DOE Storage Peer Review Electrification Panel

Panel Host: Richard Fioravanti
Quanta Technologies
Electrification – What Is Happening Today

- How are utility-scale storage and EVs traditionally linked?
  - Chart shows the expected inflection point of EV new are sales – but this inflection point will change depending on how fast or how slow the cost of batteries decline

- Using storage to assist charging
  - Other applications have storage being used with charging stations
  - In this applications, storage is used to mitigate peak-charging loads or as a back-up if the grid is not available

- Today’s Panel Session on Electrification
  - Rather than speak about Electrification from the perspective of storage, our panel wants to update on the State of Electrification today
  - Introducing panelist from different segments of the Electrification market
Panel Participants

- **Today’s Panelist**
  - **Chris Nelder** – To provide an Overview of Storage Today
  - **Mauro Dresti** – Southern California Edison – To provide an overview of how utilities are responding and what they are seeing in the market
  - **Dan Wilson** – Chanje – Will give an overview of activities with Medium Duty / Heavy Duty Trucks
  - **Clay Collier** – ChargePoint – To Discuss advances in vehicle chargers and future of charging

- **Goal is for an Interactive Presentation**
  - Each Panelist will give 5-7 minutes opening remarks
  - Then Open for Questions from participants
  - Send Questions in via chat and we will try to get through as many as possible
For Level 2 chargers (typically 7-19 kW), which are mainly used for residential and workplace charging over 8 hours or more, a conventional Time of Use (ToU) rate design to encourage managed charging is appropriate.

For DCFC (50-350+ kW), which are used briefly (< 1 hour) at random times, a more sophisticated rate design is needed, which minimizes the role of demand charges until the market matures.

• The load is “spiky” and unpredictable.
• The DCFC use-case is not conducive to managed charging.
MANAGED CHARGING

- Projected HECO demand with 23% EV penetration with uncontrolled EV charging

- Projected HECO demand with 23% EV penetration with managed EV charging
## LOAD CONTROL OF EV CHARGERS

<table>
<thead>
<tr>
<th>Level 2 charging (7-19 kW)</th>
<th>DCFC (50 kW – 1.8 MW)</th>
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<tbody>
<tr>
<td><strong>Managed charging (G2V not V2G) is desirable and delivers many benefits:</strong></td>
<td><strong>Managed charging is difficult</strong></td>
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<tr>
<td>• Optimize existing grid assets and extend their useful life</td>
<td>• Turning down power level is antithetical to the DCFC use-case</td>
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<tr>
<td>• Avoid new investment in grid infrastructure</td>
<td>• Demand charges in utility tariffs kill the business case for operating DCFC networks</td>
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<tr>
<td>• Supply ancillary services, such as frequency regulation and power factor correction.</td>
<td>• Storage can be used to shave peaks and mitigate demand charges, but fixing the rate design is cheaper.</td>
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<tr>
<td>• Absorb excess wind and solar generation</td>
<td></td>
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<tr>
<td>• Reduce emissions</td>
<td></td>
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<td>• Reduce electricity and transportation costs</td>
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CHARGING INFRASTRUCTURE: TODAY AND TOMORROW

Everything is changing…

• Today: 7 kW home charging, 50 kW fast chargers
• Tomorrow: Commitments for 150 kW fast chargers, up to 350 kW
• Retail built up around chargers like gas station? “Mega”-chargers at truck stops?
• Electrify America installing 150 DCFC network. Charging power levels up to 350 kW will be available at every station
• Home charging is dominant now, but will not be as EV range grows and adoption moves to apartment dwellers
### NEEDED UTILITY INVESTMENT

<table>
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<th>Large new loads</th>
<th>Can require</th>
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| Residential Level 2 chargers (2.9 – 7.7 kW)  
**EV load ≈ another house** | • Distribution transformer upgrades |
| Workplace Level 2 chargers (7.7 – 16.9 kW)  
- Up to ~1 MW | • Distribution transformer upgrades  
- Feeders  
- Service panel upgrades |
| Public high-speed (DCFC) charging depots  
- 50 kW – 2 MW | • Distribution transformer upgrades  
- Feeders  
- Service panel upgrades  
- Make-ready |
| Transit bus barns, fleet vehicles  
- 5 – 30+ MW | • Distribution transformer upgrades  
- Feeders  
- Service panel upgrades  
- Make-ready |
| Interstate truck stops  
- 20 – 40 MW | • Distribution transformer upgrades  
- Feeders  
- Service panel upgrades  
- Make-ready |
RMI EV-GRID REPORTS

Reducing EV Charging Infrastructure Costs (January 2020)

DCFC Rate Design Study (Sept 2019)

Seattle City Light TE Strategy (Aug 2019)

From Gas to Grid (October 2017)

EVgo Fleet and Tariff Analysis (March 2017)

Electric Vehicles as Distributed Energy Resources (June 2016)
Thank you!

Transforming global energy use to create a clean, prosperous, and secure low-carbon future.
Energy for What’s Ahead

Our Transportation Electrification Pathway
We’re Driving The Agenda:

- The Emissions Challenge
- Progress to Date
- Accelerating Electrification
By 2045, 26 million passenger vehicles on the road need to be electric, which equals three-quarters of all cars.

For medium-duty vehicles two-thirds, or 900,000 need to be electric and for heavy-duty the number of vehicles needed is one-third or 170,000.

- Low-carbon fuels play a significant role for heavy-duty vehicles and remove more than half of the carbon emissions in this segment.

- 2019 SCE Sustainability Report
### SCE’s role: availability, affordability, & awareness

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<th><strong>Availability</strong></th>
<th><strong>Affordability</strong></th>
<th><strong>Awareness</strong></th>
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<tbody>
<tr>
<td>Infrastructure necessary to fuel EVs</td>
<td>Low cost in comparison to traditional vehicles</td>
<td>Customer understanding of benefits of EVs</td>
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- **Availability**
  - Build out capitalized charging infrastructure for:
    - Passenger vehicles at workplaces, apartments, and public locations
    - Commercial freight vehicles
    - Transit buses

- **Affordability**
  - Provide charging station rebates for commercial & residential
  - Provide new and used vehicle rebates (Low Carbon Fuel Standard)
  - Invest in customer-side infrastructure
  - Offer special rates for EV charging

- **Awareness**
  - Provide market education and outreach programs
  - Run broad and targeted advertising
  - Provide fleet customer support and advisory services
SCE Business TE Programs Cover the Cost to Build EV Charging Infrastructure

• SCE will cover cost of make-ready infrastructure and may offer a rebate to offset cost of procuring and installing charging stations
• Participant is responsible for procuring charging stations
Progress made electrifying transportation

**Charging Stations**

**Charge Ready Pilot:**
Launched in 2016, the Charge Ready Pilot was SCE's first pilot to increase the availability of charging stations in our community. Over 1,800 ports have been installed over 100+ sites as of June 2020 with approximately 1000 more ports in the pipeline for construction.

**Fast Charging**

**Charge Ready DCFC:**
Pilot to promote the growth of fast charging by installing fast charging stations at five sites that are accessible to all drivers. All sites are in or adjacent to DACs and multi-family housing, rebate provided to offset the cost of the charging stations and their installation.

**Transit Vehicles**

**Charge Ready Transit:**
This pilot for government transit agencies is funding the cost of installing infrastructure to support electric bus charging at three bus yards. Efforts are focused on transit systems in underserved communities that are disproportionately impacted by air pollution from buses.

**Port Transportation**

**Port of Long Beach Projects:**
SCE is installing infrastructure for the electrification of rubber-tire gantry cranes and yard haulers used to move goods containers around the port. This equipment is currently powered by diesel engines, which are a significant source of air pollution.

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Energy for What's Ahead®
Charge Ready Transport provides infrastructure for fleet electrification

Charge Ready Transport will help grow the transportation electrification market over a five-year period by installing electric infrastructure at customer sites to support charging plug-in buses, medium- and heavy-duty trucks, forklifts and other non-road cargo handling equipment.

• Targeting 870 sites with 8,490 electric vehicles procured or converted

• Charging station rebates available for transit/school buses and sites in disadvantaged communities
Residential programs encouraging EV adoption

**Passenger Vehicles**

-available now-

Approx. 50% of US EVs are in California

**Clean Fuel Reward:**
SCE provides an up to $1000 rebate towards the purchase or lease of new and used plug-in electric vehicles. Over 100K rebates have been distributed to SCE customers since June 2020

**Charging Stations**

-complete-

**Charge Ready Home Installation Rebate:**
This one-year pilot funded the rebates to offset the costs of installing home L2 charging infrastructure such as permits and licensed electricians.

*Closed on May 31, 2019*
Plan for Charge Ready 2: Speed, Scope, and Scale

Deploy 22,200 level 1 and 2 ports at workplaces, multifamily buildings, destination centers and fleets; Install an additional 200 DC Fast Chargers.

Offer multifamily customers a turnkey solution: SCE will install, own, and maintain up to 2,500 new charging ports.

Up to $3,500 rebate per port to exceed CalGREEN building code

Multi-prong marketing strategy:
- Mass media advertising of EVs and benefits;
- Targeted marketing on EV experience;
- Support businesses to convert fleets to electric;
- Program-specific marketing.
SCE will continue to develop new programs to spur EV adoption

Charge Ready Schools
• No-cost or utility owned infrastructure to serve level 1 or level 2 EV charging
• Available to K-12 Schools

Charge Ready Parks
• Utility owned infrastructure (for existing or new construction) to serve level 2 or DCFC EV charging
• Available to California State parks and beaches

LAUNCHING IN 2020

LAUNCHING IN 2020
Join us on this ride.