High Rise / Low Carbon: Sharing Heat

In this latest event in the High Rise / Low Carbon Series, NYSERDA and BE-Ex have gathered industry experts that will feature projects utilizing hydronic systems, thermal networks, and waste heat recovery across the commercial sector. Developed in support of the Empire Building Challenge (EBC) this event will feature innovative strategies for heat recovery deployed by the award-winning partners in this flagship New York State program.

Intro Remarks
Susanne DesRoches, Vice President, Clean and Resilient Buildings, NYSERDA

Moderator
Molly Dee Ramasamy, Head of Deep Carbon Reduction, Jaros, Baum & Bolles

Presenters
Mike Izzo, Vice President, Carbon Strategy, Hines
Elizabeth Moronta, Senior Vice President of Development, Omni New York LLC

Panelists:
Mike Izzo, Vice President, Carbon Strategy, Hines
Samuel Long, Innovation Specialist, Danfoss
Adam Friedberg, Principal, Buro Happold
Miguel Gaspar, Vice President/Group Leader, Loring Consulting Engineers

September 14, 2022 | 9 to 10:30 am | 1.5 AIA LU|HSW
Building Energy Exchange | be-exchange.org

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

be ex building energy exchange

HUDSON SQUARE PROPERTIES

High Rise / Low Carbon

BE-EX

September 14th, 2022

TRINITY CHURCH WALL STREET

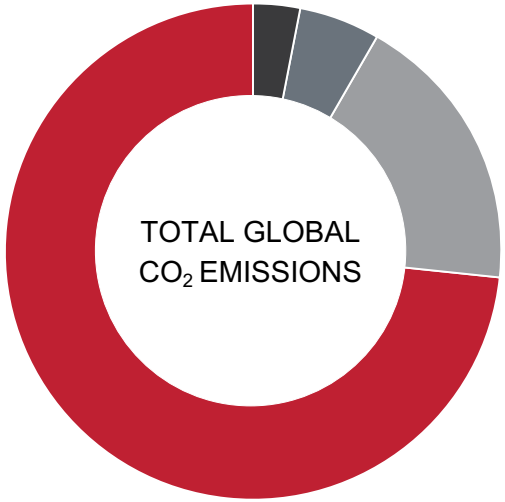
NORGES BANK INVESTMENT MANAGEMENT

Hines

Real Estate's Responsibility

REAL ESTATE HAS ONE OF THE HIGHEST GLOBAL FOOTPRINTS

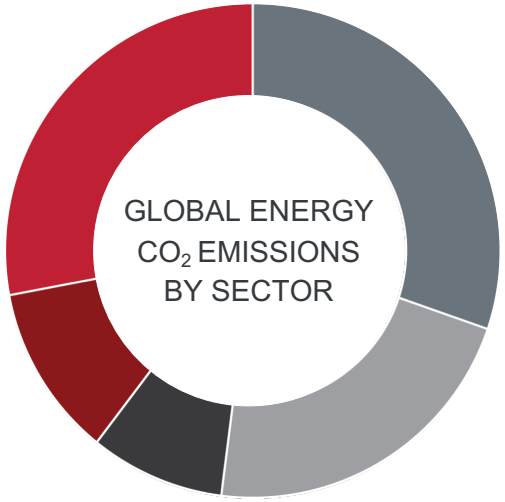
Energy



73%

of Global GHG is from Energy

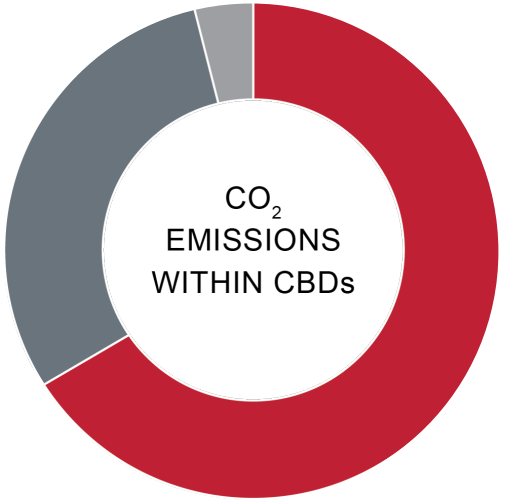
Building Materials & Construction



38%

of total Energy is from Real Estate

Buildings



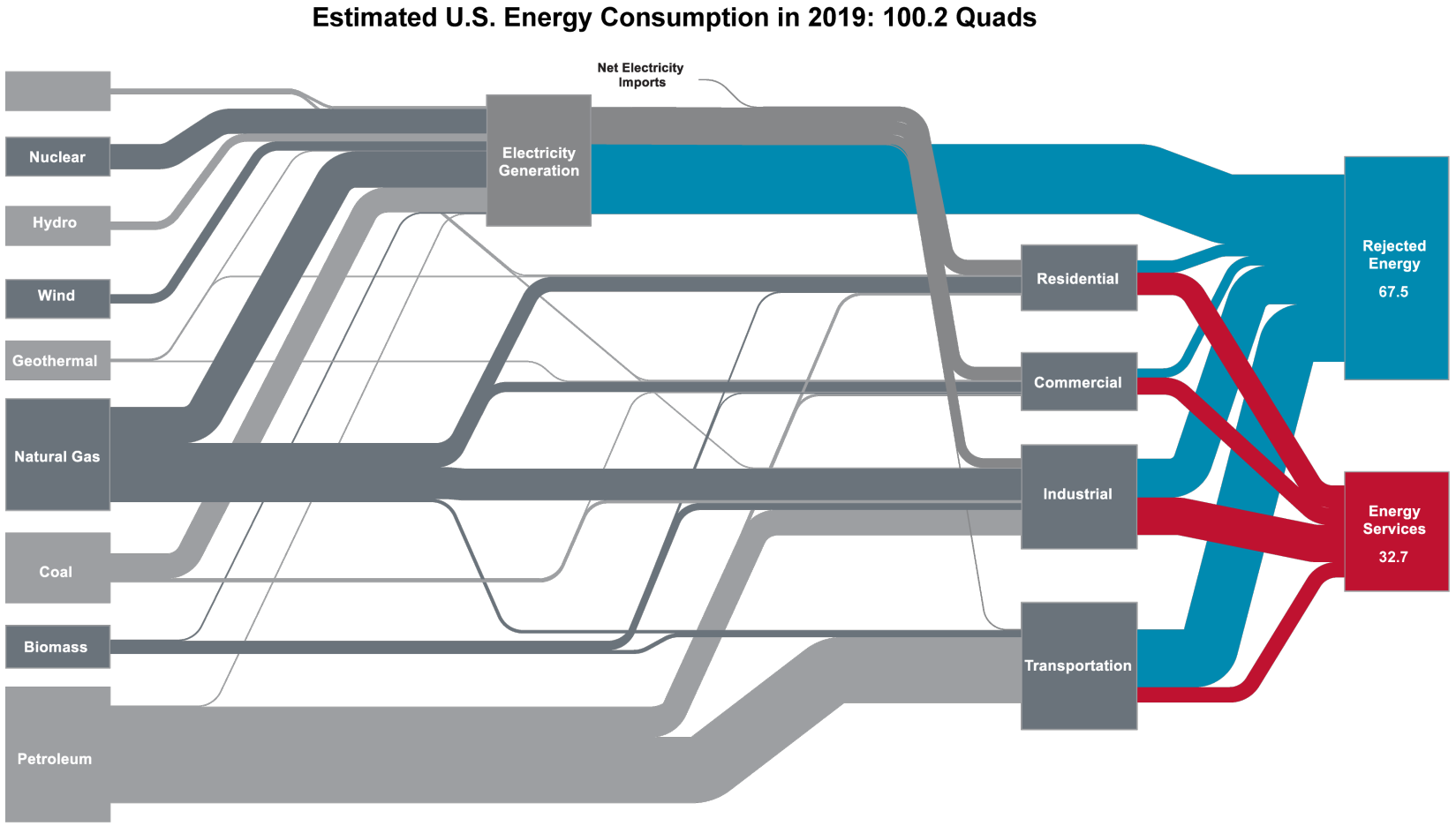
70%

of total GHG in Center Business Districts (NYC Data)

Sources : Our World in Data, World Green Building Council, Global Status Report 2017, NYC 2017 GHG Emissions Inventory

Wasted Energy

THERE IS NOT AN ENERGY PROBLEM, IT IS AN ENERGY WASTE PROBLEM



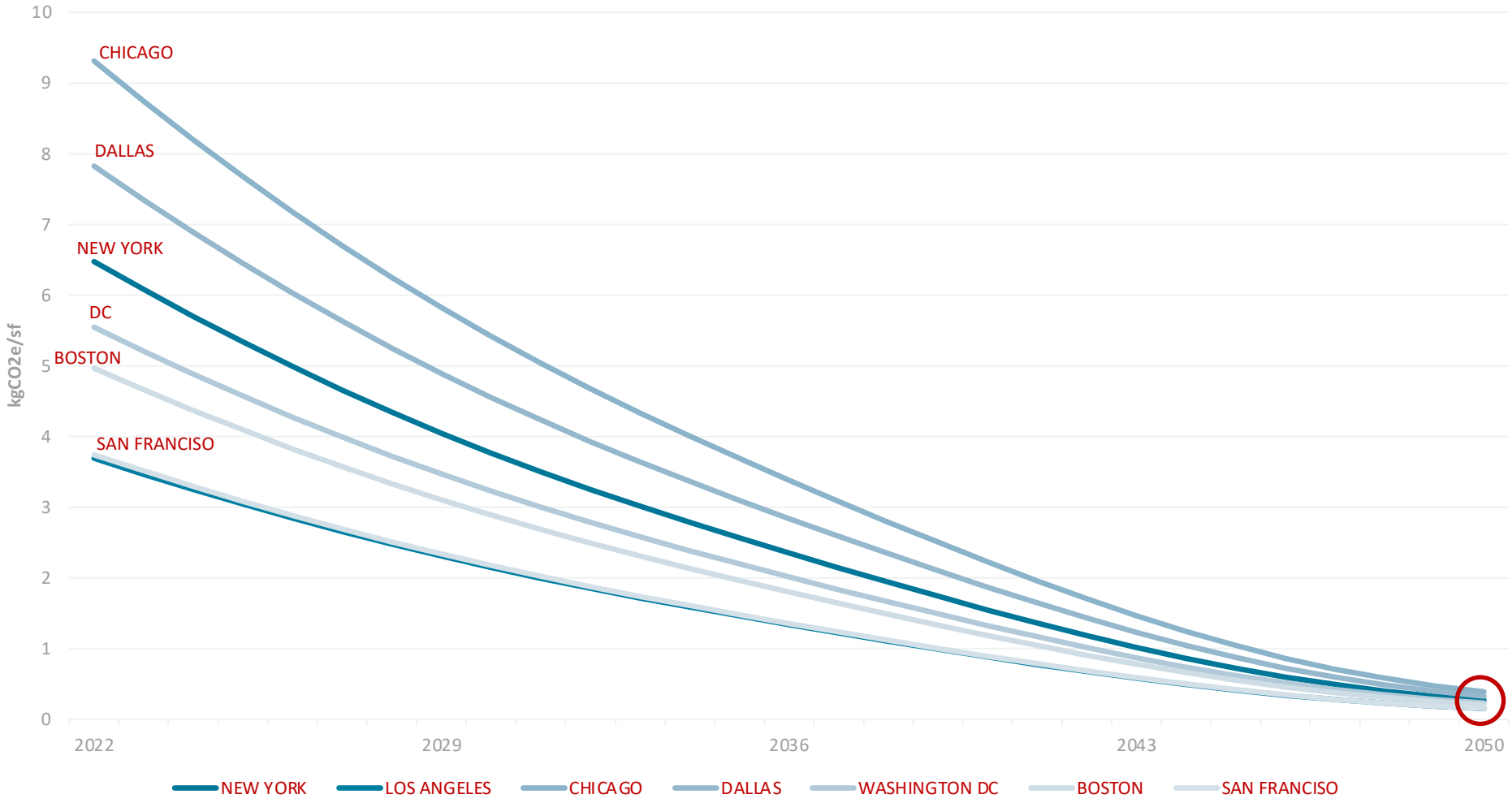
67% Wasted = $800bn

33% Wasted = $400bn

Sources : Lawrence Livermore National Laboratory and the Department of Energy
U.S. Energy Information Administration (EIA) (2021) State Energy Data 2019: Prices and Expenditures.

Science Based Pathways

THE PATH IS UNCERTAIN HOWEVER THE FUTURE IS CLEAR



CRREM

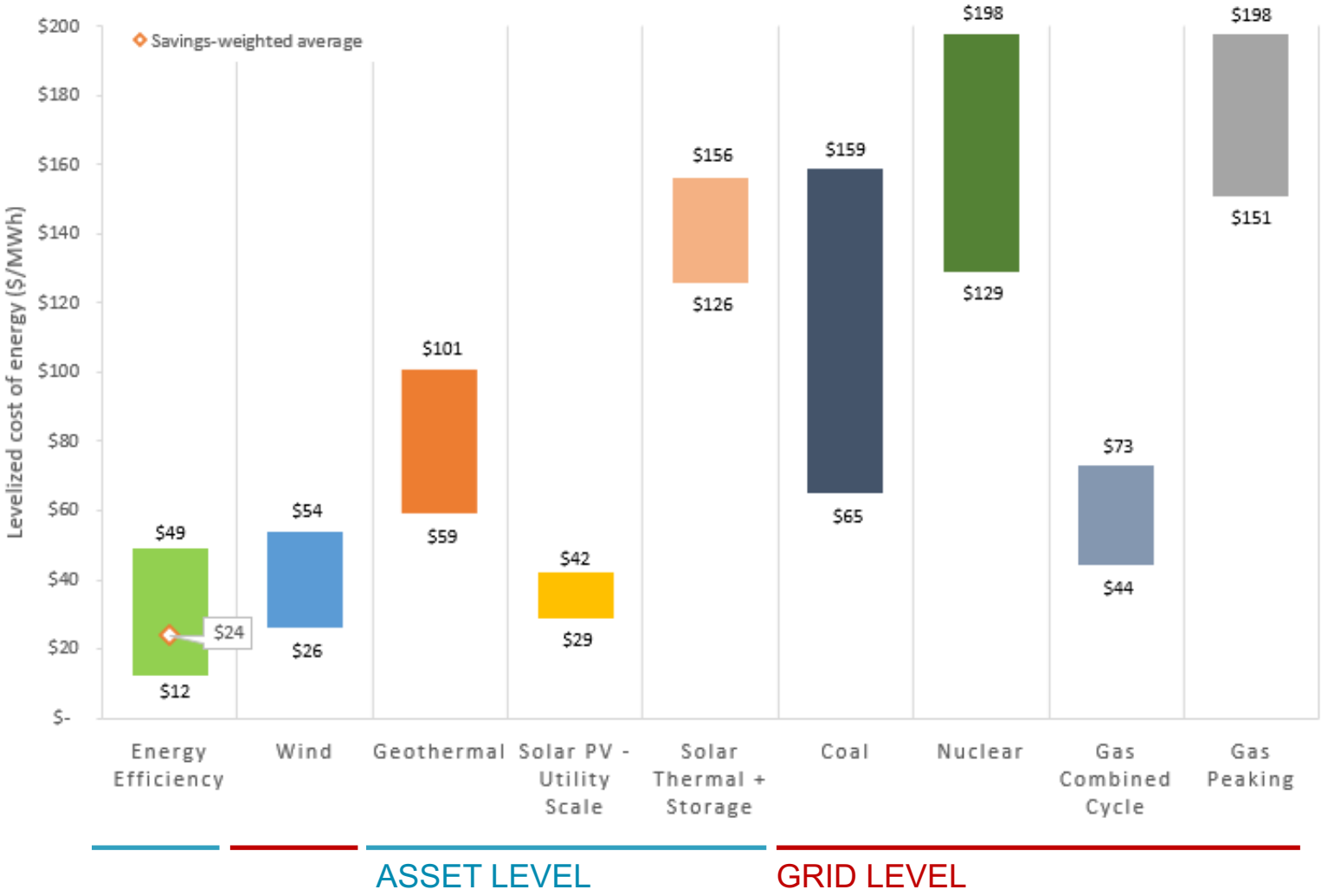
SCIENCE BASED TARGETS

All pathways lead to an electrified future, no matter the geography

Sources :CRREM US 1.5C Pathways

Energy Efficiency is Still the Cheapest Form of Energy

ENERGY EFFICIENCY MAXIMIZES RENEWABLE ENERGY UPTAKE AND REDUCES ENERGY COSTS



For every 50% demand reduction we can serve 2x the number of buildings, reducing the cost of renewable infrastructure

Sources : ACEEE Utility Scorecard 2020, Lazard 2020

The Problem Statement

TRANSFORMING THE BUILT ENVIRONMENT, STARTING WITH 345 HUDSON

900k
Square Feet

17
Floors

1930's
Vintage

Natural Gas Boilers

Steam Heating

Floor Level Packaged Units

80
kbtu/SF

54%
Energy Waste

5k
Tons CO_{2e}

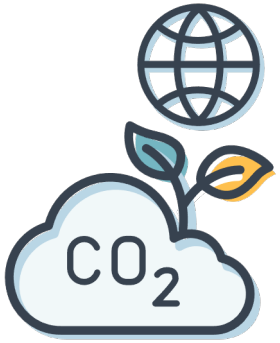
3.6 MW
Electrical Peak

Decarbonizing Real Estate

WHAT IF A SIMPLE SOLUTION CAN SOLVE A COMPLEX PROBLEM

+

FUTURE IS ELECTRIC



NET ZERO

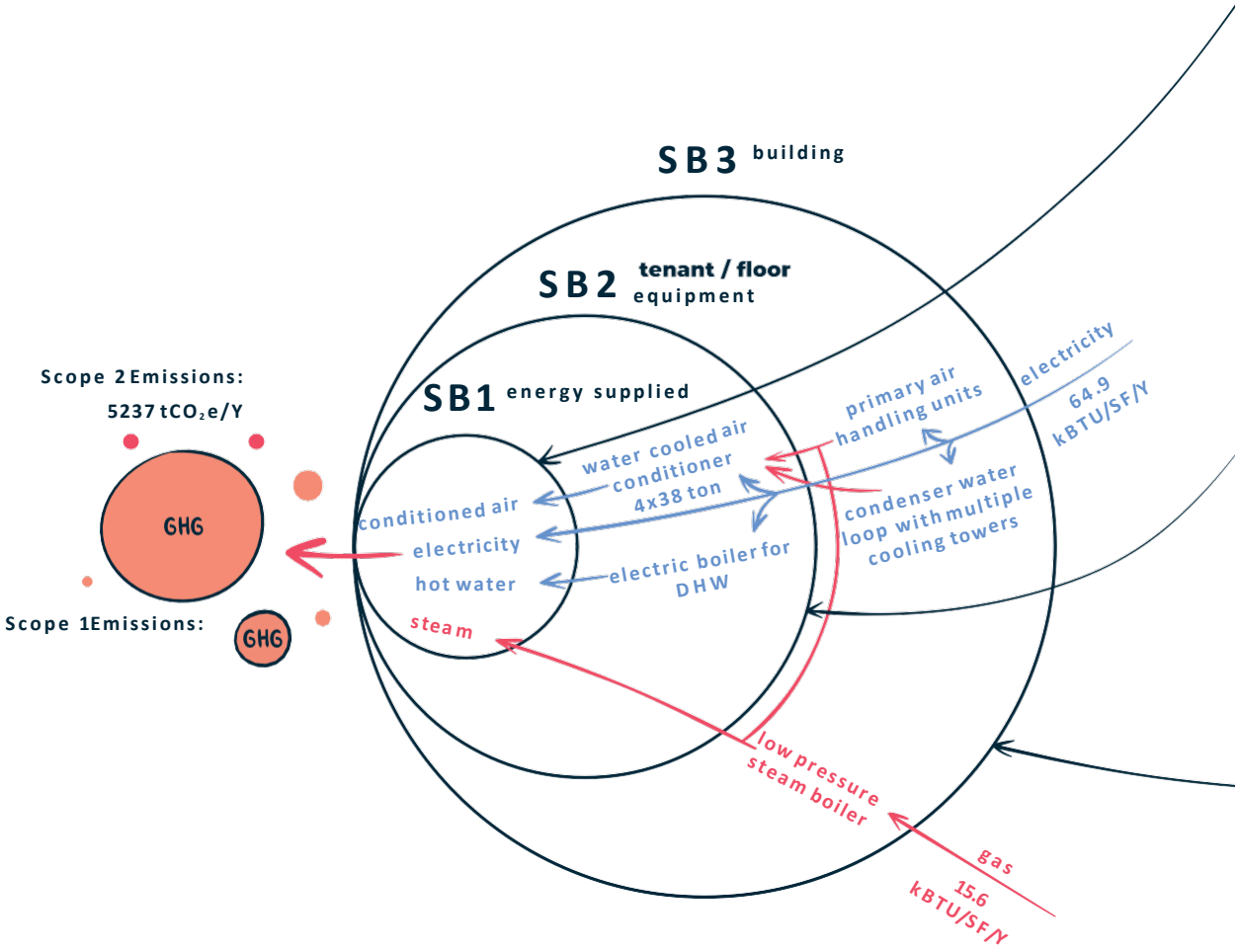
Decarbonize the grid

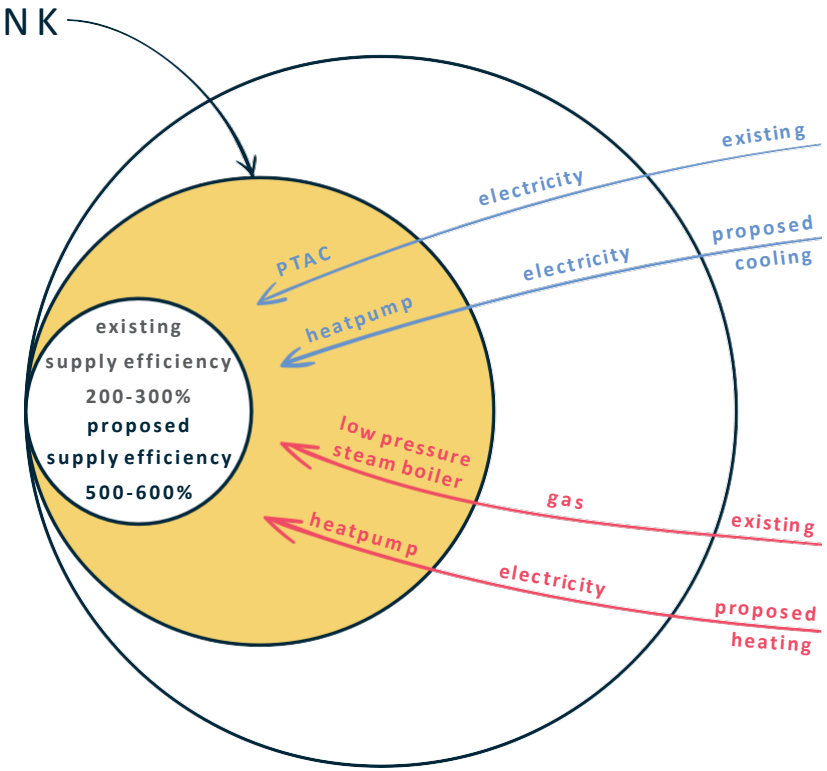
Decarbonize Heating

Redefine the status quo

System Boundaries

DISSECTING THE ENERGY FLOWS WITHIN THE CURRENT INFRASTRUCTURE

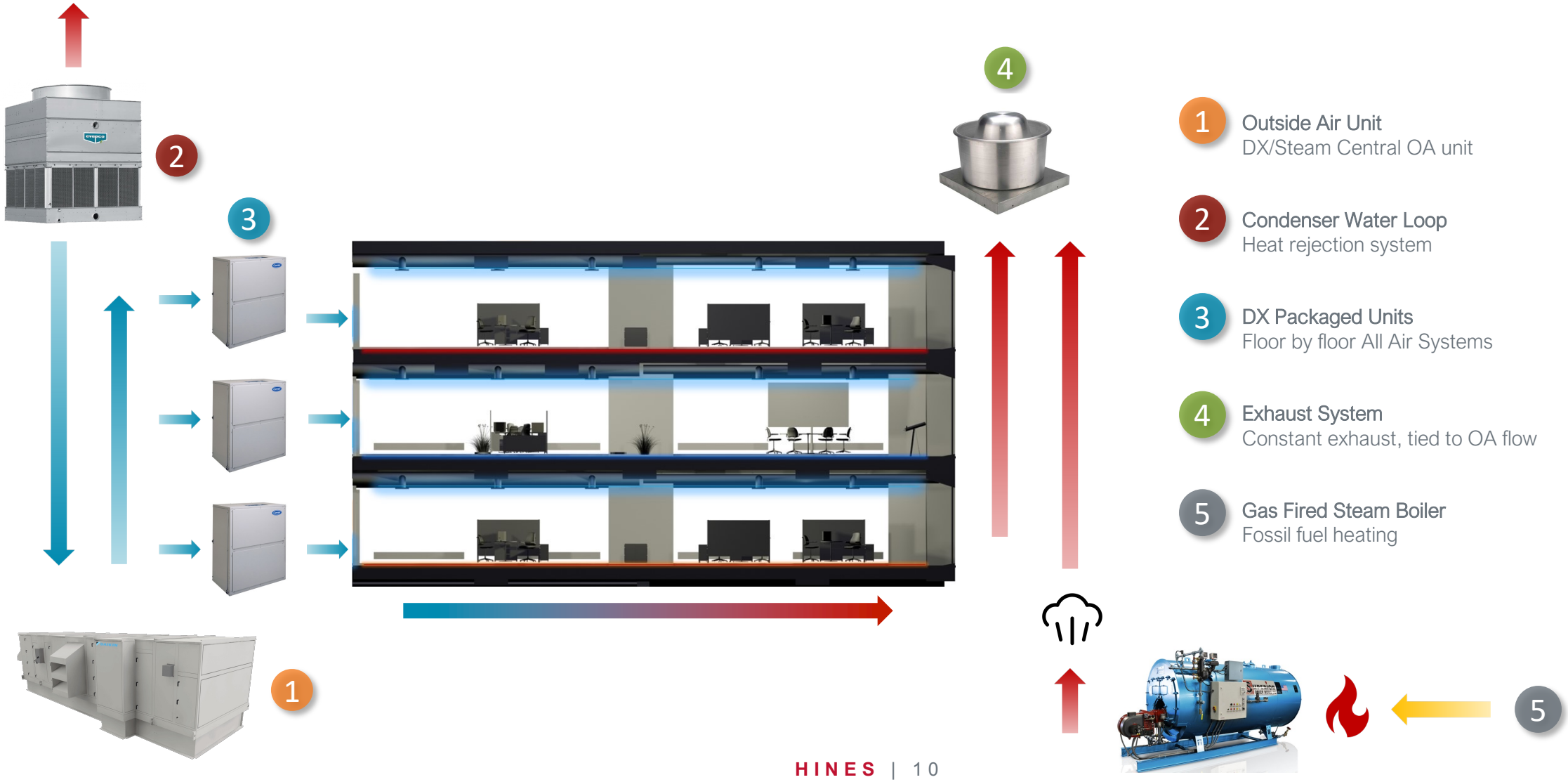




Sources :NYSERDA Empire Building Challenge Submission - URBS

Existing Building Approach

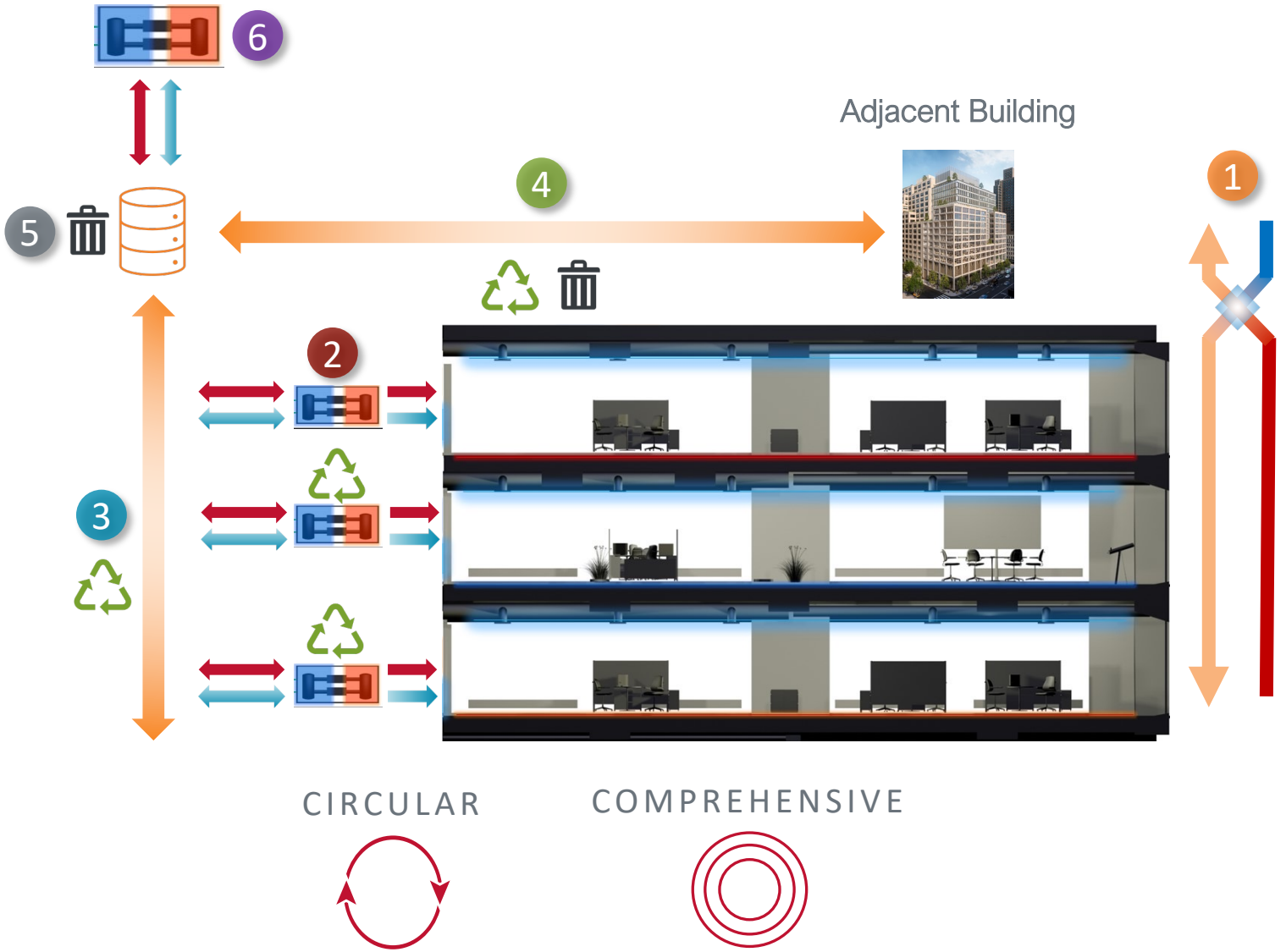
RELY ON FOSSIL FUELS, LINEAR ENERGY SYSTEMS WITH NO ENERGY RECOVERY



1. **Outside Air Unit**
   DX/Steam Central OA unit
2. **Condenser Water Loop**
   Heat rejection system
3. **DX Packaged Units**
   Floor by floor All Air Systems
4. **Exhaust System**
   Constant exhaust, tied to OA flow
5. **Gas Fired Steam Boiler**
   Fossil fuel heating

Circular System Approach

ELECTRIFY HEATING, MOVE TO HYDRONIC BASED SYSTEMS AND REDUCE THE AMOUNT OF WASTE ENERGY

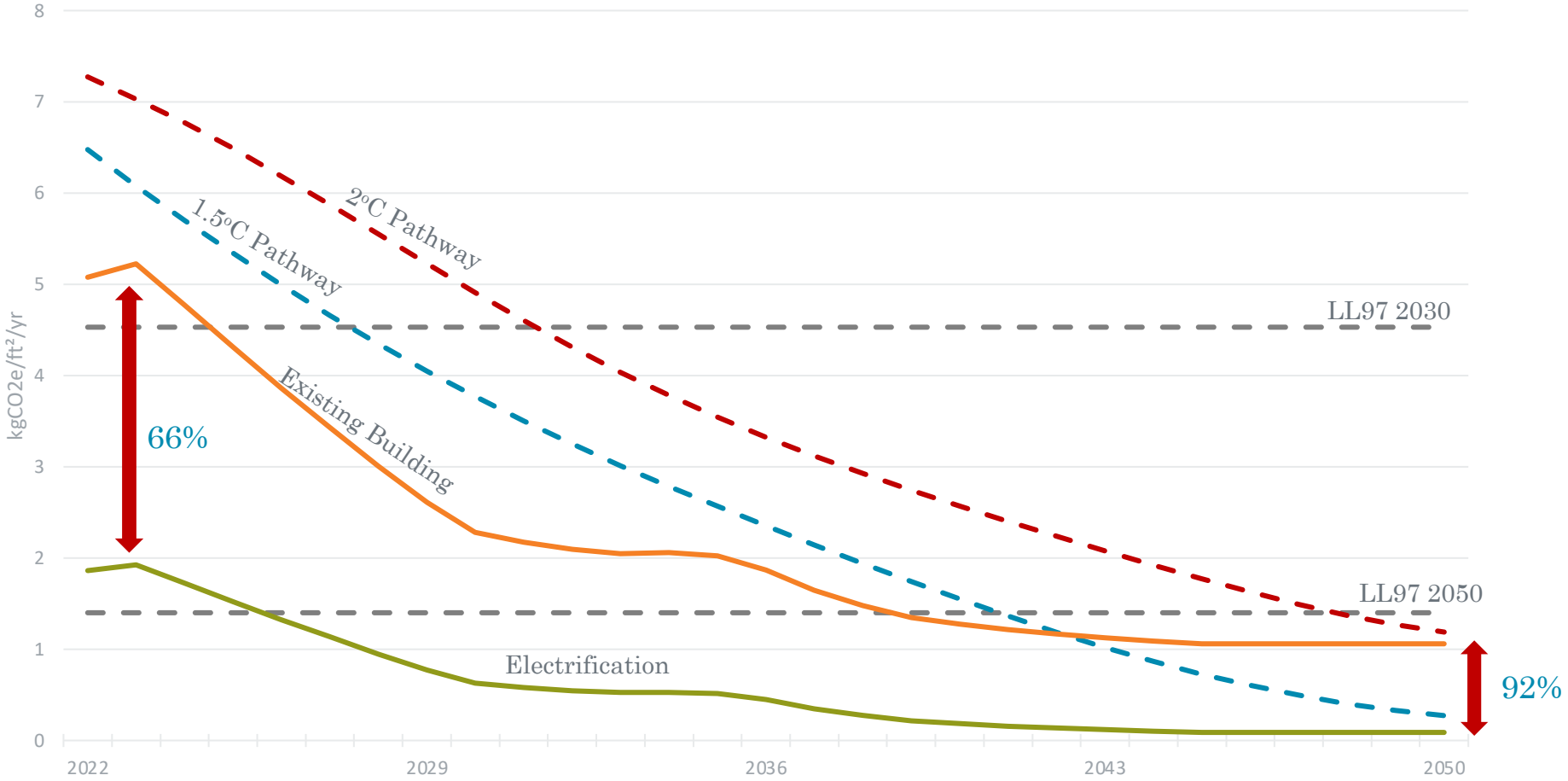


1. **Air-Air Energy Recovery**
2. **Transition to DOAS**
   Floor by floor WSHP
3. **Ambient Loop**
   Convert existing condenser water system
4. **Waste Energy Transport**
   Connect buildings for waste energy utilization
5. **Thermal Storage**
   Capture energy waste
6. **Electrify Heating**
   Air-Source Heat Pumps

Empire Building Challenge
PARTNER
Reimagining Low-carbon Buildings

Its Possible in an Existing Building

REIMAGINING THE NEW NORMAL WITHIN THE EXISTING BUILDING SECTOR



52%
energy reduction

66%
emission reduction

92%
peak heating reduction

Sources :CRREM US 1.5C Pathways

Thank you

RENEWAL
CONSTRUCTION SERVICES

Omni New York LLC

LORING
CONSULTING ENGINEERS

WHITNEY YOUNG MANOR

354 AND 358 NEPPERHAN AVE, YONKERS, NY

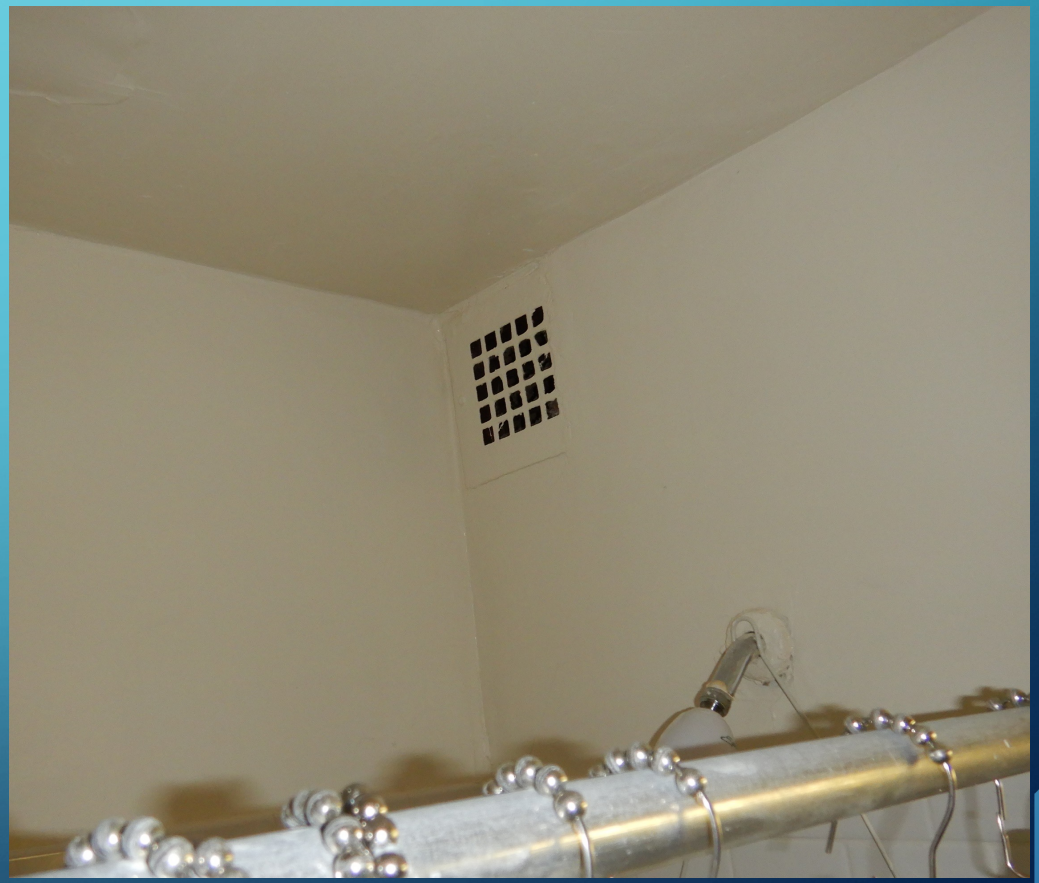
- 195 apartments originally built in 1973
- Apartments are contained within two 12-story buildings
- Concrete superstructure, brick façade on CMU back-up wall
- Original rehab in 2006 under the LIHTC program was completed by Omni New York LLC
- Original LIHTC compliance period ended in 2021, and Omni New York LLC is pursuing a LIHTC resyndication to complete a $22million comprehensive retrofit
- Project was awarded $5 million by NYSERDA as a part of Empire State Building Challenge
- Comprehensive retrofit to include:
  - Full envelope retrofit—including new EIFS exterior, UPVC casement windows and roof
  - Overhaul of the existing electrical resistance heating system and window ACs to a new centralized electric heat pump plant with backup gas-fired condensing boilers
  - Full interior upgrades, including new flooring, bathrooms, kitchens, elevators, etc.


Car Wash
Car Wash
SMART


356
ACCESSIBLE


APR 20 2022

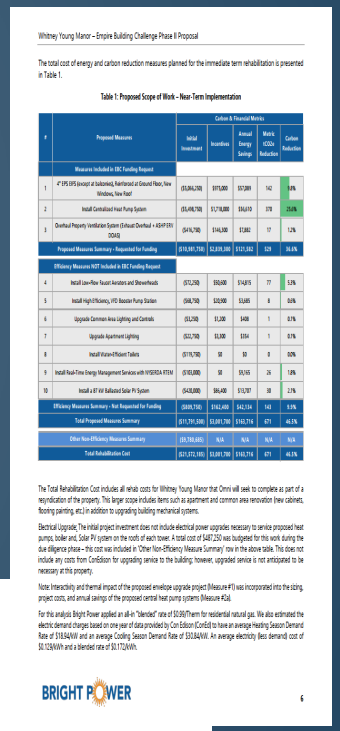
EXISTING CONDITIONS



POTENTIAL SCOPE ANALYSIS

- Bright Power – Cost/Benefit Analysis
- Loring – Mechanical Design Options
- Curtis Ginsberg – Envelope Analysis

- Decision between Electric and Gas
  - Increased implementation cost
  - Increased operating cost
  - Reducing greenhouse gases/Meeting new regulations


Whitney Young Manor – Empire Building Challenge Phase II Proposal

The total cost of energy and carbon reduction measures planned for the immediate term rehabilitation is presented in Table 1.

Table 1: Proposed Scope of Work – Near-Term Implementation

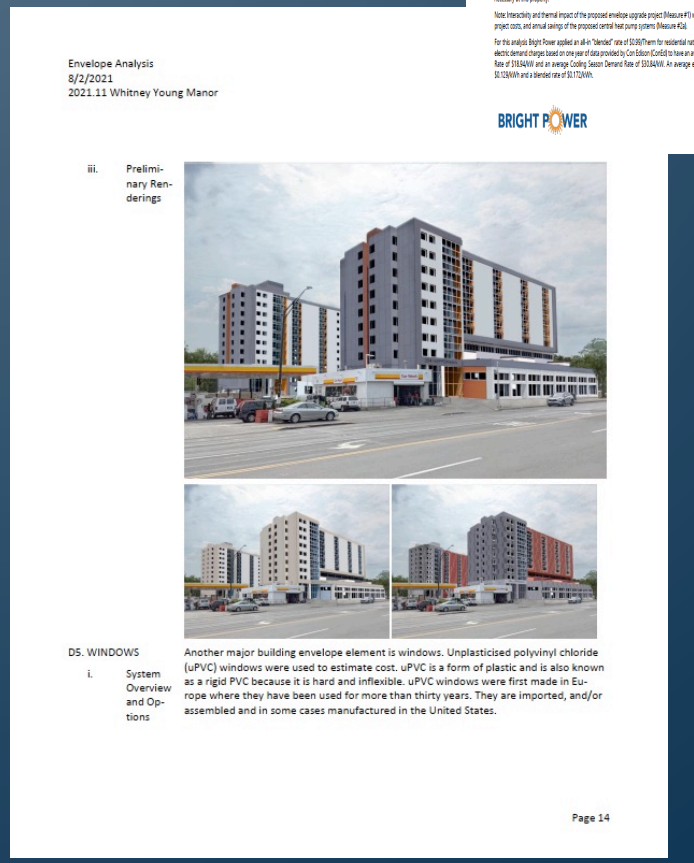
#	Proposed Measures	Carbon & Financial Metrics				
		Initial Investment	Incentives	Annual Energy Savings	Metric tCO2e Reduction	Carbon Reduction
	Measures Included in EBC Funding Request					
1	4" EPS ERS (except at balconies), Reinforced at Ground Floor, New Windows, New Roof	($5,964,700)	$975,000	$57,089	142	9.9%
2	Install Centralized Heat Pump System	($5,448,750)	$1,710,000	$56,610	378	26.0%
3	Overhaul Property Ventilation System (Exhaust Overhaul + ASHP ERV DOAS)	($476,700)	$144,000	$7,083	17	1.2%
	Proposed Measures Summary – Requested for Funding	($10,997,150)	$2,829,000	$121,352	529	36.4%
	Efficiency Measures NOT Included in EBC Funding Request					
4	Install Low-Flow Faucet Aerators and Showerheads	($72,250)	$50,000	$14,875	77	5.3%
5	Install High Efficiency, VFD Booster Pump Station	($68,750)	$20,000	$3,685	8	0.6%
6	Upgrade Common Area Lighting and Controls	($3,250)	$1,300	$408	1	0.1%
7	Upgrade Apartment Lighting	($22,750)	$3,300	$354	1	0.1%
8	Install Water-Efficient Toilets	($119,750)	$0	$0	0	0.0%
9	Install Real-Time Energy Management Services with NYSERDA PTEM	($100,000)	$0	$9,165	26	1.8%
10	Install a 87 kW Ballasted Solar PV System	($420,000)	$84,400	$12,787	10	2.7%
	Efficiency Measures Summary – Not Requested for Funding	($809,750)	$162,400	$42,314	143	9.3%
	Total Proposed Measures Summary	($11,791,500)	$2,991,700	$163,716	671	46.1%
	Other Non-Efficiency Measures Summary	($9,730,035)	N/A	N/A	N/A	N/A
	Total Rehabilitation Cost	($21,372,185)	$2,991,700	$163,716	671	46.1%

The Total Rehabilitation Cost includes all rehab costs for Whitney Young Manor that Omni will seek to complete as part of a recapitalization of the property. This larger scope includes items such as apartment and common area renovation (new cabinets, flooring painting, etc.) in addition to upgrading building mechanical systems.

Electrical Upgrade: The initial project investment does not include electrical power upgrades necessary to service proposed heat pumps, boiler and, Solar PV system on the roofs of each tower. A total cost of $487,250 was budgeted for this work during the due diligence phase – this cost was included in 'Other Non-Efficiency Measure Summary' row in the above table. This does not include any costs from ConEdison for upgrading service to the building; however, upgraded service is not anticipated to be necessary at this property.

Note: Interactivity and thermal impact of the proposed envelope upgrade project (Measure #1) was incorporated into the sizing, project costs, and annual savings of the proposed central heat pump systems (Measure #2a).

For this analysis Bright Power applied an all-in "blended" rate of $0.99/Therm for residential natural gas. We also estimated the electric demand charges based on one year of data provided by Con Edison (ConEd) to have an average Heating Season Demand Rate of $10.62/kW and an average Cooling Season Demand Rate of $10.84/kW. An average electricity (less demand) cost of $0.126/kWh and a blended rate of $0.172/kWh.


Envelope Analysis
8/2/2021
2021.11 Whitney Young Manor

BRIGHT POWER

iii. Preliminary Renderings

D5. WINDOWS

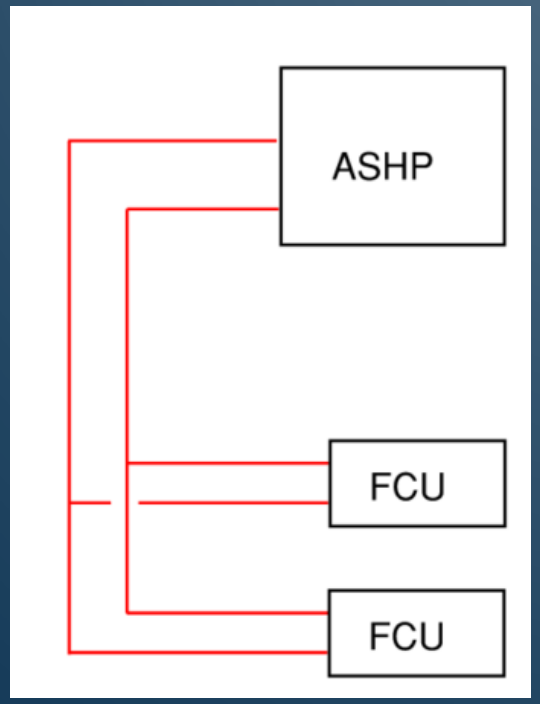
i. System Overview and Options

Another major building envelope element is windows. Unplasticised polyvinyl chloride (uPVC) windows were used to estimate cost. uPVC is a form of plastic and is also known as a rigid PVC because it is hard and inflexible. uPVC windows were first made in Europe where they have been used for more than thirty years. They are imported, and/or assembled and in some cases manufactured in the United States.

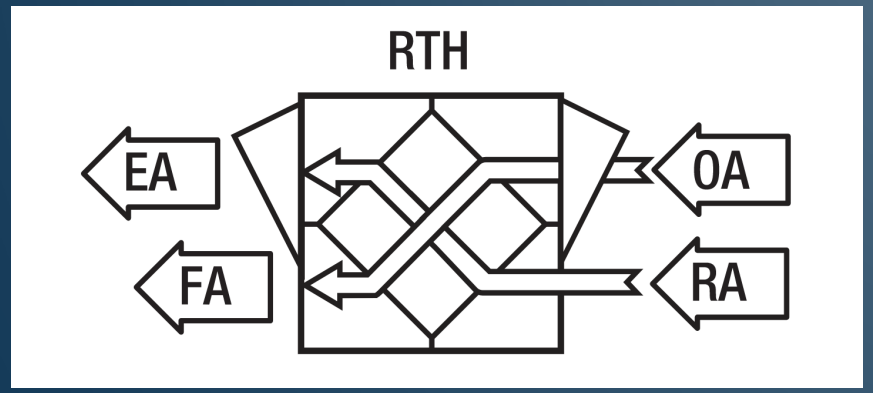
Page 14

AIR-SOURCE HEAT PUMP (ASHP)

- The ASHP uses an air-cooled condenser to provide dual temperature water to the building fan coil units (FCU).
- Increased efficiency over existing system. Existing building used electric baseboard and window AC.
- Some ASHPs have the option to provide a domestic hot water connection for simultaneous heating and cooling during the summer.



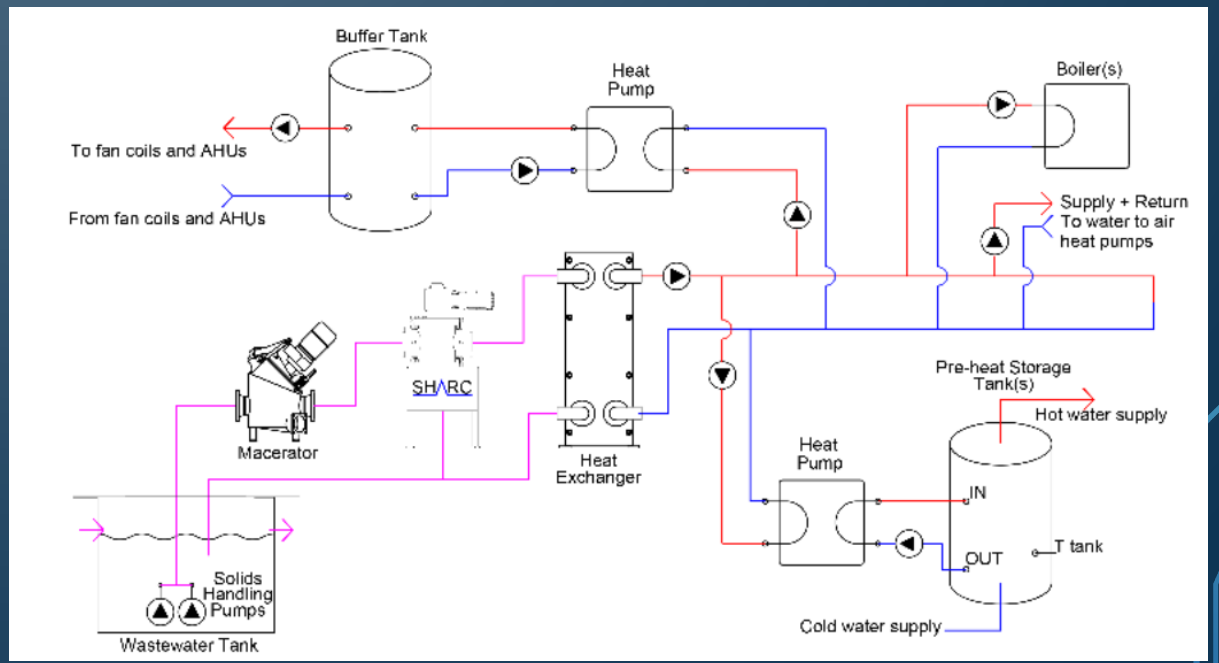
ENERGY RECOVERY VENTILATOR (ERV)



- An ERV exchanges energy from the return air and supply air.
- Use kitchen and bathroom exhaust for return air which is normally exhausted out with no energy recovery.
- Outside air is supplied to each apartment which is tempered by the ERV. This reduces the load or the FCUs.
- The existing building had no outside air to the apartments causing additional infiltration from the outside. The reduced infiltration from pressurizing the building helps reduce the total load of the building

SHARC SYSTEM

- Sharc System uses wastewater as a source to reject heat.
- Wastewater is pumped through a Macerator break down solids.
- Sharc system will filter out larger particles and send filtered water through heat exchanged.
- Average water temperature through the heat exchanger is 70°F.
- Water to Water heat pump is used after heat pump to help increase the temperature of the water




354 NEPPERHAN
Car Wash
Car Wash
SUPERMARKET
OFFICE

discuss.

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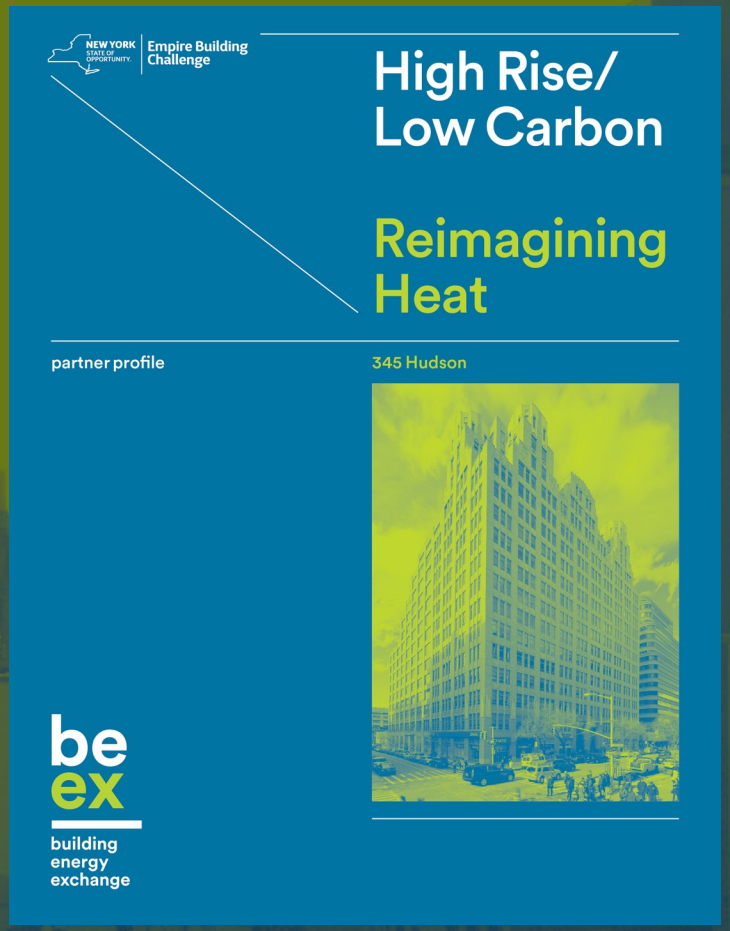

Scan to access our first High Rise / Low Carbon Partner Profile, showcasing Hudson Square Properties' 345 Hudson retrofit