

BUILDINGENERGY NYC

NYS Electrification Pilot Programs: Paving the Way for Widespread Electrification

Jen Leone (NYC Department of Housing Preservation & Development)

Danielle Donnelly (Community Preservation Corporation)

Jordan Bonomo (NYCHA)

Curated by Kristy O'Hagan and Sunitha Sarveswaran

Northeast Sustainable Energy Association (NESEA) | October 24, 2024

TODAY'S AGENDA

Welcome and Introduction

Sunitha Sarveswaran, Sustainability Program Manager, HCR

**The HPD-NYSERDA
Electrification Pilot**

Jen Leone, Assistant Commissioner and Chief Sustainability Officer, HPD

**The Climate Friendly
Homes Fund**

Danielle Donnelly, AVP of Sustainability Programs and CFHF, Community Preservation Corporation

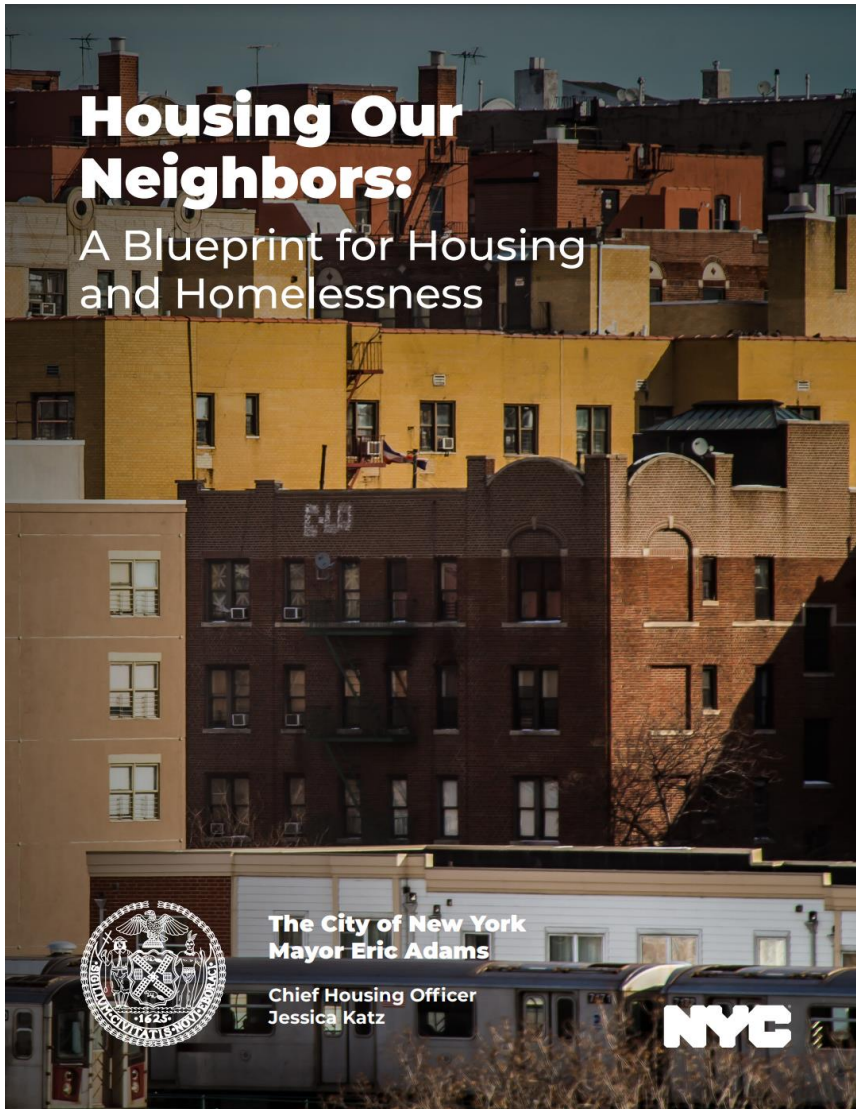
NYCHA Clean Heat for All

Jordan Bonomo, Senior Project Manager, NYCHA

Moderated and Open Q&A

The HPD-NYSERDA Electrification Pilot

NYC's Commitment to Decarbonization



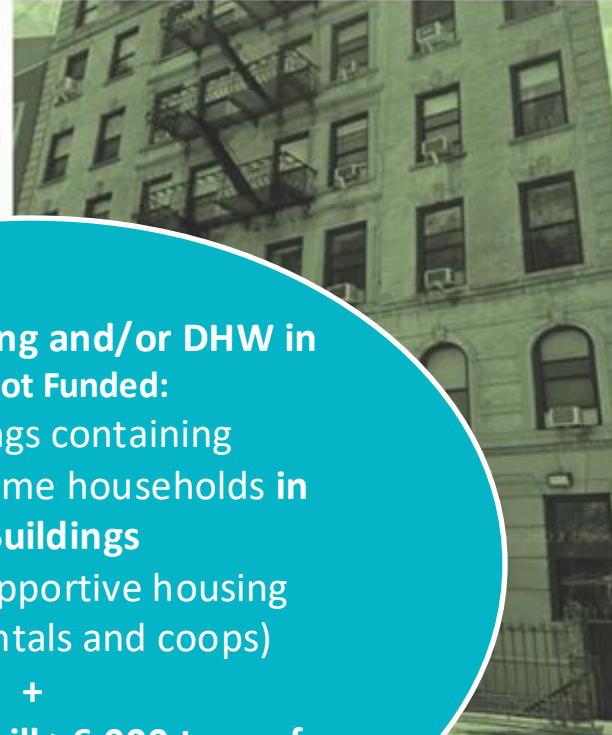
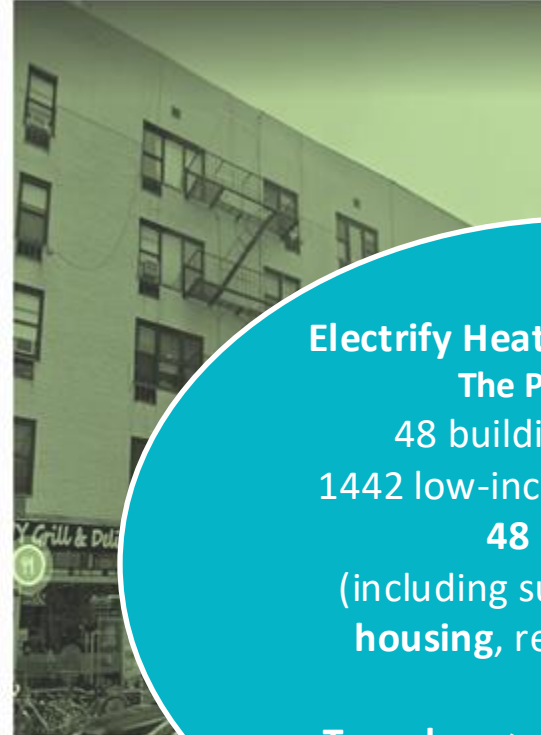
Fast-track equitable decarbonization and beneficial electrification to serve low-income households

We must ensure that the transition from a fossil-fueled economy is fair and equitable. Reaching New York City's ambitious climate targets while meeting our environmental justice goals will require significant investments in our housing stock, including scaling up beneficial electrification. Beneficial electrification reduces building emissions without creating additional costs for residents, and without stretching the energy grid in ways that may increase pollution and other environmental burdens in communities already disproportionately impacted by climate change.

SPOTLIGHT: Release Sustainable Design Guidelines that create a clear and equitable pathway to decarbonization

SPOTLIGHT: Incubate new ideas to scale beneficial electrification & resiliency

HPD-NYSERDA \$24M Retrofit Electrification Pilot



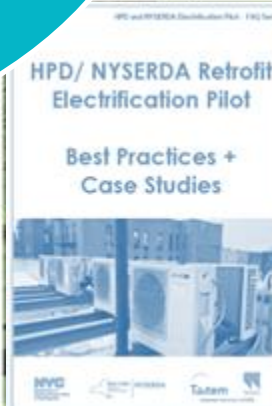
Electrify Heating and/or DHW in
The Pilot Funded:

48 buildings containing
1442 low-income households in
48 Buildings

(including supportive housing
housing, rentals and coops)

+

To reduce > will >6,000 tons of
GHG each year



Case Studies:



Project & Building Info:

- 52-unit Gut Rehab Rental
- #2 Oil/ 1-Pipe Steam

Scope: Heating Only

- Central VRF + Envelope
- Heating/ Cooling is owner-paid

Climate Metrics:

- GHG Reductions: ~ 4.6 tons/ DU
- Energy Savings: ~ 54%
- Energy Cost Savings: ~ 31%



Project & Building Info:

- 4-building Sub Rehab Coop
- #2 Oil/ 1-Pipe Steam

Scope 2: Heating Only

- Mini-Splits + Envelope
- Heating/ Cooling is resident-paid

Climate Metrics:

- GHG Reductions: ~ 3 tons/ DU
- Energy Savings: ~ 57%
- Energy Cost Savings: ~ 37%



Project & Building Info:

- 9-unit Gut Rehab Rental
- #2 Oil/ 1-Pipe Steam

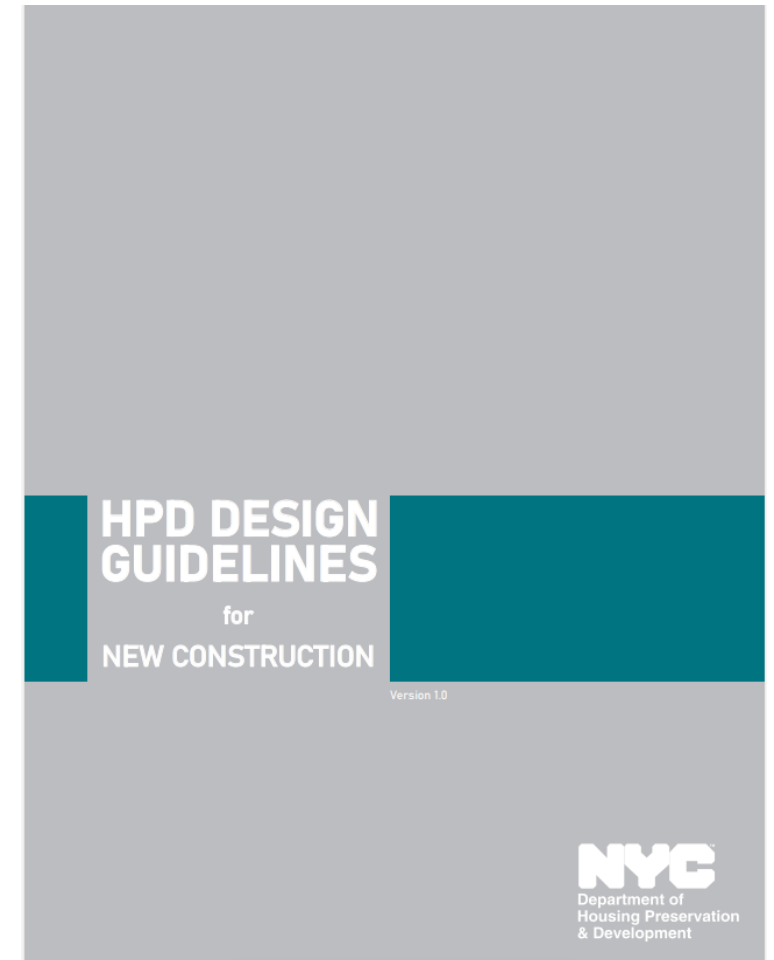
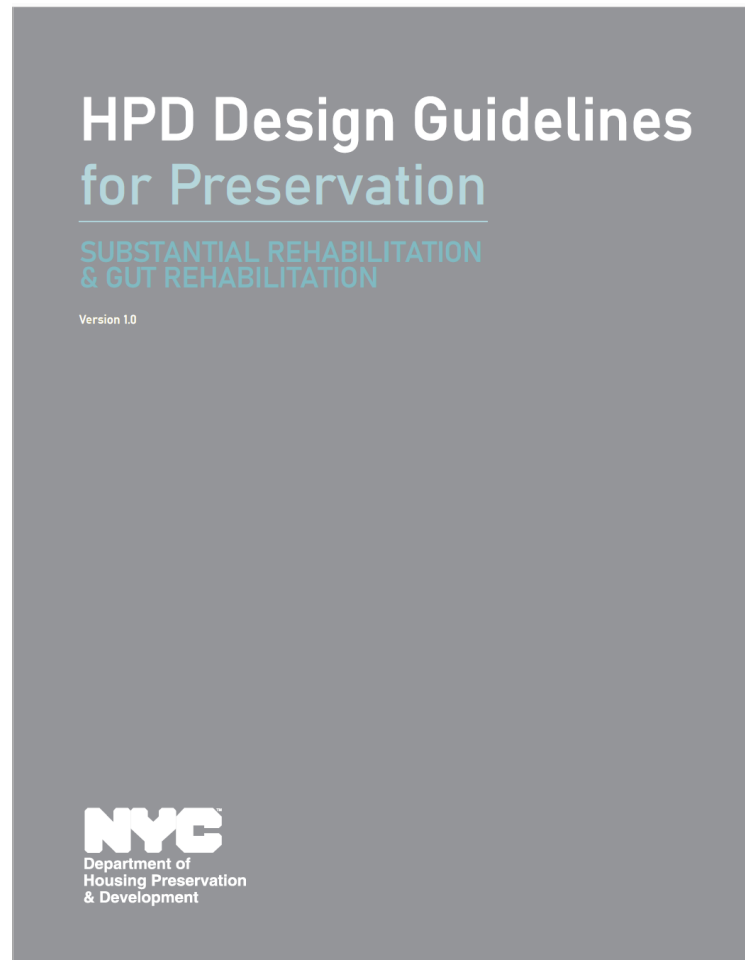
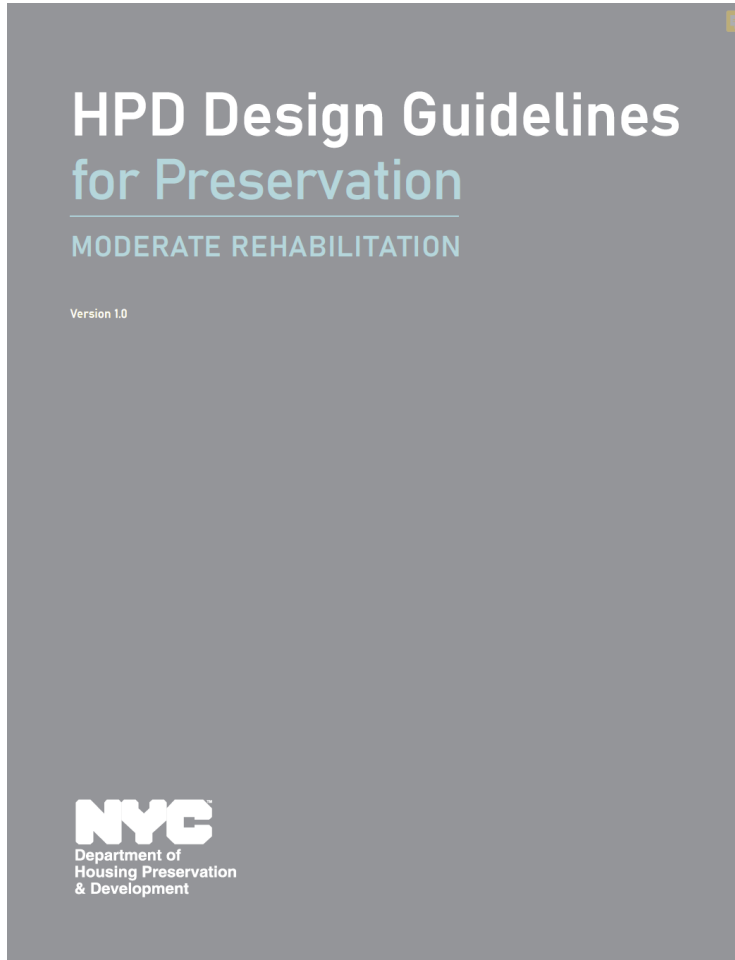
Scope : Heating + DHW

- Dual-wired PTHP + HPHW
- Heating is owner-paid

Climate Metrics:

- GHG Reductions: ~ 6.9 tons/ DU
- Energy Savings: ~ 59%
- Energy Cost Savings: ~ 50%

HPD's Design Guidelines



HPDs Guidelines focus on equitable decarbonization & strategic electrification, requiring it where it makes the most sense and allowing waivers where it is not feasible.

Resilient & Equitable Decarbonization Initiative

Environment Energy

AUGUST 19, 2024 | Albany, NY

**Governor Hochul Announces
\$16.5 Million is Now Available
to Decarbonize Affordable
Housing in New York City**

The First REDi initiative to launch is REDi: EB for Existing Buildings

REDi: EB prioritizes beneficial electrification, aligning w/ HPD's Design Guidelines, and provides free Technical Assistance to project teams.

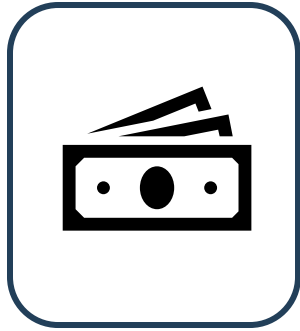
REDi provides up to \$35K/ DU and up to \$2.5 million per project to implement up to 3 of the following scopes:

Scope 1: Electrification of DHW

Scope 2: Electrification of Space Heating
+ Electrical Upgrades Boost

Scope 3: Enhanced Envelope & Ventilation

How Does HPD Define Beneficial Electrification?



IT MAKES ECONOMIC SENSE

When electrification is **cost effective** and guarantees **energy savings**



IT REDUCES FLOOD RISK

For **flood-prone sites**, where electrification would allow mechanical equipment to be moved to the roof.



IT IS PART OF A HOLISTIC SCOPE

It is implemented along with **complementary upgrades** to ensure energy conservation



Space Heating

Heat Pumps
(VRF, PTHP, etc.)

- Scope includes **roof insulation** and **window replacements**
- If currently using **oil** or **electric resistance** as heating fuel
- If **steam system** requires replacement/ reconfiguration
- If the equipment is in the cellar in **flood-prone** buildings
- If the project is a **Gut Rehab.**

Domestic Hot Water (DHW)

DHW Heat Pumps

- In buildings < 7 stories **and**:
- If DHW is currently using **oil** or **electric resistance** as fuel
- If the equipment is in the cellar in **flood-prone** buildings
- If the project is a **Gut Rehab.**

The REDi Application

Resilient & Equitable Decarbonization Initiative (REDi) Application

The Resilient & Equitable Decarbonization Initiative (REDi) program is a long-term joint HPD-NYSERDA initiative that streamlines access to financial and technical assistance from New York State. REDi funding is secured directly through HPD, without requiring an application to NYSERDA. REDi:Existing Buildings (REDi: EB) will fund electrification of domestic hot water (DHW), space heating/cooling, and enhanced envelope and ventilation.

INSTRUCTIONS:

- All light grey cells will auto-populate from information input elsewhere.
- Review which buildings are eligible to apply for REDi.
- Fill in any additional content in light blue cells to the extent possible.
- Focus on buildings pursuing electrification.
- Once pre-scoping consultation has been held and eligibility clarified, submit the form to HPD Sustainability with project's IPNA and 2 years of Utility Bills for final review and approval.

Have questions about REDi? Contact: Sustainability@hpd.nyc.gov

SUBMITTAL DATE	8/21/2024
SUBMITTAL TYPE	Milestone 1: Prescoping Consultation

Project Information	Additional Guidance	Autofilled
HPD 5-digit Project ID		68259
HPD Project Name		TBK1003-URBAN HOMESTEADING
Developer/ Sponsor Name		UHAB
Architect of Record		CEAT Architecture
MEP Engineer of Record		Senthal Engineering
HPD Primary Program		Party Transfer (TPT) - Tenant Petition

Applicant fills in project info (e.g. baseline fuel, existing heating system, flood zone, rehab classification)

Scope of Work		Project Summary (auto-filled)
Proposed Heating System Residential Spaces		Electric Heat Pump - TBD
Proposed Heating System Commercial Spaces, if applicable		
Proposed DHW (Domestic)		Electric Heat Pump - TBD
Proposed in-unit ventilation system	<i>If high performance (ERV), may be eligible for Scope 3</i>	New Exhaust Only Ventilation
Proposed Roof Scope	<i>If high performance, may be eligible for Scope 3</i>	New Roof - High Performance
Proposed Window Scope	<i>If high performance, may be eligible for Scope 3</i>	New Windows - High Performance
Proposed Wall Insulation	<i>May be eligible for Scope 3</i>	Partial Wall Insulation (meets Scope 3 UA)
Proposed Cooking Equipment Scope	<i>For reference. Cooking electrification is not covered by REDi incentives.</i>	Convert to Electric Stoves

Max. Incentive Amounts	Scope 1 (DHW only)	Scope 2 (Space Heating)	Scope 3 (ERV/Envelope)	
SRO/Studio	\$1,800	\$18,000	\$2,700	<i>Note that REDi incentives are designed to offset the incremental cost of electrification of hot water and/or space heating when compared to "BAU" but due to caps, this is not always possible. Note that certain technologies are not currently covered for Scope #2 (e.g., window heat pumps), but projects may seek additional Scope 3 funding for items covered under that scope.</i>
1-bedroom	\$2,100	\$21,000	\$3,200	
2-bedroom+	\$2,400	\$24,000	\$3,600	
Incentive Calculator: Project is eligible for the maximum incentive for the selected scope up to lower of the Per/DU or the Project Cap:				
Max. for each Scope	#VALUE!	#VALUE!	#VALUE!	<i>Maximum Incentive is capped at \$1 million for single-building projects and \$2 million for multi-building projects</i>
Max. for Scope 1+2	#VALUE!			
Max. for Scope 2+3		#VALUE!		
Max. for Scopes 1-3	#VALUE!			
Project Cap based on # of buildings:			\$2,000,000	
Will there be Operational Cost Savings from converting to Electric Heat Pumps* compared to...				
Oil	Significant savings, especially when "normalizing" the cost to today's			<i>These estimates assume air-sealing, code-compliant roof and windows, and pipe insulation/low-flow fixtures at minimum. Increased efficiency will increase savings. The REDi TAP team can help buildings assess energy costs and savings. Note that projects will be expected to underwrite to HPD's M&O standards for where allowed by HPD's Electric Heating Policy, HPD's Utility Allowance.</i>
Electric Resistance	Significant savings, due to increase equipment efficiency			
Natural Gas	Neutral to negative savings for electrification of space heating depend on building envelope. Negative savings for electrification of DHW.			

REDi Questionnaire *Review documents on REDi webpage*

Has applicant reviewed the REDi Term Sheet and Participation Agreement and is willing to commit to the the program requirements?	Yes
Has applicant reviewed the REDi Technical Requirements?	Yes
Has applicant reviewed the REDi Program Process?	
Has applicant reviewed the HPD Electric Heating Policy and is willing to comply?	Yes
Will proposed electrification scope exceed the project's Term Sheet limit when all incentives (including REDi) are factored in? Explain.	We are relatively early on in the scoping process for this project, so it's difficult to say for sure, but the figures listed on the term sheet look reasonable to me.
If not required by HPD, why do you want to electrify your building(s)? Explain.	The building has a unique energy makeup due to a 2019 gas shutoff and aging boiler at the end of its useful life. Because the building is about to undergo a substantial rehab, we believe it is worthwhile to fully electrify and input new heating and cooling systems. We also believe this will aid the tenants (who will become homeowners upon completion of the rehab) in preserving their building in the long term.

Fill in to the best of your knowledge

Electric Heat Pump - TBD									
Electric Heat Pump - TBD									
New Exhaust Only Ventilation									
New Roof - High Performance									
New Windows - High Performance									
Partial Wall Insulation (meets Scope 3 UA)									
Convert to Electric Stoves									

Applicant fills in proposed scope related to electrification

Estimates Cost Saving & GHG Reductions

p	Est. Utility Cost Savings	Comments	Project Totals/ Averages						
p	Space Heating & Cooling								
P	Estimated Cost Savings for Space Heating	Calculated, assuming commercial if included in Primary Fuel Use	42% savings	-14% savings	-3% savings	N/A, Not in Scope	56% savings	45% savings	54% savings
P	Annual Heating Costs for apartments (per M&O)	Excludes Commercial Space	\$128,535	\$14,350 /year	\$26,445 /year	Not in Scope	\$12,710 /year	\$14,350 /year	\$26,445 /year
P	Estimated Heating Costs for Commercial Space	Uses M&O estimate but multiplied proportionally (comm SF/ resi SF)	\$0	\$0 /year	\$0 /year	#VALUE!	\$0 /year	\$0 /year	\$0 /year
P	Annual Cooling Costs for apartments (per M&O)	Excludes Commercial Space	\$765	\$85 /year	\$85 /year	\$0 /year	\$85 /year	\$85 /year	\$85 /year
P	Annual Cooling Costs for apartments (per M&O)	If Owner Paid	\$53,295 /year	\$5,950 /year	\$10,965 /year	Not In Scope	\$5,270 /year	\$5,950 /year	\$10,965 /year
p	Domestic Hot Water								
P	Estimated Cost Savings for Hot Water	Calculated	9% savings	-22% savings	-22% savings	-22% savings	31% savings	N/A, Not in Scope	N/A, Not in Scope
P	Annual DHW Costs for apartments (per M&O)	Excludes Commercial Space	\$89,910 /year	\$12,950 /year	\$23,865 /year	\$23,680 /year	\$11,470 /year	Not In Scope	Not In Scope
P	Estimated DHW Costs for Commercial Space	Calculated, for reference only	\$0 /year	\$0 /year	\$0 /year	\$0 /year	\$0 /year	\$0 /year	#DIV/0!
P	Combined Space Heating + DHW								
P	Estimated Savings for Heating and Hot Water	Calculated		-17% total savings	-9% total savings	-7% total savings			37% total savings
P	Estimated GHG Emissions Reductions (%)			80%	82%	25%			62%

Savings (if any) are estimated for heating and hot water

Estimates Cost Impacts

P	Cost Analysis	Comments	Project Total						
T	Proposed DHW system	DHW Systems Proposed	\$111,895 /sf	\$170,000.00	\$331,650.00	\$304,300.00	\$106,800.00	\$258,000.00	\$135,000.00
T	Proposed Heating System	Heating System Residential	\$725,436 /sf	\$680,000.00	\$1,558,755.00	\$1,558,755.00	\$133,500.00	\$604,000.00	\$2,115,000.00
T	Proposed Cooking Scope (assumes all units w/ kitchen)	Cooking	\$28,074 /sf	\$30,600.00	\$59,697.00	\$59,697.00	\$106,800.00	\$77,400.00	\$81,000.00
T	Electrical Upgrades	Electrical Upgrades	\$133,684 /sf	\$102,000.00	\$198,990.00	#N/A	\$106,800.00	\$258,000.00	\$270,000.00
T	Proposed Ventilation system	Envelope Ventilation	\$139,796 /sf	\$127,500.00	\$248,737.50	\$228,225.00	\$133,500.00	\$322,500.00	\$337,500.00
T	Proposed Roof Scope	Envelope Roof	\$111,837 /sf	\$102,000.00	\$198,990.00	\$182,580.00	\$106,800.00	\$258,000.00	\$270,000.00
T	Proposed Window Scope	Envelope Window	\$221,595 /sf	\$170,000.00	\$331,650.00	\$304,300.00	\$178,000.00	\$602,000.00	\$630,000.00
T	Proposed Wall Insulation	Envelope Wall	\$0 /sf	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
P	Total Estimated Hard Cost (Residential Portion Only)	Based on proposed scope	#N/A	\$1,382,100.00	\$2,928,469.50	#N/A	\$1,571,740.00	\$3,581,900.00	\$3,838,500.00
P	BAU Cost for Non-Electric Scope*	For Comparison		\$26,500 /DU	\$40,100 /DU	#N/A	\$42,200 /DU	\$83,200 /DU	\$60,000 /DU
P	Incremental Cost/ DU	*	#N/A	\$14,300.00	\$22,000.00	#N/A	\$45,100.00	\$95,900.00	\$32,800.00

Incremental costs are calculated and compared to "BAU"

P	Incentive Eligibility based on Scope(s)	Comments	Project Total						
P	Scope 1 Incentive	All		\$2,400	\$2,400	\$2,400	\$2,400	\$0	\$0
P	Scope 2 Incentive	All		\$24,000	\$24,000	\$0	\$24,000	\$24,000	\$24,000
P	Scope 2 Wiring Boost	All		\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
P	Scope 2 Service Boost	All		\$2,500	\$2,500	\$0	\$2,500	\$2,500	\$2,500
P	Scope 3 Incentive	All		\$0	\$0	\$0	\$0	\$0	\$0
P	Combined Incentive Eligibility by building	Pro-rated, based on Scope		\$565,200	\$942,000	\$0	\$0	\$0	\$870,000
P	Max Incentive based on Scope	Pro-rated, based on Scope							\$2,377,200 Max Incentive Based on Funded Scopes
P	Max Incentive based on Per-Project Cap	\$1.25 M (single bldg), \$2.5 M per project							\$2,500,000 Maximum Incentive Based on Cap
P	Incentive for this Project	Max							\$2,377,200 Total Project Award
P	Incentive Gap	Based on proposed scope							-\$122,800 Incentive Gap

Incentives are calculated based on scope and project size

The REDi ProForma

REDi: EB Project Proforma



Section 1a: Project Information			Section 1b: HPD/ TAP Narrative			
Submittal Type/ Date	Date	Application	<p>TAP to replace this text with custom text about: Cost overruns, Buildings that are "Review Track" or "Revise Scope", and reasons why (project cap exceeded, savings not achieved, cost too high and some rescoping is recommended....</p> <p>Projects are encouraged to schedule an early design charette.</p>			
HPD Project ID	74298					
HPD Project Name	Urban Renaissance					
Developer						
Architect						
MEP Engineer						
HPD Primary Program	LIHTC Year 15					

The Proforma may suggest alternative scopes

Summarizes the REDi Tool results and REDi incentive amounts for the development team and HPD.

Section 2: REDi Scope, Cost & Funding Summary. Items in red need attention!

REDi Eligibility:	Fund!	Fund!	Review Track Only	Review Track Only	Review Track Only	Fund!
Project Information						
Building Address:						
Ownership Type	Rental	Rental	Rental	Rental	Rental	Coop
Number of Units	20	32	35	18	20	32
Existing Fuel Type	Natural Gas	Natural Gas	Natural Gas	#2 Oil	#2 Oil	#4 Oil
Floodprone?	Stormwater Flooding	Stormwater Flooding	No	No	No	No
What is Building's LL97 Pathway?	Not subject to LL97, building < 25,000 sf	Article 321: Prescriptive Pathway	Article 321	Not flood-prone site	Not subject to LL97, building < 25,000 sf	Article 321: Prescriptive Pathway
Proposed Scope						
REDi Scope	Scope: 1 2	Scope: 1 2 3	Scope: 1	Scope: 1 2	Scope: 2	Scope: 2
Scope 1: Hot Water Heating	Electric Heat Pump, Central	Electric Heat Pump, Central	Electric Heat Pump, Central	Electric Heat Pump, Central	Electric Heat Pump, Central	Electric Heat Pump, Central
Scope 2: Heating System	Electric Heat Pump - TBD	Electric Heat Pump-Cold	Electric Heat Pump-Cold	Electric Heat Pump-Cold	Electric Heat Pump-Central	Electric Heat Pump-Cold
Scope 2: Electrical Upgrades (assumed)	Electrical Wiring + Partial Service	Electrical Wiring + Partial Service	Electrical Wiring + Partial Service	Electrical Wiring + Partial Service	Electrical Wiring + Partial Service	Electrical Wiring + Partial Service
Scope 3: Envelope (Insulation)	Partial Wall Insulation (Does Not Meet Scope)	Partial Wall Insulation (Meets Scope 3 UA)	Not in Scope	Not in Scope	Not in Scope	Not in Scope
Cooking (not funded, included for reference)	No stoves in Scope	Convert to Electric Stoves	Convert to Electric Stoves	Convert to Electric Stoves	Convert to Electric Stoves	Convert to Electric Stoves
Estimated Energy Cost Savings*	-10%	3%	-9%	46%	27%	32%
Estimated Project Cost Impacts for Proposed REDi Scope**						
Hard Cost**	\$1,436,500	\$3,260,120	\$1,256,759	\$1,571,740	\$3,581,900	\$3,838,500
Eligible REDi Incentive	\$565,200	\$1,050,000	\$0	\$0	\$0	\$870,000
Net Cost after REDi	\$871,300	\$2,210,120	\$1,256,759	\$1,571,740	\$3,581,900	\$2,968,500
Project Hard Cost	\$14,946,000.00					
Estimated Business as Usual (BAU) Cost	\$7,462,000.00					
Eligible REDi Funding	\$2,485,200 based on fundable scope					
Available REDi Funding	\$2,485,200 Based on REDi Project Cap					
Net Incremental Cost	\$4,998,800.00					
Incremental Cost/DU	\$31,800 per/ DU					

- based on HPD M&O standards (assumes owner-paid costs*)

	\$5.00	\$185.00	\$185.00	\$119.00	\$330.00
	\$65.00	\$23,680.00	\$11,470.00	Not In Scope	Not In Scope
	Ident	Owner	Owner	N/A	N/A
	\$5.00	\$0.00	\$205.00	\$205.00	\$205.00
	\$45.00	Not in Scope	\$12,710.00	\$14,350.00	\$26,445.00
	Ident	N/A	Owner	Owner	Owner
	\$5.00	\$0.00	\$85.00	\$85.00	\$85.00
	\$65.00	Not In Scope	\$5,270.00	\$5,950.00	\$10,965.00
	Owner	N/A	Owner	Owner	Owner

Electric Heating Policy), use applicable Utility Allowance and adjust M&O accordingly / TAP if project is implementing Partial Electrification of Hot Water or Heating, which is not calculated in this table. See M&O Standards. [Apply with HPD Electric Heating Policy](#) [electric-buildings.page](#)

Section 4: HPD Approvals*

TAP Approval	
HPD Director	
HPD Signature	
Date	

*HPD Program Approval is required for projects seeking Pilot Funding.

Alternative Offer Letter (PIOL) will be issued w/ REDi: EB Technical Requirements. of 4 months for the required rounds of Design Review by the TAP. review by HPD BLDS, which may take additional time. the REDi scope at 100% DD. Upon TAP sign-off of design and scope, a Final Incentive Letter will be issued prior to closing.

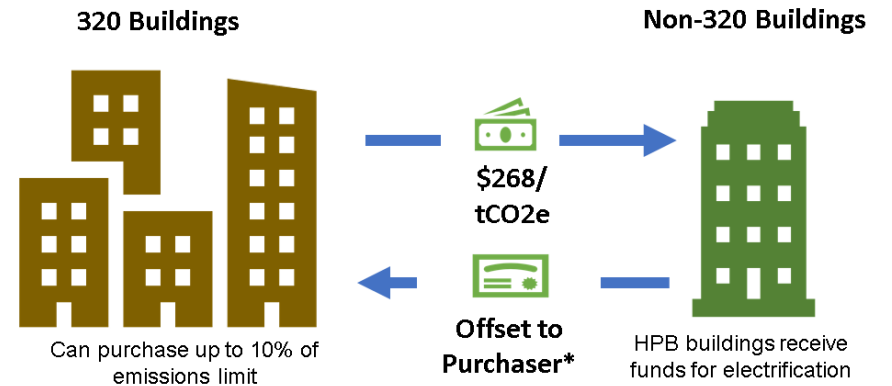
LL97 Offsets and the “GreenHOUSE Fund”



LL97 Allows building owners to offset up to 10% of their emissions limits

Offsets must be local, verifiable, and permanent

To achieve these goals, NYC developed the GreenHOUSE Fund, which will use offsets to fund electrification projects in HPD’s REDI program



The Climate Friendly Homes Fund (CFHF)

The Climate Friendly Homes Fund (CFHF)

As part of the 2022 approved Housing Plan 2.0, the \$250MM Climate Friendly Homes Fund was established to electrify 10,000 units of existing housing by 2027.

CFHF will provide up to **\$25,000/unit for regulated and unregulated affordable multifamily housing**, between 5 and 50 units, for full and partial electrification.

Key Goals of CFHF include:

- Targeting electrification in low-moderate income (LMI) census tracts and disadvantaged communities (DAC)
- Develop a benchmarking database
- **Tracking bids and construction costs to identify trends in electrification hard-costs**
- Comparing projected performance with actual, benchmarked performance
- Training, public awareness, and market building



Program Parameters

CFHF represents the largest investment in small and mid-sized, mid-cycle buildings in NYS LIDACs to date:

- New approach to incentivizing electrification focused on creating a larger pool of early adopters
- Significantly reduce the cost burden associated with electrification retrofits for building owners AND end users
- Examine existing market challenges and barriers to adoption
- Pilot limited, off-site project assessment and screening to limit soft costs
- Consistent reporting and pricing for feasibility screening, design services, construction monitoring, and other soft costs

In Year 3 of administration, CFHF has:

- Implemented a new, expedited feasibility screening to condense program evaluation timelines by at least 4 weeks
- Expanded eligibility criteria to include co-ops, condos, and larger buildings (case-by-case)
- Expanded ability to pair with additional financing sources including NYSERDA incentive programs
- Received over 400 applications (~15,000 units of housing) in 19 months of active originations
- Evaluated 120 eligible applications totaling 5181 units (excludes draft applications)

Pipeline + Construction Cost Data Sample Size

Active Applications	Active Total Units	Projects with Final Pricing/ Contractor Bid	Units with Final Pricing/ Contractor Bid
135	5785	14	434

- Current pipeline reflects drafts, completed applications (pre-screening), applications screened for eligibility and feasibility, and active closings
- Sample size for construction cost data based on projects with available:
 - G703/contractor final pricing template
 - Submitted contractor bids
 - Cost estimates from audit/feasibility screening
- Definitions:
 - Greenlight – internal evaluation of eligibility criteria (size, physical condition, financial condition, location and/or regulatory status)
 - Scope A – Off-site audit, submitted IPNA, and/or new feasibility screening
 - Scope B – Property assessment, contractor procurement, and project closing stage

Average Projected vs. Actual Construction Cost

	Space Heating and Cooling	DHW	Other Measures	Total Cost
Projected Cost/Unit	\$14,356.95	\$3,839.10	\$3,147.44	\$19,484.62
Actual Cost/Unit	\$12,402.83	\$5,911.75	\$7,738.11	\$23,285.14

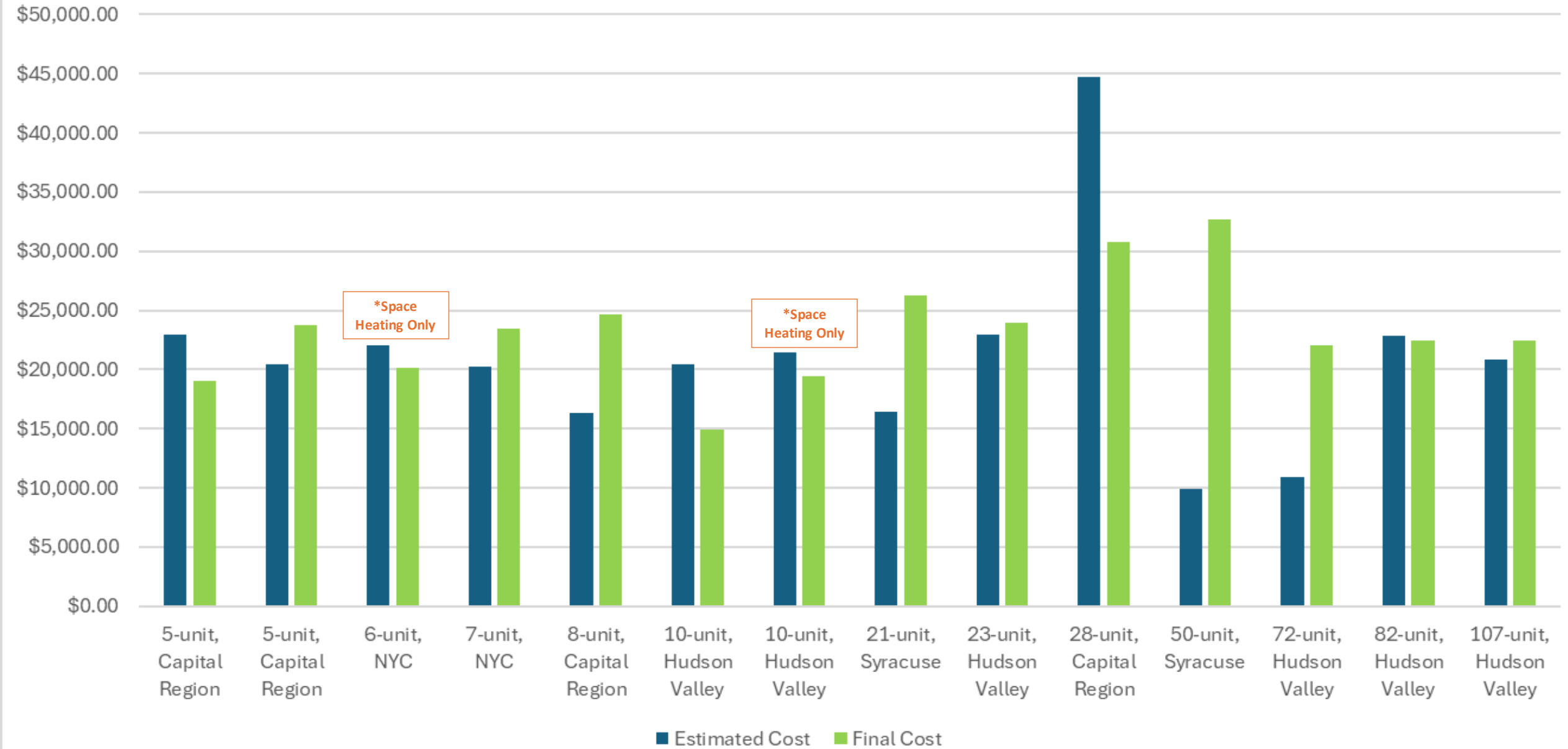
*Other measures include lead/asbestos testing, air-sealing and other ECMs, contractor general requirements, and electrical service upgrades

*14 projects included in this analysis – 9 with final approved pricing, 5 with contractor bids

*Projected cost based on estimates produced by Momentum tool and engineer assessments

Cost Comparison between Estimate and Final Pricing

(Projects with G703 or Contractor Bid)



Case Study – Multiple Buildings Mid-Hudson

Main Street, Poughkeepsie

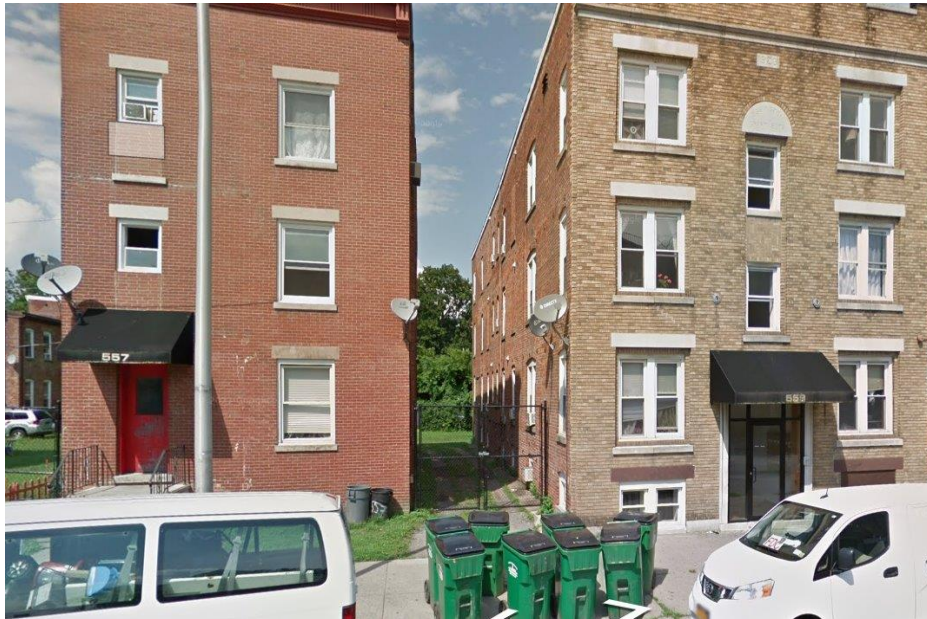
Grant Award/Status: \$575,000, Closed

Number of units: 23

Number of buildings: 4

Scope of work: Full-Electrification – 100% covered by grant

- Replacement of existing hydronic heating system with mini/multi-split HPs (Mitsubishi M-Series)
- Replacement of unitized, gas-fired HW heaters with integrated tank HP HWHs (recommended spec: A.O. Smith, SANCO2, Rheem)
- Air-sealing and electrical service upgrades



	Space Heating and Cooling	DHW	Other Measures	Total Cost
Projected Cost	\$12,600	\$1,800	\$6,079.80	\$20,479.80
Actual Cost	\$15,910		\$7,882.80	\$23,792.80

14% increase – contractor bids less competitive

Case Study – Garden Style, Mid-Hudson

Route 6, Middletown

Grant status: \$2.675M, Closed 60% complete

Number of units: 107

Number of buildings: 6

Scope of work: Full-Electrification – 100% covered by grant

- Replacement of existing condensing boiler with unitized mini-split ASHPs (Mitsubishi M-Series)
- Installation of integrated tank HP HWHs in all units (Rheem ProTerra)
- Related electrical service upgrades
- WAP scope to be completed including air-sealing and existing system demo/removal



	Space Heating and Cooling	DHW	Other Measures	Total Cost
Projected Cost	\$18,810.93	\$2,000	\$21.06	\$20,831.99
Actual Cost	\$10,157.20	\$5,552.86	\$6,764.54	\$22,474.60

7% increase – slight increase based on WAP participation and electrical wiring upgrades.

Case Study – Small Residential, Capital Region

Frear Ave, Troy

Grant status: \$125,000, Closed 80% complete

Number of units: 5

Scope of work: Full-Electrification – 100% covered by grant

- Replacement of existing electric resistance baseboards with directly metered mini-split, ASHPs (Mitsubishi M-Series)
- Replacement of existing gas-fired conventional boiler with centralized integrated tank HP HWH (Rheem ProTerra)
- Related electrical service upgrades (including utility service upgrade covered by National Grid), air-sealing



	Space Heating and Cooling	DHW	Other Measures	Total Cost/Unit
Projected Cost	\$18,000	\$1,700	\$3,208	\$22,908
Actual Cost	\$12,600	\$3,100	\$3,302.97	\$19,002.97

21% decrease – simplified scope with direct metering for heating/cooling

Case Study – Small Historic, Capital Region

2nd Street, Troy

Grant status: \$232,000*, Closed

Number of units: 8

Number of buildings: 1

Scope of work: Full-Electrification – 99% covered by grant

- Replacement of existing one-pipe steam system with centrally wired/metered mini/multi-split ASHPs (Mitsubishi M-Series)
- Replacement of existing central electric resistance HWH with integrated tank HP HWH (Rheem ProTerra)
- Air-sealing, electrical service upgrades and wiring, historic preservation work, and lead/asbestos abatement

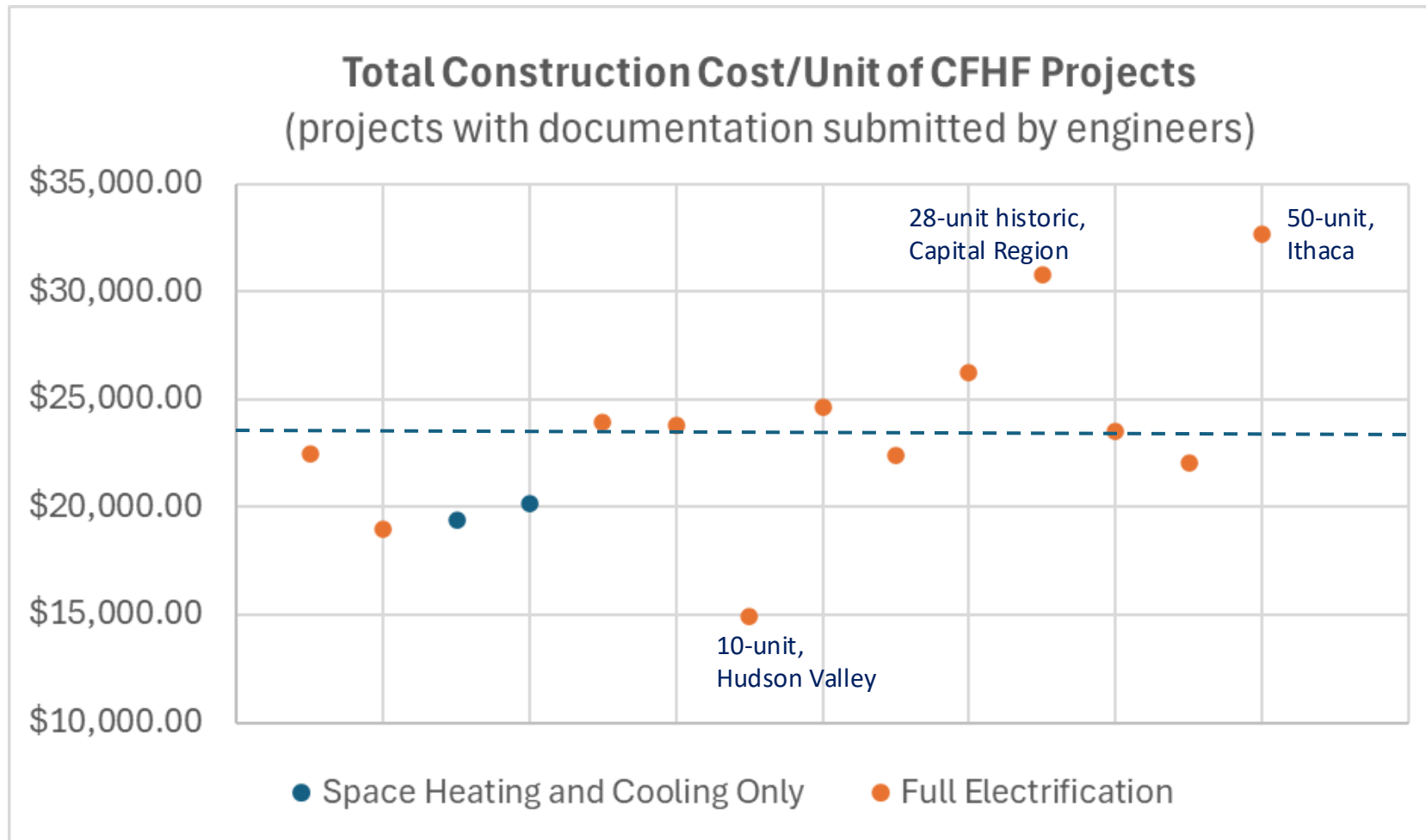


	Space Heating and Cooling	DHW	Other Measures	Total Cost
Projected Cost	\$7,894.25	\$2,230	\$6,216.63	\$16,340.88
Actual Cost	\$13,275		\$11,363.39	\$24,638.39

*Increased grant award to cover electrical service and wiring upgrade costs related to centralized metering

34% increase – electrical service upgrades to accommodate program requirement to keep heating and HW production centralized

Challenges



* Outliers on high and low end represent pricing trends observed by region

* High-end bids struggling to contract and fill financing gaps

Program Goals – Construction Cost Data

- Overview
- Workflow
- Comments
- RFP #16 Electrical Upgrade Package
- RFP #17 Clean Heat - AWHP DHW
- RFP #23 Clean Heat - Space Heating (Mini/Multi Split Heat Pumps)
- Documents
- Pricing Sheet
- Contractors
- Request for Information
- Bid Review**
- RFP #15 Mechanical/Plumbing Upgrades Package
- RFP #14 Air sealing package
- RFP #13 Insulation – roof

Clean Heat - Space Heating (Mini/Multi Split Heat Pumps)

Line Item	Quantity	Units	Unit Price	Estimate	Ebrown's Team	Tmoag's Team
Option 2: 1 Ton Mini-Split (Units 2-4)	3	each	\$14,250.00	\$42,750.00	-	-
Option 2: Air Transfer Fan (AS-1)	3	each	\$250.00	\$750.00	-	-
Option 2: Multi-Head Mini-Split (Unit 5)	1	each	\$14,500.00	\$14,500.00	-	-
Disconnect Electric Baseboard	1	property	\$2,500.00	\$2,500.00	-	-
Multi-Head Mini-Split (Unit 1)	1	each	\$14,500.00	\$14,500.00	-	-
Option 1: Multi-Head Mini-Split (Unit 2 and 4)	2	each	\$14,500.00	\$29,000.00	-	-
Option 1: Multi-Head Mini-Split (Unit 3 and 5)	2	each	\$14,500.00	\$29,000.00	-	-
				\$133,000.00	-	-

	Estimate	Ebrown's Team	→	Tmoag's Team	→	Admin's Team	→	Vsingh's Team	→	Fdmestime Team
Total	\$133,000.00	-		-		-		-		-

Program Goals – Construction Cost Data

Challenges – Contractor Engagement

We propose to install (1) 50 gallon electric water heater and disconnect current water heaters.

Price: \$4,500.00

Program Goals – Construction Cost Data

Contractor Pricing Sheet

Project Name: Ithaca Project #1

Contractor Name: Construction Co #1

Job Address(es): _____

Date Submitted: 9/13/2024

CFHF Measure	Unit Type/Description	Quantity	Per Unit Price	TOTAL
<u>Electrical</u>	<p>a. Electrical permit and inspection fees are included.</p> <p>b. A temporary generator has been included to power house loads during the cutover for the new electrical service.</p> <p>c. Based on the new mechanical equipment electrical loads, the existing electrical service will need to be upgraded from the existing 600-amp feeder to an 800-amp main breaker MDP. Therefore, costs have been included to upgrade to a 1,600-amp service.</p> <p>d. Installation of the new switch gear and moving the existing house loads over to this new switch gear is included.</p> <p>e. Replacement of the existing HP2, located on the 6th floor with an 800-amp panel is included.</p> <p>f. Provide new feeders to the new roof-top equipment from the new HP2.</p> <p>g. Install a new 225-amp panel and associated feeders to the new plumbing equipment on the ground floor.</p> <p>h. Temporary power for the temporary gas booster room is also included.</p>	1	\$ 406,054.00	\$ 406,054.00
Electrical Service Upgrades				\$ 406,055.00
			TOTAL Electric:	\$ 406,055.00
<u>Plumbing/DHW</u>	<p>a. The temporary relocation of gas booster pump to garage.</p> <p>b. Provide and install all required piping to accommodate new equipment as required.</p> <p>c. A temporary shutdown to transfer the hot water supply to the new system once the new system has been installed and wired, is included.</p> <p>d. LG electric heat pumps</p>	1	\$ 487,860.00	\$ 487,860.00
RFP #39 Clean Heat - DHW				\$ 487,861.00
			TOTAL Plumbing/DHW:	\$ 487,861.00
<u>Space-Heating/Cooling</u>	<p>a. The replacement of the existing MAU-1, RTU-1, HRU-1 and HRU-2 units with new Aeon packaged heat recovery and air handling units' models: RNA-011, RNA-015, RNA-007 and RNA-009, has been included.</p> <p>b. Modification of the existing ductwork and curbs to accommodate the new rooftop unit has been included.</p> <p>c. Rigging of new units has been provided.</p> <p>d. Decommissioning and disposal of old units has been included.</p> <p>e. Replacement of the existing 100,000 BTU gas fired boiler and replacement with new electric boiler has been included.</p> <p>f. Modification of existing hot water piping to accommodate new boiler is included.</p> <p>g. Included is the cutting and capping of boiler venting.</p> <p>h. Startup of all the units will be provided.</p> <p>i. Engineering fees to facilitate delivery of clean heat application and required calculations is included.</p> <p>j. Engineering fees to facilitate delivery of clean heat application and required calculations have been included.</p>	1	\$ 463,887.00	\$ 463,887.00
RFP #40 Clean Heat - Heating & Cooling				\$ 463,888.00
			TOTAL Space Conditioning:	\$ 463,888.00
<u>Air-Sealing</u>	<p>a. Sealing of any penetrations to accommodate upgraded systems.</p> <p>b. Installation of miscellaneous roof flashings and patching as required for the upgraded roof top units.</p> <p>c. Unit caulking around the floor to wall base has been included. Per RFI response from the design team, no floor or trim removal has been included. It is assumed that all flooring is hard flooring and there will be no sealing at carpet locations.</p> <p>d. Unit caulking has been included around the windows and entry door.</p>	1	\$ 250,855.00	\$ 250,855.00
RFP #38 Air Sealing Package				\$ 250,856.00
			TOTAL Air-sealing:	\$ 250,856.00
<u>Gen Requirements/Gen Conditions/Etc</u>				
Item 1	Permits			\$ 15,000.00
Item 2	General Conditions			\$ 10,000.00
Item 3				
			TOTAL General:	\$ 25,000.00
TOTAL Development Cost:				\$ 1,608,660.00

NYCHA's Clean Heat for All

CH4A launched in 2021 to solve gap in technology for migrating from central steam to beneficial electrification

Maintaining centralized steam system poses various challenges

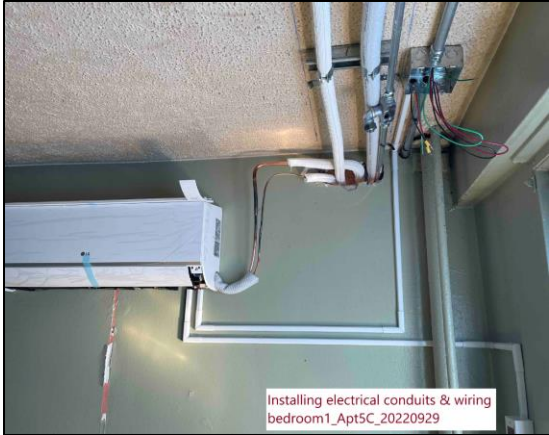
- Replacing aging steam boiler systems requires significant funding and heavy construction underground and within buildings
- Fully renovated system will still have limited energy and cost efficiency, with ongoing overheating
- Outages impact full building or development rather than individual apartments
- Skills to properly maintain steam systems are becoming difficult to recruit and train for
- Cannot meet decarbonization requirements as per LL97, nor help address extreme heat issues

Other available technologies are not suitable for NYCHA context, cost-prohibitive and/or have high O&M needs

- Mini-split, Multi-split, and Commercial VRF systems are cost-prohibitive, require significant design, and construction timelines, and have long-term risks associated with them
- Only few sites are suitable for ground source heat pump (geothermal)

Early NYCHA Electrification Efforts

Commercial VRF at 830 Amsterdam



Through-wall PTHPs at 1700 Hoe Ave



Clean Heat for All Challenge

WHO: NYCHA-NYPA-NYSERDA

WHAT: Partnership to develop new all-in-one packaged cold climate heat pump installed through existing window.

HOW: RFP for bulk purchase

- Minimum Requirements Specifications
- Additional Design Target Specifications (scoring system)
- Initial purchase order of production units

WHERE: NYCHA campus developments

NYCHA estimated internal demand: 156,000 heat pump units to reach climate goals

External demand: Letters of interest from 13 stakeholders: PHAs, government agencies, ESCOs representing over 75,000 housing units. *Price guarantee allows others to purchase at the same price.*

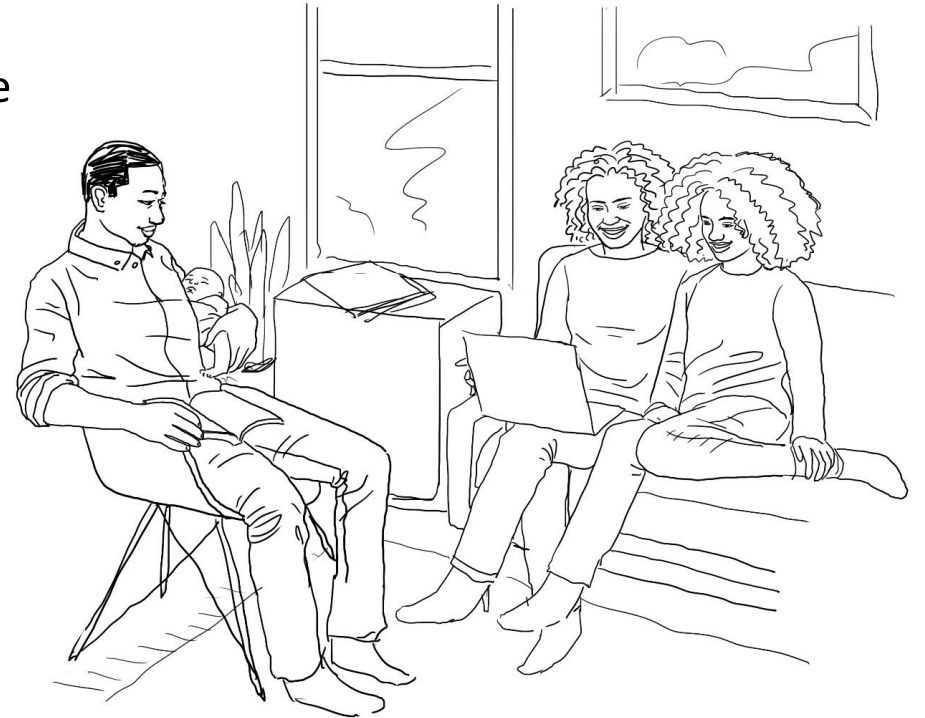


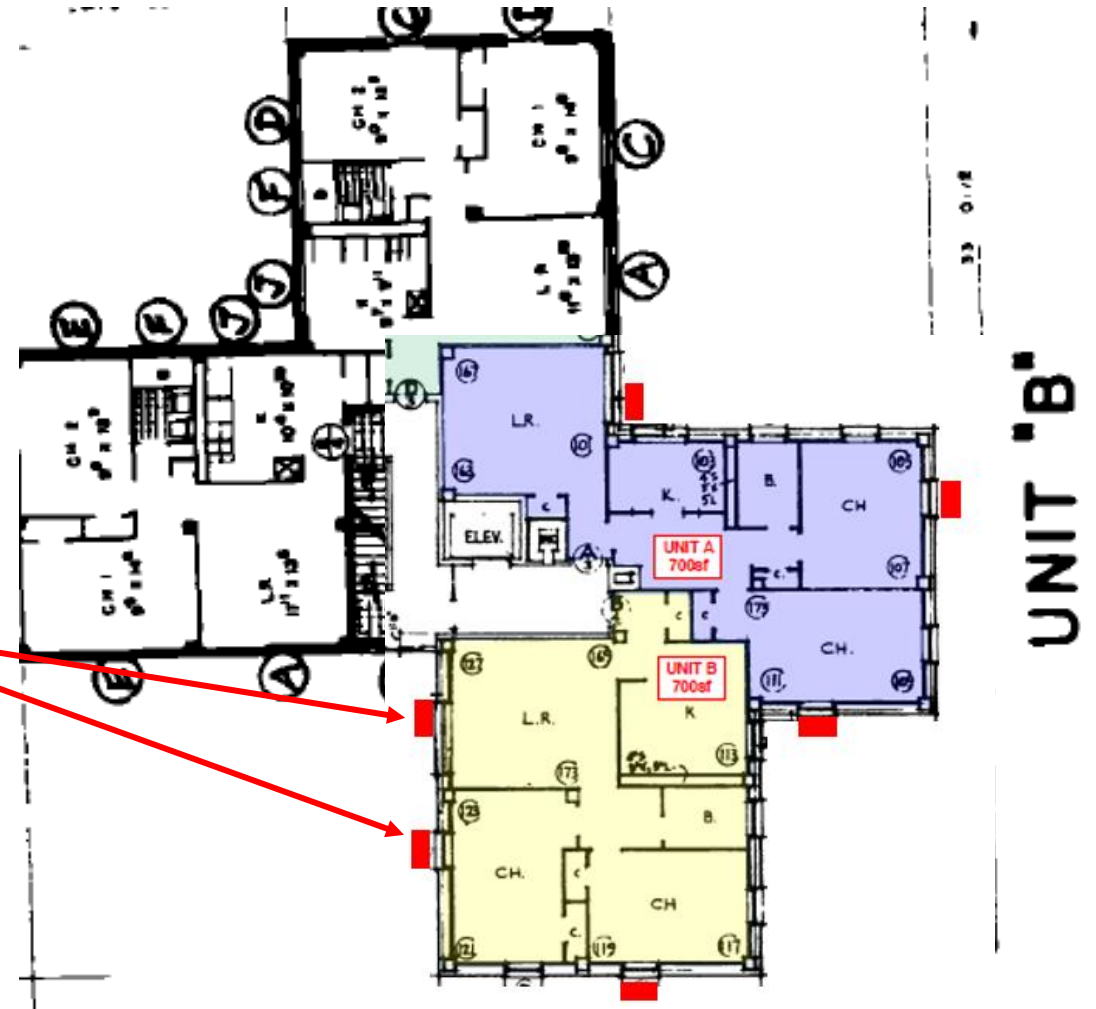
Image Source: Grain Collective

RFP Desired Product Specifications

- Form factor with approximate size and weight of a typical window or through-the-wall AC with all refrigerant piping hermetically connected within the unit and no exterior core drilling required for installation;
- Run on 115 VAC +/- 10% single phase, 60 Hz and plug into a standard 3-prong outlet, 15 amp circuit;
- Minimum efficiency of 1.85 COP at 17°F outdoor temperature and 70°F indoor temp in heating mode, at rated capacity;
- Shall operate down to 0°F and shall not use backup resistance heat for space heating;
- Variable speed compressor with capacity of 9,000 Btu/hr heating at 17°F outdoor temp;
- Condensate line and pump (if needed) are internal and discharge outdoors or nearby indoors with no need for plumber labor;
- Can be installed so it is airtight around its perimeter without any degradation to the overall R-value or infiltration of the building envelope;
- Provide BACNet compatibility for BMS integration with no external proprietary cloud software required; and
- Can be installed by unskilled labor within approximately two hours.

Two window heat pump products selected and piloted at Woodside

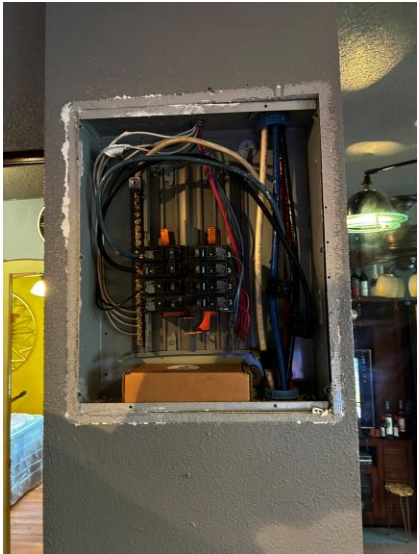
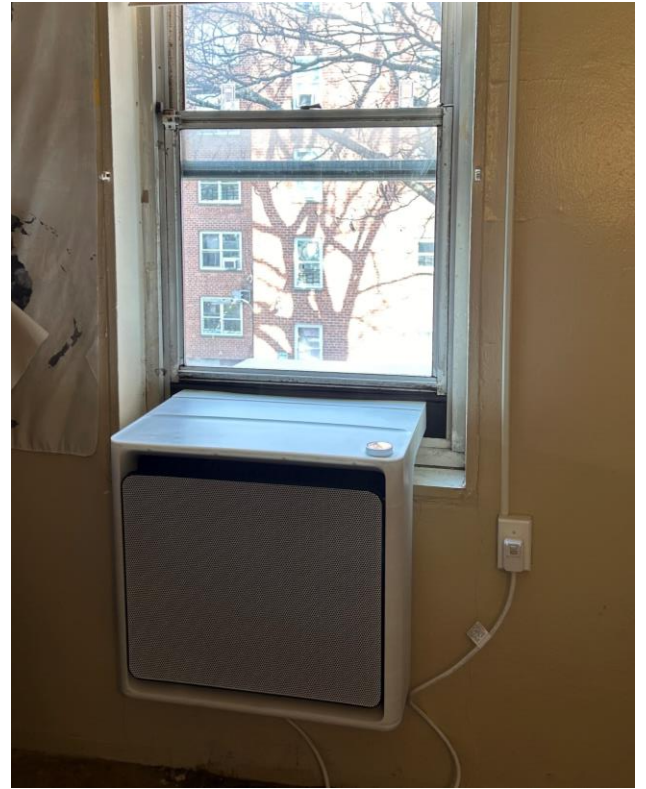
- Two adjacent lines of apartments selected at two 6-story buildings
- 6 apartments per line, 12 apartments in each building, 24 total apartments
- Buildings currently heated by 2-pipe steam
- Steam service was disconnected for the pilot apartments but left in place for the control apartments
- One heat pump installed in each bedroom and living room
- No direct heat given in kitchens and bathrooms
- Electric meters installed in each apartment and on each riser
- Space temperatures measured in each room



Exterior View

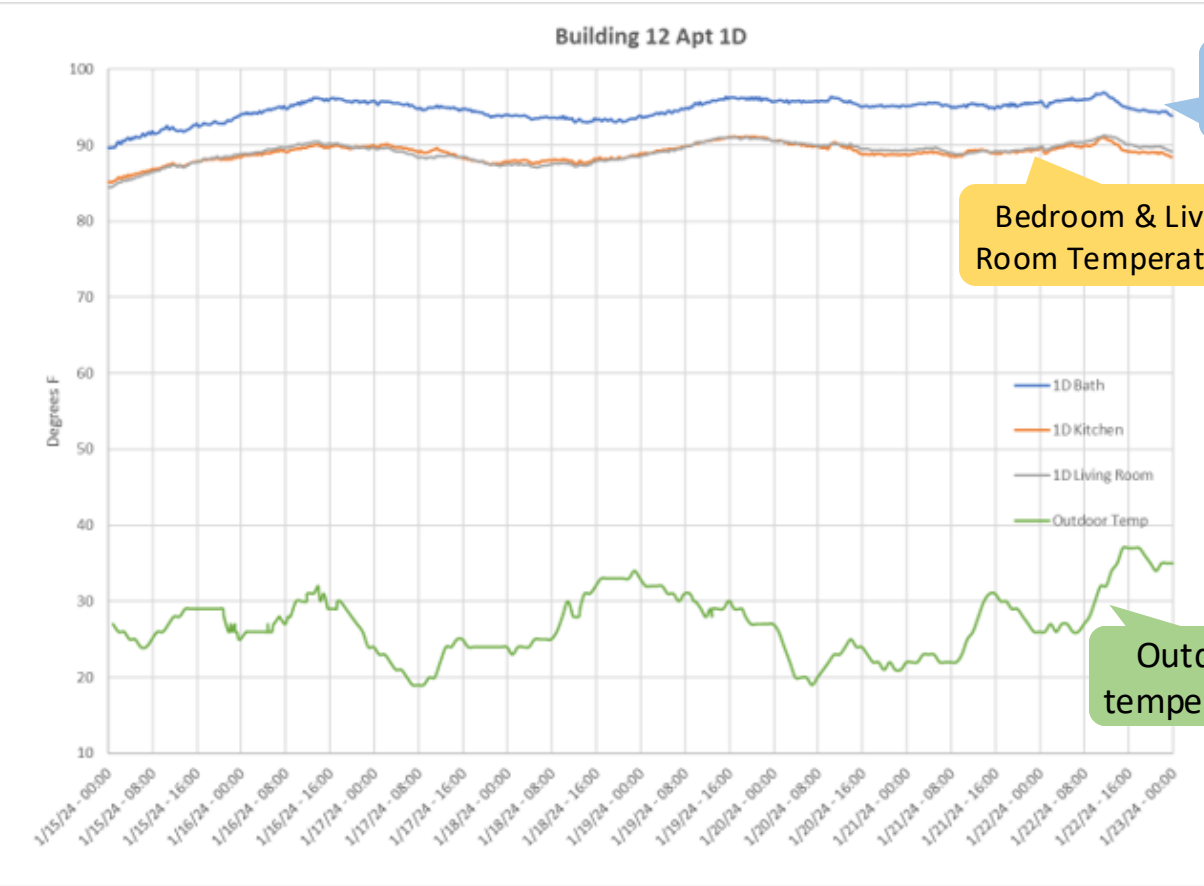


Installation completed by NYCHA maintenance staff: 24 apartments completed in 8 days (excluding outlets)

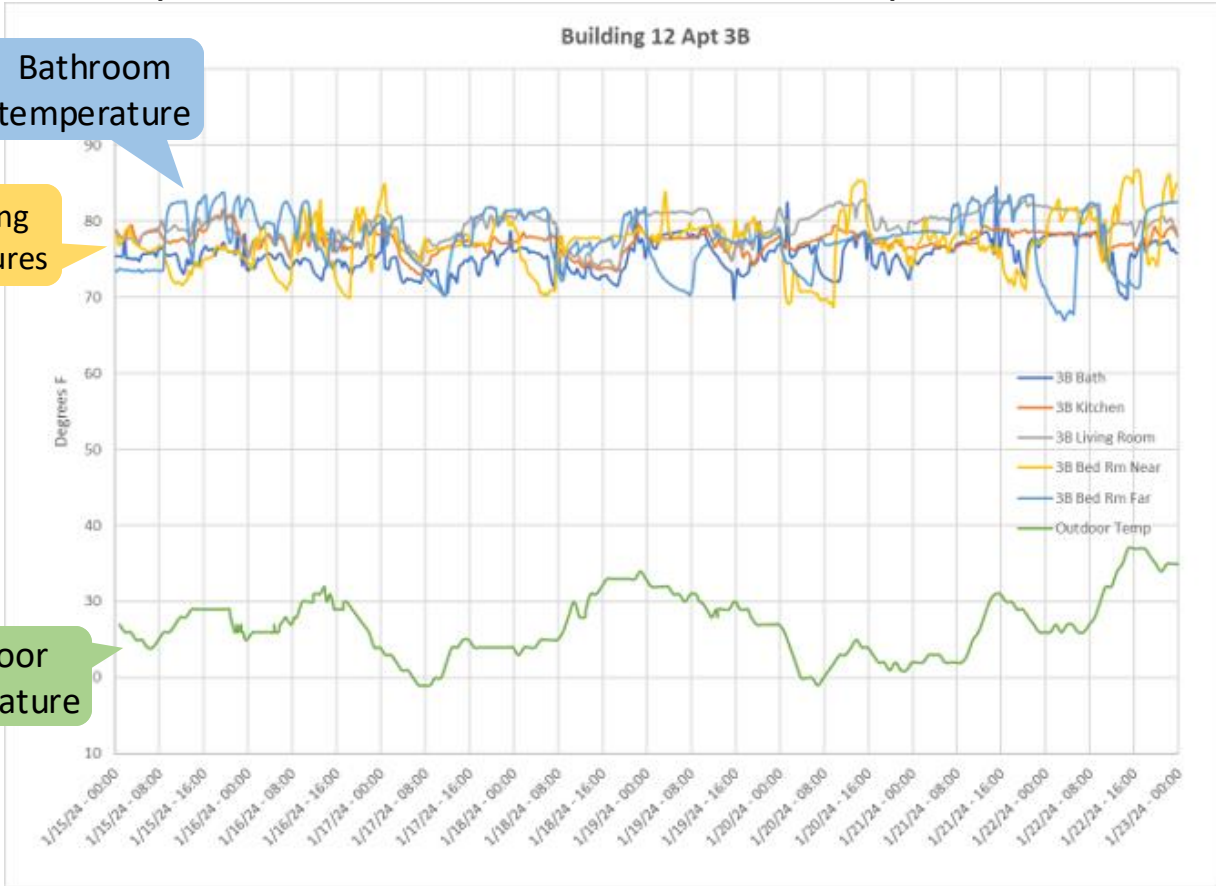


Preliminary Results: Consistent comfortable temperatures

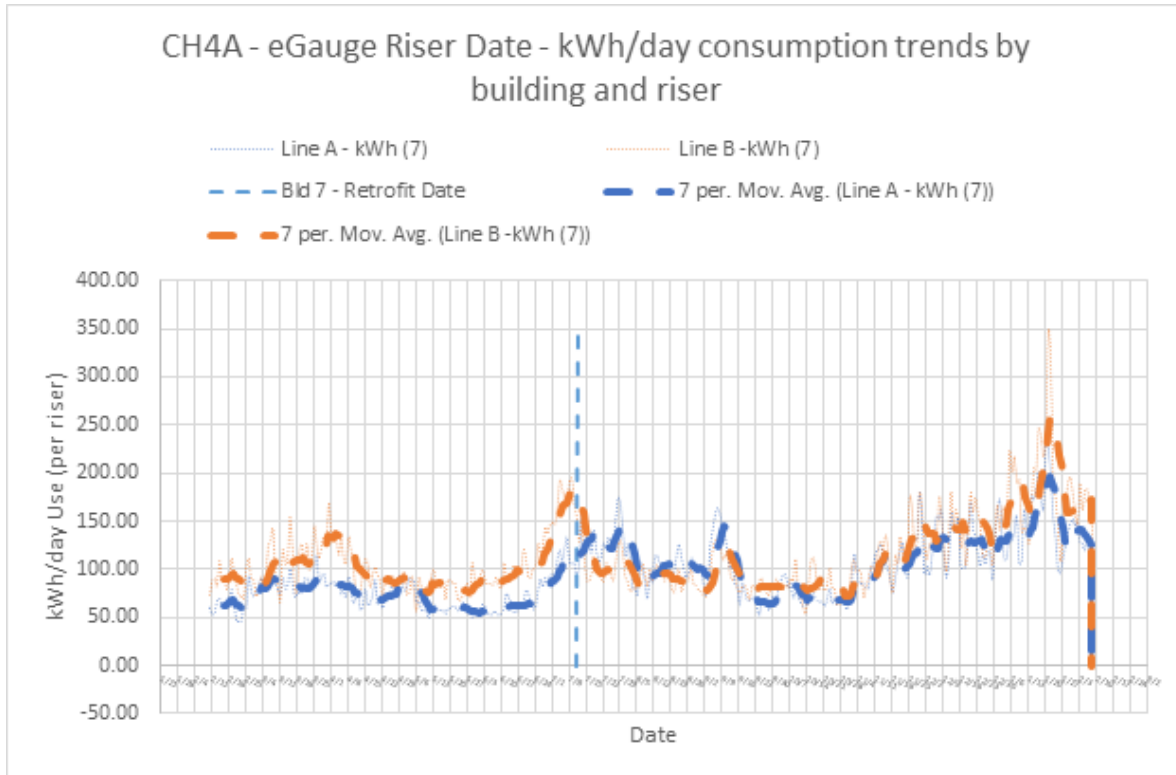
Control Apartment (Steam System)



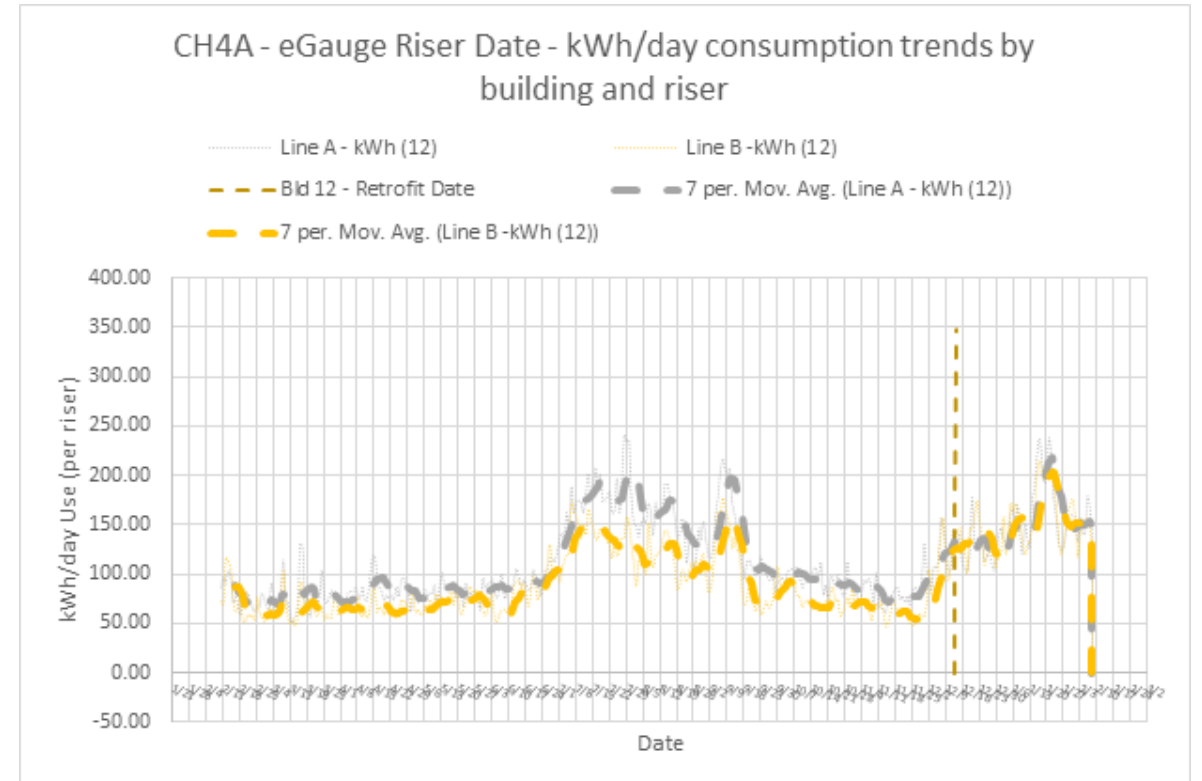
Apartment with Window Heat Pump Units



Preliminary Results: Lower electric consumption than would have been expected



July 13th Install

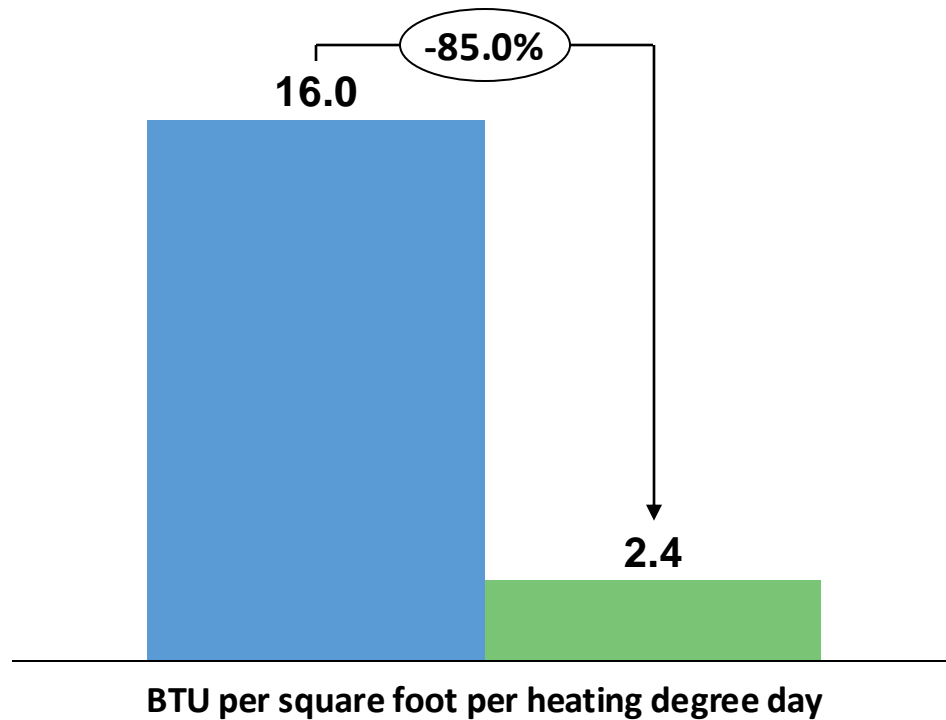


November 28th Install

Preliminary Results: 85% decrease in heating energy use and 50% decrease in heating energy cost

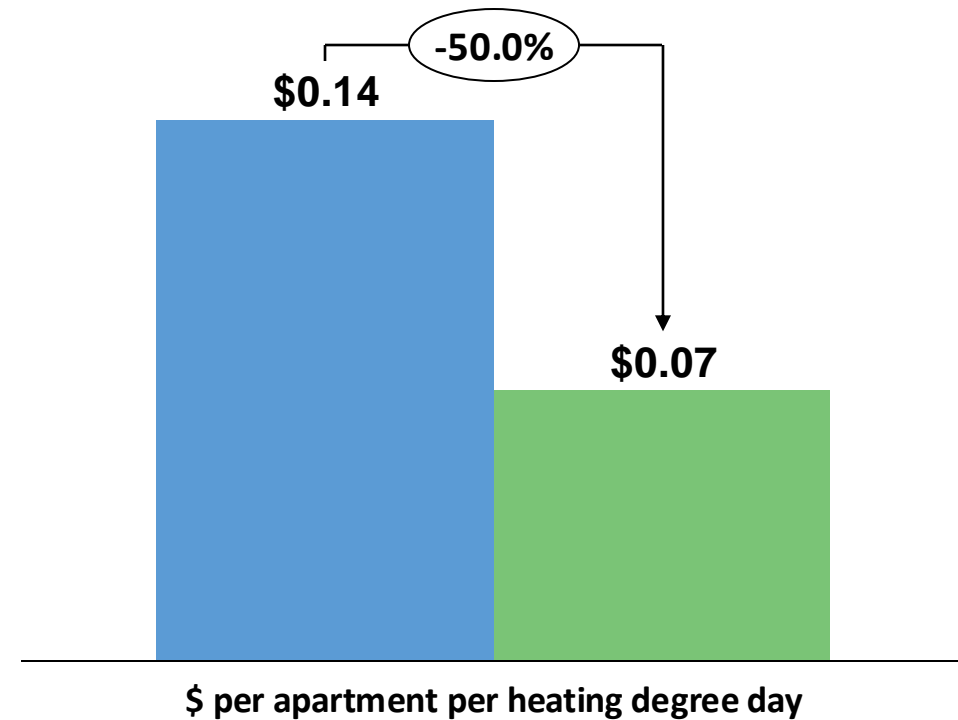
85% decrease in energy required

- Steam System (Space Heating Only)
- Window Heat Pump Unit



50% decrease in cost of energy

- Steam System (Space Heating Only)
- Window Heat Pump Unit



Lessons Learned and Continuing Efforts

Successes

- Produced and demonstrated viability of 120V cold climate room heat pumps within three years of RFP launch
- Exceeded expectations for both efficiency and price point
- Demonstrated a new model for public–private partnerships through customer-centric process of R&D
- Involved residents in the M&V and feedback process

Challenges

- Buy-in from key stakeholders necessary for further scaleup
- External partners need to understand these types of products and how they align with their programs
- Many questions regarding longevity and O&M can only be answered through more run time and larger sample sizes
- Other costs: electric upgrades and hazmat remediation may be required on case-by-case basis



New triple pane casement window with heat pump sleeve, from Intus Windows

Moderated and Open Q&A

Thank you!