



Department  
of Public Service

# Technical Conference on LMI Building Electrification

Cases 18-M-0084/14-M-0094

September 20, 2024

# Welcome, Introductions, & Housekeeping

# Opening Remarks

- Chris Coll
  - *Project Director | New York Department of Public Service*

# Facilitator Introductions

- Miquela Craytor, New York City
  - *Vice President | Kearns & West*
- Nicolas Townes, Albany
  - *Vice President | Kearns & West*

# Meeting Objectives

- Hear from diverse stakeholder perspectives on issues, challenges, opportunities, and potential solutions for LMI housing electrification for NYS.
- Learn more about the range of factors, constraints, and choices/tradeoffs at play related to LMI electrification in near term and in the long term.

# Agenda

10:00am – 10:15am	<b>Welcome &amp; Housekeeping</b>
10:15am – 11:00am	<b>NYS LMI Energy &amp; Electrification Context</b>
11:00am – 11:45am	<b>Panel 1: Case Studies from the Field</b> We will learn from 1-4 family and multifamily projects that have or have not overcome barriers in electrification and efficiency
11:45am – 12:30pm	<i>Break (Lunch on your own)</i>
12:30pm – 02:00pm	<b>Panel 2: Perspectives on LMI Electrification Considerations and Recommendations from Community</b> A Multidisciplinary panel to discuss perspectives on priorities for LMI electrification policy and programs
02:00pm - 02:50pm	<b>Open Discussion</b> Share insights on what future policy and program design to support LMI electrification needs to consider
02:50pm - 03:00pm	<b>Closing Statements</b>



# Meeting Process Guidelines

- Seek to learn and understand each other's perspective.
- Encourage respectful, candid, and constructive discussions.
- Seek to resolve differences and find common ground.
- As appropriate, discuss topics together rather than in isolation.

# Presenters

- Chris Coll
  - *Project Director | Office of Markets and Innovation | New York Department of Public Service*
- Michael Reed
  - *Head of Large Buildings – Clean & Resilient Buildings | New York State Energy Research and Development Authority*
- Sunitha Sarveswaran
  - *Director of Sustainability Programs | New York State Homes & Community Renewal*



## Virtual Participants – Q&A

You can submit questions, review all submitted questions, and upvote questions you would like asked of the presenters / panelists.

Join at:  
[menti.com](https://menti.com)

Use code:  
7805 0247



# Background for LMI electrification 101

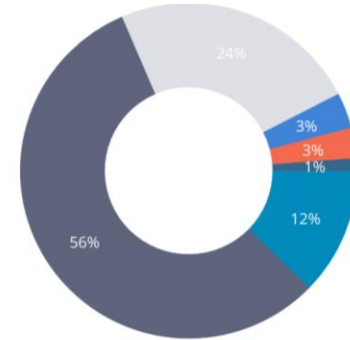
# LMI Energy Landscape- New York



## Low to Moderate-Income Households

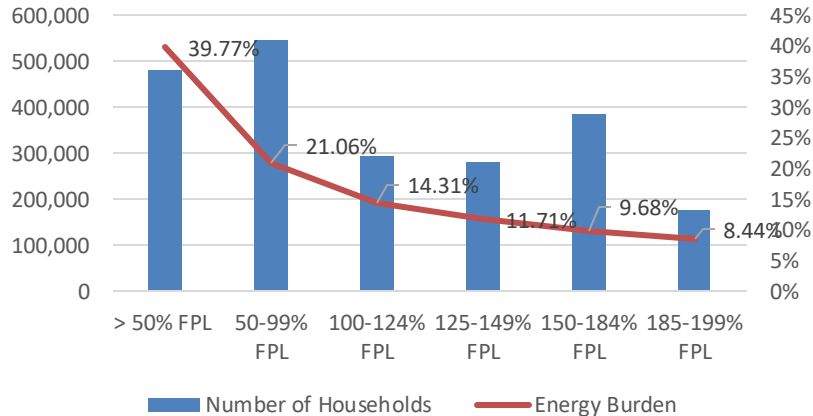
2.3 million low-income  
1.2 million moderate-income

Distribution of Primary Heating Fuel for LMI Households in New York State



Electric Natural Gas Oil Propane Other No Fuels

Energy Burden for New York State Households based on Federal Poverty Level\*



\*Fisher, Sheehan, and Colton- Home Energy Affordability Gap 2022

## In 2023...

- 369,000 low-income customers in arrears Over \$400 million in arrearages
- 46,000 low-income customers disconnected Representing over \$80 million in arrears
- 1.5 million households participated in bill payment assistance programs Including LIHEAP (federal and EAP (ratepayer/state))

# LMI Efficiency and Electrification Policy Drivers

- **Climate Leadership and Community Protection Act (CLCPA)**- established in 2019- sets economy wide decarbonization targets (e.g.: 85% reduction in GHG emission; 100% electric generated by renewable sources by 2040) and includes provisions for a just clean energy transition.
- **2 Million Climate Friendly Homes Goal**- Introduced by Gov. Hochul in 2022 State of the State, sets a goal for two million electrification ready or electrified homes by 2030.
- **Energy Affordability Policy**- established by the NYS Public Service Commission in 2016, sets a goal for low-income customers to pay no more than 6% of annual household income towards electric and natural gas bills.
- **New Efficiency: New York**- established 185 tBtu of energy efficiency by 2025 for ratepayer-funded energy efficiency programs, and established a statewide LMI portfolio.
- **Energy Efficiency/Building Electrification Portfolio**- 2026-2030 portfolio of ratepayer funded programs; \$1 billion annual investment across utilities and NYSERDA, including \$300 million directed to LMI annually.

# NYS LMI Clean Energy and Affordability Program Landscape

	Weatherization/ Energy Efficiency	Distributed Energy Resources	Bill Payment Assistance
Federal	<ul style="list-style-type: none"> <li>• WAP (DOE, BIL, LIHEAP)- NYS HCR</li> <li>• EmPower+ (LIHEAP)- NYSEDA</li> <li>• IRA Home Efficiency Rebates- NYSEDA (2024)</li> <li>• IRA Home Electrification &amp; Appliance Rebates- NYSEDA (2024)</li> </ul>	<ul style="list-style-type: none"> <li>• GGRF- Solar for All- NYSEDA (2024)</li> </ul>	<ul style="list-style-type: none"> <li>• Home Energy Assistance Program- NYS OTDA</li> </ul>
Ratepayer	<ul style="list-style-type: none"> <li>• EmPower+- NYSEDA</li> <li>• Affordable Multifamily Energy Efficiency Program- Utilities</li> <li>• Affordable New Construction/Clean Energy Initiative- NYSEDA, NYS HCR</li> </ul>	<ul style="list-style-type: none"> <li>• NY Sun Solar Energy Equity Framework (Includes Solar for All, incentives for community solar, and pre-dev/technical assistance)</li> <li>• Statewide Solar for All</li> </ul>	<ul style="list-style-type: none"> <li>• Energy Affordability Program- NYS DPS, utilities</li> </ul>
State/ Other	<ul style="list-style-type: none"> <li>• EmPower+- NYSEDA</li> <li>• Climate Friendly Homes Fund- NYS HCR</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Energy Affordability Program- NYS DPS, utilities</li> <li>•</li> </ul>
\$ 2023	Federal- \$85M Ratepayer- \$135M State/Other- \$250M	Ratepayer- \$20M	Federal- \$400M Ratepayer- \$430M State/Other- \$200M

# Efficiency and Electrification Programs

Program	Scope	Target Market	Funding Source	2023 Expenditures	2023 Units Served
EmPower +	Whole home wx/ee retrofits	Low and moderate income, 1-4 family	Ratepayer, NYS Budget, Federal	\$151 million	22,000
AMEEP	Energy efficiency upgrades	Affordable multifamily	Ratepayer	\$42 million	114,196
Energy Affordability Guarantee Pilot	Bill payment assistance, data and insights collection	Low-income, 1-4 family	NYS Budget	<i>\$50M total budget</i>	<i>Expected 1,000 total expected units</i>
WAP	Whole home wx/ee retrofits	Low-income, 1-4 family and multifamily	Federal	\$67 million	6,030
Climate Friendly Homes	Full or partial electrification	Affordable (reg and non-reg) multifamily, 5-50 units	NYS Budget	\$50 million	2,000
NYS Clean Heat	Rebate on installation of heat pumps	Market rate	Ratepayer	\$189 million	28,612
IRA Home Energy Rebates	Electrification appliance rebates + whole home EE upgrades	LMI, market-rate	Federal	Total budget: \$317M (Starting CY24)	

# Household Cost Impacts of Electrification

# Converting to Heat Pumps for Space Heating: Benefits and Challenges

## Benefits

*Retrofitting existing homes* from on-site combustion to efficient heat pumps results in

- increased comfort and control
- energy efficient heating and cooling
- convenience of getting heating and cooling from one piece of equipment
- less local air pollution

## Challenges

- *Capital (upfront) costs*
- *Operating costs*
- *How the equipment is installed/operated*

**Electrification challenges add cost and complexity**, making “electrification” programs more expensive (on a per household served basis) than energy efficiency programs



# Results from Small Homes Electrification Study 2021

Over 400 homes with delivered fuels studied

85% of the projects required additional envelope work

- avg cost for air sealing, attic, and wall insulation: \$9,077

17% needed panel box upgrades (avg cost: \$2,634)

16% needed distribution upgrades (avg cost: \$2,322)

Average air source heat pump install cost: \$19,208

Average ground source heat pump install cost: \$47,475

# Defining Capital and Operational Costs

Type of Cost	Cost Drivers
<b>Capital Costs</b> <i>(one-time, upfront)</i>	<ul style="list-style-type: none"> <li>• HVAC equipment purchase</li> <li>• Installation costs</li> <li>• Cost of ancillary improvements (e.g., ducts, electrical)</li> </ul>
<b>Operational Costs</b> <i>(ongoing, equipment useful life)</i>	<ul style="list-style-type: none"> <li>• Utility rates</li> <li>• Commodity supply markets</li> <li>• HVAC system design, install &amp; operation</li> </ul>

*The next slides will focus on possible operational (utility bill) impacts of switching from fossil fuel heating systems to heat pumps for space heat.*

# Operational Cost Impacts of Converting to Heat Pumps for Space Heating: Typical Home

**1** Review “typical” energy usage and utility bills for small homes for 2023

- For different regions of NYS
- For different existing heating fuel types

**2** Assume conversion to heat pump

- Convert space heating energy usage from existing fuel type to electricity

**3** Project bill impacts across a range of heat pump scenarios

- Convert consumption into utility electric rates (upstate/downstate)
- Generate illustrative bill impact based upon different assumptions of heat pump efficiency

*We welcome and encourage stakeholders to connect us with additional data and insights to further improve our understanding of the utility bill impacts of heat pump retrofits*

# “Typical” Annual Residential Utility Bills (2023)

Natural gas consumption: 1,000 therms/year\*

OR

Fuel oil consumption: 714 gallons/year\*\*

AND

Electric consumption: 600 kWh/month\*\*\*

Space heating for NYS households represents  
>50% of total household energy use\*\*\*\*

Heating Source	Electric Source	Pre-retrofit Annual Utility Bills
Upstate, Delivered Fuel	National Grid Electric	\$4,330
National Grid Natural Gas	National Grid Electric	\$2,338
Downstate, Delivered Fuel	Con Ed Electric	\$5,493
Con Ed Natural Gas	Con Ed Electric	\$4,776

Utility rates and fuel costs are for CY 2023

\* <https://dps.ny.gov/gas-utility-ten-year-historic-average-monthly-bill-data-typical-customers>

\*\* <https://www.nyscrda.ny.gov/Energy-Prices/Home-Heating-Oil/Average-Home-Heating-Oil-Prices>

\*\*\* <https://dps.ny.gov/electric-utility-ten-year-historic-average-monthly-bill-data-typical-customers>

\*\*\*\* EIA Residential Energy Consumption Survey <https://www.eia.gov/consumption/residential/data/2020/>



# OpEx Impacts of Converting to Heat Pumps: Fuel Cost

Existing heating fuel

Delivered Fuels  
(fuel oil, propane,  
kerosene)

Natural Gas

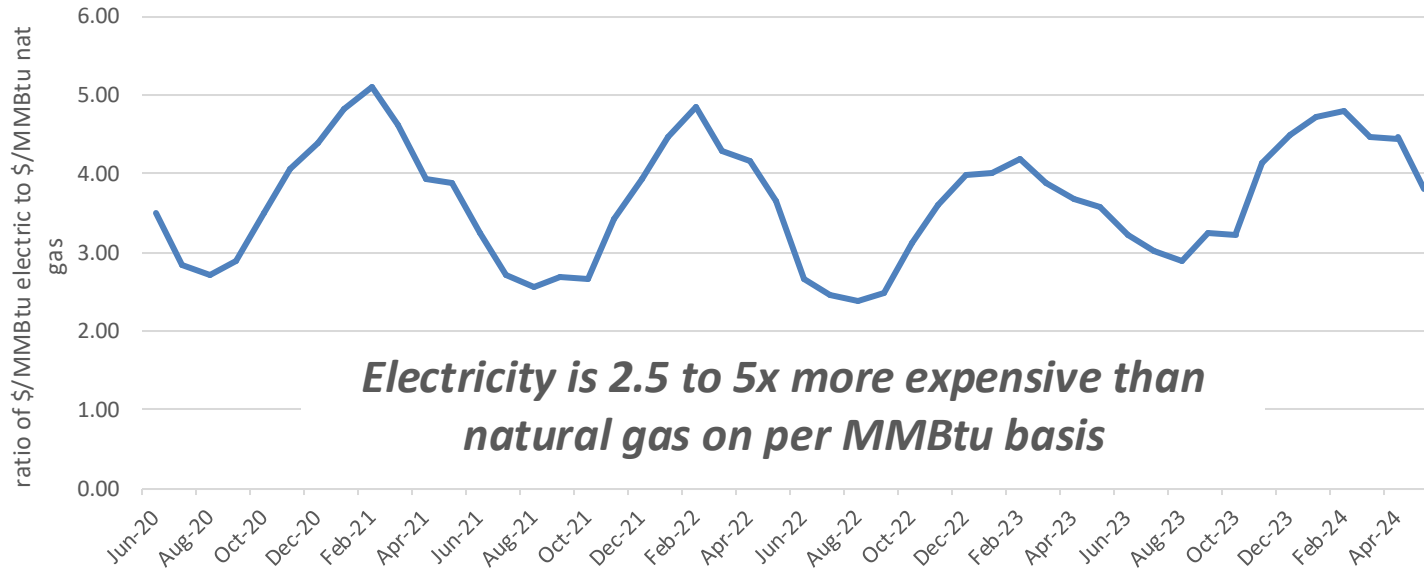
Per unit of energy cost comparison to electricity

- Delivered fuels are ***more expensive than utility-delivered electricity*** in almost all instances
- Utility delivered natural gas is ***cheaper than utility delivered electricity*** in almost all instances

Given these cost dynamics, **concerns about operational cost impacts prioritize focus on households using natural gas today for heating**



# Natural gas v. electricity: comparison of statewide average monthly retail prices



Source for Natural Gas prices <https://www.nysersda.ny.gov/Energy-Prices/Natural-Gas/Monthly-Average-Price-of-Natural-Gas-Residential>

Source for Electricity prices <https://www.nysersda.ny.gov/Energy-Prices/Electricity/Monthly-Avg-Electricity-Residential>



# Bill Impacts of Converting to Heat Pumps: Heating System Operational Efficiency

Fossil fuel systems

Heat pump systems

System  
efficiency  
range

- 60-95%

- 150-400%

System  
efficiency  
(illustrative  
average)

- 80%

- 240%

Using the illustrative average efficiency, a **heat pump is 3x more efficient** than fossil fuel systems

Operational efficiency of the heat pump system depends on many factors:

- Building envelope
- System size and design
- Equipment selection
- Equipment controls types and settings
- Type and size of supplemental/backup heat
- Occupant behavior



# Converting from fossil fuels to heat pumps: “typical” single family home

## Key Steps and Assumptions

### Project load reduction from efficiency measures

- Assume that retrofit includes weatherization (air sealing / insulation) that reduces overall space heating load by 15%

### Project remaining fossil fuel use and cost post retrofit

- Assume retrofit reduces on-site fossil fuel use by 70%.
- Convert usage into rates/bills (upstate and downstate)

### Estimate electricity consumption needs for space heating

- Generate 3 scenarios that represent a range of heat pump operational efficiencies and estimate incremental electricity usage for each:
  - HP System A: +400 kWh/month
  - HP System B: +600 kWh/month
  - HP System C: +800 kWh/month

### Calculate whole home bill impacts

- Sum projected electricity costs and remaining fossil fuel costs
- Compare against pre-retrofit baseline



# Illustrative Example 1

## Converting to Heat Pumps from Fuel Oil: Upstate Bill Impacts

Heat Pump Heating System	Add'l kWh/mo	Total kWh/mo	Annual electric bill	Annual Fuel Oil Bill	Total utility bills	Difference to Pre-retrofit baseline
HP System A	400	1,000	\$2,100	\$856	<b>\$2,956</b>	<b>-\$1,374</b>
HP System B	600	1,200	\$2,520	\$856	<b>\$3,376</b>	<b>-\$954</b>
HP System C	800	1,400	\$2,940	\$856	<b>\$3,796</b>	<b>-\$534</b>

Pre-Retrofit Baseline	
Fuel Source	Annual cost
Fuel Oil (delivered)	\$3,070
Electric Utility	\$1,260
Annual total	\$4,330



## Illustrative Example 2

### Converting to Heat Pumps from Natural Gas: Upstate Bill Impacts

Heat Pump Heating System	Additional kWh/month	Total kWh/month	Annual electric bill	Annual natural gas bill	Total household bills	Difference to Pre-retrofit baseline
HP System A	400	1,000	\$2,100	\$323	\$2,423	<b>\$85</b>
HP System B	600	1,200	\$2,520	\$323	\$2,843	<b>\$505</b>
HP System C	800	1,400	\$2,940	\$323	\$3,263	<b>\$925</b>

#### Pre-retrofit Baseline

Fuel Source	Annual cost
Nat Gas Utility	\$1,078
Electric Utility	\$1,260
Annual total	\$2,338

## Illustrative Example 3

### Converting to Heat Pumps from Fuel Oil: Downstate Bill Impacts

Heat Pump Heating System	Additional kWh/mo	Total kWh/month	Annual electric bill	Annual fuel oil bill	Total household bills	Difference to pre-retrofit baseline
HP System A	400	1,000	\$3,800	\$964	\$ 4,764	-\$729
HP System B	600	1,200	\$ 4,560	\$964	\$ 5,524	\$31
HP System C	800	1,400	\$ 5,320	\$964	\$ 6,284	\$791

#### Pre-Retrofit Baseline

Fuel Source	Annual cost
Fuel Oil (delivered)	\$3,213
Electric Utility	\$2,280
Annual total	\$5,493

## Illustrative Example 4

### Converting to Heat Pumps from Natural Gas: Downstate Bill Impacts

Heat Pump Heating System	Additional kWh/month	Total kWh/month	Annual electric bill	Annual natural gas bill	Total household bills	Difference to pre-retrofit baseline
HP System A	400	1,000	\$3,800	\$749	\$4,549	-\$227
HP System B	600	1,200	\$4,560	\$749	\$5,309	\$533
HP System C	800	1,400	\$5,320	\$749	\$6,069	\$1,293

#### Pre-retrofit Baseline

Fuel Source	Annual cost
Nat Gas Utility	\$2,496
Electric Utility	\$2,280
Annual total	\$4,776

# Range of Illustrative Examples Annual Bill Impacts (2023)

Pre-retrofit Example Scenario	Pre-retrofit bills	HP System A; post-retrofit bill impacts	HP System B; post-retrofit bill impacts	HP System C; post-retrofit bill impacts
Delivered Fuels, Upstate	\$4,330	-\$1,374	-\$954	-\$534
Nat Gas, Upstate	\$2,338	+\$85	+\$505	+\$925
Delivered Fuels, Downstate	\$5,493	-\$729	+\$31	+\$791
Nat Gas, Downstate	\$4,776	-\$227	+\$533	+\$1,293

# Expanding to Multifamily LMI Electrification

Similar concerns about operational cost increases

+

Cost-shift

- larger multifamily buildings tend to have central heating systems with utility bill paid by the landlord.
- many multifamily electrification solutions are “decentralized” and connect to the tenant’s electric meter, thereby shifting the cost of heating from landlord to tenant

# IRA Home Energy Rebates Engagement Opportunities

Type	Audience	Description
<b>NYSERDA Website</b>	All	Access to latest information available about IRA: <a href="http://www.nyserdera.ny.gov/All-Programs/Inflation-Reduction-Act/Inflation-Reduction-Act-homeowners">www.nyserdera.ny.gov/All-Programs/Inflation-Reduction-Act/Inflation-Reduction-Act-homeowners</a> Includes summary of public comments
<b>Public Meetings/ Webinars</b>	All	Public meetings are fully open to all who wish to attend. They are designed to provide transparent information and updates with opportunity for public comment. Next webinar: August; registration details to come
<b>Questions and Input</b>	All	Public may submit questions and comments at any time to <a href="mailto:residential.ira@nyserdera.ny.gov">residential.ira@nyserdera.ny.gov</a>
<b>Work Groups</b>	Contractors and service providers, community partners, utilities	Small groups of similar stakeholders designed to convene more than once in working sessions to provide deeper insights on targeted questions/challenges the program planning team is facing. Work groups may be open or invitation only, but generally kept to a small, manageable number of participants to be effective. Next open group: TBD
<b>Roundtables</b>	Retailers, manufacturers, HVAC contractors, plumbers, electricians	Non-recurring, structured discussions of stakeholders with similar interests and business priorities. Typically invitation only.
<b>Individual Meetings</b>	Housing agencies, utilities, LIPA	For stakeholders who work in direct partnership with NYSERDA to deliver energy efficiency and beneficial electrification solutions to the market.
<b>Voice of customers (VOCs)</b>	Key stakeholders and clean energy providers	Individual 1:1 meetings with a small group used to gather candid feedback on proposed model to roll out HEAR/HER incentives.
<b>Residential Market Advisory Group</b>	All industry partners and interested parties; target to 1-4 family residential stakeholders	Scheduled quarterly meetings and open to all. These meetings provide opportunities for NYSERDA to offer informational updates and to engage in structured discussion using topic-specific breakout sessions and large group forums. Keep updated at: <a href="http://www.nyserdera.ny.gov/Residential-Market-Advisory-Group">www.nyserdera.ny.gov/Residential-Market-Advisory-Group</a>



**Homes and  
Community Renewal**

**Governor  
Kathy Hochul**

**Commissioner  
RuthAnne Visnauskas**

# **NYS HCR**

## **Decarbonization in Affordable Housing**

**October 4, 2024**

**Sunitha Sarveswaran,  
Director of Sustainability Programs  
NYS Homes & Community Renewal**



# HCR Sustainability at a Glance

Administer mid-cycle and direct injection decarbonization programs

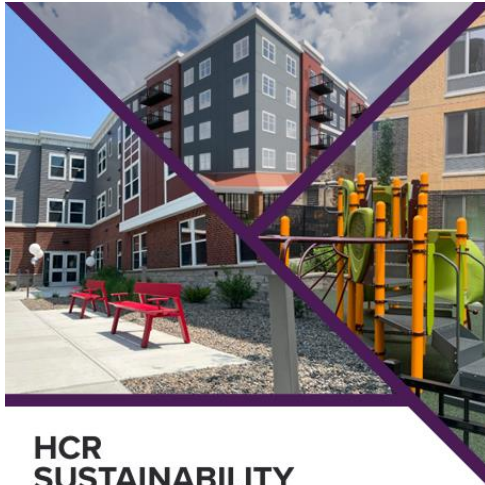
Pair electrification funds with weatherization to deepen load reduction

Prohibit cost shifting for mid-cycle programs

Office of Rent Administration

- Tenant Protection
- Pathway to beneficial electrification that benefits tenants
- Ensuring no cost shifting

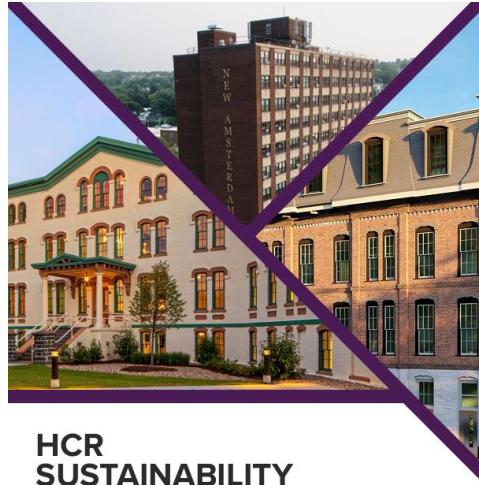
# HCR Refinancing and Rehab (Direct Injection)



**HCR  
SUSTAINABILITY  
GUIDELINES:  
NEW CONSTRUCTION**

HCR.NY.GOV  
2023

 **Homes and  
Community Renewal**  
Kathy Hochul, Governor  
RuthAnne Vinskus, Commissioner/CEO



**HCR  
SUSTAINABILITY  
GUIDELINES:  
EXISTING BUILDING**

HCR.NY.GOV  
2023

 **Homes and  
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*Steamboat: Overlook Co.*

## HCR'S CLEAN ENERGY INITIATIVE



**Homes and  
Community Renewal**

	Substantial Rehab Term Sheet	Moderate Rehab Term Sheet	
Rehab Type*	Substantial Rehab <sup>T</sup>	Moderate Rehab Level 2	Moderate Rehab Level 1
<b>MEP Scope</b>	Full MEP replacement	Full or partial MEP replacement	No MEP replacement
<b>Associated Term Sheet Goals</b>	<p><b>Goal 1:</b> Full electrification of heating (<u>\$13,500 – 22,000 per unit based on envelope performance</u>)</p> <p><b>Goal 2:</b> Full electrification of DHW (<u>\$4,000/unit</u>)</p> <p><b>Goal 1 &amp; 2 Adder:</b> Enabling Electrical Upgrades for Goals 1 and 2 (<u>up to \$4,000/unit</u>)</p>	<p><b>Goal 1:</b> Partial/Hybrid electrification of heating, with basic envelope improvements (<u>Up to \$13,500/unit</u>)</p> <p><b>Goal 2:</b> Partial/Hybrid electrification of DHW (<u>Up to \$4,000/unit</u>)</p> <p><b>Goal 1 &amp; 2 Adder:</b> Enabling Upgrades (<u>Up to \$4,000/unit</u>)</p>	<p><b>Goal 3:</b> Stretch Energy Upgrades – efficiency improvements + pathway to electrification (<u>up to \$15,000/unit</u>)</p>
<b>Maximum CEI Incentive and Associated Scope</b>	<p><b>Max Incentive:</b> \$30,000/unit</p> <p><b>Scope:</b> Full electrification of heating, DHW, enabling upgrades (wiring), with advanced envelope</p>	<p><b>Max Incentive:</b> \$21,500/unit</p> <p><b>Scope:</b> Partial or hybrid electrification of heating and DHW, includes enabling upgrades</p>	<p><b>Max Incentive:</b> \$15,000/unit</p> <p><b>Scope:</b> 20% energy savings, envelope to meet code, electrical upgrades to support future electrification</p>
<b>Incentive Structure</b>	Plug-and-play: incentive provided for each goal met	Incentive scales with % electrified	Incentive accessible for meeting Goal 3 requirements
<b>Maximum Incentive (full building)</b>	\$9,000,000	\$3,225,000	\$2,250,000

\*as defined by HCR Sustainability Guidelines

<sup>T</sup>Historic Adaptive Reuse projects may use the Substantial Rehab term sheet

# HCR Mid-Cycle Programs

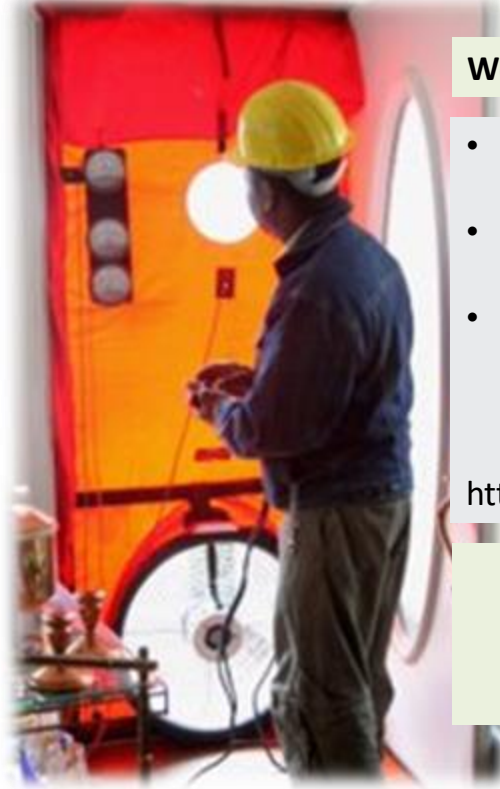


## HCR PRESERVATION SUSTAINABILITY GUIDEBOOK:

FOR SUSTAINABLE OPERATIONS,  
REPAIRS, AND RENOVATIONS

HCR NY REV  
2022

Homes and Community Renewal  
New York State Office of General Services  
Building Division, Commercial D&D



## Weatherization Assistance Programs

- Reduce energy burden for New Yorkers most vulnerable populations
- Serve households with 60% State Median income (SMI) or lower, including MF sites
- Ensure air sealing and the building envelope reduces air infiltration – leading to improved indoor air quality & lower utility bills

<https://hcr.ny.gov/weatherization>

1. Regular program year funding available through subgrantee network
2. Additional BIL Stimulus funding, \$289M for NYS over 4 years



Homes and  
Community Renewal

# HCR Mid-Cycle Programs

FEBRUARY 15, 2023

## New York State Homes and Community Renewal and Community Preservation Corporation Announce Applications Now Open for \$250 Million Climate Friendly Homes Fund

### Climate Friendly Homes Fund

As part of the 2022 approved Housing Plan 2.0, The CFHF was funded with \$250M to obligated by 2027. The Fund provides up to \$25,000/unit for mid-cycle, regulated and unregulated affordable multifamily housing, between 5 and 50 units, for Full and Partial Electrification, including:

1. Replace existing fossil-fuel burning heating systems
2. Replace fossil-fuel burning domestic hot water heating systems
3. Improve building envelopes to retain indoor temperatures



# Panel 1- Case Studies From The Field

11:00-11:45

## Virtual Participants – Q&A

You can submit questions, review all submitted questions, and upvote questions you would like asked of the presenters / panelists.

Join at:  
[menti.com](https://menti.com)

Use code:  
7805 0247



# Panelists

- Asit Patel, New York City
  - *Senior Director – Technical Services | Association for Energy Affordability*
- John Ciovacco, Albany
  - *President | Aztech Geothermal*
- Jay Best, Virtual
  - *President | Green Team Long Island*
- Gay Nicholson, Virtual
  - *President | Sustainable Finger Lakes*



# Interactive Discussion

- Facilitated Discussion
- Live Q&A with the audience

# Break

## 11:45-12:30

Lunch on your own

**Panel 2 –  
Balancing  
Affordability and  
Equity 12:30-2:00**

## Virtual Participants – Q&A

You can submit questions, review all submitted questions, and upvote questions you would like asked of the presenters / panelists.

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Use code:  
7805 0247



# Panelists

- Rebekah Morris-Gonzalez, New York City
  - *Senior Program Manager | Pratt Center for Community Development*
- Jeff Perlman, New York City
  - *Founder & Board Member | Bright Power*
- Kelly Ziegler, New York City
  - *Department Manager – Mass Market EE/BE Programs | Con Edison*
- Lisa Marshall, Albany
  - *Advocacy and Organizing Director | New Yorkers for Clean Power*
- Lindsay Speer, Albany
  - *Senior Planner | Central NY Regional Planning and Development Board*
- Laurie Wheelock, Albany
  - *Executive Director & General Counsel | Public Utility Law Project*
- Hal Smith, Albany
  - *CEO/President | Halco/Building Performance Contractors Association of New York State*
- Mark Kresowik, Virtual
  - *Senior Policy Director | American Council for an Energy-Efficient Economy*

# Interactive Discussion

- Facilitated Discussion
- Live Q&A with the audience

**Panel 3 –  
Discussion  
2:00-2:45**

# Open Discussion

- Opportunity to share your:
  - Key areas of concern
  - Suggestions & feedback
- 40~ minutes within each "room" to share individual comments
  - NYC
  - Albany
  - Virtual
- The number of comments and time will be specific to the interest within each "room"



# Next Steps / Wrap-Up



Department  
of Public Service

**Thank you!**

# Multifamily Electrification Retrofit Projects

Learning the Hard Way

**Asit Patel**

Sr. Director, Technical Services

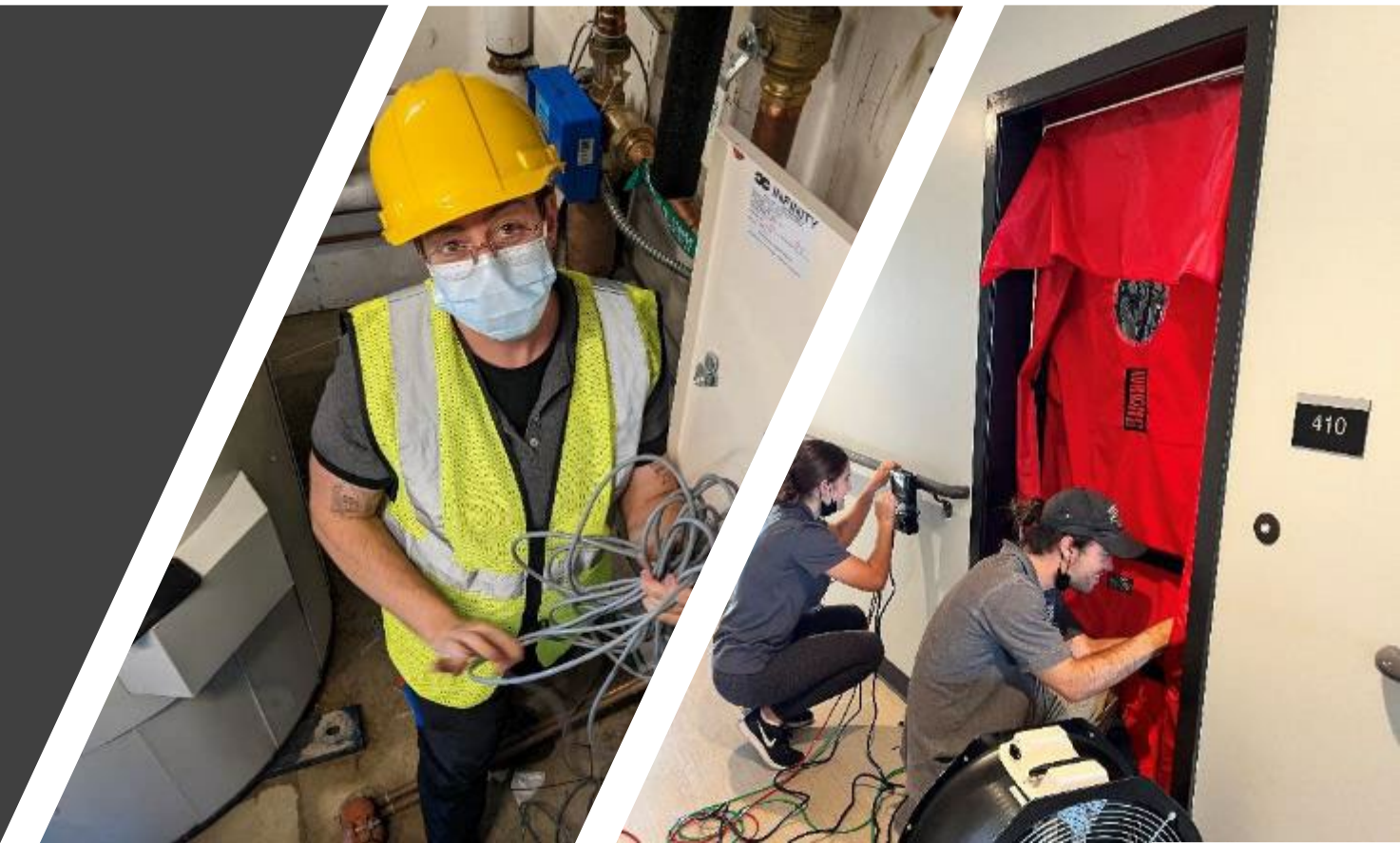
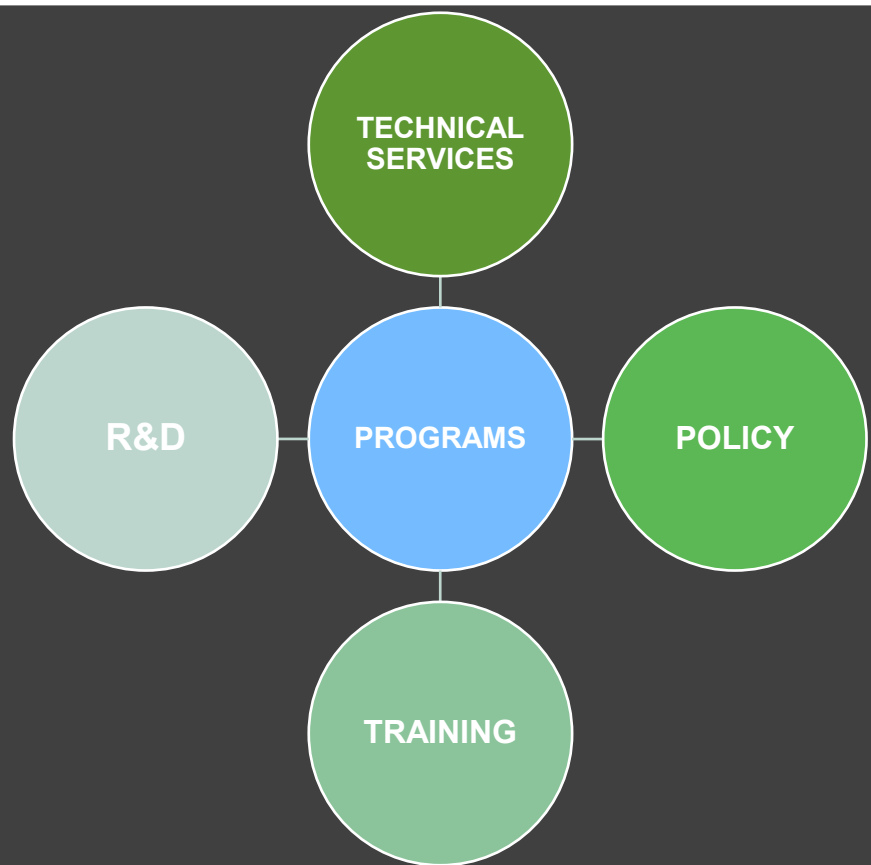
September 21, 2024

LMI Electrification Technical  
Conference

# About AEA







# The Electrification Project Experience

*(NYC office)*



# Construction completed

## 11 Projects

- All Multi family
- All LMI market segment
- Owner cost\* - none for electrification project

## AEA Role

- **6 projects** – Outreach, design, construction oversight, and commissioning
- **5 projects** – Design, construction oversight support, and commissioning

# Other project partners

## Manufacturer

- *Design support*

## Manufacturer's rep.

- *Design and field support*

## Contractor

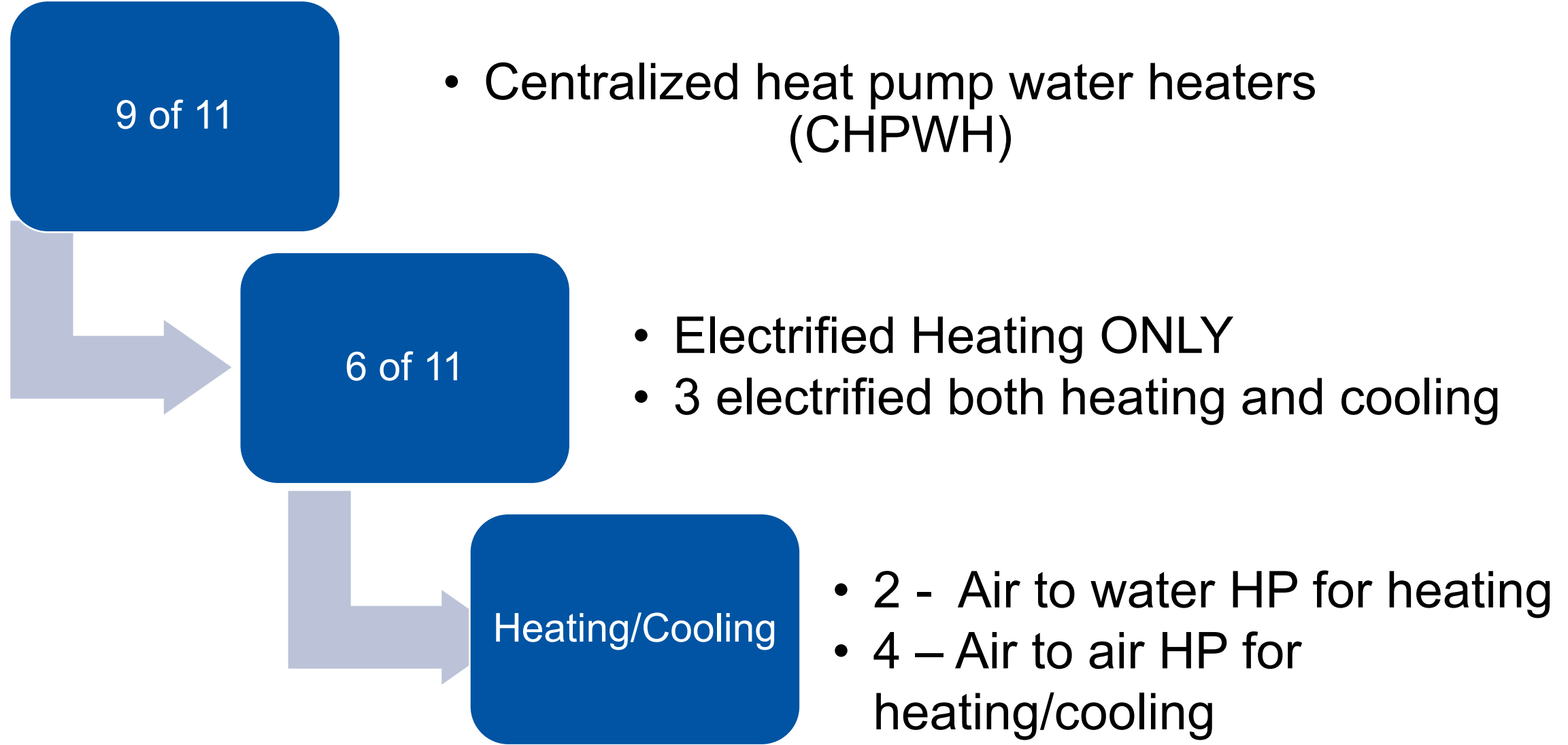
- Construction support

## Building management/operations staff

- *Access and coordination*



# Project Scopes



# Project outcomes and challenges

- Time consuming design process, start early, also need lots of patience!!!!
- Locating equipment is challenging in retrofit applications
- Cost shift barrier limits options
- Electrical upgrade requires lots of time and expensive
- In-unit work requires lots of coordination
- 
- Delay in equipment delivery
- Multi-unit mini splits and VRF can be extremely challenging to troubleshoot and service

# Thank You!

**Asit Patel**

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# Albany, NY

## Two Building Electrification Projects

1. Albany Housing Authority – Steamboat Square
2. Triple-decker in Sheridan Hollow with 3 Apartments



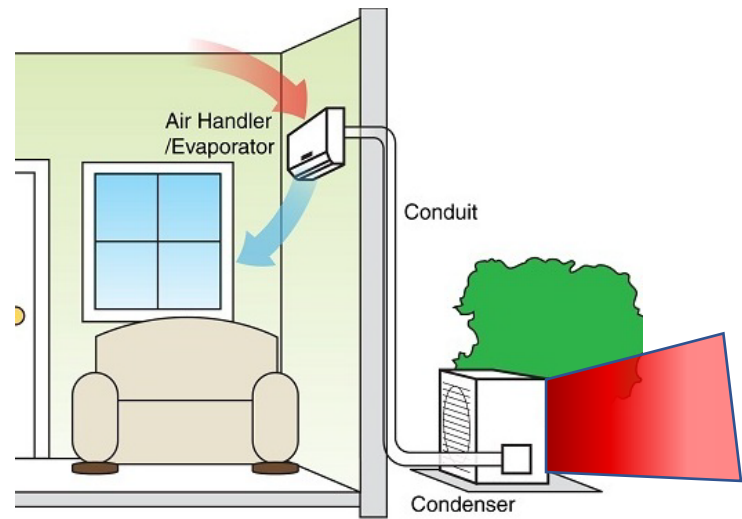
John Ciovacco  
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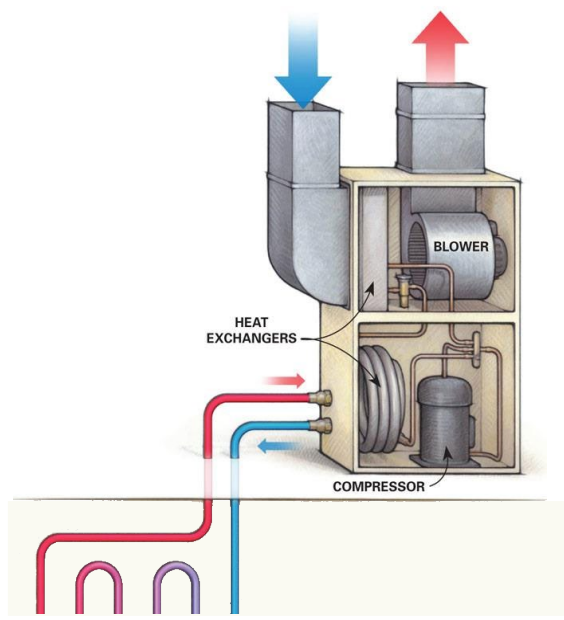
# Electric Heat Options



**Electric Resistance**



**Air Source Heat Pumps (ASHP)**



**Water/Ground Source HPs (WSHP/GSHP)**



**1.0 COP**

**1.5 to 2.5+ COP**

**3.0 to 5.0+ COP**

\$\$\$\$

**Relative Operating Cost**

\$\$  
(Propane & Oil)

**Efficiency**  
Coefficient of Performance

\$  
(Natural Gas)



# Steamboat Square – Phases 1 & 2

## *Equitable Electrification of Public and Affordable Housing*



Steamboat Square Geothermal

# Historic Steamboat Square

## Albany Housing Authority

- Since 1946, AHA has been developing and managing affordable housing in the City of Albany.
- AHA currently owns and operates over 2,000 multi-family housing units for families, senior citizens and adults with disabilities.
- Additionally, AHA administers a HUD Section 8 program that provides rental assistance for 2,200 households throughout the City.

### Steamboat Square Homes

Originally constructed in the early 1960's.

The buildings were extensively renovated in the mid 1980's.





# Steamboat Square Revitalization Project Team

- **Albany Housing Authority** – Owner/Operator & Developer
- **Edgemere Development** – Development Partner
- **MR2 Construction Services** - Owner's Consultant
- **SWBR** – Architect
- **Engineered Solutions** – Mechanical Contractor
- **AOW Construction** – General Contractor
- **Collett Mechanical** – Mechanical Contractor
- **Claverack Pump Service** – Geothermal Driller
- **Sustainable Comfort** – Green Building Consultant
- **Aztech Geothermal** – Geothermal consultant





# Steamboat Square Revitalization - Phase 1

## STEAMBOAT SQUARE REVITALIZATION -PHASE 1

- 20 Rensselaer Street is the first phase in the preservation of the Steamboat Square neighborhood.
- 88 one- and two-bedroom apartments.
- **Geothermal Heat Pumps for:**
  - Heating
  - Air Conditioning
  - Domestic Hot Water – with CO2 Refrigerant Heat Pumps!
- **32 closed loop boreholes @ 499 feet deep**
  - 16 borehole under each of the two adjacent parking lots
- **Individual heat pumps for each apartment (heat/cool)**
- **Central CO2 Refrigerant Heat Pumps**
  - Higher temperature capabilities
  - Extremely low Greenhouse Warming Potential (GWP =1)



# Steamboat Square Revitalization - Phase 1

## Funding

- NYSHCR - LIHTC & Public Housing Preservation Program
- NYS Homeless Housing and Assistance Program (HHAP)
- NYSERDA/NYSHCR "Clean Energy Incentives"
- NYS Empire State Development
- NYS Attorney General Clean Energy Funds
- National Grid "Clean Heat Incentives"
- City of Albany (HOME Funding)
- Community Preservation Corporation Perm Financing  
(Pre-dated Federal IRA Passage for original capital stack)



## Building Energy Upgrades

- All electric building design
- Ground source heat pump – Rooms and Domestic Water
- Building envelop enhancements
- ERV system
- 40% energy reduction – BTU's

# Steamboat Square Revitalization - Phase 2



- **Additional 332 apartments & 6 commercial spaces**
- **Ground Source Heat Pump:**
  - **Heating & Air Conditioning**
  - **Domestic Hot Water**
    - **CO2 Refrigerant Heat Pumps in Towers**
    - **HPWH for Townhouse Units**
- **Phase 2 will access IRA Tax Credits for:**
  - **Geothermal Heat Pumps**
  - **Considering Solar PV with Battery Storage**

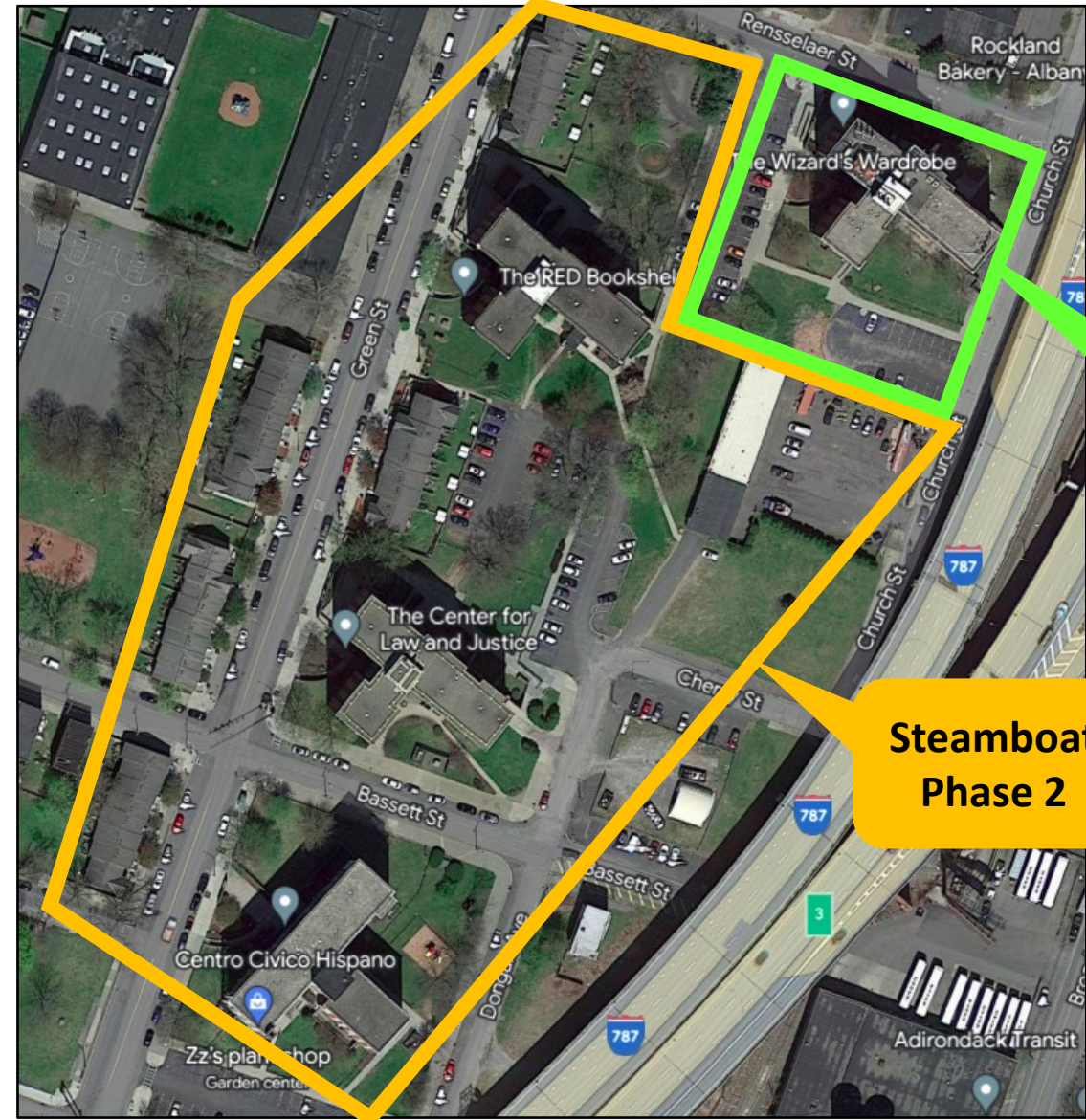


# Steamboat Square Project Phases

Albany Housing Authority's Steamboat Square projects are all going geothermal. It will be ~425 affordable housing units when it's finished in mid 2026.

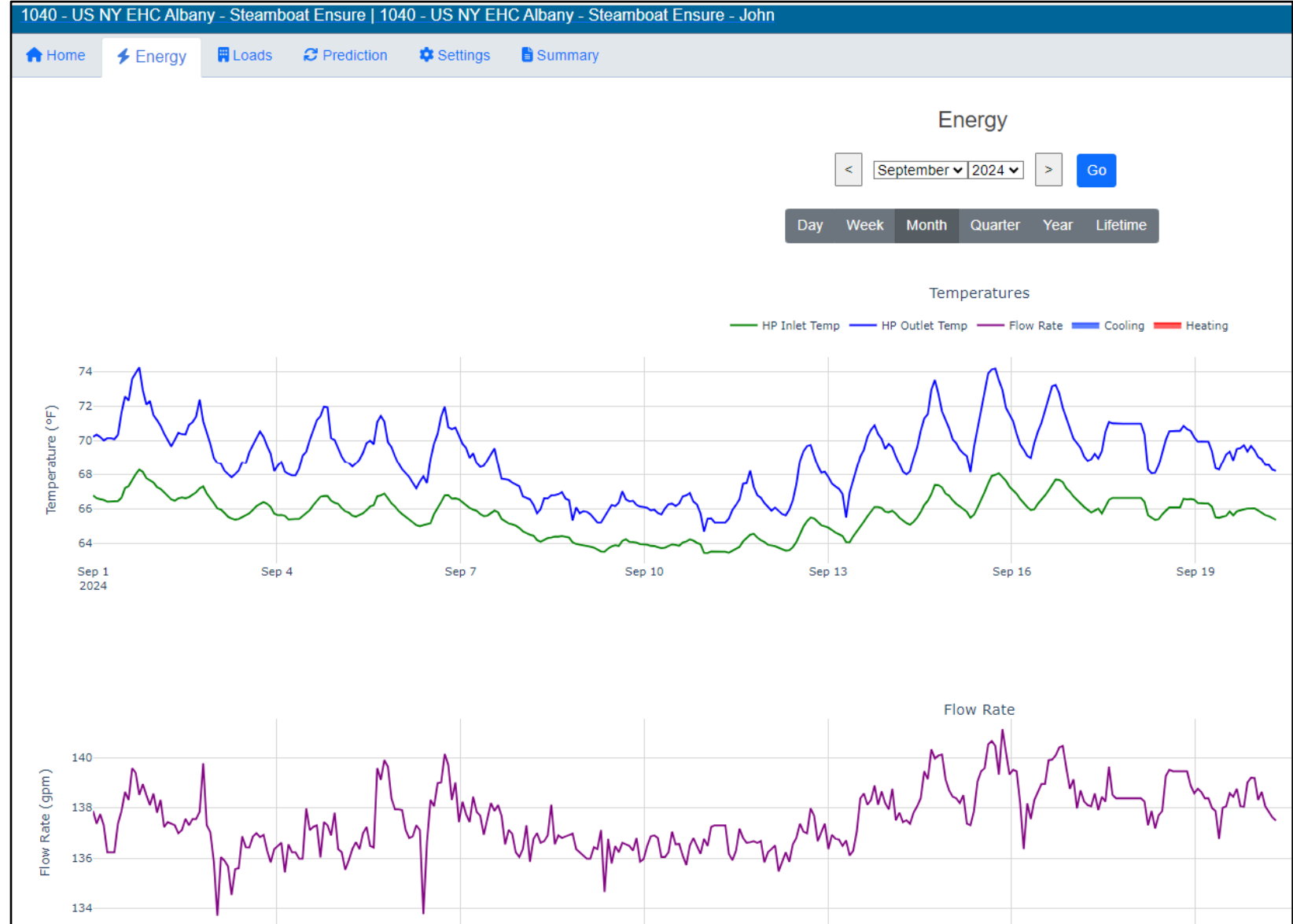
Phase I is underway - a 88 unit/12 story tower @ 20 Rensselaer St.

*(one townhouse not pictured)*



# GeoFease Loop Monitoring

- **Monitoring Ground Loop Temp and Flow Rate**
- **System compares to original design**
  - **Flags Trends**



# Geothermal Domestic Hot Water

*Going forward, DHW is becoming the largest single energy consumer in large multifamily projects as building envelope improvements are lowering the space heating requirements. Ultimately, we would benefit from more information about the electrified DHW system.*

- ❑ Proper commissioning to verify the heat pump hot water systems are functioning properly – as designed.
  - ❑ *E.g., DHW Heat Pumps can be using electric elements in tanks excessively and no one picks it up – because the tenants have hot water – not complaints.*
- ❑ Ongoing data collection and monitoring of performance and continued proper operation.
- ❑ Specify that the hot water mixing valve includes a flow meter for data collection/monitoring.
- ❑ Reports showing domestic hot water usage relative to time of day, number and type of water fixtures, occupancy, age of tenants (ranges perhaps), and possibly others.
- ❑ Look to pick up and log key data points on the DHW system into the building management system (BMS) or third-party data logger.



# Small Residential – Triple-decker

## Third Floor – Apartment/Family

### Space Heating

- Front Bedroom
  - Natural Gas (vents in room!)
- Rest of apartment - Baseboard electric

### Domestic Hot Water

- Natural Gas Tank

### Space Cooling

- Window Units

## Second Floor – Apartment/Family

### Space Heating

- Baseboard electric

### Domestic Hot Water

- Natural Gas Tank

### Space Cooling

- Window Units

## First Floor - Beauty Parlor

### Space Heating

- Shop - Radiant natural gas heater
- Rear Bathroom - Baseboard electric

### Domestic Hot Water

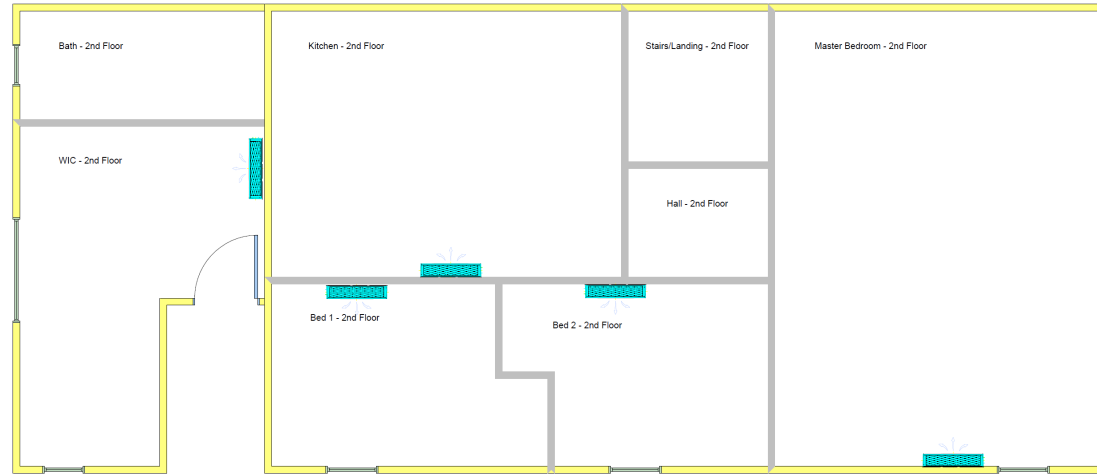
- Electric tank

### Space Cooling

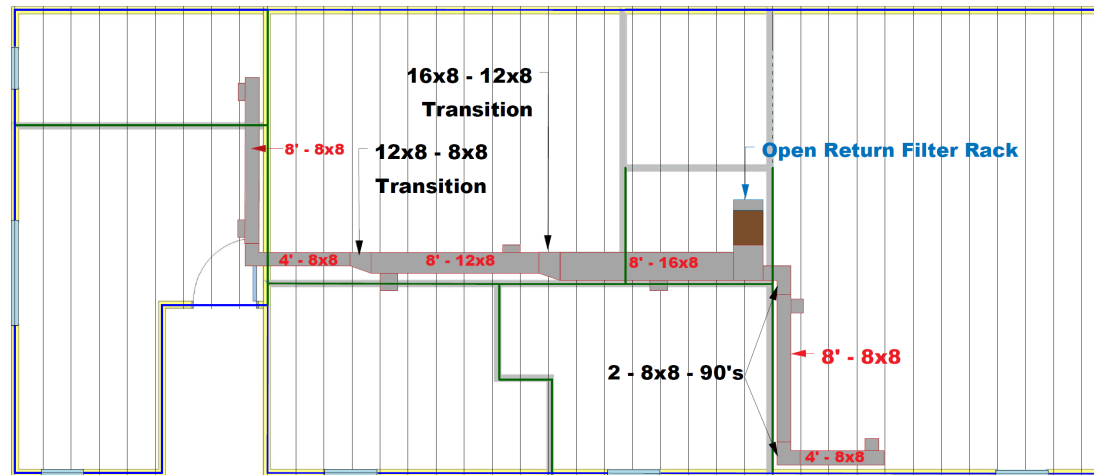
- Window Units



# Comparing Ductwork to Ductless Approach – 3<sup>rd</sup> Floor



Ductless Heads (5 or 6)



Single Central Air Handler with Ductwork

## Ductless Approach

+ Familiar to many contractors

+ Straightforward Design

- Becomes expensive as # of units increase

- Need to :

- Run 5 or 6 Power Wires
- Run 5 or 6 Control Wires
- Run 5 or 6 Refrigerant Line Sets
- Run 5 or 6 Condensate Lines

- Need to Maintain:

- 5 or 6 Condensate Lines
- 5 or 6 Air Filters

## Centrally Ducted Approach

- Fewer contractors have capabilities

- A bit more complex design

- Less expensive bill of materials

- Can be more labor intensive and invasive

+ Need to just ONE:

- Power Wire, Control Wire, Refrigerant Line Sets, Condensate Lines

+ Need to Maintain just ONE

- Condensate Line, Air Filter



# Small Residential – Triple-decker Energy Use

## 248 Orange Street Energy Analysis\*

Floor	NG Therms Heating	kWh Heating	DHW Op. Cost	Total Op. Cost	Geo. Op. Cost	Hybrid DHW Op. Cost	Savings
1	750	5,000	\$600	\$2,225	\$730	\$300	\$1,195
2	0	10,300	\$225	\$2,182	\$750	\$560	\$872
3	Incomplete Data – In Process						

### Planned Envelope Improvements

- Attic Insulation with Air Sealing
- Spray Foam Rim Joist
- Basement Wall Insulation

### Still Under Consideration:

- Window Replacements
- Insulating above grade wall insulation challenging – brick exterior and lathe and plaster right up against (no wall cavity)

### HVAC and DHW Conversion

#### Space Heating & Cooling

- Ground Source Heat Pump
  - + Savings vs Electric Resistance & Natural Gas

#### Domestic Hot Water

- Hybrid / Heat Pump Water Heaters
  - + Savings vs Electric Resistance
  - -Savings vs Natural Gas

\*Conversion Energy Price Assumptions \$0.19/kWh and \$0.90/therm

# *Thank You & Questions?*

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