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# RetrofitNY Design Workshop

*Revolutionizing Building Renovations in New York State*

*10.30.17*

# Agenda

- 11:00 – 11:10am **Welcome & Session Overview**
- 11:10 – 11:20am **RetrofitNY Introduction**
- 11:20 – 12:10pm **Guest Speakers and Q&A Panel**
- 12:10 – 12:30pm **Break + Working Lunch**
- 12:30 – 12:50pm **RFP Overview**
- 12:50 – 1:35pm **Cross-Cutting Team Networking Exercise**
- 1:35 – 1:55pm **RFP Participation Overview**
- 1:55 – 2:00pm **Closing/Next Steps**
- 2:00 – 3:00pm **Informal Networking**

# What is RetrofitNY?

# Creating a large scale, self-sustaining market for high performance retrofit solutions

Industry-designed, cost-effective retrofit solutions for tenanted buildings reaching or approaching net-zero energy.

Implement solutions on a large scale to drive industrialization and reduce costs.

# Net-Zero Energy Retrofits… or close to it

## Benefits

- Residents
  - Health & Comfort
  - Quality of Life
- Building Owners
- City & State
  - Environmental Impact
  - Affordable Housing Preservation

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Woodrow Wilson Apartments
Amsterdam, NY
Circa 2014

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Woodrow Wilson Apartments
Amsterdam, NY
Circa 2016

Courtesy: Beacon Communities, LLC

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Netherlands

United Kingdom

Germany

France

New York

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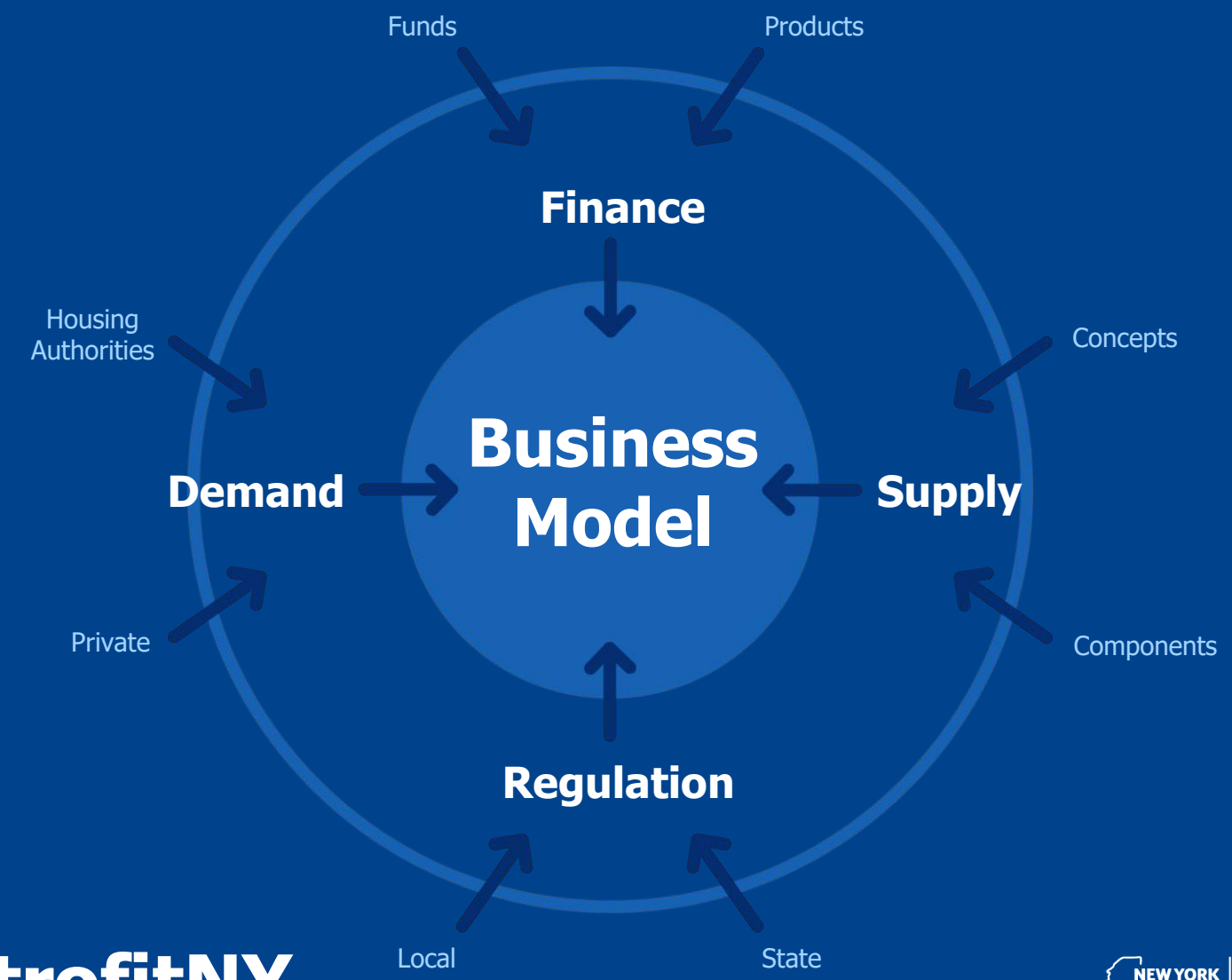
# Revolutionizing the way multifamily buildings are renovated, keeping residents in their homes.




**Nyserda.ny.gov/RetrofitNY**

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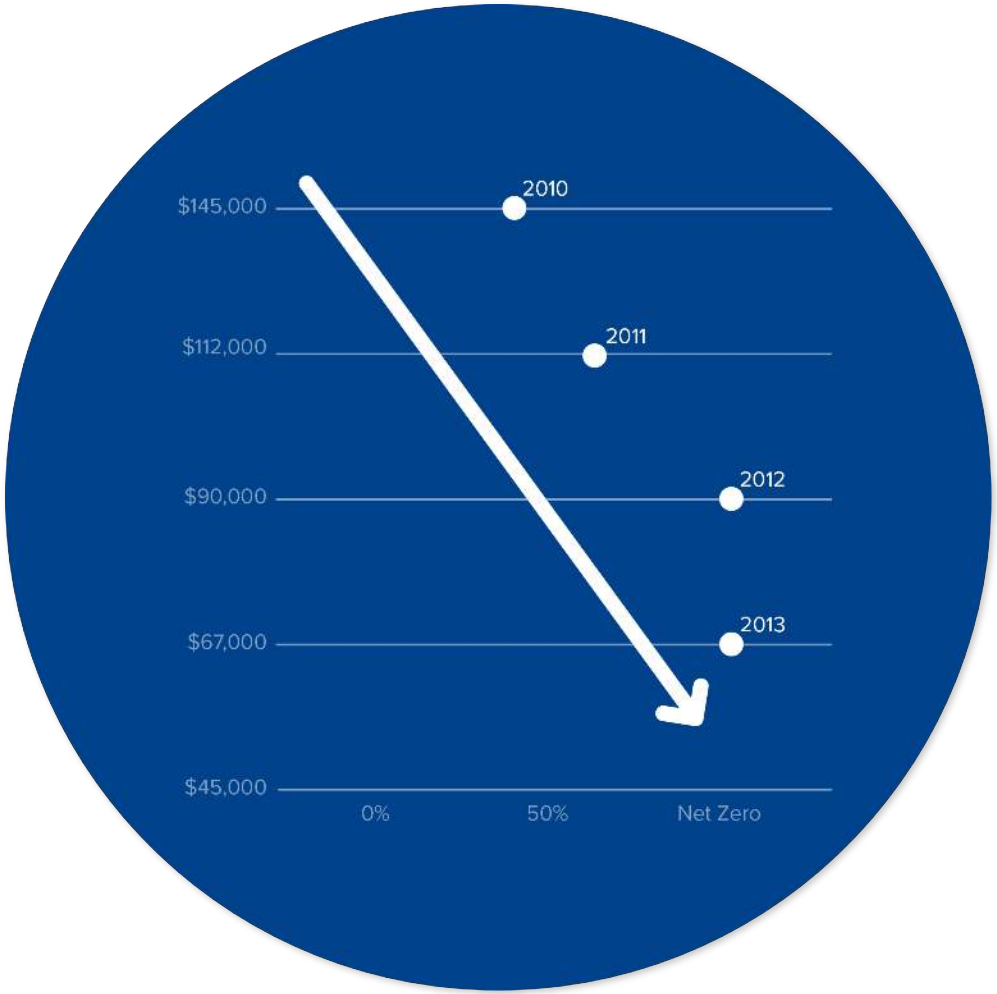


A successful model to show market potential

# Cost per Unit & Performance of Retrofits

By reaching scale, this solution will become the standard.

This is where the market is headed, and you can be ahead of the curve.

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# Guest Speaker Presentations and Q&A

# Sadie McKeown

Executive Vice President & COO,
Community Preservation Corporation

# About CPC

The Community Preservation Corporation (CPC) believes housing is central to transforming underserved neighborhoods into thriving, vibrant communities.



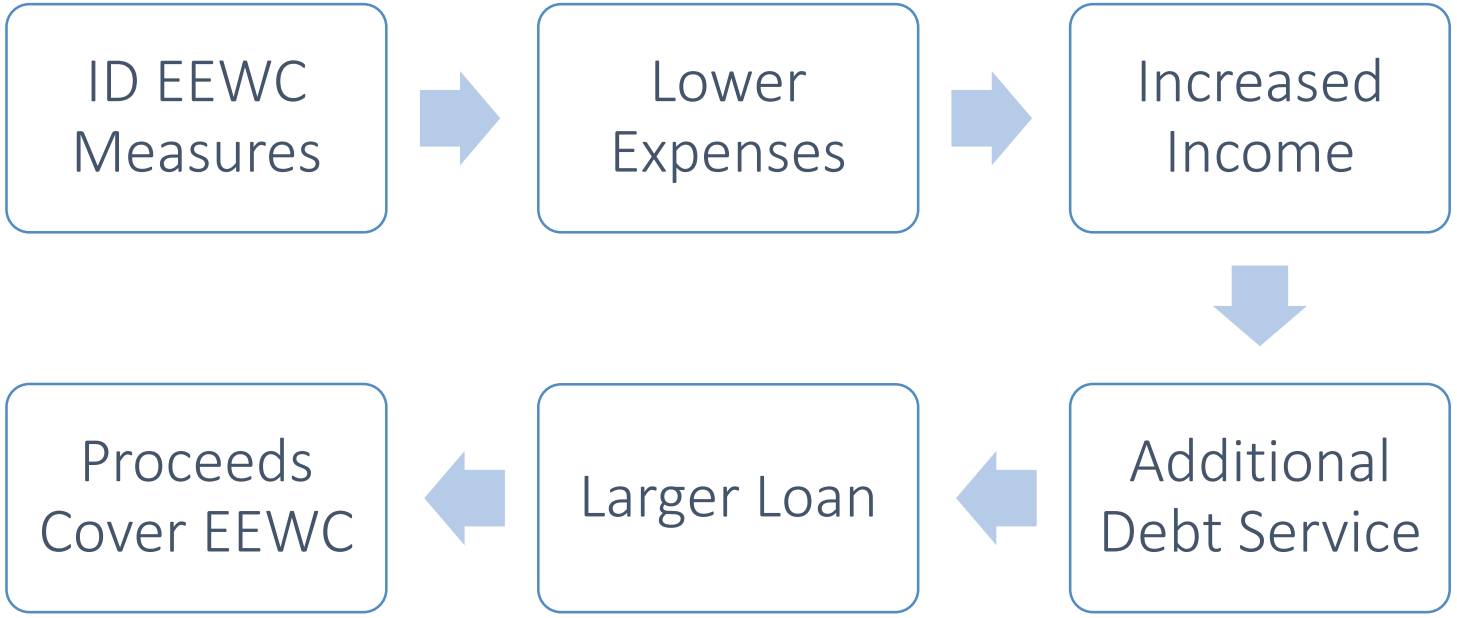

# About CPC

- CPC is a nonprofit affordable housing and community revitalization finance company providing flexible capital solutions, fresh thinking and a collaborative approach to the complex issues facing communities.

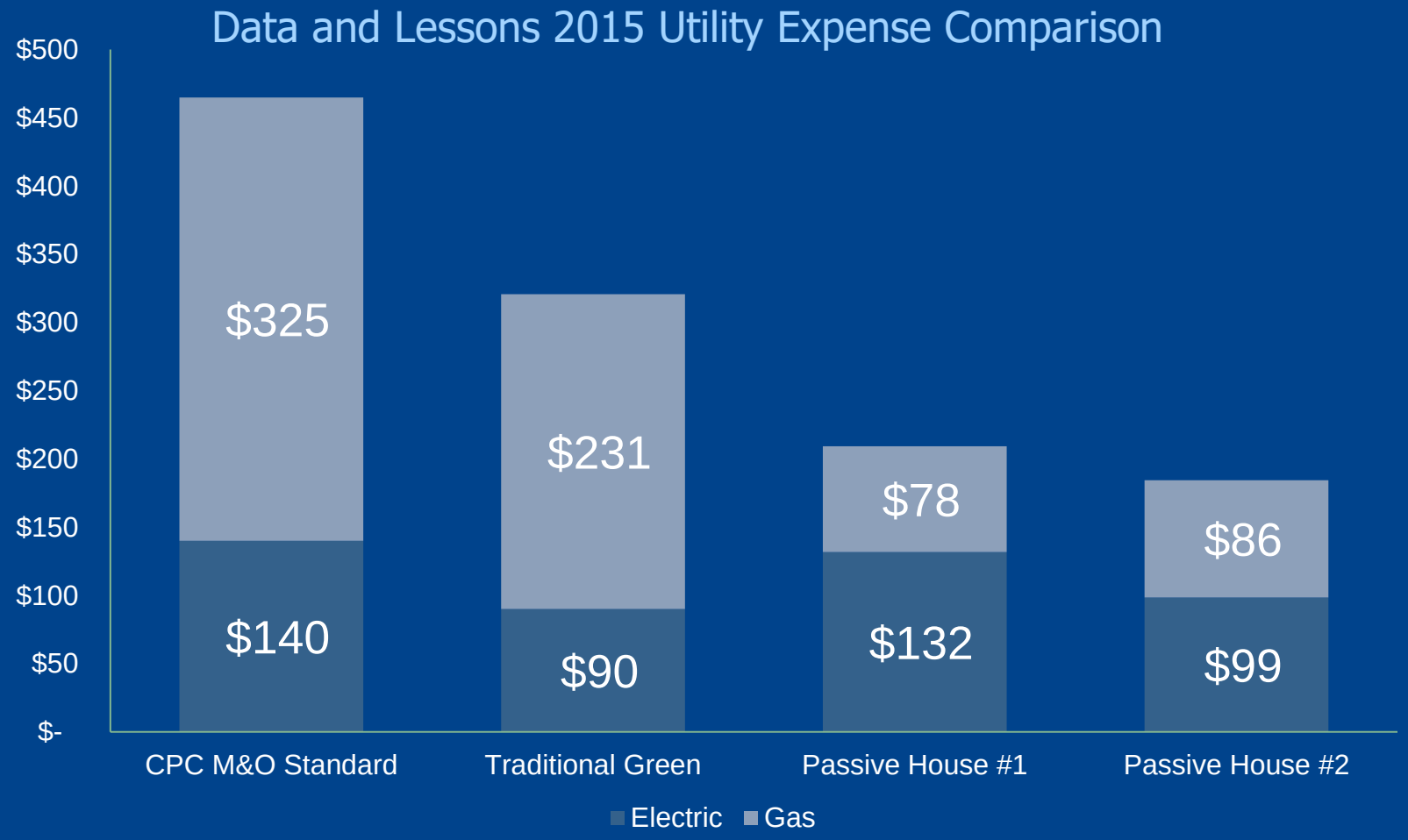
- Our goal is to be more than just a lender. At CPC, we work as a partner to provide technical expertise, support and flexible solutions that help meet the capital needs and broader community revitalization goals of our customers, local stakeholders and the communities we serve.

# CPC Approach

CPC's financing methodology integrates energy efficiency and water conservation (EEWC) measures into a traditional multifamily mortgage.



# High Performance & Operation Savings

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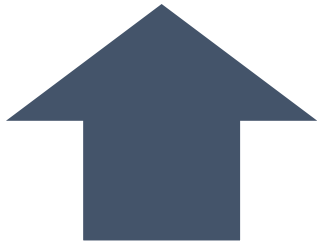
# Monetizing the Benefits

Investing in energy efficiency and renewables reduce utility bills and operating expenses.



When expenses decrease, net operating income (NOI) will increase. A higher NOI means a building can support additional private debt.

When mortgage lenders monetize energy savings, borrowers can utilize low-cost, long-term capital to finance energy investments.

# Monetizing the Benefits


Monetizing projected energy savings allow a building to support additional private debt. Now, loan proceeds can be used to fund deeper retrofits and larger energy investments.

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# Monetizing the Benefits


In affordable housing, if construction costs remain the same, additional debt can be used to offset the need for public subsidy.

# Case Study

**Passive House**

**123 1st ST**
24 Units
24,000 sq ft

# Case Study

## Underwriting Passive House – Nassau County

| **Income & Expense Schedule** | | Units | 24 |
|---|---|---|---|
| 123 1st St | | Rooms | 64 |

| | CPC Standard (NYC) | Passive House/ RetrofitNY | | |
|---|---|---|---|---|
| **Income** | | | Underwritten Savings | |
| Effective Gross Income | 453,374 | 453,374 | - | - |
| **Expenses** | | | | |
| Water & Sewer | 16,000 | 13,000 | ↓ | *18.8%* |
| Heat | 19,200 | 10,560 | ↓ | *45.0%* |
| Gas & Electric | 10,880 | 6,790 | ↓ | *37.6%* |
| Other Expenses | 105,779 | 105,779 | | |
| NOI | 301,515 | 317,245 | | |
| CPC Loan Amount | 3,640,143 | 3,830,049 | ↑ | *5.2%* |
| Subsidized Loan Amount | 2,536,297 | 2,346,391 | ↓ | *7.5%* |
| **Additional Proceeds:** | **189,906** | **Per Unit:** | **7,913** | |

| Projected Expenses Energy Model | Projected Savings Energy Model | Adjustment (%) |
|---|---|---|
| - | - | - |
| 10,000 | 6,000 | *50.0%* |
| 1,920 | 17,280 | *50.0%* |
| 2,700 | 8,180 | *50.0%* |

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# Recommendations

- Start a conversation
- Listen, process, roll up your sleeves
- Underwriting to savings
- Strong partnerships & collaboration
- Be creative

# Duncan Barrett

President,
Beacon Communities Development, LLC

# Affordable Housing Sustainability

Achieving sustainability for affordable housing assets is critical to this industry, especially right now.

- Recent political events
- Strong desire to improve the quality of life for tenants
- Need for industry and resident education around energy

# Variable Costs

- Wages
- Insurance
- Energy

***Energy is the variable cost that we have the highest opportunity to contain.***

# Our Goal

We need to build and retrofit affording housing to be nominally net-zero and meet Passive House Standards, in a mission-driven effort to improve the quality of life of our residents.

# Case Study

**Martin Luther King in Troy, New York**

**Phase 1/2:**
Colored Rehab Site Plan


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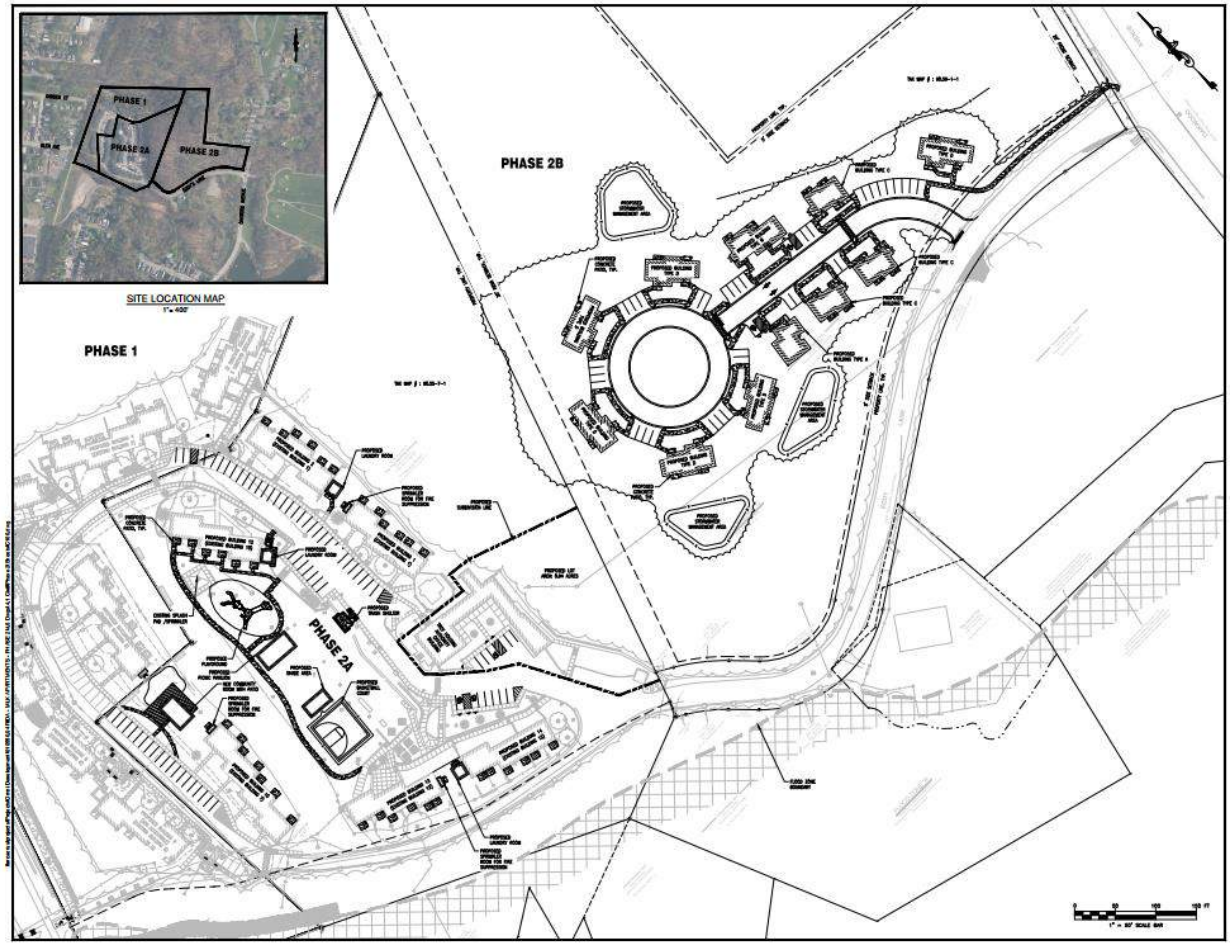
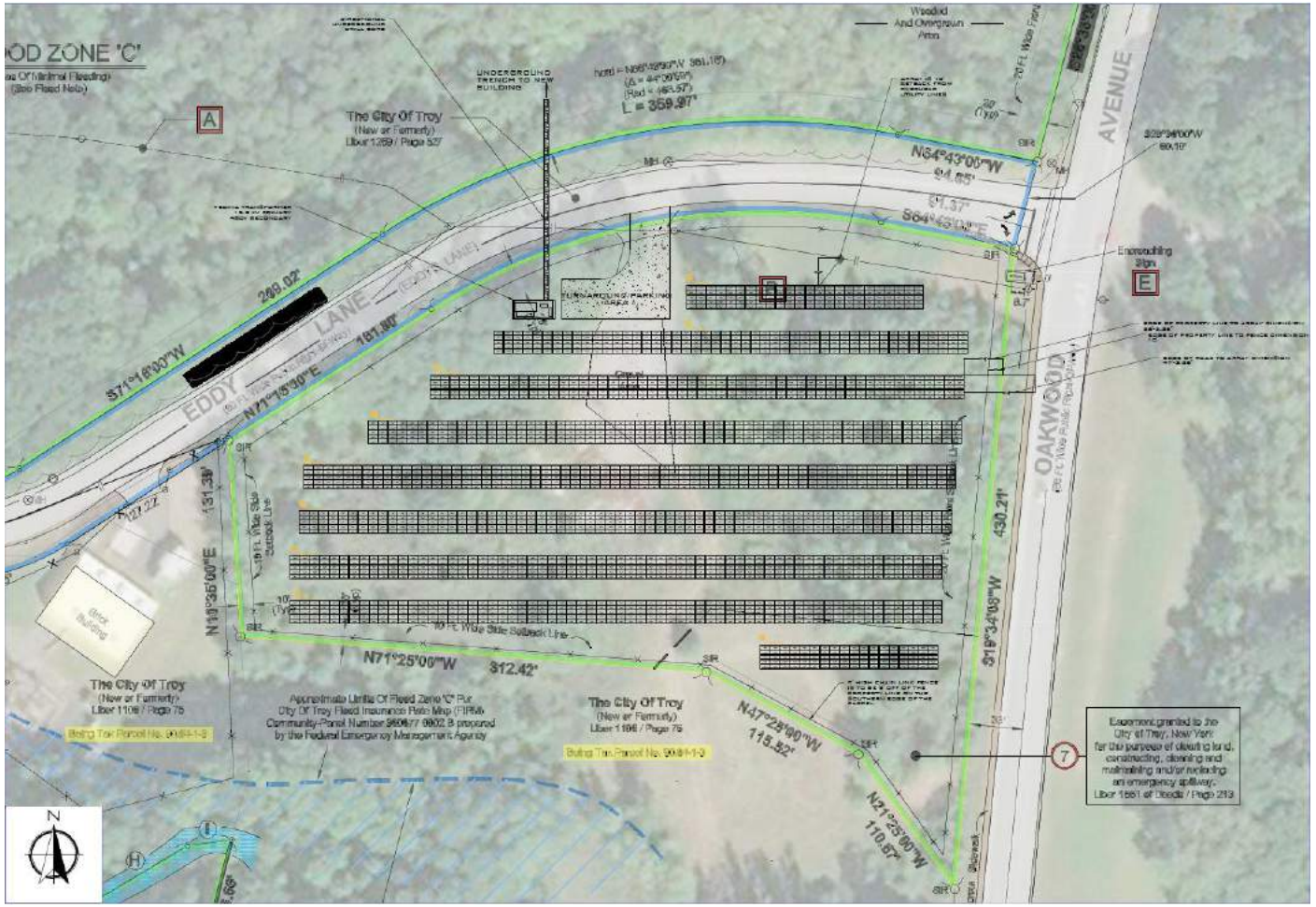
**Phase 2:** Site Plan
(Rehab & Construction)



# PV Solar Array

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# Opportunities through the RFP

- Building competitiveness and resiliency in the marketplace
- Improving the quality of life for our residents
- Reducing maintenance and management time and cost
- Participating in the first wave of movers

# Tom King

Architect,
King & King Architects

# Our Goal

We strive to lead the charge in terms of sustainability and evidence-based design.

RetrofitNY will help us to grow within relevant markets and expand our relationships with consultants and clients throughout New York State.

# Case Study

## Installing a 250 kW parking lot canopy array for our building

250KW PV Array: Fall 2017

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# Case Study

## Installing a 250 kW parking lot canopy array for our building

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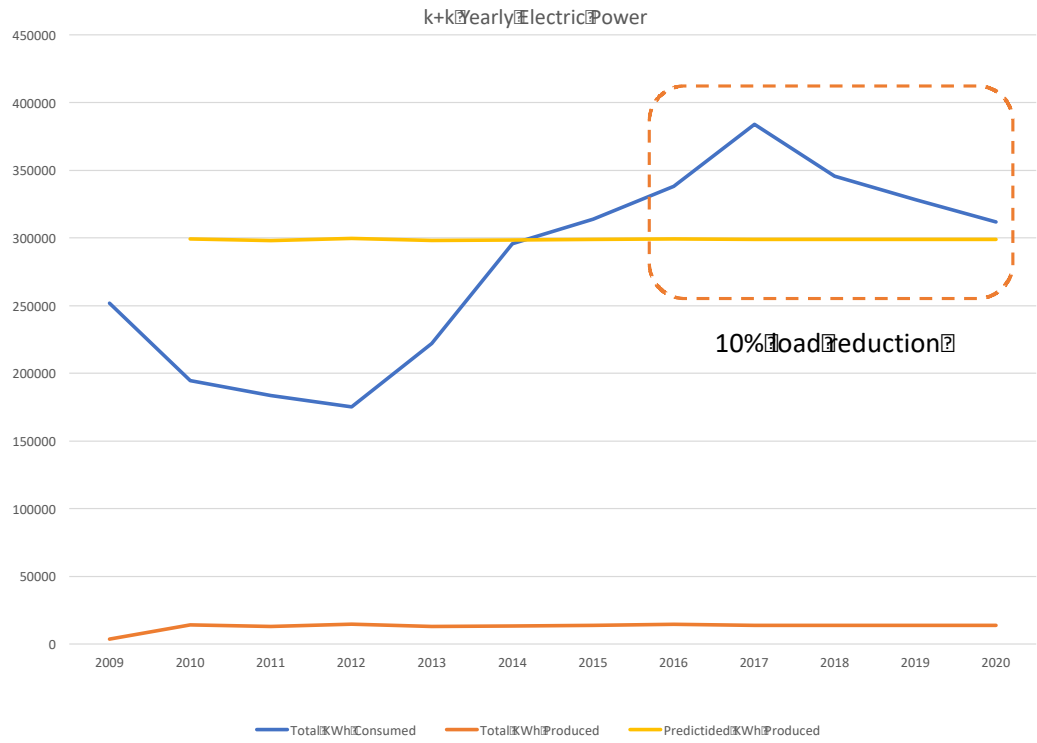
# Case Study

## Installing a 250 kW parking lot canopy array for our building




Data: Reduction Strategy

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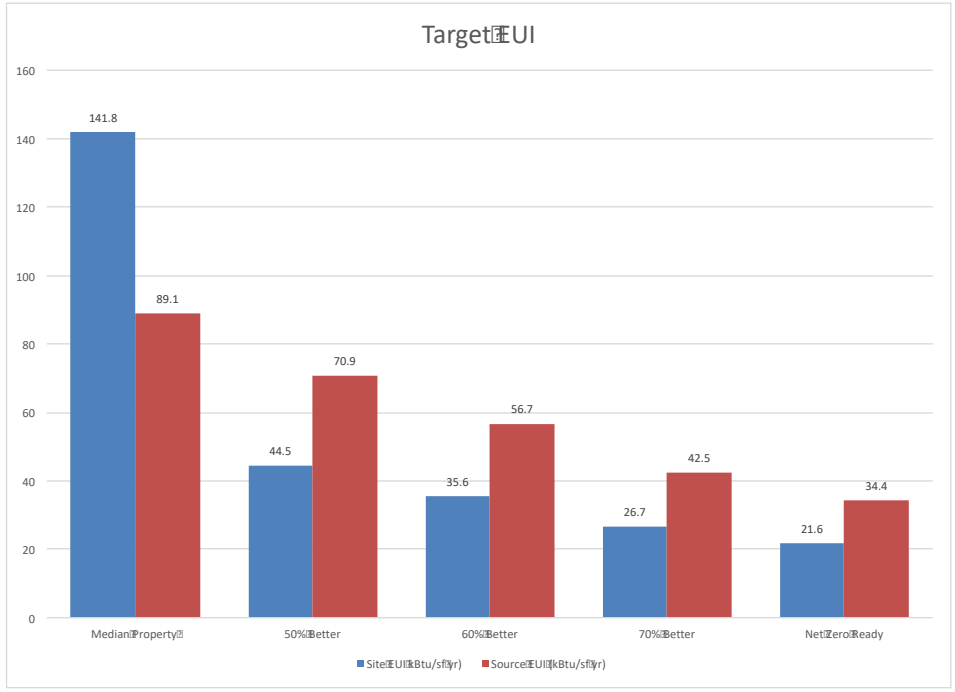
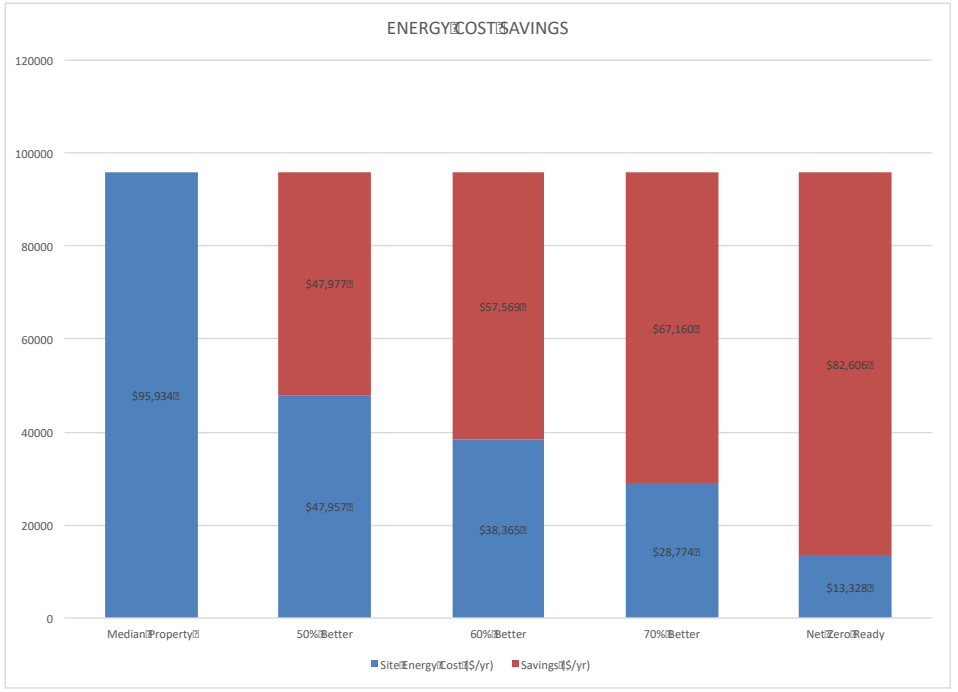
# Case Study

## Designing a Net-Zero School in North Syracuse

# Case Study

## Designing a Net-Zero School in North Syracuse

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# Case Study

## Designing a Net-Zero School in North Syracuse

**Step 1B - Envelope Optimization for ZNE**

**Project Name:** NSCSD Bear Road El
**Project Number:** 16125
**Input by:** RDH
**Date:** 4/27/2017

| | Energy Source | IECC 2015 Code Minimum | | 4A Roof Insulation New: R-40 Existing: Nothing | | 4B Roof Insulation New: R-40 Existing: R-40 | | 4C Roof Insulation New: R-40 Exist: R-16 + R-15 | | 5A Window COG Double Pane, TB Alum Frame | | 5B Window COG Triple Pane, TB Alum Frame | | 6 Window COG Double Pane, uPVC Frame | | 7 Exterior Fixed Window Shading Devices | | Design Envelope | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI |
| Lights | Electric | 511.5 | 6.9 | 511.5 | 6.9 | 511.5 | 6.9 | 511.5 | 6.9 | 511.9 | 6.9 | 512.1 | 6.9 | 511.9 | 6.9 | | | 511.9 | 6.9 |
| Receptacles/Proc | Electric | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | | | 294.2 | 4.0 |
| Kitchen Process | Natural G | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | | | 93.1 | 1.3 |
| Space Heating | Natural G | 2,237.4 | 30.3 | 2,672.1 | 36.2 | 2,117.4 | 28.7 | 2,222.8 | 30.1 | 2,103.9 | 28.5 | 2,038.7 | 27.6 | 2,035.2 | 27.6 | | | 1,716.3 | 23.2 |
| Space Cooling | Electric | 246.8 | 3.3 | 253.6 | 3.4 | 242.5 | 3.3 | 244.9 | 3.3 | 238.8 | 3.2 | 249.1 | 3.4 | 235.7 | 3.2 | | | 233.7 | 3.2 |
| Pumps | Electric | 76.8 | 1.0 | 75.9 | 1.0 | 76.8 | 1.0 | 76.8 | 1.0 | 76.3 | 1.0 | 76.0 | 1.0 | 76.0 | 1.0 | | | 74.7 | 1.0 |
| Fans | Electric | 326.8 | 4.4 | 363.0 | 4.9 | 317.0 | 4.3 | 325.3 | 4.4 | 315.4 | 4.3 | 319.4 | 4.3 | 310.0 | 4.2 | | | 293.0 | 4.0 |
| Domestic Water | Natural G | 92.5 | 1.3 | 92.5 | 1.3 | 92.4 | 1.3 | 92.5 | 1.3 | 92.5 | 1.3 | 92.5 | 1.3 | 92.5 | 1.3 | | | 92.3 | 1.3 |
| Exterior Lighting | Electric | 110.0 | 1.5 | 110.0 | 1.5 | 110.0 | 1.5 | 110.0 | 1.5 | 110.0 | 1.5 | 110.0 | 1.5 | 110.0 | 1.5 | | | 110.0 | 1.5 |
| | | | | | | | | | | | | | | | | | | | |
| Total | | 3,989.1 | 54.0 | 4,465.9 | 60.5 | 3,854.9 | 52.2 | 3,971.1 | 53.8 | 3,836.1 | 52.0 | 3,785.1 | 51.3 | 3,758.6 | 50.9 | 0.0 | 0.0 | 3,419.2 | 46.3 |

Building Area 73,823 sqft

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# Case Study

## Designing a Net-Zero School in North Syracuse

### Step 4A - Central Station VAV System

**Project Name:** NSCSD Bear Road El
**Project Number:** 16125
**Input by:** RDH
**Date:** 4/27/2017

| | | IECC 2015 Code Minimum | | Design Envelope, Lighting & DWH | | 12 Central Station AHU with VAV, HW & CW Plants | | 13A Displacement Ventilation | | 13B Perimeter Heating for Classrooms | | 13C Energy Recovery Ventilation for Classrooms | | 13D Electric Boiler | | 13E Enhanced Night Setback | | 14 Design VAV System | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Energy Source | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI | Energy | EUI |
| Lights | Electric | 511.5 | 6.9 | 212.9 | 2.9 | 212.7 | 2.9 | 212.7 | 2.9 | 212.7 | 2.9 | 212.7 | 2.9 | 212.7 | 2.9 | 212.7 | 2.9 | 212.7 | 2.9 |
| Receptacles/Proc | Electric | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 | 294.2 | 4.0 |
| Kitchen Process | Natural G | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 | 93.1 | 1.3 |
| Space Heating | Natural G | 2,237.4 | 30.3 | 1,905.0 | 25.8 | 1,511.9 | 20.5 | 1,449.7 | 19.6 | 1,488.5 | 20.2 | 1,230.9 | 16.7 | 151.2 | 2.0 | 1,518.8 | 20.6 | 1,115.6 | 15.1 |
| Space Heating | Electric | 0.0 | | 0.0 | 0.0 | | | | | | | | | 1,357.1 | 18.4 | | | | |
| Space Cooling | Electric | 246.8 | 3.3 | 204.1 | 2.8 | 182.0 | 2.5 | 178.0 | 2.4 | 187.0 | 2.5 | 171.7 | 2.3 | 182.0 | 2.5 | 170.2 | 2.3 | 159.2 | 2.2 |
| Pumps | Electric | 76.8 | 1.0 | 75.4 | 1.0 | 32.8 | 0.4 | 29.4 | 0.4 | 33.2 | 0.4 | 30.8 | 0.4 | 30.0 | 0.4 | 29.7 | 0.4 | 25.9 | 0.4 |
| Fans | Electric | 326.8 | 4.4 | 269.8 | 3.7 | 164.6 | 2.2 | 163.3 | 2.2 | 160.5 | 2.2 | 163.1 | 2.2 | 164.6 | 2.2 | 152.8 | 2.1 | 146.4 | 2.0 |
| Domestic Water | Natural G | 92.5 | 1.3 | 62.9 | 0.9 | 62.9 | 0.9 | 62.9 | 0.9 | 62.9 | 0.9 | 62.9 | 0.9 | 62.9 | 0.9 | 62.9 | 0.9 | 62.9 | 0.9 |
| Exterior Lighting | Electric | 110.0 | 1.5 | 61.8 | 0.8 | 61.8 | 0.8 | 61.8 | 0.8 | 61.8 | 0.8 | 61.8 | 0.8 | 61.8 | 0.8 | 61.8 | 0.8 | 61.8 | 0.8 |
| | | | | | | | | | | | | | | | | | | | |
| Total | | 3,989.1 | 54.0 | 3,179.2 | 43.1 | 2,616.0 | 35.4 | 2,545.1 | 34.5 | 2,593.9 | 35.1 | 2,321.2 | 31.4 | 2,609.6 | 35.3 | 2,596.2 | 35.2 | 2,171.8 | 29.4 |

Building Area 73,823 sqft

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BEAR ROAD
wel
come


Alphabet

# Opportunities through the RFP

- Developing a replicable model for retrofits, allowing us to go from nearing net-zero to achieving net-zero
- Following an approach that includes and benefits all involved parties – from architects to financers to building managers
- Offering a huge potential to show what can be done for retrofits, even beyond the housing market
- Building upon and streamlining a comprehensive approach from design through construction

# Paul Bertram

President,
PRB Connect

# Case Study

## Delivering a High Performance, Deep Energy, Resilient, Low Income, Multifamily Enclosure Retrofit in Castle Square, Boston

Existing Façade
**Zero Insulation**

New Façade
**R-40**

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# What went wrong?

- Commissioning was not done until a year after completion
- Enclosure commissioning was not done following ASTM E2813 – 12e1 Standard Practice for Building Enclosure Commissioning
- The goal 72% energy reduction was missed

# What went right?

- Castle Square was a collaborative effort that included the Tenants Association
- The exterior system was engineered with sound building science by bringing in an Enclosure Specialist
- Tenants could stay in units (with some disruption scheduling)
- Tenants saw about 50% reduction in energy bills (gas & electric)

# Right and Wrong

The modeled energy efficiency reduction goals were conceptually obtainable

# The Vision for Greater "Certainty" in Delivering System Performance

# Off-Site Construction, Panelized/Prefabricated Construction as part of the Deep Energy Exterior System Solution

# Opportunities through the RFP

- Building scalable and replicable high performance, deep energy retrofit solutions
- Mobilizing cross-functional teams to form these solutions through a collaborative design process
- Enabling social benefits, as tenants can remain in the building during retrofits
- Creating resilience in New York's building infrastructure

# RFP Overview

# We’re looking for solutions that…

# Are designed to

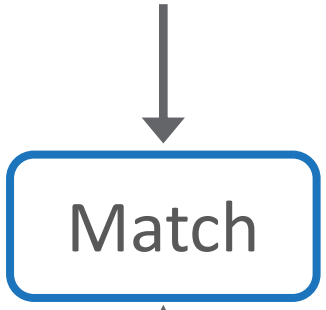
- Be cost-effective: planned rehab budget + savings
- Improve the appearance of the building
- Improve the quality of life for tenants
- Achieve or approach net-zero energy

# Are delivered with

- Residents in place and limited disruption
- An energy performance guarantee over several decades


Affordable Housing Buildings
Match
Qualified Industry Teams
6 months design period
Deal Closing + Construction


- 1-2 story garden style
- 3-7 story building
- Simple architecture




**6 months design period**


- Ability to design and deliver solution
- $75,000 stipend
- Open source design

- Designs that can be executed
- Clarity on what regulations may need adjustment
- Trust and understanding of the financial models
- Solutions adaptable to other buildings

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6 months design period

Deal Closing
+
Construction

**Gap Funding Available**

**Supporting the Teams**

- Transfer of knowledge from Energiesprong
- Coaches
- $75,000 stipend

**Making the Deal**

- Regular touch base
- HCR and HUD
- Financing partners
- Permitting agencies

**Encourage collaboration between teams**

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# RFP
## How to Participate

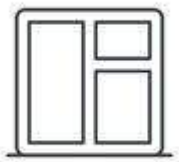
# What Buildings Are a Good Fit

Regulated Affordable or Public Housing

One of the 2 Target Typologies

Simple Architecture

Major Renovation Planned



Relatively High Energy Cost

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# What Makes a Strong Team

- Capable of designing and building the solution
- Experience with high performance or net-zero projects
- Expertise in on-site generation
- Ability to model total cost of ownership
- Ability to project energy savings

# First Round Timeline

| Q4 2017 | Q1 2018 | Q3/Q4 2018 | End 2018 - 2019 |
|---|---|---|---|
| • RFP Released | • 1st buildings and teams selected<br>• Design starts | • Solutions designed | • Construction starts<br>• Second round of pilots starts |

Key players engagement → getting to a deal

RetrofitNY team works on financing and regulatory solutions

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# Getting Ready to Participate

## Building Owners

- Select a building
- Connect with a team
- Identify building physical needs

## Potential Solution Providers

- Assemble a team
- Connect with a building owner

**Be on the lookout for updates from the RetrofitNY team**

# Thank you

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