Firming & Aggregating Customer-Sited Renewables for T&D Benefits

Dan Vickery
Director, Market Development
• One of largest providers of commercial, distributed energy storage
  • 50 MWh deployed/under construction
• Founded in 2009 out of Con Ed & DOE demo – 1st peak shaving system in NY
• Interconnection in 6 utilities
• Offices in NYC, Santa Clara, San Diego
• Pioneered performance based financing
• Proven experience drove industry-first non-recourse financing
• Recent acquisition by ENGIE (GDF Suez)
Sample Customers

- Poway Unified School District
- MVLA High School District
- Walgreens
- Safeway
- Oak Park Unified School District
- VISA
- The County of Los Angeles
- nrg
- NISSAN
- UPS
- Visalia Unified School District
- Kaiser Permanente
- Hess
- California State University Fullerton
- 7-Eleven
- Paller Community College District
- Redwood City, California
- County of Santa Barbara, California
- Shore Hotel, Santa Monica, CA
- Laney College
- Lancaster, CA
- Kohl's
- Tulare City School District
- Butte-Glenn Community College District
- SDG&E
- conEdison
- Alliant Energy
- PG&E
Introduction

Energy storage is a critical grid support asset to reduce T&D capital costs and to accommodate even greater penetrations of renewables

- Distributed network capable of surgically affecting primary feeders and secondary network is key tool to inject energy under highly-intermittent generation
  - Backfeeding and network trips are a real concern in NY
  - Each network has its own needs - peaking behavior varies network to network, thus solutions must be flexible (Wall Street v. Williamsburg)
- Systems and aggregations provide value to the network whether co-located with renewables or otherwise
- This solution is technologically proven, but developers still face barriers due to lack of state certainty; lack of investor return assurance; and lack of market products for self-sustainment
Value Stacking and Distribution Services
Solar firming drives retail demand charge savings...

- **1,000 kW**: $42,167
- **1,800 kW**: $79,348

Additional savings with solar PV and storage:

$79,348

Annual Savings

- + $37,181
Solar Firming for T&D Benefits

...and can provide substantial distribution benefits
System Control Software
Govern each storage system to maximize value, performing multiple functions to provide sustainable economics.

Energy Storage Value Streams
- Retail Peak Shaving
- Retail Tariff Optimization
- T&D Market Revenues
- Retail Energy Arbitrage
- Demand Response

Value Stack for Behind-the-Meter Systems
Energy storage targets three costly issues to New York ratepayers and to clean energy development in New York State.

- Solar/renewable intermittency
- Solar backfeed
- Peak load duration

Source: Green Charge Networks using NREL’s National Solar Radiation Data Base (NSRDB)

Source: CAISO

Source: Con Edison
Peak Load Reduction

Shifting renewable production to high-value hours allows for responding directly to distribution circuit needs.
Firming solar intermittency mitigates need for transmission and distribution capacity and spinning generators as backstop
Mitigating solar backfeed allows for higher penetration of renewables without impacts to T&D infrastructure
Mitigating solar backfeed allows for higher penetration of renewables without impacts to T&D infrastructure – regardless of co-location.
Technical capabilities for aggregation & bidding exist and are proven

- Aggregation programs being demonstrated throughout the country, including in New York City
- Encourage more utility pilots & implementations for peak relief
- Regulatory barriers remain

- Network peak relief (T&D deferral)
- Solar curtailment avoidance
- Resource adequacy
- Wholesale economic bidding
Aggregations provide immediate capacity to T&D operators

Green Charge has over 16 MWh and 40 sites enrolled and awarded in various Demand Response Programs

- **New York**: Demand Management Program (DMP), Con Edison Pilot Demonstration
- **California**: Demand Response Auction Mechanism (DRAM), Supply-side Pilot (SSP), Excess Supply Pilot (XSP), DR Programs, Other IOU Peak Relief Programs
## Requirements for Large Scale Deployment in NY

### Performance & Experience

- ✓
- ✓
- ✓

### Capital Cost Reductions

- ✓
- ✓
- ☺

### Development Cost Certainty

- ✓
- ✓
- ☺

### Revenue Availability & Certainty

- ✓
- ☺

### Regulatory Risk

- ☺
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- ✓
- ✓

#### Regulatory Risk
- ✓

**Competition & Incentives**
# Requirements for Large Scale Deployment in NY

## Performance & Experience
- ✔
- ✔
- ✔

## Capital Cost Reductions
- ✔
- ✔
- ⚫

## Development Cost Certainty
- ✔
- ✔
- ⚫

## Revenue Availability & Certainty
- ✔
- ⚫

## Regulatory Risk
- ⚫

### Barriers to Scalable Adoption of Energy Storage in New York

### Competition & Incentives

### Experience & Regulatory
### Requirements for Large Scale Deployment in NY

#### Performance & Experience
- ✔️
- ✔️
- ✔️

#### Capital Cost Reductions
- ✔️
- ✔️
- ❌

#### Development Cost Certainty
- ✔️
- ✔️
- ❌

#### Revenue Availability & Certainty
- ✔️
- ❌

#### Regulatory Risk
- ❌

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**Barriers to Scalable Adoption of Energy Storage in New York**

<table>
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<tr>
<th>Competition &amp; Incentives</th>
<th>Experience &amp; Regulatory</th>
<th>Incentives, Programs, and Long-term Contracts</th>
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5/26/2016
Green Charge Networks Proprietary & Confidential
## Requirements for Large Scale Deployment in NY

### Performance & Experience
- ✓
- ✓
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### Capital Cost Reductions
- ✓
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- 🔴

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- ✓
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- 🔴

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- 🔴

**Barriers to Scalable Adoption of Energy Storage in New York**

- **Competition & Incentives**
- **Experience & Regulatory**
- **Incentives, Programs, and Long-term Contracts**
- **Commitment to Storage**
Energy storage solutions are technologically proven, but developers still face significant barriers to deployment at scale

- **Barrier:** Lack of certainty in direction of state (locational v. statewide, co-location v. stand-alone)
  - **Solution:** Commitment to energy storage (e.g., 4 GW mandate) with additional statewide signals for stand-alone energy storage will drive company investments to state

- **Barrier:** Lack of investor assurance for adequate returns prevents project deployments
  - **Solution:** A REC-like payment that offers predictability/stability in costs and revenues for stand-alone energy storage will get systems into the field

- **Barrier:** Lack of market mechanisms to monetize services provided by energy storage systems prevents economic sustainability
  - **Solution:** Development of utility- or statewide pilot programs (in addition to REV) will push toward market self-sustainment
Thank you.