Use the orange arrow to open and close your control panel

Join audio:
• Choose Mic & Speakers to use VoIP
• Choose Telephone and dial using the information provided

Submit questions and comments via the Questions panel

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THE RESILIENT POWER PROJECT

• Increase public/private investment in clean, resilient power systems (solar+storage)

• Protect low-income and vulnerable communities, with a focus on affordable housing and critical public facilities

• Engage city, state and federal policy makers to develop supportive policies and programs
SUPPORTING 100+ PROJECTS ACROSS THE COUNTRY

Portland: Assessment of 10 LMI properties including affordable housing, foodbanks, medical centers, and shelters

Puerto Rico: Supporting the installation of solar+storage at more than 60 medical clinics

Boston Medical Center: One of the first hospitals in the country to install storage for resiliency

California: Multiple housing properties representing hundreds of units of affordable housing

DC: Largest solar+storage installation at affordable housing in the country

Puerto Rico: Supporting the installation of solar+storage at more than 60 medical clinics
WHY SHOULD I CARE ABOUT DEMAND?

SDG1 Annual Electric Bill

**ENERGY**

<table>
<thead>
<tr>
<th>Max</th>
<th>Usage (kWh)</th>
<th>Cost ($/kWh)</th>
<th>Total cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>13,085</td>
<td>0.11447</td>
<td>1,497.82</td>
</tr>
<tr>
<td>Winter</td>
<td>7,627</td>
<td>0.10565</td>
<td>826.97</td>
</tr>
<tr>
<td>Peak</td>
<td>15,259</td>
<td>0.10568</td>
<td>1,612.59</td>
</tr>
<tr>
<td>Winter</td>
<td>55,189</td>
<td>0.09102</td>
<td>5,013.46</td>
</tr>
<tr>
<td>Part-Peak</td>
<td>26,759</td>
<td>0.07920</td>
<td>2,135.17</td>
</tr>
<tr>
<td>Winter</td>
<td>46,612</td>
<td>0.07160</td>
<td>3,337.42</td>
</tr>
</tbody>
</table>

**TOTAL**

| Total usage | 144,922 | Total cost ($) | 12,623.43 |

**DEMAND**

<table>
<thead>
<tr>
<th>Avg peak (kW)</th>
<th>Cost ($/kW)</th>
<th>Total cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>33</td>
<td>22.55</td>
</tr>
<tr>
<td>Winter</td>
<td>30</td>
<td>22.55</td>
</tr>
<tr>
<td>Peak</td>
<td>33</td>
<td>19.19</td>
</tr>
<tr>
<td>Winter</td>
<td>34</td>
<td>6.86</td>
</tr>
<tr>
<td>Part-Peak</td>
<td>30</td>
<td>0.00</td>
</tr>
<tr>
<td>Winter</td>
<td>30</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**TOTAL**

| Total usage | 111,951 | Total cost ($) | 11,951.30 |

**FIXED**

<table>
<thead>
<tr>
<th>Meter charge</th>
<th>Total cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,397.28</td>
</tr>
</tbody>
</table>

**TOTAL**

| Total usage | 125,972 | Total cost ($) | 13,020.66 |

Energy Charges 49%
Demand Charges 46%
Fixed Charges 5%
Along with fixed monthly fees, commercial customers are typically billed for electricity in two distinct ways: **consumption** (energy) charges and **demand** charges.

<table>
<thead>
<tr>
<th>Table 1. Types of Charges</th>
<th>Consumption Charge</th>
<th>Demand Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are you paying for?</td>
<td>Total amount of electricity used during a billing period</td>
<td>Highest level of electricity used during a billing period (“peak demand”)</td>
</tr>
<tr>
<td>Customer Type</td>
<td>Residential and Commercial</td>
<td>Commercial</td>
</tr>
<tr>
<td>Unit of Measurement</td>
<td>Kilowatt-hours (kWh)</td>
<td>Kilowatts (kW)</td>
</tr>
</tbody>
</table>
CONSUMPTION VERSUS DEMAND

**Building A**
Has high energy consumption and reaches the same high level of demand throughout the day and night.

**Building B (Scenario 1)**
Only reaches its highest level of demand in the middle of the day, consuming less energy, but paying the same peak demand premium as Building A.

**Building B (Scenario 2)**
Stores energy in the morning to offset high demand in the middle of the day, lowering utility peak demand.

---

In **Scenario 1**, Building A and Building B will incur the same peak demand charges over the course of the day, even though Building A will have consumed considerably more energy during that time. In **Scenario 2**, Building B can use energy storage to reduce its mid-day grid energy consumption by meeting some of its demand with on-site stored energy. **This could reduce its overall peak demand** for the period, resulting in a lower utility bill.
WHO PAYS DEMAND CHARGES?

Most medium to large commercial customers in every state are subject to demand charges. Includes private and nonprofit businesses, community facilities, public buildings, and multifamily housing properties. Nearly 5 million commercial customers (over 25% of U.S.) may face demand charges high enough for battery storage to make economic sense.
WHO PAYS DEMAND CHARGES?

Demand Charges Across All Utilities Operating in the State

<table>
<thead>
<tr>
<th>State</th>
<th>Maximum charge across all utilities</th>
<th>Average of all utility maximum charges</th>
<th>Median of all utility maximum charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>$51.25</td>
<td>$9.30</td>
<td>$4.30</td>
</tr>
<tr>
<td>California</td>
<td>$47.08</td>
<td>$11.45</td>
<td>$10.60</td>
</tr>
<tr>
<td>Colorado</td>
<td>$46.43</td>
<td>$21.68</td>
<td>$16.65</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>$41.25</td>
<td>$19.14</td>
<td>$15.50</td>
</tr>
<tr>
<td>Arizona</td>
<td>$35.45</td>
<td>$18.82</td>
<td>$18.50</td>
</tr>
<tr>
<td>Nebraska</td>
<td>$30.00</td>
<td>$14.82</td>
<td>$15.70</td>
</tr>
<tr>
<td>Illinois</td>
<td>$30.00</td>
<td>$16.58</td>
<td>$16.63</td>
</tr>
<tr>
<td>Georgia</td>
<td>$28.70</td>
<td>$5.83</td>
<td>$3.60</td>
</tr>
<tr>
<td>North Carolina</td>
<td>$25.65</td>
<td>$15.61</td>
<td>$15.63</td>
</tr>
<tr>
<td>Vermont</td>
<td>$25.39</td>
<td>$17.43</td>
<td>$16.05</td>
</tr>
</tbody>
</table>

Maximum Demand Charge ($):
- > 30
- 20 – 30
- 10 – 20
- 1 – 10
- 0
- No Data
Cutting Demand Charges with Battery Storage

Webinar Speakers

Steve Kelley
Senior Vice President
ENGIE Storage
info@engiestorage.com

Seth Mullendore
Vice President & Project Director
Clean Energy Group
seth@cleanegroup.org
(Moderator)
The grid is under stress from...

1. Variable Supply
2. Transmission Constraints
3. Variable Demand

There are three ways to solve these problems...

1. Build More Power Plants
2. Build More Transmission Lines
3. Deploy Distributed Energy Resources

“[Energy storage] will strengthen our innovation economy and provide the Commonwealth with a roadmap for reducing our most expensive energy loads and securing our energy future.”

Charlie Baker, Governor
Massachusetts
We build turnkey energy storage solutions that serve consumers and producers on both sides of the meter.

- US Storage Division HQ in Silicon Valley
- Over 150 energy storage projects (65 MWh)
- Extensive operating track record (7+ years)
- Pioneer of innovative commercial structures
- Ranked #1 provider by Navigant Research

Customer Examples

Businesses & Government

Utilities & Network Operators

Navigant Research
How is energy storage being used?

- Reduce Peak Demand charges
- Solar firming/ intermittence
- Arbitrage
- Demand Response
- Back- up Power
- Capacity tag reduction
- Frequency regulation
- Switching Tariffs
A utility bill typically consists of three types of charges.

**Energy Charge ($/kWh)**
- Represents the cost of generating energy
- Monthly charge for sum of kWh's consumed from the grid

**Demand Charge ($/kW)**
- Represents the cost of the grid
- Monthly charge for highest 15-min kW grid offtake

**Fixed Charge ($)**
- Represents the administrative cost to serve a customer
- Monthly fixed charge
Creating Savings with Storage

<table>
<thead>
<tr>
<th>TIME</th>
<th>Original Power Load</th>
<th>Power Load with Energy Storage</th>
<th>SAVINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 am</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 pm</td>
<td></td>
<td></td>
<td>$7,875</td>
</tr>
<tr>
<td>12 am</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PEAK DEMAND

SAVINGS $7,875
Maximizing the Value of Energy Storage

**VALUE STREAMS**
- Demand Savings
- Tariff Optimization
- Energy Arbitrage
- Demand Response
- Market Revenues*  

*Future Upside

The GridSynergy Software Platform Optimizes Across Multiple Revenue Streams to Maximize Benefits

(2.7MW / 5.4MWh across 17 sites at a CA school district)

<table>
<thead>
<tr>
<th></th>
<th>Demand Savings</th>
<th>Tariff Optimization</th>
<th>Energy Arbitrage</th>
<th>Demand Response</th>
<th>Annual Total Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$207,908</td>
<td>$144,997</td>
<td>$81,355</td>
<td>$42,660</td>
<td>$476,920</td>
</tr>
<tr>
<td>Annual Total Benefit</td>
<td>$207,908</td>
<td>$144,997</td>
<td>$81,355</td>
<td>$42,660</td>
<td>$476,920</td>
</tr>
</tbody>
</table>

44% 31% 17% 9%

Market Revenues*
Hundreds of Operating Systems
ENERGY STORAGE SOLUTION

- Intelligent Cloud-Based Software
- Lithium-ion Energy Storage
- Performance-Based Contracts & Financing

“Each year, we expect to reduce our demand charges by $86,000, if not more.”

Mike Mathiesen, Associate Superintendent, Business Services
Mountain View Los Altos High School District
**Equipment Class**

- **Commercial** 60KWh-2MWh
- **Industrial/Utility** 2MW-20MWh
- **Utility** 20MWh +

[Images of storage systems and components]
• Factors in determining the right sized system
  • Shape of the load profile
  • Volatility and consistency of load shape
  • Back up power requirements
  • Solar installed
  • Financial returns

• Risk in under sizing and over sizing

• Future changes to building load
Load Leveling – Intelligent and predictive algorithms make charge/discharge decisions to cap your demand (setpoint)

Additional Revenues – With battery SOC often at or near 100 percent, ability to engage in additional markets...
### Southern California High Schools

**Engie Storage**

**Name:** SCE SD

**ESS Size**

750 kW / 1500 kWh

**Meter No.**

**Recommended Tariff**

SCE TOU 8 B

---

**Assumptions for above figures:** See slide above highlighting demand savings

---

**Bill Month** | **Current Demand (kW)** | **New Demand (kW)** | **Demand Shaved (kW)** | **Tariff ($/kW)** | **Current Demand (kW)** | **New Demand (kW)** | **Demand Shaved (kW)** | **Tariff ($/kW)** | **Current Demand (kW)** | **New Demand (kW)** | **Demand Shaved (kW)** | **Tariff ($/kW)** | **Monthly Demand Savings**
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
May-15 | - | - | - | - | - | - | - | - | 720 | 425 | 295 | $17.58 | $5,184
Jun-15 | 816 | 462 | 354 | $16.92 | 784 | 552 | 232 | $4.79 | 816 | 552 | 264 | $17.58 | $11,738
Aug-15 | 832 | 388 | 444 | $16.92 | 880 | 750 | 130 | $4.79 | 880 | 750 | 130 | $17.58 | $10,417
Sep-15 | 1088 | 633 | 455 | $16.92 | 1104 | 1002 | 102 | $4.79 | 1104 | 1002 | 102 | $17.58 | $9,976
Oct-15 | - | - | - | - | - | - | - | - | 1024 | 732 | 292 | $17.58 | $5,132
Nov-15 | - | - | - | - | - | - | - | - | 656 | 287 | 369 | $17.58 | $6,485
Dec-15 | - | - | - | - | - | - | - | - | 512 | 259 | 253 | $17.58 | $4,446
Jan-16 | - | - | - | - | - | - | - | - | 496 | 260 | 236 | $17.58 | $4,147
Feb-16 | - | - | - | - | - | - | - | - | 768 | 400 | 368 | $17.58 | $6,468
Mar-16 | - | - | - | - | - | - | - | - | 624 | 330 | 294 | $17.58 | $5,167
Apr-16 | - | - | - | - | - | - | - | - | 1512 | 762 | 750 | $17.58 | $13,183

**Total 12-Month Savings:** $95,948
Actual Load Profile (September 10, 2015)

Site Name: Brewery

ESS Size: 500kW / 1000kWh

Annual Savings: $103,453

Recommended Tariff: PG&E E-19 / COM-19 Secondary

Load Leveling – Intelligent and predictive algorithms make charge/dischARGE decisions to cap your demand (setpoint)

Additional Revenues – With battery SOC often at or near 100 percent, ability to engage in additional markets...
• Cash Purchase (3-6 year payback)

• Financed Solutions
  • Shared Savings Agreement
  • Fixed Payment
  • Public Financing
  • PPA with Solar
  • Performance Contracting
LARGE SCALE DEPLOYMENTS THROUGHOUT THE U.S.
Intelligent Energy Storage

Steve Kelley, SVP of Sales
info@engiestorage.com
Thank you for attending our webinar

Seth Mullendore
Vice President and Project Director
Clean Energy Group
seth@cleanegroup.org

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@Resilient_Power on Twitter
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Resilient Power in Practice: Lessons from the Field
Wednesday, June 27, 2-3pm ET

The Future of Electrification and What It Means for Clean Energy
Tuesday, June 26, 1-2pm ET

Building Markets: Energy Storage in Massachusetts and Offshore Wind in Rhode Island
Thursday, August 9, 1-2:30pm ET

Read more and register at [www.cleanegroup.org/webinars](http://www.cleanegroup.org/webinars)