Smart Principles for EV Infrastructure Investment

Advanced Energy NY Conference
March 27, 2018

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Greenlots Background
What we do

Leading provider of EV charging technology and solutions

EV Charging Network Operating Platform
- Network management
- Dynamic pricing
- Smart charging software
- Open Standards

Turnkey EV Charging Deployment
- Hardware agnostic
- Site identification & design
- Operation & Maintenance

Advanced Grid Services
- Demand response
- Load-side grid management
- DER Integration
- Ancillary services

greenlots
Example Clients & Partners

- LA DWP
- SMUD
- AVISTA
- Hawaiian Electric Company
- pepco
- Southern California Edison
- PG&E
- Seattle City Light
- AES
- Southern Company
- BC Hydro
- SDGE
- LAX
- Los Angeles World Airports
- bp
- ADP
- New York State Thruway Authority
- SUNOCO
- ADP
- Ontario Power Authority
- Kawartha Lakes
- Simcoe County
- Oxford
- Toronto Parking Authority
- Propark America
- Kia
- Nissan
- BMW
- Ford
- Electrify America
Electrify America
$2B Investment in Building US Charging Infrastructure

Greenlots selected to deploy 900 stations in eight cities at more than 140 sites

Nationwide Fast Charging Network
Greenlots selected to provide the network operating platform to manage 2000+ high power chargers across the US
LAPD Fleet Charging and Load Management

PROJECT OVERVIEW
The City of Los Angeles has a target of 50% of new city fleet vehicles to be electric by 2017 and 80% by 2025.

- LAPD is the largest fleet in the city and the first department to “go electric” with the first 150 BMW i3s out of 500 EVs in total
- Building on open standards allows HW to be selected based on specific site requirements
- Greenlots was selected to provide 100 L2 and 4 DC Fast Chargers at one location with DR capabilities

KEY BENEFITS
Load management avoids electrical infrastructure upgrades and reduces demand charges.

- Responds to real-time electricity demand of building
- Charge optimization and prioritization ensures vehicles are charged when they are needed
- Fleet reporting tracks fleet data, operating cost and efficiencies of an all electric fleet.
- Rolling out charging infrastructure at 25 facilities across city
Successful Market Intervention Models

Successful Models

Public DC Fast Charging
- Incentives to Host or Developer
- Utility Ownership

Level 2 Use Cases
- Incentives to Host or Developer
- Utility Ownership

Incentives to Host or Developer

Utility Ownership

Utility Ownership

Confidential
DC Charging Economics

Levelized Cost of DC Charging
Assumes 16% utilization rate, 10% load factor and 10% pre tax cost of capital

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>$/kWh</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site ID and Development</td>
<td>$0.06</td>
<td>Assumes $30k for every 100 kW</td>
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<tr>
<td>Construction</td>
<td>$0.20-$0.30</td>
<td>Assumes $100k - $150K for every 100 kW</td>
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<tr>
<td>Parking Fees</td>
<td>$0.02</td>
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<tr>
<td>Maintenance/Network</td>
<td>$0.02</td>
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<tr>
<td>Electricity (including demand charge)</td>
<td>$0.15-0.20kWh</td>
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<tr>
<td>Total</td>
<td>$0.45-$0.60</td>
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Variable Economics to Owner AFTER Capital Costs

**DC Fast Charging**
- $0.20/kWh +
- $0.25/kWh

**Solar Energy**
- $0.10 - $0.20/kWh +
- No Headroom
DC Charging Station Population

- Denver
- Houston
- Seattle
- Atlanta
- Nashville
- Chicago
- NYC

Source: Plugshare
Important for REV to Adapt

- Make-ready/incentives for DC charging do not work on paper, so why would they work in practice?
- Reliance on automaker funding alone for DC charging (Electrify America, Nissan, BMW, Tesla, etc.) will not bring us the DC charging we need to fulfill policy goals
- New York is not a leader in DC charging deployment, and REV process has – to date - held the state back
  - REV focus on “public private” collaboration sounds good, but it is not the right fit at this stage in the market for public fast charging
  - Utilities are spending too much time fitting their projects into a REV box, and not enough time helping the market grow
  - Better to focus on market growth – the figure out the right model

- Study after study (MA, NJ, OH, MD) has shown a positive ratepayer return for utility EV charging investments – let’s focus on that first important first principle