New York State
Clean Heat Program
2022 Annual Report

Jointly Filed By:

Central Hudson Gas & Electric Corporation
Consolidated Edison Company of New York, Inc.
Niagara Mohawk Power Corporation d/b/a National Grid
New York State Electric & Gas Corporation
New York State Energy Research and Development Authority
Orange and Rockland Utilities, Inc.
Rochester Gas and Electric Corporation

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Table of Contents

Executive Summary

In 2022, the NYS Clean Heat Program supported, via incentives, the installation of a total of 22,293 heat pump projects – a nearly threefold increase in projects relative to 2021. More than 80% of these projects were whole home/full load heating projects. Approximately 84% of the 2022 Clean Heat projects were ASHP technologies in residential (1-4 family) buildings and 3% were GSHP technologies in residential buildings. In addition, the Long Island Power Authority (LIPA) supported 7,385 heat pumps in 2022, for a total of more than 29,500 heat pump projects installed in 2022 across New York State.

In 2022, the NYS Clean Heat Program spent $453 million and achieved almost 1,960,000 MMBtu of savings. Based on the annual budgets and targets laid out in the 2020 New Energy New York ("NE:NY") Order,[1] Clean Heat delivered 358% of targeted savings at 581% of the targeted budget for 2022. Since the NYS Clean Heat Program launch on April 1, 2020, cumulative program spend has totaled over $613 million and the Program has achieved over 3,225,000 MMBtu of savings as of December 31, 2022.[2] As of the end of 2022, the Program has achieved over 90% of the 6-year (2020-2025) NE:NY MMBtu savings target and spent 135% of the combined 6-year incentive program budget. The program is on track to achieve its cumulative 6-year target by 2025. Details on individual Utility performance can be found in Section 4 of this report.

In 2022 Con Edison achieved its cumulative 2020-2025 NE:NY heat pump program targets and exhausted authorized Program funding. In February 2022, Con Edison filed a request with the New York State Public Service Commission (PSC) for additional program funding. While a ruling on the petition was pending, Con Edison paused accepting applications for ASHP projects on May 9, 2022. In August 2022, the Commission authorized Con Edison to transfer additional funding to its Clean Heat program and a new $10 million per month Continuity Funding Mechanism to sustain the program through the NENY Interim Review. More details about the Con Edison program and pause can be found in Section 4.2.

Over 3,900 individuals across the heat pump supply chain were trained toward growing a quality-oriented skilled labor force. Recruitment efforts in 2022 continued to grow the pool of ASHP and GSHP contractors. At the start of 2021 the Program had enrolled more than 300 NYS Clean Heat Participating Contractors; by the start of 2022 there were more than 750 Participating Contractors; by the start of 2023 there were 980 Participating Contractors in the program. Recruitment activities continue with the goal of continuously increasing the pool of ASHP and GSHP contractors.

NYSERDA's Market development efforts included $30.7 million in spending across various initiatives. A summary is provided in Section 2, with specific program details provided in Section 4.

[1] Case 18-M-0084, In the Matter of a Comprehensive Energy Efficiency Initiative ("NE:NY Proceeding"), Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025 (issued January 16, 2020) ("2020 NE:NY Order")

[2] The prior heat pump achievement in Q1 2020 – as acquired by NYSERDA – was incorporated into the respective NY Electric Utilities' individual 2020 budgets and targets, pursuant to the 2020 NE:NY Order.

Key Program Accomplishments and Planned Areas of Improvement

The Joint Efficiency Providers engaged in many activities throughout 2022 in their efforts to develop, support, and improve the NYS Clean Heat Program. The key accomplishments fall into three categories: Program Administration, Process Improvements and Heat Pump Incentives and are summarized below:

Program Administration

- Maintained and improved key communications including updates to the NYS Clean Heat Program Manual, Implementation Plan, Program Website, and Working Group Series for Participating Contractors and Industry Partners ("PC&IP")
- Updated and enhanced Clean Heat Custom Savings and Incentive Calculator to help contractors determine project savings and incentives

Process Improvements

- Updated and improved the heat pump measures in the NY Technical Resource Manual ("TRM")
- Made QA/QC process improvements including revising ASHP and GSHP checklists in coordination with stakeholders, revising the decommissioning checklist, and promoting 110 Clean Heat contractors to Full Status
- Updated Program data exchange practices and intake tools to make the application process more efficient and promote future heat pump deployment
- Improved application process cycle times through increased program staffing, improved communication with participants, and increased training opportunities for industry partners
- Reduced the frequency of application errors and the duration of time to resolve errors.

Heat Pump Incentives

- Agreed to add Heat Pump Water Heater midstream incentives to the Program Manual, and utilities began to deploy these programs.
- Central Hudson, National Grid, NYSEG and RG&E added Category 2a - ccASHP full load heating with integrated controls and Category 2b - ccASHP with decommissioning
- National Grid introduced a bonus for priority electrification zip codes

Planned Areas of Improvement in 2023

The Joint Efficiency Providers are committed to improving the program, particularly in response to feedback from participants. Planned areas of improvement in 2023 include:

- Reduce application process cycle time from application submission through incentive payment
- Reduce the frequency of application errors and the duration of time to resolve errors

The Joint Efficiency Providers will also continue to collaborate with stakeholders to evaluate potential changes such as incentive categories or levels and the addition of new eligible technologies in both Residential and non-residential applications. They will expand the market channel offerings for heat pump water heaters. In addition to a midstream incentive for distributors, Clean Heat Programs will begin offering an instant discount in certain big box retailers, both in brick-and-mortars stores and at their online commerce sites.

Section 3 details the key activities completed in 2022 and planned areas of improvement for 2023.

2023 Lookahead

In 2023, the Joint Efficiency Providers look forward to supporting New York State's electrification goals. The Joint Efficiency Providers will also work with Department of Public Service to support both the New Efficiency: New York Interim Review and the NY Statewide Technical Study of Heat Pump Performance.

1. Introduction

Pursuant to the January 16, 2020 *Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios through 2025* ("2020 NE:NY Order"),[3] the New York State Energy Research and Development Authority ("NYSERDA") and the NY Electric Utilities[4] (collectively, "Joint Efficiency Providers") hereby file this New York State Clean Heat Statewide Heat Pump Program ("NYS Clean Heat Program" or "Program") Annual Report for 2022 ("Annual Report").

The NYS Clean Heat Program, which launched on April 1, 2020, provides customers, contractors, and other heat pump solution providers with a consistent experience and business environment throughout New York State. The NYS Clean Heat Program supports a consistent statewide heat pump program designed to achieve the State's ambitious heat pump goals and build the market infrastructure for a low-carbon future.

The NYS Clean Heat Program includes initiatives to advance the adoption of efficient electric heat pump systems for space and water heating applications throughout New York State. The NY Electric Utilities provide incentives to support customer adoption of eligible heat pump technologies, including cold climate air source heat pump ("ccASHP") systems, ground source heat pump ("GSHP") systems, variable refrigerant flow ("VRF") systems, larger scale heat pump systems in commercial and multifamily buildings and heat pump water heaters ("HPWHs"), as well as their promotion and pricing by contractors and other heat pump solution providers.[5] The Implementation Plan[6] and the two Program Manuals[7] provide detail about the Program, including incentive structures and levels, eligible technologies, program rules and processes, and information for participating contractors.[8] The Program is implemented in coordination with a portfolio of NYSERDA-led market development initiatives, which aim to build market capacity to deliver building electrification solutions. The market development

[3] Case 18-M-0084, *In the Matter of a Comprehensive Energy Efficiency Initiative* ("NE:NY Proceeding"), Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025 (issued January 16, 2020) ("2020 NE:NY Order"), p. 93.

[4] Central Hudson Gas & Electric Corporation ("Central Hudson"); Consolidated Edison Company of New York, Inc. ("Con Edison"); Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid"); New York State Electric & Gas Corporation ("NYSEG"); Orange and Rockland Utilities, Inc. ("Orange & Rockland"); and Rochester Gas and Electric Corporation ("RG&E") (collectively, "NY Electric Utilities")."

[5] NE:NY Proceeding, NYS Clean Heat: Statewide Heat Pump Program Implementation Plan ("Implementation Plan"), (initially filed on March 16, 2020, and most recently refiled July 1, 2021), Appendix 3: NYS Clean Heat Program Glossary of Terms, p. 54-57. This Glossary provides definitions of ccASHP, GSHP, HPWH, Participating Contractor, and other key terms used in this Annual Report.

[6] NE:NY Proceeding, Implementation Plan. The Joint Efficiency Providers' work in coordinating development of the NYS Clean Heat Program began in 2019, following the issuance of the Commission's NE:NY Order - NE:NY Proceeding, Order Authorizing Accelerated Energy Efficiency Targets (issued December 13, 2018) ("2018 NE:NY Order").

[7] NE:NY Proceeding, NYS Clean Heat: Statewide Heat Pump Program Manual ("Program Manual"), (initially filed on March 16, 2020 and most recently refiled March 1, 2023); NYS Clean Heat Con Edison Heat Pump Program Manual, (initially filed on January 12, 2023 and most recently refiled March 1, 2023).

[8] Both the Implementation Plan and Program Manual are revisited, as necessary and with prior notice, on a separate schedule from this Annual Report.

efforts, which are described in Appendix 1 of the Implementation Plan, include support for training and qualification of contractors, processes to assure quality installations, marketing and education initiatives to help customers understand and select among options and to operate systems optimally, and research and demonstration initiatives.

2. NYS Clean Heat – Statewide Heat Pump Incentive Program

This 2022 Annual Report describes the milestones, activities, results, and findings for 2022 and planned areas of improvement for the NYS Clean Heat Program for 2023. Table 1 shows 2022 program achievement as compared to the budgets and targets from the 2020 NE:NY Order.[9]

Statewide Program Performance

Table 1. NYS Clean Heat Statewide Program Spend and Achievement 2022

Category	Spend ($)	Savings (MMBtu)*
2022 Actual	$452,921,936	1,959,833
2022 NE:NY Budget/Target	$77,905,608	547,046
Difference Between 2022 Actual and NE:NY Budget/Target	$374,646,762	1,412,860

Table 2. NYS Clean Heat Statewide Program Cumulative Spend and Achievement versus Plan-to-Date[10]

Category	Spend ($)	Savings (MMBtu)*
2020-2022 Spend/Achievement	$613,755,266	3,221,316
Plan-to-Date (2020-2022) Budget/Target	$171,906,667	1,210,975
Share of Plan-to-Date Budget/Target Realized Through 2022	357%	266%
NE:NY 2020-2025 Budget/Target	$454,318,222	3,566,590
Share of NE:NY Budget/Target Realized Through 2022	135%	90%

** Equivalent Annual MMBtu, net of all energy savings and associated usage*

[9] NE:NY Proceeding, 2020 NE:NY Order, Appendix C; NE:NY Proceeding, Implementation Plan, p. 4-5. Similar tables are shown for each utility in Section 4.

[10] The prior heat pump achievement in Q1 2020 – as acquired by NYSERDA – was incorporated into the respective NY Electric Utilities' individual 2020 budgets and targets, pursuant to the 2020 NE:NY Order.

Table 3 shows the number of heat pump projects that were installed and provided incentives in 2022 by program category.

Table 3. Projects Installed and Provided Incentives in 2022 by Electric Utility and Category

Category	Description	Central Hudson	Con Edison	National Grid	NYSEG	RG&E	ORU	Total by Category
1	*ccASHP: Partial Load Heating*	103	612	501	504	135	25	1,880
2	*ccASHP: Full Load Heating*	2,089	2,547	845	2,413	371	203	8,468
2a	*w/ Integrated Controls*	2	2,093	-	-	-	37	2,132
2b	*w/ Decommissioning*	387	5,949	16	178	11	60	6,601
3	*GSHP: Full Load Heating*	84	130	114	176	84	6	594
4	*Custom Space Heating Applications*	11	151	19	24	4	1	210
4a	*Heat Pump + Envelope*	-	5	2	-	-	-	7
5	*HPWH (up to 120 gal)*	567	303	434	260	181	15	1,760
6	*Custom Hot Water Heating Applications*	-	7	-	-	-	-	7
7	*GSHP Desuperheater*	20	24	71	90	33	3	241
8	*Dedicated DHW WWHP*	2	2	4	10	6	-	24
9	*Simultaneous Install of Space & Water Heating*	111	193	71	188	66	8	637
Total Project Count[11]		3,356	11,768	2,075	3,843	891	360	22,293

[11] Total Project Count is the total number of customer heat pump projects installed and provided incentives in 2022. Since some projects include more than one category of eligible heat pump equipment (e.g. combination space heating and water heating projects), the sum of projects by category may exceed the Total Project Count.

Table 4. Cumulative Projects Installed and Provided Incentives, Program To-Date 2020-2022 by Electric Utility and Category

Category	Description	Central Hudson	Con Edison	National Grid	NYSEG	RG&E	ORU	Total by Category
1	*ccASHP: Partial Load Heating*	1,173	4,991	923	1,007	291	50	8,435
2	*ccASHP: Full Load Heating*	4,167	9,628	1741	2,855	488	447	19,326
2a	*w/ Integrated Controls*	2	2,123	-	4	1	38	2,168
2b	*w/ Decommissioning*	509	6,077	16	147	39	62	6,850
3	*GSHP: Full Load Heating*	168	183	330	318	116	12	1,127
4	*Custom Space Heating Applications*	15	178	23	28	9	7	260
4a	*Heat Pump + Envelope*	-	5	2	0	0	0	7
5	*HPWH (up to 120 gal)*	1,143	488	690	608	377	35	3,341
6	*Custom Hot Water Heating Applications*	-	7	-	0	0	0	7
7	*GSHP Desuperheater*	60	104	130	200	65	23	582
8	*Dedicated DHW WWHP*	11	3	10	33	8	0	65
9	*Simultaneous Install of Space & Water Heating*	268	229	99	388	123	10	1,117
Total Project Count[12]		7,516	23,770	3,964	5,588	1,517	684	43,039

Each NY Electric Utility's individual performance is presented in more detail under its respective "Utility-Specific Progress" section.

[12] Total Project Count is the total number of customer heat pump projects installed and provided incentives since 2020. Since some projects include more than one category of eligible heat pump equipment (e.g., combination space heating and water heating projects), the sum of projects by category may exceed the Total Project Count.

2.1 Summary of NYS Clean Heat Program in 2022

2.1.1. Program Administration Activities

The Joint Efficiency Providers conduct a range of program administration activities and implement continuous improvement practices to make implementation more efficient, make rules and communication clearer, and to respond to participant feedback and market developments.

These activities are ongoing and will continue going forward, with modifications to reflect programmatic needs or changing market conditions. Key activities include:

- **Maintain and improve key communications, including:**
  - Updates to the Program Manual to improve clarity and consistency, and reflect program updates such as new measures, eligibility changes, and incentive changes. Program Manual updates were filed in March 2022 (Version 6) and September 2022 (Version 7).[13] The Joint Efficiency Providers anticipate the same cadence of updates with updates on March 1 and September 1, 2023.
  - Updates to the NYS Clean Heat Implementation Plan (latest version filed December 2022).
  - Development and support of the NYS Clean Heat webpage.[14]
  - Continuation of the Working Group Series for Participating Contractors and Industry Partners. The webinar cadence shifted from monthly to quarterly as the program matured. The working group held six meetings in 2022 with an average attendance of more than 140 attendees per session.
- **Grow and support the Clean Heat Contractor Network**
  - 100 registered statewide Clean Heat contractors achieved Full status in 2022.
  - The JMC conducted 44 School of Clean Heat training webinars with 803 attendees and numerous one-on-one trainings with individual contractors.
  - The Joint Efficiency Providers posted recorded trainings focused on various topics, which can be viewed anytime at https://www.gotostage.com/channel/ac7f5f9bccc643a5a3a6c0841311f18e.

2.1.2. Process Improvements

As part of the effort in developing, initiating, and implementing the NYS Clean Heat Program, the Joint Efficiency Providers achieved the following key process improvements in 2022:

[13] *See,* NE:NY Proceeding, NYS Clean Heat: Program Manual
[14] https://saveenergy.ny.gov/NYScleanheat/

2.1.2.1. Key Accomplishments in 2022

- **Updates to New York Technical Resource Manual ("TRM") by the TRM Management Committee, including:**
  - Baseline efficiencies for electric cooling and heating systems.
  - Values for Building Equivalent Full Load Hours were updated based on 30-year (1991-2020) National Centers for Environmental Information data.
  - Annual average outdoor temperature values and heating/Cooling Degree Data were updated.
  - Supply water main temperature tables.
- **QA/QC Process Improvements**
  - Updates to both ASHP and GSHP Checklists to support more decommissioning approaches to offer flexibility to contractors and customers
- **Updates to the Decommissioning Checklists**
  - Clarified best practices and highlight all required measures for each decommissioning scenario.
- **Improvements to the Custom Savings and Incentive Calculator for Contractors**
  - The calculator tool was updated to reflect the latest programmatic updates captured in the Program Manual.
- **Improvements to Program Data Exchange**
  - Updates to intake fields to streamline the collection of program information.
- **Efforts to Reduce Application Process Cycle Times**
  - Higher staffing levels to process applications, efforts to improve communications with applicants, and increased training.
  - For the non-Con Edison[15] utilities, the time to process and pay applications which did not require contractors' attention and correction fell from 49 days in 2021 to 19 days in 2022.
- **Efforts to Reduce the Frequency of Application Errors and the Duration of Time to Resolve Errors**
  - To reduce application errors and reduce processing timelines, School of Clean Heat training sessions concentrated on going over common sources of application errors and providing tips on how to avoid them. The rate of applications with flaws for non-Con Edison[16] utilities improved from an error rate of 47% in Q1 to an error rate of 39% in Q4. The overall average for 2022 was 42%.

2.1.2.2. Planned Areas of Improvement

- **Continue to Reduce Application Process Cycle Time**
  - The Utilities will work to reduce the application process cycle time for prescriptive applications during 2023, including processing and payment cycle time for Con Edison's program, which resumed accepting new applications on January 17, 2023. In 2022,

[15] The Con Edison Program is excluded because the pause interrupted normal application processing.
[16] *Idem*.

excluding Con Edison, the utilities set a new standard by processing and paying applications without an error in, on average, under three weeks. The utilities are committed to maintaining that success and improving on that timeline where possible.

- **Reduce the Frequency of Application Errors and the Duration of Time to Resolve Errors**
    - Roughly 40% of applications to the Clean Heat Program include some level of error that requires correction from contractors. The Program is committed to expanded contractor training in 2023, as well as providing one-on-one process assistance and retraining to resolve and drive down error rates. In addition, the Utilities will enforce the deadline for contractors to submit missing and/or corrected information that was introduced in 2022, in order to ensure more timely resolutions.[17]

2.1.3. Heat Pump Incentives

2.1.3.1. Key Accomplishments in 2022

In the Program Manual update of March 1, 2022, the Joint Efficiency Providers introduced relatively few changes. The most notable change at that time were incentive reductions announced in December 2021 by Central Hudson, Con Edison, and Orange & Rockland. Rapid Program growth in these territories prompted incentive rate reductions to manage program budgets.

The Program Manual update of September 1, 2022, included several incentive changes:

- **Added Heat Pump Water Heater Midstream Incentives**
    - This change created new distributor and retailer midstream channels to access HPWH rebates. These midstream channels offer easier access to incentives, with the goal to drive greater overall participation and more customers accessing the benefits of heat pump water heaters. The Utilities progressed towards launching these programs in 2022; Central Hudson and National Grid began accepting applications in 2022.
- **Added Incentives for Integrated Controls and Decommissioning**
    - Central Hudson, National Grid, NYSEG and RG&E added Category 2a (ccASHP full load heating with integrated controls and Category 2b (ccASHP full load heating with decommissioning of an existing fossil fuel heating system). Con Edison and Orange & Rockland introduced these adder incentives in 2021. Central Hudson announced the introduction of Category 2b in December 2021.
- **Kickers for Priority Electrification Areas**
    - National Grid introduced a bonus, or "kicker," of 25% for qualifying projects in several priority electrification zip codes.
- **Consideration of New Technologies**

[17]The electric utility will notify the Participating Contractor if an application contains missing or inaccurate information. Beginning March 1, 2022, Participating Contractors will be given 45 days from the date that the electric utility contacts the Participating Contractor with a missing information request to complete their application. See NYS Clean Heat: Statewide Program Manual, Version 6, March 1, 2022, p.71.

- The Joint Efficiency Providers added Ground Source VRF to the program based on feedback from program participants.

2.1.3.2. Planned Areas of Improvement

The midstream heat pump water heater incentive will be expanded to include the service territories of Central Hudson, NYSEG, Con Edison, Orange & Rockland, and RG&E. In addition to expanding the midstream heat pump water heater incentive, the Joint Efficiency Providers are expanding an instant discount for heat pump water heaters at Lowe's and Home Depot stores. This channel, which is currently being offered in Central Hudson service territory, will be expanded to the service territories of Con Edison, National Grid, NYSEG, Orange & Rockland and RG&E in 2023.

The Joint Efficiency Providers will continue to analyze program data and seek feedback from Participating Contractors and Industry Partners to evaluate any potential changes to incentives in 2023.

Additionally, the Joint Efficiency Providers will continue to collaborate with technical experts, manufacturers, and other industry partners to explore and expand the range of technologies eligible for Clean Heat incentives and will continue to provide notice of new eligible technologies through the Program Manual and outreach to the participant network.

2.1.4. Market Development

2.1.4.1. Key Accomplishments in 2022

- **Market Development**
  NYSERDA Market Development activities were funded through the Clean Energy Fund ("CEF")
  - Additional details on the achievements below are included in Section 5:
    - In 2022, the NYS Clean Heat marketing campaign nearly doubled the size of the campaign target audience by expanding to include natural gas households that meet the current income threshold (household income >$90,000).
    - NYSERDA launched an interactive web version of the Heat Pump Planner for consumers, showing several common configurations of heat pump installations based on home type and existing heating system.
    - NYSERDA, through its Clean Heat Connect Network, launched a cold climate air source heat pump equipment graphical selection tool developed in partnership with the Northeast Energy Efficiency Partnerships ("NEEP"), which provides users with a searchable interface and graphical visualization of critical heat pump performance data as it varies over the course of a year to aid in selecting specific ccASHPs by brand and model that will meet the needs of specific applications.
    - The Technical Assistance programs received 236 study applications in 2022 that focused on electrification or had an electrification component. Most of these studies are from multifamily facilities, commercial real estate, and PreK-12 schools. The studies completed in 2022 identified and evaluated 326 electrification measures: 212 ccASHP, 92 VRF measures, and 25 GSHP measures.
    - The Community Heat Pump Systems Solicitation, Program Opportunity Notice

("PON") 4614, for the development of clean thermal energy networks was released in early 2021. To date the program has awarded funding to perform feasibility, detailed design, and construction of thermal energy networks at 51 diverse project sites, covering nearly 90 million square feet of conditioned space throughout the State, with over 50% located in disadvantaged communities ("DACs") and/or serving low- to moderate income ("LMI") customers.

- NYSERDA's NextGen HVAC Innovation Challenges, PON 3519, completed Round 6 in 2022. This PON continues to issue targeted and specific challenges to address New York State's unique heating and cooling requirements. Efforts under the challenge have resulted in five commercialized products that are seeing utilization and increasing adoption in the State.
- The Empire Building Challenge established a second cohort of program partners, bringing the total to 16 portfolio partners who collectively control over 220 million square feet of commercial and multifamily New York real estate, including more than 75,000 housing units. The first four demonstration projects have begun implementation and a solicitation for a second round of demonstration projects was released in 2022, with awards expected to be announced in Q2 2023.
- In 2022, NYSERDA committed $25 million to Homes and Community Renewal ("HCR") to be awarded under HCR's 9% and 4% financing Request for Proposals ("RFPs"), and seven new construction projects were selected. NYSERDA also partnered with NYC Housing Preservation and Development ("HPD") to create the Retrofit Electrification Pilot, which incorporated incentives for space heating and cooling and/or domestic hot water electrification for existing multifamily building rehabilitation projects into HPD's preservation programs. In 2022, HPD and NYSERDA selected 6 projects to receive incentives for space heating electrification scopes.
- NYSERDA launched Clean Heat Connect, a network which now includes 5 HVAC manufacturers and 10 distributors, covering a majority of the New York State market, promoting adoption of educational and technical tools and resources through their contractor networks.
- In 2022, Comfort Home expanded its geographic reach and as a result enrolled 32 new participating contractors for a total of 72. Comfort Home more than doubled its prior-year production, completing 1,006 load reduction projects in 2022 for a total of 1,447 homes improved since Pilot inception.
- In 2022, analysis conducted in support of the Building Electrification Roadmap was incorporated into the New York State Climate Action Council deliberations and the Scoping Plan's Integration Analysis. In addition, an interagency team has utilized and helped to refine scenario analysis being conducted for this Roadmap in developing the plan for 2 million climate-friendly electrified or electrification-ready homes by 2030.

2.2 2023 Lookahead

The Joint Efficiency Providers of the NYS Clean Heat program continue to monitor policy developments that may inform or influence the program.

- The Climate Action Council released its final Scoping Plan in December 2022; as the recommendations begin to manifest in executive orders and legislative action, NYSERDA and its utility partners will ensure that actionable proposals in this plan are incorporated into the NYS Clean Heat program where applicable.
- As mandated in the 2020 NE:NY Order,[18] an Interim Review commenced in 2022, with expected Commission action in 2023. The Interim Review will assess program design and administration, innovative technologies and practices, governance and oversight mechanisms, and targets and budgets required to support the Climate Leadership & Community Protection Act ("CLCPA") and other State goals. The Joint Efficiency Providers will support the review and implement directives following a Commission Order anticipated later in 2023.
- The statewide heat pump technical study conducted by Department of Public Service ("DPS") Staff started in Q3 2021 with results anticipated in 2023. The Joint Efficiency Providers will incorporate insights from the study and make programmatic adjustments as applicable.

[18] NE:NY Proceeding, 2020 NE:NY Order, p. 59-60.

3 Utility-Specific Progress

3.1. Central Hudson

Table 5. 2022 Clean Heat Program Spend and Achievement

Category	Spend ($)	Savings (MMBtu)
2022 Actual	$15,287,344	185,308
2022 NE:NY Budget/Target	$7,049,949	38,850
Difference Between 2022 Actual and NE:NY Budget/Target	$7,867,829	146,458

Table 6. Clean Heat Program Spend and Achievement 2020-2022

Category	Spend ($)	Savings (MMBtu)
Cumulative 2020-2022 Spend/Achievement	$43,839,088	447,752
Cumulative NE:NY 2020-2025 Budget/Target	$43,221,312	255,292
Share of NE:NY Budget/Target Realized Through 2022	101%	175%

3.1.1. 2022 Program Performance

Central Hudson overachieved and overspent on its 2022 savings targets and budget respectively. Central Hudson saw consistent high levels of activity throughout 2022 for installations under the Clean Heat program, with over two-thirds of projects involving heat pump adoption for the full heating and cooling needs of homes and businesses. In addition, Central Hudson introduced the Category 2A Integrated Controls and Category 2B Decommissioning measures in 2022, focusing on full legacy fossil fuel displacement. Central Hudson has experienced a steady increase in completed projects for each measure throughout the year. In addition to this high volume, Central Hudson saw growth in the GSHP and HPWH categories.

As a result of the high project volume, Central Hudson expended the allotted NENY Clean Heat budget, and petitioned for additional program funding in early 2023. While awaiting the pending ruling, Central Hudson is utilizing additional authorized funds to continue program operations as normal, with no expected changes to incentives.

3.2. Con Edison

3.2.1. Con Edison 2022 Program Performance

Table 7. Con Edison 2022 Clean Heat Program Spend and Achievement

Category	Spend ($)	Savings (MMBtu)
2022 Actual	$403,932,443	1,422,531
2022 NE:NY Budget/Target	$35,884,450	151,334
Difference Between 2022 Actual and NE:NY Budget/Target	$368,047,993	1,271,197

Table 8. Con Edison Clean Heat Program Spend and Achievement 2020-2022 compared to NE:NY budget

Category	Spend ($)	Savings (MMBtu)
Cumulative 2020-2022 Spend/Achievement	$510,590,975	2,153,617
Cumulative NE:NY 2020-2025 Budget/Target	$227,315,835	1,000,000
Share of NE:NY Budget/Target Realized Through 2022	225%	215%

Table 8. Con Edison Clean Heat Program Spend and Achievement 2020-2022 with authorized funding transfers

Category	Spend ($)	Savings (MMBtu)
Cumulative 2020-2022 Spend/Achievement	$510,590,975	2,153,617
Cumulative NE:NY 2020-2025 Budget/Target w authorized transfers	$745,599,511	-
Share of NE:NY Budget/Target Realized Through 2022	68%	-

In 2022, Con Edison experienced significant growth in the program and achieved both the annual savings target as well as the cumulative 6-year NE:NY target. Con Edison exceeded its annual savings target by 1,271,197 MMBtu while spending $368,047,993 over its authorized annual budget. Furthermore, Con Edison exceeded the cumulative program savings target by 215% at a spend rate 225% higher than cumulate 6-year budget.

The Clean Heat program continued to see growth in the Con Edison service territory in 2022 across all sectors, led by residential ASHP installations. Program savings from residential (1-4 family) customers accounted for 77% of savings. Non-residential sectors exhibited significant growth as its share of savings increased from roughly 8% in 2021 to 23% in 2022.

Con Edison also helped catalyze a shift toward residential customers decommissioning their fossil fueled systems. In 2022, ASHP installations with decommissioning of existing fossil fuel heating systems accounted for over 50% of all projects acquired.

Order Approving Additional Funding for Con Edison's Clean Heat Program

Due to accelerated program achievement, Con Edison petitioned the Commission for additional program funding in February 2022. While a ruling on the petition was pending, Con Edison paused accepting applications for ASHP projects on May 9, 2022, as well as placed all new non-residential GSHP incentive applications on a waitlist on July 11, 2022. On August 11, 2022, the Commission authorized additional funding for the program and required the Company to work with Staff, stakeholders and market participants to implement necessary changes to relaunch the program. The Con Edison Clean Heat Order[19] included a $10 million per month Continuity Funding Mechanism to sustain the program through the NE:NY Interim Review.

[19] NE:NY Proceeding, Order Approving Funding or Clean Heat Program (issued August 11, 2022) ("Con Edison Clean Heat Order"), p. 93.

In the Con Edison Clean Heat Order, the Commission authorized the transfer of $518 million to support the Clean Heat program. This includes the transfer of: $216 million of unspent funding from its non-LMI electric energy efficiency programs; an additional $156 million of these funds made possible by waiving requirements for annual savings targets in favor of achieving Con Edison's 2020-2025 cumulative target; and a further $100 million of these funds made possible by combining the cumulative Clean Heat and non-LMI electric energy efficiency targets for 2020-2025. The Order also authorized the reallocation of $46 million of previously collected, unspent funds from Con Edison's legacy Energy Efficiency Portfolio Standard ("EEPS") and Energy Efficiency Transition Implementation Plan ("ETIP") programs.

In addition to these transfers, the Con Edison Clean Heat Order also approved the implementation of a Continuity Funding Mechanism which will provide necessary funding to relaunch and continue the Clean Heat Program until the conclusion of the NENY Interim Review. This additional funding will be capped at $10 million in expenditures per month and any unspent funds will carry over to be utilized in subsequent months. The Company will recover these expenditures over a 10-year amortization period through the Company's Monthly Adjustment Clause.

Con Edison removed the program pause on January 17, 2023, and subsequently, began accepting new applications for projects installed under a modified program framework designed to operate within the approved budgets.

Incentive Level Changes

On March 1, 2022, Con Edison made incentive level adjustments for residential (1-4 family) ASHP projects (Categories 1, 2, 2a and 2b), to manage its remaining authorized Clean Heat program budget.

On September 1, 2022, Con Edison introduced Program incentive limitations, including 70% of project costs for all projects; provisions related to $1 million cap per project; and a total GSHP incentive limit of $50,000 per project for residential projects.

3.3. Orange & Rockland

3.3.1. 2022 Program Performance

Table 9. Orange & Rockland 2022 Clean Heat Program Spend and Achievement

Category	Spend ($)	Savings (MMBtu)
2022 Actual	$3,668,628	25,890
2022 NE:NY Budget/Target	$2,397,539	13,027
Difference Between 2022 Actual and NE:NY Budget/Target	$1,271,089	12,863

Table 10. Orange & Rockland Clean Heat Program Spend and Achievement 2020-2022

Category	Spend ($)	Savings (MMBtu)
Cumulative 2020-2022 Spend/Achievement	$7,223,218	51,154
Cumulative NE:NY 2020-2025 Budget/Target	$15,003,888	86,657
Share of NE:NY Budget/Target Realized Through 2022	48%	59%

Orange & Rockland's program participation grew significantly in 2022 with an increase of 360 completed projects. This resulted in overachievement and overspending for the year and cumulatively since program inception. ASHP installations were completed in over 93% of all 2022 projects while GSHP installations accounted for 3% of projects. Fossil fuel heating systems were displaced by heat pumps in 91% of all projects. Full load displacements accounted for 86% of all projects, while partial load displacements accounted for 7% of all projects. Residential projects accounted for 89% of all projects.

Incentive Level Changes

On March 1, 2022, Orange & Rockland made incentive level adjustments for residential (1-4) family air source heat pump projects (Categories 1, 2, 2a and 2b) to manage its remaining authorized Clean Heat program budget.

3.4. National Grid

Table 11. National Grid (Niagara Mohawk) Clean Heat Program Spending and Achievement 2022

Category	Spend ($)	Savings (MMBtu)
2022 Actual	$13,163,031	135,945
2022 NE:NY Budget/Target	$ 14,789,044	172,203
Difference Between 2022 Actual and NE:NY Budget/Target	$ (1,626,013)	(36,258)

Table 12. National Grid (Niagara Mohawk) Clean Heat Program Spending and Achievement 2020-2022

Category	Spend ($)	Savings (MMBtu)
Cumulative 2020-2022 Spend/Achievement	$ 22,951,872	234,151
Cumulative NE:NY 2020-2025 Budget/Target	$84,398,834	1,113,681
Share of NE:NY Budget/Target Realized Through 2022	27%	21%

3.4.1. 2022 Program Performance

During the 2022 program year, National Grid did not fully spend its allocated 2022 budget, nor reach its target. However, the company made great strides over prior years' performance, with a 115% increase in MMBtu savings from 2021 and achieving 79% of the 2022 MMBtu savings target.

National Grid saw an increase in application volume, as well as improvements in application processing time. National Grid and its implementation partner invested extensive effort onboarding and training new and existing contractors, growing the network of partners in the service territory from 327 at the start of 2022 to 456 by the end of the year.

Another highlight of the National Grid program was a large percentage increase in C&I program participation, with a 1,356% increase in MMBtu savings from 2021.

Finally, National Grid was able to stand up its heat pump water heater distribution midstream offering less than 6 months from the time this program enhancement was announced. Impact to 2022 was relatively small due to its late-year launch, but this opened new contractor and distributor relationships to broaden the reach of the program.

Continuing challenges to performance include program and technology awareness.

3.5. NYSEG and RG&E

Table 13. NYSEG Clean Heat Program Spend and Achievement 2022

Category	Spend ($)	Savings (MMBtu)
2022 Actual	$13,276,045	150,125
2022 NE:NY Budget/Target	$13,173,160	153,328
Difference Between 2022 Actual and NE:NY Budget/Target	$102,885	(3,203)

Table 14. NYSEG Clean Heat Program Spend and Achievement 2020-2022

Category	Spend ($)	Savings (MMBtu)
Cumulative 2020-2022 Spend/Achievement	$23,409,817	267,620
Cumulative NE:NY 2020-2025 Budget/Target	$75,130,577	992,737
Share of NE:NY Budget/Target Realized Through 2022	30%	27%

Table 15. RG&E Clean Heat Program Spend and Achievement 2022

Category	Spend ($)	Savings (MMBtu)
2022 Actual	$3,594,445	40,035
2022 NE:NY Budget/Target	$1,611,466	18,304
Difference Between 2022 Actual and NE:NY Budget/Target	$1,982,979	21,731

Table 16. RG&E Clean Heat RG&E Program Spend and Achievement 2020-2022

Category	Spend ($)	Savings (MMBtu)
Cumulative 2020-2022 Spend/Achievement	$5,740,296	67,022
Cumulative NE:NY 2020-2025 Budget/Target	$9,247,776	119,223
Share of NE:NY Budget/Target Realized Through 2022	61%	56%

3.5.1. 2022 Program Performance

RG&E Clean Heat program achieved twice its 2022 annual MMBtu savings goal. This resulted in greater spend, while maintaining the originally budgeted cost of savings. NYSEG Clean Heat program was slightly under goal in 2022 for annual MMBtu while maintaining budget spend. The programs focused on the continued development of the participating contractor and implementation partner network. The Companies' participating contractor network grew by 40%. Both NYSEG and RG&E saw substantial growth in ASHP installations, which constituted 80% of total savings for the year. Overall, in 2022 the Companies saw an increase in heat pump adoption, resulting in a 50% increase in MMBtu savings from 2021.

4 Market Development Plan

4.1. Overview

Starting in Q2 2020, the NY Electric Utilities launched the NYS Clean Heat Statewide Heat Pump incentive program. To achieve the statewide heat pump goals and build the market infrastructure for a low-carbon future, the incentive program has been paired with a portfolio of market development initiatives implemented by NYSERDA.

NYSERDA is investing more than $256 million in market-enabling initiatives funded through CEF to support the NYS Clean Heat Market Development Plan, which aims to build market capacity to deliver building electrification solutions.

The NYS Clean Heat Market Development Plan is designed to address critical barriers and market needs through the initiatives listed in the table below. These initiatives have been approved through various NYSERDA CEF Investment Plans.

While NYSERDA does report benefits such as energy savings and leveraged funding from various investments outlined in the following table in routine CEF reporting (from investment plans[20] unrelated to utility investments), NYSERDA's NYS Clean Heat performance is quantitatively assessed in the following manner:

1. Funding commitments made in comparison to the Implementation Plan; and
2. Progress against near-term output metrics and longer-term outcome metrics which are summarized in Appendix A of this report.

[20] https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7bD918D49F-6E27-4D2C-A484-D3CCEADB2154%7d

4.2. NY Clean Heat Market Development Plan Funding Commitments

The table below summarizes NYSERDA 2022 progress of funding commitments per each Critical Market Need identified in the Market Development Plan; these metrics are also documented in quarterly/annual CEF reporting related to each NYSERDA investment plan supporting the Market Development Plan.

Table 17. NYSERDA 2022 Progress per Critical Market Need

Critical Market Need	Initiative	Expended Through 2021	Expended in 2022	Planned 2022 Expenditures	Difference Actual v Projected 2022	NYSCH Goal (all years)	Total Expended as % of NYSCH Goal
Train and develop the needed clean heating and building electrification workforce	Workforce Development	$2.2M	$3.7M	$5.3M	-$1.6M	$38.2M	15%
Build consumer demand and market confidence and reduce customer acquisition costs	Marketing	$6.8M	$7.5M	$8.7M	-$1.2M	$25.5M	56%
	Community Campaigns	$0.2M	$1.1M	$1.0M	$0.1M	$10.0M	13%
	Critical Tools	$0.1M	$0.6M	$0.3M	$0.2M	$4.5M	15%
	Technical Assistance & Audits	$2.8M	$4.5M	$3.0M	$1.4M	$28.8M	25%
Drive performance improvements, reduce cost, and deliver new economic solutions through technology innovation and demonstrations	Clean Thermal District Systems	$1.0M	$2.3M	$3.5M	-$1.1M	$20.0M	16%
	HVAC Technology Challenges	$5.8M	$2.7M	$2.9M	-$0.2M	$25.3M	33%
	Empire Building Challenge	$0.6M	$1.3M	$0.7M	$0.6M	$15.0M	13%
	Multifamily Building Demonstrations	$0.2M	$0.2M	$0.8M	-$0.6M	$18.3M	2%
	Exploratory Cost Reduction Strategies	$0.0M	$0.0M	$0.1M	-$0.1M	$5.0M	1%
Make electrification solutions available for LMI consumers	LMI	$3.9M	$2.2M	$3.9M	-$1.7M	$30.0M	20%
Make products available when and where consumers need them by building the clean heat supply chain	Clean Heat Supply Chain	$0.7M	$1.0M	$1.9M	-$0.9M	$12.2M	14%
Minimize winter electrical peak by investing in demand reducing "heat-pump ready" solutions	Comfort Home	$1.9M	$3.3M	$3.4M	-$0.1M	$22.7M	23%
Develop a long-term building electrification roadmap to guide the transformation of how New Yorkers heat and cool their buildings	Building Electrification Roadmap	$0.6M	$0.3M	$0.3M	$0.0M	$1.0M	87%
Totals		**$26.7M**	**$30.7M**	**$35.8M**	**-$5.1M**	**$256.5M**	**22%**

Note: A CEF filing of NYSERDA's Compiled Investment Plans (CIP) in 2022 was made that included revisions to the Residential Program resulting in budget updates to the Technical Assistance & Audits and Comfort Homes NYS Clean Heat initiatives. This summary table in the CIP was not formally updated, therefore it does not align with Version 5 of NYS Clean Heat Statewide Heat Pump Implementation Plan (Implementation Plan)[21]. Those budget updates are reflected here for proper reporting and will be reflected in the next version of the Implementation Plan.

[21] https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b71DC25C5-90E9-4C30-80F6-411E057C9CB5%7d

4.3 2022 Updates: Critical Market Needs and Market-Enabling Initiatives

1. TRAIN AND DEVELOP THE NEEDED CLEAN HEATING AND BUILDING ELECTRIFICATION WORKFORCE

2022 Performance

During 2022, 3,924 individuals were trained (7,089 cumulative to date). Approximately 60% of those trained to date are associated with HVAC occupations in the areas of sales, installation, and design.

2023 Lookahead

Plans for 2023 include: continued offerings and promotion of programs to build capacity building for heat pump training to meet demand and address market gaps'; career pathways training for new heat pump workers; and hiring support programs for the heat pump industry such as on-the-job-training, internships and fellowships; supporting the National Grid Good for Good Program that focuses on entry-level training and mentoring for young adults in DACs; career awareness initiatives including Roadtrip Nation (a clean energy career awareness initiative); an HVAC Career Map to increase interest in clean energy jobs; and partnerships with the Clean Energy Hubs to increase reach of workforce development programs.

2. BUILD CONSUMER DEMAND AND MARKET CONFIDENCE AND REDUCE CUSTOMER ACQUISITION COSTS

2022 Performance

Marketing

In 2022, the NYS Clean Heat marketing campaign nearly doubled the size of the campaign target audience by expanding to include natural gas households that meet the current income threshold (household income >$90,000). With this expansion, an expected dip in familiarity and interest metrics was observed. However, awareness levels did remain at 82% showing that the broad-based channels used were effective and that marketing efforts are successfully building awareness at a broader scale.

Community Campaigns

The Clean Heating and Cooling Community Campaigns have successfully increased awareness, built demand, and boosted market confidence in energy efficiency and heat pump technologies, including ccASHPs, GSHPs, and HPWHs. Community Campaigns engaged a variety of partner networks to serve single-family and multifamily residential, commercial, and other markets in a variety of income brackets,

including LMI residents. Through 2022, approximately 9,000 people have participated in clean heating and cooling campaigns and installed approximately 1,600 energy efficiency and heat pump installations.

Critical Tools

NYSERDA launched an interactive web version of the Heat Pump Planner for consumers, which shows several common configurations of heat pump installations based on home type and existing heating system to assist homeowners in better understanding their heat pump choices by enabling a virtual "test drive" and informing consumers of key considerations to discuss with their contractors.

National Grid has expressed interest in working with NYSERDA, in partnership with Clean Energy States Alliance ("CESA"), to make the residential clean heating and cooling value proposition calculator available to their customers.

NYSERDA, through its Clean Heat Connect Network, launched promotion of a ccASHP equipment selection tool providing graphical visualizations of specific equipment performance for specific applications over the course of a year, developed in partnership with NEEP. This tool helps aid contractors in understanding the seasonal performance trade-offs to be considered when selecting ccASHP equipment for their projects.

NYSERDA staff with NYSERDA contractors Steven Winter Associates and TRC co-authored a peer reviewed paper, "Air-Source Heat Pumps: Metrics and Tools for Cold Climate Programs"[22] published and presented at the 2022 the American Council for an Energy-Efficient Economy ("ACEEE") Summer Study on Energy Efficiency in Buildings conference, summarizing findings related to test methods and performance metrics to provide guidance to program administrators to optimize the selection of eligible ccASHP equipment for incentive programs. The insights included in this paper provided the basis for ensuring the standards published by the Consortium for Energy Efficiency, referenced in the Inflation Reduction Act's ("IRA's") individual tax credits for homeowners (25c provisions), were updated to reflect both meaningful and attainable performance metrics for ccASHPs to qualify for IRA tax credits starting in 2023.

NYSERDA continues to advance the standardized simulation savings approach outlined in the NY TRM Custom Measures section. Building from Custom Measure Category 5, NYSERDA developed Custom Measure 6, Heat Pump Plus Weatherization Retrofit Standard Simulation for Measure Packages (HP+Retrofit). The new custom measure can be used to determine savings for combined heat pump and envelope measure packages offered in residential retrofit programs. The standardized simulation method offers a streamlined alternative to deemed and partially deemed savings calculations or whole house energy simulations. The HP+Retrofit measure was developed to further support the integration of envelope improvements with the installation of ccASHP and enables rapid deployment of the forthcoming IRA Homes program.

[22] https://aceee2022.conferencespot.org/event-data/pdf/catalyst_activity_32344/catalyst_activity_paper_20220810190439169_85747746_6874_4fb6_962f_4a9d2f51ec4d

Technical Assistance

The Technical Assistance programs received 236 study applications in 2022 that focused on electrification or had an electrification component. Most of these studies are from multifamily facilities, commercial real estate, and PreK-12 schools. The studies completed in 2022 identified and evaluated 326 electrification measures: 212 ccASHP measures, 92 VRF measures, and 25 GSHP measures.

2023 Lookahead

Marketing

In 2023, the marketing campaign will focus on increasing familiarity and interest among the newly expanded natural gas target. Campaign messages are expanding to include additional information about comfort, health, and safety. Additionally, to test custom regional messages and their potential impact on driving interest, the marketing campaign will pilot co-branded (NYS Clean Heat brand with individual utility brands) social media posts featuring custom utility territory rebate amounts as well as peer-to-peer utility customer testimonials on the CleanHeat.ny.gov website and across marketing channels.

Community Campaigns

Clean Heating and Cooling Community Campaigns will continue across the state in select locations until 2025, supporting the evolution of community campaigns within the Regional Clean Energy Hubs Program. Campaigns under the Regional Clean Energy Hubs will have a special focus on connecting DACs with clean energy solutions and technologies, including energy efficiency, clean heating and cooling, solar photovoltaic (“PV”), electric vehicles, and demand response, and will serve all residential and most commercial markets.

Phase 2 Clean Heating and Cooling campaigns will be executed by the Clean Energy Hubs and funding moved to the LMI Joint Implementation Plan.

Critical Tools

Continuing improvements are planned for both the residential CESA clean heating and cooling value proposition calculator and Geopossibilities.ny.gov, a GSHP calculator focused on commercial properties in Westchester County, to provide a smoother user experience with more accurate results for initial investment, annual operating cost reductions and reduced greenhouse gas emissions.

Additions and improvements will be made to the Heat Pump Planner based on current usage and feedback, such as a web version of the heat pump water heater PDF resource.

NYSERDA will continue to work with our industry partners, in particular our contractor networks, Residential Market Advisory Group, and our Clean Heat Connect upstream partners network to identify and develop new tools and resources as needs arise.

Technical Assistance

NYSERDA is engaging in sector specific-electrification-centric efforts, such as the development of a healthcare protocol playbook and higher education playbook to create sector-specific roadmaps for decarbonization and resiliency. NYSERDA is also targeting approximately 100 new studies that include an electrification measure or electrification component.

3. DRIVE PERFORMANCE IMPROVEMENTS, REDUCE COST, AND DELIVER NEW ECONOMIC SOLUTIONS THROUGH TECHNOLOGY INNOVATION AND DEMONSTRATIONS

2022 Performance

Clean Thermal District Systems

The Community Heat Pump Systems Solicitation, PON 4614, for the development of clean thermal energy networks was released in early 2021. To date the program has awarded funding to perform feasibility, detailed design, and construction of thermal energy networks at 51 diverse project sites, covering nearly 90 million square feet of conditioned space throughout the State, with over 50% located in DACs and/or serving LMI customers.

Cost Reduction Strategies

NYSERDA continues efforts to streamline the customer experience to support envelope work as an opportunity to make homes "heat pump ready" by collecting market insights to identify key value propositions to various market actors that will accelerate implementation of envelope improvements and subsequent heat pump adoption.

Early efforts of Clean Heat Connect, Experience Clean Heat, and other Supply Chain activities are designed to support growth in contractor/installer capacity, and increase in the number of businesses supported by Clean Heat serving the Heat Pumps and Weatherization market.

HVAC Technology Challenges

NYSERDA's NextGen HVAC Innovation Challenge, PON 3519, completed Round 6 in 2022. This PON continues to issue targeted and specific challenges to address New York State's unique heating and cooling requirements. Efforts under the challenge have resulted in five commercialized products that are seeing utilization and increasing adoption in the State.

Twelve projects were initiated in 2022 to accelerate the development and commercialization of innovative products and solutions to enable broader adoption of heat pump, including solutions for mid-rise buildings, thermal energy storage, and building envelope solutions. The twelve projects comprise an investment of $5 million. Projects focus on cold climate performance, cost compression, refrigerant usage, peak load reduction, building envelope improvements, and heat pump solution needs unique to New York's stock of buildings. In addition to these activities, support was provided to the Clean Heat for All initiative being led by the New York Power Authority ("NYPA"), New York City Housing Authority

("NYCHA") and NYSERDA to develop-and commercialize a 120V cold climate window mounted heat pump. The expected products will offer a practical and economic solution for the deployment of heat pumps in multi-family buildings beyond NYCHA's portfolio of properties.

Empire Building Challenge

The Empire Building Challenge is a $50 million initiative to form public-private partnerships with leading real estate portfolio owners, engineers, and technology providers to demonstrate commercially viable low carbon retrofit approaches that can decarbonize New York's existing stock of high-rise buildings.

There is significant interest from the real estate industry in clean heat technology innovations and demonstration projects. In 2022, NYSERDA published the Empire Building Playbook, which includes the results and processes from deep technical analysis and strategic capital planning conducted by program partners. This Playbook illustrates pathways for significant energy and carbon reduction in existing buildings at commercially acceptable returns.

The Empire Building Challenge established a second cohort of program partners, bringing the total to 16 portfolio partners who collectively control over 220 million square feet of commercial and multifamily New York real estate, including more than 75,000 housing units. The first four demonstration projects have begun implementation and a solicitation for a second round of demonstration projects was released in 2022, with awards expected to be announced in Q2 2023.

Multifamily Building Demonstrations

In 2022, NYSERDA selected 6 projects, representing $1.9 million in incentives, to participate in the Low Carbon Pathways for Multifamily Buildings program for owners or managers of multifamily buildings to implement low carbon solutions. Two of the projects are located within DACs, as defined by the interim State criteria. Several of the projects had received funding through a NYSERDA FlexTech study to help plan for these low carbon improvements prior to securing implementation funding.

2023 Lookahead

Clean Thermal District Systems

Continued support will be available to advance projects to detailed design and construction. Best practices and lessons learned about system design, business models, and workforce development will be used to educate industry stakeholders, including municipal leaders and decision makers, through webinars, charrettes, marketing, and direct outreach.

Cost Reduction Strategies

NYSERDA will continue to work directly with the market and all levels of the heat pump and building shell supply chain to identify creative strategies to address cost reduction. Concepts under discussion include:

- Working with distributors to increase stocking of “off the shelf” ccASHP heat pump solutions that have to potential to reduce cycle times and address system replacement use case, and exploring how to offset the cost for restocking fees
- Working with Manufacturers to extend ccASHP special offers/financing promotional periods and offsetting associated contractor fees
- Additional tools and resources for contractors to de-risk heat pump jobs, for example – consultation for improved bid process, improved sizing and design tools to demystify complexity, peer groups to share best practices and growth strategies for offering heat pump service lines, increased partnership/match making for envelope contractors with heating/cooling installers. Ad hoc business planning and consultation services for contractors interested in expanding service lines
- Bulk procurement and aggregation concepts
- Increasing the capacity of GSHP service providers bottoms up market research with a dedicated focus on learning from drillers and other market actors on the periphery to see how to reframe the opportunity and value proposition to grow the industry.

HVAC Technology Challenges

In 2023, NextGen HVAC Innovation Challenges PON 3519 will become NextGen Buildings. The PON will continue to support thermal energy storage and building envelope challenges. It will also support a new focus on Intelligent and Grid Interactive Buildings. Projects will be sought that develop buildings as a viable and reliable grid resource that also enables the participation of building owners and occupants in a transactive energy market. Projects will look to recognize the benefits of occupants’ wellbeing in addition to energy efficiency and affordability.

Empire Building Challenge

The second round of demonstration projects will be announced in Q2 2023, and by the end of 2023, NYSERDA will update the Empire Building Playbook with additional case studies, analyses, and best practices from the program partners. In addition, the Empire Technology Prize, a companion program to Empire Building Challenge that intends to spur product development and innovation to better meet the needs of tall building owners, is expected to be launched in 2023.

Multifamily Building Demonstrations

Activities planned for 2023 include the launch of tenant/resident surveys to measure the non-energy benefits associated with the low carbon retrofits in the Low Carbon Pathways program both pre- and post-retrofit (e.g., improved thermal comfort, reduced noise, improved controls in in-unit spaces, etc.). NYSERDA will publish relevant insights through case studies and video testimonials from initial project experiences and any learnings from these tenant surveys with the market. Additional opportunities for program updates, such as those informed through “Voice of the Customer” sessions, will be assessed based on market response to the Low Carbon Pathways program and informed by progress under the related Empire Building Challenge.

4. *MAKE ELECTRIFICATION SOLUTIONS AVAILABLE FOR Low-to-Moderate-Income (LMI) CONSUMERS and Affordable Housing*

2022 Performance

The electrification of heating and domestic hot water for LMI households and in affordable housing requires additional considerations for consumer protections related to the potential for energy burden impacts and the shifting of heating costs from landlords to tenants; the upfront cost for installing a heat pump and necessary upgrades[23] to ensure optimal performance; and the development of performance thresholds and other technical supports for affordable housing agencies necessary to advance electrification throughout their portfolios. To inform strategies for increasing adoption of heat pump solutions in the LMI market segment, NYSERDA is undertaking a series of pilots, research and analysis, and collaborations with housing agencies.

Pilots and Demonstrations

In 2022, NYSERDA allocated $10 million to provide incentives for heat pump installations through the LMI Heat Pump Demonstration Pilot as part of comprehensive efficiency upgrades in LMI homes and affordable multifamily buildings offered through LMI programs. Through the EmPower and Assisted Home Performance with ENERGY STAR programs, 451 1-4 family homes received subsidized weatherization retrofits and heat pumps, as well as funding to address electric panel upgrades, where needed. Through the Multifamily Performance Program, there are currently 23 multifamily projects enrolled in the pilot, with 3 projects completing the installation in 2022. All projects participating in the pilot will undergo evaluation to determine the impact of the electrification on household and building owner energy bills, as well as to identify key insights associated with the homes and buildings, including the prevalence and cost of ancillary upgrades that were necessary.

In addition, $5M was allocated to support design & development of Community Thermal Energy Networks serving LMI housing. NYSERDA will continue to work with the Joint Utilities and other industry partners to identify pilot activities that can help to inform New York State's strategy for scaling the deployment of heat pumps in the LMI market segment.

Research and Analysis

In 2022, NYSERDA launched a market research and technical analysis to better understand the institutional barriers associated with electrification in the LMI market segment and identify opportunities for addressing these barriers, as well as to understand the potential impacts that electrification can have on energy bills. The specific analysis includes (1) utility bill modeling to assess the bill affordability impacts of electrification in sub-segments of multifamily housing based on size, existing heating system type, metering configuration, regulatory/subsidy status, vintage, region, and other variables, and (2) complementary qualitative research assessing the electrification-readiness of

[23] Including weatherization, addressing health and safety or structural deficiencies associated with deferred maintenance, and electric panel upgrades.

sub-segments based on similar variables. It also includes scenario planning to further refine best-fit technology solutions corresponding to specific sub-segments of the LMI building stock. It is expected that this research will result in targeted program support for sub-segments of the LMI market; policy and regulatory decision-makers including DPS, other state agencies, and the Joint Utilities; and specific affordable housing portfolios within the State's affordable housing and public housing stock.

In addition, NYSERDA is supporting the DPS and the Energy Affordability Policy working group to conduct a low-income bill analysis, which will include a segmentation of low-income households and associated energy bills by demographic, housing type, and heating fuel. The analysis will also incorporate modeling of the impacts of various clean energy interventions on the energy bills of low-income households. The results of this analysis are expected to inform the structure of the EAP bill discount program to increase the impact of bill discounts for low-income customers, which can serve as one way to mitigate potential energy burden increases associated with heat pump adoption. Findings from both sets of studies will be available by the end of 2023, and NYSERDA will publish the results when available.

Collaboration with Housing Agencies

In 2022, NYSERDA continued its partnerships with affordable housing agencies to advance electrification and bring the benefits of comfort and improved indoor air quality to low- and moderate-income residents. This included the Clean Energy Initiative, a pilot with NYS HCR to integrate technical assistance and funding to support electrification directly into HCR's affordable housing finance applications, beginning with affordable new construction and adaptive reuse projects. In 2022, NYSERDA committed $25 million to HCR to be awarded under HCR's 9% and 4% financing RFPs, and seven new construction projects were selected. NYSERDA also partnered with NYC HPD to create the Retrofit Electrification Pilot, which incorporated incentives for space heating and cooling and/or domestic hot water electrification for existing multifamily building rehabilitation projects into HPD's preservation programs. In 2022, HPD and NYSERDA selected 6 projects to receive incentives for space heating electrification scopes. Lastly, NYSERDA partnered with NYCHA – the largest public housing authority in the country and the largest landlord in New York City -- and NYPA to create the Clean Heat for All Challenge, a heating and cooling industry competition to create a packaged, cold climate heat pump that can be mounted in a window opening and provide comfortable, efficient heating and cooling to NYCHA residents on a room-by-room basis, with NYCHA committing $70 million in a proven solution. This is an adaptation of the strategy leveraged under NYSERDA's HVAC Technology Solutions' PON 3519 Initiative cited previously in Sections 2.1.4.1 and 4.3.3. In this case, in August of 2022, Governor Hochul, Mayor Adams, and executives from NYSERDA, NYCHA, and NYPA announced the selection of two manufacturers, Gradient and Midea, as winners of purchase orders for 10,000 and 20,000 window heat pumps, respectively.

2023 Lookahead

Engagement of DACs and LMI households around electrification and other clean energy topics is essential. DAC/LMI stakeholder engagement will help ensure strategies are informed by important

policy, regulatory, and financial considerations that need to be addressed to accelerate electrification of the affordable housing sector. In December 2022, the Regional Clean Energy Hubs were announced - one hub in each of the ten economic development regions across the state with the exception of the New York City region, where three hubs were established. Regional Clean Energy Hubs are teams of trusted, knowledgeable, community-based organizations in and from New York State with an aim to assist communities and residents with accessing clean energy programs and solutions and participating in the clean energy economy. The Regional Clean Energy Hubs will play an instrumental role of positioning disadvantaged communities to benefit from the clean energy transition by:

- Acting as a trusted local resource for community members to learn more about the energy-related programs and services available to them.
- Increasing awareness of these programs and services by leveraging the expertise and trust of local community organizations - particularly those with a proven track record of engaging disadvantaged communities.
- Developing outreach and engagement strategies to elevate the needs of communities and residents into program and policy development.
- Addressing gaps in and advancing diversity of the clean energy workforce by connecting residents with educational, training, and job opportunities and small businesses with resources to support economic development.

NYSERDA's Affordable Housing Agency partnerships with HCR and NYC HPD will continue to drive progress in electrification of LMI households. Most notably, in 2023 NYSERDA and HCR will be rolling out a multiyear collaboration that will leverage $100 million of NYSERDA NYS Clean Heat, CEF, and Regional Greenhouse Gas Initiative ("RGGI") funds along with $750 million of HCR funds included in their 5-year capital plan to support electrification in affordable housing. The partnership with HPD will expand to support new construction electrification.

See the LMI Statewide Implementation Plan[24] for further details including specific milestones for 2022-2025.

5. MAKE PRODUCTS AVAILABLE WHEN AND WHERE CONSUMERS NEED THEM BY BUILDING THE CLEAN HEAT SUPPLY CHAIN

2022 Performance

NYSERDA developed and promoted several additional resources oriented toward HVAC contractors to support air source heat pump capacity.

For example, NYSERDA launched Clean Heat Connect, a network which now includes 5 HVAC manufacturers and 10 distributors, covering a majority of the New York State HVAC market, to promote and facilitate adoption of educational and technical tools and resources through their contractor

[24] NE:NY Proceeding, Statewide Low- to Moderate Income Portfolio Implementation Plan Version 3 (Filed November 1, 2022, Updated November 22, 2022)

networks. Members include the top three heat pump manufacturers, Mitsubishi, Daikin, and Fujitsu and some of the largest distributors such as ABCO, CE, Ferguson, and Meier Supply. Fifteen market interventions have resulted in over 30 resources produced and provided to the market, including supporting and promoting heat pump sizing and design trainings in coordination with New York State Clean Heat, a coordinated online training calendar hosted on the Clean Heat Connect website, the NEEP sizing and design visualization tool, eight sales and technical training short videos with more in production, summary sales sheets for NYS Clean Heat incentives by utility, promotional materials for NYSERDA's Workforce Development and Cooperative Advertising and Training programs, IRA 25c tax rebates, and more. At least 300 HVAC contractors have been influenced by drawing from these resources across multiple categories including program guidance, marketing, business development support, technical training, and support, which has begun to shift attitudes toward the importance of quality heat pump installations.

2023 Lookahead

Two new supply chain initiatives planned for 2023 include: 1) providing an online "non-traditional installer" training resource that will be a "how-to" guide for contractors in adjacent trades (e.g., solar, plumbing, insulation, windows, etc.) who wish to add heat pump installation services, and 2) training for refrigerant line flare fittings (a method of joining metal refrigerant lines done on most heat pump installations) along with managing a separately-funded NYSERDA incentive pool to provide discounts for contractors purchasing higher quality tools needed for proper installation, as incorrect flare fittings are one of the most common causes of refrigerant leaks in heat pump installations.

6. MINIMIZE WINTER ELECTRICAL PEAK BY INVESTING IN DEMAND-REDUCING "HEAT-PUMP READY" SOLUTIONS – THROUGH THE COMFORT HOME PILOT

2022 Performance

Work has been underway to define the level of envelope performance needed, develop meaningful performance metrics and specifications for ccASHPs, and develop supplemental heat strategies that minimize peak demand impact in residential homes. Projects designed to address heat pump performance metrics and supplemental heat strategies are further discussed in the Critical Tools section of this report.

Meanwhile, the Comfort Home team has refined its analysis to develop a preliminary definition for a threshold of thermal envelope performance required to deem a home "heat pump ready." This definition has been integrated in NYSERDA's Empower and Assisted Home Performance programs as a minimum compliance standard to receive incentives toward heat pump installations and is included as the working definition of an electrification-ready home in the draft multi-agency plan to achieve 2 million climate friendly homes by 2030. Additional work is needed to further define the heat pump ready threshold of performance in NY's coldest climate zones. That work will go hand-in-hand with NYSERDA's efforts to establish a strategy allowing for right-sized supplemental heat in homes that are in

very cold climates and/or cannot be upgraded to the desired level of performance to be deemed heat pump ready.

In 2022, Comfort Home expanded its geographic reach and as a result enrolled 32 new participating contractors for a total of 72. Comfort Home more than doubled its prior-year production, completing 1,006 load reduction projects in 2022 for a total of 1,447 homes improved since Pilot inception. Cumulatively, load reduction projects completed through Comfort Home are projected to save 51,783 MMBtu in annual fossil fuel savings and 922 MWh in annual electricity savings. Potential grid impacts resulting from the homes improved include an estimated avoided electrification-driven peak demand of as much as 2500 kW in future winter peak demand reduction compared to electric resistance heat typically used as back-up for whole house heat pump installations. With approximately 2.5 million homes in need of insulation and air sealing improvements, these basic measures are projected to reduce future winter peak demand by as much as 2,200 MW via reduced heat pump capacity needs and 4,500 MW in avoided electric resistance back-up heat for the 1–4-unit residential market.

NYSERDA continued its “co-invest, co-save" collaboration with Con Edison in Westchester County, delivering incentives for weatherization improvements by combining Comfort Home with Con Edison’s existing weatherization program offering. The joint offering stacks weatherization incentives for the Better and Best measure packages to expand program reach and project work scope through a “co-invest, co-save” framework.

2023 Lookahead

NYSERDA will continue modeling analysis and launch a field study to further refine the definition of a heat pump ready envelope inclusive of all climate zones in the state and establish guidance for right-sized supplemental heat where needed.

The program will focus on maintaining a presence in the market for continuity and will evolve to utilize the Comfort Home program infrastructure to support deployment of federal IRA incentives to non-LMI households statewide.

The project goal for 2023, based on available budget, is 2,000 load reduction projects. Additional budget flexibility and/or utility partnerships can support accelerated and increased production levels. 2023 work will include further testing of demand impact calculation methods and quantification of comfort impacts for load reduction measure packages.

NYSERDA will continue to coordinate with National Grid as they plan to expand their residential gas weatherization program to their upstate service territory, seeking alignment with Comfort Home and IRA rebate offers to minimize market confusion and fully leverage all resources available to homeowners in those regions.

7. DEVELOP A LONG-TERM BUILDING ELECTRIFICATION ROADMAP TO GUIDE THE TRANSFORMATION OF HOW NEW YORKERS HEAT AND COOL THEIR BUILDINGS

2022 Performance

In 2022, an analysis conducted in support of the Building Electrification Roadmap was incorporated into the New York State Climate Action Council deliberations and the Scoping Plan's Integration Analysis. In addition, an interagency team has utilized and helped to refine a scenario analysis being conducted for this Roadmap in developing the plan for 2 million climate-friendly electrified or electrification-ready homes by 2030.

2023 Lookahead

NYSERDA will assess the timing and an effective format to issue the Building Electrification Roadmap in 2023, such as potentially in conjunction with the 2 million climate-friendly homes plan.

5 Appendix A. NYSERDA Output/Outcome Progress Summary

Several NYSERDA investment plans (initiatives) support the NYS Clean Heat Market Development plan. However, not all initiatives have output/outcome indicators with targets attributed solely to NYS Clean Heat. Indicators shown below are limited to those specifically identifying targets for NYS Clean Heat. **Table 18. NYSERDA Output/Outcome Progress Summary**

			Baseline	*Cumulative Progress*	*Cumulative Targets by Year*					
	Initiative	**Indicators**	**Before/Current**	**2022**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Outputs	Heat Pumps Phase 2 (2020)	Number of leads generated for contractors	1	431,394	30,000	140,000	250,000	430,000	680,000	1,000,000
		Customer acquisition costs offset, in dollars	0	$5,270,600	$185,000	$600,000	$1,000,000	$1,600,000	$2,250,000	$3,000,000
		Coop advertising campaign costs offset, in dollars	0	$8,983,000	$600,000	$3,150,000	$5,850,000	$8,250,000	$9,500,000	
		Number of Clean Thermal District System projects supported by NYSERDA	0	3				2		
		Businesses provided with tools, technical support, and business development assistance	0	300		50	75	125	150	200
		Number of energy-efficient electrified space and water heating technologies installed through NYS Clean Heat	0	43,039	3,900	18,200	32,500	55,900	88,400	130,000
	Multifamily Low-Carbon Pathways	Number of low carbon technology demonstrations in units	0 units	1622		96	1,141	3,314	6,696	11,274
	Building Operations and Maintenance Partnerships	Increase in number of workers trained (electrification target in parenthesis)	20	3,553 (0)		3,000 (0)	5,000 (100)	6,500 (250)	7,500 (400)	9,600 (1,000)
	Talent Pipeline	Number of students placed in internships by training providers	0	277 (25)		128 (0)	300 (75)	400 (150)	500 (225)	600 (300)
		Number of Interns and Fellows (electrification target in parenthesis)	0	1,206 (71)		1,050 (18)	1,200 (100)	1,350 (200)	1,600 (350)	2,000 (500)
		Number of New Hires (electrification target in parentheses)	0	1,044 (417)		650 (170)	900 (250)	1,100 (350)	1,400 (450)	1,700 (600)
Outcomes	Heat Pumps Phase 2 (2020)	Increase in awareness of CH&C technologies*	TBD	N/A			15%			50%
		Replication of Clean Thermal District System projects beyond NYSERDA supported projects	0	N/A					1	2
		Reduce the cost of heat pump installations in New York*	0	N/A			10%			25%
		Increase stocking of heat pumps above HARDI 2019 shipments*	0	37%		0%	20%	30%	40%	50%
		Increase penetration of high-performance cold climate heat pumps as a percent of all heat pumps shipped for space conditioning in New York*	61%	N/A		61%	70%	75%	85%	90%

Table notes

a. A 0 (zero) denotes that the actual value is currently believed to be zero for baseline/market metrics.

* Some investment plans supporting the NYS Clean Heat implementation plan include broader market progress metrics, for example overall heat pump market size and market penetration of cold climate heat pumps. These market progress metrics will be supported collectively by all of NYSERDA's market development activities that extend beyond any singular investment plan. NYSERDA will measure market progress broadly, rather than for each specific investment plan. Progress will be reported collectively within the Statewide Heat Pump Program.

6 Appendix B. PSEG Long Island 2020-2022 Heat Pump Summary

LIPA has adopted a target of approximately 1.15 TBtu of savings through heat pump deployment on Long Island between 2020 and 2025. This equates to a goal of installing 30,000 new residential or commercial heat pumps for space, water, and pool heating in LIPA's service territory. Technologies supported include both full- and partial-load ASHP, heat pump water heaters, heat pump pool heaters, and GSHP. All residential, multifamily, and commercial customers are eligible, with added rebates for income-qualified residential customers who install full-load ccASHP.

As of December 31, 2022, LIPA had achieved 58% of the TBtu goal, having deployed approximately 20,000 heat pumps with the support of PSEG Long Island-administered rebates. In 2020, LIPA customers installed nearly 6,000 heat pumps totaling over 218,000 net MMBtu of energy savings, with over $6.2 million in rebates and incentives provided to support heat pump deployment. In 2021, LIPA customers installed over 6,700 heat pumps totaling 272,000 net MMBtu of energy savings and over $7.6 million of rebates and incentives. In 2022, LIPA customers installed over 7,300 heat pumps totaling 182,000 net MMBtu of energy savings and over $12.3 million in rebates and incentives. Additional Attorney General Funding provided enhanced rebates to LMI heat pump customers for whole home heat pumps. In each year, there were about 100 participating contractors in the Home Comfort program who performed the majority of the space heating work, in addition to other pathways for participation for heat pump water heaters and pool heaters.

Full breakdown of program data is available below:

LIPA	2020	2021	2022	Totals
Heat Pumps Installed[25]	5,973	6,722	7,385	**20,080**
Total MMBTUs	218,172	272,257	182,297	**672,726**
Total Rebates & Incentives	$6,210,640	$7,628,514	$12,323,961	**$26,163,115**
# Participating Contractors	105	100	92	**N/A**
# Partial Air Source Heat Pumps	3,176	3,002	2,417	**8,807**
# Whole House Air Source Heat Pumps	587	1,088	1,643	**3,308**
# Geothermal Heat Pumps	293	146	204	**643**
# Heat Pump Water Heaters	229	207	349	**785**
# Heat Pump Pool Heaters	1,635	1,867	1,217	**4,719**
# Commercial Heat Pumps	53	412	1,554	**2,019**

[25] Heat pump pool heaters are not eligible under the New York State Clean Heat program.