Electric Vehicle Grid Integration

SDGE connected

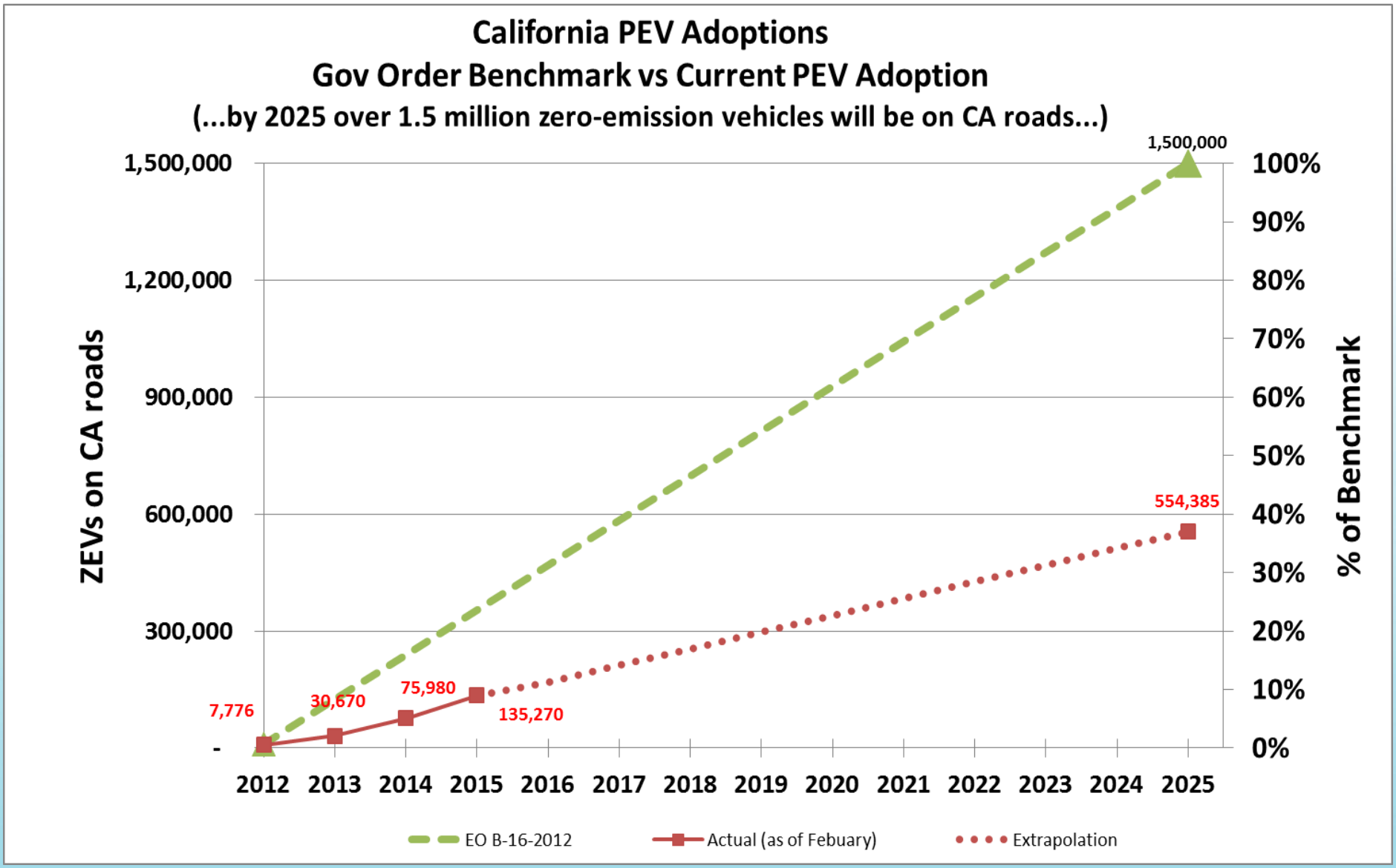
A Sempra Energy utility℠

"Charging Toward a Cleaner Future"

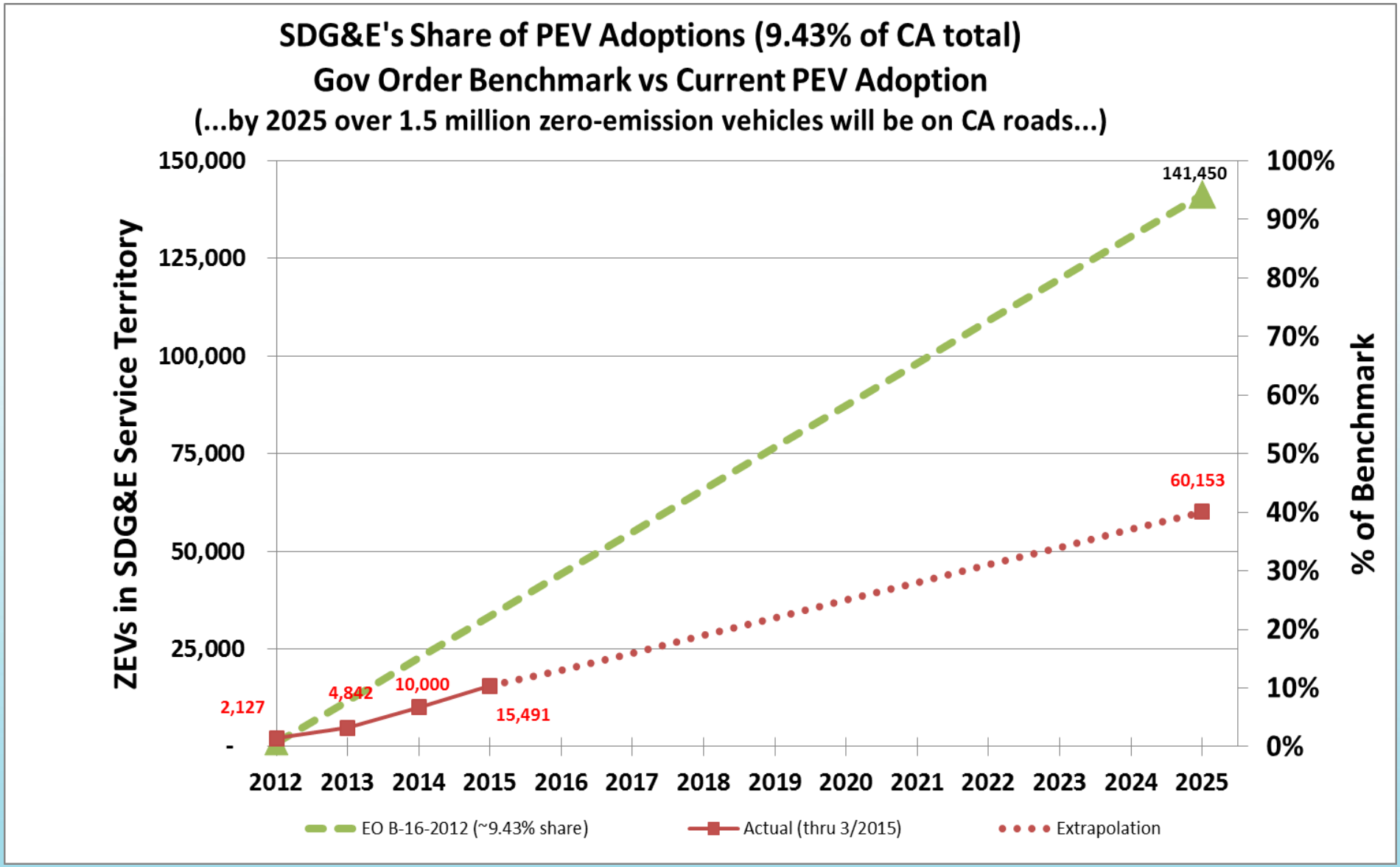
California Objectives

- Roughly 40% of CA's greenhouse gas emissions come from transportation
- Governor Jerry Brown's "Zero Emission Vehicle (ZEV) Action Plan"
  - By 2020 – **Grid-integrated** charging infrastructure to support 1 million ZEVs
  - By 2025 – 1.5 million ZEVs on California roadways
  - By 2020 - Restore greenhouse gas emissions to 1990 levels (AB32)
  - "Drive the Dream" commitment to workplace charging
- DOE launched Workplace Charging Challenge – SDG&E is a partner
  - Achieve a tenfold increase in U.S. employers offering workplace charging in 5 years
- >33% renewable energy resource mix by 2020
  - SDG&E on target to exceed 40% by 2017

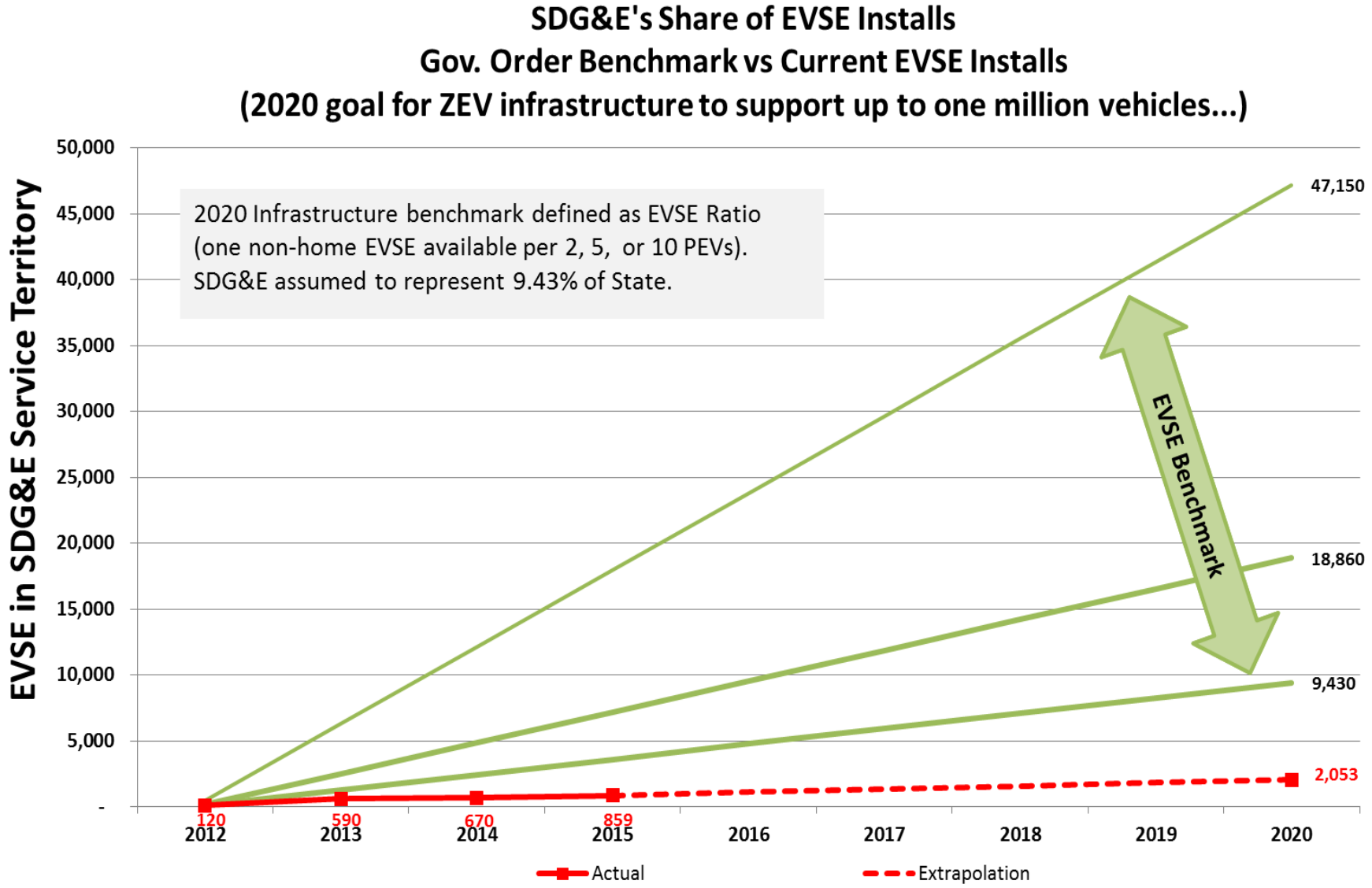
Transportation Electrification Key to State GHG Goals



PEV Sales Falling Short of Goals in San Diego



Charging Infrastructure is Insufficient in San Diego



Electric Vehicle Grid Integration Pilot Proposal

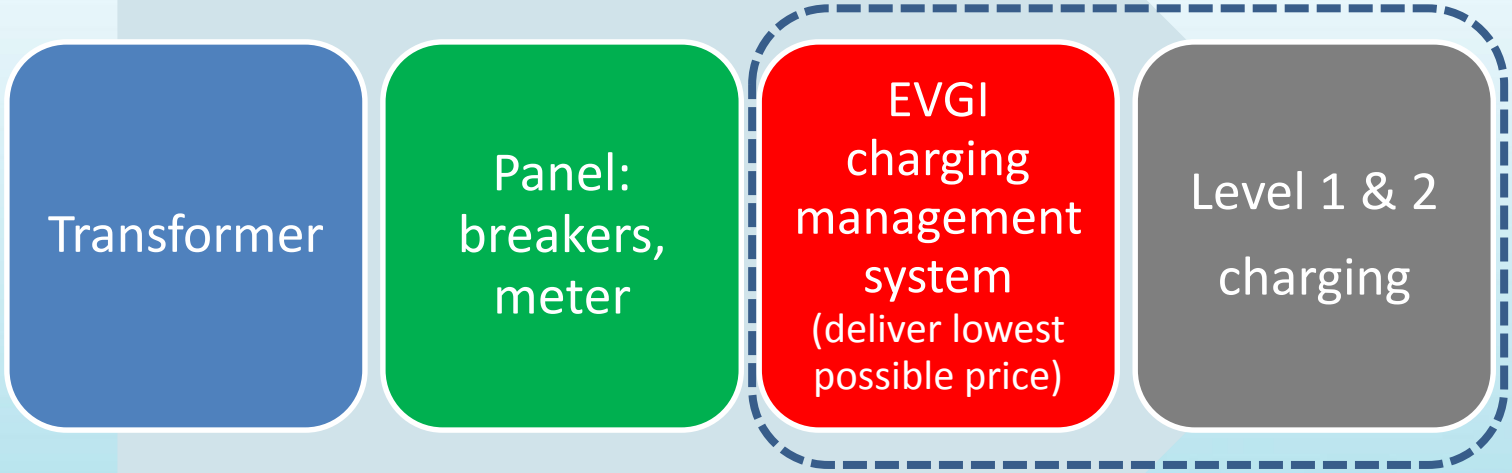
- Focused on installing grid-integrated charging infrastructure in multi-family communities and places of work
  - Multi-family customers make up 50% of SDG&E's residential population
  - Best opportunity for grid-integrated charging due to frequently used, long parking durations
- Introduce an hourly rate and EV charging infrastructure to efficiently integrate and manage charging loads with the electric grid
- Give EV customers the electricity needed at the best price possible
- To greatest extent possible use multiple third parties to operate and maintain grid integration charging system to SDG&E specifications
  - Install 550 facilities (with 10 chargers each) over 5 years
- EV charging billed directly to an EV drivers' SDG&E bill

Electric Vehicle Grid Integration Benefits All Customers

- Reduces harmful air emissions from gasoline and diesel fuels
- Reduces on-peak charging and the need to build system capacity
- Helps charge EVs when energy is low cost and supply is plentiful, such as renewable energy resources
- Increases EV sales/leases and reduces risk of market stalling
- Doubles zero-emission miles for plug-in hybrids
- Creates jobs and attracts EV related businesses to the region
- Educates customers about dynamic pricing
- Provides data to guide EV policy
- Stepping-stone toward "Vehicle-to-Grid"
- Increases US energy independence

EVGI Charging System Requirements

- Communicating: utility-specified, time-variant prices, day-ahead
- Pricing: opportunity to get lowest price and meet charging needs
- Billing: total bill features time-of-day usage and unit price



Proposed EVGI Installation – New electric service from existing, upgraded or new transformer

All sites will have new electric service

Grid-Integrated EV charging and control

Primary Conduit

Primary Cable

Existing, upgraded or new transformer

Service Conduit

Service Cable

Meter pedestal and breaker panel

Customer Conduit

Customer Cable

Control electronics, keypad and communications equip.

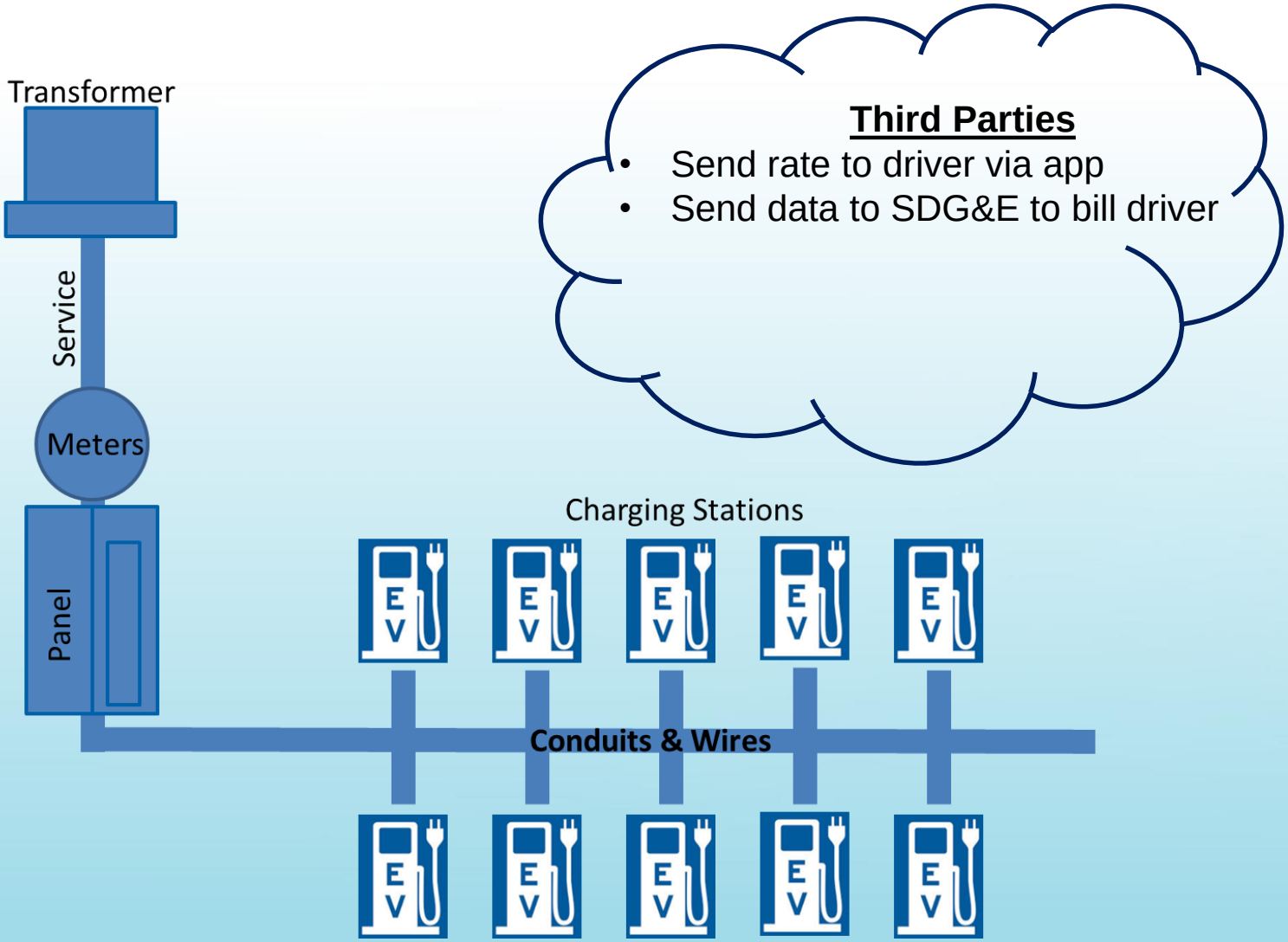
10 EVSE

Utility would provide upgraded or new transformer, all trenching, conduit, wiring, backfill, pavement repair, connectors, meter pedestal / panel, charging / control equipment, and billing. An easement would be required from property owner for placement of equipment.

Note: EVGI control and charging architecture shown conceptually

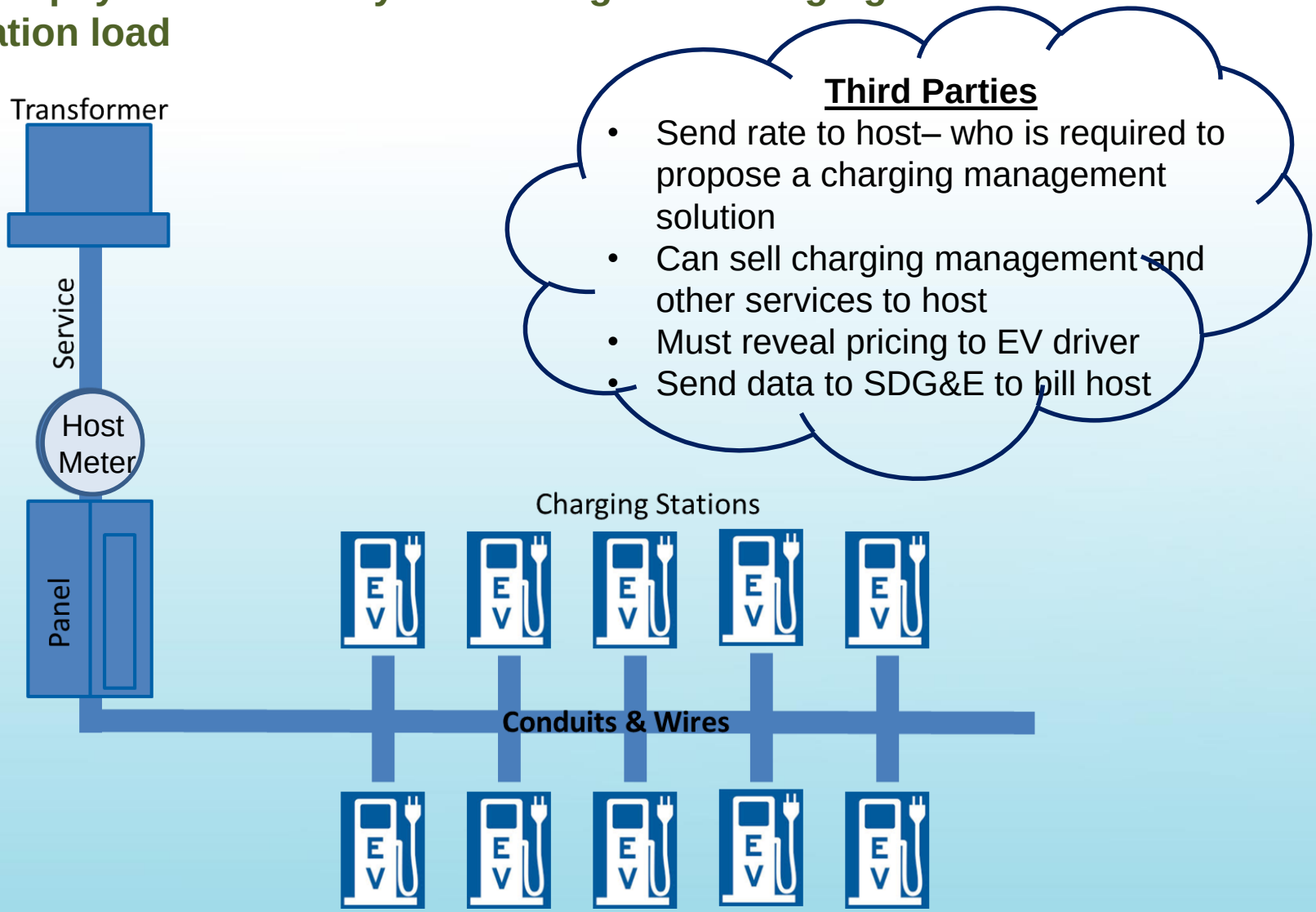
Driver's Choice

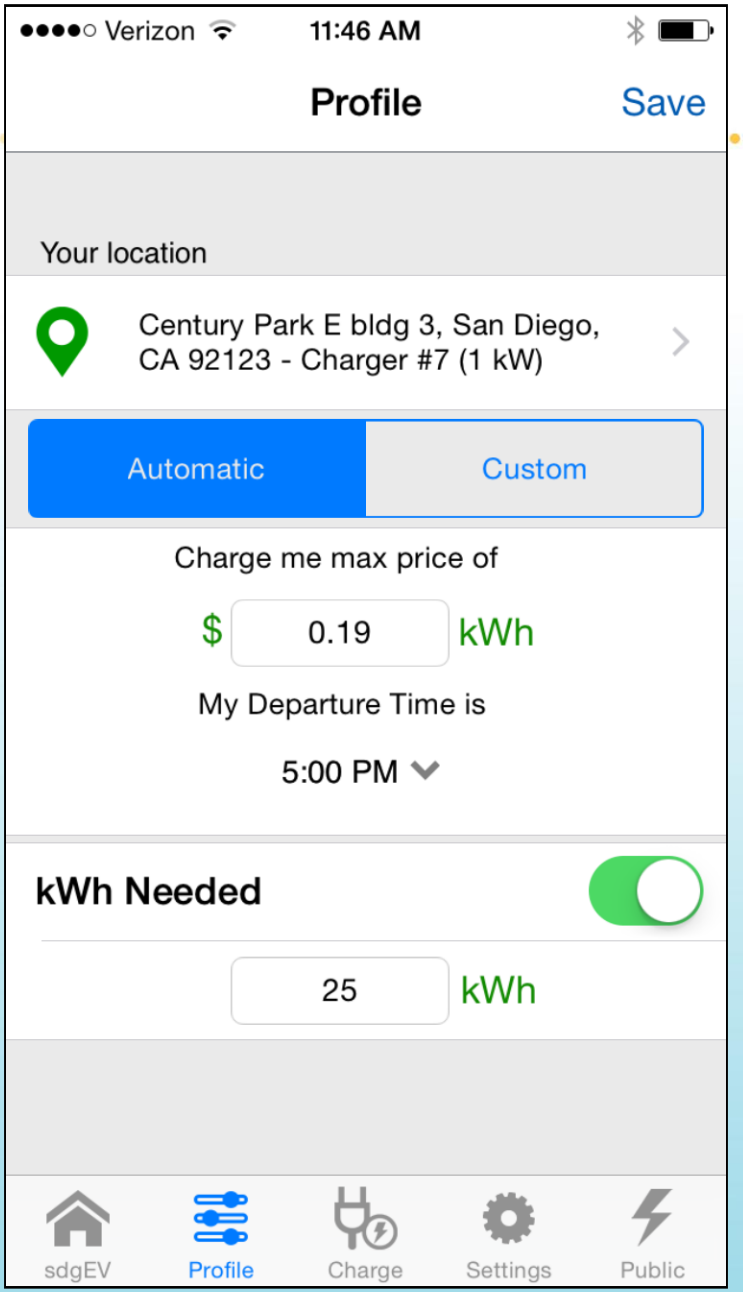
- SDG&E/IBEW installs and maintains entire facility
- Third parties operate charging management system
- **Driver chooses price and manages own load**

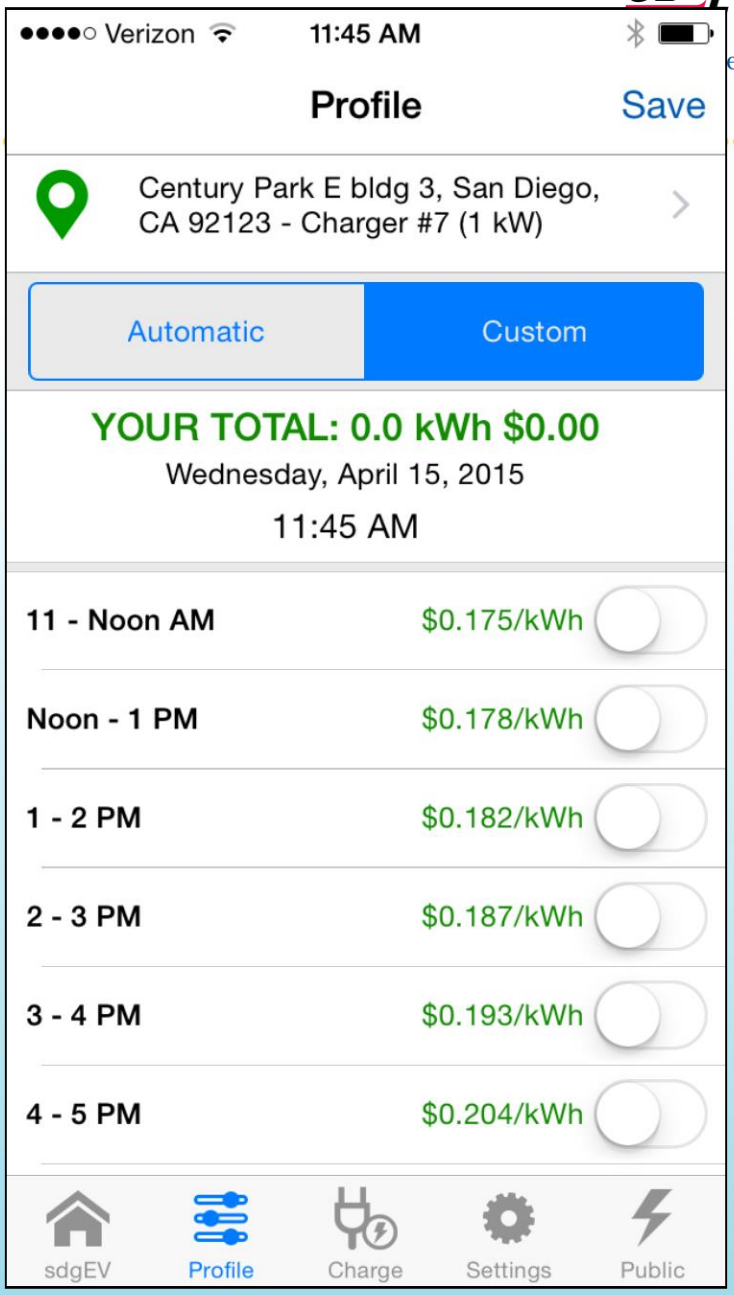


Host's Choice

- SDG&E/IBEW installs and maintains entire facility
- Third parties operate charging management system
- **Host pays for electricity and manages all charging station load**




●●●●○ Verizon
11:46 AM
Profile
Save
Your location
Century Park E bldg 3, San Diego, CA 92123 - Charger #7 (1 kW)
Automatic
Custom
Charge me max price of
$
0.19
kWh
My Departure Time is
5:00 PM
kWh Needed
25
kWh
sdgEV
Profile
Charge
Settings
Public


●●●●○ Verizon
11:45 AM
Profile
Save
Century Park E bldg 3, San Diego, CA 92123 - Charger #7 (1 kW)
Automatic
Custom
YOUR TOTAL: 0.0 kWh $0.00
Wednesday, April 15, 2015
11:45 AM
11 - Noon AM
$0.175/kWh
Noon - 1 PM
$0.178/kWh
1 - 2 PM
$0.182/kWh
2 - 3 PM
$0.187/kWh
3 - 4 PM
$0.193/kWh
4 - 5 PM
$0.204/kWh
sdgEV
Profile
Charge
Settings
Public


INSTRUCTIONS:
Enter stall number, then #
2.) Enter code, then #
For questions or to sign up
ev@sdge.com
liberty enabled

1st Employee Incentive Program