

# Plug-In. Charge. Network.

Greenlots SKY™ manages networked charge stations on an **open**, cloud based solution.



# Greenlots Partnerships: Automotive OEMs



- Soul EV 2014 US rollout partner
- DCFC across dealerships in CA in 2014
- Currently installing in new markets across US
- ChargeUp program manager



- Exclusive Singapore BMW i3 and i8 partner
- Data services
- Singapore public charging network (L2 & DCFC)
- Residential charge stations & installations



- 100+ public DCFC across East Coast and growing
- Dealership DCFC on West and East Coast
- EZCharge, NCTC

# Greenlots Partnerships: Utilities and Grid Operators

## United States



## Canada



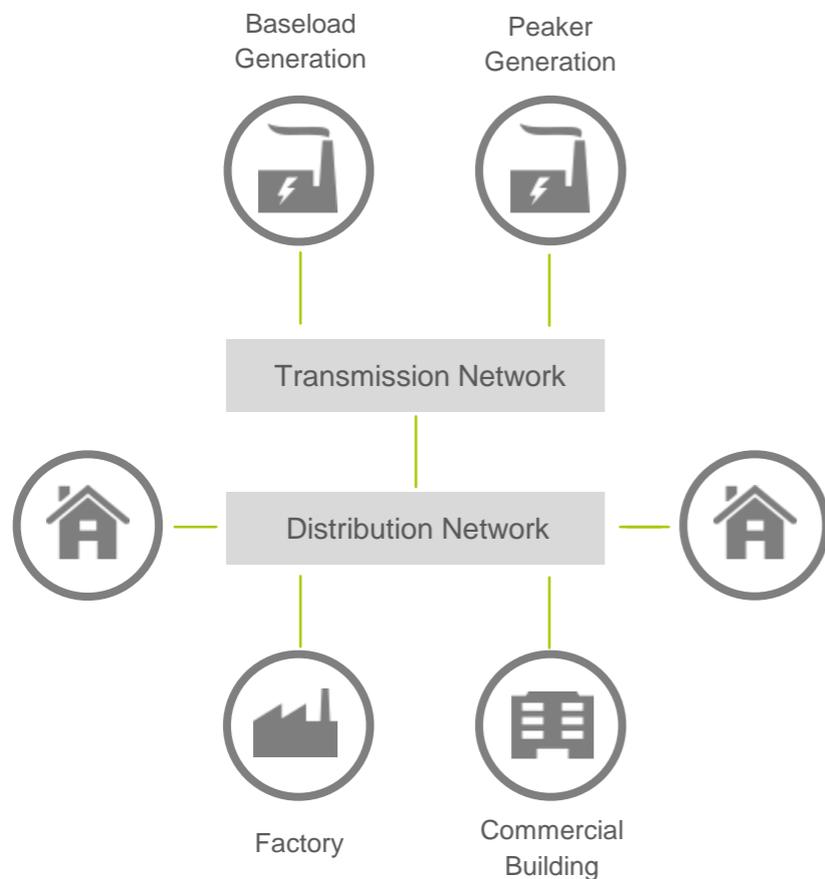
## International



# New York's Vision & The Emerging Reality

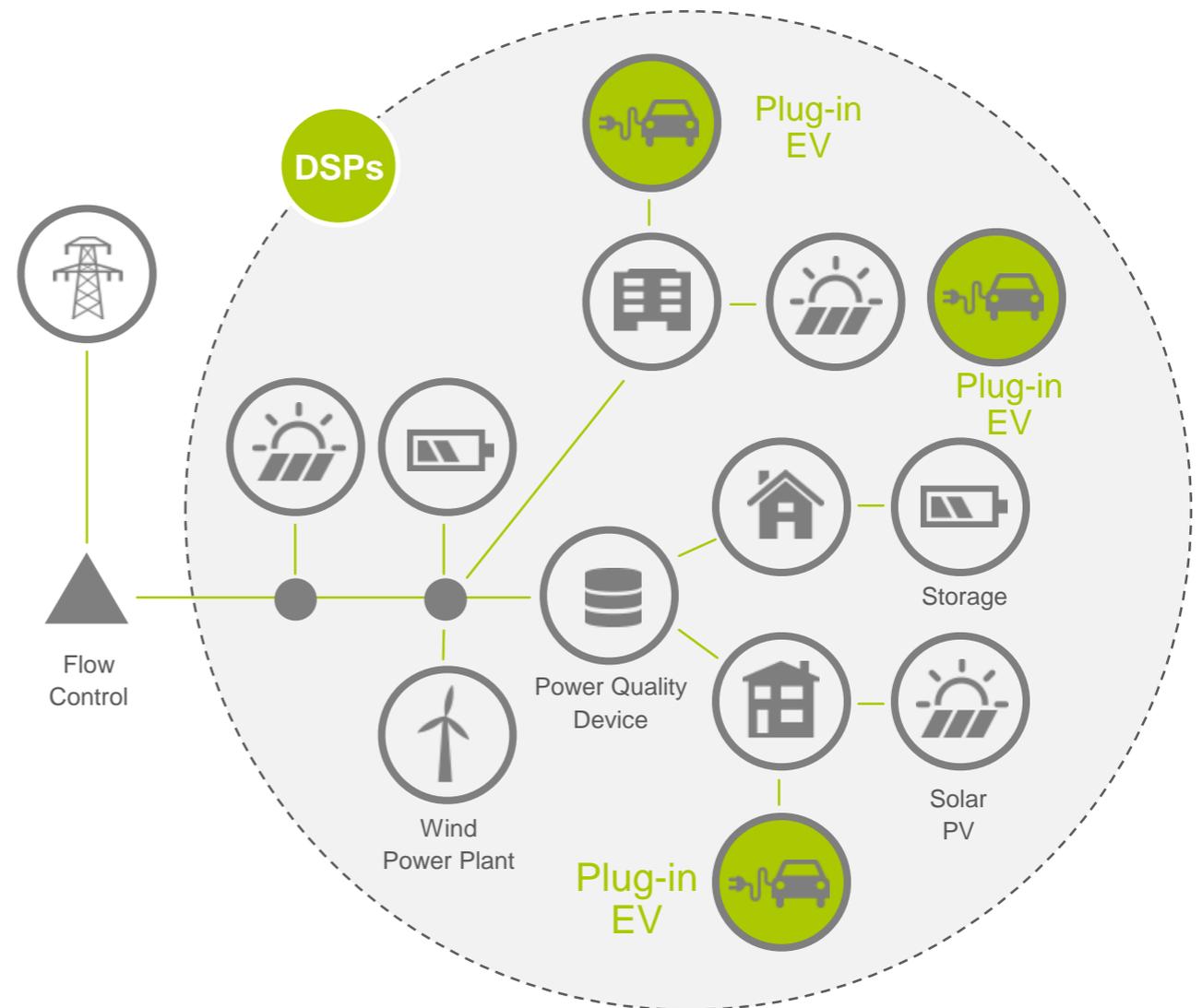
## Yesterday

### Centralized Power



## Tomorrow

### Clean Distributed Resources



#### Track Order 1:

“**DSP** markets can assist a transition to electric vehicles by turning what could be a strain on distribution systems into a valued asset. Electric vehicles present great opportunity if coordinated with grid functions to provide storage and voltage support. Electric vehicles can also increase utility sales and reduce rate pressure caused by infrastructure needs.”

# Multi State ZEV Action Plan

## Action 8: Remove barriers to ZEV charging and fueling station installations

- **CA SB 454** – California legislature, signed by Governor Gerry Brown in 2013, mandates alternative payments for access to charging stations, meaning that drivers must be able to access a charge station without having a subscription

## Action 9: Promote access, compatibility, and interoperability of the plug-in electric vehicle charging network

### OCPP – Charge Station to Network Management Platform

- Designed to meet the needs of utilities who experienced first hand the risk of proprietary protocols
- Deployed in over 50 countries, across 10,000 charge stations
- De-risks investment in infrastructure by guarding against stranded assets and vendor lock-in
- As suggested to be required in ZEV multistate action plan

### OpenADR – Charge Station to Utility & Customer

- Created to standardize, automate and simplify DR to enable utilities to cost-effectively meet growing energy demand, and allow customers to control their energy future
- Uses a common language over any existing IP-based communications network
- **The most comprehensive open and standardized protocol**

### Driver Roaming Interoperability – Drivers across Networks

- OEMs and network providers working together to create interoperable access and convenience for drivers to have seamless charging experience
- Examples include: EZCharge, NCTC
- Requires partnership between network operators to coordinate customer experience, access card distribution, customer support integration and driver engagement

# Greenlots: Open Standards



- Open Charge Alliance (OCA) which develops, promotes and maintains OCPP
- Greenlots SKY is currently the only EV network to be Open ADR 2.0b certified



▼ Forbes,

<http://www.forbes.com/sites/peterdetwiler/2014/03/13/building-out-the-electric-vehicle-charging-infrastructure-greenlots-advocates-for-open-standards/>



▼ Breaking Energy,

<http://breakingenergy.com/2015/03/04/open-standards-needed-to-facilitate-ev-charging-and-demand-response/>

**greentechgrid:**

The Demand Response Industry Simplifies Communication Protocol OpenADR

▼ Green Tech Media,

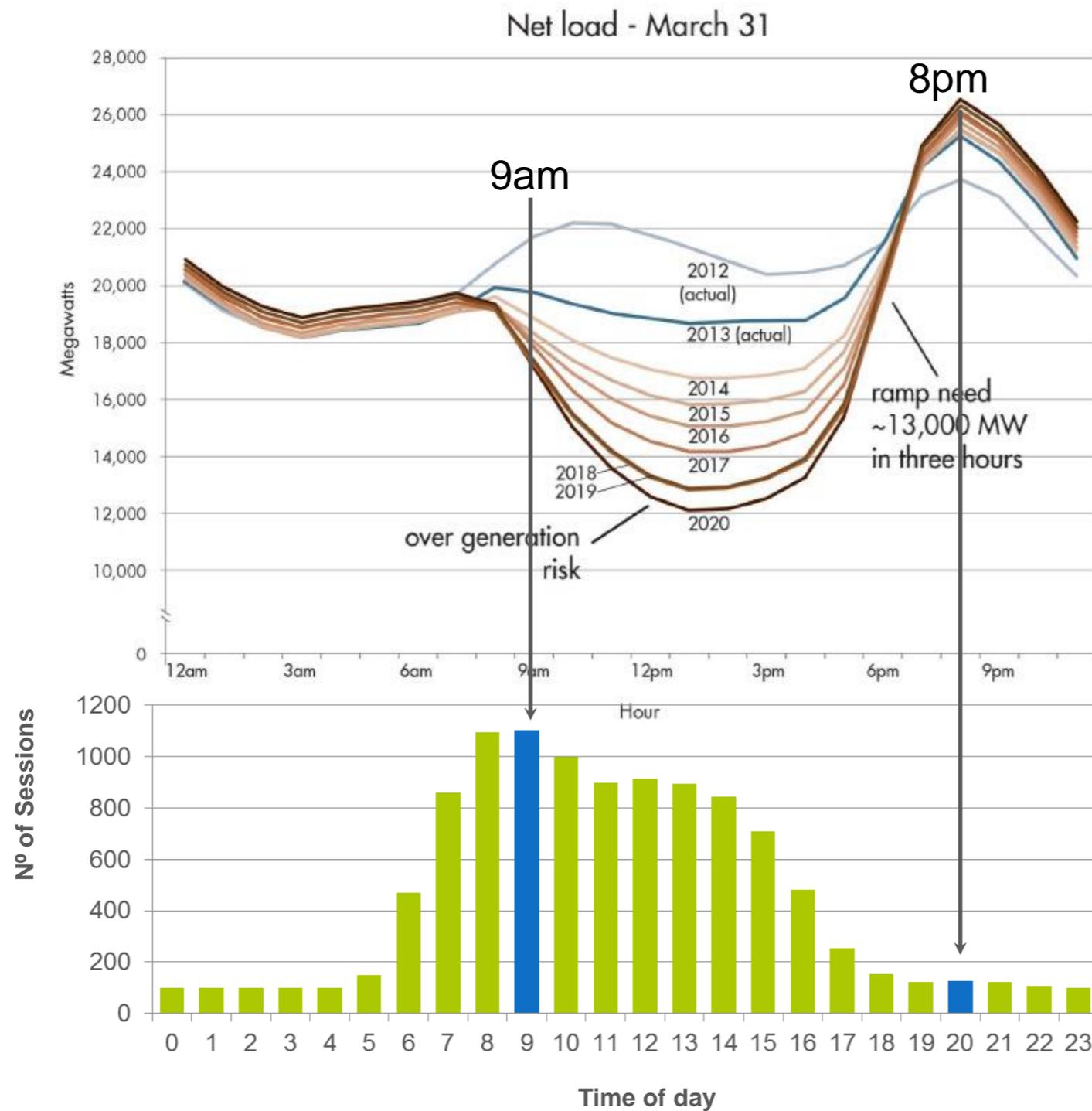
<http://www.greentechmedia.com/articles/read/just-one-flavor-rules-openadr-for-now>

# Demand Response with Open Standards: SCE Workplace Charging

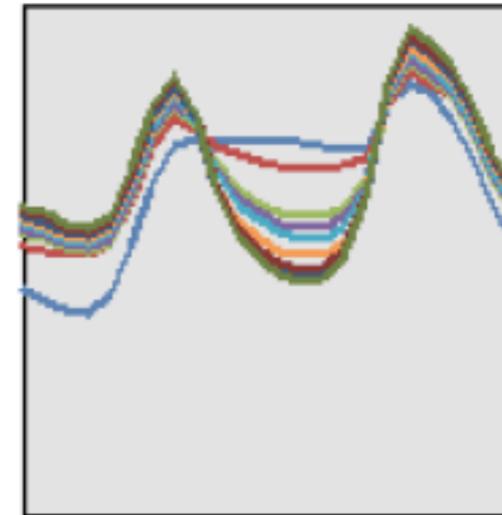
- Greenlots Demand Response Load Control (DRLC) utilizing OpenADR 2.0b with dynamic pricing
- 80 Level 2 EVSE that can be curtailed to L1 with dynamic pricing at the point-of-sale across 9 SCE properties in So. Cal
- Now live thru 2016
- Users choose between 3 prices: **High** for maximum charge, **Medium** for maximum charge but curtailed to L1 when called, **Low** for maximum charge and curtailed to zero when called
- This pricing is pushed day-ahead to all payment kiosks and web software across locations. Users may also use the mobile app or check Greenlots' portal for latest pricing and information about the DR event
- Users have the option to pay a fee to opt-out, unless it is an emergency event. Users are notified via SMS and email during events about the severity and duration



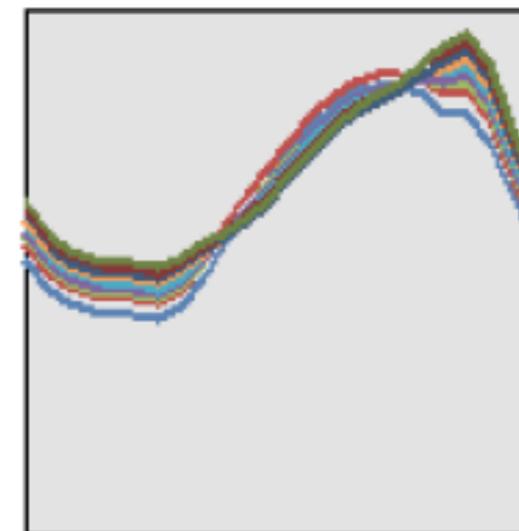
# Public & Workplace Charging: Solving the Duck Curve



Winter - January 31st



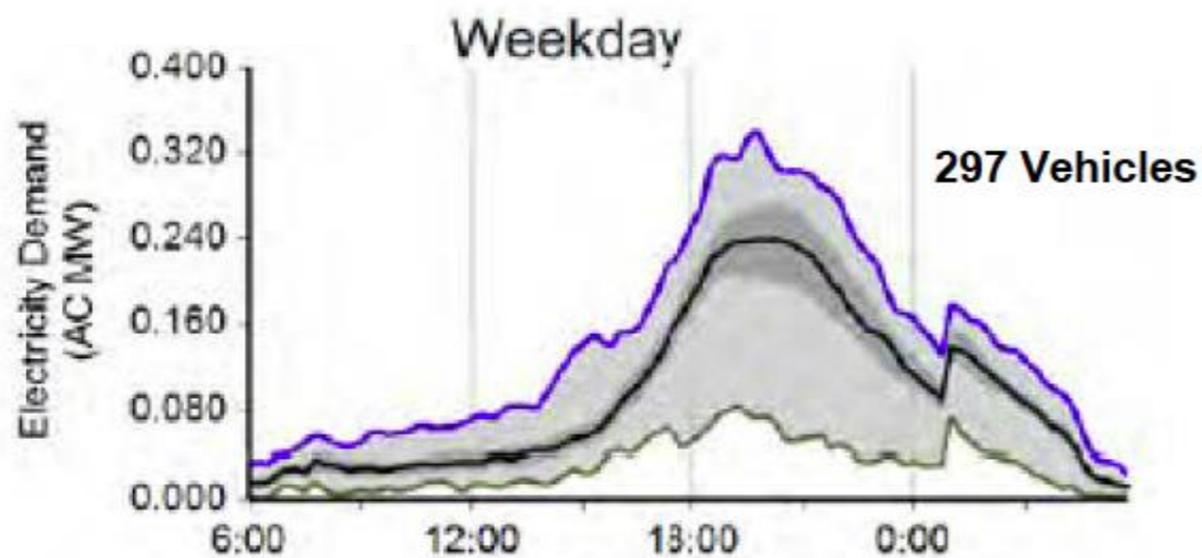
Summer - August 10th



California ISO forecasted grid load thru 2020 based on 33% renewables portfolio

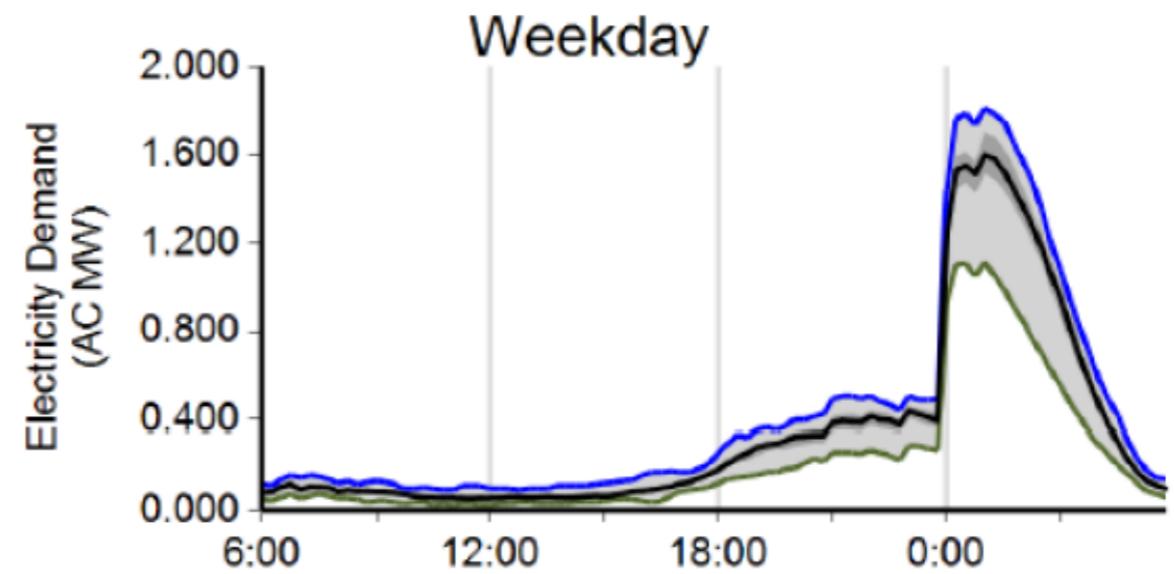
# Residential Smart Charging: Beyond TOU

## Residential Washington, DC<sup>1</sup>



Time of Day – no ToU rates

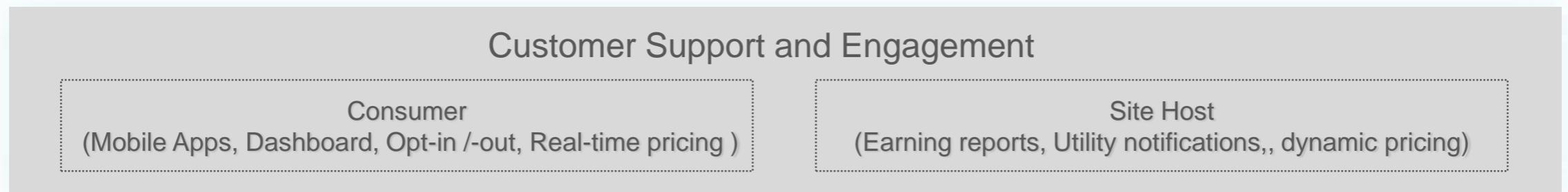
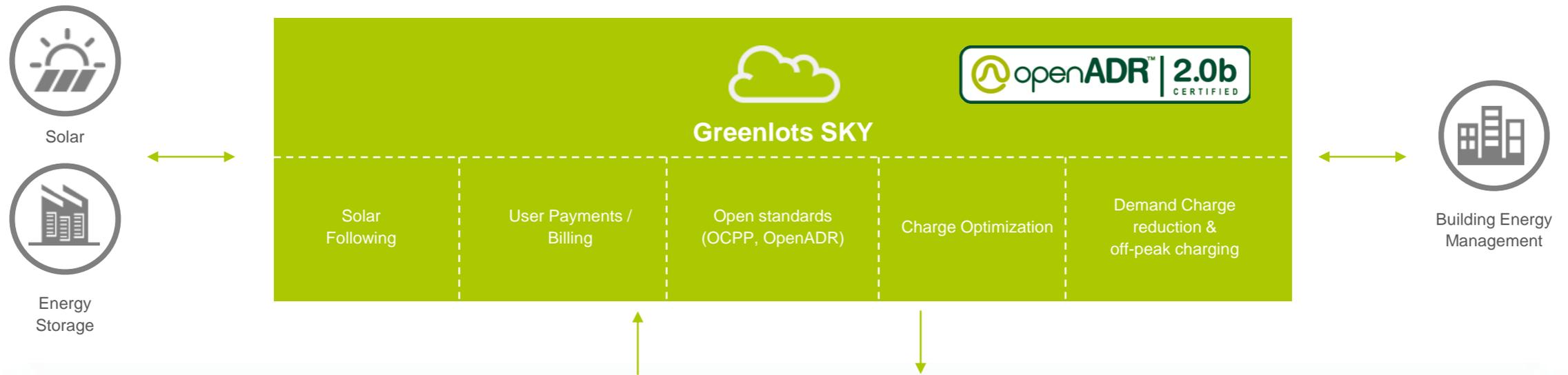
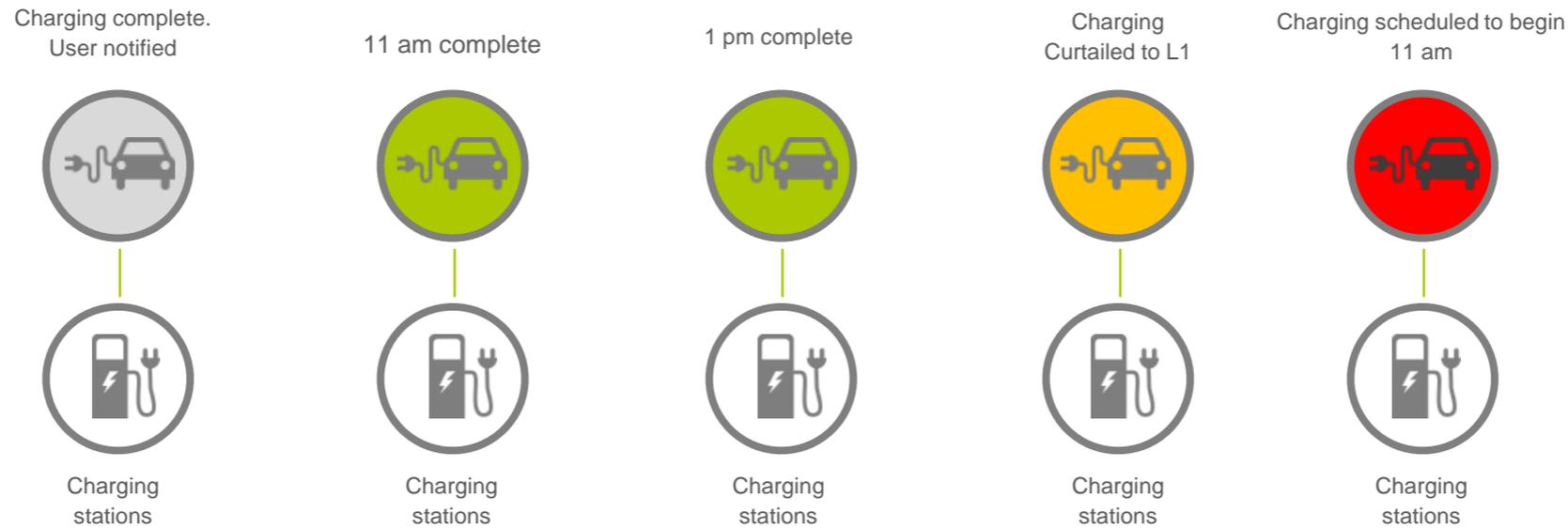
## Residential SF Bay Area



Time of Day – off-peak at midnight

- Behavior heavily influenced by time-of-use rates, but ToU alone is insufficient
- Need to manage residential charging to avoid secondary peaks
- Key is to involve consumer to minimize user impact
- How to incentivize consumer to pay for smart L2 charging at home?

# The Complete Smart Energy System



# Strategies for Meeting Future Charging Demand

**To better design strategies for meeting future charging demand, we need to:**

- **Better understand charging behavior.** This is essential to ensure infrastructure investments are made intelligently and facilitate grid/system value through smart charging
- **Work with automakers** to ensure infrastructure rollout meets or matches vehicles sales/sales projections
- **Involve utilities and leverage their ability to educate ratepayers and design easily understood programs.** In New York's vision, utilities will play a key role in (and be compensated for) facilitating the marketplace for EV-derived grid services
- **Minimize stranded assets by requiring open standards** and maximizing the number of vehicles that can be served by infrastructure investments
- **Minimize public charging dwell times to maximize subscription**



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