

# **BUILDINGENERGY NYC**

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## **Grid-Interactive Efficient Buildings: How Smart Buildings are Decarbonizing NYC**

**Andy Anderson, WatchWire**

**Evan Fitzgerald, Generac**

**Matt McCue, CPower Energy Management**

**Moderator: Jay Snyder, CPower Energy Management**

Curated by Tommaso Bitossi (Transsolar) and

Christina McPike (WinnCompanies)

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**Northeast Sustainable Energy Association (NESEA)**

**October 12, 2023**

# Speakers



**Jay Snyder**  
Manager, Field Integration &  
Technology Alliances  
CPower Energy Management  
  
Moderator



**Matthew McCue**  
Account Executive, NYISO  
CPower Energy Management



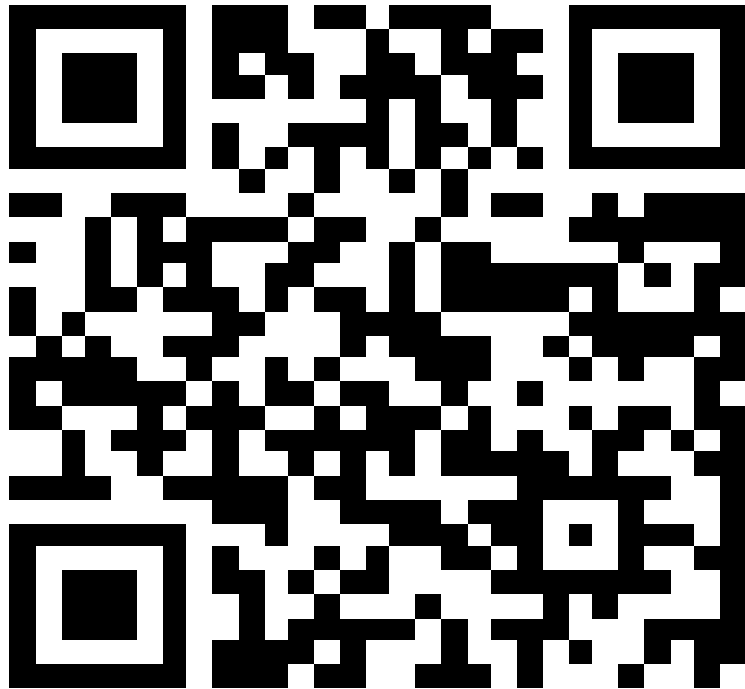
**Andy Anderson**  
Chief Executive Officer  
Watchwire by Tango



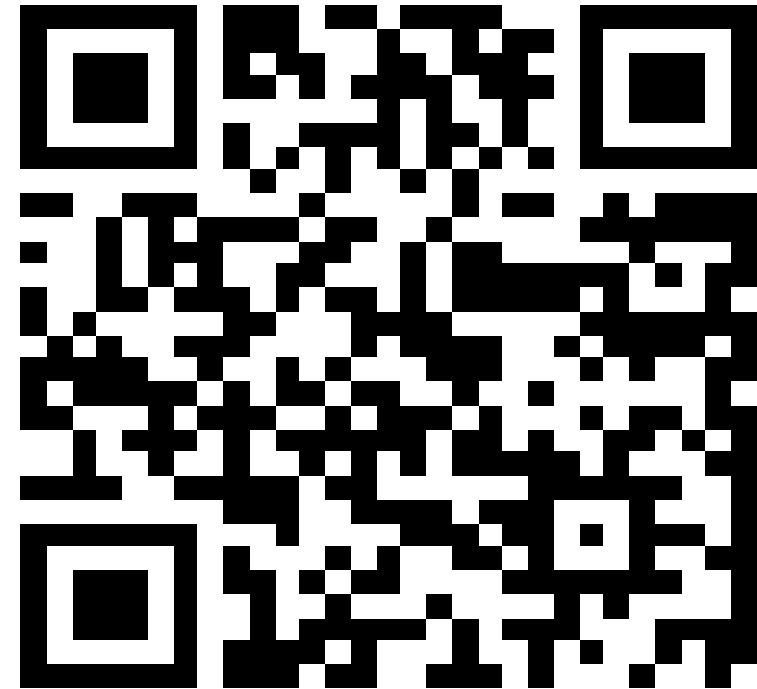
**Evan Fitzgerald**  
Manager, Energy  
Markets  
Generac Power Systems

# Audience Participation! Two Surveys...

- Your Definition of GEBs?



- Your Experience with GEBs?



# Objectives

- **Dissect the integrated components of a GEB and VPP (Virtual Power Plant)**
- **Identify revenue streams that enable GEB technology deployment, such as BESS (Battery Energy Storage System)**
- **Share innovative approaches for maximizing load flexibility in buildings**
- **Explain the roles of different stakeholders in the development of GEBs**

# Grid Interactive Efficient Buildings & Virtual Power Plants



## EFFICIENT

Persistent low energy use minimizes demand on grid resources and infrastructure



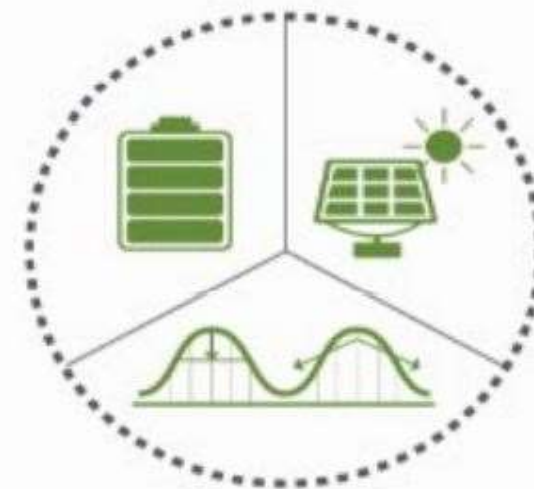
## CONNECTED

Two-way communication with flexible technologies, the grid, and occupants



## SMART

Analytics supported by sensors and controls co-optimize efficiency, flexibility, and occupant preferences



## FLEXIBLE

Flexible loads and distributed generation/storage can be used to reduce, shift, or modulate energy use

**Let's look at the survey results!**

# Grid Interactive Buildings in the Press

“Lawrence Berkeley National Laboratory and energy consulting firm Brattle Group... [find] that a massive investment in commercial and residential building investments could cut annual power system costs involved with achieving nationwide carbon-free electricity by 2050 by as much as \$107 billion per year. Compared to the business-as-usual scenario, that would shave more than one-third off the cost of decarbonizing the country’s power supply. Those savings would require both significant investments in energy efficiency, as well as outfitting buildings with the technology required to shift electricity use based on the ups and downs of solar and wind power, a capability known as ‘demand flexibility.’”

St. John, Jeff (2023, August 22). Why efficient buildings are key to decarbonizing the power grid. Canary Media.  
<https://www.canarymedia.com/articles/energy-efficiency/why-efficient-buildings-are-key-to-decarbonizing-the-power-grid>

# Grid Interactive Efficient Buildings in the Press



← Today's top news ●●●●●●●●●● →



## What do office tenants really want?

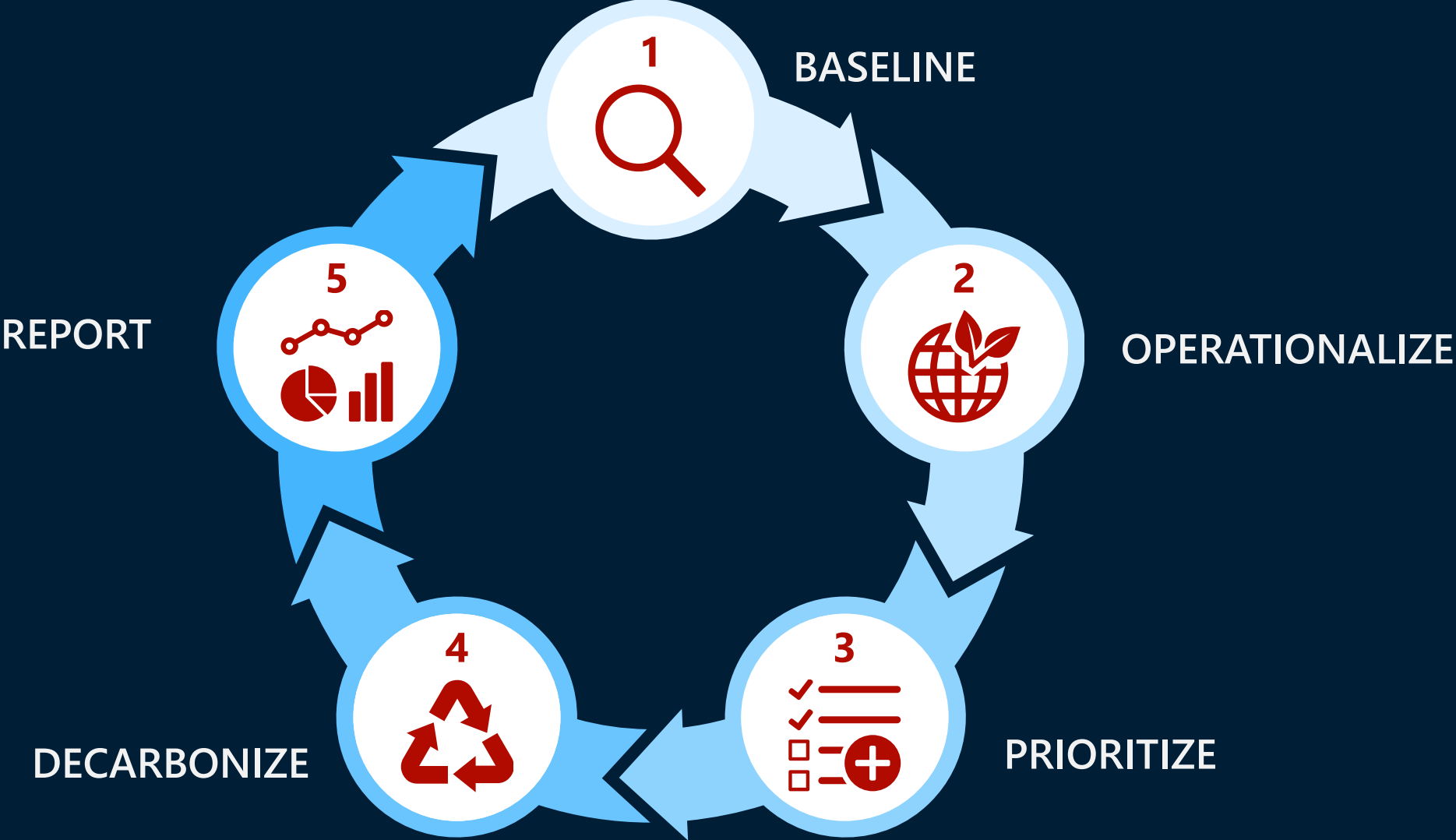
By [Alessandra Riemer](#), Editor at LinkedIn News  
Updated 6 hours ago ⓘ

Even with already discounted prices for their offices, tenants still want more bang for their buck. What are they asking for? Everything from new "smart building features," writes [The Globe and Mail](#), to blueprints for decarbonization. [Deloitte](#) surveyed roughly 100 commercial real estate executives and tenant companies, in an effort to distinguish priorities from landlords vs. tenants. One of the largest divides between the two was on sustainability, with 58% of tenants prioritizing net-zero goals, and only 30% of landlords saying they have plans to get there.

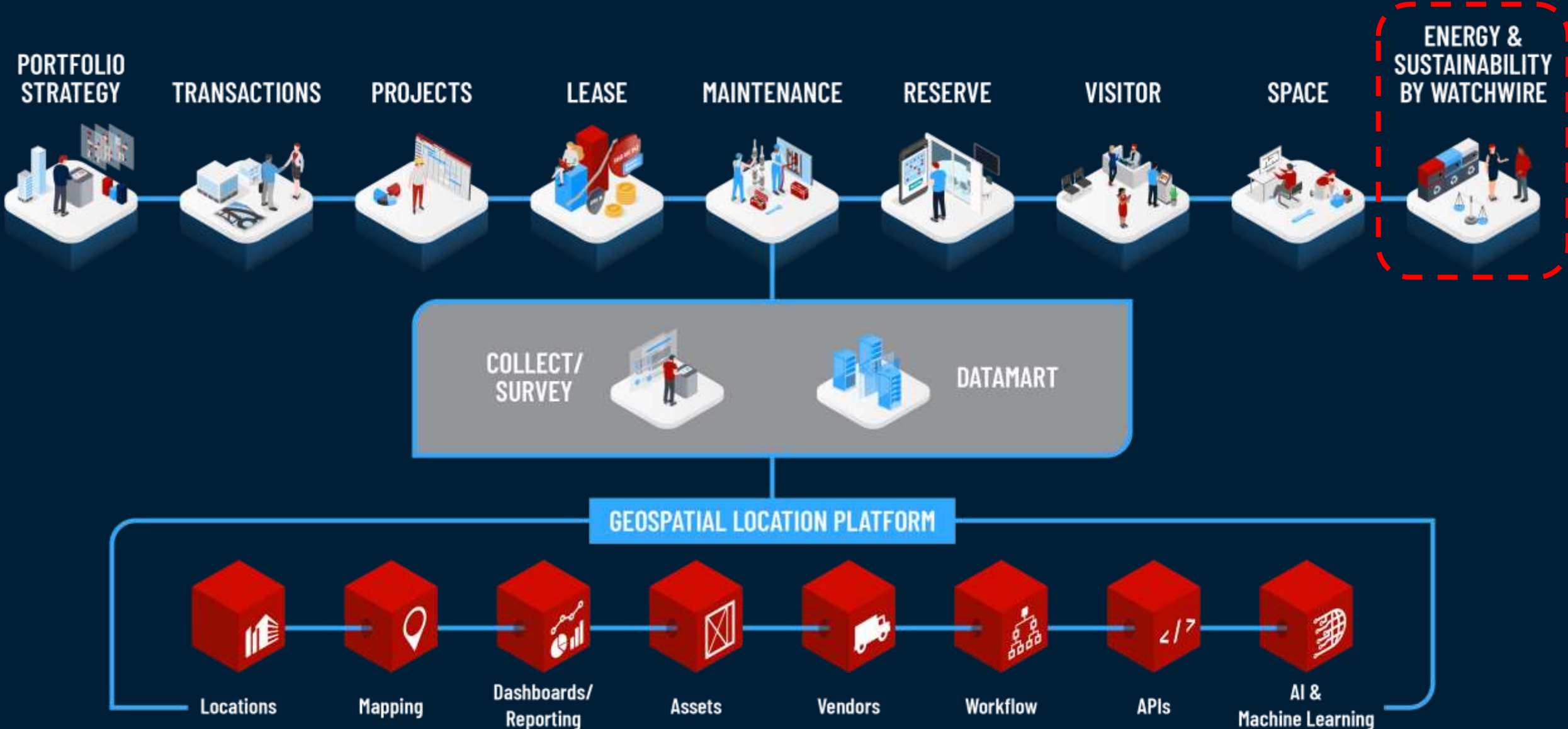




# WATCHWIRE'S HOLISTIC APPROACH TO SUSTAINABILITY & ENERGY MANAGEMENT



# TANGO CONNECTED SOLUTIONS



# WATCHWIRE'S IMPACT

Helping over 1B sq ft of real estate + 23k buildings reduce their carbon footprint and simplify their sustainability reporting

**5B+**

Energy and Water Spend Under Management

**>1B+**

ft<sup>2</sup> Under Management

**>23k**

Buildings Under Management



# Commercial buildings in the United States occupy >97 Billion square feet of space

CBECS Estimates Over 5.9 Million Buildings in the U.S As Of 2018

\*At 6% Industry Growth Rate There Would Be Approximately 7.48 Million Commercial Buildings As Of 2023



# Built Environment Accounts For A Quarter Of The World's Greenhouse-gas (GHG) Emissions, Often Higher In Cities

## EMISSION BY TYPE

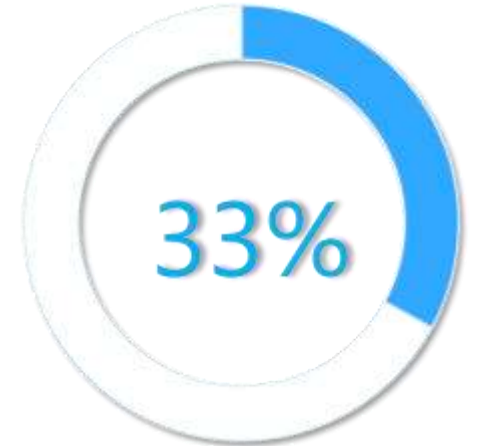
### OPERATIONAL EMISSIONS

Related to operating and maintaining buildings and structures  
(e.g. heating, cooling)



### EMBODIED EMISSIONS

Related to producing and transporting building materials and constructing buildings and structures  
(e.g. cement, design, construction)

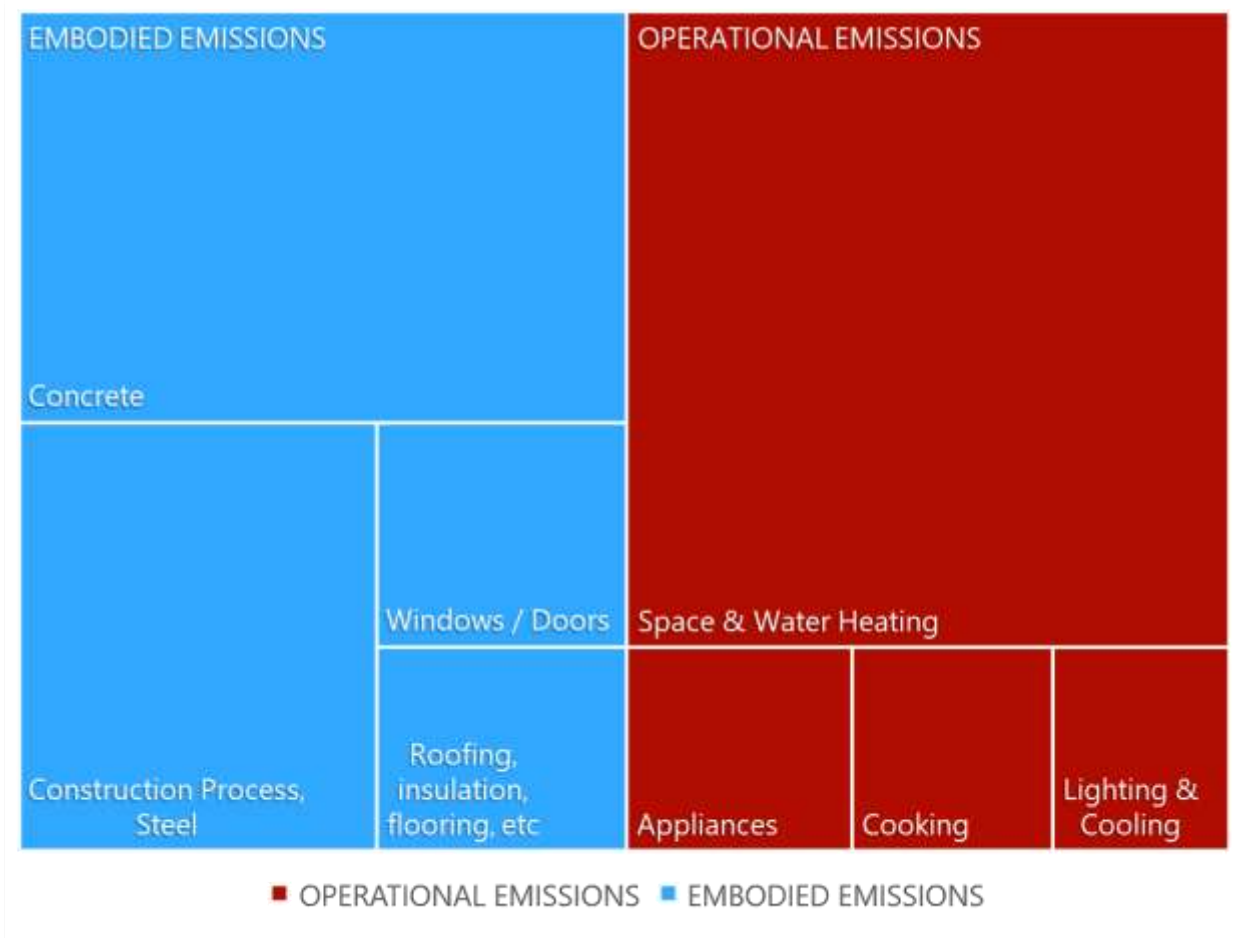


LOCAL EMISSIONS RANGE BETWEEN 30%-70%

70% New York | 80% St Louis | 74% Salt Lake City | 51% Denver | 37% Washington

# Facility Managers Can Help Abate Up To 90 Percent Of Operational Emissions

EMISSION BREAKDOWN



SPACE MANAGEMENT & SMART DESIGN



EMISSION TRACKING & BUILDING RESILIENCE

TOP 4 ACTION LEVELS

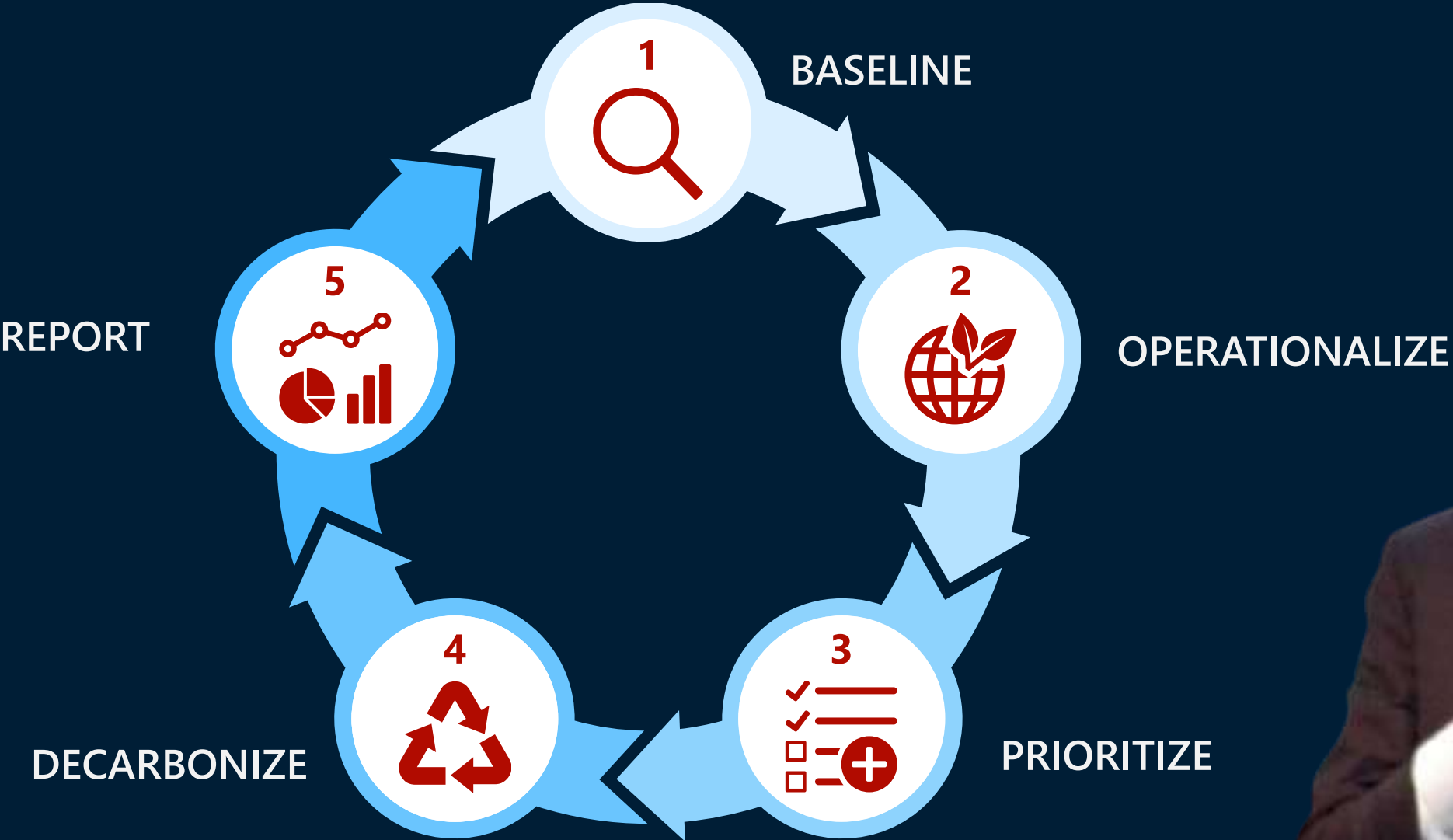


ENERGY MANAGEMENT & ELECTRIFICATION



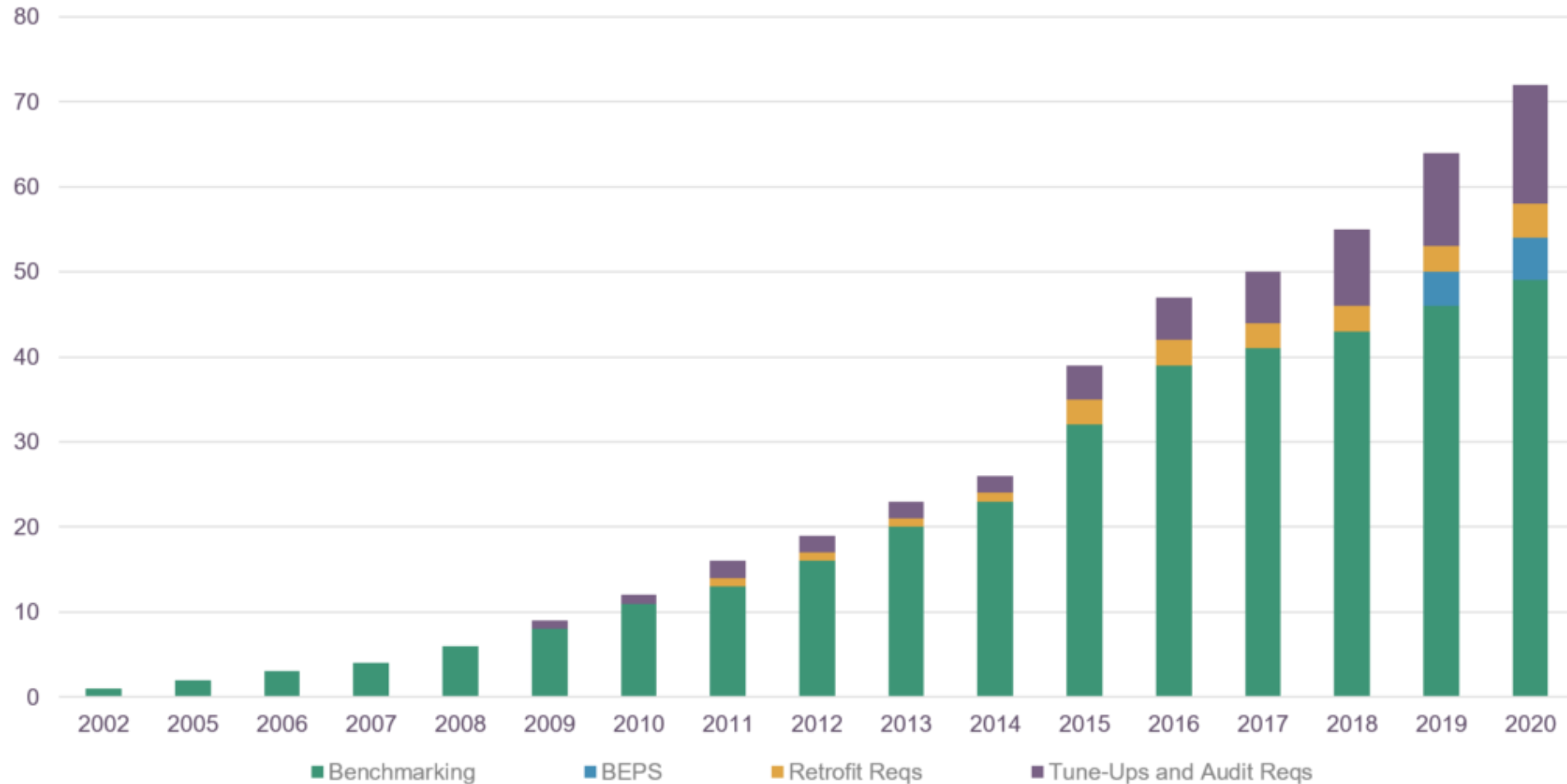
WATER & WASTE MANAGEMENT

# IT'S THE DATA...



# FROM BENCHMARKING TO BPS

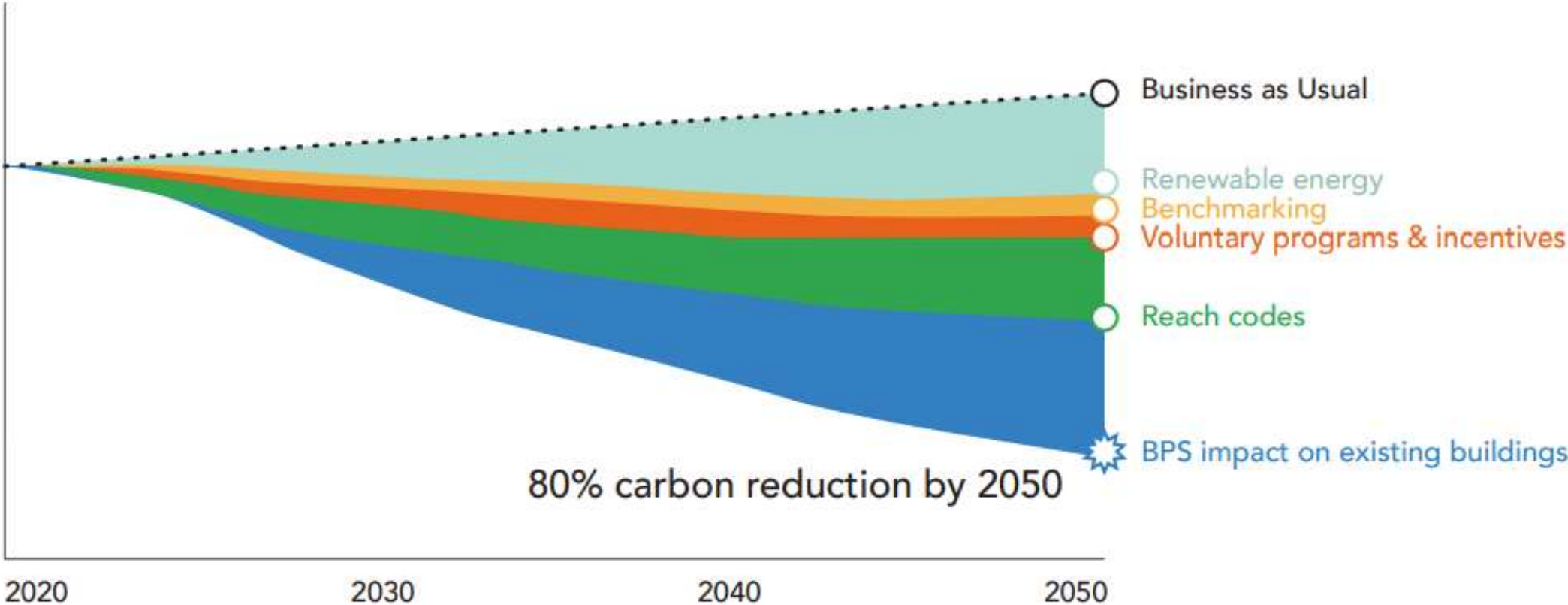
Total U.S. Benchmarking, BEPS and Other Performance Policies Per Year\*





# WHY BPS?

Illustrative Emissions Reduction Potential for Building Sector



# NYC LL97 SPECIFICS

## LL97 ARTICLE 320 PENALTY FRAMEWORK

Properties have two main compliance responsibilities

**Submit building emissions report**

$Penalty = (Floor\ Area \times \$0.50) / month$

**Meet emissions limits**

$Penalty = ((Emissions - Limit) \times \$268) / yr$

Penalty mitigation opportunities\* (2024-2029)

Unexpected or Unforeseeable Event

Good Faith Efforts

Building Emissions Report and Compliance with Any Adjustment

Benchmarking

Lighting & Sub-metering (LL88 rule)

Complete all of these  
AND  
one of these

Decarbonization Plan (see next slide)

Complete Application for the Work Approved by DOB

Building out electrification readiness

Previous Compliance with Emissions Limits

Critical Facility

Financing (28-320.7 (2) Adjustment)

\*Adjustments available for hospitals, nonprofits, landmarks and buildings with special circumstances or financial hardship.

# NYC LL97 SPECIFICS

## Beneficial Electrification

- Owners that replace fossil fuel equipment early with high-efficiency space conditioning or water heating equipment receive a credit against emissions limits for the first or second compliance period
- A negative coefficient may be applied against a building's emissions reducing penalties for buildings that convert to heat pumps (2x '21-'26, 1x '27-'29)
- Deemed vs. metered
- Banking credits

## Clean Distributed Energy Resources

- Must be sub-metered
- Deductions from reported emissions for certain clean DERs based on published GHG coefficients, TOU, or Department determined total emissions spread (TES)



**40+ Cities, Counties,  
And States Have  
Committed To Pass  
Building Performance  
Standards By Earth Day  
2024 To Reduce Carbon  
Emissions From Buildings**

The State of Building Performance Standards in the U.S.  
September 2023



# Existing BPS Policies Vary Considerably

Energize Denver vs New York City's Local Law 97

## ENERGIZE DENVER

Enacted: 2021

Compliance Target: 2025

Weather Normalized Site Energy Use Intensity (EUI)

All Comm & MF Buildings  $\geq$  25,000 Sq. Ft.

30% total normalized site energy savings across all covered buildings is achieved.

Exceeding limit: \$0.70 per year for each required kBtu

False statement: \$2000

## SUSTAINABLE BUILDINGS NEW YORK CITY LOCAL LAW 97

Enacted: 2019

Performance Reporting: 2025

Annual greenhouse gas (GHG) emissions (tCO<sub>2</sub> e/sq. ft.)

All Comm & MF Buildings  $\geq$  25,000 Sq. Ft.

40% reduction in greenhouse gas emissions

Exceeding limit: \$268 MT CO<sub>2</sub>e over limit

Failure to file a report: \$0.50 per sq footage

False statement: \$500,000 or imprisonment

YEAR

METRICS

SCOPE

2030 TARGET

PENALTIES



DATA

#1



SORTED

#2



ARRANGED

#3



PRESENTED  
VISUALLY

#4



EXPLAINED  
WITH A STORY

#5



ACTIONABLE  
(USEFUL)

#6

# Powering a **Smarter** World

**GENERAC**  
POWERING A  
**SMARTER  
WORLD**



Increase power reliability through onsite generation and storage solutions that provide resiliency for homes, businesses and communities.



Enable sustainable and more efficient power generation and consumption through monitoring, management and lower-carbon solutions.



Offering innovative solutions that enable and protect next-generation power, communications, transportation and other critical infrastructure.

**OUR PURPOSE:** Lead the evolution to more resilient, efficient, and sustainable energy solutions.

# Broad Product Offering Address

## Strategic Opportunities





# Generac Energy Services Vision

CUSTOMER ENTRY POINT

## Infrastructure & Equipment



- Backup Power
- Facility Expansion
- Electrical System Upgrade
- Switch Upgrades

## Energy Programs & Solutions



- Grid Services and VPP
- Demand Response
- Peak Demand Reduction
- Price Response

## Energy Efficiency and Sustainability



- Battery Energy Storage
- EV Charging
- Microgrids
- ESG / Carbon Reporting

ENERGY JOURNEY

ENERGY JOURNEY

ENERGY JOURNEY

GENERAC SOLUTIONS



Switching Equipment



Standby Generators



Site Optimization



Battery Storage Systems



Decarbonization Planning and Reporting



Demand Response and Grid Services



Microgrids



EV Chargers

Building technology must be capable of meeting the customer needs

- **Connectivity**

Unlock energy savings via on-bill & Grid Services

- **Customer Flexibility**

Meet customer on their energy journey

- **Grid Flexibility**

Ensure easy integration into Grid Services

Agnostic on platform integrations

## Value Proposition shift to: Behind-The-Meter + Grid

Energy technology is no longer just about Behind-the-Meter benefits. It must be capable of layering in the benefits it can provide to the electric grid

Commercial & Industrial



Residential

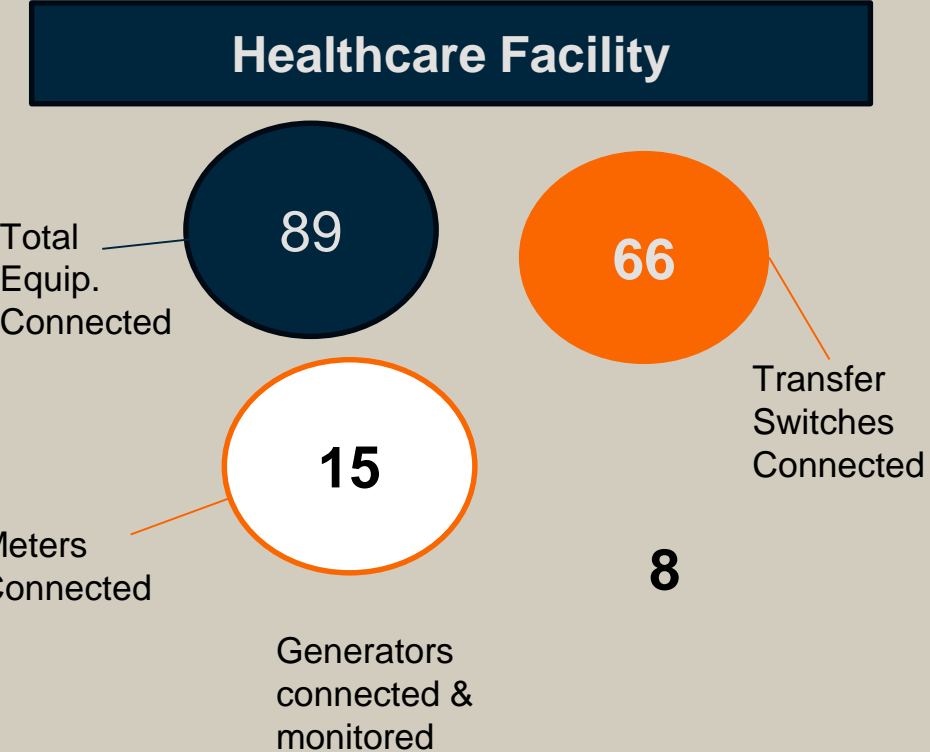


# Smarter Energy Use Via Connectivity Solutions

## Generac Business Connectivity Solution

Internet of Things (IoT) solution that allows buildings to monitor and control electrical systems

- Remotely monitor assets and loads in real-time
- Identify & shift energy usage to optimize rate structures
- Provide demand flexibility to support internal and grid related needs
- Creation of safety & environmental reporting requirements



- Provides the complex compliance solution
- Enables customer to understand energy usage
- Unlocks the ability to manage flexible loads:

Emergency Situations

Economic Benefit via Utility Programs

# Leveraging Flexible Buildings for Grid Services

**Challenge:** Europe's power grids are changing as the industry moves toward renewable energy and integrates digital technology into the electrical system

**Solution:** Integrate various commercial & industrial loads into VPP software solution that can aggregate, operate, and optimize its DER assets in highly scaled portfolios

- Monitor and dispatch DERs in near Real-Time
- DERs responds to needs within seconds
- Manage variations in response by optimizing all assets to ensure meeting needs of grid

Note to Cpower: Working on a little more detail from PM

## Details

### Customer Types:

- Heavy Industry
- Data Centers
- Manufacturers
- Municipal Customers

### Aggregation Composition:

- Industrial and Commercial Loads
  - Generators
  - Process Loads
  - Electric Boiler (60+ MW)

### Participation Models:

- Reserve Markets
  - Primary, Secondary, Tertiary
- Intraday Energy Markets

# Smart Thermostat Deployment in Multi-Family

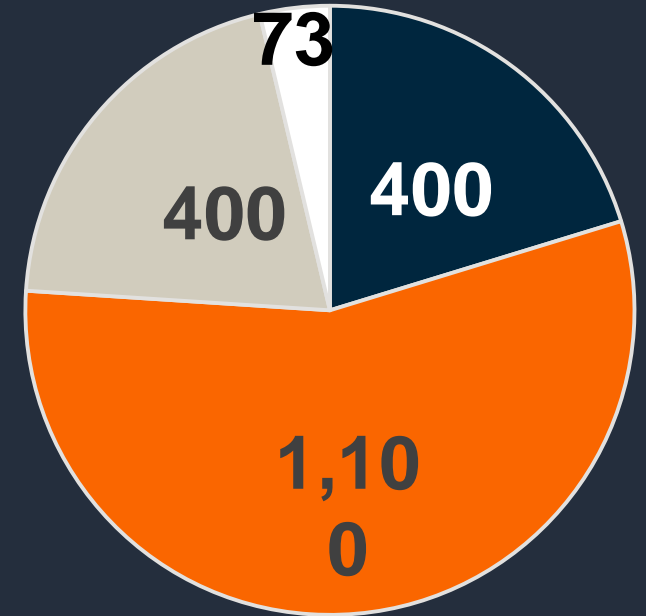
## ecobee Smart Buildings

Smart thermostat solution that provides property managers and tenants:

- Energy & Operational Savings
- Heating & Cooling ~30% of energy consumption
- Asset Protection
- Early detection of inefficient systems
- Increased Visibility & Control
- Access to demand response programs
- Either via property manager or customer enrollment.

## NYC Projects

Existing Projects In Service



- Providing 17% of energy savings to building
- Providing up to 2 MW of flexible load to the NYC Grid on four projects
- Many more projects in NYC area underway

## **CPower's Vision**

Creating the Customer-Powered Grid™ that enables a flexible, clean and dependable energy future.

## **CPower's Mission**

We unlock the full value of distributed energy resources for our customers to balance the power grid when and where dispatchable resources are needed the most.



# The Smart Grid Transition - AMI & Smart Meters

## Analog Meter



## ConEd AMI Meter



ConEd is 99% through a 2 Billion Dollar Smart Grid Infrastructure upgrade. Over 5.5 million AMI meters have been installed in buildings over 25,000 square feet from Westchester through New York City.

- |                        |                        |                                                         |
|------------------------|------------------------|---------------------------------------------------------|
| • <b>Display</b>       | Spinning Dials         | Digital                                                 |
| • <b>Measurement</b>   | Monthly Usage Data     | 5 Minute Intervals                                      |
| • <b>Recording</b>     | Manual Onsite Readings | Interval Data Uploaded every 45 Minutes                 |
| • <b>Communication</b> | None                   | Multi Channel – ConEd, Client, Demand Response Provider |

# Smart Thermostat Transition

## Smart Thermostat Implementation

Before



After



- Remote visibility into HVAC operation and runtime
- Ability to set thermostat minimum and maximum temperatures
- Remotely set occupied and unoccupied schedules
- Automated demand response



# ConEd Demand Response Growth – AMI

## Enrollment Statistics



# ConEd Demand Response Program Growth Continued

## 2022 Programs Growth

Program	2021	2022	Percent Difference
CSRP (MW Enrolled)	344 MW	374 MW	9% 
DLRP (MW Enrolled)	371 MW	406 MW	10% 
CSRP (Customers Enrolled)	6,130	15,139	147% 
DLRP (Customers Enrolled)	6,278	15,477	147% 
Term-DLM (MW Enrolled)	12.3 MW	25.6 MW	108% 
Auto-DLM (MW Enrolled)	0.1 MW	3.9 MW	3,800% 

# NYISO - Short Term Reliability Solicitation 466 MW Shortfall in Peak Demand For Zone J

- The Need is primarily driven by a combination of forecasted increases in peak demand and the assumed unavailability of generation in New York City affected by the New York State Department of Environmental Conservation's ("DEC's") "Peaker Rule."<sup>5</sup> Specifically, the New York City locality is deficient by as much as 446 MW for a duration of nine hours on the peak summer day under expected weather conditions, after accounting for forecasted economic growth and policy-driven increases in demand for electricity.

**There is no Clean Energy Transition without a Resilient Energy Transition**

# Class B GIEB Case Study



## Commercial Class B Office Building

- **Vertical:** Orion Sustainable Buildings
- **Scope:** Integrate with large aggregator to effectively enable automated demand response during times of peak demand - while also allowing the building owner to view and control space temperature across all tenant spaces throughout the year.
- **Deployment:** Fifteen (15) smart thermostats.

✓ **37kW** Load Committed

✓ **\$11K+** Annual DR Revenue

✓ **1.2** Year Payback Period

# 230 West 39<sup>th</sup> Street - Demand Response Event

## Analytics

Select data sources to view analytics chart

Custom: Jul 27, 2023 - Jul 27, 2023

Export

Selected Metrics: 2 of 6 (\*F)

Select Metrics



Performance Report for July 20, 2022  
 CONED CSRP



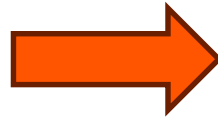
Program	Acct. Number	Account Address	Performance	Event Baseline	Enrollment kW	Target Meter Read	Average Meter Read (Usage)	Average Load Drop	Event Performance %
CSRP	494121200300017	230 West 39th St New York, NY 10018	100%	158	37	121	113	44	120%

# 230 West 39<sup>th</sup> Street - BMS Efficiencies

## Building Energy Efficiency Rating

**A**

**87**

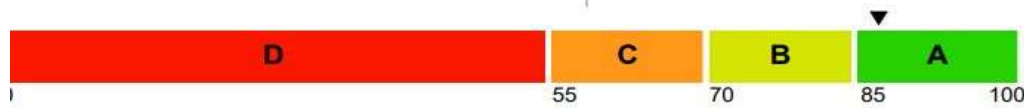


## Building Energy Efficiency Rating

**A**

**91**

2020 Rating  
A/87



### Building Specifications

**230 WEST 39 STREET,  
MANHATTAN**

Year of Compliance.....2020  
Borough, Block and Lot.....1-00788-0064  
BIN.....1014486  
NYC Average.....52

### More Information

The 1-100 ENERGY STAR® score compares this buildings energy consumption to similar buildings. Buildings with a score of 75 or better are high performers and eligible for ENERGY STAR certification.

### Building Specifications

**230 WEST 39 STREET,  
MANHATTAN**

Year of Compliance.....2021  
Borough, Block and Lot.....1-00788-0064  
BIN.....1014486  
NYC Average.....54

### More Information

The 1-100 ENERGY STAR® score compares this buildings energy consumption to similar buildings. Buildings with a score of 75 or better are high performers and eligible for ENERGY STAR certification.

# Class A GIEB Case Study



## Commercial Class A REIT Portfolio

- **Vertical:** Orion Healthy Buildings
- **Scope:** Maintain indoor air quality (IAQ) that automatically adjusts the ventilation rate provided to a space in response to changes in conditions such as occupancy or indoor pollutant concentration.
- **Deployment:** One-hundred thirty-three (133) multi-parameter IAQ monitors across seven (7) buildings.

✓ **\$3.4M** Rebate Captured

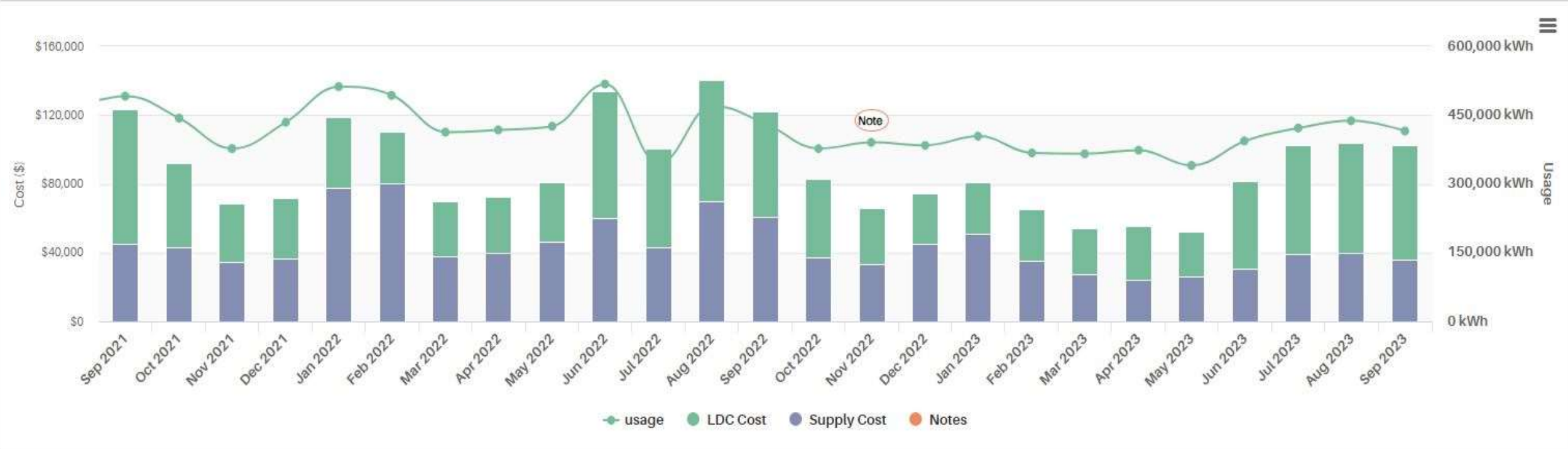
✓ **2.9M** Annual kWh Saved

✓ **13K** Annual Mlbs Saved

✓ **1.5K** Annual GHG Reduction



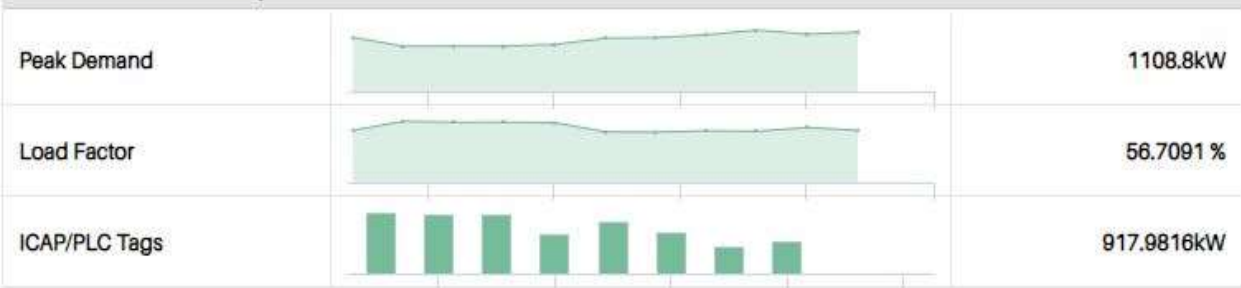
Monthly Sep 2021 Sep 2023 Add Note

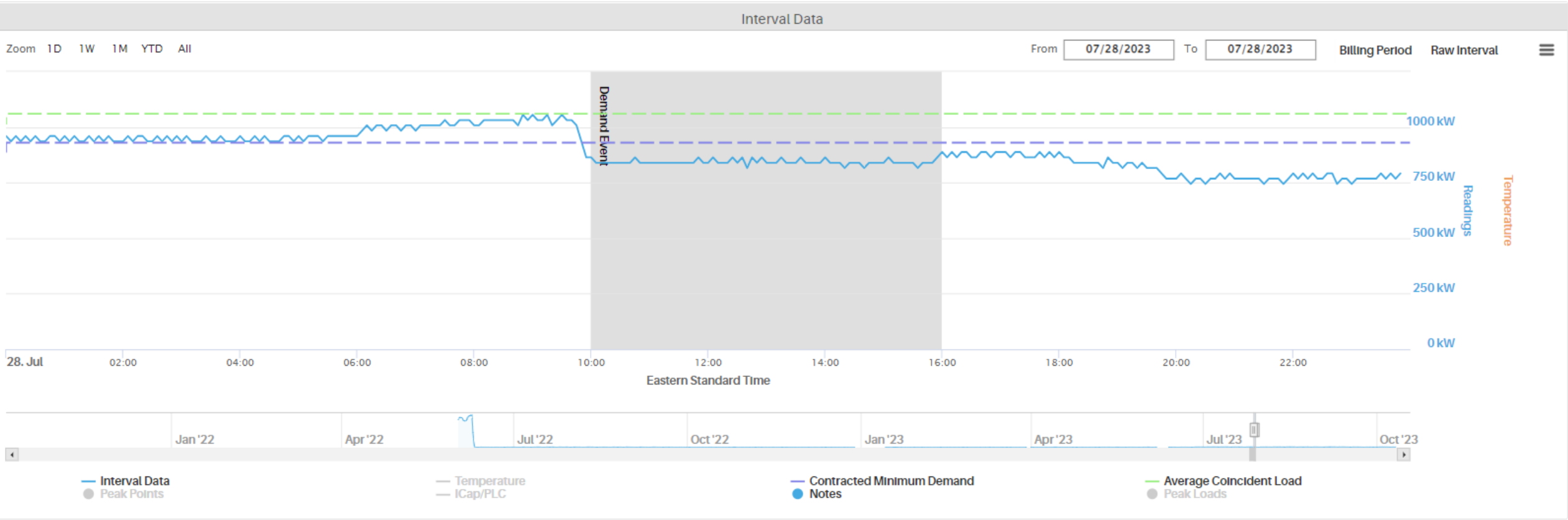


Summary Past 12 vs. Prior 12

	Oct '2021 - Sep '2022	Oct '2022 - Sep '2023	Δ	%
Consumption - Total	5,278,400	4,669,600	-608,800	11.53 ↓
Delivery \$	\$550,645.67	\$498,121.28	-\$52,524.39	9.54 ↓
Delivery \$/kWh	\$1.043	\$1.067	\$0.024	2.30 ↑
Supply \$	\$631,503.70	\$425,122.43	-\$206,381.27	32.68 ↓
Supply \$/kWh	\$1.196	\$0.991	-\$0.205	23.91 ↓
Total \$	\$1,182,149.37	\$923,243.71	-\$258,905.66	21.9 ↓
Total \$/kWh	\$0.2240	\$0.1977	-\$0.0263	11.74 ↓

Demand Summary





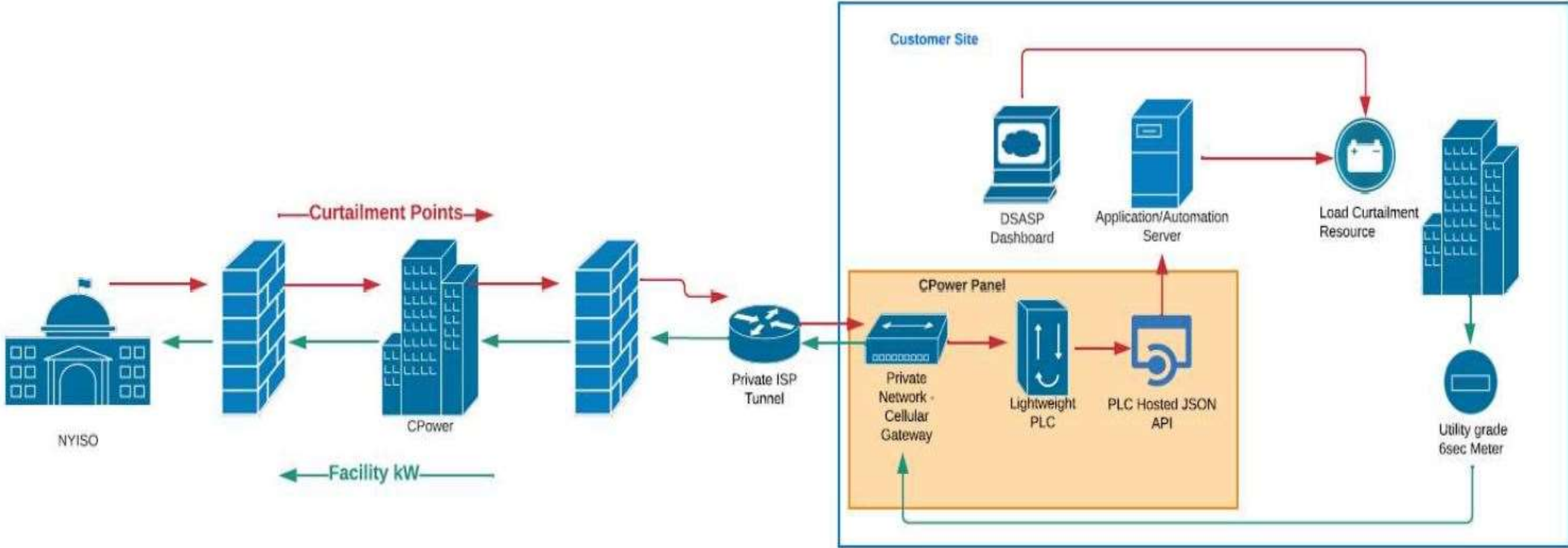
Interval Information									
Start Date & Time	End Date & Time	# Days	# Hours	Total Consumption (kWh)	Peak kW	Min kW	Average kW	Avg. Temperature	
Jul 28, 2023 : 0:00:00	Jul 28, 2023 : 23:59:59	0	23	21,228	1,056	744	888	83	

Demand Events				
Start Date & Time	End Date & Time	Info	Program	Indicative Performance
Jul 28, 2023 10:00:00	Jul 28, 2023 16:00:00		Commercial System Relief Program (CSRP)	110.240%
Jul 14, 2023 16:00:00	Jul 14, 2023 18:00:00		Distribution Load Relief Program (DLRP)	108.580%
Aug 9, 2022 11:00:00	Aug 9, 2022 15:00:00		Commercial System Relief Program (CSRP)	105.43%
Aug 8, 2022 11:00:00	Aug 8, 2022 15:00:00		Commercial System Relief Program (CSRP)	102.530%

# FERC Order 2222 – The Virtual Power Plant

- Order No. 2222 is seeking to facilitate participation and competition in any of the RTO markets as long as qualifications are met. DER aggregations would have the opportunity to earn the same compensation as other types of resources that participate in RTO markets, such as power plants.

# DSASP Dispatch and Communication One-Line / Protocol



# NYCHA – Case Study CPower & GENERAC

327 GENERAC Generators across 32 NYCHA Complexes providing resiliency to 500,000 Residents throughout New York City in response to the aftermath of Super Storm Sandy.

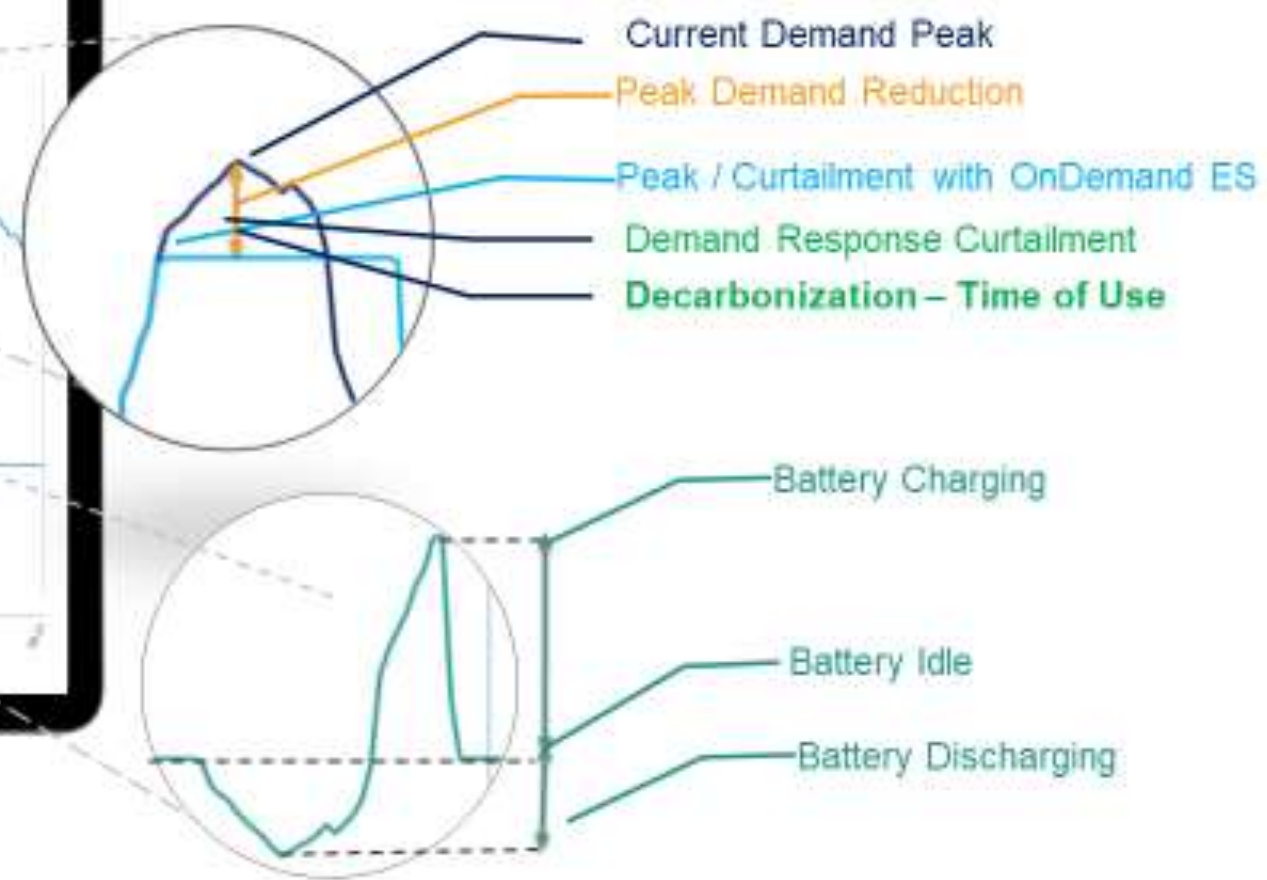
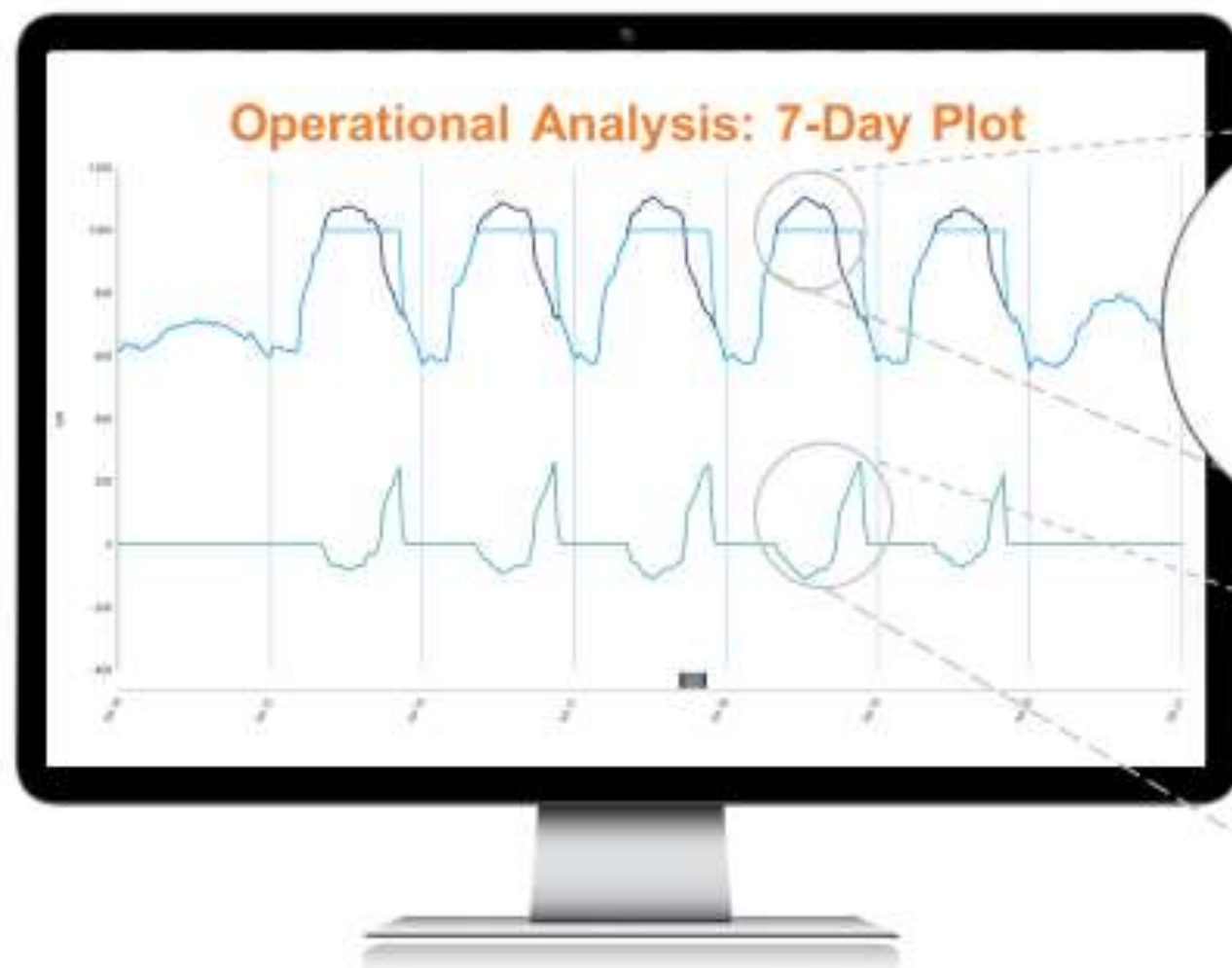
GENERAC Natural Gas Generators are equipped with Controls for Automated Demand Response. CPower has enrolled 7 NYCHA complexes in NYISO SCR, Coned Term DLM and ConEd DLRP for 3 MWs. Annual Demand Response revenue is used to pay for the ongoing maintenance of the generators.



# Northeast Battery Energy Storage – College Campus

- 2 MW Battery
- \$416,000 in Annual Revenue – Dailey Dispatch
- 2020 Energy Storage & Smart Grid Winner
- 5.5 MW of Solar Production
- \$30,000 - \$50,000 in Annual ISO New England On-Peak Program Revenue
- \$200,000 of Annual on Bill savings for Cap Tag and Demand Charge Management.



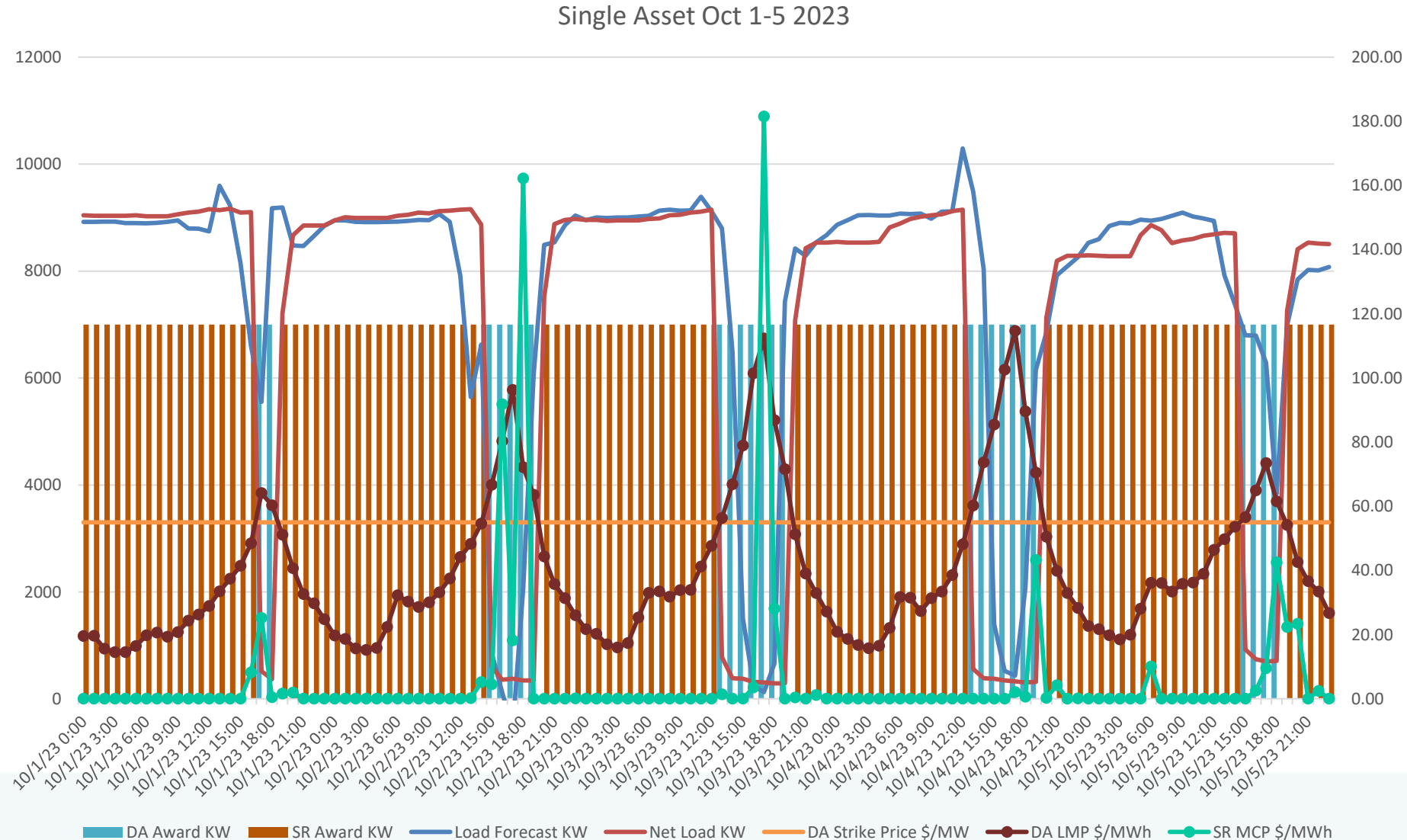


## Demand Charge Management, Demand Response Curtailment & Decarbonization at the Facility level

7-Day Energy Storage Operational Detail shows facility grid demand with "pre-ES" daily peaks, energy storage charge/discharge, and the resulting demand reductions.

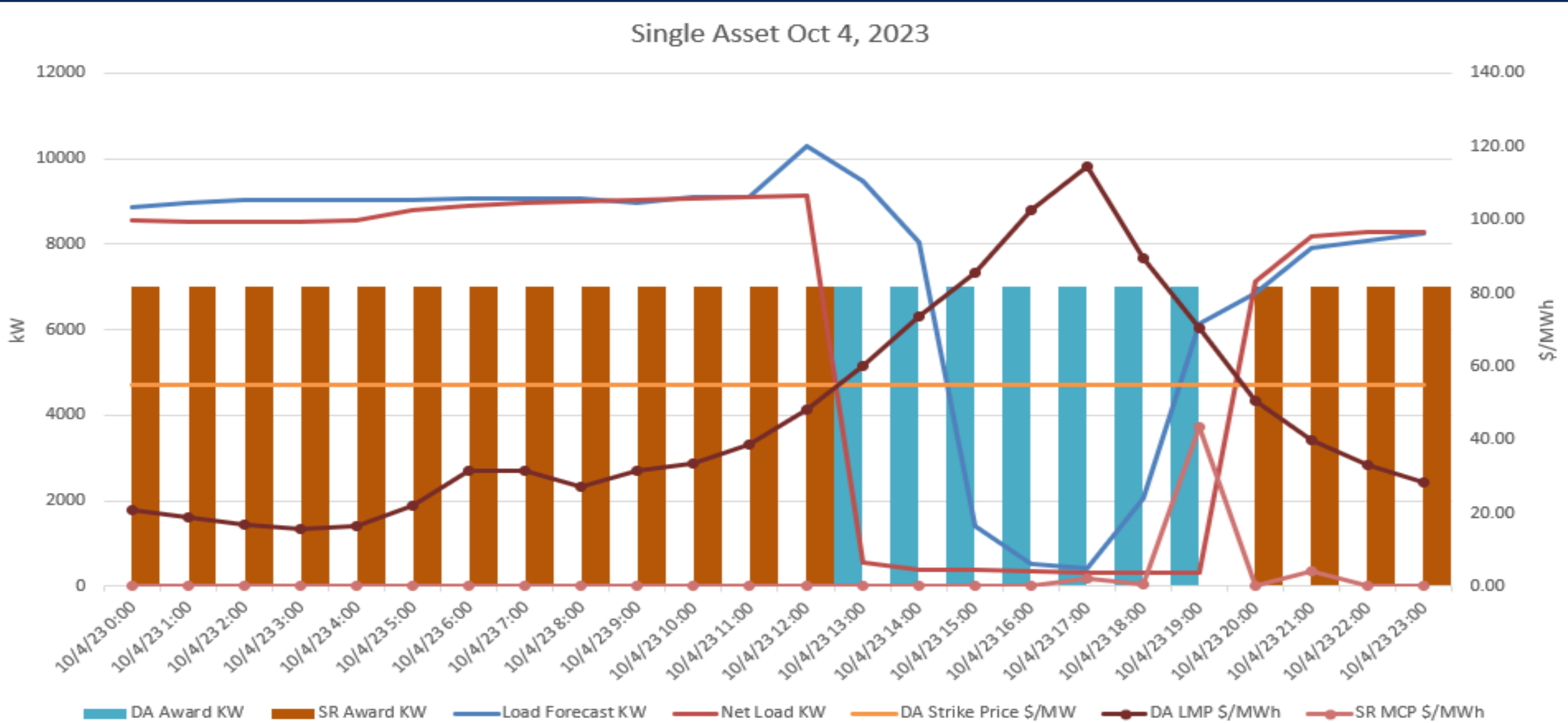
# EnerWise Example October 2023 - PJM

- Unexpected energy and reserves price spikes first week of October
- EnerWise sites were poised to capture the unexpected price spikes
- Leveraging price forecasting as well as knowledge of the market mechanics, CPower was able to seamlessly pivot the site between DA Economic and RT Reserves, even in a “shoulder month”





# EnerWise Example Daily - PJM

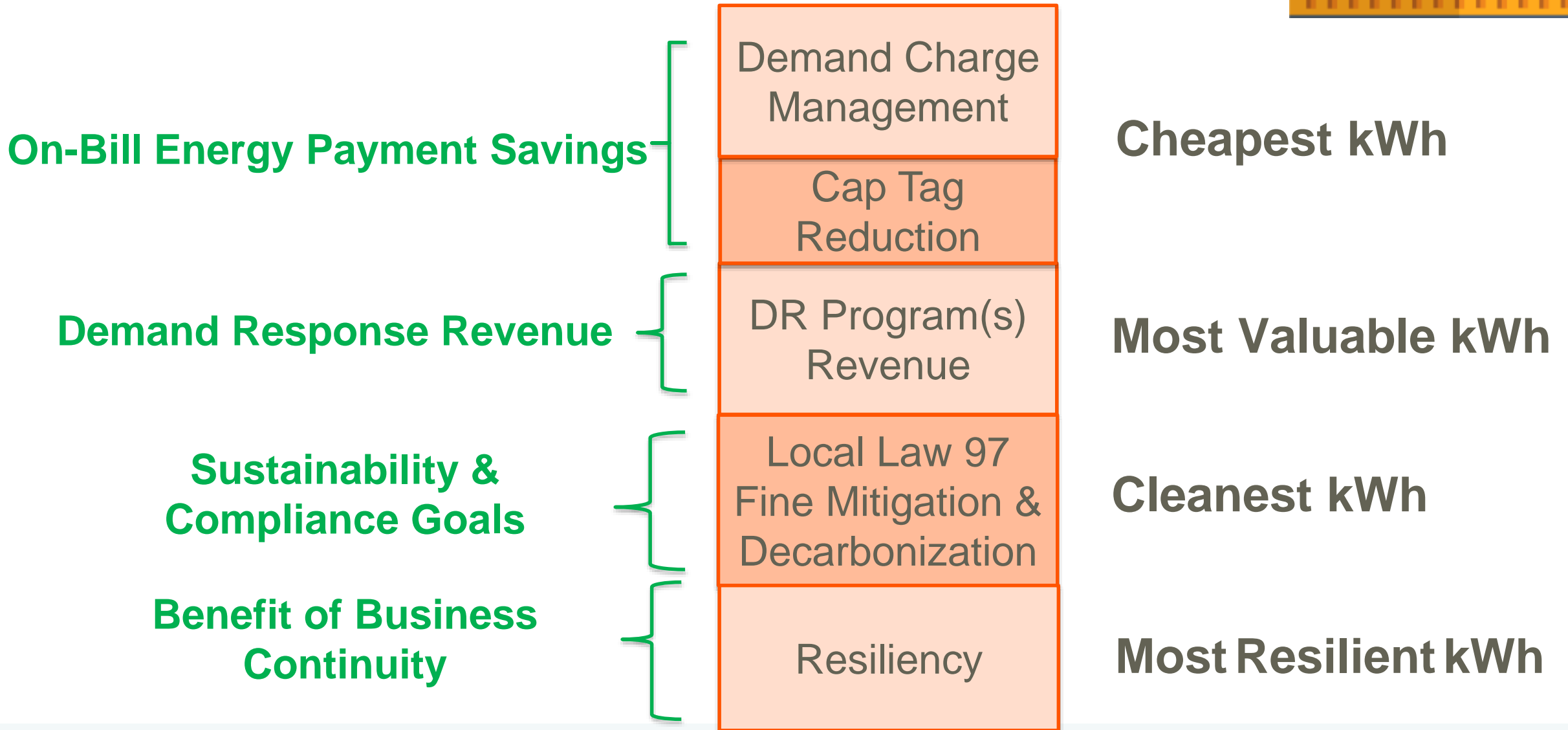


# Time of Use Decarbonization – 14 MW

**Marginal Carbon Reduction Table**

Location	Market	Date and Time of Reduction	Avolded Marginal Carbon Reduction (Metric CO2 tons)
1001 E Delavan Ave, Buffalo NY 14215	NYISO	8/22/2019 (2:00 PM – 3:00 PM)	8.9
<b>2019 Totals</b>		<b>Hours: 1</b>	<b>8.9</b>
1001 E Delavan Ave, Buffalo NY 14215	NYISO	7/8/2020 (4:00 PM – 8:00 PM)	17.4
1001 E Delavan Ave, Buffalo NY 14215	NYISO	7/9/2020 (4:00 PM – 8:00 PM)	17.3
1001 E Delavan Ave, Buffalo NY 14215	NYISO	7/10/2020 (4:00 PM – 8:00 PM)	17.2
1001 E Delavan Ave, Buffalo NY 14215	NYISO	7/20/2020 (4:00 PM – 8:00 PM)	17.4
1001 E Delavan Ave, Buffalo NY 14215	NYISO	7/27/2020 (4:00 PM – 8:00 PM)	15.7
<b>2020 Totals</b>		<b>Hours: 20</b>	<b>84.9</b>
1001 E Delavan Ave, Buffalo NY 14215	NYISO	6/28/2021 (3:00 PM – 7:00 PM)	27.3
1001 E Delavan Ave, Buffalo NY 14215	NYISO	6/29/2021 (3:00 PM – 7:00 PM)	27.5
<b>2021 Totals (YTD)</b>		<b>Hours: 8</b>	<b>54.8</b>
<b>Total (All Periods)</b>		<b>Total Hours: 29</b>	<b>148.7</b>

# GIEB & Virtual Power Plant Value Stack



# Thank You, Questions & Contact Information

Andy Anderson

EVP, Energy and Sustainability Solutions

Watchwire by Tango

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908-720-1925

Evan Fitzgerald

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