Housekeeping

All participants are in “Listen-Only” mode. Select “Use Mic & Speakers” to avoid toll charges and use your computer’s VOIP capabilities. Or select “Use Telephone” and enter your PIN onto your phone key pad.

Submit your questions at any time by typing in the Question Box and hitting Send.

This webinar is being recorded.

You will find a recording of this webinar, as well as previous Resilient Power Project webinars, online at:

www.cleanegroup.org/ceg-projects/resilient-power-project/webinars/

and at

vimeo.com/channels/resilientpower
Who We Are

www.cleanegroup.org

www.resilient-power.org
Resilient Power Project

• Increase public/private investment in clean, resilient power systems
• Engage city officials to develop resilient power policies/programs
• Protect low-income and vulnerable communities
• Focus on affordable housing and critical public facilities
• Advocate for state and federal supportive policies and programs
• Technical assistance for pre-development costs to help agencies/project developers get deals done
• See www.resilient-power.org for reports, newsletters, webinar recordings
Today’s Guest Speakers

• **Steve Kelley**, Senior Vice President, Green Charge Networks [info@greencharge.net](mailto:info@greencharge.net)

• **Mark Johnson**, Smart Cities & MW Battery Energy Storage Microgrids, Schneider Electric [mark.johnson1@schneider-electric.com](mailto:mark.johnson1@schneider-electric.com)
INTELLIGENT ENERGY STORAGE

Stephen Kelley, SVP Sales
Largest Provider of Commercial Energy Storage
  - Systems installed coast-to-coast
  - Proven track record of savings

No cost, no risk solution
- Founded in 2009
- Headquartered in Santa Clara, CA with offices in NY

Green Charge Networks

[Logos and awards icons]
<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Green Charge Networks</td>
</tr>
<tr>
<td>2</td>
<td>Sharp</td>
</tr>
<tr>
<td>3</td>
<td>Greensmith</td>
</tr>
<tr>
<td>4</td>
<td>CODA Energy</td>
</tr>
<tr>
<td>5</td>
<td>Stem</td>
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</table>

1\textsuperscript{st} among energy storage companies in the commercial market.
Electric bills are increasing and half the charges cannot be addressed with energy efficiency.

“Our energy costs are going up at a rate that makes your head spin”

- Tony Knight, Superintendent, Oak Park USD
### Two Customers Segments

- **Customer Side** ("Behind the Meter")
  - Peak Demand Savings
  - Energy Arbitrage
  - Demand Response
  - Micro Grid/Resiliency
  - No operational Impact

- **Utility Side** ("Front of the Meter")
  - Distributed Generation
  - Substation Deferral
  - Ancillary services
  - Renewable firming
Two Components of Commercial Utility Bills

ENERGY CHARGES (kWh)

Total amount of energy use.

DEMAND CHARGES (kW)

Highest 15 minute peak.

Demand Charges can account for over 50% of an electric bill.
Save On Demand Charges

STATE OF CHARGE

Original Power Load

Power Load with Energy Storage

6 am

12 pm

6 pm

12 am

SAVINGS

$7,875
## California Demand Charges

<table>
<thead>
<tr>
<th>Year</th>
<th>SDG&amp;E</th>
<th>PG&amp;E</th>
<th>SDG&amp;E Cost Per KW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>$23.30</td>
<td>$16.10</td>
<td>$16.19</td>
</tr>
<tr>
<td>2006</td>
<td>$26.62</td>
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<td>$26.11</td>
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<td>2010</td>
<td>$29.22</td>
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<td>2011</td>
<td>$27.40</td>
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<td>2012</td>
<td>$28.10</td>
<td>$26.19</td>
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<tr>
<td>2013</td>
<td>$33.14</td>
<td>$28.40</td>
<td>$35.68</td>
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<tr>
<td>2014</td>
<td>$38.14</td>
<td>$30.96</td>
<td>$41.87</td>
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<tr>
<td>2015</td>
<td>$43.14</td>
<td>$36.46</td>
<td>$45.75</td>
</tr>
</tbody>
</table>

**Avg. Year Over Year Increase ‘05 – ‘15**

- SDG&E: 180% over the past decade and 49% over just the last three years!**
Ideal Markets

Variable Load Profile
- Breweries/Wineries
- Schools
- Industrial
- Farming
- Pharma
- Retail

“Our energy costs are going up at a rate that makes your head spin”

- Tony Knight, Superintendent, Oak Park USD
<table>
<thead>
<tr>
<th>Category</th>
<th>System Size</th>
<th>Savings per Year</th>
<th>10 year Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools</td>
<td>60-500kw system</td>
<td>$12-80K</td>
<td>$120 – $2M</td>
</tr>
<tr>
<td>Retail</td>
<td>30 – 500kw system</td>
<td>$7,000-$70k</td>
<td>$70k- $700k</td>
</tr>
<tr>
<td>Industrial</td>
<td>250 – 1000 kw</td>
<td>$45 - $250K</td>
<td>$450 - $3M</td>
</tr>
<tr>
<td>Multi-Family Housing</td>
<td>60 – 250 kw system</td>
<td>$15 – 40K</td>
<td>$150 – 480k</td>
</tr>
<tr>
<td>Muni</td>
<td>30 – 500 kw</td>
<td>$12 – 75K</td>
<td>$120 – 1M</td>
</tr>
</tbody>
</table>
ENERGY STORAGE SOLUTION

- Intelligent Cloud-Based Software
- Lithium-ion Energy Storage
- Integrated Risk Free Financing

“They install it, they pay for it, and over 10 years we split the savings. How could you possibly say no to that?”

- Rex Parris, Mayor, City of Lancaster
Intelligent software automatically responds to peaks in demand by learning a facility’s energy use patterns.

- 5 years of proven savings
- Scalable software platform
- Easily measure and communicate energy performance and savings

- Leverage data to identify additional energy savings
  - Daily weather feed
- Additional Utility service revenue
  - Demand response
  - Utility services
Flexible and proven hardware options designed to perform optimally in various environments.

- Industry leading lithium-ion batteries
- Modular and expandable
- 10-year warranty
- Indoor/outdoor
- HVAC cooling
- Perfect Safety Record
A no cost financing option with equipment, installation, warranty and maintenance all included.

POWER EFFICIENCY AGREEMENT

No cost. No risk. Just savings.

• No cost or risk
  • Green Charge owns and operates the system absorbing all risk
  • No operational impact to customers
  • 10 year warranty

• Just savings
  • Savings are shared between customer and Green Charge
  • Aligned incentives to increase savings
INTELLIGENT ENERGY STORAGE

www.greencharge.net
Resilient Power Project Webinar: Energy Storage for Demand Charge Management

Wed, Jun 24, 2015 1:00 PM - 2:00 PM EDT

Mark Johnson | Mark.Johnson1@Schneider-Electric.com
Presenter: Mark Johnson
Schneider Electric Smart Cities & MW Battery Energy Storage Microgrids

‘Graduate’ of:
U.S. Department of Energy in Washington, DC
IBM Energy & Utilities
Navigant Consulting
Johnson Controls
Several energy startups
BA University of Notre Dame
MBA Loyola University of Chicago
Mark.Johnson1@Schneider-Electric.com
Energy consumption continues to grow with no signs of slowing down.

What drives this demand?

Urbanization

Digitization

Economic & Government rebalancing

Industrialization
How can we ensure we won’t cook the planet?

> **Consume Green**
> - Change your energy mix by utilizing renewable resource fuels to replace fossil fuels whenever possible.

> **Consume Low Carbon**
> - Replace high carbon fuels with lower carbon alternatives such as shale gas.
Neither approach keeps pace with demand.

We need to eliminate every element of waste and reduce demand, while improving profitability and resource productivity.

We believe conservation efforts should build a route to a secure energy future.
In this new economy, economic growth is decoupled from rising energy consumption.

Success = Growth ≠ Rising energy consumption
Think about it

What if your multi-billion dollar investment towards a new power plant was premature? What if the gas extraction field you started to build wasn’t necessary?

According to the IEA:

230 GW of coal-fired and 120 GW of gas-fired power plants could go offline worldwide by 2035 if proper energy efficiency programs are put into place.
Think about it

What if digitization no longer focuses on optimizing communications but aims to maximize capacity and minimize energy consumption?

According to Microsoft:
Cloud solutions can reduce power consumption by 40% and carbon emissions from 30-90% when compared to on-premise applications.
Think about it

What if investing in smart infrastructure helped minimize consumption and reduce waste to create a cleaner planet?

According to an EPRI study: Smart grid could prevent nearly 4% of global emissions by 2020 and could reduce CO2 emissions by 60 to 211 million metric tons by 2030.
Driving innovation and sustainability

Achieve more while using less of our common planet by utilizing smart solutions for a more sustainable world.
This is where we come in with MW battery energy storage microgrids.
From smart devices through to big data, we provide our customers with services, systems and technology to:

- Reduce energy consumed
- Reduce cost per kWh
- Reduce CO2 footprints
- Reduce operating expenditures
- Realize measurable efficiency
- Produce energy locally across the grid
Site Optimization

To help businesses use their resources in the most efficient way possible, we access smart, real-time data and information through open platforms. This allows us to optimize energy usage across integrated systems, providing higher return on investment on CapEx and OpEx through improved site performance.

30% less energy per unit produced

<100 kWh/m2/yr

Increased availability and target
Grid Optimization

By balancing loads and more effectively managing, shifting and sharing capacity across the grid, we can reduce consumption and optimize overall performance. We create this level of smart, renewable integration through full network visibility and management.
We deliver this promise!

We are:
- Global with USA coverage
- Innovative
- A solution provider
- Green
- Reliable
ISO Markets:

<table>
<thead>
<tr>
<th>Member</th>
<th>Headquarters</th>
<th>Installed Capacity</th>
<th>Miles Lines</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>AESO</td>
<td>Calgary, AB</td>
<td>14,586 MW</td>
<td>16,155</td>
<td>3.7 M</td>
</tr>
<tr>
<td>CAISO</td>
<td>Folsom, CA</td>
<td>57,124 MW</td>
<td>26,000</td>
<td>30 M</td>
</tr>
<tr>
<td>ERCOT</td>
<td>Austin, TX</td>
<td>94,000 MW</td>
<td>40,530</td>
<td>23 M</td>
</tr>
<tr>
<td>IESO</td>
<td>Toronto, ON</td>
<td>35,056 MW</td>
<td>18,641</td>
<td>13.7 M</td>
</tr>
<tr>
<td>ISONE</td>
<td>Holyoke, MA</td>
<td>32,000 MW</td>
<td>9,130</td>
<td>14 M</td>
</tr>
<tr>
<td>MISO</td>
<td>Carmel, IN</td>
<td>205,759 MW</td>
<td>62,200</td>
<td>48 M</td>
</tr>
<tr>
<td>NYISO</td>
<td>Rensselaer, NY</td>
<td>37,976 MW</td>
<td>11,055</td>
<td>19.5 M</td>
</tr>
<tr>
<td>PJM</td>
<td>Valley Forge, PA</td>
<td>183,004 MW</td>
<td>62,500</td>
<td>61 M</td>
</tr>
<tr>
<td>SPP</td>
<td>Little Rock, AR</td>
<td>63,000 MW</td>
<td>46,921</td>
<td>15 M</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>713,838 MW</td>
<td>291,596</td>
<td>228 M</td>
</tr>
</tbody>
</table>
## ISO program details:

<table>
<thead>
<tr>
<th>IRC</th>
<th>AESO</th>
<th>CAISO</th>
<th>ERCOT</th>
<th>Ontario</th>
<th>ISL-NE</th>
<th>ISO-NE</th>
<th>NYISO</th>
<th>PJM</th>
<th>SPP</th>
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<tbody>
<tr>
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<td>OGS</td>
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<tr>
<td>Variable</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Wholesale</td>
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<td>Y</td>
<td>Y</td>
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<tr>
<td>Retail</td>
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<td>Y</td>
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<td>Y</td>
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<tr>
<td>Supply</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Load</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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</tr>
</tbody>
</table>

- **Variable**: wholesale, retail, supply, load
- **Wholesale**: ISO-P, OGS
- **Retail**: ISO-P, OGS
- **Supply**: ISO-P, OGS
- **Load**: ISO-P, OGS

### Notes
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Examples of utility demand savings programs:

CURRENT FINANCIAL VALUE OF DEMAND RESPONSE REVENUES IN NYC DR PROGRAMS
In 100 kW, 500 kW, and 1 MW amounts of pledged load reduction.

<table>
<thead>
<tr>
<th>Programs and kW Enrollments</th>
<th>100 kW</th>
<th>500 kW</th>
<th>1 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. NYISO SCR Capacity: summer and winter (capacity payment)</td>
<td>$13,035</td>
<td>$85,215</td>
<td>$130,350</td>
</tr>
<tr>
<td>2. NYISO SCR Energy Performance: summer and winter (Energy Performance Payment)</td>
<td>$750</td>
<td>$3,750</td>
<td>$7,500</td>
</tr>
<tr>
<td>3. CECNY DRLP Capacity: summer only (Capacity Payment)</td>
<td>$3,000</td>
<td>$15,000</td>
<td>$30,000</td>
</tr>
<tr>
<td>4. CECNY DRLP Energy Performance: summer only (Energy Performance Payment)</td>
<td>$4,000</td>
<td>$2,000</td>
<td>$4,000</td>
</tr>
<tr>
<td>5. CECNY DRLP 2-Year Retention Bonus</td>
<td>$1,500</td>
<td>$15,000</td>
<td>$30,000</td>
</tr>
<tr>
<td>6. CECNY CSR Capacity: summer only (Capacity Payment)</td>
<td>$5,000</td>
<td>$25,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>7. CECNY CSR Energy Performance: summer only (Energy Performance Payment)</td>
<td>$1,250</td>
<td>$6,250</td>
<td>$12,500</td>
</tr>
<tr>
<td>8. CECNY CSR 3-Year Retention Bonus</td>
<td>$5,000</td>
<td>$25,000</td>
<td>$50,000</td>
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<tr>
<td>Total Annual DR Revenue (assumes three events in the summer, one in the winter)</td>
<td>$308,895</td>
<td>$1,534,425</td>
<td>$3,088,850</td>
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</tbody>
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Source: ConEdSolutions.com
Teaming:

**Schneider Electric**: engineer, procure & construct with Demand Side Operations, inverters & transformers

**Batteries** & battery management systems in delivered containers

**MWBattery.com**: customer trust, optimization & financial risk responsibility with monthly reporting

- **Chicago PJM** frequency regulation revenue income
- **NYISO demand response & utility demand savings revenue income**
- **California demand response revenue & utility demand savings revenue income**
Fast, friendly, focused & flexible timetable:

<table>
<thead>
<tr>
<th>#</th>
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<th>Month3</th>
<th>Month4</th>
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</tbody>
</table>
Our capabilities

Allow us to deliver tangible results for customers, wherever they might be.

Mark.Johnson1@Schneider-Electric.com

More information about the Resilient Power Project, its reports, webinar recordings, and other resources can be found at www.resilient-power.org.
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Program Associate
Clean Energy Group
Email: seth@cleanegroup.org
Phone: (802) 223-2554

www.cleanegroup.org
www.cesa.org
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