

# **BUILDINGENERGY BOSTON**

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## **Aggressive Continuous Commissioning: A Decade of Energy and Carbon Reduction at Liberty Mutual Tower**

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**Jess Farber, CMTA**

**Terri Laurence, CMTA**

*Curated by Mark Schow and Charlie Simek*

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**Northeast Sustainable Energy Association (NESEA) | March 20, 2025**



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Sr. Facility Manager



**Terri Laurence**  
Sr. Mechanical Engineer



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Vice President



# Learning Objectives

- Identify the benefits of optimizing current building systems through aggressive continuous commissioning to achieve greater efficiency and sustainability.
- Apply best practices on how to effectively inform and educate building facility staff on best practices for energy efficiency and carbon reduction.
- Explore approaches to enhance building controls strategies to improve system operation, occupant comfort and efficiency.
- Employ practical strategies for meeting BERDO regulations related to energy and greenhouse gas emissions reductions.



# Agenda

**01**

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Basic facts

**03**

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Where do  
we go from  
here?

**02**

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What did  
we do?

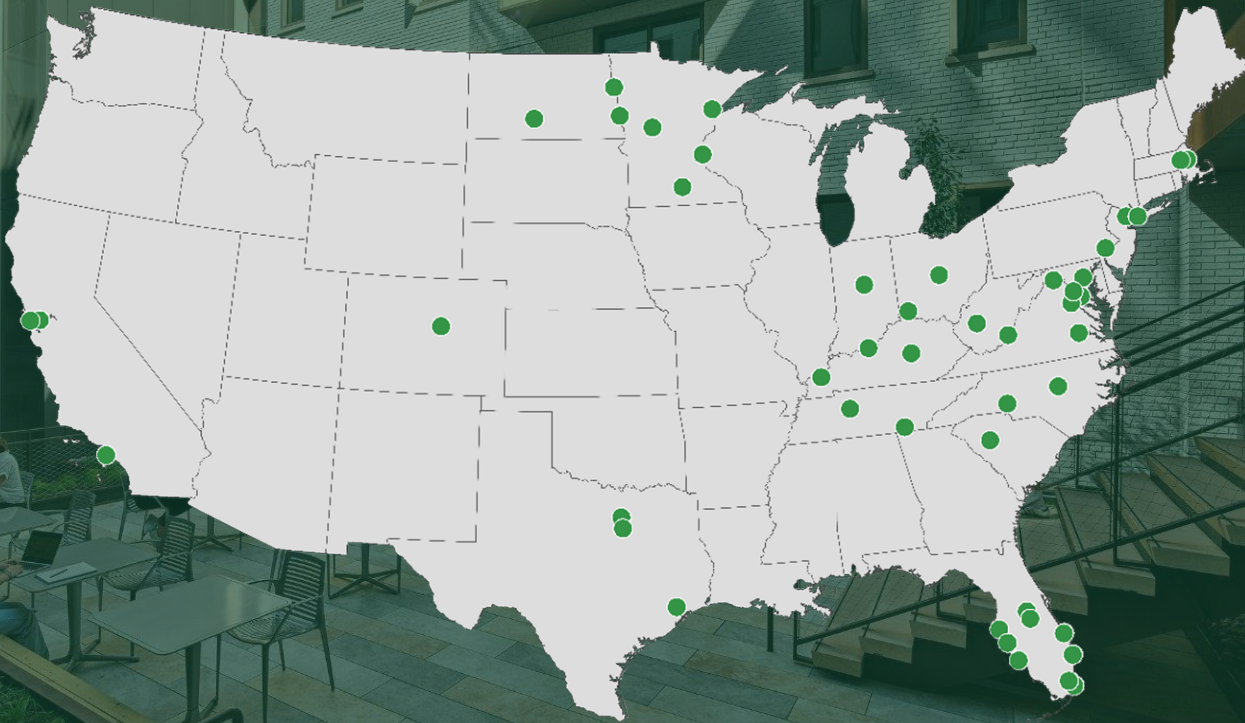
**04**

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Q&A



# By the Numbers



**1290**

Employees

**50**

Offices Nationwide

**260**

Professional Engineers

**56**

Years of Service

# CMTA's Expertise

MEP Engineering

Zero Energy / Carbon Engineering

Renewable Energy & Sustainability

Energy Modeling

Commissioning

Technology / Security Infrastructure Design

Construction Administration

Performance Contracting

Energy as a Service (EaaS)

Inflation Reduction Act







## **Founded in 1912**

Originally founded to provide workers compensation insurance in July 1912. Grown to over 30 countries across the globe.

## **Boston Roots**

Liberty's home office was built in 1937, in Boston.

## **Leadership**

Liberty Mutual Boston has surpassed BERDO requirements and is a leading example in the Boston market for commercial real estate decarbonization.



# 157 Berkeley Street Liberty Mutual Tower



**22**  
stories

**757,000**  
ft<sup>2</sup>

**LEED**  
**Gold**

**Open**  
**2013**

**2,900**  
occupants

Continuous  
**CX**





# Global Recognition for Consumption Reduction

1<sup>ST</sup>

2024 ASHRAE  
TECHNOLOGY  
AWARDS  
CASE STUDY

## Drastic Energy and Carbon Reductions in Office Headquarters

By Terri Laurence, P.E.

Terri Laurence, P.E., is a principal and mechanical engineer at CMTA in Boston

The 157 Berkeley Street Liberty Mutual Tower, located in Boston's Back Bay neighborhood, is one of two major building complexes comprising the Liberty Mutual Home Office campus. Construction on the 157 Berkeley Street Tower project commenced in 2010 and was completed in 2013, with full occupancy in 2014. The 22-story tower is 757,000 ft<sup>2</sup> (70,327 m<sup>2</sup>), is designed for 2,900 occupants and has four subgrade levels. Office floors are configured with large, open collaboration spaces and multiple conference rooms that can be configured with foldable partitions. The project included a complete renovation of 330 Stuart Street (the 1917 Salada Tea Building), an adjacent 10-story 130,000 ft<sup>2</sup> (12,077 m<sup>2</sup>) building. The 330 Stuart building's existing façade was structurally connected to 157 Berkeley, making it a single building and integrating the historic structure with the new construction.



# Liberty Mutual's Commitment to Sustainability



## Improve Energy Efficiency

Optimize existing systems to ensure that equipment is operating in the most efficient way.



## Prioritize occupant comfort

Improve indoor air quality to enhance occupant health and wellness. Occupant calls to the facilities team has decreased by 96%.



## Reduce GHG emissions

Maintain energy efficient operation and test new EMS strategies. Liberty Mutual has committed to a 50% reduction of Scope 1 and 2 GHG emissions from 2019 levels by 2030.



## Reduce utility costs

Plan operational tweaks and retrofits well before equipment end-of-life.

# LEED Gold

## LEED 2009 New Construction

Attempted: 61, Denied: 2, Pending: 0, Awarded: 60 of 110 points

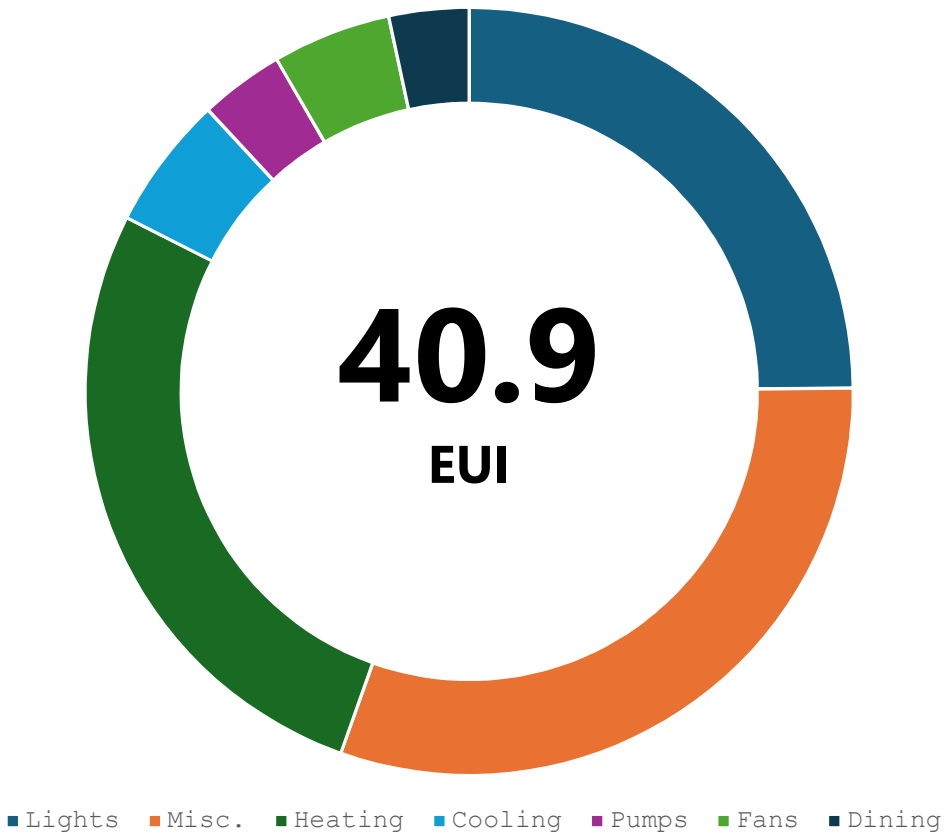
SUSTAINABLE SITES		23 OF 26
SSp1	Construction Activity Pollution Prevention	Y
SSc1	Site Selection	1/1
SSc2	Development Density and Community Connectivity	5/5
SSc3	Brownfield Redevelopment	1/1
SSc4.1	Alternative Transportation-Public Transportation Access	6/6
SSc4.2	Alternative Transportation-Bicycle Storage and Changing Rooms	1/1
SSc4.3	Alternative Transportation-Low-Emitting and Fuel-Efficient Vehicles	3/3
SSc4.4	Alternative Transportation-Parking Capacity	2/2
SSc5.1	Site Development-Protect or Restore Habitat	0/1
SSc5.2	Site Development-Maximize Open Space	0/1
SSc6.1	Stormwater Design-Quantity Control	1/1
SSc6.2	Stormwater Design-Quality Control	1/1
SSc7.1	Heat Island Effect-Non-Roof	1/1
SSc7.2	Heat Island Effect, Roof	1/1
SSc8	Light Pollution Reduction	0/1
WATER EFFICIENCY		3 OF 10
WEp1	Water Use Reduction, 20% Reduction	Y
WEc1	Water Efficient Landscaping	0/4
WEc2	Innovative Wastewater Technologies	0/2
WEc3	Water Use Reduction	3/4
ENERGY AND ATMOSPHERE		10 OF 35
EAp1	Fundamental Commissioning of the Building Energy Systems	Y
EAp2	Minimum Energy Performance	Y
EAp3	Fundamental Refrigerant Mgmt	Y
EAc1	Optimize Energy Performance	3/19
EAc2	On-Site Renewable Energy	0/7
EAc3	Enhanced Commissioning	2/2
EAc4	Enhanced Refrigerant Mgmt	2/2
EAc5	Measurement and Verification	1/3
EAc6	Green Power	2/2
MATERIALS AND RESOURCES		5 OF 14
MRp1	Storage and Collection of Recyclables	Y
MRc1.1	Building Reuse-Maintain Existing Walls, Floors and Roof	0/3
MRc1.2	Building Reuse - Maintain 50% of Interior Non-Structural Elements	0/1
MRc2	Construction Waste Mgmt	2/2
MRc3	Materials Reuse	0/2
MRc4	Recycled Content	2/2
MRc5	Regional Materials	1/2
MRc6	Rapidly Renewable Materials	0/1
MRc7	Certified Wood	0/1
INDOOR ENVIRONMENTAL QUALITY		9 OF 15
IEQp1	Minimum IAQ Performance	Y
IEQp2	Environmental Tobacco Smoke (ETS) Control	Y
IEQc1	Outdoor Air Delivery Monitoring	0/1
IEQc2	Increased Ventilation	1/1
IEQc3.1	Construction IAQ Mgmt Plan-During Construction	1/1
IEQc3.2	Construction IAQ Mgmt Plan-Before Occupancy	1/1
IEQc4.1	Low-Emitting Materials-Adhesives and Sealants	1/1
IEQc4.2	Low-Emitting Materials-Paints and Coatings	1/1
IEQc4.3	Low-Emitting Materials-Flooring Systems	1/1
IEQc4.4	Low-Emitting Materials-Composite Wood and Agrifiber Products	0/1
IEQc5	Indoor Chemical and Pollutant Source Control	0/1
IEQc6.1	Controllability of Systems-Lighting	1/1
IEQc6.2	Controllability of Systems-Thermal Comfort	0/1
IEQc7.1	Thermal Comfort-Design	1/1
IEQc7.2	Thermal Comfort-Verification	1/1
IEQc8.1	Daylight and Views-Daylight	0/1
IEQc8.2	Daylight and Views-Views	0/1
INNOVATION IN DESIGN		6 OF 6
IDc1.1	Pilot Credit 14 Walkable Streets	1/1
IDc1.1	Innovation in Design	0/1
IDc1.2	SSc4.1 Alternate Transportation EP	1/1
IDc1.2	Innovation in Design	0/1
IDc1.3	SSc6.1 Stormwater Design Quantity Control EP	1/1
IDc1.3	Innovation in Design	0/1
IDc1.4	Innovation in Design	0/1
IDc1.4	SSc7.1 Heat Island Effect EP	1/1
IDc1.5	Pilot Credit 12 Reduced Automobile Dependence	1/1
IDc1.5	Innovation in Design	0/1
IDc2	LEED® Accredited Professional	1/1
REGIONAL PRIORITY CREDITS		4 OF 4
SSc3	Brownfield Redevelopment	1/1
SSc6.1	Stormwater Design-Quantity Control	1/1
SSc7.1	Heat Island Effect-Non-Roof	1/1
SSc7.2	Heat Island Effect, Roof	1/1
TOTAL		60 OF 110



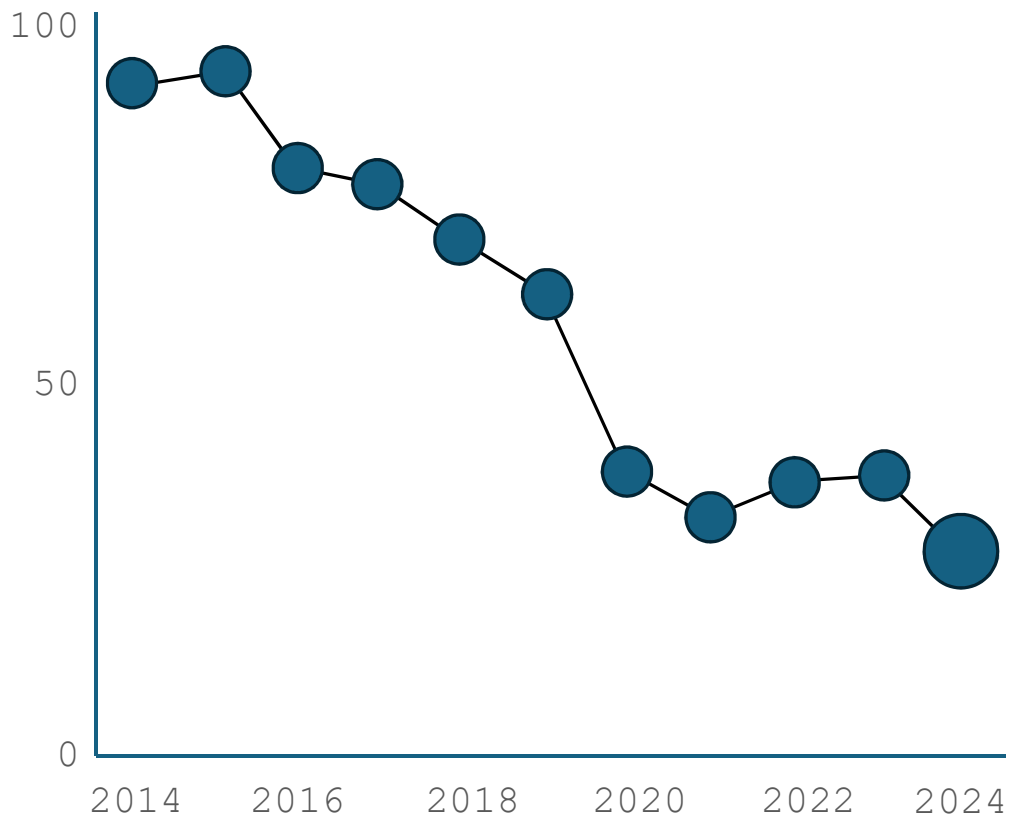


# LEED Model vs. Energy Performance

Baseline Model



Site EUI Trend



# Root Cause & Effect

2014

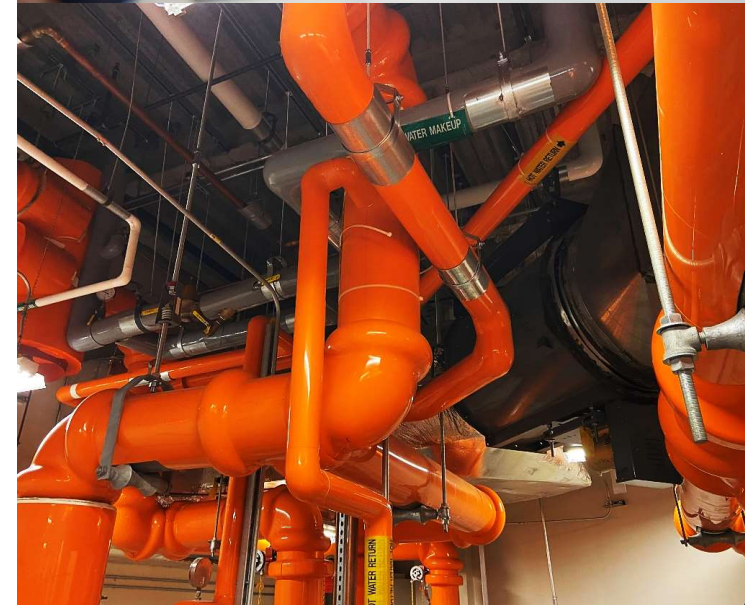
- LEED Comfort Survey identified comfort complaints
- Developed root cause analysis from Year 1 findings

2015

- Began RCx energy conservation journey
- Created ATC strategies to correct operating problems and improve efficiency
- Various equipment life cycle replacements

2016  
– 2024

- ECMs for terminal boxes and AHUs
- ECMs for central plant and ventilation
- Customized BAS



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# Trends are Your Friends

Problem	Finding	Solution
Hot Complaints	Greenhouse Effect	Increase RA Grille Size
Cold Complaints	Water Stagnation/Air Bound TBs	Flush HW Loops, HW Valve Cycling Program
Draft Complaints	High CFM & Low AHU Supply Temp	Reduce CFM, AHU SA Temp Reset Program
Conference Center Complaints	2 TBs Serving Conference Rooms	Parallel Thermostats, Control Outputs, Add FSCs



# Experimental Tweaks



Location: 10TH FLOOR

EXP-1  
LEVEL 10 MECHANICAL ROOM

Level 10 Controls:

- EXP1 SS: NONE OFF
- FAN PROOF: OFF
- GAR.EXP1.SPO: 0.00 %
- GAR.EXP1.AMP: -0.29 AMPS
- VFD ALARM: NONE OFF
- OA.DIFF.PRESS: -0.012 IN WC
- OA HUMIDITY: 37.64 %

Level	Temp (DEG F)	Humidity (%)	CO	CO	CO	CO
LEVEL 2 SUPPLY OUTSIDE AIR LOUVERS						
LOWER LEVEL REFER TO PLAN H1B1			0.00	0.00	0.00	2.00
PARKING LEVEL 1 REFER TO PLAN H1B2	77.36 DEG F 47.68 % RH		CO	CO	CO	CO
PARKING LEVEL 2 REFER TO PLAN H1B3	75.42 DEG F 43.38 % RH		2.00	1.00	2.00	
PARKING LEVEL 3 REFER TO PLAN H1B4	72.90 DEG F 45.03 % RH		0.00	0.00	0.00	

SHAFT 17

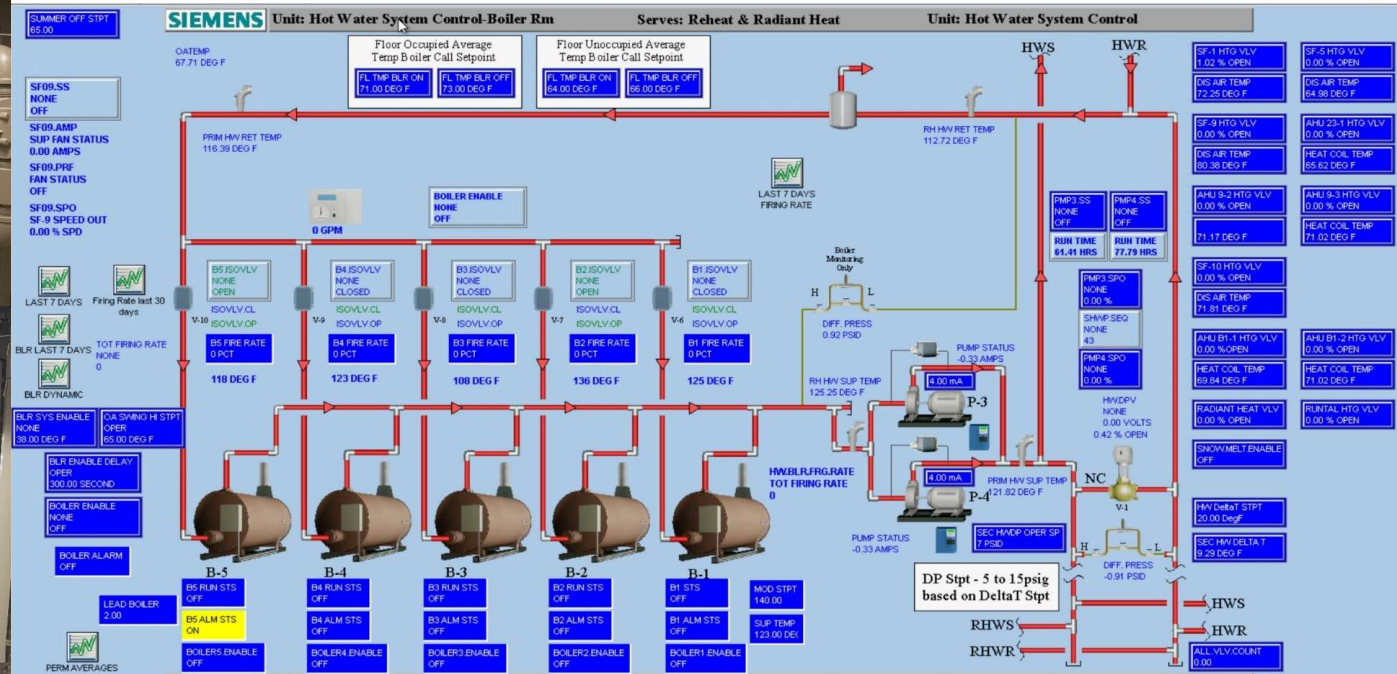
OA AIR

Right Side Controls:

- SUMP HIGH ALARM: OFF
- P1 SUP FAN 2B: OFF
- 0.01 AMPS
- PRF: OFF
- P2 SUP FAN 3B: OFF
- 0.05 AMPS
- PRF: OFF
- P3 SUP FAN 4B: OFF
- 0.04 AMPS
- PRF: OFF

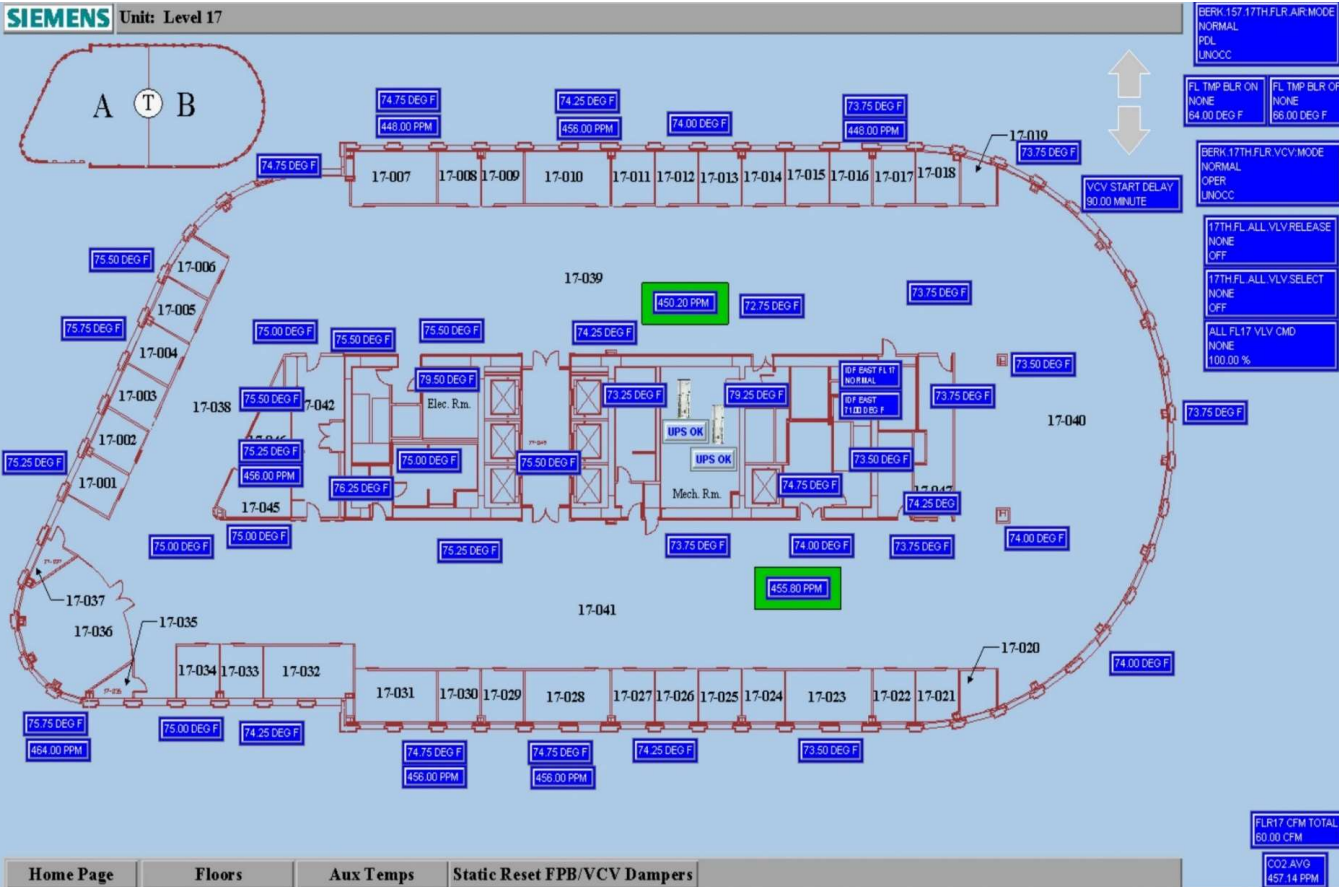


# Mission to Eliminate Summer Reheat





# Occupancy Optimization

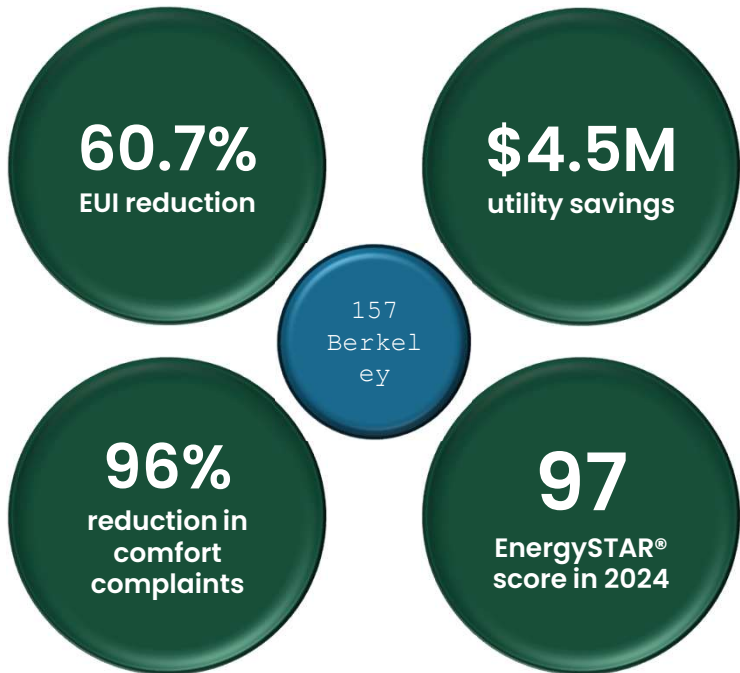


# Outside the Box

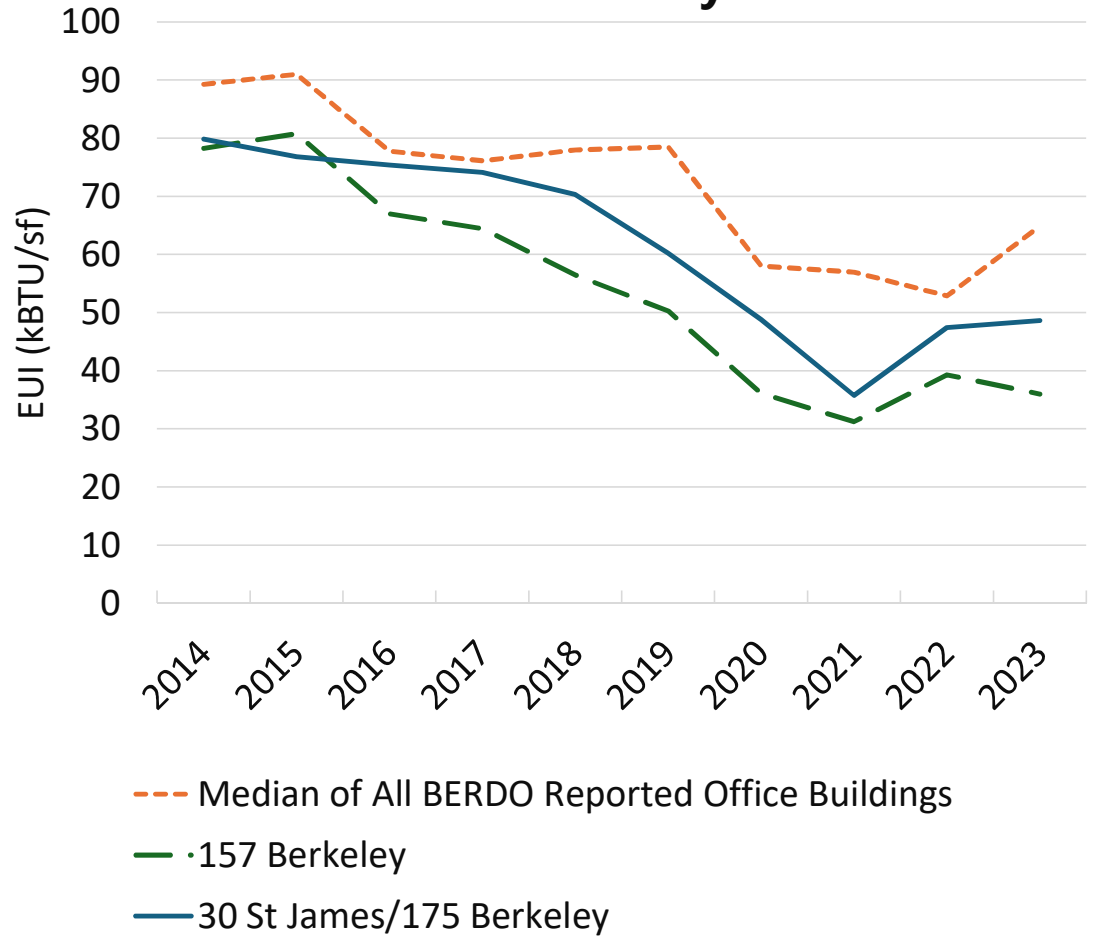
Condensate  
Recovery:  
The "YETI"



# Savings & Results



## EUI Reduction: Liberty Mutual Site





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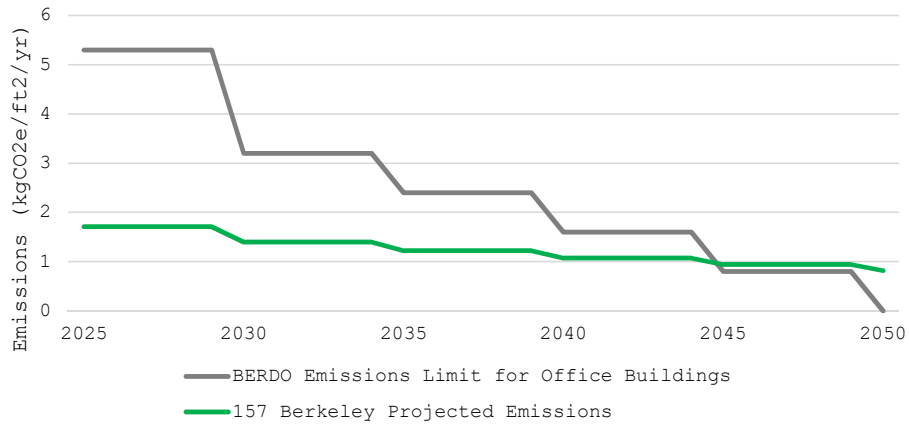
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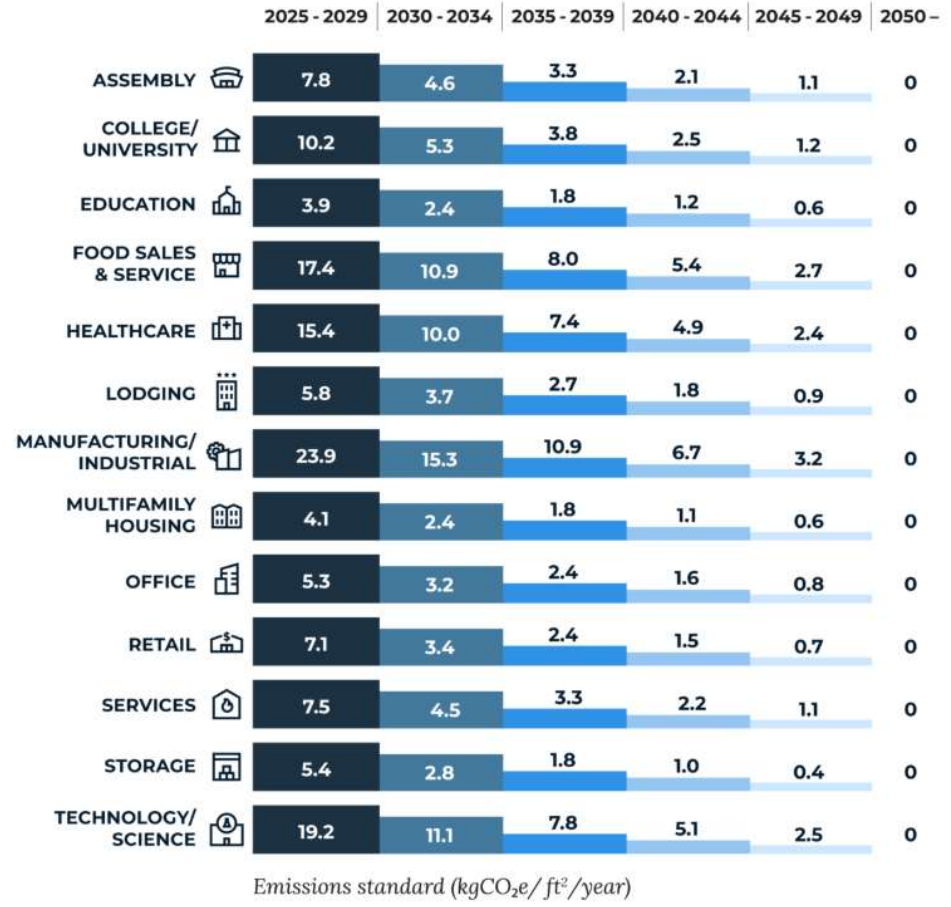
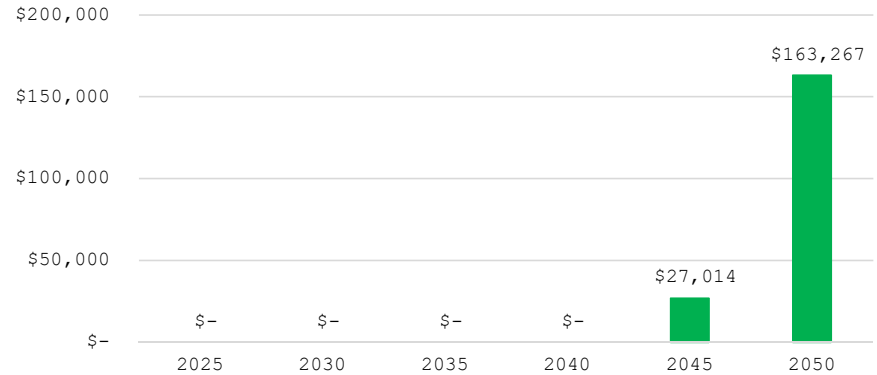
Q&A

# BERDO 2.0 Implications

BERDO Emission Limits and Reduction Projection

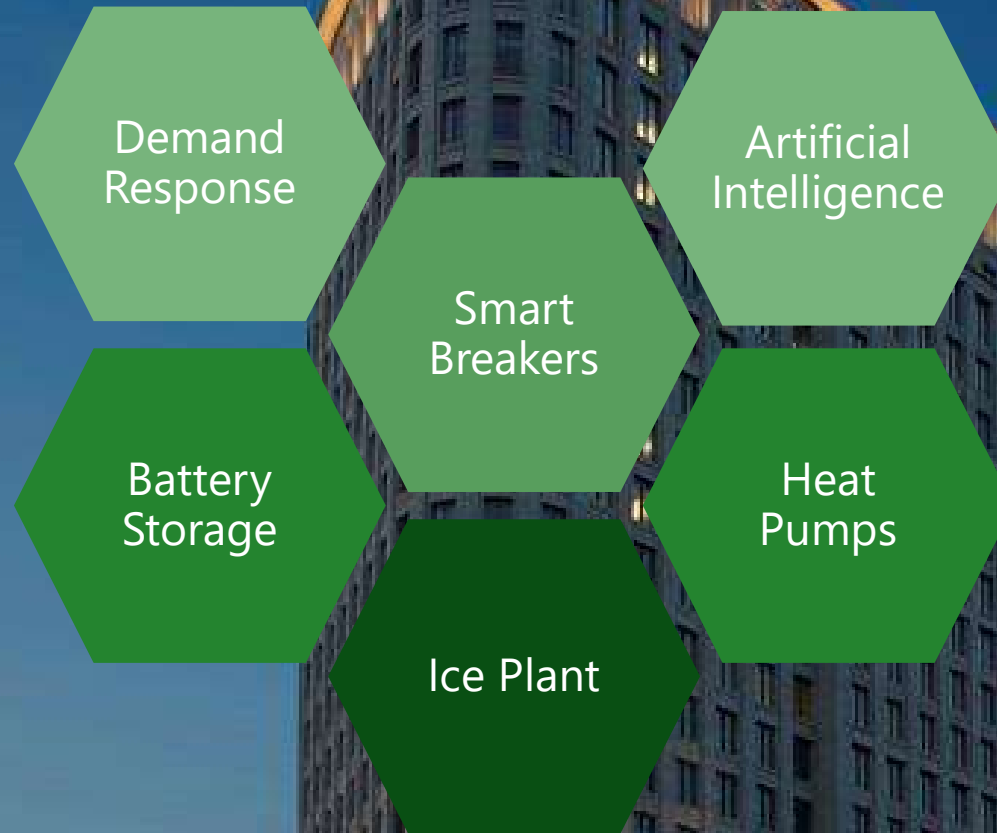


Potential Compliance Payment without Additional Reduction



Emissions standard (kgCO<sub>2</sub>e/ ft<sup>2</sup>/year)

# Future Opportunities for Continued Savings & Efficiency





# Q+A

## Thank You!



Liberty  
Mutual.  
INSURANCE



CMTA  
A LEGENCE Company