

Take the Heat!

Part 2:

Building Core & Perimeter

In this 2-part series focused on building decarbonization, NYSERDA and BE-Ex have gathered industry experts that will feature projects deploying breakthrough heating & cooling recovery solutions across the commercial and multifamily buildings sector.

presentations by

Christopher Colasanti, Associate Partner, JB&B Deep Carbon Reduction Group

David Noyes, Project Executive, Brookfield Properties

Jonathan Da Silva Johrden, Building Systems Director, Steven Winter Associates, Inc.

moderator

Mike Richter, President, Brightcore Energy

speakers

Karen Oh, Vice President, Energy Innovation and Strategy, Vornado Realty Trust

Christopher Colasanti, Associate Partner, JB&B Deep Carbon Reduction Group

David Noyes, Project Executive, Brookfield Properties

Jonathan Da Silva Johrden, Building Systems Director, Steven Winter Associates, Inc.

be
ex

building
energy
exchange

31 Chambers Street
New York, NY

February 8, 2024
9:30 to 11 am

1.5 AIA
LU

PENN ONE BUILDING SUMMARY

- 2.5 million square feet
- Iconic midcentury commercial office (incl. retail and amenities)
- Fifty-seven (57)-story skyscraper
- 750 feet high with three setbacks
- Penn District neighborhood (Midtown Manhattan)
- 6 MW cogeneration plant
- Recent Lobby renovation & window replacement
- Pillar of Vornado's *Vision 2030*
- Anticipated to face LL97 penalties in 2030

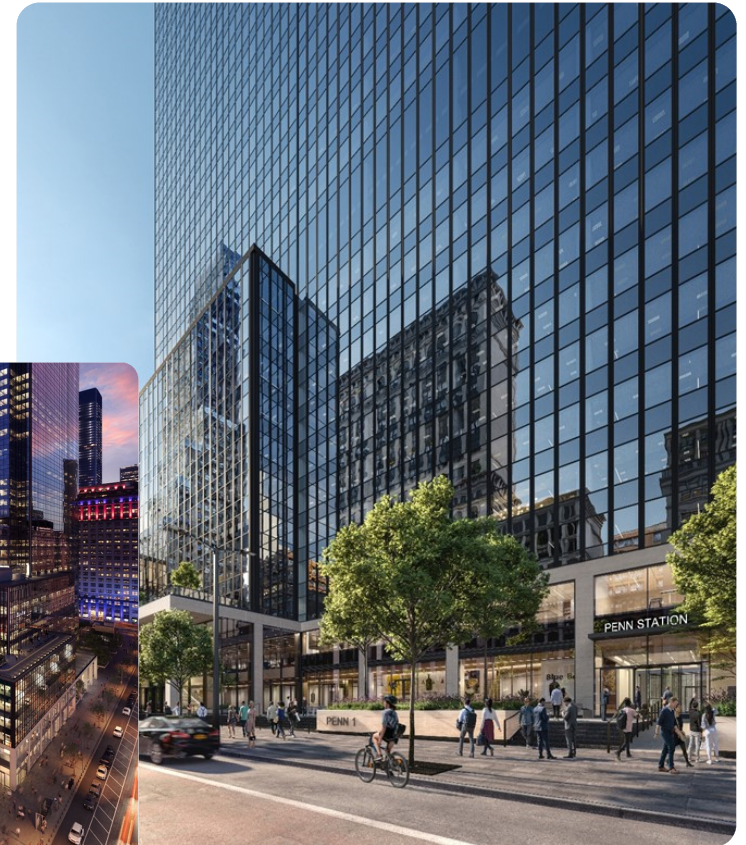
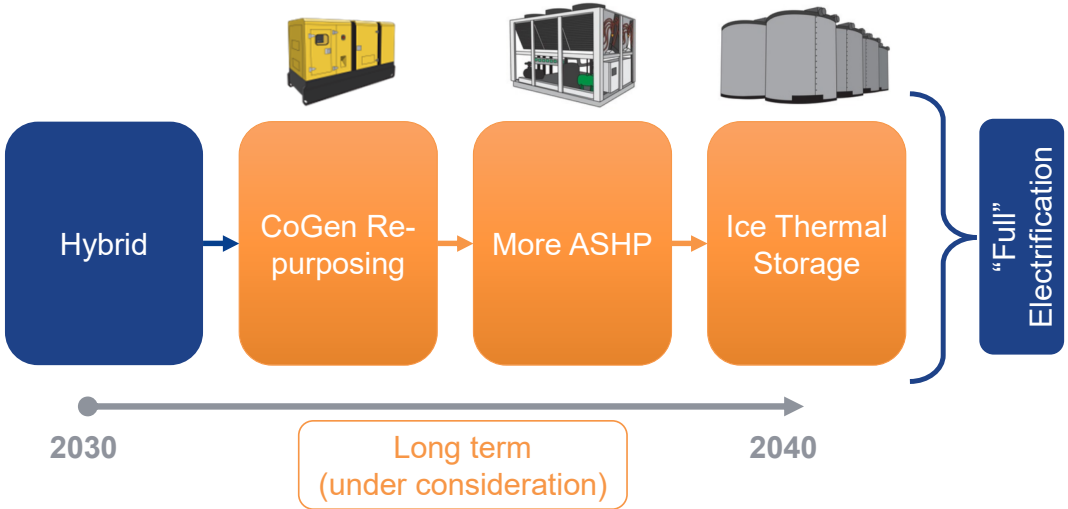
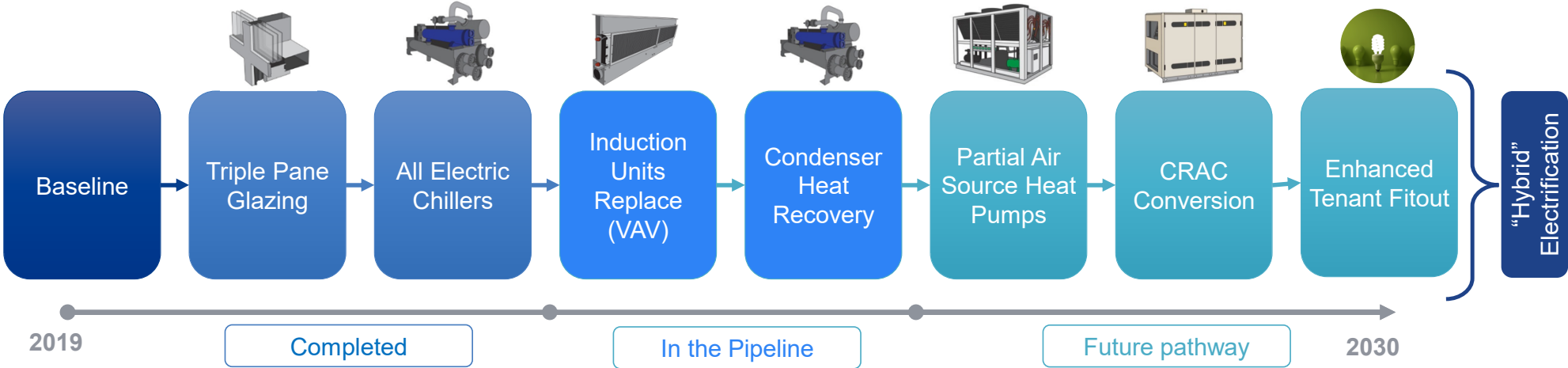
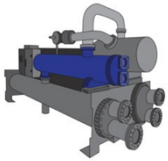


Photo Credit: Courtesy of Vornado Realty Trust

DECARBONIZATION ROADMAP



CONDENSER WATER HEAT RECOVERY

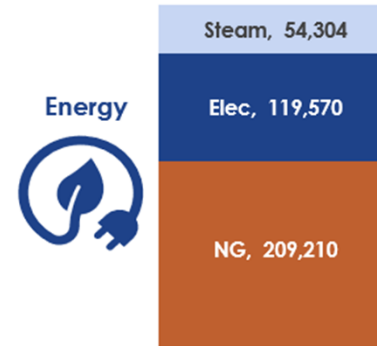


Condenser Heat Recovery

“This strategy is a cornerstone project, which is a **subset** of **Hybrid Electrification**, that is a foundational first-step to prepare for **Cogen plant decommissioning**. It’s a **key enabler** of deeper decarbonization projects such as heat pumps and thermal storage in the future.”

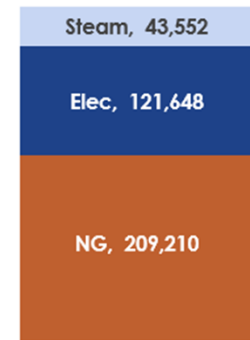
Business As Usual (2021)

383,084 MMBtu Total



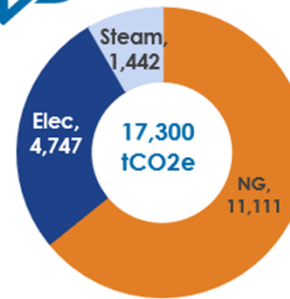
CWHR

374,410 MMBtu Total
-2.3%



167 kBtu/SF

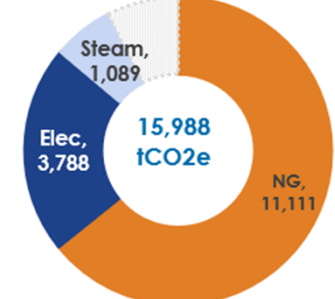
2022



163 kBtu/SF

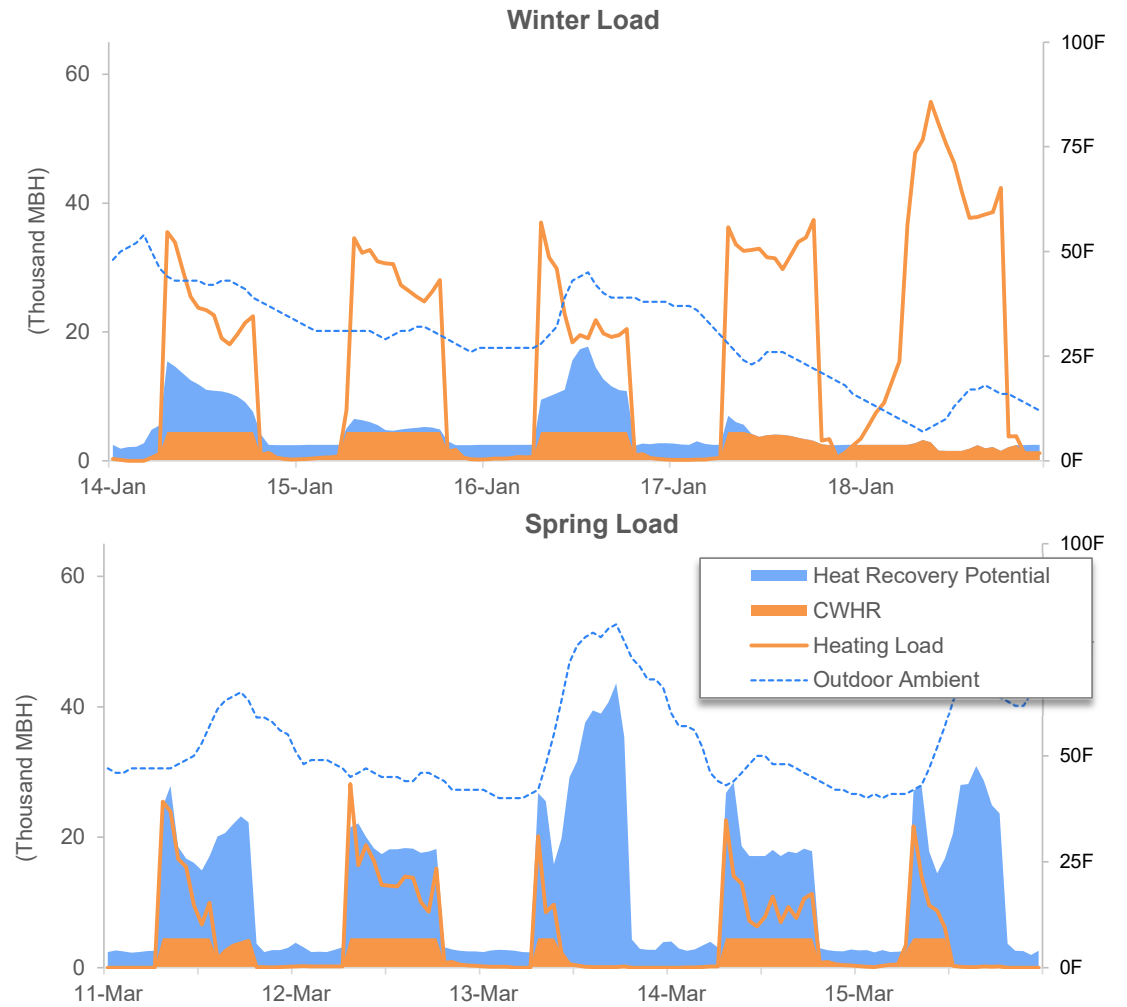
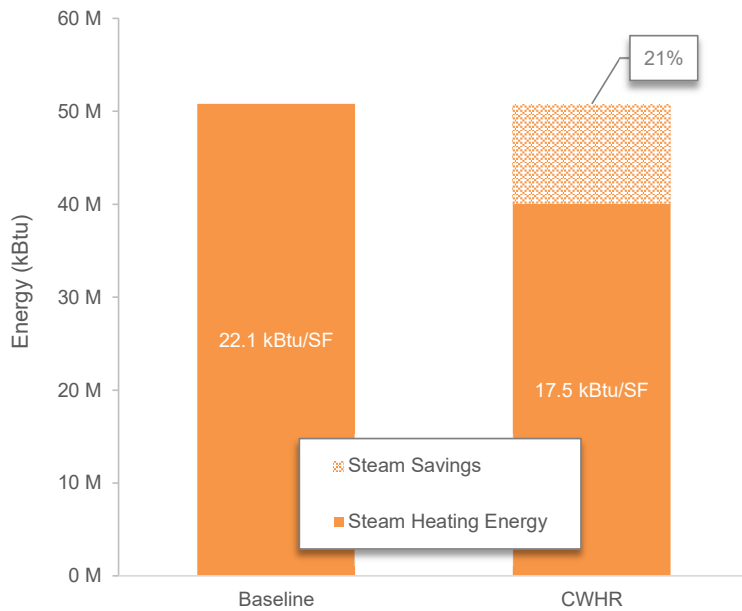
2027

Carbon Reduced, 8%

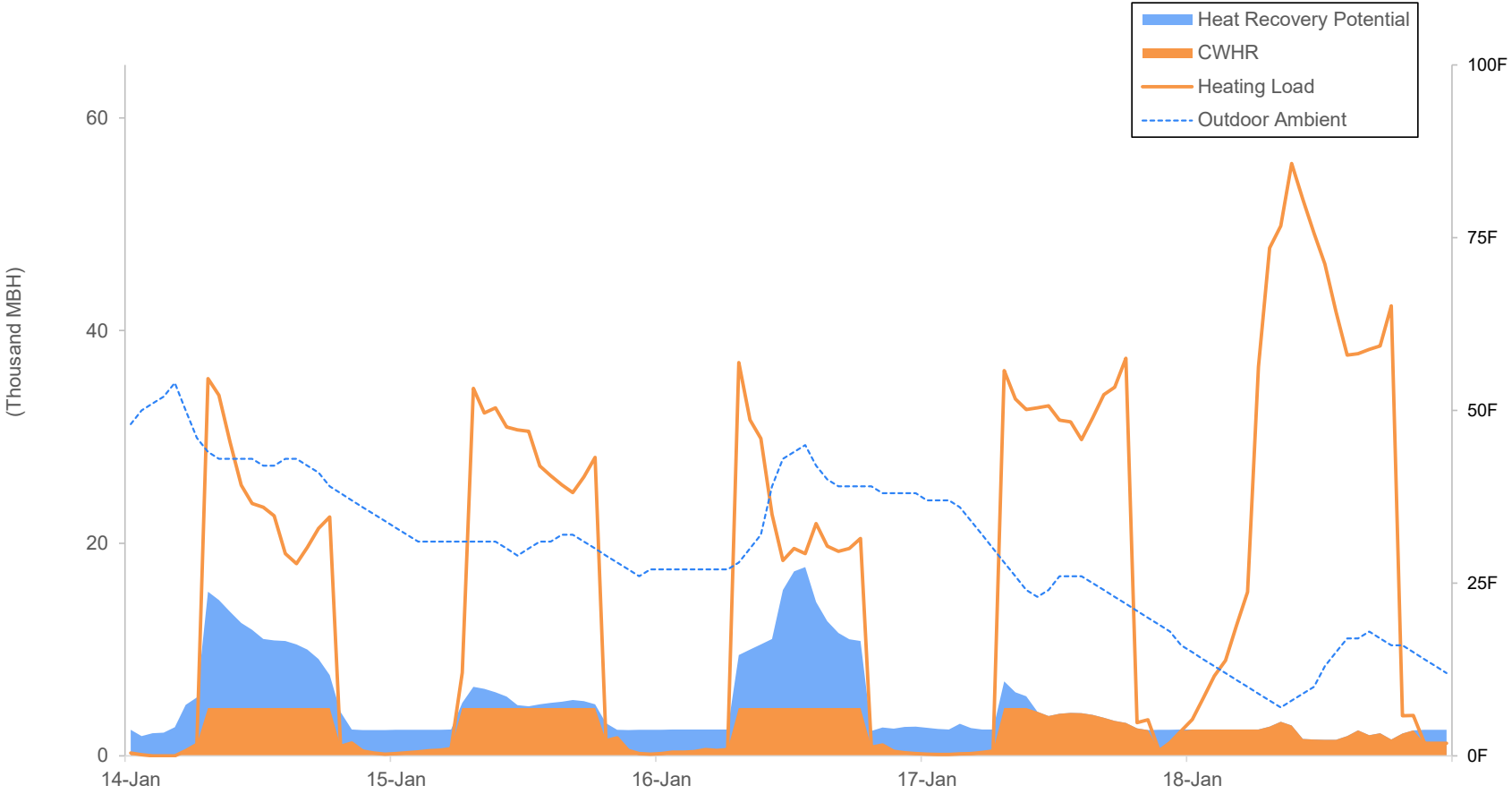


LOAD PROFILES DETERMINE BENEFIT

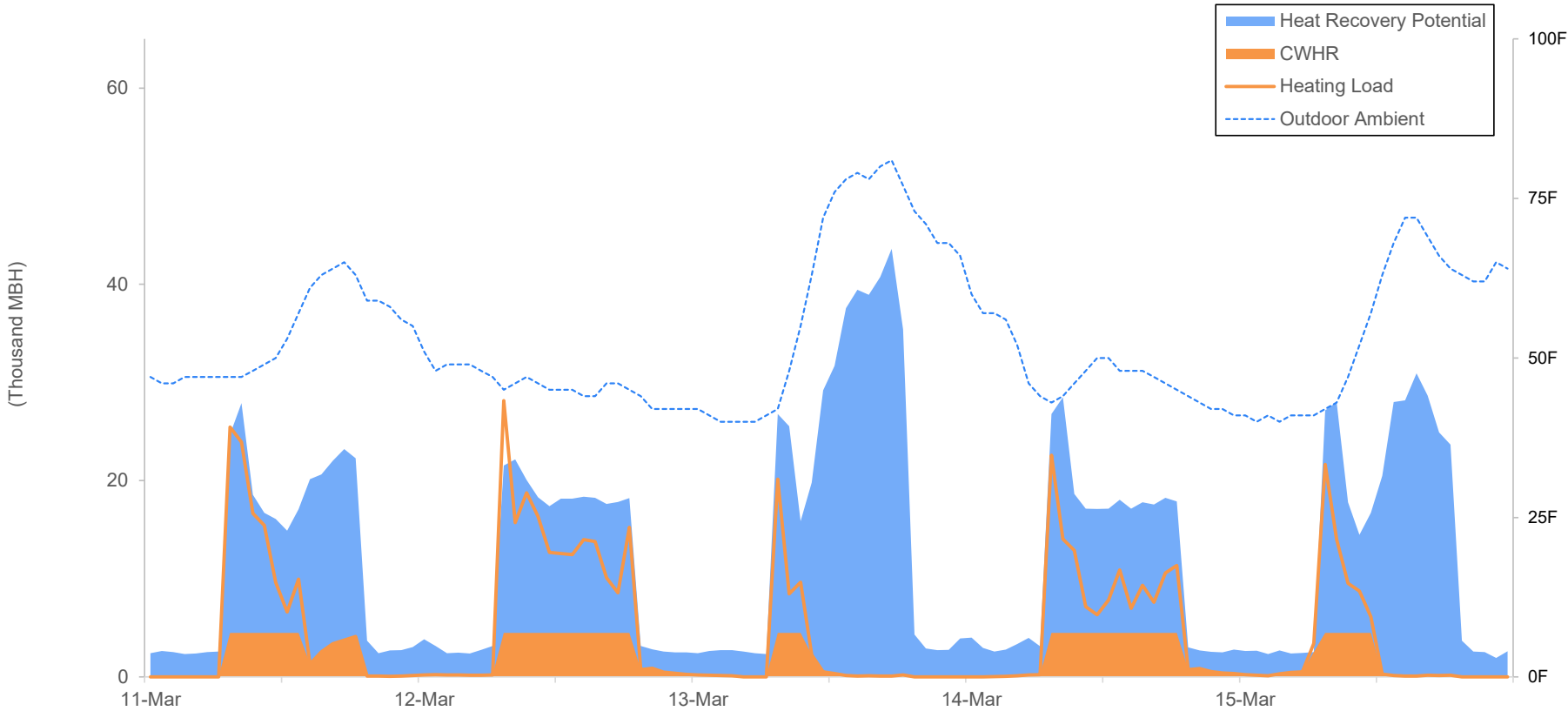
- Steam heating reduced by **21%**
- Additional heat pumps can increase to **40%+**



WINTER WEEK LOAD PROFILE



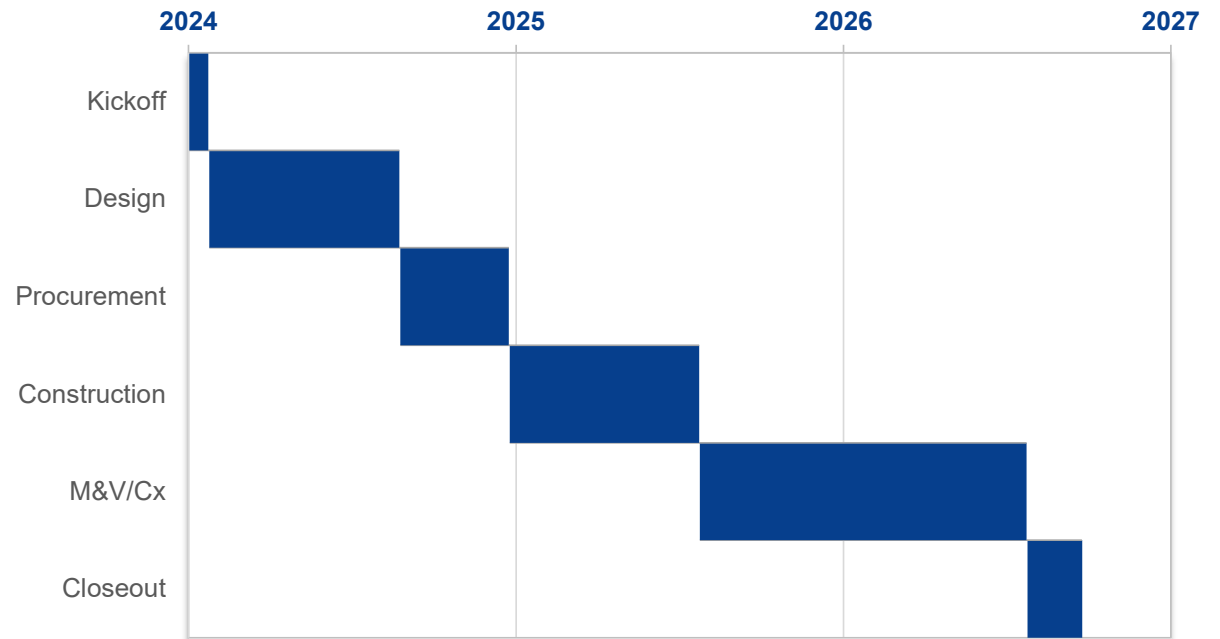
SPRING WEEK LOAD PROFILE



THE PROJECT

- Estimated total project cost **\$4 million**
 - Estimated **\$100K** energy cost savings
- NYSERDA award of **\$1 million**
- Project completion mid 2026

Schedule



660 Fifth Avenue

Empire Building Challenge Project Highlights

David Noyes

Vice President, Strategic Projects

February 8, 2024





7000+

properties around the world



637+

million square feet of commercial space



65+

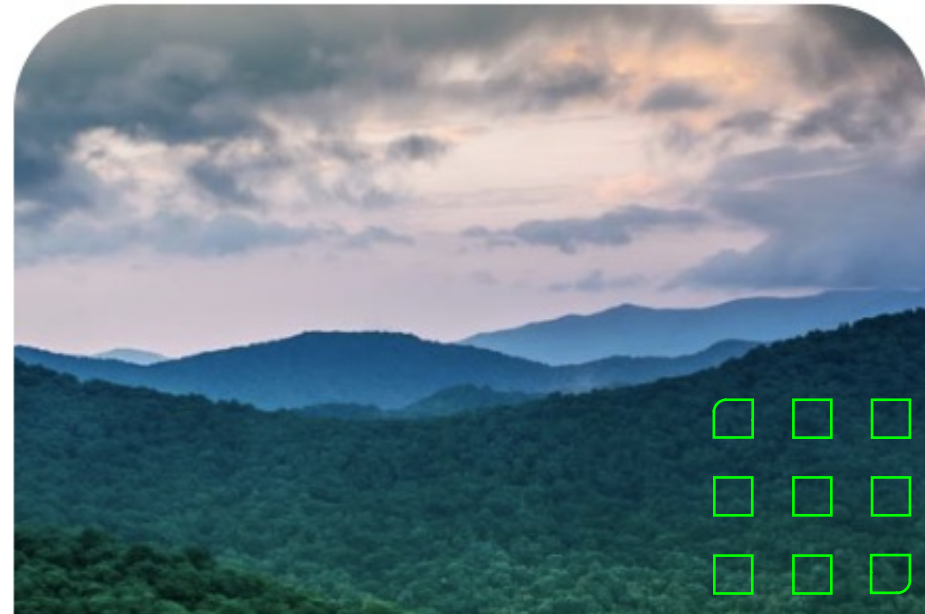
million square feet of development

Brookfield's Net Zero Carbon Emissions Commitment

- Achieve net zero greenhouse gas emissions by 2050 or sooner
- Focus on reducing emissions in the companies we invest in and use long-term solutions to remove carbon if needed
- Set an interim target for the proportion of assets to be managed in line with the attainment of net zero emissions by 2050 or sooner, ramping up to include all assets, and review our interim target every five years
- Account for portfolio scope 1 and 2 emissions and, to the extent possible, material scope 3 emissions

The Net Zero Asset Managers initiative

More than 315 signatories with USD 57 trillion in AUM



Brookfield Properties Real Estate Net-Zero Strategy

1

PROCURE CLEAN ENERGY

We leverage both onsite and offsite clean energy through solar installations and power purchase agreements, decarbonizing both our business operations and the local electricity grid



INVEST IN ASSET-LEVEL IMPROVEMENTS

We invest in asset-level improvements to reduce our demand for energy, avoiding significant GHG emissions

2

ACQUIRE HIGH-QUALITY CARBON OFFSETS AND REMOVALS

We plan to procure high-quality carbon offsets and removals to eliminate remaining emissions once all other economically feasible measures have been exhausted

3

660 Fifth Ave

New York, New York

42-story commercial office building located in Midtown Manhattan that is currently undergoing a full redevelopment to modernize the building.

Brookfield Properties is leveraging the \$400M+ redevelopment of this property to integrate decarbonization solutions that will upgrade its internal systems, reducing its reliance on fossil fuels and positioning it for full decarbonization by 2035.

The decarbonization plan for this property utilizes a variety of solutions that will cut energy use, recycle heat that would otherwise be wasted, and electrify existing building systems.

As part of the overall carbon neutrality roadmap, the Empire Building Challenge is funding measures including lower distribution temperatures, thermal network expansion, and waterside heat recovery.



Property highlights

- 42-story, trophy class office
- 1.25 million sq. ft.
- 42,000 sq. ft. exclusive terraces
- 11' x 9' single-pane glass - largest in NYC redevelopment history



Sustainability + Recognition

- LEED Gold v4 BD+C C+S certified
- 60% EUI reduction
- 40% water use reduction
- 75% construction waste recycled
- 100% renewable electricity

Energy Load Reduction:

Brookfield is incorporating several measures to immediately reduce the building's steam demand and enable strategic implementation of low carbon heating solutions. These include:

- Replace single pane windows with an insulated curtain wall.
- Replace steam turbine chillers with electric chillers.
- Install a full energy recovery dedicated outdoor air system (DOAS), which separates the building's ventilation system from the heating system, allowing each to operate independently.
- Optimize the existing hydronic system to lower heating hot water supply temperatures and enable integration of air source heat pumps in the future.

Maximize Heat Recovery:

This project utilizes water source heat pumps in a variety of heat recovery and reuse applications to dramatically reduce steam use throughout the building. The team looks to maximize heat recovery by integrating retail and tenant supplemental cooling loops to the main condenser water loop.

Current Baseline	Expected by 2035	
119.5 kBtu/SF/yr.	47.9 kBtu/SF/yr.	↓ 60%
62% Electricity + 38% District Steam	94% Electricity + 6% District Steam	
12,508 Ton CO2e/yr	3,059 Ton CO2e/yr	↓ 76%
\$340,000 /year of LL97 fines starting in 2030	\$0 LL97 fines starting in 2030	



LeFrak (59-17 Junction Blvd) EBC – Central Plant Rebuild

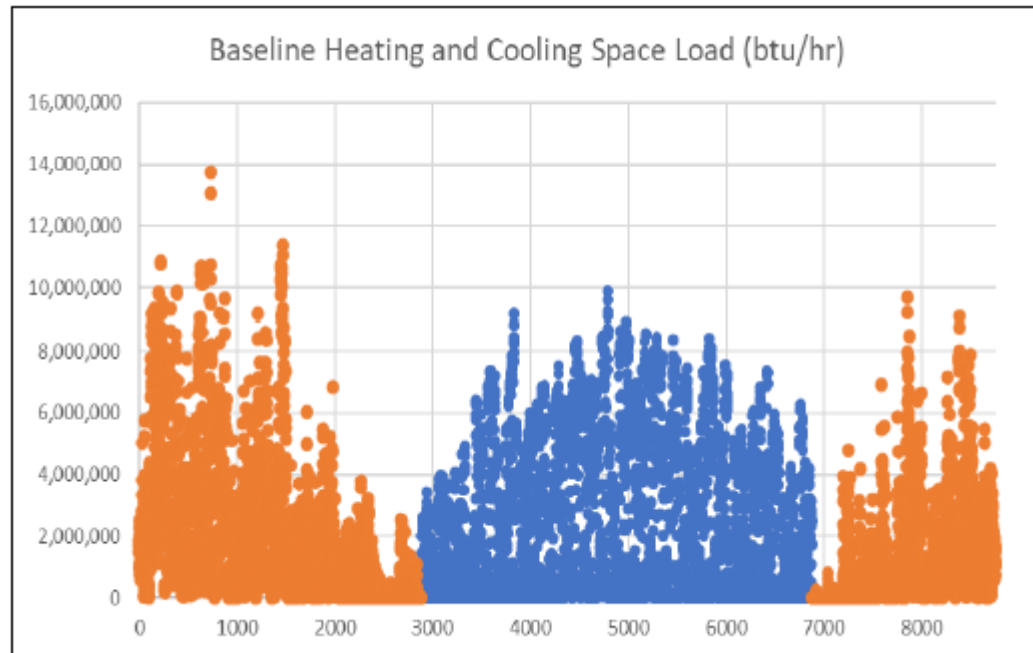
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LeFrak Building Background



- Building Type: Office Space
- No. of Fls: 20
- Area: 395,745 ft²
- EUI = 131.7 kBtu/SF

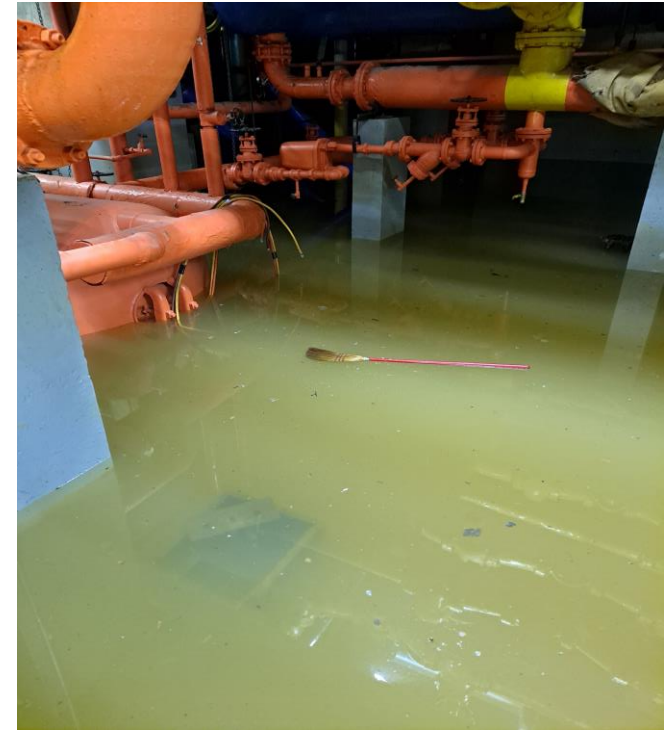
- Baseline Building Information:
 - Two (2) Scotch Marine Boilers
 - Two (2) 770-Ton Steam-Fired Absorption Chillers
 - Two (2) double cell CTs
 - Dual-Temp hydronic distribution system serving constant volume/pressure, core AHUs and perimeter FCUs on each floor
 - One (1) FCU perimeter distribution pump
 - One (1) AHU core distribution pump
 - One (1) Swing/Standby distribution pump



Opportunity from Natural Disaster



- What was the catalyst for this project? Energy Efficiency Goals?
 - Central Plant **flooding** which occurred due to Hurricane Ida in 2021!



- Flooded end of life equipment provided an opportunity for a central plant rebuild and exploring ***additional energy savings!***

Project Requirements, Constraints, & Goals



1) Project Requirements:

- Replace existing central plant
- Do not disrupt existing tenants
- Increase plant resiliency
- Future proof for LL97

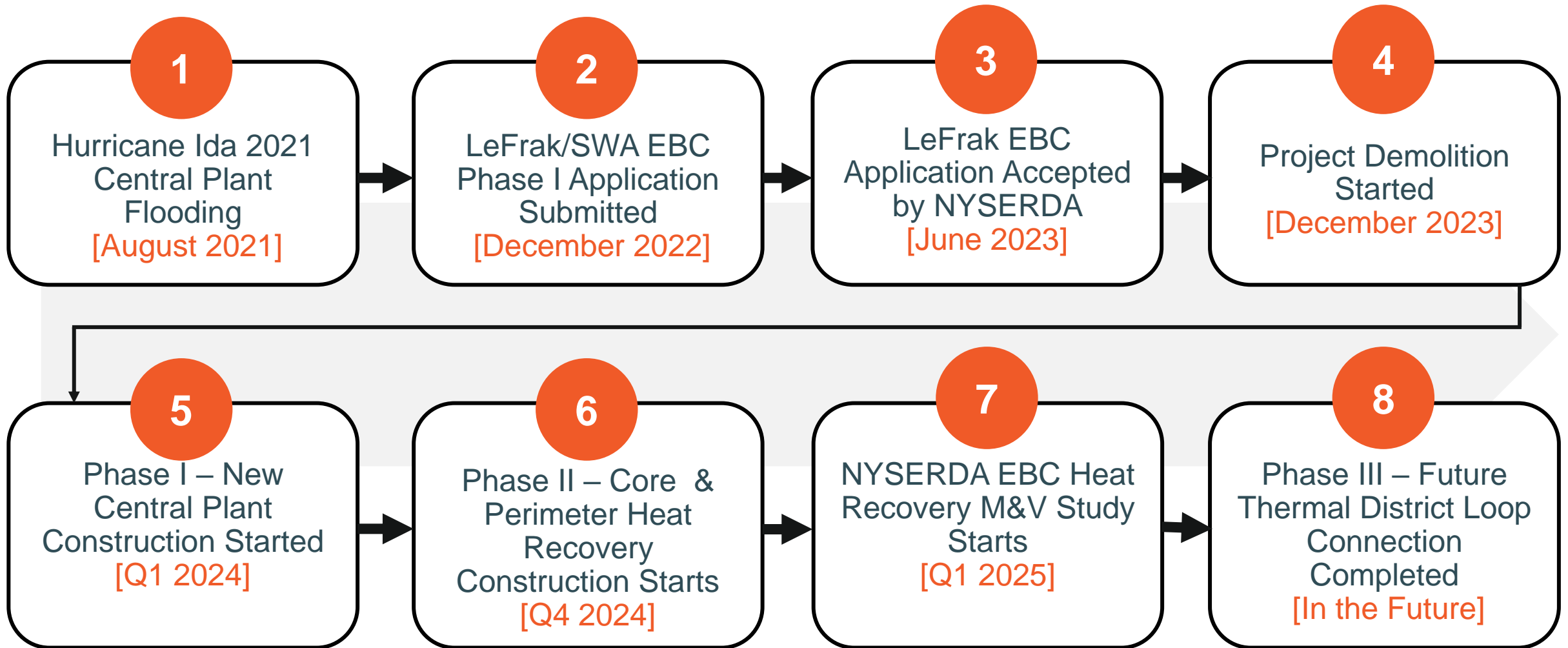
2) Project Constraints:

- Limited electric service availability
- Additional electric service request wait time
- Phased construction
- Focus design to meet budget requirements
- Design to maintain existing building operations

3) Project Goals:

- Implement building Heat Recovery from core AHUs to perimeter FCUs during shoulder season
- Provide future connection taps for district thermal loop
- Zone building systems to properly increase overall operational efficiency

Central Plant Project Timeline



Central Plant Demolition



New Equipment Deliveries

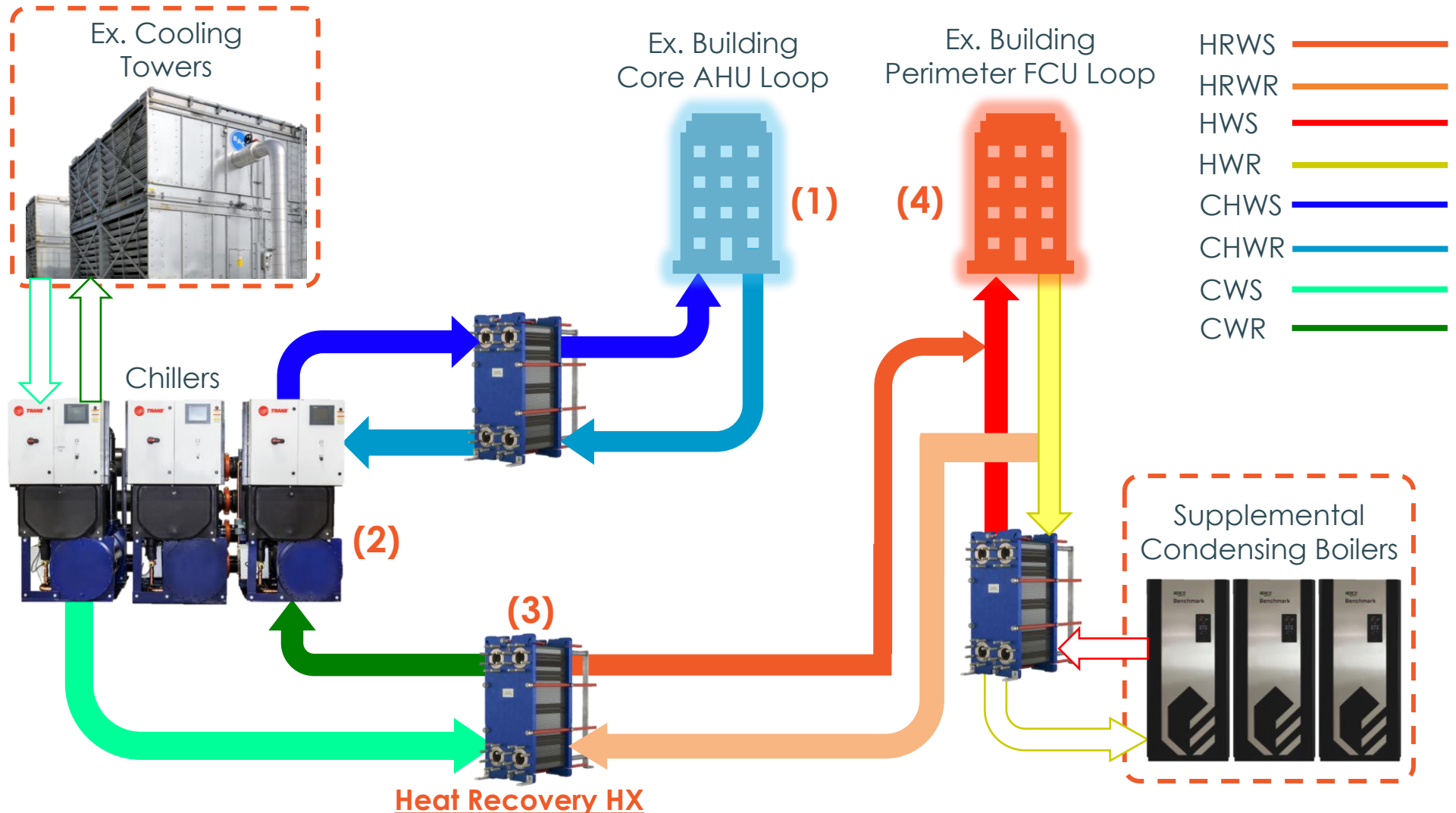


Shoulder Season Heat Recovery Operation



Heat Recovery Flow:

- 1) Core AHU loop requires cooling
- 2) Chillers reject heat and produce cooling for core AHU loop
- 3) CWS from Chiller to Heat Recovery HX
- 4) Heat Recovery hot water supply to perimeter FCU loop





Contact Us

Steven Winter Associates, Inc.

307 Seventh Avenue, Suite 1701
New York, NY 10001



Jonathan Da Silva Johrden, P.E.



jjohrden@swinter.com



(475) 291-1604



www.swinter.com



discuss.

moderator

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panelists

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thank you.

