Heat Pump Use and Savings Among Income-Qualified New York Homes

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Agenda

- Background
- Study Methodology
- Study Results
- Conclusions

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Background

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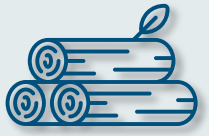
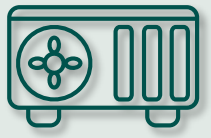
Background

Single-Family Low- to Moderate-Income (LMI) Heat Pump Demonstration Study Pilot Program



Delivered fuels (kerosene, propane, oil, and wood) represent about **one-third of residential space heating** energy use New York.

Home electrification is key to New York's **decarbonization goals** and provides **benefits** to income-qualified **New York households**.



The goal of the pilot program is to **gauge LMI single-family adoption** of, **experiences** with, and **impacts** of **heat pump** technologies.

413 **projects** were completed through the pilot program.

Study Methodology

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Methodology

To validate modeled savings, assess customer and trade ally satisfaction, and identify opportunities to improve program design, the Cadmus team performed these activities:

surveyed	**176**	income-eligible customers
conducted	**46**	extreme weather customer surveys
surveyed	**39**	contractors
conducted follow-up interviews with	**13**	of those contractors
reviewed	**351**	project files
completed delivered fuel analysis of	**30**	homes
completed electric billing analysis of	**210**	projects

Electric Billing Data Quality and Attrition

This table shows attrition within the sample of electric billing data.

Full population of completed projects	**413**	-
1. Missing Site Data	**-10**	2.4%
2. Missing Billing Data	**-42**	10.2%
3. Negative Meter Reads	**-6**	1.5%
4. Missing Start Date	**-51**	12.3%
5. Insufficient # Observations	**-87**	21.1%
6. Missing Zip Code	**-7**	1.7%
Total Sites Remaining	**210**	**50.8%**

Delivered Fuel Data Attrition

This table shows attrition within the sample of delivered fuel data, manually submitted by customers.

Full population of completed projects	**413**	-
1. Did Not Complete Survey	**-307**	74.3%
2. Did Not Provide Usable Data	**-76**	18.4%
Sites analyzed	**30**	**7.3%**

Study Results

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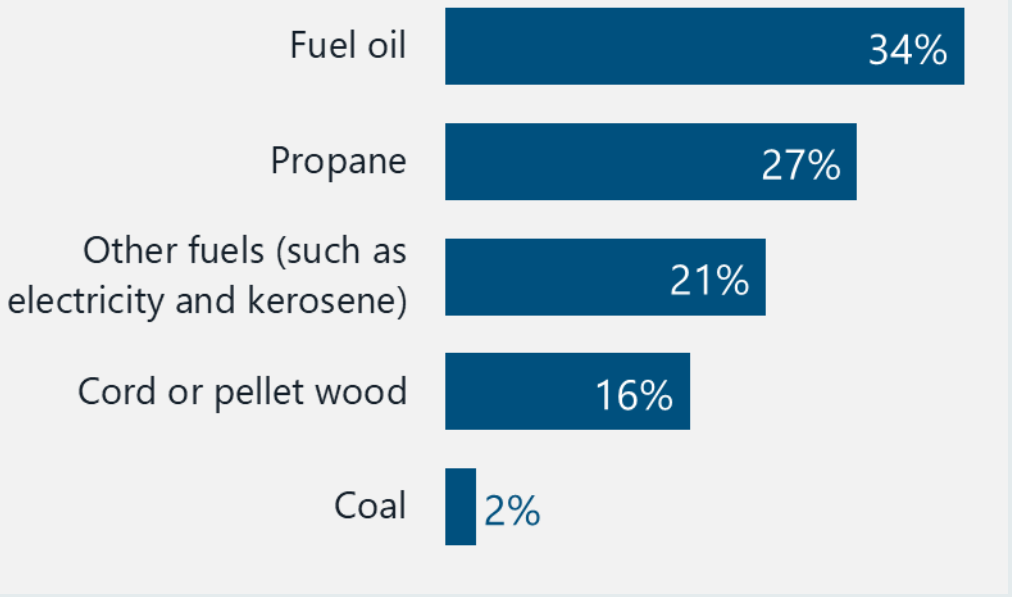
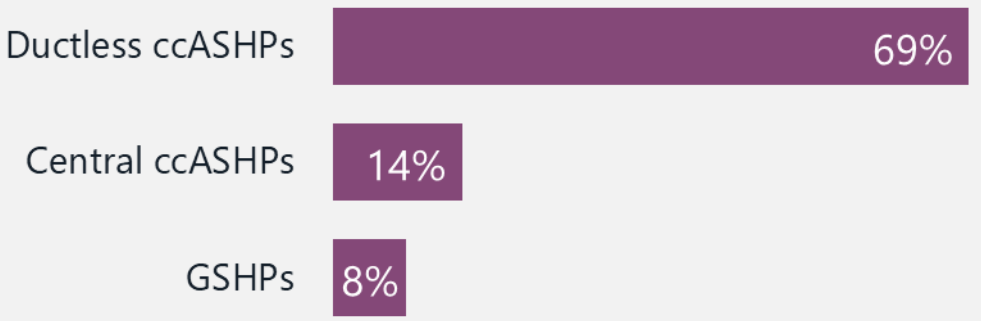
Project Types

Customers replaced a variety of heating equipment, most commonly with ductless cold-climate air-source heat pumps.

Previous primary heating type



System installed through pilot program



Customers installed **HPWHs** in **33%** of projects, with **27%** of projects including both **heat pumps and HPWH equipment**.

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Heating Equipment Use

Most respondents use their heat pump as the primary system and rely on their pre-existing heating equipment only as needed, but some operate both systems concurrently.

Reasons for using pre-existing equipment

- **37%** Heat pump provides inadequate heating
- **25%** Heat pump provides inadequate cooling
- **24%** The two systems serve different areas or rooms

Extreme cold weather survey respondents

- **58%** Supplement heating with pre-existing system or use backup system only for heat
- **42%** Used only heat pumps during extreme cold weather event

Cooling Equipment Use

While most customers can meet their cooling needs with the new equipment, some continue to use their pre-existing equipment.

Cooling equipment and needs

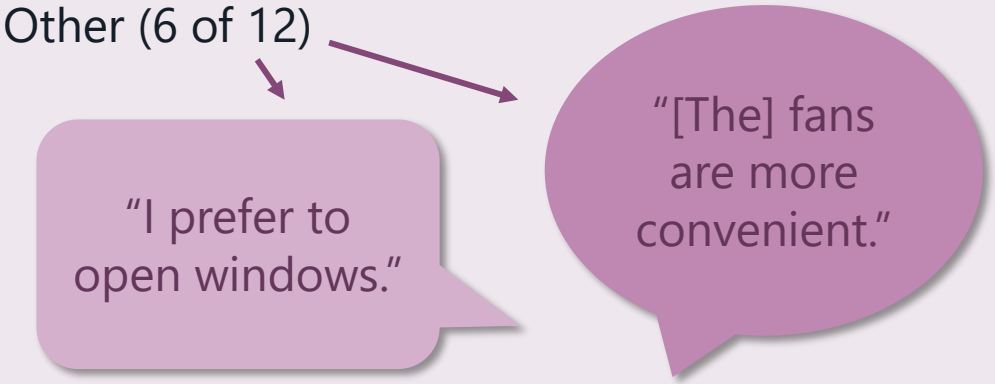
54% Pre-existing cooling equipment was working without issues

- **49%** window air conditioners
- **42%** fans

89% Able to meet cooling needs with new heat pump system

Reasons for using pre-existing equipment

- The two systems serve different rooms or areas (2 of 12)
- Heat pump provides inadequate cooling (2 of 12)
- Pre-existing system is more economical (2 of 12)
- Other (6 of 12)



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Motivations

Surveyed customers reported similar motivations for installing heat pumps across various equipment types (cold-climate air-source heat pumps, ground-source heat pumps, and heat pump water heaters).

save money

improve home comfort (cooling)

improve home comfort (heating)

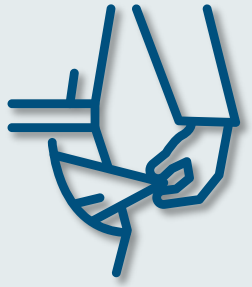
reduce environmental impacts

add heating source

replace old or nonfunctional equipment

Barriers

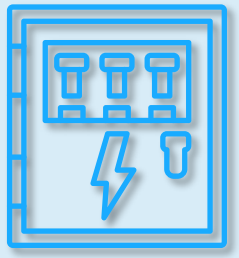
Contractors identified several barriers for LMI customers to complete heat pump installations.



cost or financing concerns

structural challenges

lack of home readiness



need for electric panel upgrades

Savings Validation

To determine the validity of modeled savings, we analyzed delivered fuel displacement and utility bill savings.

Delivered Fuel Displacement

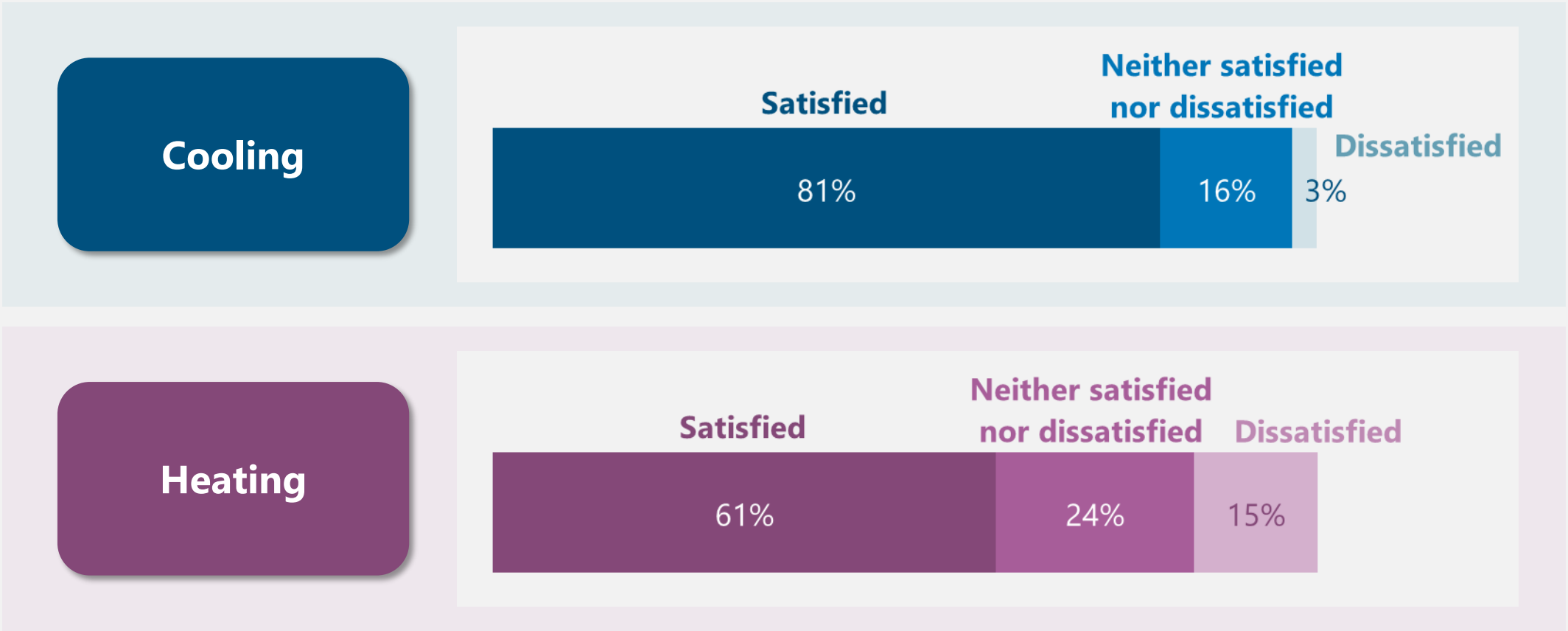
Projects that displaced	Energy savings		Realization Rate
oil, propane, and kerosene	92	MMBtu	96%
wood heating	113	MMBtu	94%
wood pellets	87	MMBtu	100%

Utility Bill Impacts

Original fuel	Bill savings	
oil and firewood	$1,000	annually
propane	$1,400	annually
kerosene	$1,800	annually

Satisfaction with Costs since Installing Heat Pumps

Most customer respondents rated themselves as *satisfied* with their cooling and heating costs since installation of their heat pumps.



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Extreme Weather Details

Between February 3 and 6, 2023, the Northeast experienced an extreme cold snap. Temperatures ranged from 4 to -6 degrees F.

Proportion of respondents who supplemented heat pumps during the cold snap: **58%**

Of those…	**28%**	used an **electric space heater**
	20%	used **fuel oil or propane central heating**
	18%	used **firewood, fireplace, or a wood pellet stove**
	5%	used **electric resistance backup or baseboard heaters**
	3%	Used **natural gas or kerosene space heaters**

Extreme Weather Details

Between February 3 and 6, 2023, the Northeast experienced an extreme cold snap. Temperatures ranged from 4 to -6 degrees F.

Reasons why customers used backup systems:

42%	said it was **too cold for their heat pump to keep up**
37%	said **one area of their home remained cold**
11%	had **concerns about electricity costs**
5%	had **concerns about their heat pump freezing**
5%	thought **other fuels would provide more heat**

Conclusions

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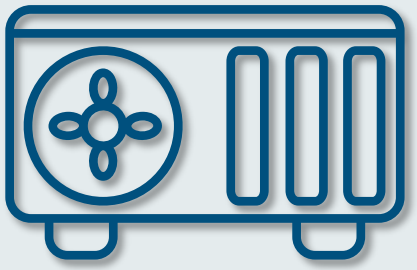
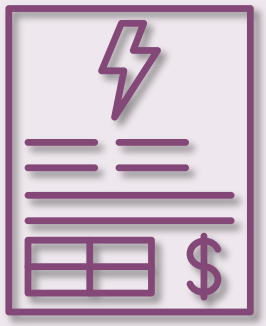
Conclusions

LMI households with delivered fuels can use heat pumps to reduce their reliance on expensive and carbon-intensive fuels.

LMI customers install heat pumps to **save money**, **improve home comfort**, and **replace systems before burnout**.



Heat pumps and heat pump water heaters significantly **displaced delivered fuels** and **lowered utility bills** for LMI residents.



Incentives for envelope, weatherization, and ancillary electrification improvements in LMI households **are not always sufficient** to meet heat pump eligibility requirements.

Home is Where the Heat Pump Is

Final takeaways from this market characterization study

Overall, customers are **happy with the performance of their heat pumps** and **save money using them.**

Heat pumps **met the primary heating and cooling needs of most customers** during normal weather.

Thank You

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