NYC's High Performance Retrofit Program and Resources

BuildingEnergy NYC
September 26, 2019

NESEA
NORTHEAST SUSTAINABLE ENERGY ASSOCIATION

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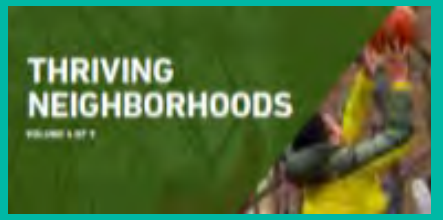
NYC Mayor's Office of Sustainability

OneNYC 2050

30 initiatives across 8 goals
to secure our city's future



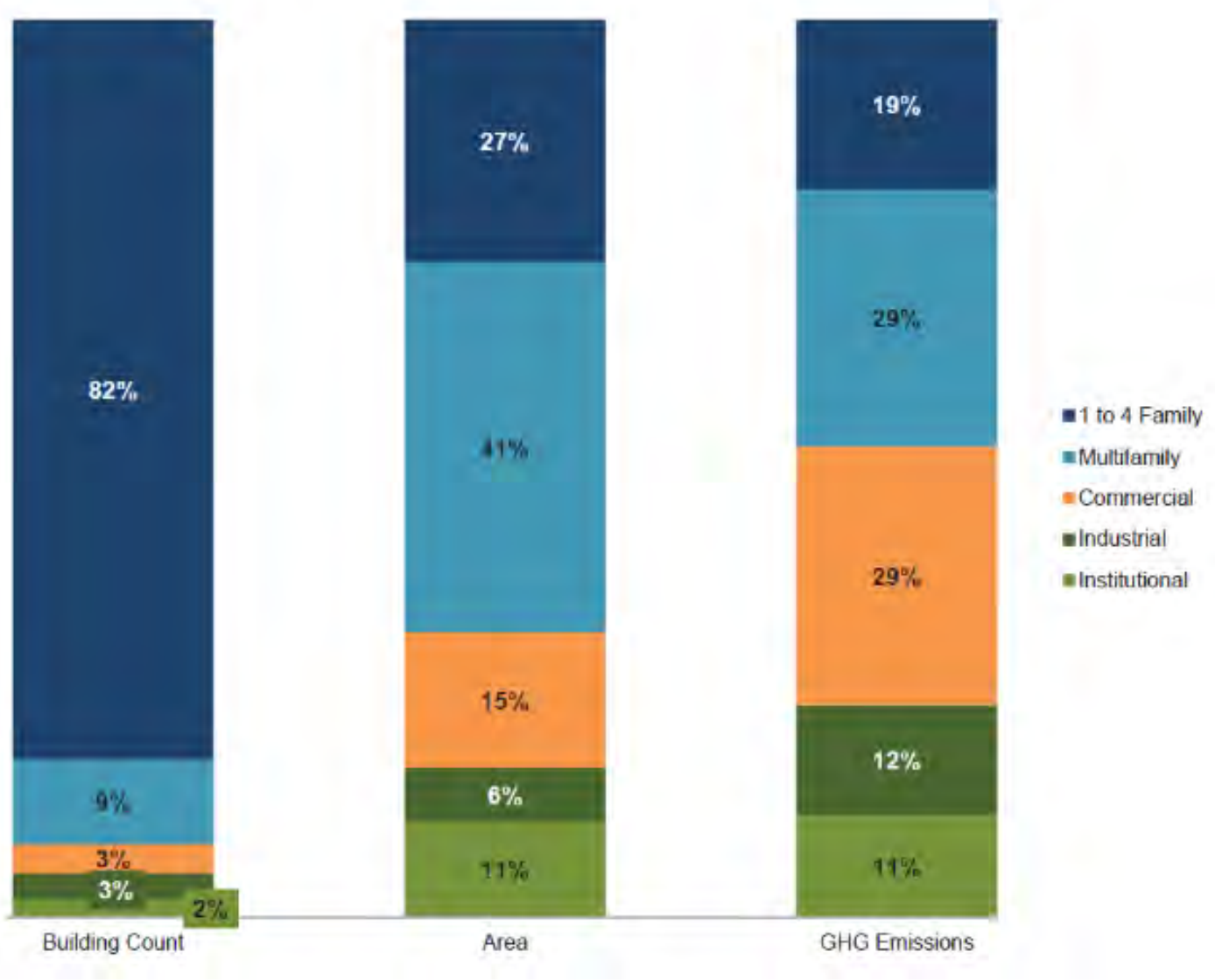
Key commitments from *A Livable Climate:*

- Achieve carbon neutrality and 100% clean electricity
- Require buildings to cut their emissions
- Hydro-power City government

NYC Mayor's Office of Sustainability

Key Findings about Building Energy Use

- **Greatest absolute number** of buildings: 1-4 family homes
- **Greatest share of GHG emissions**: Commercial and multifamily buildings



Source: PLUTO and 2015 GHG Inventory

Climate Mobilization Act

LOCAL LAWS 92 AND 94

requiring that the roofs of certain buildings be covered in green roofs or solar PV systems

LOCAL LAW 95

a building energy efficiency grade

LOCAL LAW 96

establishing a sustainable energy loan program (i.e. PACE)

LOCAL LAW 97

the commitment to achieve certain reductions in greenhouse gas emissions by 2050

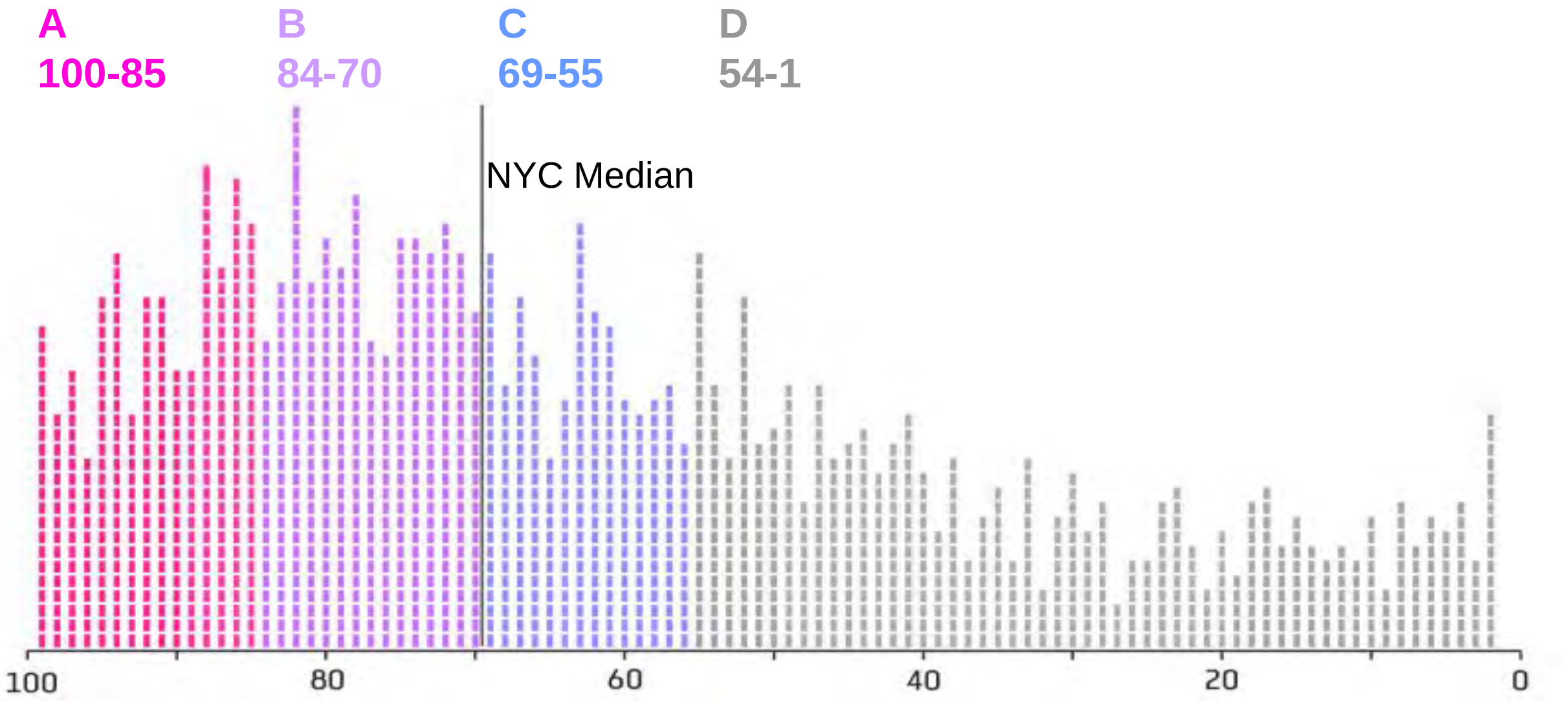
LOCAL LAW 95

a building energy efficiency grade

Energy grades to be posted on buildings larger than 25,000sf in size, beginning October 2020

LOCAL LAW 95

a building energy efficiency grade



LOCAL LAW 96

establishing a sustainable energy loan program (i.e. PACE)

Financing for energy efficiency and renewable energy projects with long terms and little or no money down

NYC Mayor's Office of Sustainability

LOCAL LAW 97

the commitment to achieve certain reductions in greenhouse gas emissions by 2050

BUILDINGS LARGER THAN 25,000SF IN SIZE:

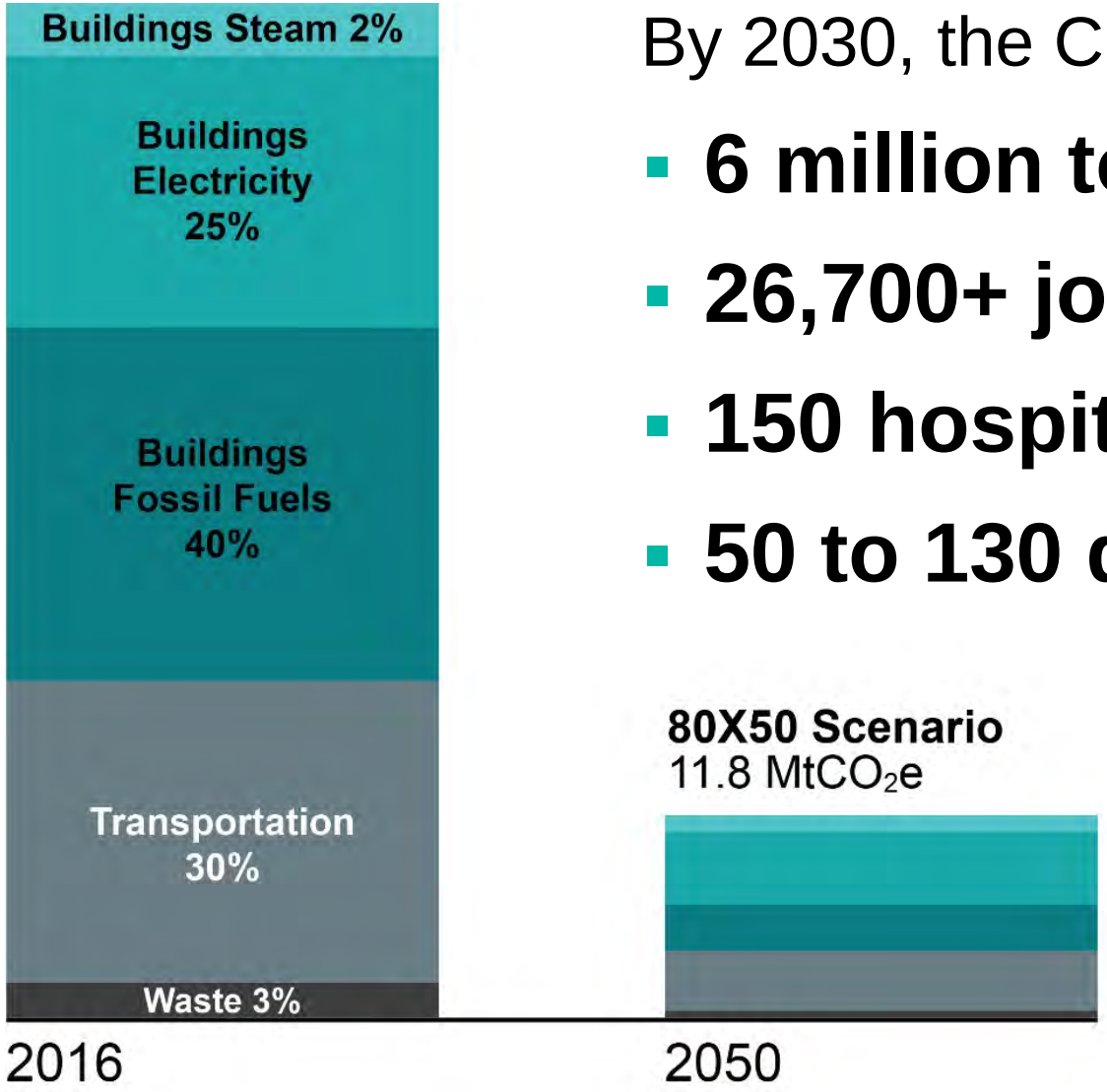
Greenhouse gas emissions limits must be met starting in 2024

LOCAL LAW 97

the commitment to achieve certain reductions in greenhouse gas emissions by 2050

- GHG emissions limits for all buildings >25,000 square feet
- Creation of a DOB “Office of Building Energy and Emissions Performance”
- Convening of an advisory board on future limits
- Study for a building carbon trading scheme
- City operations GHG reductions of 40% by 2025 and 50% by 2030
- NYCHA properties need to meet GHG reductions of 40% by 2030

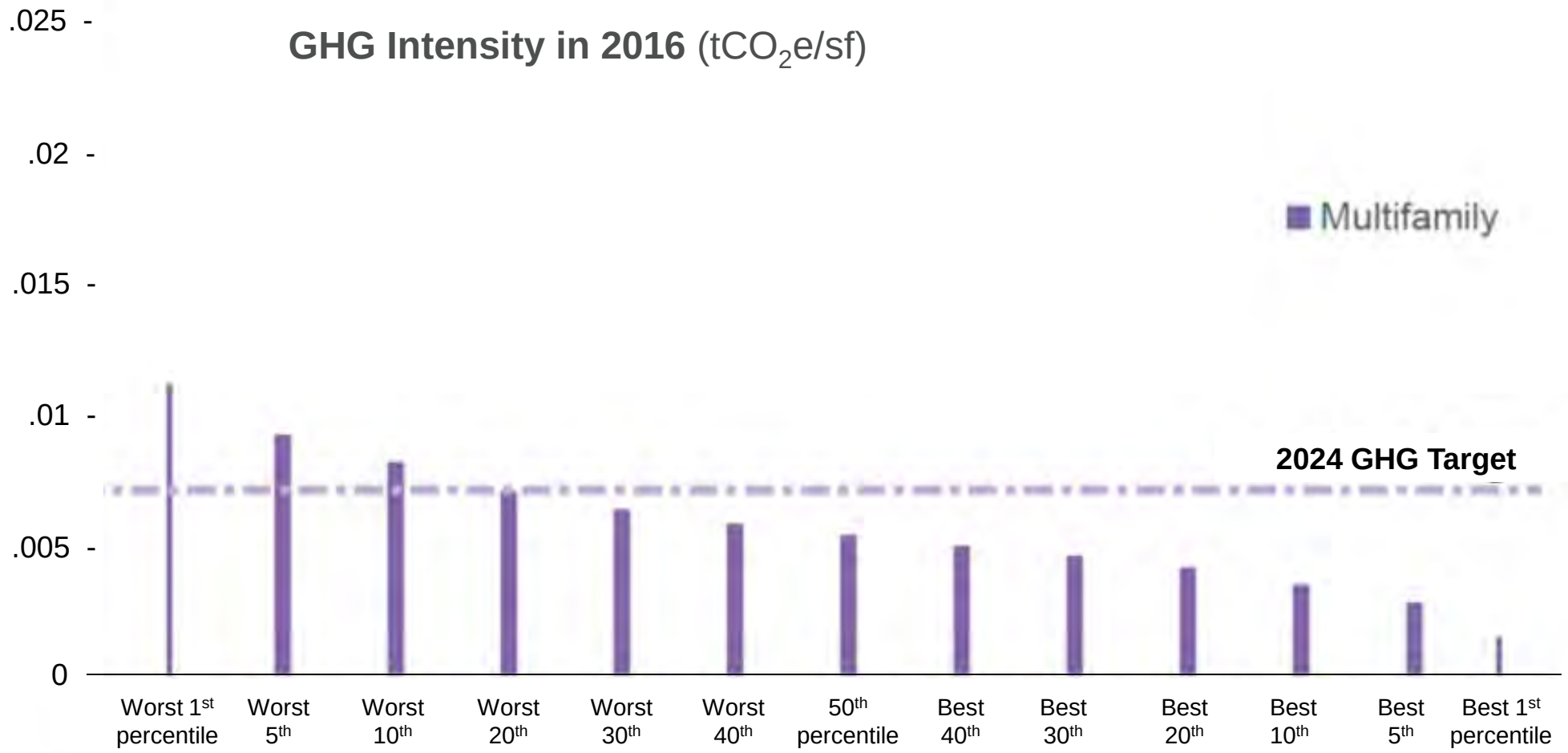
NYC emissions: 51.7 $MtCO_2e$



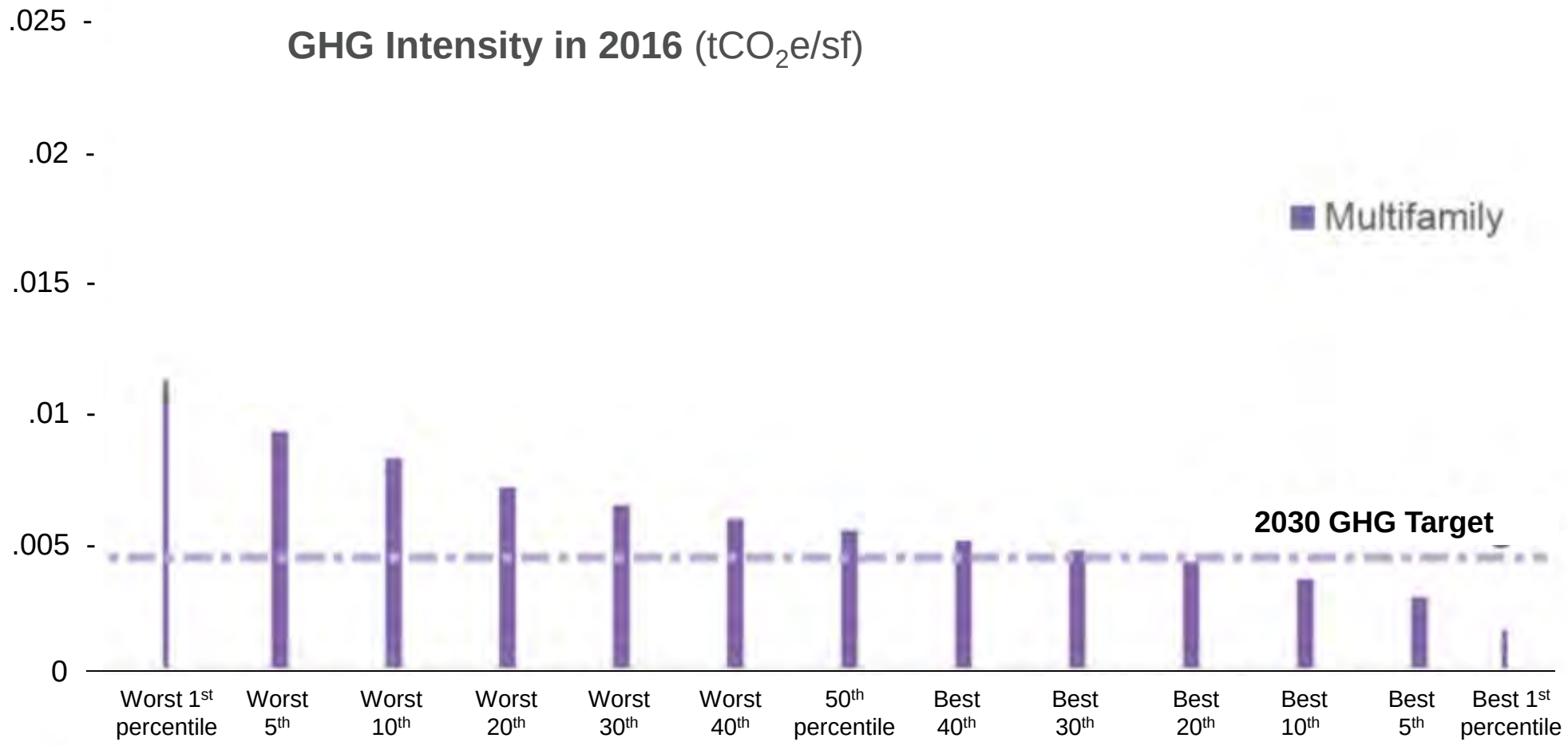
By 2030, the Climate Mobilization Act will achieve:

- **6 million tons of CO_2e reduced**
- **26,700+ jobs created**
- **150 hospitalizations avoided per year**
- **50 to 130 deaths prevented per year**

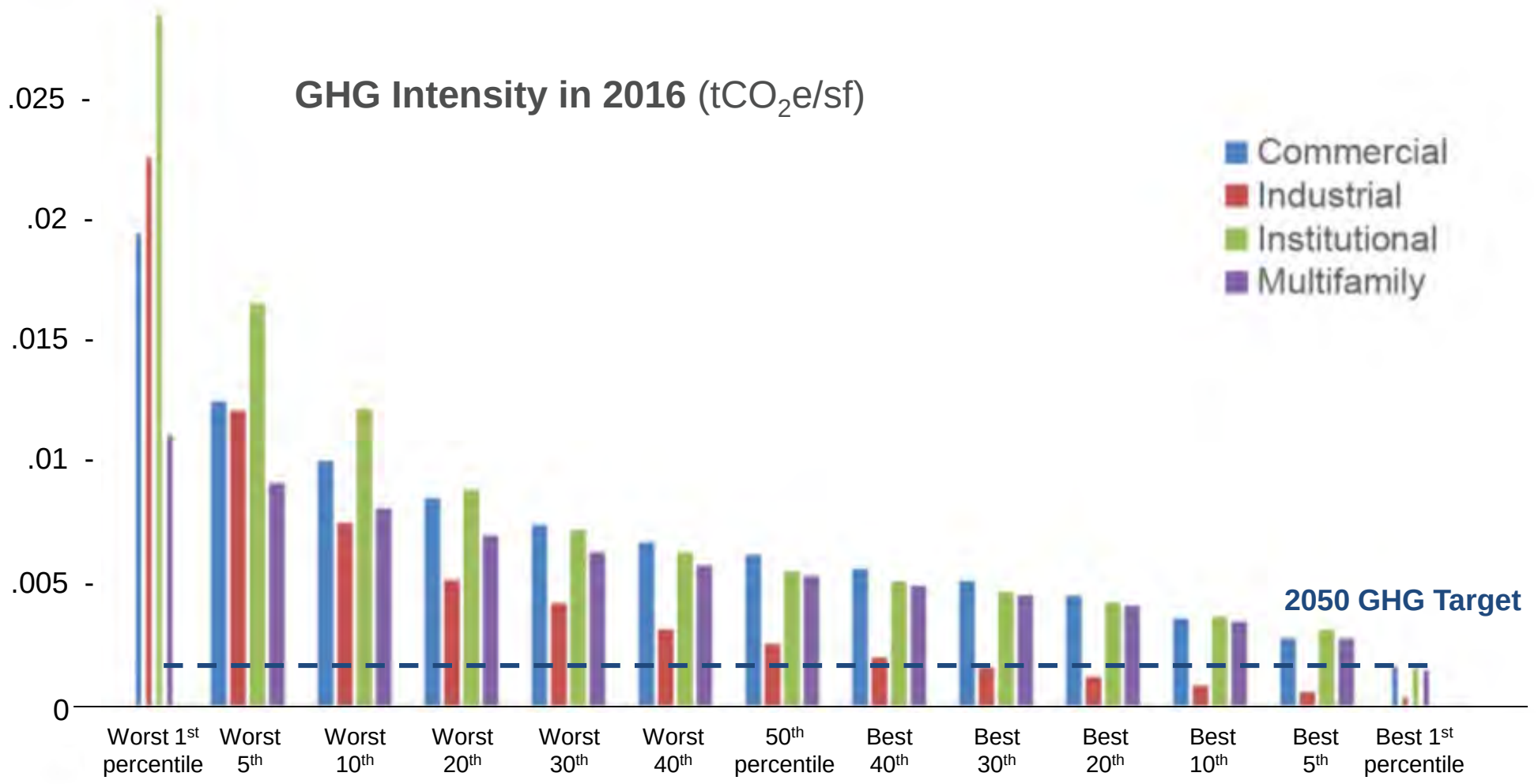
LOCAL LAW 97 TARGETS



LOCAL LAW 97 TARGETS



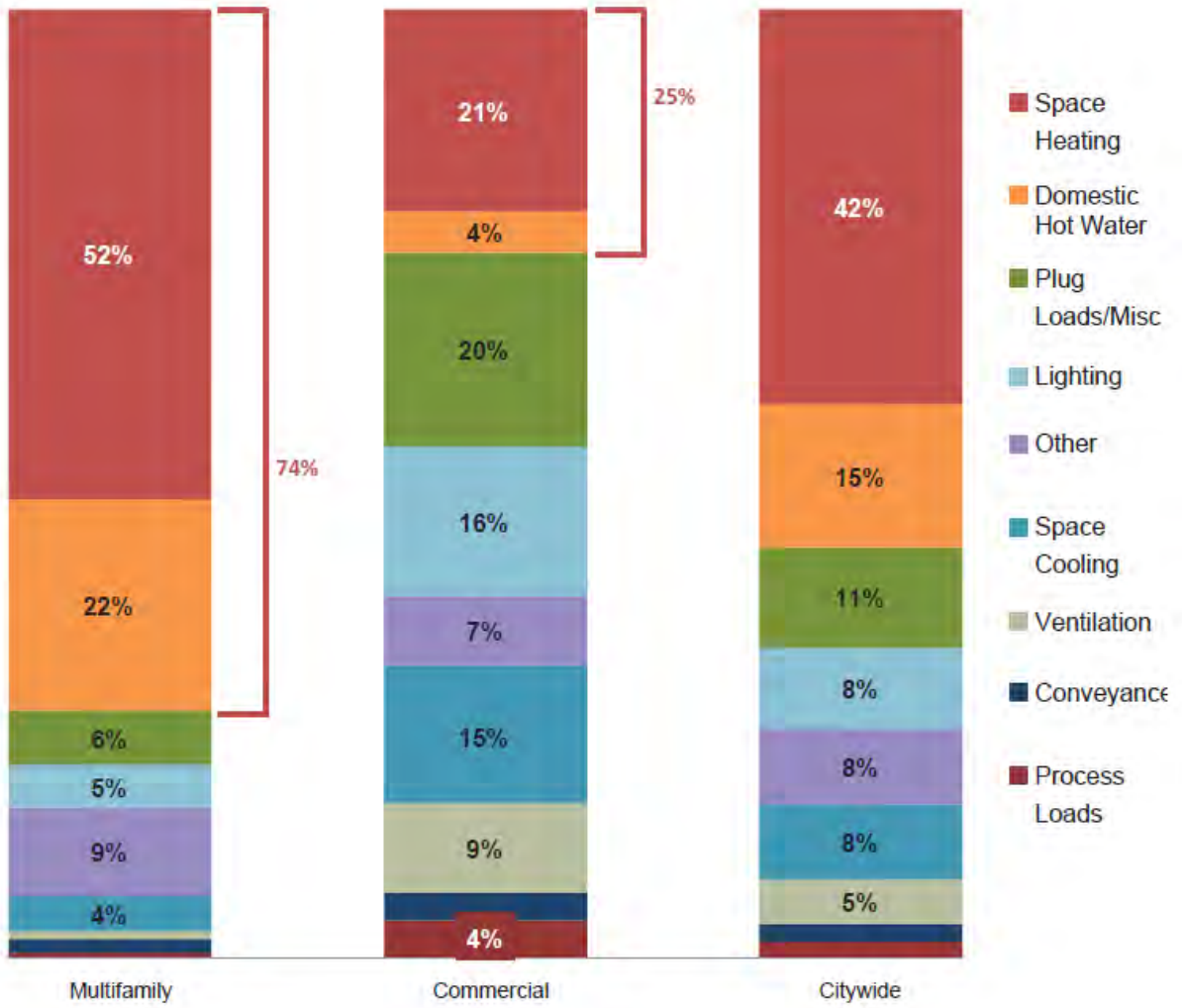
LOCAL LAW 97 TARGETS



Key Findings about Building Energy Use

- The energy used for **space heating** and **domestic hot water (DHW) production** accounts for the majority of building-based emissions

Building GHG Emissions by End Use

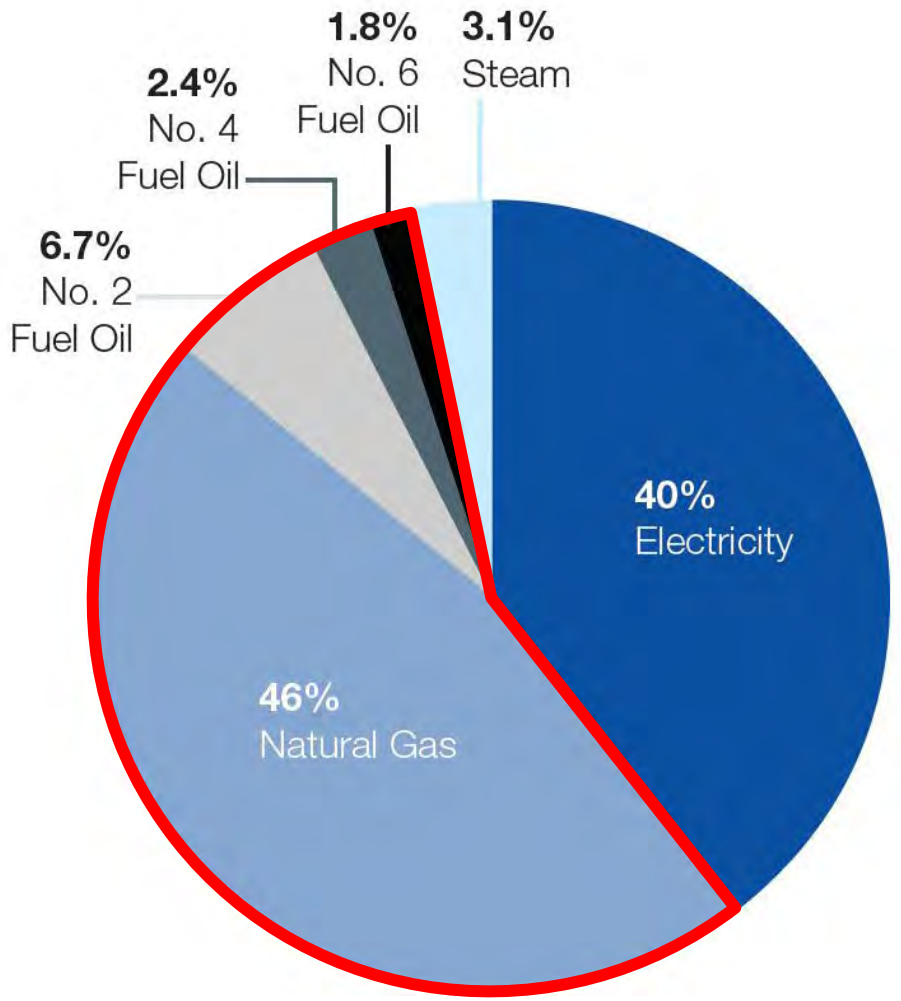


Source: 2013 and 2014 Local Law 87 Submissions

Building Energy Use by Fuel Type

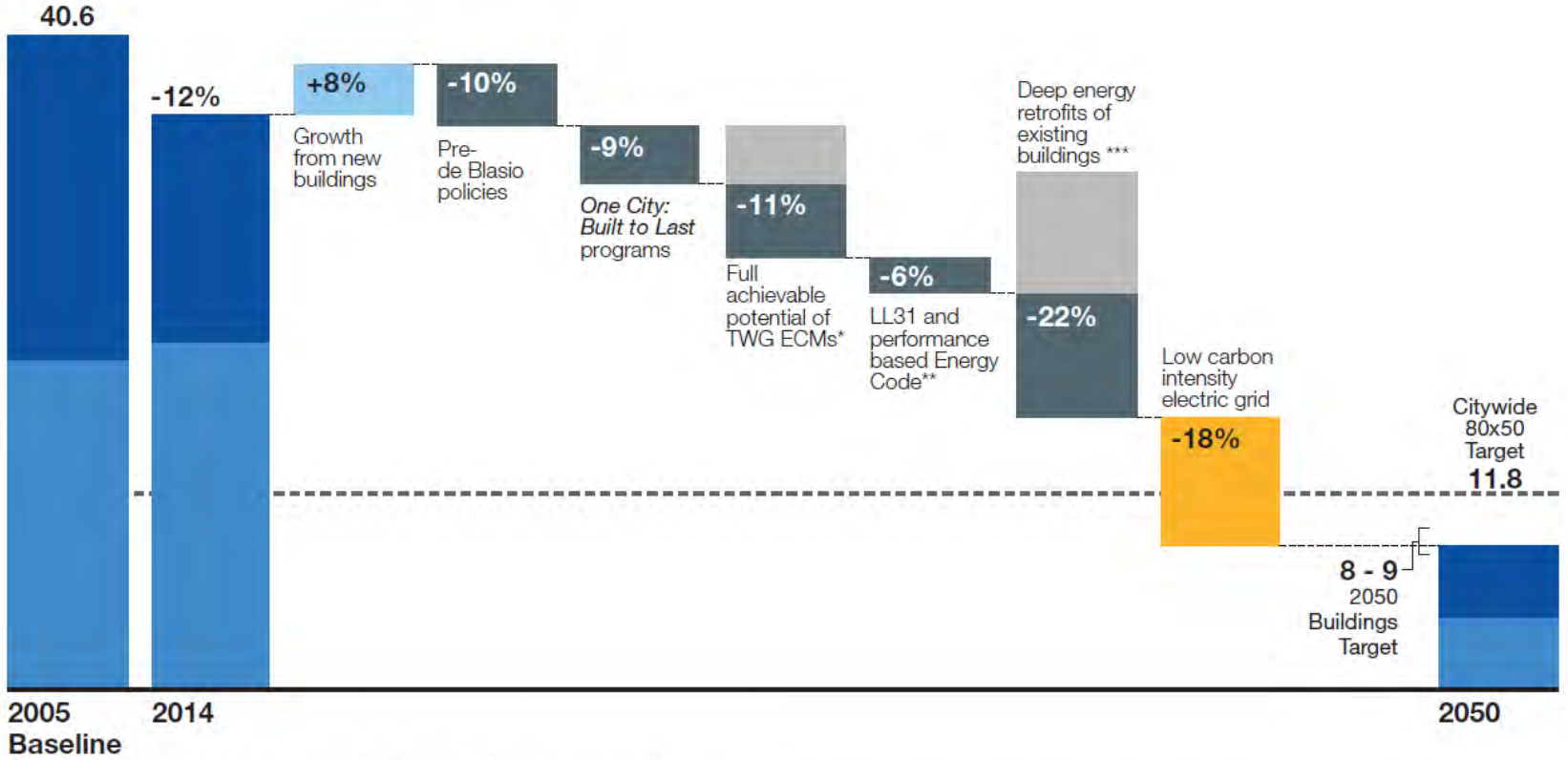
- **Fossil fuels dominate** energy use and GHG emissions from New York City's buildings.

Sources of NYC Building-based Emissions by Fuel Type



A Buildings Pathway to 80 x 50

Nearly every building will need to complete a deep energy retrofit, and many will need to move away from fossil fuel-based heating and hot water systems.



* Full implementation of TWG ECMs includes 100% overlap with One City: Built to Last initiatives

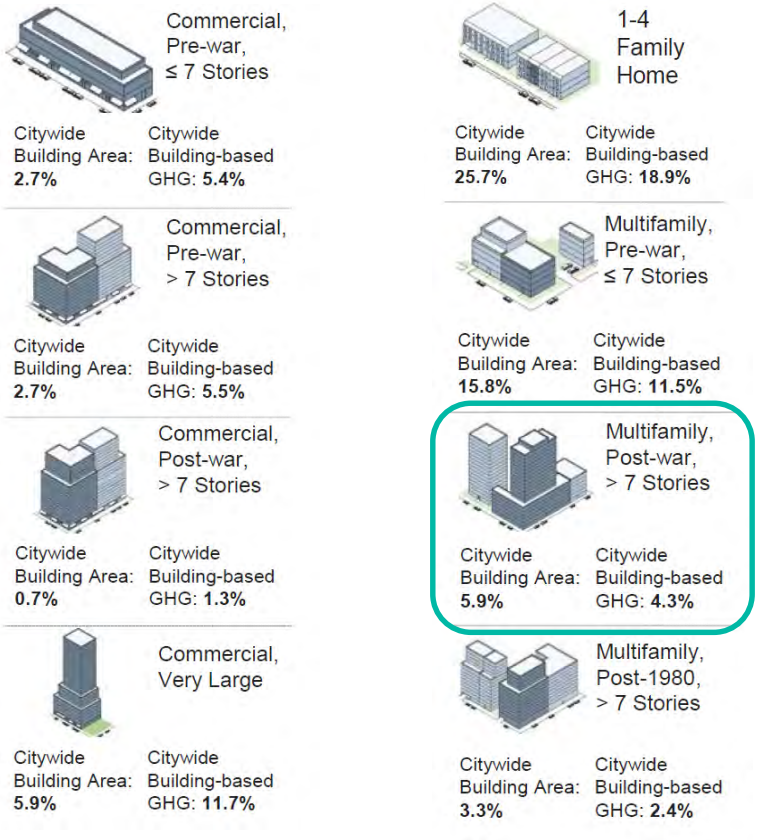
** Assumes a 50% reduction from ASHRAE 2013 standards for new construction and substantial renovations in public buildings beginning in 2017, and a 70% reduction from ASHRAE 2013 standards implemented in 2022 for both public and private buildings.

*** Includes 100% overlap with ***One City Built to Last initiatives*** and TWG ECMs. 50-60% of buildings implement strategies that include high efficiency electric technologies for heat and hot water.

Deep Energy Retrofit Paths

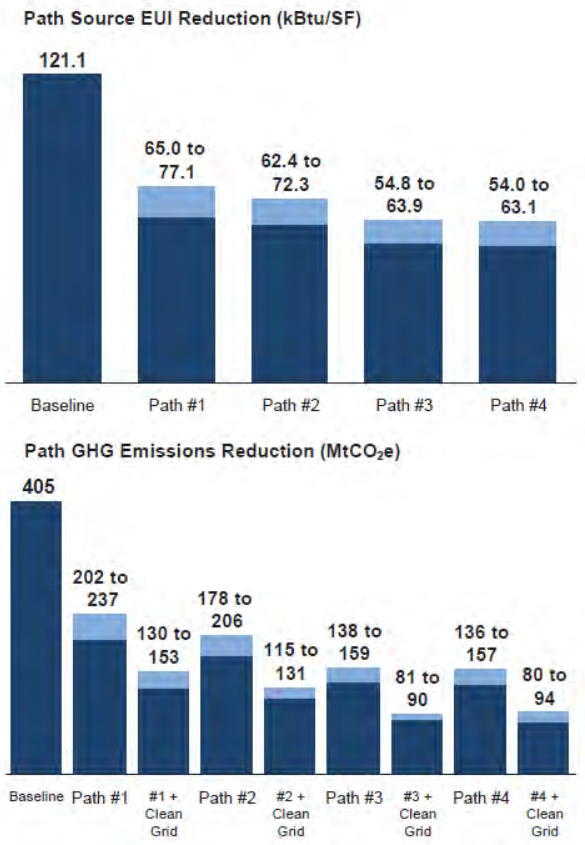
Models of deep energy retrofit paths show that **40-60 percent energy reductions are possible using existing technologies and strategies.**

Eight Key Building Typologies



Sample Deep Retrofit Path Results

Multifamily, Post-War, > Seven Stories



Electrification Paths:

Path 3: Heat Pumps for Heating and Cooling

Path 4: Heat Pumps with Building Envelope Measures

New York City's Energy Efficiency Programs

The City has created a **suite of programs and policies to help decision-makers** understand their buildings' energy use and make voluntary upgrades.

THE NEW YORK CITY GREENER, GREATER BUILDINGS PLAN

NYC CARBON CHALLENGE

NYC Retrofit ACCELERATOR

NYC Department of Housing Preservation & Development

Green Housing Preservation Program

COMMUNITY RETROFIT NYC

BETTER BUILDINGS, BLOCK BY BLOCK

greeNYC

SOLARIZE NYC

NYC Benchmarking HELP CENTER

NYC Accelerator

Free Help. Simple Fixes. Big Results.

- Work with you one-on-one to understand your needs
- Connect you with qualified contractors to do the job
- Find cash incentives and financing to help pay for your upgrades
- Train your building staff so your building continues to run efficiently
- Support you every step of the way from project start to finish

The High Performance Retrofit Track

- Pilot deep energy retrofits in real buildings
- 15-year capital plans to reach high performance
- Upgrades to all major building systems: HVAC, DHW, Envelope
- Develop a pathway for implementation across larger portfolios

NYC Retrofit ACCELERATOR

High Performance Track Services

- Create capital plans that integrate energy efficiency
- Educate and train on high performance technology
- Deploy intern capacity
- Train decision makers on high performance retrofits
- Support implementation of early capital projects

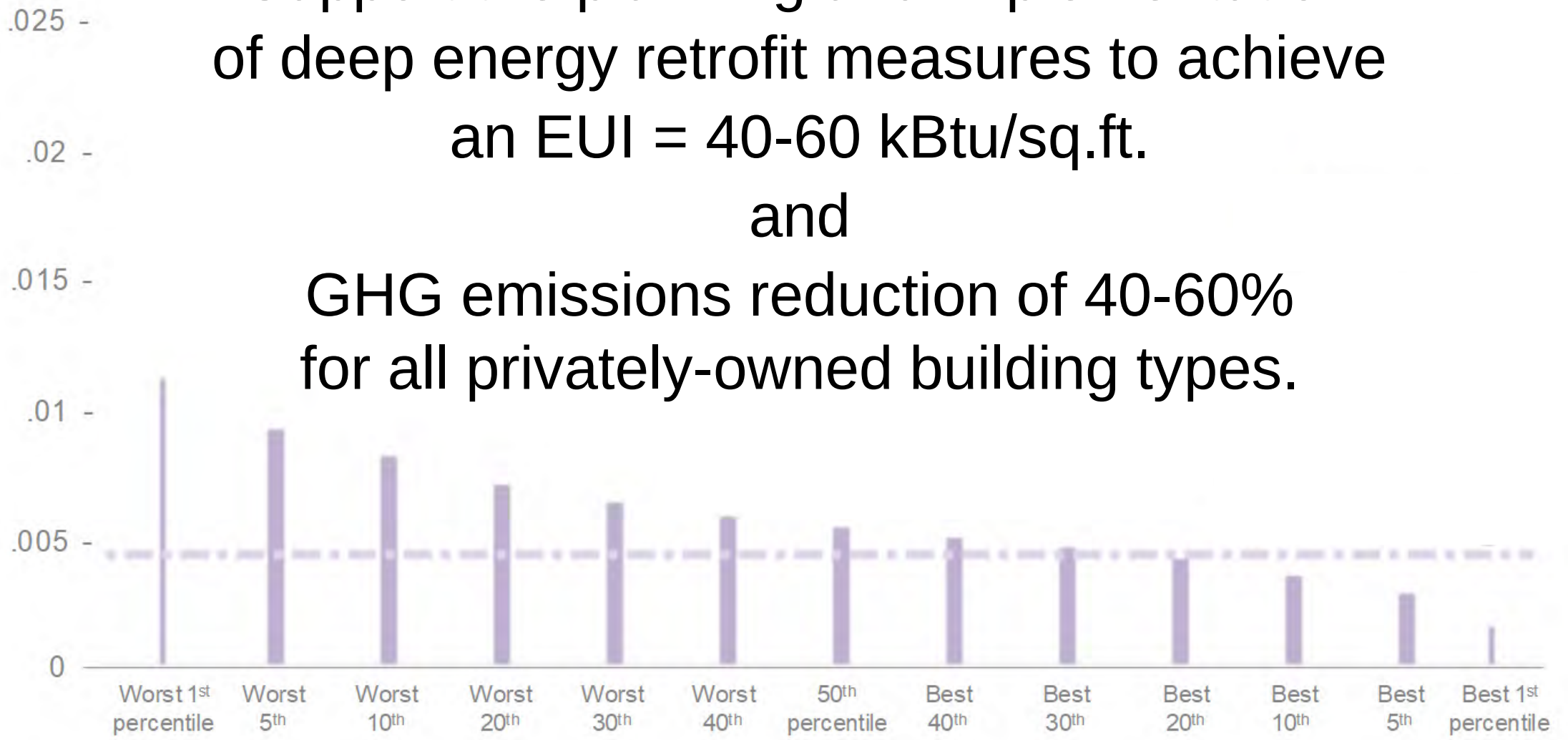
NYC Retrofit ACCELERATOR

High Performance Retrofit Track (HPRT) Mission

Support the planning and implementation of deep energy retrofit measures to achieve an EUI = 40-60 kBtu/sq.ft.

and

GHG emissions reduction of 40-60% for all privately-owned building types.



High Performance Retrofit Track (HPRT) Process

Data Collection

- Local law 87 audit review
- Equipment inventory review
- On-site visit

Resources

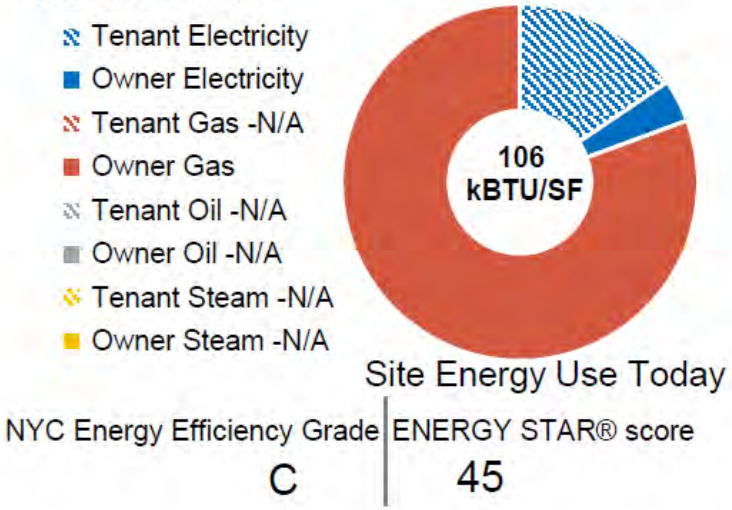
- Deep Energy Retrofit Planning Analysis (DERPA) reports
- HPRT 15-year plan
- Technical Primers

Pre-engineering feasibility assessment

Deep Energy Retrofit Planning Report (DERPA)

Summary of Your Building

123 45th Street



NYC Energy Efficiency Grade	ENERGY STAR® score
C	45

TWG Typology	Multifamily, Post-war >7 stories
Building Typology Based on Audit	MF, Dorm, or Hotel, pre-1980 construction, steam heat
Size	108,633 SF
Height (stories)	12
Construction Year	1965
Heating System	Steam Boiler
Cooling System	Room by room
Wall Construction	Brick/Stone on Steel Frame
Domestic Hot Water (DHW)	Heat Exchanger with Heating System

Package 1	**Package 2**	**Package 3**	**Package 4**
Deep Optimization	Hydronic Conversion	Heat Pumps for Heating	Package 3 + Wall Insulation
Site Energy Savings	Site Energy Savings	Site Energy Savings	Site Energy Savings
44% to 54%	50% to 58%	66% to 72%	72% to 78%
Major existing systems are optimized as much as possible	Low temp hydronic heating with high efficiency plant	High efficiency heat pumps for heating and cooling	High efficiency heat pumps and added insulation where possible

High Performance Retrofit Plan

Property Name:
Address:
Select HPR Pathway: **Package 3**

Package 3 Objective:
Year 15 Site Energy Savings
78% to 82%

*HPRT requires that upgrades on at least two major building systems begin within three years of signing commitment, major systems are indicated in bold

Category	Measure	Implementation Tracking										
Existing Building System Optimization		**2018***	**2019***	**2020***	2021	2022	2023	2024	2025	2026	2027	2028-2033
DHW												
Air S												
Ligh												
Ven												
On-												

Existing Building System Optimization: pre-Electrification
- Space Heating, Cooling, Ventilation: Improve distribution, controls; maintenance
- Lighting
- Envelope: Air sealing
- On-site generation: Solar

Res												2028-2033
Lights/Appliances												
Lights/Appliances	Improved tenant space plug load efficiency/controls				X							
Air Sealing	Tenant space air sealing						X					

Existing Building System End of Life		2018*	2019*	2020*	2021	2022	2023	2024	2025	2026	2027	2028-2033
Spa												
Coo												
Ven												
DHW												

Existing Building System End of Life: Electrification Opportunity
- Space Heating, Cooling, Ventilation: Heat pumps, DOAS
- Domestic Hot Water: Heat Pumps
- Envelope: Walls, Windows, Roof – Passive House

Exterior Walls	Package 3: No major change, ENERGY STAR											X
Windows	Double pane insulated windows and frames											X
Roof	Maximize roof insulation											X

10 Participants, 30 Buildings

BRONXPRO GROUP

RiseBoro COMMUNITY PARTNERSHIP

DB

FirstService RESIDENTIAL

STUYTOWN
STUYVESANT TOWN | PETER COOPER VILLAGE

AvalonBay COMMUNITIES

1884
Memorial Sloan Kettering Cancer Center

Fourth Avenue Owners Corp.

NYC HEALTH+ HOSPITALS

NYU

HPRT Projects & Support

Projects:



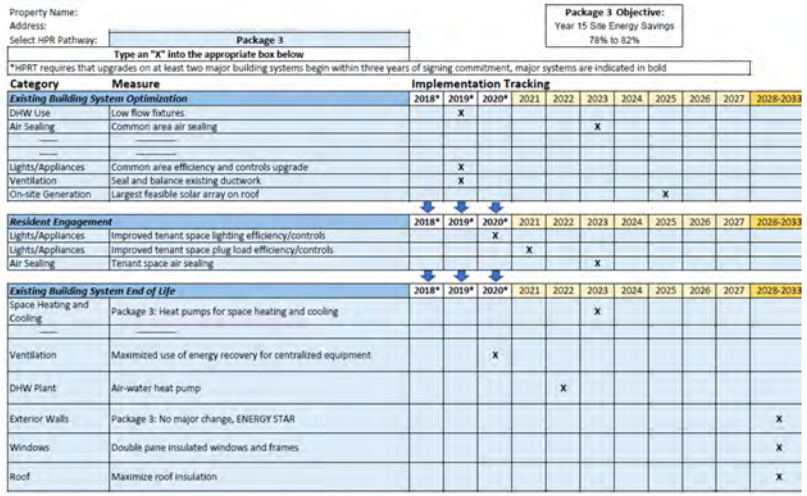
- Air Source Heat Pumps (ASHP)
- DHW heat pumps (ASHP)
- Hybrid heat pump (AWHP)
- Windows
- Advanced central space cooling technology





Support Services

- Building site visits
- Multifamily residential board meeting presentations
- Pilot project planning support
- Review vendor proposals and RFP for heating and cooling system
- Vendor engagements



Property Name:
Address:
Select HPR Pathway: **Package 3**

Package 3 Objective:
Year 15 Site Energy Savings
78% to 82%

Type an "X" into the appropriate box below

*HPRT requires that upgrades on at least two major building systems begin within three years of signing commitment, major systems are indicated in bold

Category	Measure	Implementation Tracking									
Existing Building System Optimization		**2018***	**2019***	**2020***	2021	2022	2023	2024	2025	2026	2027	2028-2033
DHW Use	Low flow fixtures		X									
Air Sealing	Common area air sealing						X					
Lights/Appliances	Common area efficiency and controls upgrade		X									
Ventilation	Seal and balance existing ductwork		X									
On-site Generation	Largest feasible solar array on roof								X			
Resident Engagement		**2018***	**2019***	**2020***	2021	2022	2023	2024	2025	2026	2027	2028-2033
Lights/Appliances	Improved tenant space lighting efficiency/controls			X								
Lights/Appliances	Improved tenant space plug load efficiency/controls				X							
Air Sealing	Tenant space air sealing						X					
Existing Building System End of Life		**2018***	**2019***	**2020***	2021	2022	2023	2024	2025	2026	2027	2028-2033
Space Heating and Cooling	Package 3: Heat pumps for space heating and cooling						X					
Ventilation	Maximized use of energy recovery for centralized equipment			X								
DHW Plant	Air-water heat pump					X						
Exterior Walls	Package 3: No major change, ENERGY STAR											X
Windows	Double pane insulated windows and frames											X
Roof	Maximize roof insulation											X

Technology Primers: Electrification

tech primer

Air to Water Heat Pumps (AWHPs)

Highly efficient domestic hot water production that reduces emissions and energy costs.

tech primer

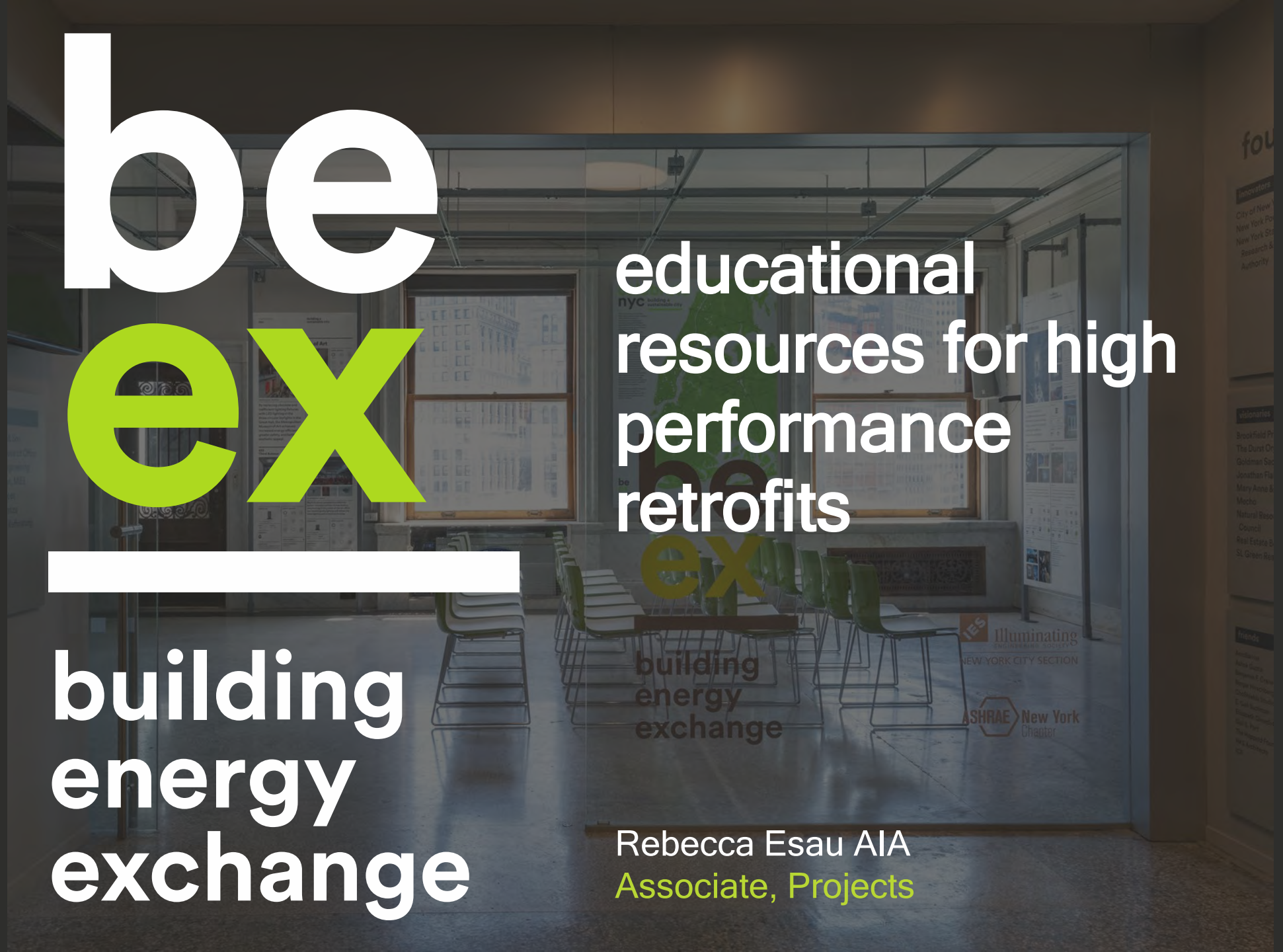
Mini-Split Systems

Highly efficient heat pumps for decentralized electric heating and cooling in multifamily buildings.

tech primer

Solar Photovoltaics & Batteries

Clean, renewable electricity generation and storage to dramatically reduce utility costs.

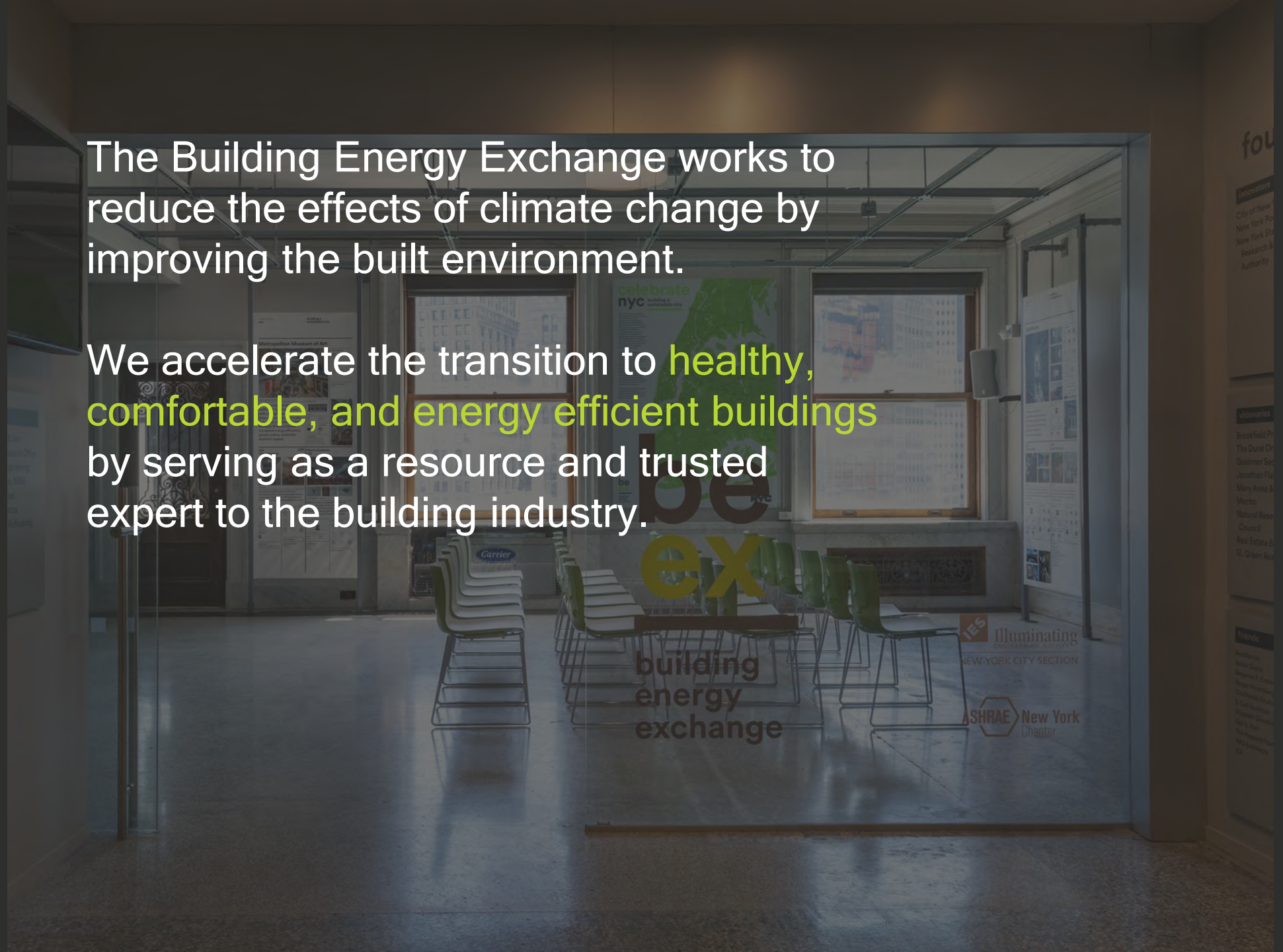


be ex

building energy exchange

educational resources for high performance retrofits

Rebecca Esau AIA
Associate, Projects

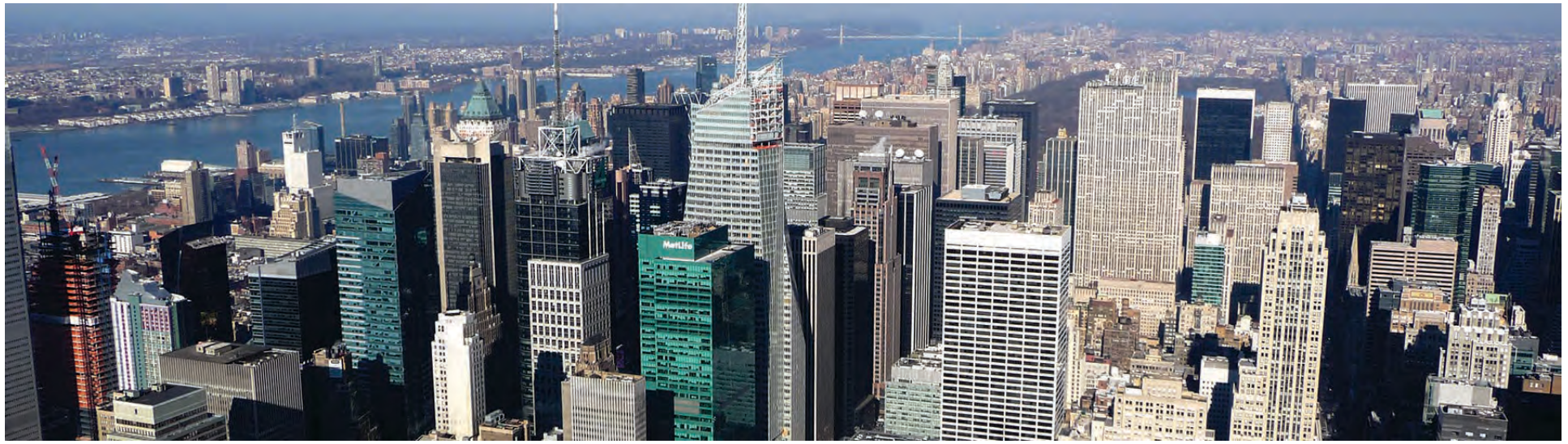


The Building Energy Exchange works to reduce the effects of climate change by improving the built environment.

We accelerate the transition to healthy, comfortable, and energy efficient buildings by serving as a resource and trusted expert to the building industry.

the problem

buildings are responsible for 70% of NYC’s greenhouse gas emissions



buildings are essential to combating climate change;
they must become dramatically more:

- **efficient**
- **comfortable**
- **affordable**
- **resilient**

the solution

connecting decision makers with actionable information

100,000+ building decision makers in New York City

+

energy efficiency solutions & education

what is BEEx?

a global center for excellence dedicated to building energy efficiency

building community

networking, inspiring stories, topical events

everyday efficiency

incremental measures, systems and products

high performance

long term planning, holistic retrofits

what is BEEx?

a global center for excellence dedicated to building energy efficiency

1. education
training, events
& symposia

2. tools
reports, case studies
& campaigns

3. exhibits
advanced technology
& hands-on experiences

1. education

diverse programming that informs on energy efficiency

700

trainings & events
in our energy efficiency resource center

19,000

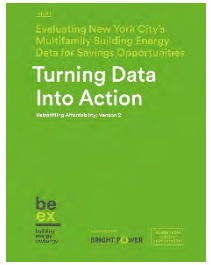
building decision makers
have attended BEEx programming

50+

organizations
have hosted events in our space

2. tools

research & initiatives that have real impact



reports
that turn data into action

Daylight Hour

campaigns
that engage entire communities

case studies
with clear, critical lessons

3. exhibits

hands-on experiences that display advanced technology and inspire action

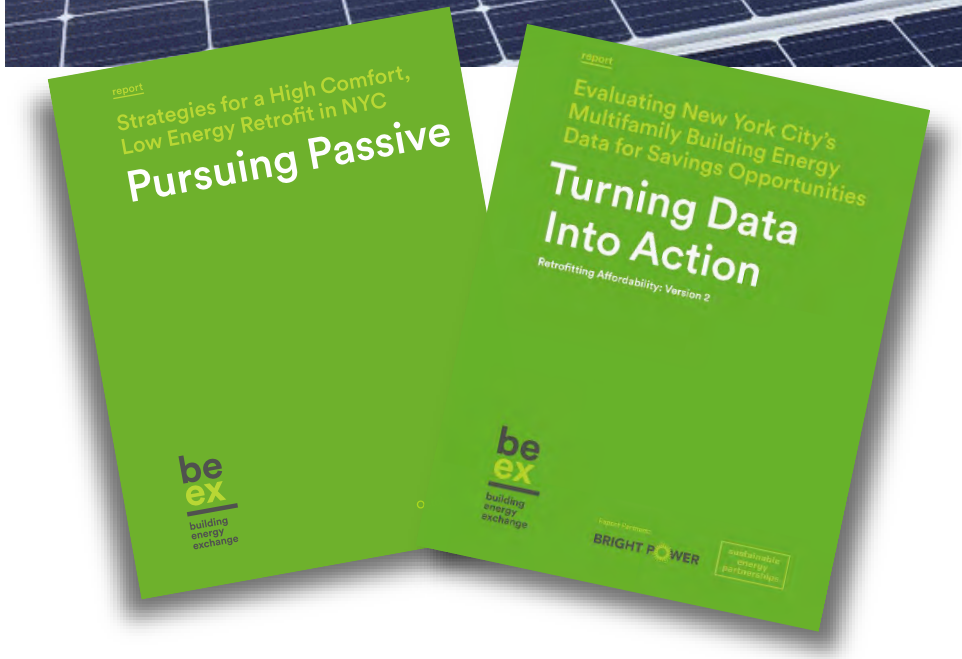
educational
exhibits demystify energy efficiency

transformative
exhibits inspire action

fun
exhibits are hands-on, interactive experiences

case: electrification

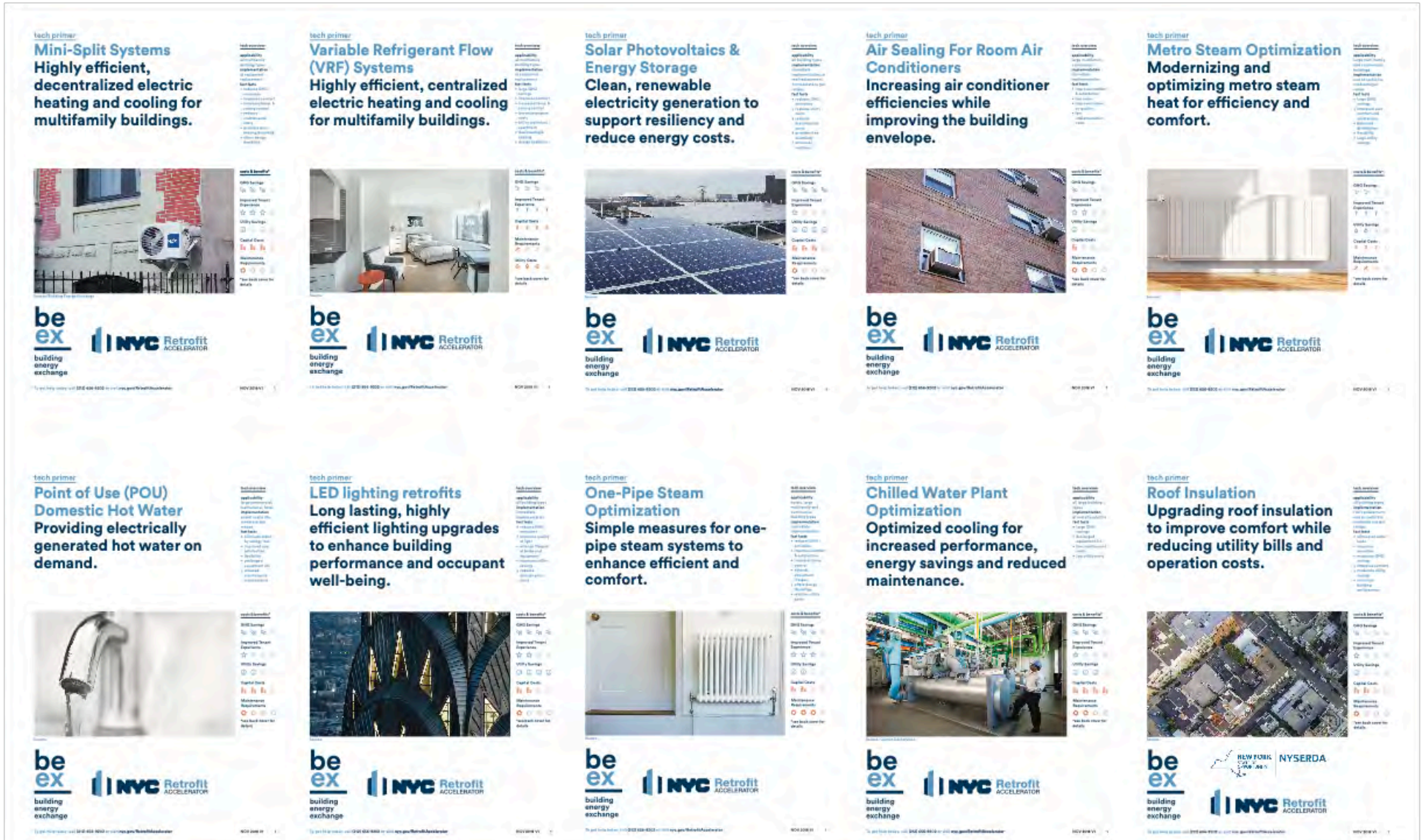
supporting fossil fuel conversion retrofits



Climate Mobilization Act primer
free one-hour seminar

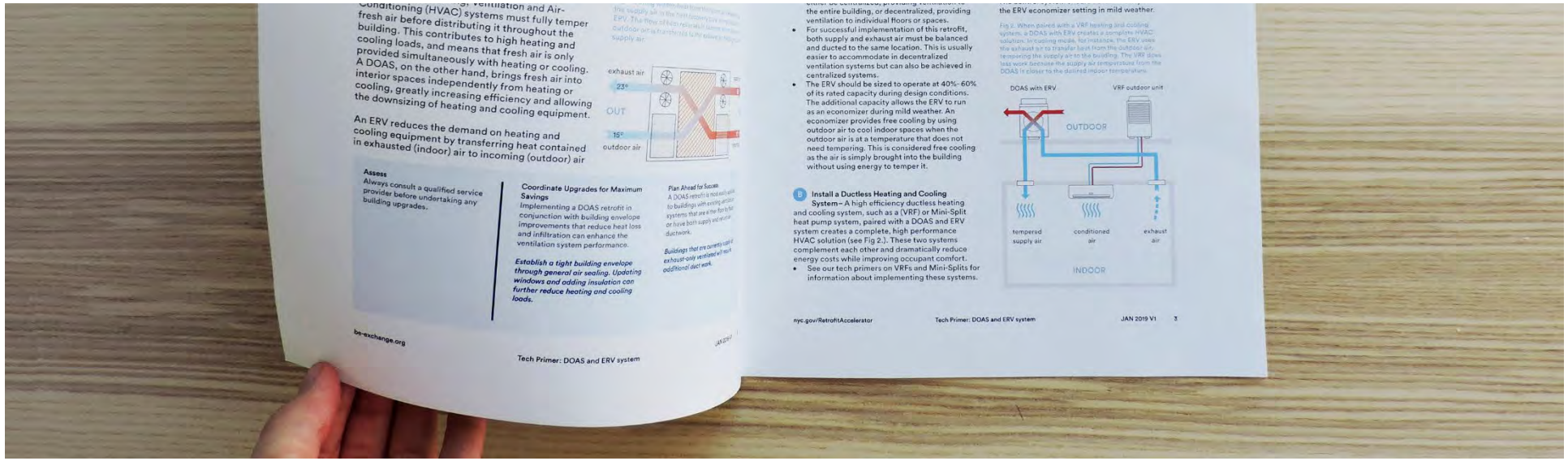
case: high performance tech primers

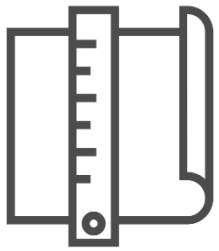
intro to deep-energy saving technologies + implementation best-practices



case: high performance tech primers

intro to deep-energy saving technologies + implementation best-practices





architects & engineers

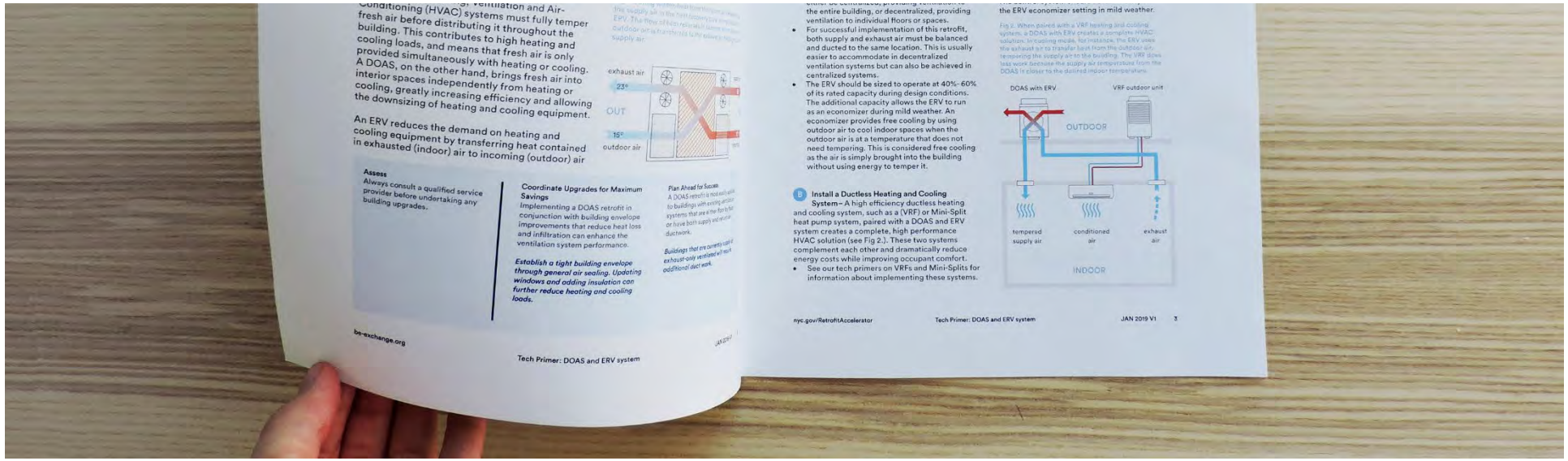
building owners

building operators

grandma

case: high performance tech primers

intro to deep-energy saving technologies + implementation best-practices



- envelope
- heating
- cooling
- LED lighting
- domestic hot water
- plug load reduction
- ventilation
- renewable energy

case: high performance tech primers

intro to deep-energy saving technologies + implementation best-practices

tech overview

applicable building types

commercial

implementation

anytime, at mid-cycle or refinance

fast facts

- reduces GHG emissions
- improves air quality
- reduces heating and cooling loads
- reduces maintenance costs
- reduces utility costs

costs & benefits*

GHG Savings

Tenant Experience Improvements

Utility Savings

Capital Costs

Maintenance Requirements

case: high performance tech primers

intro to deep-energy saving technologies + implementation best-practices

getting to know DOAS and ERV systems

Dedicated Outdoor Air Systems (DOAS) and Energy Recovery Ventilators (ERVs) provide controlled and conditioned ventilation that improves indoor air quality and occupant health, while reducing greenhouse gas emissions and saving energy.

how do DOAS and ERVs work?

All commercial buildings in the US are required to supply fresh air to occupied spaces. Fresh, clean air supports human health and is critical to indoor air quality and comfort. Although ventilation methods may differ, tempering fresh air can be an energy demanding process.

A Dedicated Outdoor Air System (DOAS) with a high efficiency Energy Recovery Ventilator (ERV) is an alternative ventilation system design that can significantly reduce a building's heating and cooling loads. Pairing DOAS and ERV with a ductless heating and cooling system, such as Variable Refrigerant Flow (VRF) or Mini-Split heat pumps, can further reduce heating and cooling loads while enhancing comfort.

Conventional Heating, Ventilation and Air-Conditioning (HVAC) systems must fully temper fresh air before distributing it throughout the building. This contributes to high heating and cooling loads, and means that fresh air is only provided simultaneously with heating or cooling. A DOAS, on the other hand, brings fresh air into interior spaces independently from heating or cooling, greatly increasing efficiency and allowing the downsizing of heating and cooling equipment.

An ERV reduces the demand on heating and cooling equipment by transferring heat contained in exhausted (indoor) air to incoming (outdoor) air or vice versa, depending on the season (see Fig 1). The two air streams do not mix, keeping odor and pollutants in exhausted air separate from fresh supply air. This technique, called preconditioning, conserves a significant amount of energy that would otherwise be lost with traditional exhaust ventilation methods.

This tech primer outlines a high performance ventilation upgrade option for commercial buildings using a DOAS with ERV and recommends the installation of an efficient, ductless heating and cooling system (VRF or Mini-Split) to fully realize savings.

Fig 1. During winter, heat from the return air is transferred to the supply air in the heat recovery core (orange hatch) of an ERV. The flow of heat reverses in summer, where heat from the outdoor air is transferred to the exhaust air, helping to cool the supply air.

Assess
Always consult a qualified service provider before undertaking any building upgrades.

Coordinate Upgrades for Maximum Savings
Implementing a DOAS retrofit in conjunction with building envelope improvements that reduce heat loss and infiltration can enhance the ventilation system performance.

Establish a tight building envelope through general air sealing. Updating windows and adding insulation can further reduce heating and cooling loads.

Plan Ahead for Success
A DOAS retrofit is most easily applied to buildings with existing ventilation systems that are either floor by floor or have both supply and return air ductwork.

Buildings that are currently supply or exhaust-only ventilated will require additional duct work.

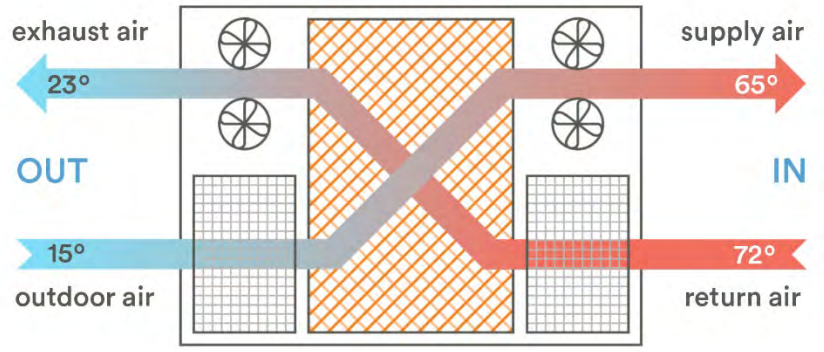
technology overview:

performance

benefits

compatibility

timing



case: high performance tech primers

intro to deep-energy saving technologies + implementation best-practices

how to upgrade to DOAS and ERV systems

A DOAS and ERV will greatly reduce the heating and cooling loads of a building. Coordinate heating and cooling retrofits in order to size equipment based on these load reductions.

retrofit solutions

A DOAS and ERV system combined with a properly downsized heating and cooling system and programmed HVAC controls will generate significant energy savings. There are multiple steps to achieving these savings:

A **Install a DOAS with an ERV**– Typical ERV efficiencies are around 70%. However, very high efficiency ERVs (on the order of 85% to 93%) have long been used in Europe and are now available in North America. A high performance ventilation retrofit requires the installation of an ERV at the highest efficiency available.

- A building's existing ventilation system may either be centralized, providing ventilation to the entire building, or decentralized, providing ventilation to individual floors or spaces.
- For successful implementation of this retrofit, both supply and exhaust air must be balanced and ducted to the same location. This is usually easier to accommodate in decentralized ventilation systems but can also be achieved in centralized systems.
- The ERV should be sized to operate at 40%–60% of its rated capacity during design conditions. The additional capacity allows the ERV to run as an economizer during mild weather. An economizer provides free cooling by using outdoor air to cool indoor spaces when the outdoor air is at a temperature that does not need tempering. This is considered free cooling as the air is simply brought into the building without using energy to temper it.

B **Install a Ductless Heating and Cooling System**– A high efficiency ductless heating and cooling system, such as a (VRF) or Mini-Split heat pump system, paired with a DOAS and ERV system creates a complete, high performance HVAC solution (see Fig 2.). These two systems complement each other and dramatically reduce energy costs while improving occupant comfort.

- See our tech primers on VRFs and Mini-Splits for information about implementing these systems.

C **Upgrade Controls**– Further optimization of the building's HVAC system can be achieved by programmed heating, cooling, and ventilation controls based on demand, measured CO2 levels, or an occupancy schedule.

- The HVAC controls must coordinate the operation of the DOAS with ERV and the heating and cooling system.
- The DOAS terminal units must be controlled by occupancy or CO2 sensors to provide fresh air to individual spaces when needed.
- When fresh air is not needed, the control system must reduce airflow at the terminal units and reduce the ERV fan to minimize energy consumption.
- The control system should automatically enable the ERV economizer setting in mild weather.

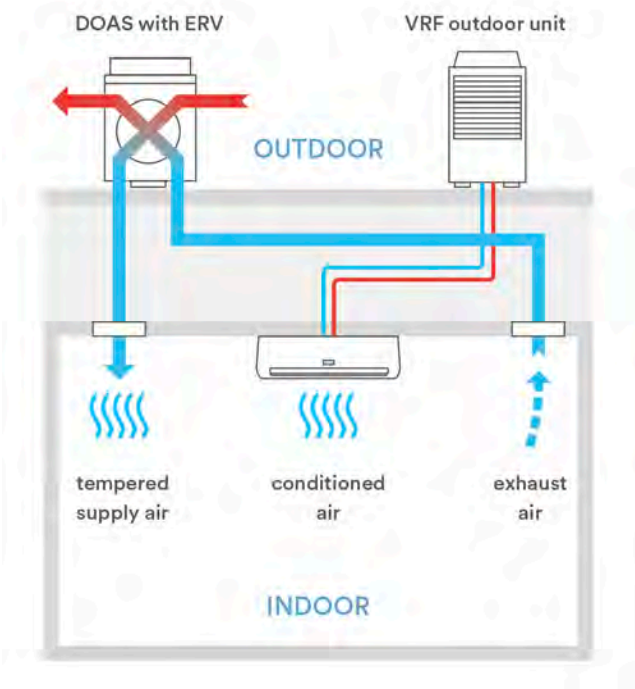
loser to the desired indoor temperature.

implementation requirements:

components

coordination

tenant engagement



case: participant profiles

showcasing high performance retrofits

"Passive House is about more than saving energy. It's about improving comfort, health, quality of life, and laying a foundation for communities to thrive."

-Scott Short, CEO RiseBoro Community Partnership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building
energy
exchange
be-exchange.org/
techprimers/
thank you.
Rebecca Esau AIA
Associate, Projects
re@be-exchange.org

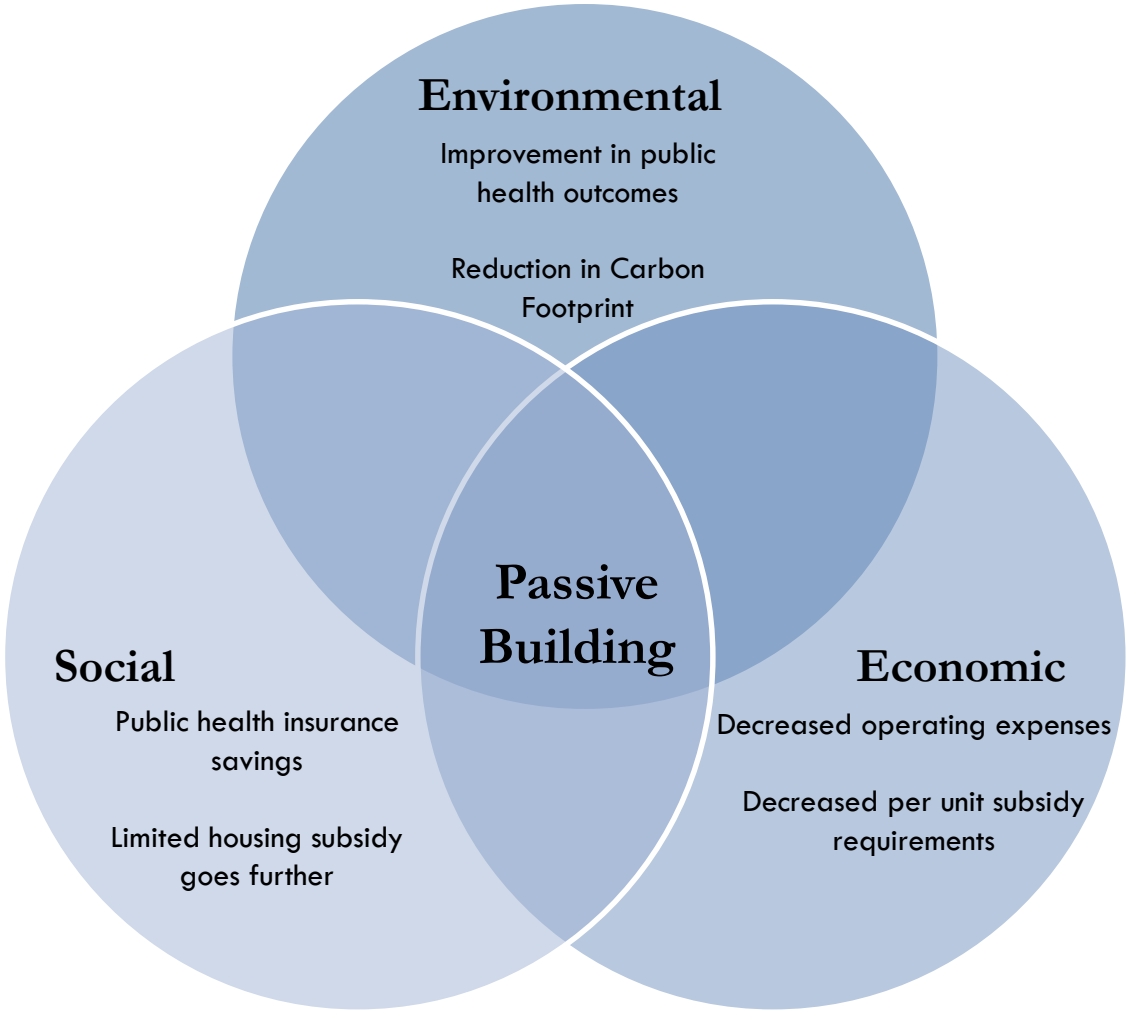
RiseBoro
COMMUNITY PARTNERSHIP

High Performance Retrofit Accelerator
Casa Pasiva
September 26 2019

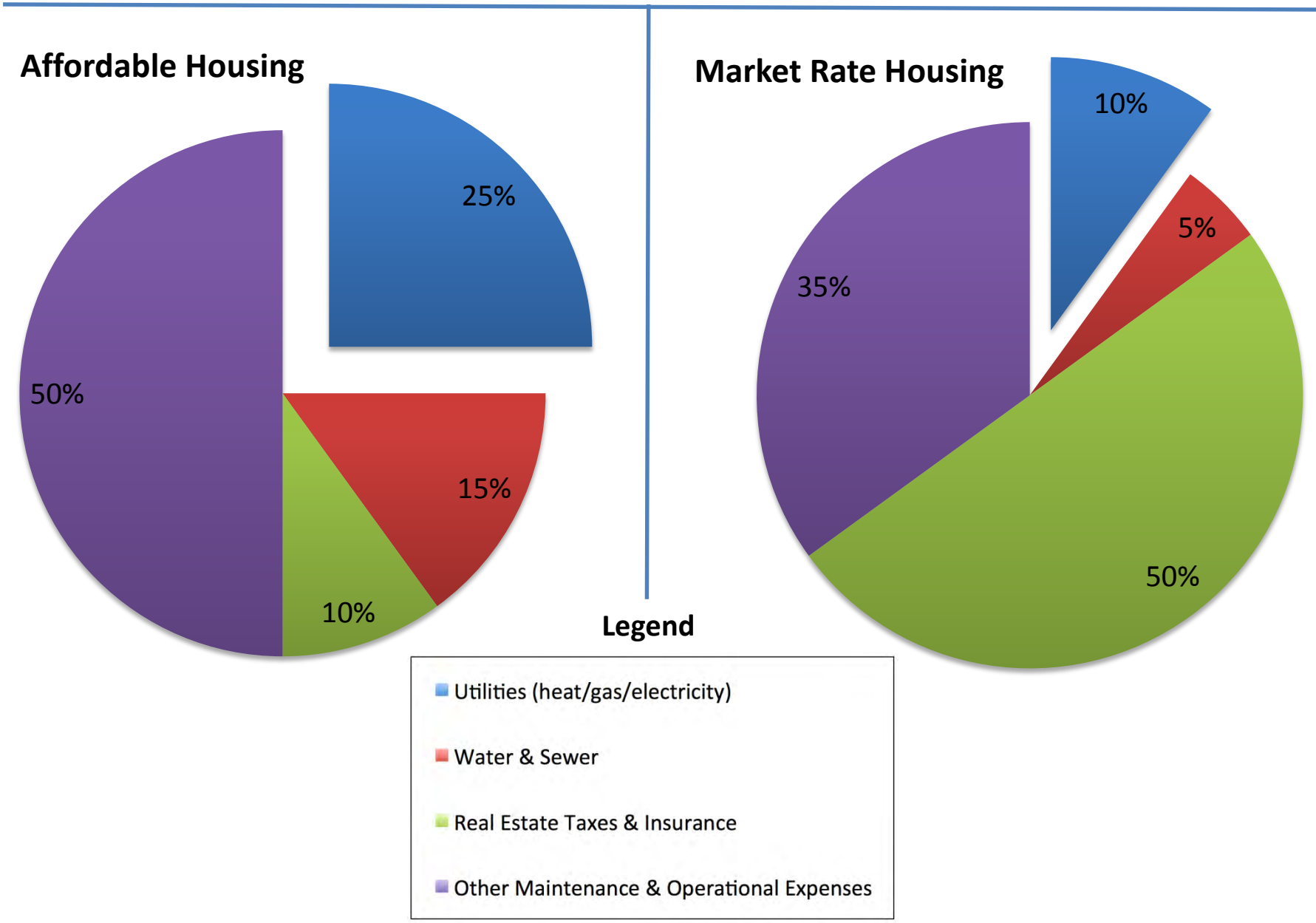
Ryan Cassidy, CPHC
Dir of Construction & Sustainability

Why Passive House?

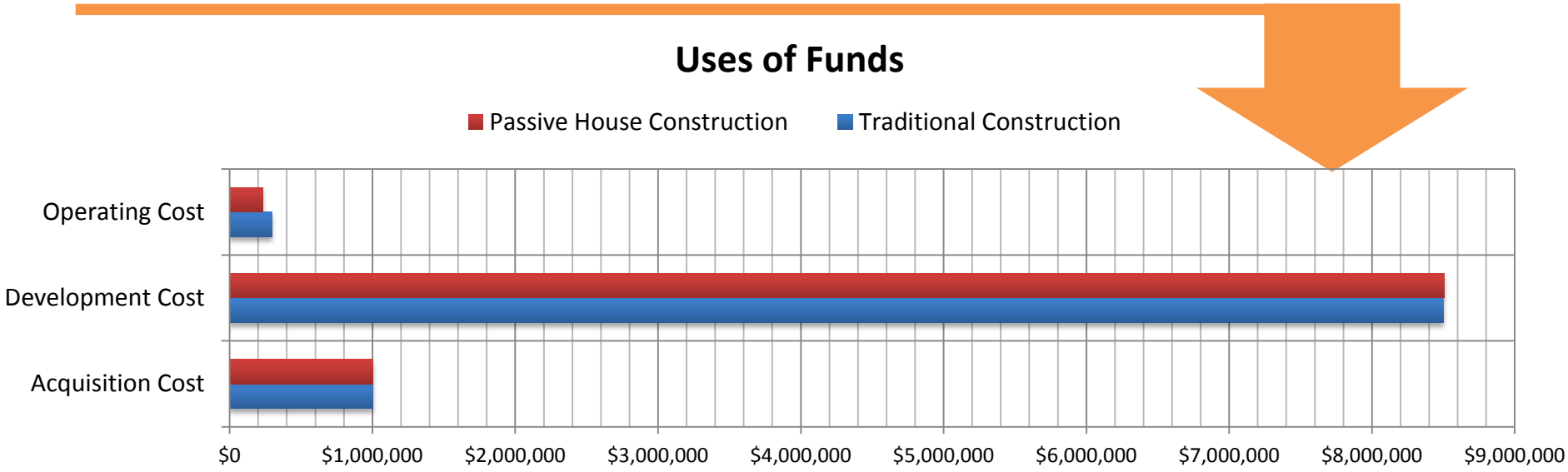
The Triple Bottom Line of Passive House Buildings

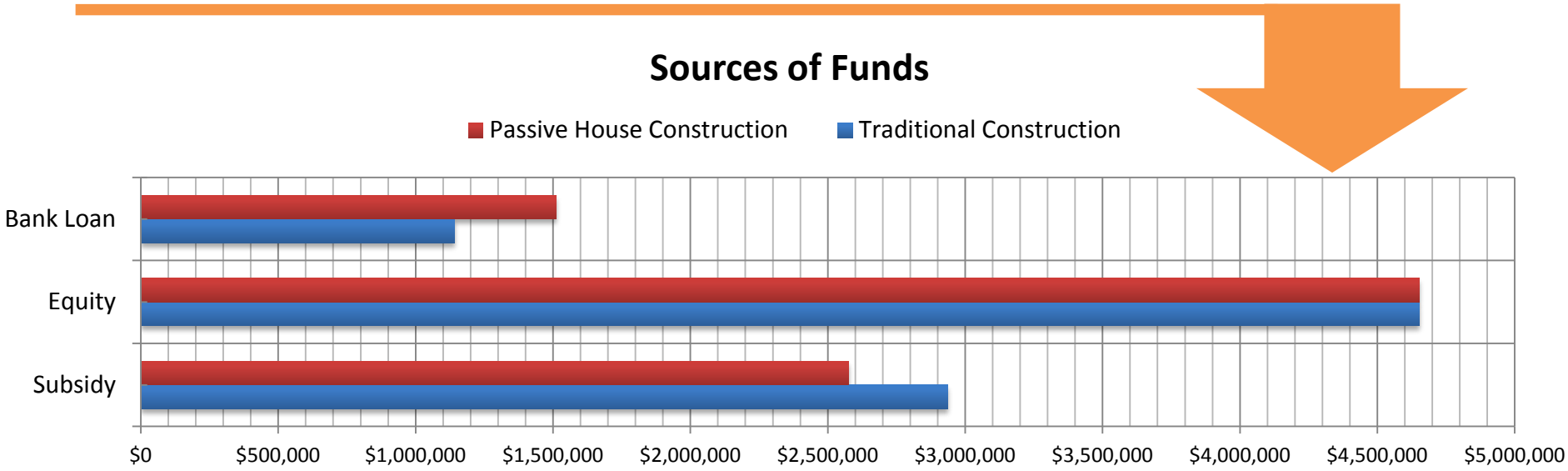


A Comparison of Typical Annual Maintenance & Operational Expenses

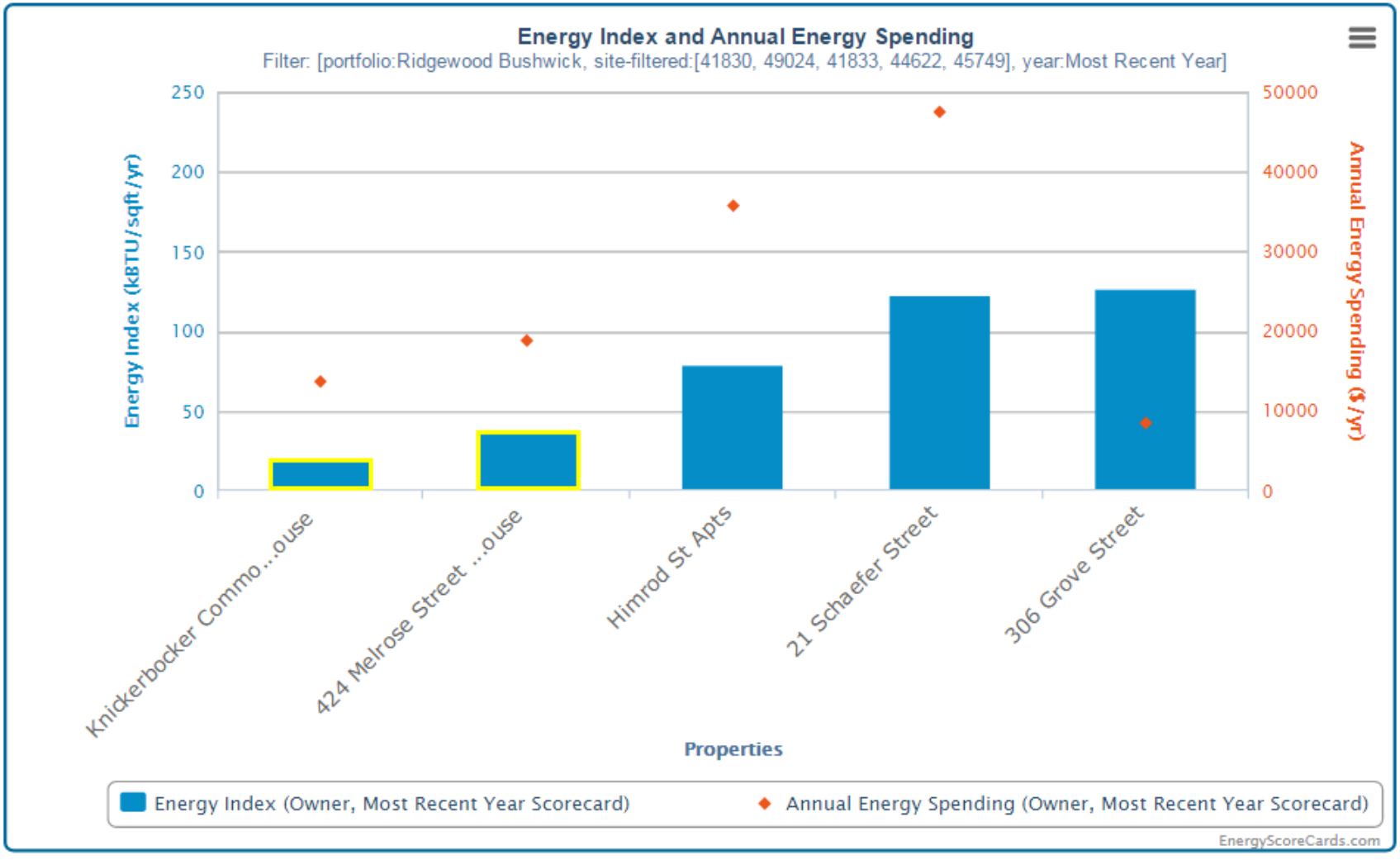


Impact on funding: 50% reduction in gas & electric cost



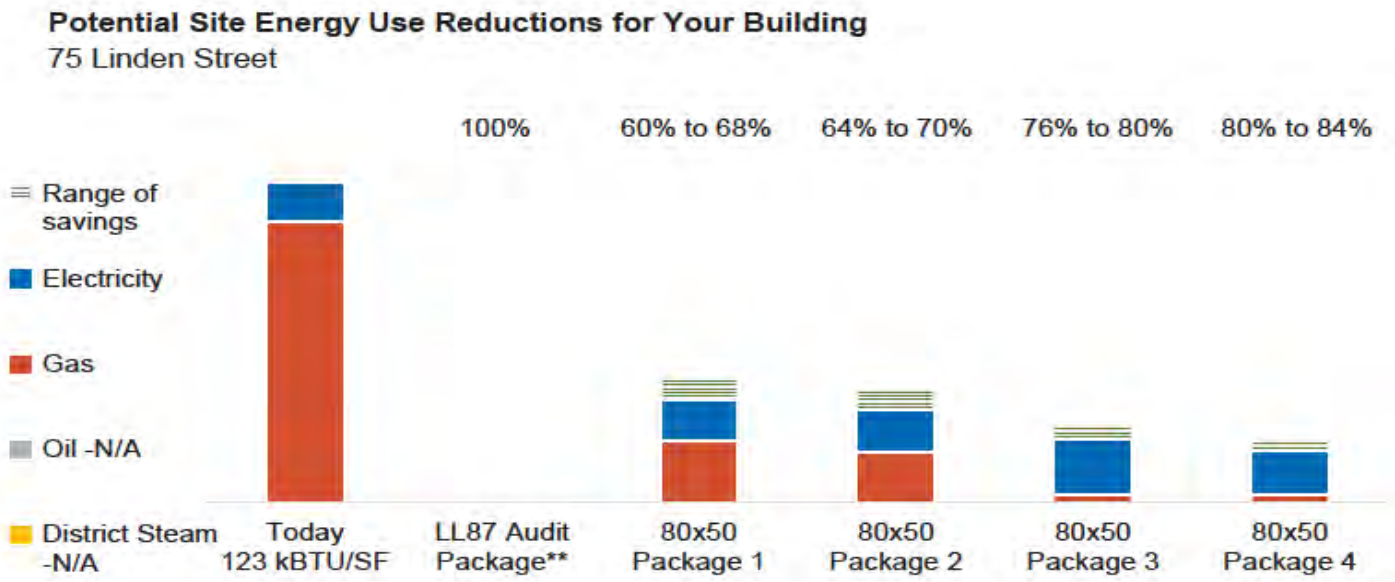


"80 by 50" Is It Possible?
RiseBoro New Construction



RiseBoro COMMUNITY PARTNERSHIP

"80 by 50"
NYC Deep Energy Retrofit Planning Report



Renovating to the Passive Standard

Renovating to the Passive Standard

- Typical YR15 Financing Methods
- Moderate Rehab/Tenant In Place
- Underwrite to Savings
- Gap financing by NYSERDA
- Meet Passive House (PHIUS) Standard
- Bonus: Renewables/Solar

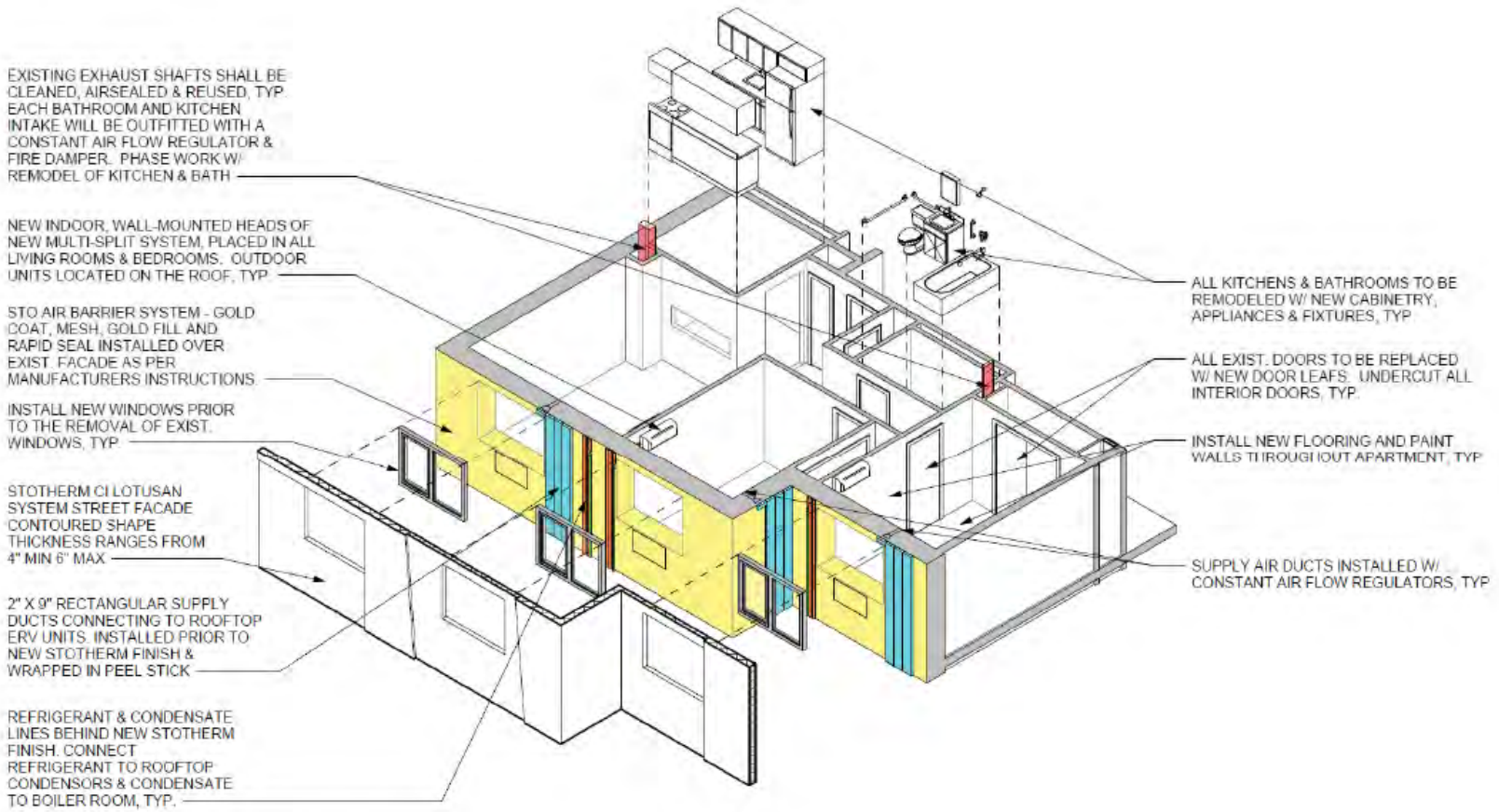
Portfolio

Building	Building Type	Old LL84	2018 LL84	Stories	Elevator	Total Units	1BD	2BD	3BD
75 Linden Street	Masonry/wood joist			4		12	4	5	3
104 Grove	Masonry/wood joist		Y	4		23		17	6
110 Grove	Masonry/wood joist		Y	4		23		17	6
116 Grove	Masonry/wood joist		Y	4		16	2	14	
120 Grove	Masonry/wood joist		Y	4		16	2	14	
93-95 Stockholm	Masonry/wood joist			4		14	6	8	
160 Harman	block/ poured concrete			4		14		14	
173 Harman	block/ poured concrete			4		14		14	
181 Harman	block/ poured concrete			4		14		14	
				Total		**146**	**14**	**117**	**15**

Scope of Work

Newer Buildings (built after 1990)

Scope of Work Diagram:



Passive Rehab: Means & Methods

HVAC Systems (VRF and ERV)

- Opportunity: Controlled, efficient distribution
- Challenge: Cost, Billing, Submetering

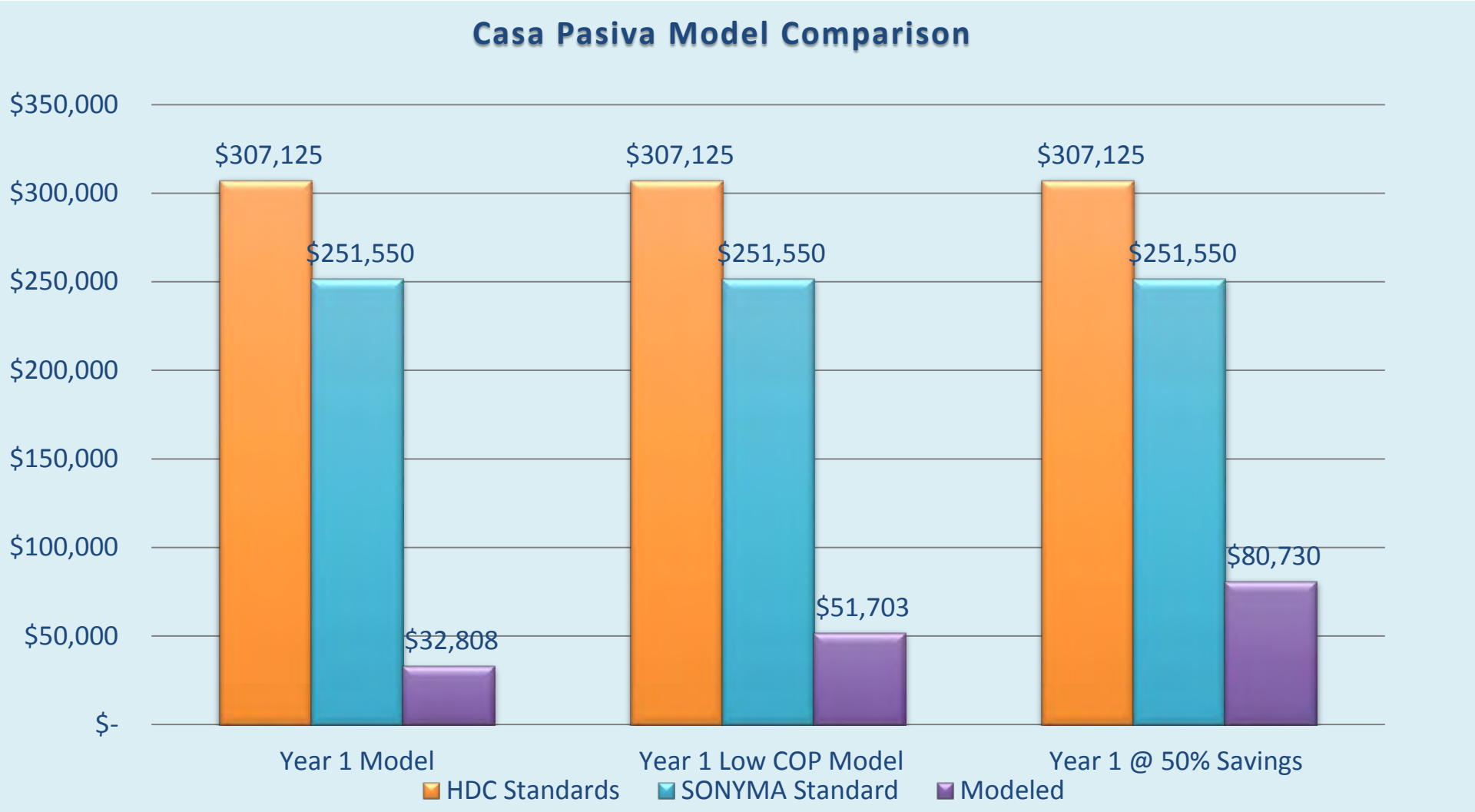
Insulate Outside Existing Walls (Rainscreen or EIFS)

- Opportunity: Run HVAC lines in new insulation- less tenant
- Challenge: Lot line easements for new insulation
- Opportunity: New air & moisture barrier

Passive Rehab UTILITY analysis

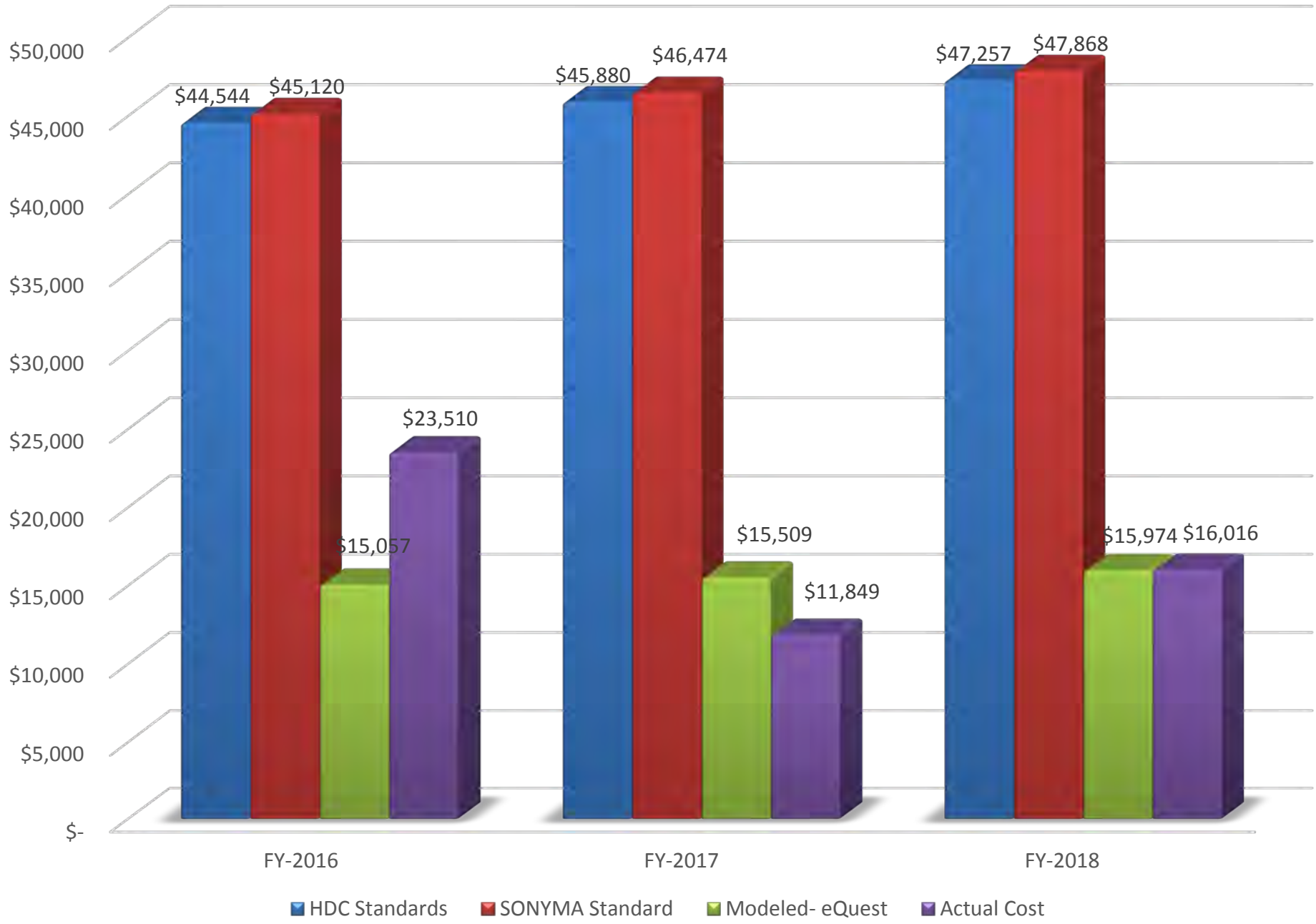
	Electric	Gas	Oil	Water & Sewer	Total Energy	Utility Total	Energy % Reduction	% Utility Reduction
2014 Utilities	$ 41,149.00	$ 87,486.00	$ 177,269.00	$ 194,576.00	$ 305,904.00	$ 500,480.00		
2018 Utilities	$ 35,519.00	$ 127,992.00	$ 3,813.00	$ 143,829.00	$ 167,324.00	$ 311,153.00	45.30	37.83
Modeled: WUFI Passive	$ 40,082.49	$ 11,620.98	$ -	$ 107,871.75	$ 51,703.47	$ 159,575.22	83.10	68.12

Underwriting

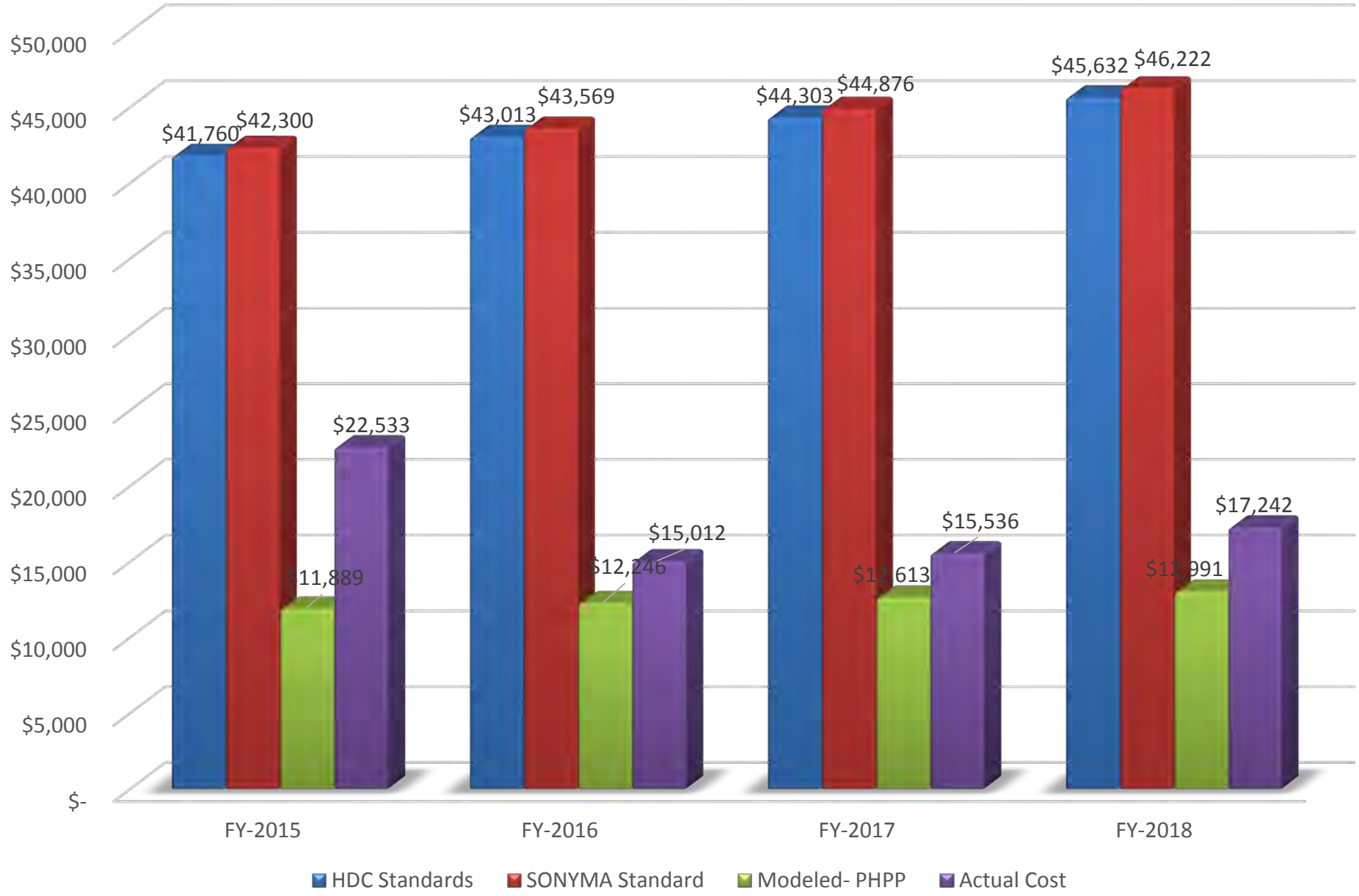


How Are We Doing?

Knickerbocker Commons Passive House



Mennonite United Passive House



Future: Sustainable Construction & Renovation

Local Laws- 84, 87, 31, 11, 91

Increased Data Collection

Electrifying Buildings !!!

Renewables & Net Zero

One City: Built to Last

What is Passive House?

A building constructed to "Passive House" standards must meet strict energy efficiency criteria for its insulation, space heating and cooling, and primary energy demand within the building. These standards require minimizing heating and cooling loads through substantial insulation; the "passive" use of solar heat and internal heating sources, such as people and electrical equipment, to heat the building; solar shading to cool the building; and heat recovery systems for space heating that is required. Because the building is essentially airtight, a continuous supply of low volume filtered fresh air must also be supplied to living and working spaces, and stale air regularly exhausted from spaces with high-efficiency heat exchange to minimize heating losses.

Passive House standards can be applied to both new construction and renovations. For the renovation of existing buildings, the performance standard is slightly more lenient, but still results in a roughly 90 percent reduction in average heating and cooling energy usage and up to a 75 percent reduction in primary energy usage. A Passive House building can also be any type of building, including an apartment building, a school, an office building, a factory, a supermarket, or a single-family house.

Case Study: Knickerbocker Commons Affordable Housing

803 Knickerbocker Avenue, Brooklyn
Architect: Chris Benedict, R.A.
Owner: Ridgewood Bushwick Senior Citizen's Council
General Contractor: Galaxy Construction
Construction Cost: $180/square foot
No. of Units: 24

Knickerbocker Commons, the first mid-sized apartment building designed to Passive House standards in the United States

Knickerbocker Commons, a six-story residential building containing 24 units of affordable housing, is the country's first mid-sized apartment building to conform to Passive House design standards. To achieve the strict Passive House standards, each rental unit in Knickerbocker Commons has its own ventilation system and small radiators for heating and airtight window air conditioning units for cooling. In addition, the building features triple-paned windows and a sculpted exterior that shade windows from the sun in the summer and maximize exposure in the winter. According to the project's architect, Chris Benedict, the building will use 85 percent less energy than is typically required to heat a New York City apartment building in the winter.

The apartment is located in the Bushwick neighborhood of Brooklyn and was developed through HPD's Low Income Rental Program. Of the 24 units, six units will be rented to households earning up to 30 percent of Area Median Income (AMI), five units will be rented to households earning up to 50 percent of AMI, 12 units will be rented to households earning up to 60 percent of AMI, and one unit will be set aside for a building superintendent. In addition to the residential units, the project includes almost 5,000 square feet of community facility space.

How Can We Help?

- Utility Allowance Reform
  - Heat pumps & electric stove
- Utility Pricing- gas versus electric
- Retainage withheld from Contractor for Building Performance
- Energy Reserve
  - Funded From Developer Fee
  - Performance-based

Resources

- Architect & Designer
  - Chris Benedict, R.A.
  - Paul Castrucci Architect
- Utility Rebates
  - ConEd- BQDM, LMI
  - National Grid- replacement incentives
  - DEP- MCP Program
- NYSERDA (State)
  - MPP Targeted
  - Gap Financing via RetrofitNY
- NYC (local/City)
  - Retrofit Accelerator
  - Carbon Challenge
- 3rd Party Providers
  - Water Conservation- aerators, wireless meters
  - Renewables- Solar Tax Credit

THANK YOU

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Sustainability
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