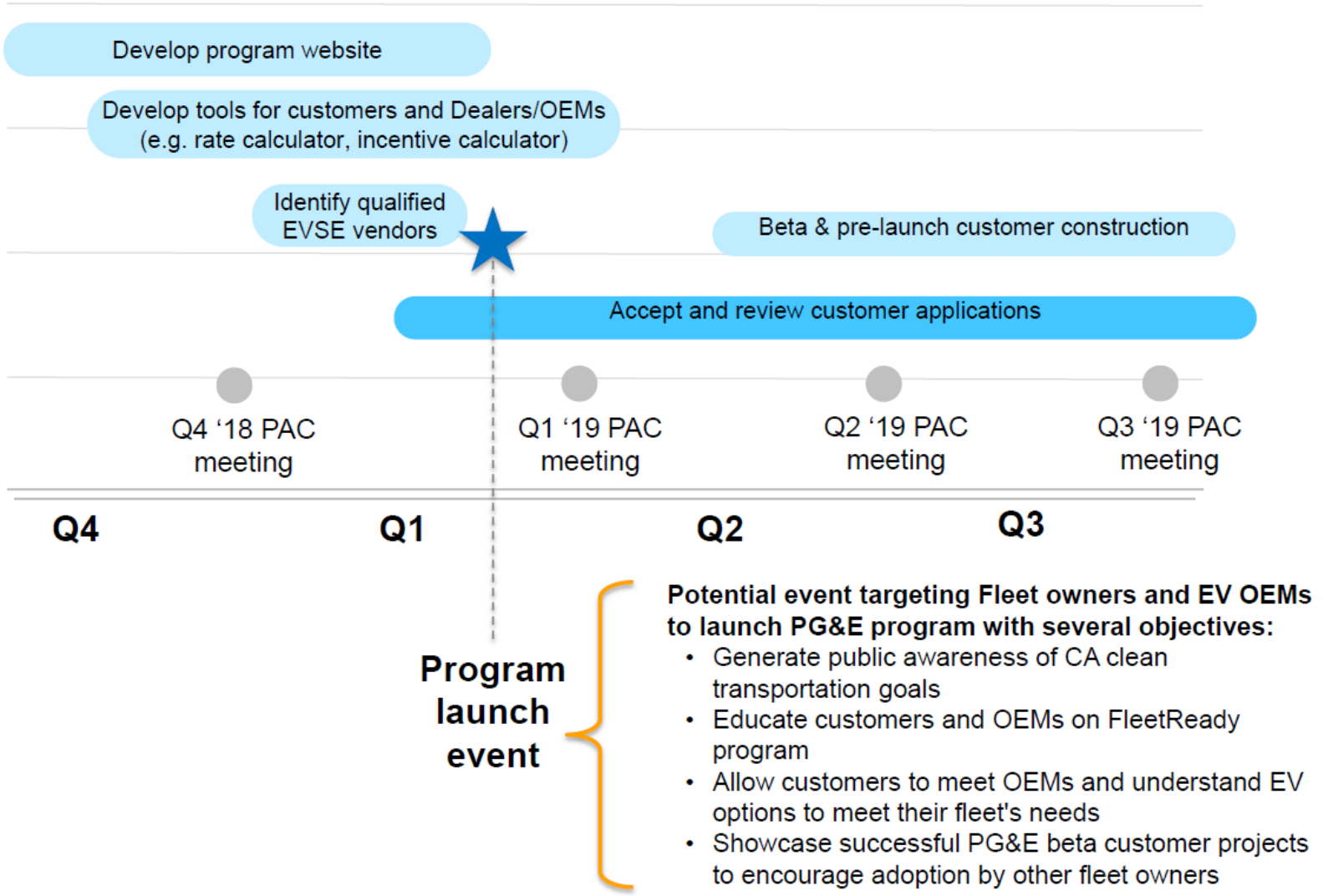
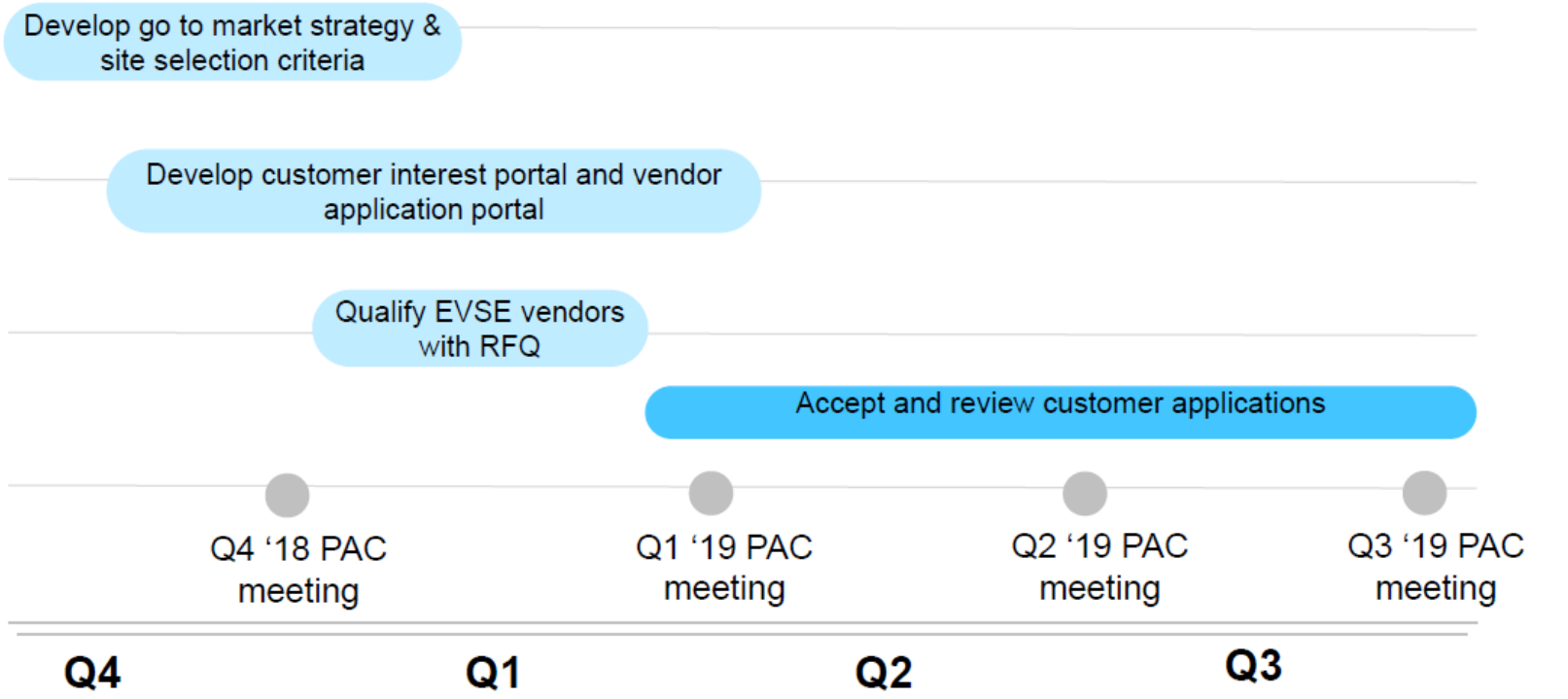


*Image from PG&E Dec 2018 presentation

PG&E DCFC EVSE Rebate

- PG&E to offer rebate up to $25k per EVSE
- At least 25% “in or adjacent to disadvantaged communities” (not to exceed costs)
- $22.4M program



Program details

- Customers express interest in program through website
- Approved EVSE vendors listed on website for customer consideration
- Once customer selects approved EVSE vendor, vendor submits complete application on behalf of customer

*Image from PG&E Dec 2018 presentation

Some EVSE Next Steps . . .

- Provide input to EVSE Joint Action Plan via interviews/focus group participation
- Involvement/support in SVCE's CALeVIP grant application
- Channel questions to SVCE re current EVSE/Fleet programs
- Identification/participation in SVCE DCFC Depot Pilots
- Others?

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In other news . . .

- SVCE annual rate update likely in May/June timeframe
- New commercial Time-of-Use rates in 2020
- SVCE establishes two new solar + storage PPAs
  - Recurrent Energy – RE Slate Project in Kings County, CA
    82.5 MW / 99 MWh
  - EDF – BigBeau Solar Project in Kern County, CA
    70 MW / 88 MWh
- No service interruptions!
- Questions?

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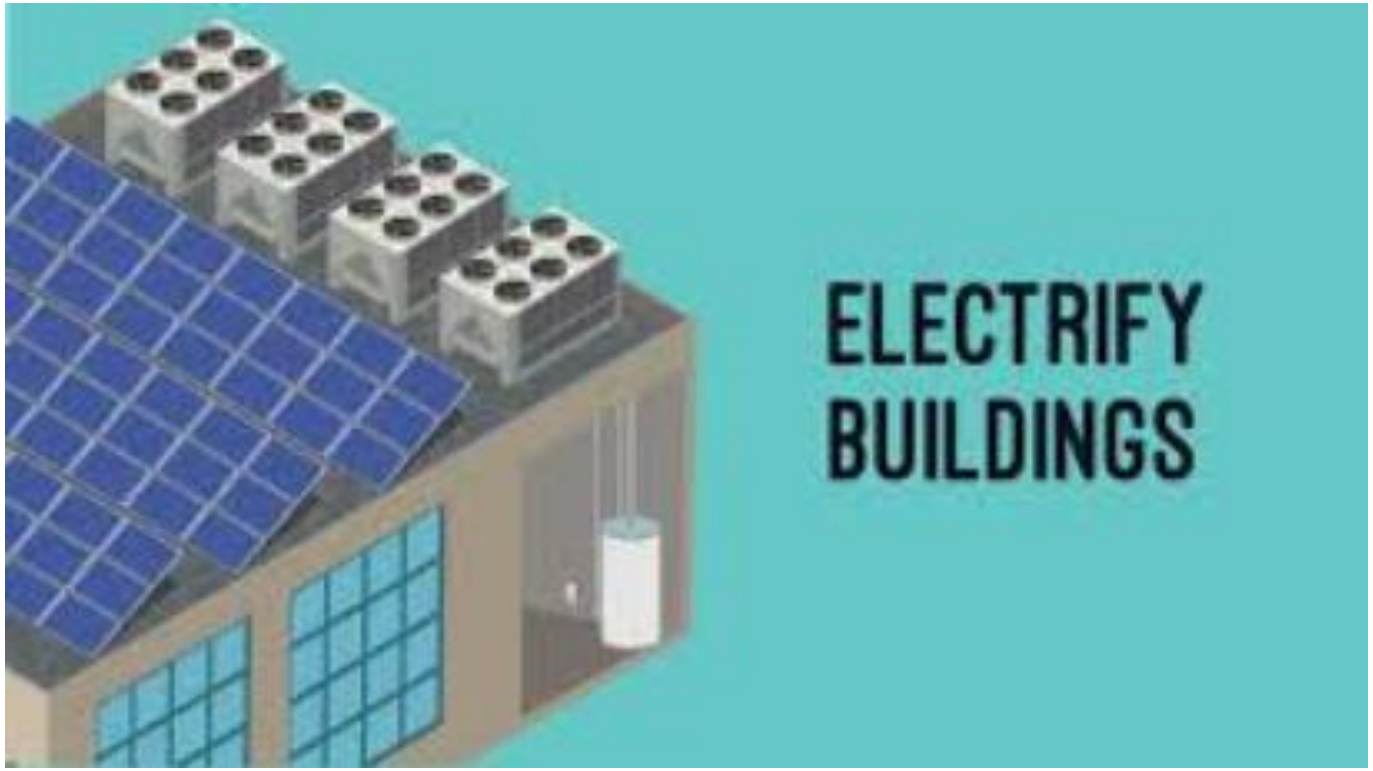
Next ‘Watts’ Meeting….



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Thank You!!!

SVCleanEnergy.org

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