Multifamily Passive House: Connecting Performance to Financing

How energy efficiency and operational savings can provide additional, ongoing cash flow

building energy exchange

Thursday, March 18, 2021

be ex

building energy exchange

BE-Ex is a center of excellence dedicated to reducing the effects of climate change by improving the built environment. BE-Ex accelerates the transition to healthy, comfortable, and energy efficient buildings by serving as a resource and trusted expert to the building industry.

Sadie McKeown

Executive Vice President, Lending and Initiatives, Community Preservation Corporation

introduction

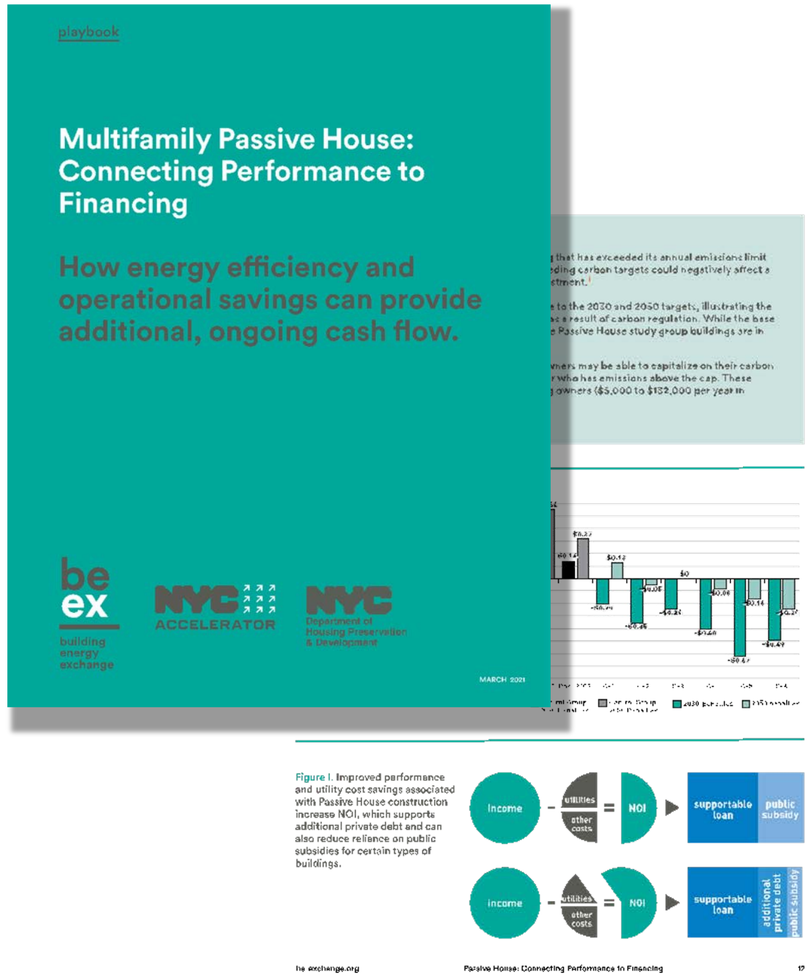
Playbook

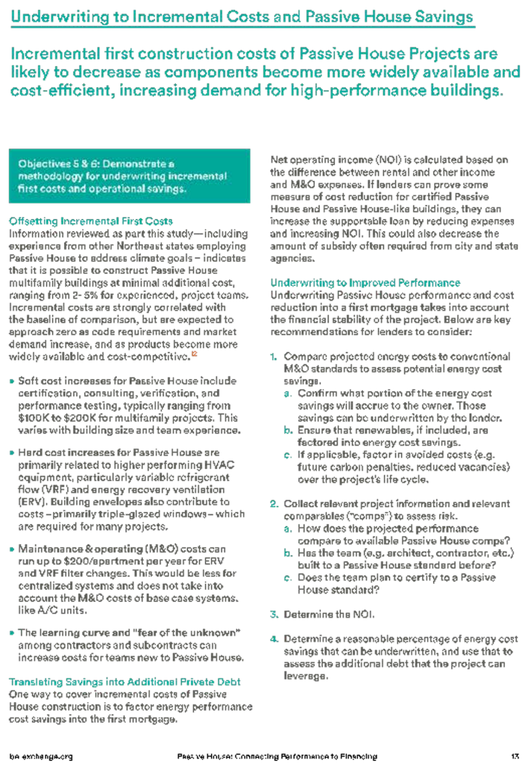
- NYC HPD, Bright Power, CPC, SWA, BE-Ex & NYC Accelerator
- Available for download at **be-exchange.org**

Agenda

- Presentation
- Panel Discussion
- Audience Q&A

***Please submit questions using Zoom Q&A feature**

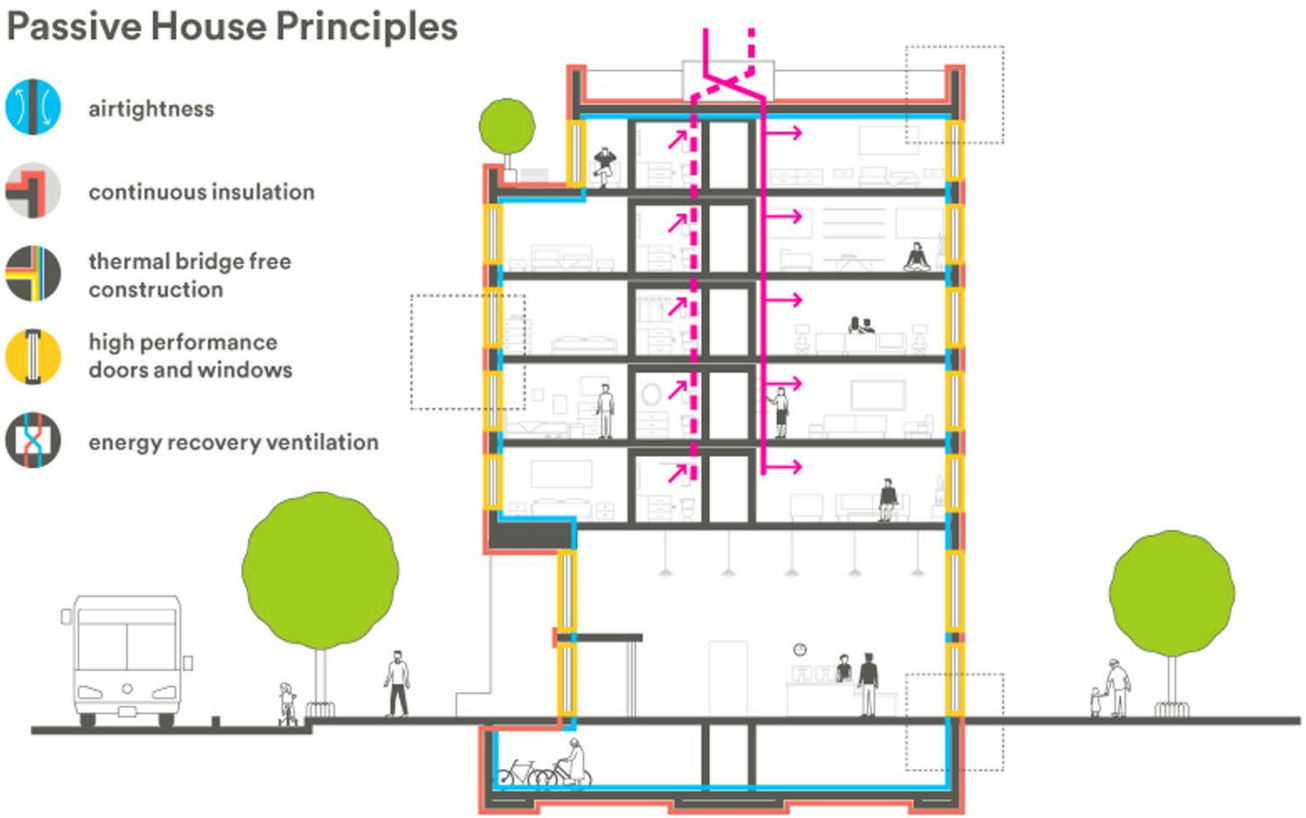




why passive house?

Benefits

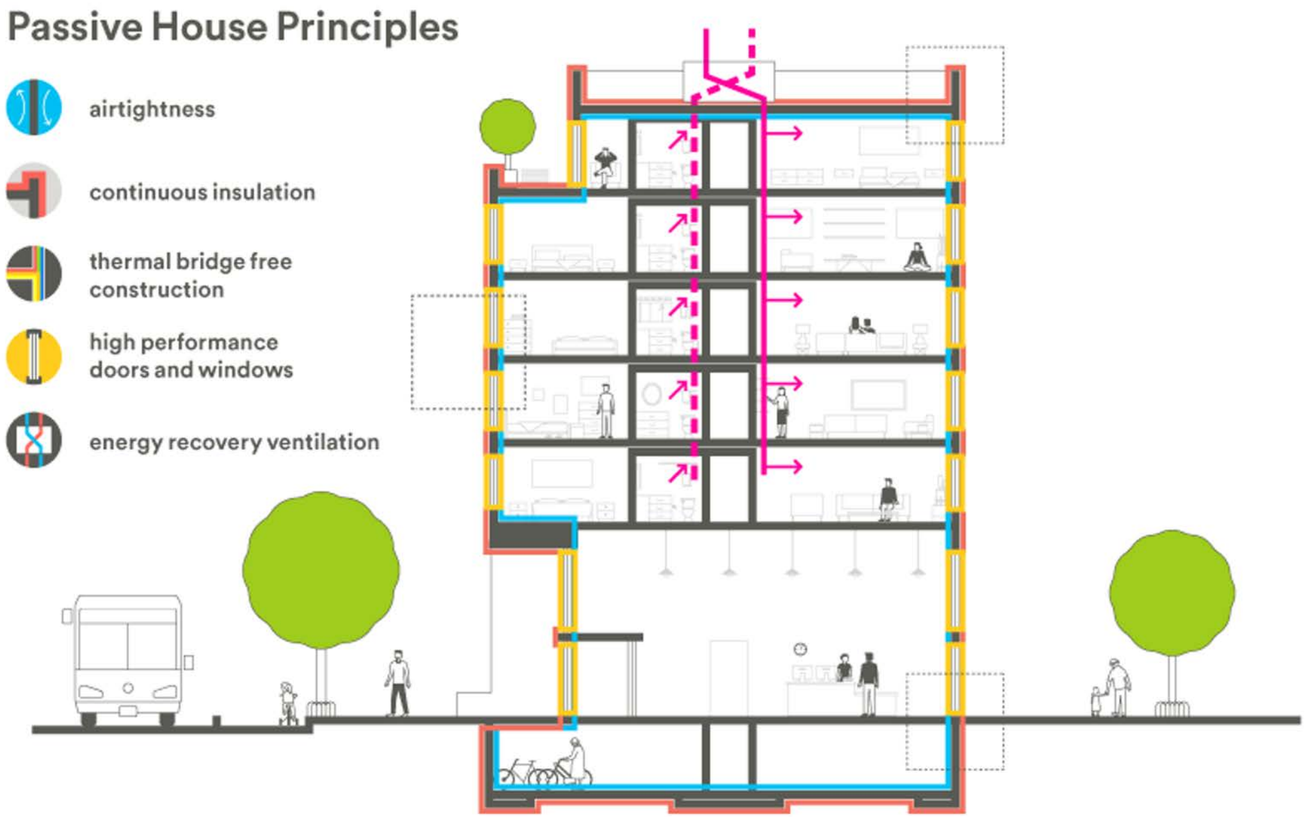
- Utility cost savings
- Avoidance of carbon penalties
- Construction risk reduction
- Excellent indoor air quality & occupant health
- Superior comfort
- Climate resilience & reliability



barriers to passive house adoption

Limited Access to Financing

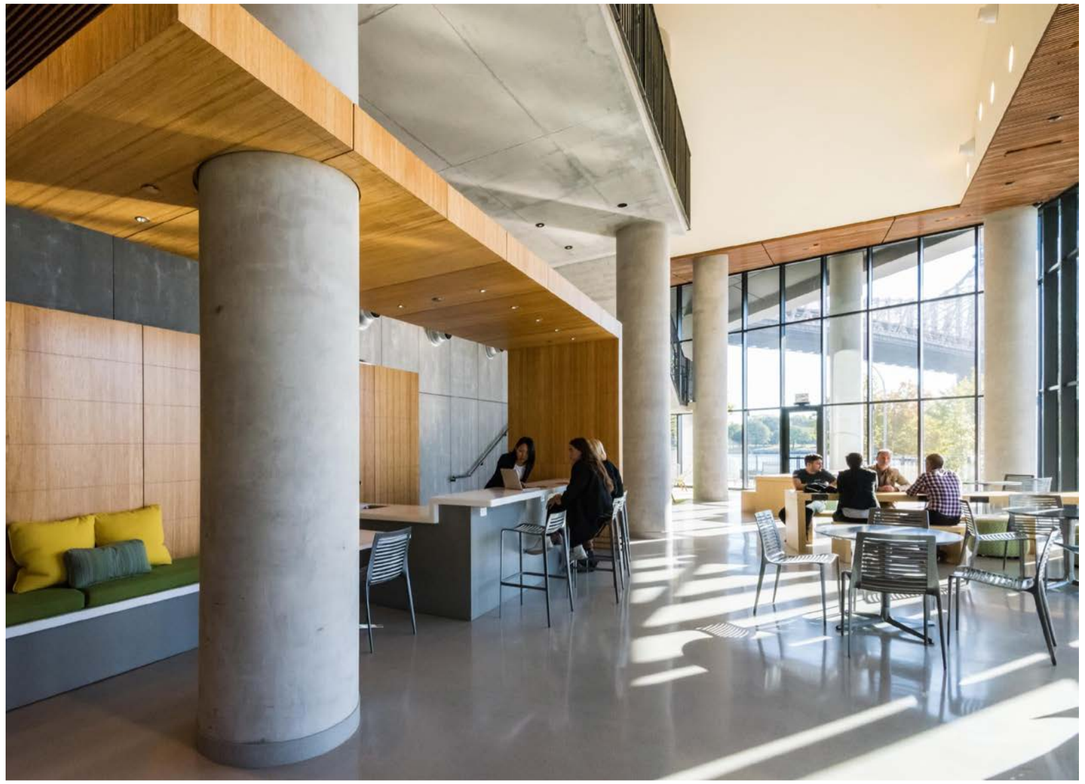
- Perceived first cost increase
- Limited data to prove operational savings
- Inability to quantify the value of non-energy benefits
- Lack of methodology to underwrite to high performance



objective 1: provide a framework to compare data from case study and control groups

Compare metrics for:

- Energy consumption
- Greenhouse gas emissions
- Utility costs
- First costs
- Operational savings



The House at Cornell Tech

establishing the passive house study group

Gas-Heated Group

- Two projects
- Hydronic heating
- Window air conditioners (A/C)
- Not Passive House certified
- Small, affordable housing

Knickerbocker Commons, RiseBoro (C-2)

Mennonite United, RiseBoro (C-1)

establishing the passive house study group

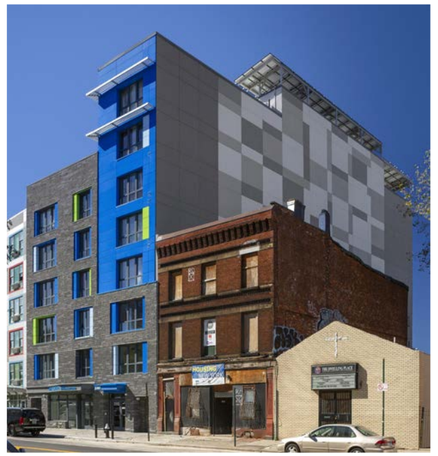
Electric-Heated Group

- Four projects
- Two certified, one pursuing certification, one “Passive House Like”
- Projects of all scales
- Variable refrigerant flow (VRF) heating & cooling

Woodycrest Veterans Housing,
CMC Development (C-3)

Beach Green Dunes,
Bluestone Organization (C-5)

Cornell Tech, Hudson &
Related Companies (C-6)



Third Avenue Development,
Bronx Pro Group (C-4)

establishing the control groups

Pre-2003 Group

- Benchmarking data from 1,633 NYC buildings
- 96% gas heating
- 4% electric heating

establishing the control groups

Pre-2003 Group

- Benchmarking data from 1,633 NYC buildings
- 96% gas heating
- 4% electric heating

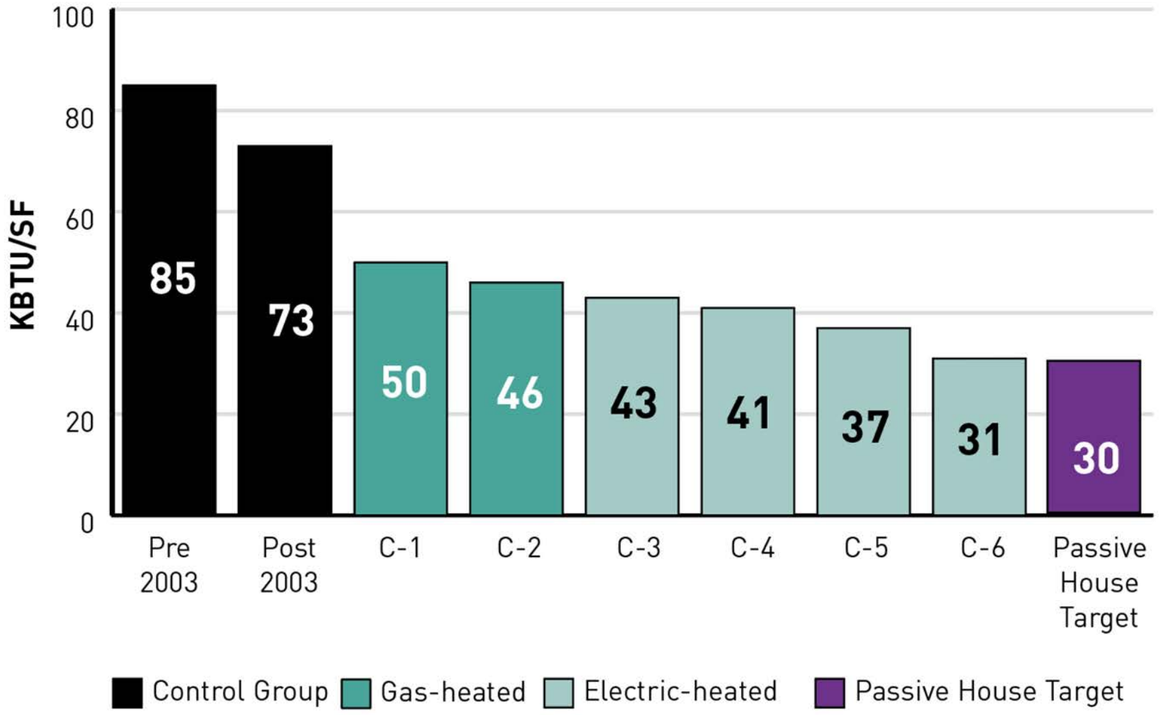
Post-2003 Group

- 315 buildings
- 94% gas heating
- 6% electric heating

objective 2: compare site energy use intensity (EUI)

Findings:*

- Passive House study group buildings perform 32% to 58% better
- Electric-heated Passive House buildings perform better than gas-heated
- Certified Passive House buildings perform best



* Passive House EUI targets range from high 20s to low 30s when properly commissioned. For methodology and additional context, see the Playbook at be-exchange.org.

objective 3: compare carbon emissions

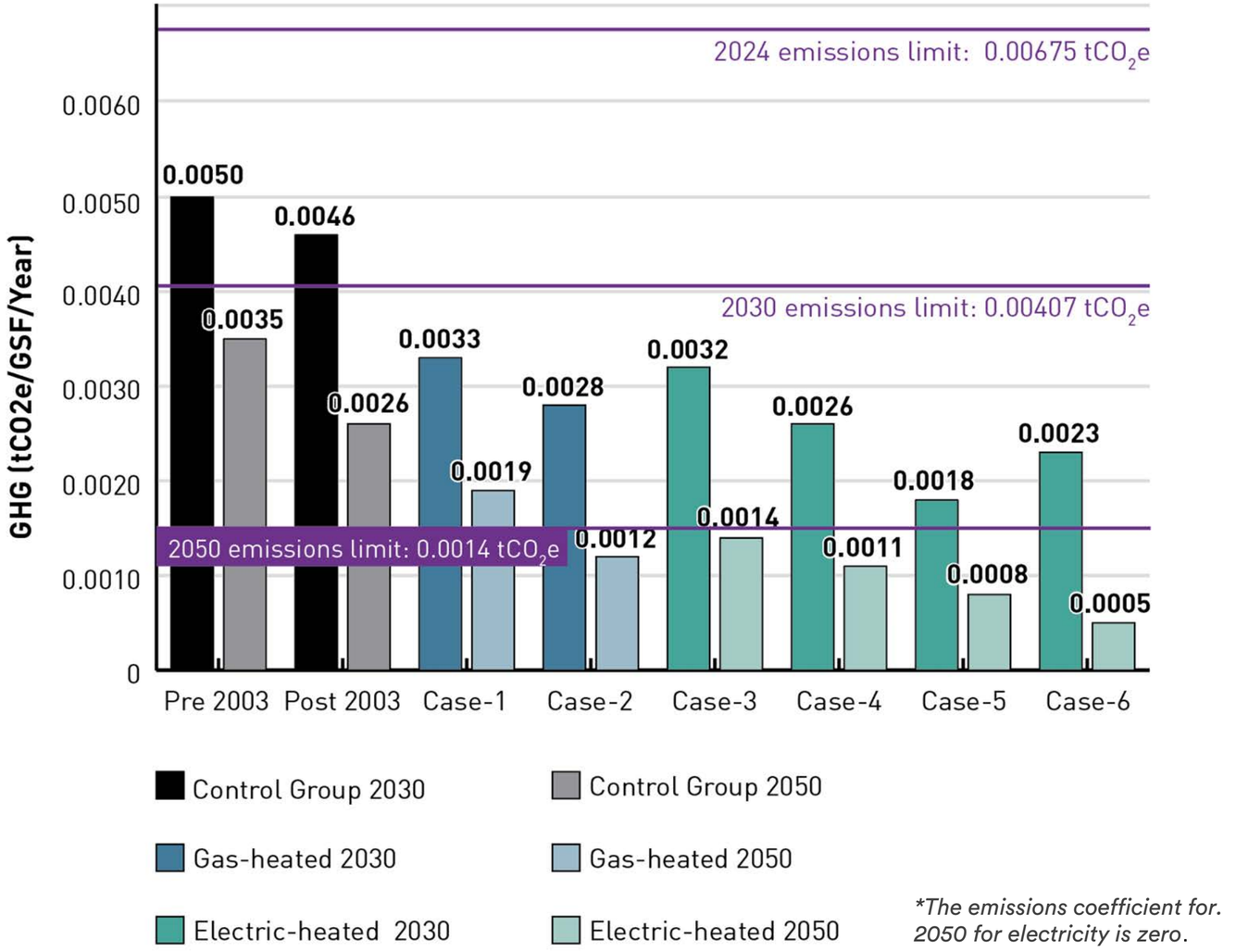
Rationale:

- Buildings account for two-thirds of total NYC emissions
- NYC Local Law 97 (LL97) established emissions limits
- Certain types of affordable housing are subject to alternative compliance requirements

objective 3: compare carbon emissions

Findings:

- Both control groups will require capital improvements to comply with the 2030 and 2050 limits
- All Passive House buildings would comply with the 2024 and 2030 limits and avoid civil penalties.
- All but one of the Passive House buildings would comply in 2050



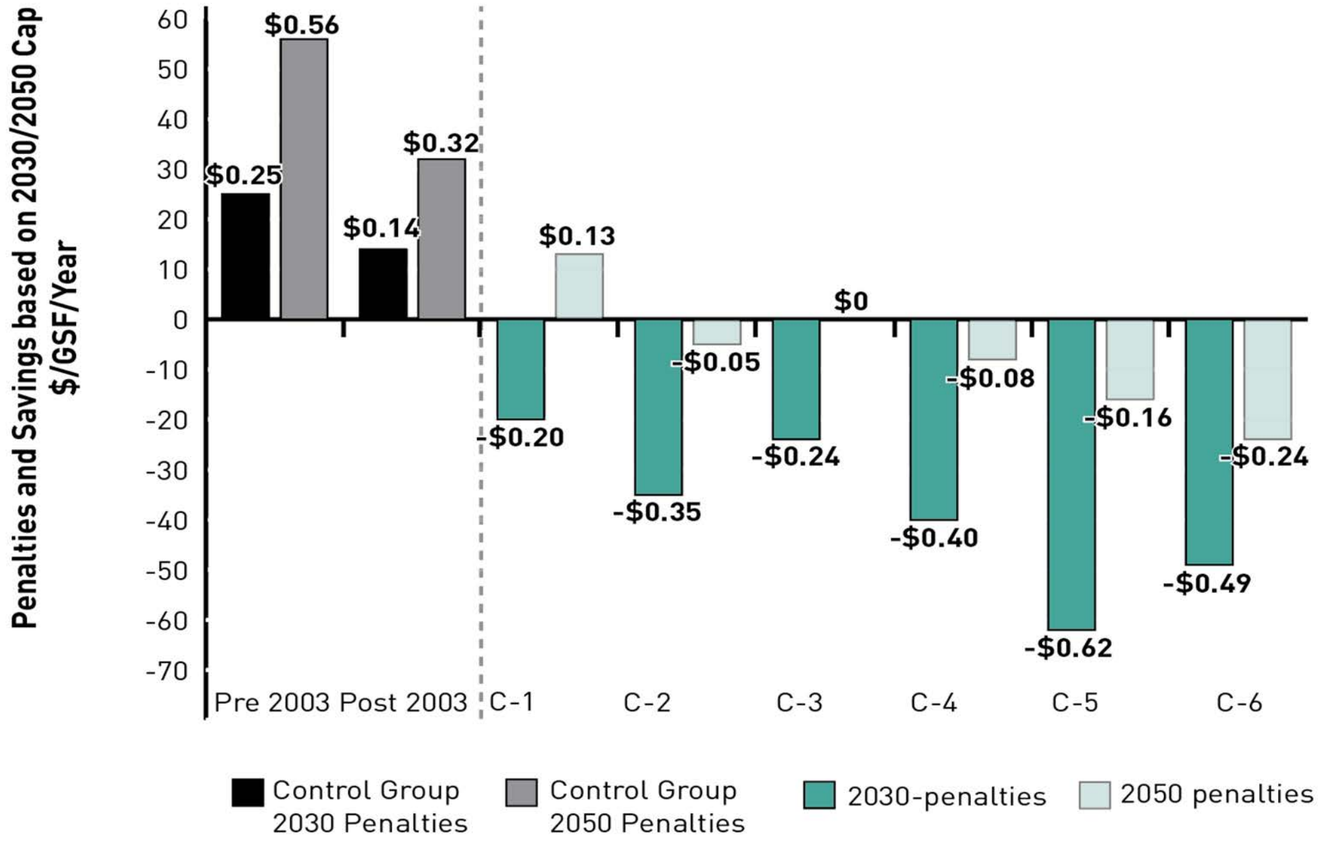
**The emissions coefficient for. 2050 for electricity is zero.*

putting a price on carbon

If carbon trading passes in NYC:

- Building owners below cap may be able to sell carbon savings to owners who exceed cap.

- For the Passive House study group, revenues in 2030 could be $5,000 to $132,000.*



* Potential revenues are based on the LL97 price of $268/ton of carbon

objective 4: calculate utility cost savings

Rationale:

- Energy savings create additional cash flow
- Underwriting to energy savings can unlock access to financing
- Financing can offset incremental first costs of green buildings

objective 4: calculate utility cost savings

Findings:*

- 28– 68% annual cost savings for Passive House study group
- Performance improves as owners and tenants acclimate
- Renewables can contribute to savings

FUEL SOURCE	C-1	C-2	C-3	C-4	C-5	C-6
ELECTRIC COST REDUCTION	52%	40%	41%	12%	62%	30%
GAS COST REDUCTION	62%	70%	65%	60%	80%	85%
TOTAL ENERGY COST REDUCTION	55%	50%	48%	28%	68%	47%
DEBT THAT COULD BE LEVERAGED ($/SF)	$9-$13	$7-$10	$7-$11	$2-$4	$9-$13	$6-$9

* Cost savings are based on a comparison to underwriting standards for utility expenses in NYC affordable housing. Potential additional debt leverage assumes 50% of whole building energy savings.

objective 5: demonstrate methodology to underwrite incremental first costs

Rationale:

- Better understanding of first costs
- Better understanding of how to offset any incremental costs
- Overcome hesitancy to underwrite to Passive House performance

incremental first costs

Findings

- 0-5% incremental cost for Passive House
- **Soft Costs** (certification, consulting, verification, and performance testing): $100-$200k
- **Hard Costs** (higher performing HVAC equipment, windows, insulation, etc.)
- **Maintenance & Operating Costs** (filter changes, etc.): Up to $200/apartment per year
- **Unknowns** (costs related to initial learning curve)

incremental first costs

Findings, cont'd

- Costs come down as team experience and market demand increase, and as equipment prices drop

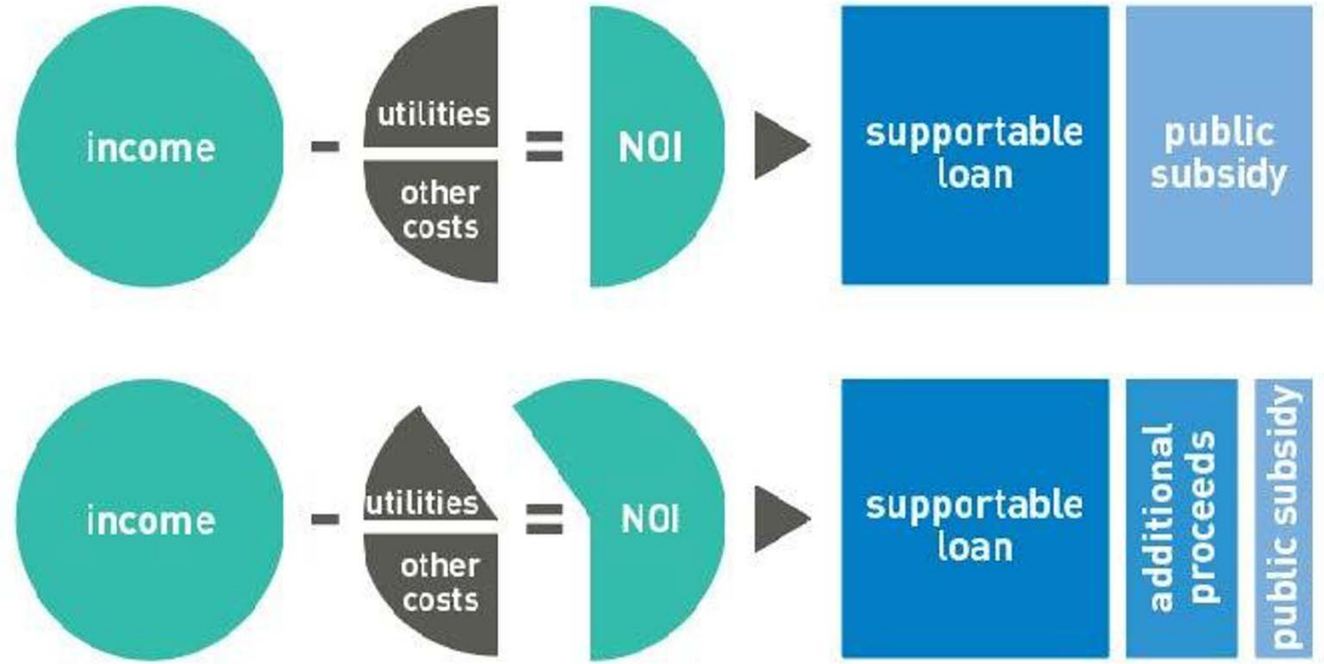
- Operational savings can offset first costs

- Non-Energy Benefits add value to appraisals
  - Occupant Comfort
  - Indoor Air Quality & Health
  - Resiliency
  - Reduced construction risk
  - Emissions reduction

Objective 6: demonstrate a methodology to underwrite operational cost savings

Rationale:

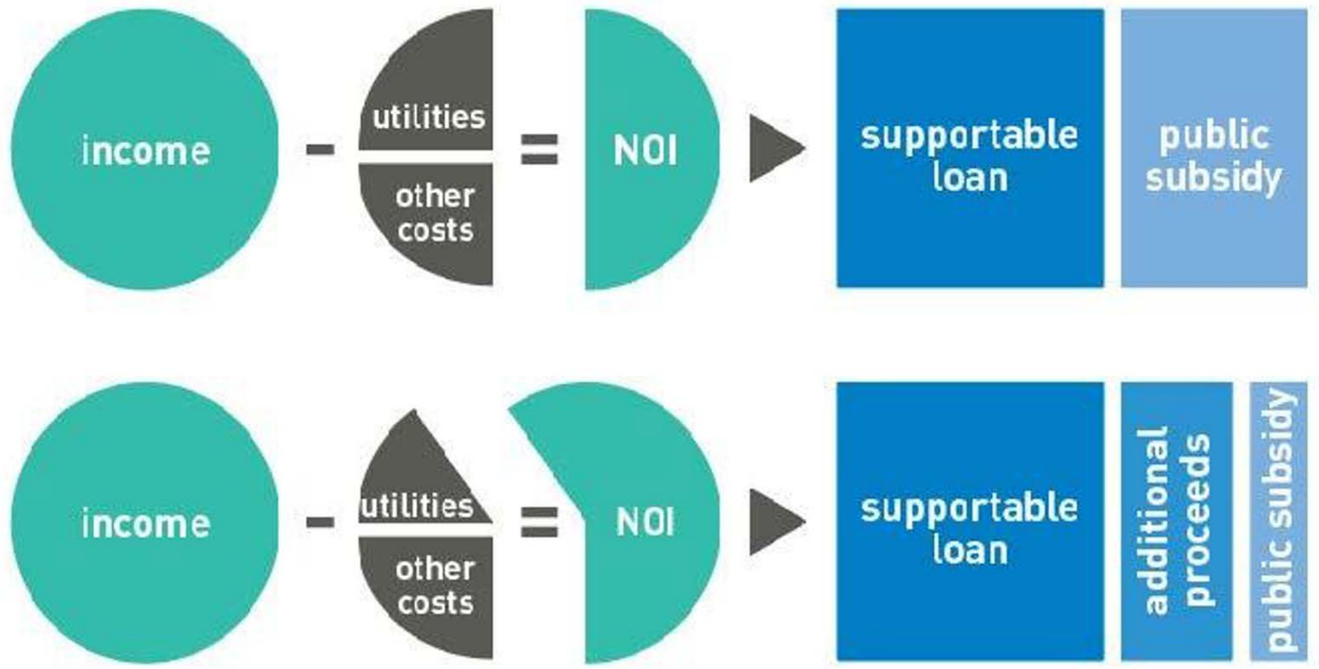
- Savings from Passive House performance can increase net operating income (NOI)
- Increase loan amount
- Decrease subsidies
- Accelerate adoption of Passive House construction



Objective 6: demonstrate a methodology to underwrite operational cost savings

Key Considerations for Lenders:

1. Compare projected energy costs to conventional M&O standards
2. Determine a reasonable percentage of energy cost savings that can be underwritten
3. Determine the NOI
4. Collect relevant project information and comparables



summary of key findings

Lessons from Passive House study buildings:

1. 28-68% annual energy cost savings
2. $2- $13/sf extra debt could be leveraged
3. Compliance with NYC emissions limits and avoided civil penalties
4. Electric heating and Passive House certification improve performance

looking ahead

1. Deep dive into energy performance, to understand implications of:

- Building design
- Operation
- System choices
- Tenant behavior

looking ahead

2. Collect more data:

- City College of New York (CUNY) Sustainability in the Urban Environment capstone team
- Multifamily Passive House database
- North American climates similar to NYC
- Online survey to collect data

Participate in the survey!

Openpassivehouse.commons.gc.cuny.edu

looking ahead

3. Provide better data and tools for lenders

- Quantify energy savings and non-energy benefits of Passive House
- Improve accuracy of underwriting
- Create a Passive House comps database
- Improve data collection and energy modelling

panel discussion: Beach Green Dunes

Project Team

- The Bluestone Organization
- Curtis + Ginsberg
- Steven Winter Associates

panel discussion: Beach Green Dunes

Building Information

- Rockaways, NY
- 94,000 Gross ft
- 101 units
- Completed in 2017

panel discussion: Beach Green Dunes

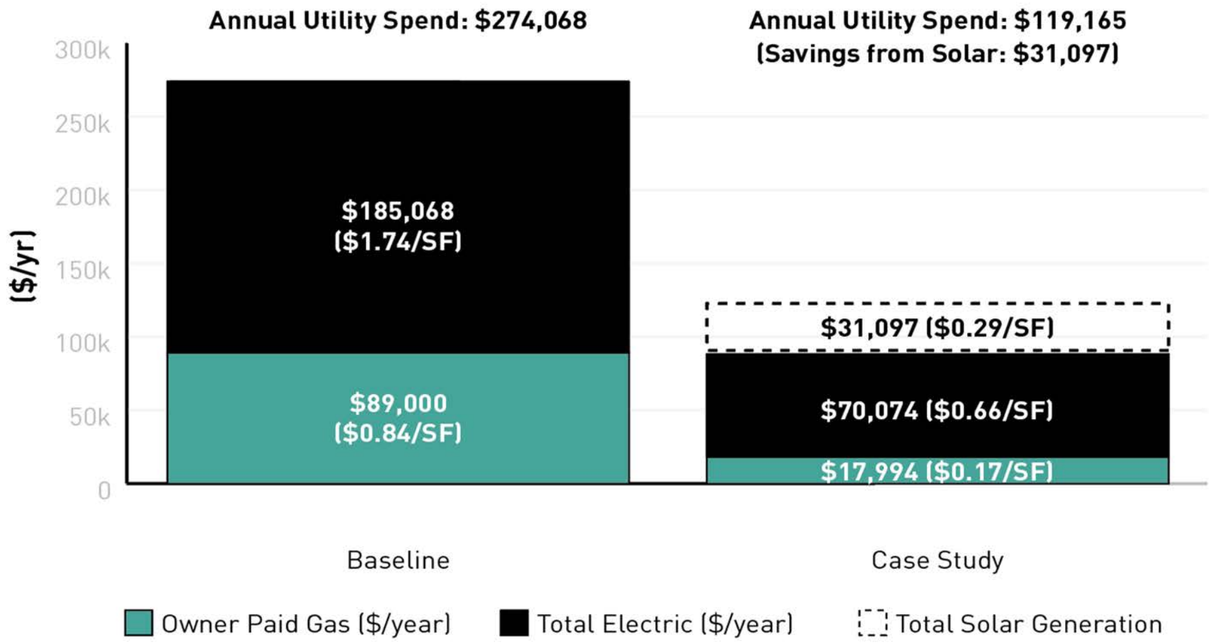
Project Details

- Passive House certified
- VRF heating and cooling
- Energy recovery ventilation
- On-site solar and co-generation

panel discussion: beach green dunes

Study findings:*

- 56% annual utility savings (before renewables)
- 68% annual utility savings with renewables



More to come in panel discussion!

* For methodology and additional context, please see the Playbook at be-exchange.org

Please submit questions through Zoom Q&A!

Moderator:

- **Elizabeth Kelly, Senior Policy Advisor, NYC Mayor's Office of Sustainability**

Panelists:

- **Eric Bluestone, Partner, Bluestone Organization**
- **Mark Ginsberg, Partner, Curtis + Ginsberg Architects**
- **Jennifer Leone, Chief Sustainability Officer, NYC HPD**