

July 2021 – Version 4

NYS Clean Heat

Statewide Heat Pump Program Manual



Version History and Description of Revisions: NYS Clean Heat Program Manual

Date Filed	Version	Topic	Description of Change	Section/ Page
3/16/2020	1	N/A	N/A	N/A
4/30/2020	2	Revisions identified in 3/31/2020 New York Department of Public Service Letter Approving NYS Clean Heat Implementation Plan	Revision of terminology in accordance with industry use; additional detail on distributor incentives; clarification on eligibility requirements; inclusion of Glossary of Terms; consistency with NYS Clean Heat Implementation Plan.	Whole Document
5/29/2020	3	Revisions given additional Quality Assurance/ Quality Control (QA/QC) Materials	Program Manual updates to reflect development of additional materials related to QA/QC.	Section 5
7/1/2021	4	Transition Plans	Discussion of Transition Plans (from NYSERDA and/or Electric Utility-specific heat pump programs to NYS Clean Heat) has been removed since this transition is complete.	Whole document
7/1/2021	4	Criteria to determine eligibility	Additional clarity provided for scenarios in which project eligibility is not clearly defined; changes in eligibility to provide additional flexibility and options.	Sections 4, 5
7/1/2021	4	Field Assessments	QA/QC references changed to “Field Assessments”; edits made to align with the New York State Clean Heat Statewide Heat Pump Program Quality Policies and Procedures Manual; clarification of procedures for contractors to contest assessments scores.	Section 5
7/1/2021	4	System Sizing Requirements	Revisions including: allowing manufacturer equipment sizing software; additional direction regarding temperature information; information regarding alternative methods to comply with residential building codes; clarification of definitions; clarification and flexibility on sizing systems cooling capacities.	Section 3

7/1/2021	4	Energy Modeling	Additional clarity and information for energy modeling; reference to provision of Excel tool to calculate energy savings and estimated incentives for specific eligible heat pump technologies, including a user manual for the tool.	Section 4
7/1/2021	4	Financing	Additional information regarding Green Jobs- Green New Work Financing.	Section 2
7/1/2021	4	Incentives	Changes and clarifications to incentives, including: new category of heat pump plus envelope measures; changes to distributor incentives for certain utilities; total incentive cap for certain categories; new Customer Participation Acknowledgement form allowing additional payment option.	Sections 2-4
7/1/2021	4	Program Incentive Application Process	Clarifications and changes on program incentive application process.	Section 4
7/1/2021	4	Participating Contractor Eligibility	Clarifications/changes on certain requirements for Participating Contractors.	Section 4

Contents

Version History and Description of Revisions: NYS Clean Heat Program Manual	2
1. Introduction	7
What is the NYS Clean Heat Statewide Heat Pump Program?.....	7
2. Program Summary	7
2.1 Available Incentive Funding	9
2.2 Modifications to Incentives	20
2.3 Green Jobs – Green New York Financing.....	20
3. Eligibility and Requirements	21
3.1 Site Eligibility.....	21
3.2 Eligible Technologies.....	21
3.2.1 Code-Required System Sizing.....	22
3.2.2 Air-Source Heat Pump Systems	25
3.2.3 Ground Source Heat Pumps (GSHPs)	32
3.2.4 Heat Pump Water Heaters and Ground Source Water-to-Water Heat Pumps.....	38
3.2.5 Envelope measures (for Category 4A: Heat Pump + Envelope).....	40
3.2.6 Additional Project Eligibility Criteria	41
3.3 Warranty Requirements.....	41
3.4 Operation and Maintenance Requirements	42
3.5 Savings Methodology for Categories 1, 2, 3, 5, 7 and 8.....	43
3.6 Engineering Savings Analysis Requirements for Custom Categories 4, 4A & 6	43
3.6.1 Statewide Clean Heat Program Savings Calculator.....	43
3.6.2 Energy Modeling	44
3.6.2.1 Modeling Submittals	44
3.6.3 Establishing Baselines	45
3.6.3.1 Baseline Equipment Types	45
3.6.3.1.1 Existing Facilities	45
3.6.3.1.2 New Construction	45
3.6.3.2 Baseline Efficiencies (except Category 4A)	45
3.6.3.3 Baseline Efficiencies - Category 4A	46
3.6.3.3.1 Existing Facilities - Category 4A	46
3.6.3.3.2 New Construction – Category 4A.....	46
3.7 Additional Requirements for New Construction.....	46
3.7.1 New Construction Eligibility.....	46

3.7.2 Energy Code Compliance	47
3.7.3 New Construction Energy Savings Analysis	47
3.8 Special Circumstance Replacements	47
3.8.1 Early Replacement Projects.....	48
3.8.2 Required Project Documentation.....	48
3.8.3 Extended Life Projects	48
3.8.4 Required Project Documentation.....	49
3.8.5 Special Circumstance Savings Baselines	49
4. Participating in the Program.....	49
Step 1. Become a Participating Contractor	51
Participating Contractor Requirements	52
Step 2. Confirm Project Eligibility.....	55
Step 3. Submit Application Package.....	55
Step 4. Initial Technical Review	57
Step 5. Pre-Inspection.....	57
Step 6. Receive Project Pre-Approval.....	57
Step 7. Install Equipment	58
Step 8. Post-Inspection.....	58
Step 9. Final Technical Review.....	59
Step 10. Receive Incentive Payment.....	59
Step 11. Installation Assessment.....	59
5. Field Assessments and Compliance	60
5.1 Compliance with Manufacturers' Installation Requirements, Laws and Codes.....	60
5.2 Execution of Work Requirements	60
5.3 Field Assessments Overview	60
5.3.2 Summary of Field Assessment Process.....	60
5.4 Field Assessments	61
5.5 Photo Assessment (ASHP & GSHP Systems, Category 4 <i>Custom Space Heating Applications</i>)..	62
5.6 Procedure for Handling Nonconformance and Corrective Action	63
5.7 Procedure for Contesting a Score	64
5.8 Contractor Feedback and Training	64
6. Participation Status.....	65
6.1 Provisional Status	65
6.2 Full Status	65
6.3 Probationary Status.....	65
6.4 Suspended Status	66

6.5 Terminated Status.....	67
6.6 Inactive Status	67
6.7 Status Review Process.....	68
7. Recommended Program Guidelines	69
8. General Information	70
8.1 Waiver.....	70
8.2 Logo Use Disclaimer.....	70
9. Contact Information.....	71
10. Appendix: NYS Clean Heat Program - Glossary of Terms	72
11. Appendix 2: Calculating Sizing Ratios in the New York State Clean Heat Program Guide	76

1. Introduction

What is the NYS Clean Heat Statewide Heat Pump Program?

Heat pumps have been an efficient source of heating and cooling for many years, but advances in technology now allow them to effectively address heating needs in cold climates, helping customers lower their energy costs and reduce greenhouse gas emissions. To achieve the statewide heat pump goals and build the market infrastructure for a low-carbon future, the New York State (“NYS”) Clean Heat Statewide Heat Pump Program (“NYS Clean Heat Program” or “Program”) is being implemented in coordination with a portfolio of market development initiatives to build market capacity and deliver building electrification solutions. The NYS Clean Heat Program, a collaborative effort between the New York Electric Utilities¹ and the New York State Energy Research & Development Authority (“NYSERDA”) (collectively, “Joint Efficiency Providers”²), is designed to provide customers, contractors, and other heat pump solution providers a consistent experience and business environment throughout New York State.³

The NYS Clean Heat Program includes a range of initiatives to advance the adoption of efficient electric heat pump systems that are designed and used for space and water heating. Core to the Program is the suite of incentives that support customer adoption of eligible heat pump technologies, both cold climate air source and ground source systems, through promotion and pricing discounts offered by contractors and other heat pump solution providers. The market development effort includes support for training and qualification of contractors, processes to assure quality installations, and marketing and education to help customers understand and select among options and to operate systems optimally.

2. Program Summary

Heat pumps transfer heat from a source (or sink) such as outdoor air, the ground, or a mechanically heated or cooled fluid loop rather than producing it (e.g., via an electric resistance coil or by burning fossil fuels). In the heating season, heat is extracted from the heat source and supplied to the conditioned space. During the cooling season, heat is extracted from the conditioned space and rejected to the heat sink. Heat pump technology can provide customers with the following benefits:

- Less volatile annual energy bills, especially advantageous for customers with fixed,

¹ The New York Electric Utilities consist of 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, “Electric Utilities”).

² The New York Electric Utilities and NYSERDA are referred to as “Joint Efficiency Providers” for purposes of their partnership in the NYS Clean Heat Program.

³ Version 4 of the NYS Clean Heat Program Manual was provided on July 1st, 2021. This revised version reflects many of the changes, as identified by the Joint Efficiency Providers and external stakeholders, deemed necessary to enhance the Program.

low, or moderate incomes and service-oriented institutions like nonprofits, schools, community centers, and houses of worship

- Greater comfort and health due to added air conditioning and improved indoor air quality delivered by emissions-free technology
- A long-term solution to heating and cooling needs that is easier to maintain than alternatives

The NYS Clean Heat Program funding has been designated by the New York State Public Service Commission through the Joint Efficiency Providers. Incentives are offered for Air-Source Heat Pumps (“ASHPs”) and Ground-Source Heat Pumps (“GSHPs”) for both space heating and cooling as well as for Heat Pump Water Heaters (“HPWHs”) for water heating.

To apply for incentives under this Program, ASHP installers, ASHP designers, GSHP installers, GSHP designers, and GSHP drillers must first become “Participating Contractors” by submitting a Participating Contractor Application indicating in which service territories they plan to perform work and a Contractor Participation Agreement for each of those specified territories (available at <http://saveenergy.ny.gov/nyscleanheat>). Upon approval, the applicant will receive an approval notification from the Electric Utility and become eligible to apply for incentives in the Program.

GSHP drillers must be approved through this process to become a “participating driller,” but are not eligible to submit for and receive incentives. Each GSHP installation must be completed by a participating driller. Contractors installing only HPWHs do not have to be a Participating Contractor to submit an incentive application on behalf of a customer.

Project incentive amounts are paid directly to the Participating Contractor. The project incentive amount, less the optional Contractor Reward, is required to be passed along to the customer. Participating Contractors may request that the project incentive be paid to an alternate payee.

The Joint Efficiency Providers recommend that site owners contact a heat pump professional to assess and implement energy efficiency opportunities related to building envelope and HVAC distribution system prior to, or in coordination with, installing a heat pump system. Common thermal efficiency upgrades include attic and wall insulation, air sealing, and duct sealing. These types of improvements can significantly help meet the goal to provide cost-effective heating with the installation of a cold-climate heat pump. Site owners can elect to receive incentives for a “Heat Pump + Envelope” project, as laid out in Category 4A (see Section 3: Eligibility and Requirements for more details). Site owners can also access additional building envelope incentive programs and assistance through NYSERDA or their local utility.

The Joint Management Committee (“JMC”), responsible for reviewing and maintaining the NYS Clean Heat Statewide Heat Pump Program, follows a process for making ongoing changes to program areas including incentive structure, eligible technologies, program rules and other features in order to be responsive to technology and market developments and to maintain market confidence and stability. Participating Contractors will be notified electronically of any program modification or change, and reference documents are publicly available on the NYS Clean Heat Resources webpage (<https://saveenergy.ny.gov/NYScleanheat/resources/>).

Starting in May 2021, the Joint Management Committee began a recurring, monthly Participating Contractor Working Group series webinar that is open to all industry program

participants. Details on participation and prior discussions can also be found on the NYS Clean Heat Resources webpage (<https://saveenergy.ny.gov/NYScleanheat/resources/>) under the “Working Group Series” heading.

This NYS Clean Heat Resources webpage includes other important information and resources, under the following headings:

- Working Group Series
- Training and Workforce Development
- Green Jobs — Green NY (GJGNY) Financing
- Ground Source Heat Pump (GSHP)
- Air Source Heat Pump (ASHP)
- Heat Pump Water Heaters (HPWH)
- Program Development, Approvals and Process Documents
- Field Assessments
- Submit Your Incentive Applications
- For Manufacturers

2.1 Available Incentive Funding

Incentives are available on a first come, first served basis. Tables 1-3, below, provide summary information regarding the incentive programs and additional detail is provided in following sections. Definitions for key terms are included in the NYS Clean Heat Program Glossary of Terms in Section 10. Table 1 provides the overall structure of the incentives, including identifying category description, target segments, eligible technology, incentive structure and eligibility criteria. Table 2 details the Total Incentive amount available per technology and installation type. Each Participating Contractor may retain up to the Participating Contractor Reward amount shown in Table 3. The balance of the Total Incentive less the Participating Contractor Reward must be passed or otherwise credited to the customer in its entirety. Incentives listed in Table 2 and Table 3 were effective as of April 1, 2020.

Project incentive amounts are paid directly to the Participating Contractor. The project incentive amount, less the optional Contractor Reward, is required to be passed along to the customer. Participating Contractors may request that the project incentive be paid to an alternate payee.

Table 1: Incentive Structure and Eligibility Criteria

Category Number	Description	Eligible Technologies	Incentive Structure	Eligibility Criteria
1	Cold Climate ASHP (“ccASHP”): Partial Load Heating	Minisplit Heat Pump (“MSHP”), Central ccASHP	\$/outdoor condenser unit	<ul style="list-style-type: none"> • Each unit in system must be on the Northeast Energy Efficiency Partnership ccASHP Product List (“NEEP Product List”) • Total heat pump system heating capacity is <300,000 British Thermal Units per hour (“Btu/h”) • For central ASHPs installed with a back-up furnace in the same cabinet, the back-up furnace must have capacity <225,000 Btu/h • Total heat pump system heating capacity satisfies <90% of the building’s design heating load (“BHL”)
2	ccASHP: Full Load Heating	Minisplit Heat Pump (“MSHP”), Central ccASHP	<p>\$/10,000 Btu/h of maximum heating capacity at 5°F, as documented on the NEEP Product List</p> <p>Total incentive to be limited to 120% of BHL - e.g., Total incentive <= (Maximum Heating Capacity * 1.2 / HP Sizing Ratio). See Equipment Sizing Requirements in Appendix 2 for additional details.</p> <p>New Construction Multifamily projects that elect to install ASHP systems will be incentivized at the Category 4: Custom Space Heating Applications rate.</p>	<ul style="list-style-type: none"> • Each unit in system must be on the NEEP Product List • Total heat pump system heating capacity is <300,000 Btu/h, with the exception of systems installed in multifamily buildings. For multifamily buildings, all retrofit ASHP systems shall be eligible for Category 2 regardless of heating capacity, while multifamily new construction projects shall be eligible for Category 4, regardless of capacity. • For central ASHPs installed with a back-up furnace in the same cabinet, the back-up furnace must have capacity <225,000 Btu/h • Total heat pump system heating capacity satisfies at least 90% of the BHL. Systems sized for >120% BHL may incur further review and require justification.

Category Number	Description	Eligible Technologies	Incentive Structure	Eligibility Criteria
3	GSHP: Full Load Heating	GSHP	<p>\$/10,000 Btu/h of full load heating capacity as certified by AHRI</p> <p>Total incentive to be limited to 120% of BHL - e.g., Total incentive \leq (Full Load GLHP Rating OR Full Load GWHP Rating*1.2)/HP sizing ratio). See Equipment Sizing Requirements in Appendix 2 for additional details.</p> <p>New Construction Multifamily projects that elect to install GSHP systems will be incentivized at the Category 4: Custom Space Heating Applications rate.</p>	<ul style="list-style-type: none"> • Each heat pump in the system must meet or exceed the ENERGY STAR Geothermal heat pump specification, with the exception of console units, which must meet or exceed the specifications in Table 4; and GSHPs with <2 tons rated full load cooling capacity, which must meet or exceed the specifications in Table 5 • Total heat pump system heating capacity is <300,000 Btu/h, with the exception of systems installed in multifamily buildings. For multifamily buildings, all retrofit GSHP systems shall be eligible for Category 3 regardless of heating capacity, while multifamily new construction GSHP projects shall be eligible for Category 4, regardless of capacity. • System consists only of individual appliance cooling capacity for open-loop and closed-loop GSHP installs <135,000 Btu/h and/or individual appliance cooling capacity for direct exchange GSHP installs \leq180,000 Btu/h • Ground loops must comply with applicable New York Department of Environmental Conservation (“NY DEC”), New York City (“NYC”), and International Ground-Source Heat Pump Association (“IGSHPA”) standards • Total heat pump system heating capacity satisfies at least 90% of the BHL. Systems sized for >120% BHL may incur further review and require justification.

Category Number	Description	Eligible Technologies	Incentive Structure	Eligibility Criteria
4	Custom Space Heating Applications	General	\$/MMBtu of annual energy savings	<ul style="list-style-type: none"> • Total heat pump system heating capacity is $\geq 300,000$ Btu/h at design heating temperature, with the exception of systems installed in multifamily buildings. For multifamily buildings, all retrofit ccASHP systems shall be eligible for Category 2 regardless of total installed heating capacity, while multifamily new construction projects shall be eligible for Category 4, regardless of installed heating capacity. • Installed systems must satisfy the dominant HVAC load for the building, per applicable code. If the building has a higher BHL than BCL, the system must be sized to satisfy BHL. If the building has a higher BCL, the system must be sized to satisfy BCL. For new construction or the comprehensive upgrade of a heating plant, the heat pump system heating capacity must satisfy at least 90% of the BHL; for phased upgrade of a heating plant, eligibility will be determined on a case-by-case basis via project-level analysis. • Eligibility for all other systems 1) within this category and 2) other technologies will be determined on a case-by-case basis via project-level analysis. • Requires confirmation of projected MMBtu savings to determine incentive amount • Each project requires pre-approval, based on a review of projected MMBtu savings and an associated preliminary incentive amount (\$/MMBtu) <p>Projects shall be for full-load heating systems. If the proposed project is a partial-load heating system, it will require additional justification. Each partial-load heating system will be subject to a review on a case-by-case basis, via project-level analysis.</p> <p>For scenarios in which Custom project eligibility is not clearly defined, the following shall be used to determine eligibility for Category 4 <i>Custom Space Heating Applications</i> incentives:</p> <ul style="list-style-type: none"> - Fossil fuel (heating oil, natural gas, steam generated by fossil fuel, etc.) energy consumption must be reduced by the new electric technology or application - The new electric technology or application: <ol style="list-style-type: none"> 1. Must not increase the overall annual site energy consumption 2. Shall be market ready and can meet or exceed applicable minimum efficiency specifications

Category Number	Description	Eligible Technologies	Incentive Structure	Eligibility Criteria
4 (Cont'd)	Custom Space Heating Applications	Central ccASHP	\$/MMBtu of annual energy savings	<p>Eligible Central ccASHP systems must have either of the following characteristics:</p> <ul style="list-style-type: none"> • NEEP listed equipment with total heat pump system heating capacity at design condition of $\geq 300,000$ Btu/h • Individual heat pump appliances tested under AHRI 210/240 that meet or exceed the NEEP ccASHP specification requirements, but are not NEEP listed • For central ASHPs installed with a back-up furnace in the same cabinet, the back-up furnace must have capacity $< 225,000$ Btu/h
		MSHP		<p>Eligible Central ccASHP systems must have either of the following characteristics:</p> <ul style="list-style-type: none"> • NEEP listed equipment with total heat pump system heating capacity at design condition of $\geq 300,000$ Btu/h • Individual heat pump appliances tested under AHRI 210/240 that meet or exceed the NEEP ccASHP specification requirements, but are not NEEP listed
		Commercial Unitary Systems/Large Commercial ASHPs		<p>Eligible Commercial Unitary Systems must have the following characteristics:</p> <ul style="list-style-type: none"> • Include individual heat pump appliances that are powered by three-phase electricity or have rated cooling capacities $\geq 65,000$ Btu/h • Systems must consist of multi-speed or variable speed compressor. Constant speed systems are not eligible for incentives.
		Air Source Variable Refrigerant Flow Heat Pump ("VRF")		<p>Air source VRF systems up to 240,000 Btu/h cooling capacity must meet or exceed current ENERGY STAR Light Commercial HVAC Key Product Criteria. For systems with capacities greater than those covered by ENERGY STAR, program eligibility will be determined based on whether proposed heat pump efficiencies exceed local energy code.</p> <p>If the building has a higher BHL than BCL, the total system heating capacity must satisfy 90%-120% of the BHL, which is consistent with the requirement to satisfy BHL under relevant municipal or state code.</p> <p>If the building has a higher BCL than BHL, the system must be sized to satisfy 100%-115% of BCL, as required by relevant municipal or state code.</p>

Category Number	Description	Eligible Technologies	Incentive Structure	Eligibility Criteria
4 (Cont'd)	Custom Space Heating Applications	GSHP	\$/MMBtu of annual energy savings	<ul style="list-style-type: none"> • Each heat pump in the system must meet or exceed the ENERGY STAR Geothermal heat pump specification, with the exception of console units, which must meet or exceed the specifications in Table 4; and GSHPs with <2 tons rated full load cooling capacity, which must meet or exceed the specifications in Table 5 • Individual appliance cooling capacity for closed-loop GSHP installs $\geq 135,000$ Btu/h • Individual appliance cooling capacity for direct exchange GSHP installs $\geq 180,000$ Btu/h
		Packaged Terminal Heat Pumps ("PTHPs")		<p>Eligible PTHPs must meet the following criteria:</p> <ul style="list-style-type: none"> • Manufacturer reported COP at 5°F must exceed 1.75 (at full operating capacity) • Compressor must be variable capacity (three or more distinct operating speeds, or continuously variable) • Manufacturer reported Heat Pump output at 5°F must be a minimum of 50% of rated heating capacity at 47°F
4A	HP + Envelope	See Category 4, plus Window Replacements, Window Film, Wall Insulation, Continuous Insulation, Window Walls, Curtain Walls, Exterior Façade, Air Leakage Sealing, Air Barrier Continuity, Roof Insulation	\$/MMBtu of annual energy savings	<p>A Category 4 project that is coupled with a significant envelope upgrade. The envelope upgrade must produce a quantifiable impact on the heat pump sizing to be eligible for a packaged approach. When combined, the existing baseline will be used for calculating energy savings. The MMBtu savings from both the envelope measures and the HP measures will both be paid out at the 4A rate.</p> <p><u>Eligible measures:</u> Exterior: window replacements, window film Opaque shell: wall insulation, continuous insulation, window walls, curtain walls exterior façade Air leakage sealing, air barrier continuity Roof insulation</p>

Category Number	Description	Eligible Technologies	Incentive Structure	Eligibility Criteria
5	HPWH (up to 120 gallons of tank capacity)	Air-to-water HPWHs Dedicated DHW WWHP (>120 gallons) added to ground loop	\$/Unit	Air-to-Water HPWHs with storage capacities up to 120 gallons must meet or exceed Energy Star Residential Water Heater specification
6	Custom Hot Water Heating Applications	Air-to-Water HPWHs (>120 gallons) Dedicated DHW WWHP (>120 gallons) added to ground loop	\$/MMBtu of annual energy savings	<p>Air-to-Water HPWHs with storage capacities greater than 120 gallons must meet or exceed ENERGY STAR Commercial Water Heater requirements.</p> <p>Dedicated DHW WWHP with storage capacities greater than 120 gallons must meet or exceed ENERGY STAR Geothermal requirements.</p> <p>For scenarios in which Custom project eligibility is not clearly defined for domestic hot water heat pump applications, the following shall be used to determine eligibility for Category 6 <i>Custom Hot Water Heating Applications</i> incentives:</p> <ul style="list-style-type: none"> - Fossil fuel (heating oil, natural gas, steam generated by fossil fuel, etc.) energy consumption must be reduced by the new electric technology or application - The new electric technology or application: <ol style="list-style-type: none"> 1. Must not increase the overall annual site energy consumption 2. Shall be market ready and can meet or exceed applicable minimum efficiency specifications
7	GSHP Desuperheater	Optional component to GSHP systems	\$/Unit	Installed as integrated component in an eligible GSHP
8	Dedicated Domestic Hot Water ("DHW") Water-to-Water Heat Pump ("WWHP")	Dedicated DHW WWHP (<120 gallons) added to ground loop	\$/Unit	<p>Can be integrated into an eligible GSHP or installed as a separate WWHP meeting or exceeding Energy Star Geothermal specifications</p> <p>Must meet 100% of water heating load</p>
9	Simultaneous Installation of Space Heating & Water Heating	HPWH plus others	Additional (\$) bonus incentive	Category 2 ccASHP <u>or</u> Category 3 GSHP: Full Load Heating project that opts to include a HPWH meeting the criteria, in Category 5, <u>or</u> DHW WWHP in Category 8, respectively

Table 2: Total Incentives

Con Edison and Orange & Rockland will be offering the following additional incentive concepts in their service territories:

1. Effective July 1, 2021, an additional 30% kicker incentive for all HPs (except Categories 1 and 9) installed within designated gas-constrained areas (e.g., certain areas of Westchester⁴)
2. Effective August 1, 2021, an optional adder incentive for a Category 2 *ccASHP: Full Load Heating* installation installed in a residential 1-4 family building, with
 - a. Integrated controls package⁵
 - b. Decommissioning of existing heating system⁶

Notes:

- Effective date refers to project application submit date
- Concept 2b will require submittal of an additional attestation form and will only be available for retrofit projects
- Total heat pump incentive, inclusive of additional concepts, shall not exceed total project cost

This section intentionally left blank.

⁴ <https://www.coned.com/en/save-money/convert-to-natural-gas/westchester-natural-gas-moratorium/about-the-westchester-natural-gas-moratorium>

⁵ Eligible equipment: Mitsubishi Kumo Cloud, Flair Puck Pro. Additional equipment models shall be added on a recurring basis.

⁶ Verification that the existing fossil-fuel heating equipment has been deactivated (oil, propane, natural gas, etc.). Contractors must adhere to all applicable rules and regulations for proper handling of equipment.

Category	Description	Incentive	Central Hudson	Con Edison	National Grid	NYSEG/RGE	Orange & Rockland
1	<i>ccASHP: Partial Load Heating</i> ⁷	\$/outdoor condenser unit	\$500	\$500	\$500	\$500	\$500 ⁸
2	<i>ccASHP: Full Load Heating</i> ⁹	\$/10,000 Btu/h of maximum heating capacity at NEEP 5°F	\$1,300	\$2,000 a. Plus integrated controls (inclusive): \$3,500 b. Plus decommissioning (inclusive): \$5,000	\$1,000	\$1,000	\$1,600 ¹⁰ a. Plus integrated controls (inclusive): \$2,400 b. Plus decommissioning (inclusive): \$2,400
3	<i>GSHP: Full Load Heating</i>	\$/10,000 Btu/h of full load heating capacity as certified by AHRI	\$2,000	\$5,000	\$1,500	\$1,500	\$2,000 ¹¹
4	<i>Custom Space Heating Applications</i>	\$/MMBtu of annual energy savings	\$80	\$200	\$80	\$80	\$80
4A	<i>Heat Pump plus Envelope</i> ¹²	\$/MMBtu of annual energy savings	\$100	\$400	\$100	\$100	\$160
5	<i>HPWH (up to 120 gal)</i>	\$/unit	\$1,000	\$1,000	\$700	\$700	\$1,000
6	<i>Custom Hot Water Heating Applications</i>	\$/MMBtu of annual energy savings	\$80	\$200	\$80	\$80	\$80

⁷ See section 3.2.1.2 for definition, pg.11.

⁸ In addition to the amount shown here, O&R offers a \$300 incentive per condenser unit. See Section 5.B.4 of the Implementation Plan for details.

⁹ See section 3.2.1.2 for definition, pg. 11.

¹⁰ In addition to the amount shown here, O&R offers a \$1,500 incentive per condenser unit.

¹¹ In addition to the amount shown here, O&R offers a \$2,500 incentive per system. See Section 5.B.4 of the Implementation Plan for details.

¹² Based on total project savings from the heat pump system plus any envelope measures. See Section 3.2.5 for more details.

7	<i>GSHP Desuperheater</i>	\$/unit	\$150	\$150	\$100	\$100	\$150
8	<i>Dedicated DHW WWHP</i>	\$/unit	\$1,000	\$1,000	\$900	\$900	\$1,000
9	<i>Simultaneous Installation of Space Heating & Water Heating</i>	Additional bonus per combination installation	\$250	\$250	\$250	\$250	\$250

Table 3: Participating Contractor Reward

Incentives listed in this table are included in the total incentives listed in Table 2.

Category	Description	Incentive	Central Hudson	Con Edison	National Grid	NYSEG/RGE	Orange & Rockland
1	<i>ccASHP: Partial Load Heating</i>	\$/outdoor condenser unit	\$100/ outdoor unit	\$250/ outdoor unit	\$100/ outdoor unit	\$100/ outdoor unit	\$250/ outdoor unit
2	<i>ccASHP: Full Load Heating</i>	\$/10,000 Btu/h of maximum heating capacity at NEEP 5°F	\$500/ project	\$1,000/ project a. With integrated controls: \$2,000/pro ject b. With decommissioning: \$3,500/pro ject	\$500/ project	\$500/ project	\$500/ project a. With integrated controls: \$1,000/pr oject b. With decommissioning: \$1,000/pr oject
3	<i>GSHP: Full Load Heating</i>	\$/10,000 Btu/h of full load heating capacity as certified by AHRI	\$500/ project	\$500/ project	\$500/ project	\$500/ project	\$500/proj ect
4	<i>Custom Space Heating Applications</i>	\$/MMBTU of annual energy savings	\$500/ project	\$1,000/ project	\$500/ project	\$500/ project	\$500/ project
5	<i>HPWH (up to 120 gal)</i>	\$/unit	N/A	N/A	N/A	N/A	N/A
6	<i>Custom Hot Water Heating Applications</i>	\$/MMBTU of annual energy savings	N/A	N/A	N/A	N/A	N/A
7	<i>GSHP Desuperheater</i>	\$/unit	N/A	N/A	N/A	N/A	N/A
8	<i>DHW WWHP</i>	\$/unit	N/A	N/A	N/A	N/A	N/A
9	<i>Simultaneous Installation of Space Heating & Water Heating</i>	Additional bonus per combination installation	\$250/ project	\$250/ project	\$250/ project	\$250/ project	\$250/ project

2.2 Modifications to Incentives

The Electric Utilities reserve the right to change the incentive offering (including but not limited to total incentive amount, Participating Contractor Reward, timing, recipient, structure, and cap) at any time. The Electric Utilities reserve the right to further limit the number of incentives per Participating Contractor, site owner, site, or meter.

Modifications to incentives are specified where applicable. Program changes will be reflected in the Program Manual. They will be e-mailed to Participating Contractors and posted at <http://saveenergy.ny.gov/nyscleanheat>. The incentive amount for any project will be based on the incentive offering and program rules that are in effect at the time the project application is submitted. Participating Contractors are prohibited from cancelling submitted incentive applications and re-applying if the new incentive payment results in a higher amount. The Electric Utilities reserve the right to structure incentive payments differently to accommodate unique situations.

2.3 Green Jobs – Green New York Financing

The Green Jobs – Green New York (GJGNY) Loan Fund for Residential Financing (the GJGNY Loan Fund) was authorized by Title 9-A of Article 8 of the Public Authorities Law of the State of New York, as amended to finance energy audits and energy efficiency retrofits or improvements, including solar energy and other renewable installations, for the owners of residential 1-4 family buildings. This GJGNY Loan Fund is administered by NYSERDA.

NYSERDA offers the GJGNY On-Bill Recovery, Smart Energy, and Renewable Energy Tax Credit Bridge and Companion Loans to help New York State residents finance energy efficiency and renewable energy improvements made through NYSERDA's programs. Through NYSERDA's Companion Loan, a resident can access additional financing for projects that exceed the \$25,000 cap on the GJGNY On-Bill Recovery and Smart Energy loans. The Bridge Loan allows a resident to access short-term financing to borrow a portion of the renewable energy system cost that may be eligible for a federal or state tax income tax credit or a New York City Real Property Tax Abatement for eligible renewable energy system costs. Complete details of these residential financing options can be found on the NYSERDA Residential Financing Options [webpage](#).

The ability to provide access to GJGNY Loans and other participant financing options ("Program Financing") and incentives through the GJGNY Program is reserved exclusively for Participating Contractors, including the NYS Clean Heat Program Participating Contractors. At no time may a non-participating subcontractor of a Participating Contractor represent itself as having the ability to access GJGNY Program Financing or incentives.

The Participating Contractor shall ensure that the GJGNY Program Financing options and incentives are utilized only for the installation of those eligible measures and accessories identified in the work scope submitted to, and satisfactorily approved by, the GJGNY Program.

The roles and responsibilities of a Participating Contractor offering a GJGNY Loan can be found in the Green Jobs – Green New York Residential Implementation Manual, hereby incorporated in this Program Manual by reference and located on NYSERDA's Become a Loan-offering Contractor [homepage](#).

If a Participating Contractor wishes to offer financing other than GJGNY financing, they will need to comply with all applicable NYS and federal laws and regulations including NYS Banking Law.

3. Eligibility and Requirements

Projects and Participating Contractors must meet the requirements in this Program Manual for incentive eligibility.

3.1 Site Eligibility

Eligible sites include new and existing buildings owned or controlled by an active Electric Utility customer where an eligible heat pump system for space heating, hot water heating, and/or process heating is being installed.

3.2 Eligible Technologies

Eligible heat pump equipment is grouped into three major categories:

- (1) Air Source Heat Pumps for space heating applications, including:
 - a. Cold Climate Air-to-Air Mini-Split Heat Pumps
 - b. Cold Climate Air-to-Air Single Packaged Heat Pumps
 - c. Air-to-Air Large Commercial Unitary heat pumps (single packaged or split system)
 - d. Air Source Variable Refrigerant Flow heat pumps; and
 - e. Packaged Terminal Heat Pumps
- (2) Ground Source Heat Pumps for space and water heating applications; and
- (3) Heat Pump Water Heaters for domestic and service water heating applications, including:
 - a. Air-to-Water HPWHs
 - b. Ground Source Heat Pump Desuperheaters
 - c. Dedicated Water-to-Water Heat Pump added to Ground Loop

For scenarios in which project eligibility is not clearly defined, the following shall be used to determine eligibility:

- Fossil fuel (heating oil, natural gas, steam generated by fossil fuel, etc.) energy consumption must be reduced by the new electric technology or application
- The new electric technology or application:
 1. Must not increase the overall annual site energy consumption
 2. Shall be market-ready and can meet or exceed applicable minimum efficiency specifications

Program incentives are available for systems installed in existing buildings and new construction. Incentive structures are described in terms of their applicability to various building types, which are:

- Residential (one to four units);
- Multifamily (five or more units);
- Small commercial businesses (small commercial); and
- Large commercial and industrial buildings (“C&I”).

The Clean Heat Program provides incentives under nine categories reflecting applicable technology type, system size, customer type, and incentive structure. The incentive categories are as follows:

- Category 1 *ccASHP: Partial Load Heating*

- Category 2 *ccASHP: Full Load Heating*
- Category 3 *GSHP: Full Load Heating*
- Category 4 *Custom Space Heating Applications*
- Category 4A *Heat Pump + Envelope*
- Category 5 *HPWH (up to 120 gallons of tank capacity)*
- Category 6 *Custom Hot Water Heating Applications*
- Category 7 *GSHP Desuperheater*
- Category 8 *Dedicated Domestic Hot Water (“DHW”) Water-to-Water Heat Pump (“WWHP”)*
- Category 9 *Simultaneous Installation of Space Heating & Water Heating*

To be eligible for incentives, heat pump projects must comply with the requirements described in this document. For projects installed at new construction sites, all components installed as part of an approved ASHP, GSHP and HPWH system must be new. For projects installed at existing sites, the heat pumps must be new and any system subcomponent or subassembly such as controls or ductwork that is replaced should be replaced by a new subcomponent or subassembly. The use of used or refurbished equipment, including retrofitting of existing air handlers with heat pump coils, is not permitted under the program.

Heat pump projects are eligible for incentives no matter which heating fuel (e.g., fuel oil, natural gas, propane, biomass, or electricity) they are either transitioning from, in the case of retrofits, or declining to include, in the case of new construction.

3.2.1 Code-Required System Sizing

The use of ASHPs in cold climates is growing rapidly, but system sizing and selection practices have not always kept up with the wide range of applications that are now available. System performance, comfort, and energy efficiency can be significantly impacted by poor sizing and system selection. The ASHP and connected ductwork must be properly sized for the application to meet the building heat load requirements, ensure occupant comfort and satisfaction, and optimize system performance and energy savings. The Joint Efficiency Providers therefore require Participating Contractors to review and to use the NEEP Guide to Sizing and Selecting Air-Source Heat Pumps in Cold Climates¹³ to assist in sizing and selecting ccASHP equipment.

Participating Contractors are also encouraged to use additional design manuals as applicable to the system, including ACCA¹⁴ Manual D: Duct Design,¹⁵ ACCA Manual T: Air Distribution,¹⁶ and ACCA Manual B: Test, Adjust and Balance.¹⁷

To be eligible for incentives, all heat pump systems must be sized in compliance with applicable state and municipal code.¹⁸ Residential heating and cooling equipment and appliances shall be sized in

¹³ <http://neep.org/sites/default/files/Installing%20Air-Source%20Heat%20Pumps%20in%20Cold%20Climates.pdf>

¹⁴ Air Conditioning Contractors of America

¹⁵ ACCA Manual D: Duct Design: Method used to determine the overall duct lay-out including the individual duct sizes.

¹⁶ ACCA Manual T: Air Distribution: Method used to determine how to distribute airflow.

¹⁷ ACCA Manual B: Test, Adjust and Balance: Method designed to test and balance HVAC equipment in an order that speeds up and improves the balancing process.

¹⁸ Energy Conservation Construction Code of New York State (“ECCCNYS”) 2016, Section R403.7 and 2016 New York City Energy Conservation Code (“NYCECC”), Section R403.7. ECCCNYS 2016 and 2016 NYCECC require that

accordance with ACCA Manual S or other approved sizing methodologies based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.¹⁹ Applicable exceptions shall apply.²⁰

Equipment installed in commercial buildings must be sized in accordance with heating and cooling load calculations following ANSI²¹/ASHRAE²²/ACCA Standard 183-2007 (RA2017) or other code-approved equivalent computational procedure.²³ The output capacity of heating and cooling equipment shall not be greater than that of the smallest available equipment size that exceeds the calculated loads. A single piece of equipment providing both heating and cooling (such as a heat pump or heat pump system) shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.²⁴

All heat pump systems, except for those qualifying for Category 1 *ccASHP: Partial Load Heating* or Categories 4 or 6, with justification, shall be designed and sized for full load heating. Under the NYS Clean Heat Program, a full load heat pump system is defined as a system installed as a building's primary heating source, with a total system heating capacity that satisfies at least 90% of the BHL at design conditions, in accordance with applicable code. The following are examples of heat pump systems qualifying full load heating:

- *Full Load Heating Example 1:* Heat Pump system provides 110% of the heating load for an entire commercial building. Since system provides more than 90% of the heating load for the building,

systems serving multiple dwelling units, where commercial code is applicable, follow Sections C403 and C404 of the respective codes. In general, heat pumps installed in dwellings where residential code is applicable are required to be sized per ACCA Manual S. The intent is to match the equipment capacity closely to the load calculations of ACCA Manual J. In addition to program requirements regarding sizing heat pumps relative to the heating load, Manual S sets a maximum low-speed heat pump cooling capacity (which corresponds to minimum capacity on NEEP Cold Climate Heat Pump List information sheets) of 115% of the total Manual J cooling load for multi-speed or variable-speed heat pumps. As an alternate, if the sensible heat ratio (SHR) is $\geq 95\%$, the maximum low-speed cooling capacity may be 15,000 Btu/h greater than the total Manual J cooling load for multi-speed or variable-speed heat pumps. For a single-speed water-to-water heat pump utilizing a buffer tank, the limit of 115% applies only to indoor coils that provide cooling from the buffer tank. The NYS Clean Heat Program considers the above cooling capacity limits to be best-practice targets, not absolute program rules. Contractors must make a good faith effort to select equipment whose combined low-speed cooling capacity is within the above guidelines.

¹⁹ 2020 Residential Code of NYS, Chapter 14, Section M1401.3 Equipment and appliance sizing

²⁰ The Joint Efficiency Providers coordinated with NY Department of State ("DOS") and others to provide an efficient path for activity under the NYS Clean Heat Program providing for the ability to confirm the eligibility of additional heat pump installations. This coordination resulted in a DOS-issued Technical Bulletin ([TB-7005-ECCNYS](#)) clarifying the process of approving alternate methodologies for the calculation of heating and cooling loads and the sizing of residential heating and cooling equipment. One such alternative sizing methodology resource, Alternate Methodology to Demonstrate Energy Code Compliance: Heat Pump Sized to Meet Heating Design Load can be found under the Resources page of <https://saveenergy.ny.gov/NYScleanheat/>.

²¹ American National Standards Institute

²² American Society of Heating, Refrigerating, and Air-Conditioning Engineers

²³ ECCCNYS 2016, Section C403.1.1 Calculation of heating and cooling loads

²⁴ ECCCNYS 2016, Section C403.3.1. The intent of this section is to provide some flexibility in design for systems such as heat pumps that provide both heating and cooling. For a commercial building that has a higher building heating load ("BHL") than building cooling load ("BCL"), the heat pump system capacity shall be as small as possible so as to adequately satisfy the BHL, while minimizing oversizing for the cooling function to the extent possible with available equipment. For commercial buildings for which BCL is higher than BHL the heat pump system capacity shall be as small as possible so as to adequately satisfy the BCL, while minimizing oversizing for the heating function.

it qualifies as a full load heating system.

- *Full Load Heating Example 2:* Heat Pump system is an independent heating system that satisfies 100% of the heating load of served 3 floors of a 10-floor commercial building. The remaining 7 floors will be heated using the existing boilers. In this case, the program will consider the 3 floors in the scope of the project. Since the heat pumps satisfy more than 90% of the heating load for the areas it serves, they qualify as full load heating systems. The participating contractor has submitted justification for completing three of ten floors.

A partial load heating system is defined as a prioritized, first stage, heat pump system installed alongside a supplemental, second stage, heating system for the purpose of providing heating. The supplemental heating system may be either the existing system or a new system. A partial load system has a total system heating capacity that satisfies <90% of the BHL at design conditions.

If a proposed *Category 4 Custom Space Heating Applications* or *Category 6 Custom Hot Water Heating Applications* project is a partial-load heating system, the project application must include an explanation as to:

- Why additional electrification above and beyond the proposed design is not feasible at the time of installation
- How a verifiable and reliable control strategy will be employed to ensure that the heat pump is being prioritized for heating. Each partial-load heating system will be subject to a review on a case-by-case basis, via project-level analysis.

Equipment sizing may be determined through the use of applicable equipment documentation, including:

- NEEP Cold Climate Air Source Heat Pump List product information sheet, if equipment is NEEP-certified.²⁵ For NEEP-certified equipment, the heating capacity shall be based on the equipment's NEEP certificate maximum heating capacity values, while the cooling capacity shall be based on the equipment's NEEP certificate minimum cooling capacity values.
- AHRI certificate (equipment not certified by NEEP)
- Manufacturer engineering documentation
- Manufacturer-developed software that is capable of assigning equipment capacity at entered design heating and cooling temperature, in accordance with ACCA Manual S, Standard 183, or other code-approved equivalent computational procedure

For systems that have sizing ratios substantially greater than 120% BHL and 115% BCL, the Program reserves the right to request additional justification or documentation. Over-Sized Systems whose incentives are calculated based on equipment heating capacity, namely Categories 2 and 3, will have their incentives capped according to Table 1.

Refer to Appendix 1 for more information on how to calculate heating and cooling sizing ratios.

Calculation of the BHL shall be at the 99% dry bulb heating design temperature for the most relevant

²⁵ Information on performance of qualifying NEEP Cold Climate ASHPs is available at: [ASHP \(neep.org\)](https://www.neep.org).

ASHRAE (2017) location. Calculation of the BCL shall be at the 1% dry bulb cooling design temperature for the same ASHRAE location. Refer to the table below for ASHRAE (2017) dry bulb heating and cooling design temperatures for various locations across New York State.

City Name	2017 ASHRAE	
	99% Heating Dry Bulb (deg F)	1% Cooling Dry Bulb (deg F)
Albany	4.7	86.1
Binghamton	4.5	82.3
Buffalo	7.4	83.9
Central Long Island	17.0	86.3
Elmira	4.8	86.4
Fort Drum	-4.4	83.6
Glens Falls	-1.8	84.7
Islip	15.9	85.7
Jamestown	4.8	81.1
Massena	-7.8	84.4
Monticello	4.7	82.5
New York City - Central Park	17.5	88.0
New York City - JFK	18.0	86.6
New York City - LaGuardia	18.4	89.6
Niagara Falls	6.9	85.2
Poughkeepsie	8.4	88.4
Rochester	7.1	85.6
Saranac Lake	-11.5	81.0
Syracuse	4.9	86.4
Utica	1.2	84.2
Watertown	-5.0	83.1
Westhampton	12.2	84.0
White Plains	13.5	86.4

Load calculations performed at dry bulb temperatures different from those stated above will be accepted if the temperatures are within +/- 5 degrees F.

3.2.2 Air-Source Heat Pump Systems

Air-source heat pumps transfer heat between the inside of a building and the outside air. A heat pump's refrigeration system consists of a compressor and two coils made of copper tubing (one inside and one outside), which are surrounded by aluminum fins to aid heat transfer. In the heating mode, liquid refrigerant in the outside coils extracts heat from the air and evaporates into a gas. The inside coils release heat from the refrigerant as it condenses back into a liquid. A reversing valve, near the compressor, can change the direction of the refrigerant flow for cooling as well as for defrosting the outside coils in winter.

Under the NYS Clean Heat Program, to be eligible for a program incentive, ASHP systems must either be listed on the NEEP Product List²⁶ or meet the criteria established in this Program Manual and the NYS Clean Heat Implementation Plan for product classes that are not covered by the NEEP Product List.

There are several categories of ASHPs eligible for the Statewide Heat Pump Program, including:

- (1) Residential and Small Commercial Central ccASHPs identified on the NEEP Product List
- (2) Ductless or Partially Ducted MSHPs identified on the NEEP Product List, which include “single-head” (one indoor air handler per outdoor compressor) and “multi-head” or “multi-split” (more than one indoor air handler per outdoor compressor)
- (3) Commercial Unitary (i.e., Large Commercial) ASHPs (Split or Single Package)
- (4) VRFs
- (5) Packaged Terminal Heat Pumps

The customer may either decide to keep their existing heating system in service to provide back-up or emergency heat, or to decommission it. The Joint Efficiency Providers acknowledge that the decommissioning of existing systems may help the State advance its heating electrification and decarbonization goals, as long as the systems are decommissioned legally, safely, and in compliance with applicable jurisdictional programs, codes and requirements (e.g., federal, state, municipal, etc.).

The Joint Efficiency Providers will work to educate customers on the benefits of safe decommissioning and to train and refer Participating Contractors to applicable jurisdictional programs, codes and requirements (e.g., federal, state, municipal, etc.) that govern decommissioning and facilitate best practices.²⁷ Effective August 1, 2021, Con Edison and Orange & Rockland will be offering an optional adder incentive for a Category 2 – ccASHP: Full Load Heating installation installed in conjunction with decommissioning of the existing heating system. Please see Section 2 for more details. Other members of the Joint Utilities are performing ongoing research related to this effort.

3.2.2.1 Cold Climate Central ASHPs (Residential and Small Commercial)

Central Air Source Heat Pumps listed by NEEP as ccASHPs have cooling capacities less than 65,000 Btu/h and are not contained within the same cabinet as a furnace with rated capacity greater than 225,000 Btu/h.²⁸ These are defined as “Residential” units under the ENERGY STAR Key Product Criteria.²⁹ These

²⁶ The current specification and listed eligible units are available at <https://neep.org/ASHP-Specification>.

²⁷ See, for example, *Amended Notice of Adoption – Rule amending and updating the Uniform Code* applied to “Abandonment or removal of a heating oil storage tank.” March 25, 2020. NYS Register (April 8, 2020), pp. 14-22. I.D. No. DOS-14-20-00002-E. <https://dos.ny.gov/system/files/documents/2020/10/040820.pdf>.

²⁸ Code of Federal Regulations (“CFR”) 10 CFR part 430, Subpart A, § 430.2 Definitions: definition of central air conditioner or central air conditioning heat pump: https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=29d99fa0a367f0166b9cc8528ad29023&mc=true&n=pt10.3.430&r=PART&ty=HTML#se10.3.430_12.

²⁹ ENERGY STAR “Air-Source Heat Pumps and Central Air Conditioners Key Product Criteria.” Current link: https://www.energystar.gov/products/heating_cooling/heat_pumps_air_source/key_product_criteria.

units are typically sized to provide heating and cooling to the whole building through a central duct distribution system. They are a retrofit solution for existing homes and small businesses that are replacing central air conditioners, which were installed in conjunction with a separate heating system (typically a fossil fuel or electric furnace) that shares the same duct distribution system.

Eligibility, Sizing and Installation Requirements

Equipment Eligibility: Category 1 *ccASHP: Partial Load Heating*, Category 2 *ccASHP: Full Load Heating* and Category 4 *Custom Space Heating Applications*

To be eligible for a Category 1 Partial or Category 2 Full Load Heating incentive, the Central ASHP system's total heating capacity must be <300,000 Btu/h. All individual heat pumps in the installed system must be listed by NEEP as ccASHPs, tested under AHRI test standard 210/240, powered by single-phase electricity, have cooling capacities <65,000 Btu/h, and may not be installed in the same cabinet as a furnace with heating capacity $\geq 225,000$ Btu/h.

Systems that have heating capacities of at least 300,000 Btu/h, or that contain equipment that is three-phase or exceeds the above equipment capacities; or that contain equipment that meets or exceeds the NEEP cold climate air-source heat pumps specifications but is not NEEP listed, may qualify for incentives under Category 4 *Custom Space Heating Applications*.

Exception for Multifamily Buildings: As shown in Table 1, Residential and Small Commercial Central ccASHP systems installed in multifamily buildings as retrofits to existing heating systems shall be eligible for Category 2 incentives, regardless of the overall capacity of the systems being installed. Residential and Small Commercial Central ccASHP systems installed in multifamily new construction and gut rehab projects shall be eligible for Category 4, regardless of the overall capacity of the system being installed.

Equipment Sizing for Categories 1 and 2: In order to determine which incentive category the system is eligible for (Partial or Full Load Heating), the Participating Contractor shall size and select equipment for the system using the methodology provided in Section 3.2.1. Contractors shall apply the central ASHP maximum heating capacity at design temperature when a NEEP cold climate rating is available; otherwise AHRI shall be used. To be eligible for the Category 2 *ccASHP: Full Load Heating*, the system must be documented to satisfy at least 90% of the design BHL. If the system satisfies < 90% of design heating load, it will be eligible for the Category 1 *ccASHP: Partial Load Heating*.

The Participating Contractor is required to submit documentation of the load calculations with the application for incentives.

Equipment Installation: Systems and system components must be installed in accordance with manufacturer specifications and installation requirements, and in compliance with all applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review Act, the Statewide Uniform Fire Prevention and Building Code and State Energy Conservation Construction Code, the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements.

The Participating Contractor shall verify and document the system's operation with the equipment manufacturer's specifications via one or both of the following methods:

1. Direct measurement of the system airflow across a dry indoor heat exchanger coil in CFM/ton;
OR
2. Measurement of the total external static pressure drop (air handler unit entering pressure minus the air handler unit exiting pressure) in Pascals or inches of water column.

Based on manufacturers' installation manuals, outdoor units shall be installed above the local snow line. A map of the New York State average snow depth is available online at NYSERDA's website.³⁰

3.2.2.2 Cold Climate Mini-Split Heat Pumps (Residential and Small Commercial)

Cold climate MSHPs are ccASHPs that can circulate refrigerant between an outdoor unit containing a variable capacity compressor and one or more indoor air handlers ("indoor units"). Cold climate MSHPs are often referred to as "ductless mini-splits" because they are typically ductless, but can also be installed with short duct runs that enable single air handlers to serve more than one room at a time. For existing homes and businesses that have no central ductwork, cold climate MSHPs are a viable and energy efficient solution.

Eligibility, Sizing, and Installation Requirements

Equipment Eligibility: Category 1 *ccASHP: Partial Load Heating*, Category 2 *ccASHP: Full Load Heating* and Category 4 *Custom Space Heating Applications*

Cold climate MSHPs are eligible for Program incentives under Category 1 *ccASHP: Partial Load Heating* and Category 2 *ccASHP: Full Load Heating*. To be eligible for an incentive in these categories, cold climate MSHP systems must have a total heating capacity of <300,000 Btu/h and consist only of individual heat pump appliances that are listed on the NEEP ccASHP Product List and tested under AHRI test standard 210/240.

Systems that have a total heating capacity of at least 300,000 Btu/h, have equipment that are tested under AHRI test standard 210/240, and meet or exceed the NEEP cold climate air-source heat pumps specifications, but are not NEEP listed, may qualify for incentives under Category 4 *Custom Space Heating Applications*.

Exception for Multifamily Buildings: As shown in Table 1, Residential and Small Commercial MSHP systems installed in multifamily buildings as retrofits to existing heating systems shall be eligible for Category 2 incentives, regardless of the overall capacity of the systems being installed. Residential and Small Commercial MSHP systems installed in multifamily new construction and gut rehab projects shall be eligible for Category 4, regardless of the overall capacity of the system being installed.

Equipment Sizing: In order to determine which incentive category the system is eligible for (Partial or Full Load Heating), the Participating Contractor shall size and select equipment for the system using the methodology provided in Section 3.2.1. Contractors shall apply the MSHP maximum heating capacity at design temperature when NEEP rating is available; otherwise AHRI shall be used. To be eligible for the Category 2 *ccASHP: Full Load Heating*, the system must be documented to satisfy at least 90% of the design BHL. If the system satisfies < 90% of design heating load, it will be eligible for the Category 1 *ccASHP: Partial Load Heating*.

³⁰ Current link to NYSERDA's snow depth map: <https://www.nyserda.ny.gov/-/media/files/programs/ashp/snow-depth-map.pdf>

The Participating Contractor is required to submit documentation of the load calculations with the application for incentives.

Equipment Installation: Systems and system components must be installed in accordance with manufacturer specifications and installation requirements, and in compliance with all applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review Act, the Statewide Uniform Fire Prevention and Building Code and State Energy Conservation Construction Code, the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements.

Based upon best practices and manufacturers installation manuals, outdoor units should be installed above the local snow line. A map of New York State highest annual snow depths can be found on NYSERDA's website.³¹

3.2.2.3 Commercial Unitary Systems/Large Commercial ASHPs

Large commercial ASHPs are eligible for Program incentives under Category 4 *Custom Space Heating Applications*. These are systems that have either of the following characteristics:

- Include individual heat pump appliances that are powered by three-phase electricity or have rated cooling capacities $\geq 65,000$ Btu/h; or
- Total system heating capacities $\geq 300,000$ Btu/h

In addition, systems must consist of multi-speed or variable speed compressor. Constant speed systems are not eligible for incentives.

Large commercial ASHPs are a retrofit solution for businesses and multifamily buildings that currently have rooftop or central air conditioners, which were often installed in conjunction with a separate heating system.

Eligibility, Sizing, and Installation Requirements

Equipment Eligibility: Category 4 *Custom Space Heating Applications*

The eligibility criterion for commercial ASHPs is equivalent to the ENERGY STAR specification for Light Commercial HVAC, which covers heat pumps with cooling capacity ranging from 65,000 Btu/h up to 240,000 Btu/h.³² For systems with individual heat pump appliances sizes of 240,000 Btu/h and above, eligibility will be determined based on whether heat pump efficiencies meet or exceed local energy code efficiency requirements. These systems are tested under AHRI Test Standard 340/360.

Equipment Sizing: The Participating Contractor applying for incentives shall document that non-residential systems are sized according to the requirements of Section 3.2.1. If the building has a higher BHL than BCL, the total system heating capacity must satisfy at least 90% of the BHL, which is consistent with the requirement to satisfy BHL under relevant municipal or state code. If the building has a higher BCL than BHL, the system must be sized to satisfy full building cooling load (BCL), as required by relevant municipal or state code.

³¹ Current link to NYSERDA's snow depth map: <https://www.nyserda.ny.gov/-/media/files/programs/ashp/snow-depth-map.pdf>

³² ENERGY STAR Light Commercial HVAC, specification: https://www.energystar.gov/products/heating_cooling/light_commercial_heating_cooling/light_commercial_hvac_key_product_criteria.

Equipment Installation: Systems and system components must be installed in accordance with manufacturer specifications and installation requirements, and in compliance with all applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review Act, the Statewide Uniform Fire Prevention and Building Code and State Energy Conservation Construction Code, the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements.

Based upon best practices and manufacturers installation manuals, outdoor units should be installed above the local snow line. A map of the New York State average snow depth can be found on NYSERDA's website.³³

3.2.2.4 Air Source Variable Refrigerant Flow Heat Pump Systems

Air Source Variable Refrigerant Flow systems are an engineered direct exchange (DX) multi-split system that circulate refrigerant between a variable capacity compressor and multiple indoor air handlers, each capable of individual zone temperature control. They provide some major advantages, including the ability for heat recovery that allows them to heat and cool different zones simultaneously; optimized performance across a range of zonal comfort levels and part load conditions; and the avoidance of ductwork or the need for secondary circulation fluids such as chilled or heated water. Because they circulate refrigerant and allow for a separate outside air ventilation system, they require less ceiling space than conventional systems.

Eligibility, Sizing, and Installation Requirements

Equipment Eligibility: *Category 4 Custom Space Heating Applications*

All air source VRF systems fall under the *Category 4 Custom Space Heating Applications* and are tested under AHRI standard 1230. To be eligible for the program, VRF systems up to 240,000 Btu/h cooling capacity must meet or exceed current ENERGY STAR Light Commercial HVAC Key Product Criteria.³⁴ For systems with capacities greater than those covered by ENERGY STAR, program eligibility will be determined based on whether proposed heat pump efficiencies exceed local energy code. The program will adopt a NEEP cold-climate VRF specification when it is issued.

Equipment Sizing: The Participating Contractor applying for incentives shall document that non-residential systems are sized according to the requirements of Section 3.2.1. If the building has a higher BHL than BCL, the total system heating capacity must satisfy at least 90% of the BHL, which is consistent with the requirement to satisfy BHL under relevant municipal or state code. If the building has a higher BCL than BHL, the system must be sized to satisfy full building cooling load (BCL), as required by relevant municipal or state code.

Equipment Installation: Systems and system components must be installed in accordance with manufacturer specifications and installation requirements, and in compliance with all applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review Act, the Statewide Uniform Fire Prevention and Building Code and State

³³ Current link to NYSERDA's snow depth map: <https://www.nysesda.ny.gov/-/media/files/programs/ashp/snow-depth-map.pdf>

³⁴ Like central ASHP, VRF systems are also covered under the ENERGY STAR Light Commercial HVAC, specification: https://www.energystar.gov/products/heating_cooling/light_commercial_heating_cooling/light_commercial_hvac_key_product_criteria

Energy Conservation Construction Code , the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements.

In addition, the VRF systems must comply with ASHRAE Standard 15-2019 Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants, which addresses refrigerant capacities and possible leakage, especially if the system serves small rooms, which could cause oxygen depletion. In addition, the VRF systems must comply with ASHRAE Standard 34-2019 Addendum L, which establishes the maximum refrigerant concentration limit (“RCL”) of 26 lbs./1,000 ft³ of room volume for occupied spaces.

3.2.2.5 Packaged Terminal Heat Pumps

A packaged terminal heat pump is a wall sleeve and a separate un-encased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall, and that is industrial equipment. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of hot water, steam, or electricity. A PTHP utilizes reverse cycle refrigeration as its primary heat source and is equipped with supplementary heating via hot water, steam, or electric resistant heat.

Eligibility: *Category 4 Custom Space Heating Heat Pump Applications*

All packaged terminal heat pumps fall under the *Category 4 Custom Space Heating Applications* and are tested under AHRI standard 310/380. To be eligible for the program, PTHPs must meet or exceed the following criteria:

- Manufacturer reported COP at 5 degrees F must exceed 1.75 (at maximum capacity operation)
- Compressor must be variable capacity (three or more distinct operating speeds, or continuously variable)
- Manufacturer reported Heat Pump output at 5 degrees F must be a minimum of 50% of the rated heating capacity at 47 degrees F.

It is noted that NEEP is currently in the process of drafting specifications for cold climate packaged terminal heat pumps. The above eligibility requirements are subject to change to align with the NEEP cold climate PTHP specification upon its publication. The NEEP cold-climate PTHP product list will be adopted upon publication.

Equipment Sizing: The Participating Contractor applying for incentives shall document that non-residential systems are sized according to the requirements of Section 3.2.1. If the building has a higher BHL than BCL, the total system heating capacity must satisfy at least 90% of the BHL, which is consistent with the requirement to satisfy BHL under relevant municipal or state code. If the building has a higher BCL than BHL, the system must be sized to satisfy full building cooling load (BCL), as required by relevant municipal or state code.

Equipment Installation: Systems and system components must be installed in accordance with manufacturer specifications and installation requirements, and in compliance with all applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review Act, the Statewide Uniform Fire Prevention and Building Code and State Energy Conservation Construction Code , the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements.

3.2.3 Ground Source Heat Pumps (GSHPs)

GSHPs, also known as geothermal heat pumps, achieve high efficiency by exchanging thermal energy with the ground or with groundwater instead of outside air. GSHP systems work well in cold climates because of their ability to maintain capacity at low ambient air temperature. GSHPs are installed in all building sectors and are expected to provide heat to the whole home or whole building.

GSHP systems also take advantage of the heat generated by the indoor compressor, particularly in cooling mode, by providing a desuperheater loop that pre-heats domestic hot water. GSHPs distribute heating and cooling in the building through a ducted air system or a water loop. System performance depends on an effective ground heat exchanger design and proper installation. The ground heat exchanger design can be highly site-specific, given the variability of site conditions that affect ground conductivity or loop designs.

Eligibility, Sizing, and Installation Requirements

Equipment Eligibility: Category 3 *GSHP: Full Load Heating*, and Category 4 *Custom Space Heating Applications*

Full Load GSHP Incentive: To be eligible for the Category 3 Full Load GSHP Incentive, the GSHP system:

- Must meet or exceed Geothermal ENERGY STAR specifications, which covers equipment powered by single-phase electricity³⁵
- Must have a system heating capacity equivalent to at least 90% of BHL
- Must have a closed loop ground heat exchanger circulating a water/antifreeze solution, an open loop heat exchanger, or a direct expansion (DX) heat exchanger
- Must have a total system heating capacity <300,000 Btu/h and consists only of individual appliance cooling capacity for open and closed-loop GSHP installs <135,000 Btu/h and/or individual appliance cooling capacity for direct exchange GSHP installs ≤180,000 Btu/h

ENERGY STAR eligibility is based on the following test procedures to determine GSHP appliance Energy Efficiency Ratio (“EER”) and Coefficient of Performance (“COP”):

- Closed Loop Systems:
 - ISO 13256-1-1998 “Water-source heat pumps – Testing and rating for performance – Part 1: Water-to-air and brine-to-air heat pumps” for water to air models; OR
 - ISO 13256-2-1998 “Water-source heat pumps – Testing and rating for performance – Part 2: Water-to-water and brine-to-water heat pumps” for water-to-water models.
- Direct Exchange Systems: AHRI 870 (I-P/2016) and AHRI Standard 871 (SI) – 2016 “Performance

³⁵ ENERGY STAR references:

https://www.energystar.gov/products/heating_cooling/heat_pumps_geothermal/key_product_criteria
[https://www.energystar.gov/sites/default/files/specs//private/Geothermal Heat Pumps Program Requirements %20v3.1.pdf](https://www.energystar.gov/sites/default/files/specs//private/Geothermal%20Heat%20Pumps%20Program%20Requirements%20v3.1.pdf)
<https://www.energystar.gov/productfinder/product/certified-geothermal-heat-pumps/results>

Rating of Direct GeoExchange Heat Pumps”

Eligibility for any GSHP less than 135,000 Btu/h of cooling capacity may be obtained from an AHRI rating certificate. For units larger than 135,000 Btu/h cooling capacity, which are not rated by AHRI, manufacturer specification sheets may be used instead, provided the units have been tested in accordance with the applicable test procedure.

For multi-stage systems for which AHRI certificates are not available, the EER and COP must be calculated using the following equations:

- $EER = (\text{full load EER} + \text{part load EER})/2$
- $COP = (\text{full load COP} + \text{part load COP})/2$

Calculation of the EER and COP values must be determined using the following AHRI-rated data:

- Ground loop heat pump (GLHP) for closed-loop system
- Direct GeoExchange for DX systems

Custom Incentive: The following systems may be considered for a *Category 4 Custom Space Heating Applications Incentive*:

- Systems with individual heat pump appliances powered by three-phase electricity;
- Systems with a total system heating capacity $\geq 300,000$ Btu/h;
- Systems that have individual appliance cooling capacity for closed-loop GSHP installs $\geq 135,000$ Btu/h;
- Systems that have an individual appliance cooling capacity for direct exchange GSHP installs $\geq 180,000$ Btu/h;
- The units must meet or exceed ENERGY STAR Geothermal heat pump specifications, with the following exceptions:
 - Systems that have individual console type heat pump appliances whose performance does not meet or exceed ENERGY STAR specifications; and/or
 - Systems that have non-console heat pump appliances less than 2 tons whose performance does not meet or exceed ENERGY STAR specifications

Exception for Multifamily Buildings: As shown in Table 1, GSHP systems installed in multifamily buildings as retrofits to existing heating systems shall be eligible for Category 2 incentives, regardless of the overall capacity of the systems being installed. GSHP systems installed in multifamily new construction and gut rehab projects shall be eligible for Category 4, regardless of the overall capacity of the system being installed.

Program applications for any *Category 4 Custom Space Heating Applications Incentive* GSHP less than 10 tons of cooling capacity must include an AHRI rating certificate for each heat pump model to be installed. For units larger than 10 tons of cooling capacity, which are not rated by AHRI, manufacturer specification sheets must be submitted instead, provided the units have been tested in accordance with AHRI/ISO 13256-1, 13256-2, 550/590, or 870/871, as applicable.

GSHP console units—which are only eligible for the program if they are required due to sizing and/or space constraints—must have an AHRI-rated EER and an AHRI-rated COP of no less than the following:

Table 4. Efficiency Requirements Applicable to console units

System Type	EER	COP
Water to Air		
Closed-Loop Water-to-Air	14.0	3.0
Open-Loop Water-to-Air	14.0	3.0
Water-to-Water		
Closed-Loop Water-to-Water	N/A	N/A
Open-Loop Water-to-Water	N/A	N/A
Direct Exchange		
Direct Exchange	N/A	N/A

The EER and COP must be calculated using the following equations:

- $EER = (\text{full load EER} + \text{part load EER})/2$
- $COP = (\text{full load COP} + \text{part load COP})/2$

GSHP systems that are not console units and have capacities less than two tons must have AHRI-rated EER and AHRI-rated COP of no less than the following:

Table 5. Efficiency requirements applicable to non-console units with capacities less than 2 tons

System Type	EER	COP
Water to Air		
Closed-Loop Water-to-Air	15.0	3.2
Open-Loop Water-to-Air	20.0	4.1
Water-to-Water		
Closed-Loop Water-to-Water	16.6	3.1
Open-Loop Water-to-Water	20.1	3.5
Direct Exchange		
Direct Exchange	N/A	N/A

EER and COP calculations for such systems must be calculated using the full-load EER and full-load COP.

Equipment Sizing: To be eligible for an incentive, a GSHP must be a Full Load Heating System installed as the building's primary heating source and have a heating capacity equivalent to 90%-120% of design BHL, as calculated according to the system sizing methodology described in Section 3.2.1. The Participating Contractor is required to submit documentation of the heating and cooling load calculations with the application for incentives.

Equipment Installation: Systems and system components must be installed in accordance with

manufacturer specifications and installation requirements, and in compliance with all applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review Act, the Statewide Uniform Fire Prevention and Building Code and State Energy Conservation Construction Code, the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements. GSHPs may have additional requirements specific to the type of ground heat exchanger the GSHP system is coupled to.

General Well/Borehole/Loop Field Requirements

- All projects must comply with New York State Department of Environmental Conservation (“DEC”) regulations for geothermal well drilling, which may be found at <https://www.dec.ny.gov/lands/61176.html>.
- Projects in New York City must comply with NYC Department of Environmental Protection (“DEP”) rules concerning drilling and excavation, including insurance requirements.
- For non-DX systems, only polyethylene piping is appropriate for underground loop field piping.
- For large scale systems, Participating Contractors must show rated walls and ceilings and specify firestopping of pipe penetrations.
- Any vertically bored, closed-loop GSHP system must have a borehole depth that is sufficient to provide a minimum entering water temperature to the heat pump of 30°F in heating mode and a maximum entering water temperature to the heat pump of 90°F in cooling mode.
- All well/bore fields must provide adequate well/bore spacing and thermal dispersion to accommodate the thermal load and thermal balance.
- For large GSHP systems, provide emergency eye washes on site during installation, as required by OSHA.
- Piping must be stored on site in a manner that prevents damage and the introduction of foreign matter. Piping shall be kept free from damage, debris, and foreign matter during installation.
- Grout and admixtures must be received and stored in a way that protects them from moisture and contamination.
- Manifolds installed underground or in a buried enclosure must have proper valves, pressure, and temperature ports.
- All equipment and system parts should be labeled per IGSHPA and ASHRAE guidelines.
- Performance tests must be verifiable. Temperatures, pressures, flow rates, control valve operation, controls, balancing reports, sequence or operations, power measurements, software, start-up and commissioning efforts and reports are all subject to review and observation.
- Projects must meet all setback requirements enforced by the local authority having jurisdiction.
- It is also recommended that GSHP systems meet the ANSI/CSA C448 Series-16 standard.

Closed-Loop Systems: Unless specifically superseded by the requirements detailed in this manual, the design and installation of closed loop GSHP systems (including ground-loop and interior systems) must comply with the standards and practices outlined in the most recent edition of the Closed-Loop/Geothermal Heat Pump Systems: Design and Installation Standards edited by the IGSHPA Standards Committee and published by the International Ground Source Heat Pump Association. These standards are available online at <https://igshpa.org/manuals> on the IGSHPA website.

Table 6 presents program requirements for the maximum allowable rated pumping power at design conditions (based on duty point), as well as good-practice guidance based on an ASHRAE GSHP Design

Guide³⁶ for large systems and field measurements for small systems.

Table 6: Maximum Allowable and Good Practice Pumping Power for Closed-Loop GSHP Systems in watts (W) per AHRI rated³⁷ full-load heating or cooling capacity of the installed system

GSHP System Size	Maximum Allowable Pumping Power in watts (W) per 10,000 Btu/h of full-load heating capacity OR in watts (W) per ton of full-load cooling capacity	Good Practice Pumping Power in watts (W) per 10,000 Btu/h of full-load heating capacity OR in watts (W) per ton of full-load cooling capacity
Individual GSHP units in residential and small commercial applications where each GSHP unit has its own dedicated loop pump	100	Less than 75
Large GSHP systems with multiple heat pump units served by centralized ground loop pumping	85	Less than 60

Closed Loop Antifreeze Protection Requirements: Propylene glycol (CAS No. 57-55-6), methanol (CAS No. 67-56-1) and ethanol (CAS No. 64-17-5) are the three presumptively acceptable antifreeze additives for use in the loop field. Use of any other antifreezes requires prior approval from the Joint Efficiency Providers. The acceptable denaturants for ethanol additives are denatonium benzoate (CAS No. 3734-33-6), ethyl acetate (CAS No. 141-78-6), isopropanol (CAS No. 67- 63-0), pine oil (CAS No. 8002-09-3), and tertiary butyl alcohol (CAS No. 75-65-0).

Large systems with ethanol and methanol must comply with Section 1207 of the 2020 Mechanical Code of New York State and, therefore, “the flash point of transfer fluid in a hydronic piping system shall be not less than 50°F above the maximum system operating temperature.”

The maximum allowable concentration of methanol is 12.5% by weight. The maximum allowable loop field temperature in small systems using methanol as an antifreeze is 75°F. In addition, the designer and installer should ensure the loop field operating temperature is at least 50°F lower than the flash point of methanol at all times.

The maximum allowable concentration of ethanol is 10% by weight. The maximum allowable loop field temperature in a small system using ethanol as an antifreeze is 70°F. In addition, the designer and installer should ensure that the loop field operating temperature is at least 50°F lower than the flash point of ethanol at all times.

For loop fields with glycol or organic antifreeze, the Participating Contractor must sterilize with a chlorine shocking protocol that is similar to what is required in potable water plumbing systems. If the manufacturer recommends specific disinfection, the Participating Contractor should follow the

³⁶ Kavanaugh and Rafferty (2014). Geothermal Heating and Cooling: Design of Ground-Source Heat Pump Systems. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

³⁷ Reference the AHRI Ground-loop Heat Pump Application (GLHP) rating for Full-Load Heating Capacity and for Full-load Cooling Capacity.

manufacturer’s protocols.

Horizontal-Loop Systems: Horizontal loops must be installed below the frost line and have a surface area that is sufficient to provide a minimum entering water temperature of 30°F to the heat pump in heating mode and a maximum entering water temperature of 90°F to the heat pump in cooling mode. Incentive applications must include the file from the horizontal-loop design software showing inputs and system design specifications.

Open-Loop Systems: A standing column well must include a bleed circuit, drywell, or locally approved receptor to maximize thermal efficiency based on available water production.

Incentive applications must quantitatively explain the method for determining pressure and flow rate. All projects must comply with NYS DEC regulations for geothermal well drilling, which can be found at <https://www.dec.ny.gov/lands/61176.html> on the DEC website.

All projects must comply with ANSI/CSA/IGSHPA C448.6, *Installation of open-loop systems ground water heat pump systems*. All standing column well projects must comply with ANSI/CSA C448.7, *Installation of standing column well heat pump system*.

Table 7 presents program requirements for the maximum allowable rated pumping power at design conditions (based on duty point), as well as good-practice guidance.

Table 7: Maximum Allowable and Good Practice Pumping Power for Open-Loop GSHP Systems in watts (W) per AHRI rated³⁸ full-load heating or cooling capacity of the installed system

GSHP System Size	Maximum Allowable Pumping Power in watts (W) per 10,000 Btu/h of full-load heating capacity OR in watts (W) per ton of full-load cooling capacity	Good Practice Pumping Power in watts (W) per 10,000 Btu/h of full-load heating capacity OR in watts (W) per ton of full-load cooling capacity
Individual GSHP units in residential and small commercial applications where each GSHP unit has its own dedicated loop pump	140	Less than 105
Large GSHP systems with multiple heat pump units served by centralized ground loop pumping	120	Less than 90

DX System: Direct exchange heat pumps, which circulate a refrigerant typically through a closed-loop copper pipe system (whereas most systems utilize plastic pipes that circulate water or a water-antifreeze mixture), must meet the following additional conditions:

³⁸ Reference the AHRI Ground-water Heat Pump Application (GWHP) rating for Full-Load Heating Capacity and for Full-load Cooling Capacity

- DX systems must have a minimum loop field length of 100 feet per 12,000 Btu/h of heating capacity.
- DX wells require cathodic protection ensuring a minimum expected well life of 25 years.
- DX system owners must certify that they will undergo an end-of-life decommissioning that includes full-refrigerant recovery.
- The refrigerant must be R-410A unless otherwise approved by the Joint Efficiency Providers.
- The entire well depth interval for DX wells is grouted with thermally enhanced grout with hydraulic conductivity below 1×10^{-7} centimeters/second.
- A permanent placard must be attached to the heat pump unit, detailing the following:
 - loop field refrigerant content, type, and volume
 - loop location description
 - loop piping material
 - required maintenance schedule on loop field, refrigerant, and heat pump
 - planned decommissioning date and process, consistent with loop field useful life
- DX systems must also comply with ANSI/CSA/IGSHPA C448.8, "Installation of direct expansion heat pump systems."
- DX GSHP systems must use only ACR B280 Copper Piping for Underground Loop Field.
- DX GSHP systems must conform to requirements of ASHRAE Standard 15-2019.

Large GSHP System-Specific Requirements

- For large systems, a loop field design includes:
 - Loop/site plan
 - Loop sizing report (flexible)
 - Loop field pressure drop calculations
 - Antifreeze type and concentration
 - System documentation must include a piping schematic accurately representing below grade and above grade piping strategy
- Large systems with ethanol and methanol must comply with Section 1207 of the 2015 Mechanical Code of New York State and, therefore, "the flash point of transfer fluid in a hydronic piping system shall not be less than 50°F above the maximum system operating temperature."
- Large systems must implement the following:
 - Show rated walls and ceilings and specify firestopping of pipe penetrations
 - Detail cross connection control devices in the design
 - Conform to the requirements and standards of ASHRAE 15

Thermal Conductivity Tests: For any new construction or retrofit for which a new vertically bored, closed-loop ground loop greater than 300,000 Btu/h system heating capacity is being installed, a test borehole must be drilled prior to system design to more accurately determine the soil's thermal conductivity and enable accurate system modeling and design optimization. Testing should conform to the requirements detailed in the latest edition of the ASHRAE Applications Handbook and must report undisturbed ground temperature.

Test boreholes are recommended, but not required, for projects with system capacities between 135,000 Btu/h and 300,000 Btu/h.

3.2.4 Heat Pump Water Heaters and Ground Source Water-to-Water Heat Pumps

In addition to space heating, the NYS Clean Heat Program also promotes the use of heat pump technology for heating domestic hot water, as a replacement or in new construction in lieu of common electric resistance or fossil fuel water heaters. As with space conditioning heat pump technologies, for retrofit applications, the program will require that applicants report the existing water heating fuel that is being replaced; for new construction, the replaced unit will be determined on a case-by-case basis, based on contemporary construction practice in the area.

As with space conditioning, heat pump water heaters can be air source or ground source technology.

3.2.4.1 Air-to-Water Heat Pump Water Heater

Air-to-Water HPWHs are water heater tanks that heat domestic hot water using an onboard air source heat pump that extracts heat from the air in the building surrounding the unit. They use a secondary electric resistance as a back-up to ensure that the water temperature meets the desired setpoint during times of high demand. Air source HPWH models come in two versions (integrated and split-system HPWH) and both versions are eligible for incentives under the program.

System eligibility: Category 5 HPWH (up to 120 gallons of tank capacity) and Category 6 Custom Hot Water Heating Applications.

To be eligible for a program incentive, an air-to-water HPWH must meet or exceed ENERGY STAR water heater specifications.

A residential duty HPWH defined as having a tank up to and including 120 gallons, a current rating ≤ 24 amps and voltage ≤ 250 volts³⁹, shall receive incentives based on \$/unit, under Category 5 HPWH (up to 120 gallons of tank capacity).

Air Source HPWH with storage larger than 120 gallons⁴⁰ shall receive incentives based on \$/MMBtu of annual energy savings, under Category 6 Custom Hot Water Heating Applications.

Equipment Sizing: Systems shall be sized according to equipment manufacturer recommendations.

Equipment Installation: Systems and system components must be installed in accordance with manufacturer specifications and installation requirements, and in compliance with all applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review Act, the Statewide Uniform Fire Prevention and Building Code and State Energy Conservation Construction Code, the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements. They shall be installed in spaces that provide sufficient make up air to support efficient heat pump operation, per manufacturer specifications.

3.2.4.2 Ground Source Desuperheaters and Dedicated DHW Water to Water Heat Pumps

Ground source systems can reduce DHW energy consumption by two optional methods: 1) Using a GSHP unit with a desuperheater or 2) adding a water-to-water heat pump (WWHP) to the ground loop that is dedicated to meeting the DHW load.

³⁹ 10 CFR 430.2 – Definitions.

⁴⁰ https://www.energystar.gov/products/water_heaters/commercial_water_heaters/key_product_criteria

Desuperheaters are available on most GSHP models. A desuperheater recovers heat from the GSHP's compressor during both cooling and part-load heating mode and transfers it to the DHW tank. Thus, they satisfy a portion of the building's annual DHW load. They therefore require some form of complimentary water heating.

Full-load DHW WWHPs can either be installed as a priority zone on a GSHP HVAC system, or as a stand-alone system. They are designed to provide all of the building's DHW needs.

System eligibility: Category 6 *Custom Hot Water Heating Applications*, Category 7 *GSHP Desuperheater*, and Category 8 *Dedicated DHW WWHP*

Any desuperheater that is installed on a GSHP system shall be eligible for an incentive under Category 7 *GSHP Desuperheater*.

A full-load DHW WWHP must meet or exceed ENERGY STAR Geothermal Heat Pump specification requirements⁴¹ **OR** the efficiency requirements listed in Section 3.2.3 for Non-Energy Star Compliant Geothermal Heat Pumps to be eligible for incentives. Ground Source DHW WWHPs (up to 120-gallon tanks), are eligible for \$/unit incentives under Category 8 *Dedicated DHW WWHP*.

Dedicated Ground Source DHW WWHPs (>120 gallons) shall receive incentives based on \$/MMBtu of energy savings under Category 6 *Custom Hot Water Heating Applications*.

Equipment Sizing: Systems shall be sized according to equipment manufacturer recommendations.

Equipment Installation: Systems and system components must be installed in accordance with manufacturer specifications and installation requirements, and in compliance with all applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review Act, the Statewide Uniform Fire Prevention and Building Code and State Energy Conservation Construction Code, the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements.

Ground Source HPWH loop requirements shall be the same as those for GSHP, as described above in Section 3.2.2.

3.2.5 Envelope measures (for Category 4A: Heat Pump + Envelope)

The building envelope, which includes the walls, windows, roof, and foundation, forms the primary thermal barrier between the interior and exterior environments. The building envelope plays a key role in determining optimal comfort levels, ventilation, natural lighting, and energy needed for heating and cooling. These shell improvements help regulate indoor climate (temperature control, air quality, etc.) and protect against the outdoor environment (drafts, condensation, etc.).

Without a properly insulated building envelope, the heating and cooling systems will not work as effectively, making this an essential element in creating a higher-performing building. Eligible building

⁴¹ ENERGY STAR Program Requirements for Geothermal Heat Pumps. Current link: [https://www.energystar.gov/sites/default/files/specs//private/Geothermal Heat Pumps Program Requirements](https://www.energystar.gov/sites/default/files/specs//private/Geothermal_Heat_Pumps_Program_Requirements)

envelope upgrades or retrofits should be quantifiable and directly impact heat pump sizing, i.e. locating and sealing air leaks, increasing walls/roofs insulation, windows replacement, weatherstripping windows and doors.

The impact from the building envelope upgrades should be captured in the loads' calculations for pre- and post-conditions calculated per Manual J or ACCA 183.

This Category applies to a Category 4 *Custom Space Heating Applications* project that is coupled with a significant envelope upgrade. The envelope upgrade must produce a quantifiable impact on the heat pump sizing to be eligible for a packaged approach. When combined, the existing baseline will be used for calculating energy savings. The MMBtu savings from both the envelope measures and the HP measures will both be paid out at the 4A rate.

Eligible measures may include:

- Exterior: window replacements, window film
- Opaque shell: wall insulation, continuous insulation, window walls, curtain walls, exterior façade
- Air leakage sealing, air barrier continuity
- Roof insulation

3.2.6 Additional Project Eligibility Criteria

For scenarios in which project eligibility is not clearly defined, the following shall be used to determine eligibility:

- Fossil fuel (heating oil, natural gas, steam generated by fossil fuel, etc.) energy consumption must be reduced by the new electric technology or application
- The new electric technology or application:
 1. Must not increase the overall annual site energy consumption
 2. Shall be market ready and can meet or exceed applicable minimum efficiency specifications

3.3 Warranty Requirements

All ASHPs, including VRF

Category 1 ccASHP: Partial Load Heating, Category 2 ccASHP: Full Load Heating, Category 4 Custom Space Heating Applications

Each qualified residential and small commercial ASHP receiving an incentive under this program must include a minimum five (5) year manufacturer's warranty for parts including compressor.

Full Load Heating GSHP Systems

Category 3 GSHP: Full Load Heating

For small GSHP systems, including desuperheaters and WWHPs, Participating Contractors must transfer to the system owner the manufacturer's and/or distributor's/dealer's warranty. At a minimum, such warranty must cover all parts and equipment against breakdown or malfunction and the warranty period must be no less than five (5) years. In addition, the warranty will cover the full costs, including labor and repair or replacement of components or systems.

The Participating Contractor must also provide additional warranty coverage that fully covers the labor and design services provided by the Participating Contractor (and any of its subcontractors). The warranty period must be no less than three (3) years. Participating Contractors must present to the site owner any optional extended warranty up to the maximum supported by the manufacturer.

Custom GSHP Systems

Category 4 Custom Space Heating Applications

For large GSHP systems, the minimum manufacturer's warranty must be at least one-year parts and labor, as required by law. Participating Contractors must present to the customer any optional extended warranty up to the maximum supported by the manufacturer.

HPWH Systems

Category 5 HPWH (up to 120 gallons of tank capacity), Category 6 Custom Hot Water Heating Applications

Each HPWH system receiving an incentive under this program must include a minimum ten (10) year manufacturer's warranty for parts and tank.

3.4 Operation and Maintenance Requirements

Electrified heating systems are often a new type of appliance for the site owner so it is important that owners understand how to effectively operate and maintain their new systems. Participating Contractors must inform site owners on system operation and maintenance, including on the use of these systems in both heating and cooling modes. A detailed manufacturer operation handbook as well as a maintenance manual containing information on the major components and a schedule of required system maintenance must be provided by the Participating Contractor.

The manual must include maintenance and testing requirements of antifreeze solutions used on the project. It must include any start-up/commissioning documentation for the system(s). For large systems, the O&M manual must include as-built drawings.

For ccASHP and cold climate MSHP installations under incentive Categories 1 and 2, the Joint Efficiency Providers require that Participating Contractors provide site owners with the "Get the Most Out of Your Air Source Heat Pump" tip sheet which can be found at <https://saveenergy.ny.gov/NYScleanheat/resources/>.

The Joint Efficiency Providers strongly recommend that GSHP systems include a performance monitoring system. Recommended best practices for performance monitoring of GSHP systems can be found at <https://saveenergy.ny.gov/NYScleanheat/resources/> under the Ground Source Heat Pump (GSHP) drop-down menu.

Participating Contractors should strongly encourage system owners to purchase a maintenance agreement.

3.5 Savings Methodology for Categories 1, 2, 3, 5, 7 and 8

The Electric Utilities shall rely on *The New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs - Residential, Multi-Family, and Commercial/Industrial*, known as the Technical Resource Manual (“TRM”) and best practices to estimate energy savings for heat pump installations.⁴² For multiple-unit configurations not covered by the TRM, or for larger or custom systems, the Participating Contractor will perform custom analyses to determine savings, consistent with the approaches outlined for custom measures in the TRM. Refer to Section 3.6 for more details concerning the requirements for the custom category engineering savings analysis.

3.6 Engineering Savings Analysis Requirements for Custom Categories 4, 4A & 6

Each application shall include a detailed engineering analysis showing energy savings in net MMBtu related to the project measures. Savings may be calculated through one of the following methods:

1. Statewide Clean Heat Program Savings Calculator
2. Engineering Modeling
3. Temperature Bin Analysis

All calculations must be clear and transparent utilizing standard engineering methodologies, including a listing of source values. Energy savings analyses may be accepted in the following formats:

- Unlocked Microsoft Excel spreadsheet (PDFs not accepted) showing all equations, parameters, formulas, and assumptions used to calculate savings.
- Whole building energy modeling using approved simulation software. Approved list of modelling software is based on current computational capabilities and familiarity of the respective utility and is therefore utility specific. Contact the respective Electric Utility for a complete list of their pre-approved software.

3.6.1 Statewide Clean Heat Program Savings Calculator

The Statewide Clean Heat Program Savings Calculator (Clean Heat Calculator) is an Excel based tool that has been developed to assist Participating Contractors applying to the New York State Clean Heat Program with calculating energy savings and incentives for the following heat pump technologies:

- NEEP listed Cold climate single package air source heat pumps
- NEEP listed Cold climate air source mini-splits

⁴² The New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs - Residential, Multi-Family, and Commercial/Industrial, known as the Technical Resource Manual (TRM), <https://www3.dps.ny.gov/W/PSCWeb.nsf/All/72C23DECF52920A85257F1100671BDD>

- Large Unitary Air-to-Air Heat Pumps
- Air Source Variable Refrigerant Flow (VRF) Heat Pumps
- Large Closed Ground Loop Heat (Ground Source) Pumps with centralized ground loop pumping

The Clean Heat Calculator should be used as the default method to calculate energy savings for the above-mentioned technologies if one or more of the following statements are true:

- The project involves installing NEEP listed cold climate air source or mini-split units at new construction and existing multi-family buildings.
- Project proposes to install a mix of the above heat pump technologies. For example, project scope includes installation of both NEEP listed mini-splits and Air Source VRFs.

Under certain circumstances, applicants may bypass using this calculator, opting instead to calculate savings using their own custom bin analysis or energy modeling approach.

3.6.2 Energy Modeling

Whole building energy models shall be prepared using an approved modelling software and shall be simulated following one of the compliance paths prescribed in ASHRAE Standard 90.1. The model shall be developed using a “Stacked” parametric approach, where energy savings are modeled by starting with the proposed design model, and gradually transforming it into the minimally code compliant baseline design by subtracting the Energy Efficiency Measures (EEMs) one-by-one in the following order:

- HVAC measure(s)
- Base load measure(s) such as lighting, process loads, plug loads, etc.
- Envelope measure(s)
- Non-interactive measures such as service water heating

If there are several EEMs of the same type, for example several HVAC EEMs, the order in which they are modeled relative to each other is not prescribed to allow flexibility in supporting the specific project circumstances and may be determined by the Modeling Entity performing the modeling based on communications with the customer. For example, if a design includes a high efficiency make-up air unit, and energy recovery is considered as a design alternative, the energy recovery EEM should be modeled (subtracted from the proposed design) first, to show the added energy savings for this option, with the unit efficiency EEM modeled (subtracted) second.

With the stacked approach, the difference between the sum of EEM savings and the total savings of the proposed design relative to the baseline is attributed entirely to the impact of components that differ between the baseline and proposed models but are not included in any EEM.

If project involves new construction, review additional new construction criteria in Section 3.7 below.

3.6.2.1 Modeling Submittals

The simulation reports with the following information for the baseline, proposed design, and each energy measure model must be included in the report appendix:

- Monthly Energy End-use Summary (such as PS-E: Energy End-Use Summary for All Meters)
- Overall annual building energy consumption including all fuels and meters (such as BEPS: Building Energy Performance Summary and BEPU: Building Utility Performance)
- Energy cost summary (such as ES-D: Energy Cost Summary)
- Information on hours when space/system loads are not met (such as BEPS/BEPU)
- System design parameters report (SV-A: System Design Parameters for HVAC)

3.6.3 Establishing Baselines

Establishing the equipment or system baseline is a necessary step in calculating energy savings for any project. This section defines the types of baselines used by the Program and the general requirements for each baseline type. Baselines will depend on the type and vintage of the facility.

3.6.3.1 Baseline Equipment Types

Equipment baselines are defined as the type of equipment that would have been installed without the influence of the program. In other words, the savings baseline should represent customer choice in absence of the Program, not optimal behavior, or policy goals.

3.6.3.1.1 Existing Facilities

For existing facilities, the baseline equipment type defaults to the existing equipment type installed. However, the customer may instead choose to select a baseline in accordance with contemporary construction practice for the area and based on an evaluation of the technology's cost effectiveness. If a baseline that differs from the existing system is selected, the applicant shall provide a separate analysis supporting its selection, showing that the baseline chosen aligns with contemporary construction standards and is cost effective from both an installation and life cycle standpoint.

3.6.3.1.2 New Construction

For all eligible new construction projects in the program, the default heating fuel type has been set to natural gas. This default heating baseline may be overridden if natural gas service is not available, or access is not economical in their area.

3.6.3.2 Baseline Efficiencies (except Category 4A ⁴³)

Baseline system efficiencies for all categories except category 4A shall be based on minimally code compliant equipment in accordance with the latest Energy Conservation Construction Code of New York State (ECCCNYS). There are three exceptions to this requirement:

1. Project qualifies as a Special Circumstance Replacement in accordance with the TRM⁴⁴ requirements – i.e. Early Replacement or Extended Life. For Special Circumstance Replacements (Section 3.8), the existing equipment efficiency shall be used for the baseline condition in accordance with the TRM two step analysis method.

⁴³ Refer to the statewide LMI Implementation Plan for more information on baseline efficiencies for Low- to Moderate Income projects:

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?Mattercaseno=18-M-0084>

⁴⁴ The New York State TRM can be found on the Department of Public Service website here:

<https://www3.dps.ny.gov/W/PSCWeb.nsf/All/72C23DECF52920A85257F1100671BDD?OpenDocument>

2. Projects involving new construction whose design demonstrates compliance with Section 406 of the latest ECCCNY or the New York City Energy Conservation Code (NYCECC) by providing more efficient HVAC performance shall set the baseline system efficiencies to exceed the minimum code efficiency requirements by 10%.
3. Projects that plan to submit a whole building energy simulation for the purposes of reporting energy savings shall set the baseline system to comply with one of the following compliance approaches prescribed in ASHRAE 90.1-2016 (as amended by the ECCCNY):
 - a. Appendix G - Performance Rating Method **OR**
 - b. Section 11 – Energy Cost Budget Method.

3.6.3.3 Baseline Efficiencies - Category 4A

Baseline system efficiencies for:

3.6.3.3.1 Existing Facilities - Category 4A

The energy savings from the packaged envelope upgrades and heat pump installations are based on the existing baseline. The thermal performance of the building envelope and the efficiency of the HVAC system should reflect the current conditions found at the project. The participating contractor should provide a separate set of analyses for the envelope upgrades and heat pumps. Documentation clearly describing the existing building envelope as well as age and performance data for the existing HVAC system, such as cutsheets stipulating existing efficiency, boiler combustion tests, etc. shall be submitted for projects at existing facilities pursuing Category 4A incentives.

The heat pump analysis should calculate incremental energy savings related to the heat pump equipment based on the upgraded building envelope conditions.

3.6.3.3.2 New Construction – Category 4A

For all eligible new construction projects in the program, the baseline is code compliant equipment in accordance with the latest Energy Conservation Construction Code of New York State (ECCCNY).

The default building envelope baseline shall be set to the ECCCNY code minimum compliant performance. Upon final incentive payment, the participating contractor should provide a Department of Buildings (“DOB”) or Authority Having Jurisdiction (“AHJ”) -approved set to confirm the building envelope baseline.

The default heating fuel type has been set to natural gas at the minimum ECCCNY code efficiency. This default heating baseline may be overridden if the applicant provides documentation indicating that new natural gas service is not available or access is not economical in their area.

3.7 Additional Requirements for New Construction

3.7.1 New Construction Eligibility

New Construction projects installing heat pump technologies complying with New York State Clean Heat Program requirements are eligible to receive incentives. Incentives will be applicable to the portions of the scope of work relating to heat pump installations. Additional requirements for new construction projects are outlined this section.

Eligibility for new construction projects using trade-offs will be determined on a case-by-case basis.

Please note: new construction Multifamily projects that elect to install Central ccASHP, MSHP, or GSHP will be incentivized at the Category 4: Custom Space Heating rate.

3.7.2 Energy Code Compliance

New construction projects must demonstrate compliance with the 2020 applicable Energy Code in one of the following ways:

- **Prescriptive:** Each discrete component complies with specific requirements
- **Component Performance Alternative:** Prescriptive approach that allows trade-offs between some components (some can be below code if others are above)
- **Total Building Performance:** Using an energy model, show the entire building compliance with code; With this method, performance trade-offs are allowed, meaning that some components in the proposed design may be less efficient than the minimally code compliant like component in the baseline. In these instances, a trade-off must be made to “make up” for a component that does not comply with code. For example, a building owner might choose to install a larger, more energy efficient heat pump system to “make up” for putting in more window area than allowed by the code.

If trade-offs are taken, provide a side-by-side comparison table between proposed and baseline identifying the areas where trade-offs are made (i.e. building or system elements that do not comply with the prescriptive requirements of the code, elements exceeding requirements, and building elements or systems modeled to provide additional energy savings to offset the non-complying elements).

3.7.3 New Construction Energy Savings Analysis

New construction projects that follow a prescriptive approach, preparing either a COMcheck or Tabular analysis to demonstrate energy code compliance, may opt to submit an energy analysis using excel calculations or a whole building energy model. Modeling methodology is discussed in section 3.6.2.

When a “Total Building Performance” compliance path is followed because trade-offs are taken, the applicant shall submit a whole building energy model for review. Excel calculations will not be accepted.

3.8 Special Circumstance Replacements

Projects may qualify for special circumstance replacement if they meet the criteria specified below. Special circumstance replacement does not change or impact the incentive category for a project, so the incentive rate offered remains the same as shown on. Qualifying for special circumstance replacement may affect the project baseline, which affects the energy savings calculated for your project. Consequently, qualifying for this type of replacement may have an indirect benefit to projects whose

incentive rates are calculated on a \$/MMBtu saved basis in accordance with Category 4, Category 4A and Category 6.

Only projects in existing buildings can be eligible for Special Circumstance. New Construction projects do not qualify for special circumstance replacement.

3.8.1 Early Replacement Projects

For existing cooling and/or heating equipment to be eligible for early replacement under the Program:

1. Proposed work must involve a retrofit or substantial improvement to an existing facility.
2. The savings baseline for calculating energy savings must be based on the existing heating and/or cooling equipment type installed at the facility. Savings baselines that do not default to the existing equipment type, but instead are selected based on the most cost-effective technology installed in the absence of the program are not eligible for early replacement.
3. At the time of application to the Program, the existing equipment cannot exceed its Effective Useful Life (EUL) and should have at least one year of its EUL remaining (Refer to Appendix P in the latest version of the TRM for EUL for various heating/cooling equipment).
4. The existing equipment must be fully functioning.

A facility's existing cooling and heating systems shall be evaluated separately against the criteria noted above to determine whether each individually qualifies for early replacement. It is noted that one or both systems may be eligible.

3.8.2 Required Project Documentation

The minimum documentation required for all early replacement projects are listed below. These requirements are in addition to the requirements listed in the NYS Clean Heat Program Manual and any applicable supplementary guidelines issued for the proposed energy conservation measures.

- Cooling/heating capacity of the existing equipment:
 - Supported by manufacturer's equipment data sheets or industry standard performance testing results for existing equipment
 - Supported by manufacturer's equipment data sheets or AHRI certificate
- Age of the existing equipment
 - Original invoice, bill of sale, construction permit, service log, or nameplate date

3.8.3 Extended Life Projects

For existing cooling and/or heating equipment to be eligible for extended life replacement under the Program:

1. Proposed work must involve a retrofit or substantial improvement to an existing facility.
2. The savings baseline for calculating energy savings must be based on the existing heating and/or cooling equipment type installed at the facility. Savings baselines that do not default to the existing equipment type, but instead are selected based on the most cost-effective technology installed in the absence of the program are not eligible for extended life replacement.
3. At the time of application, existing cooling and/or heating equipment must exceed its Effective Useful Life (EUL) by at least 25% (Refer to Appendix P in the latest version of the TRM for EUL for various heating/cooling equipment)

- For cases in which the age of the existing equipment cannot be determined relative to 125%, the Energy Use Rule may be considered for eligibility; existing equipment energy consumption must exceed that of the new high efficiency model by at least 35% for chillers, and 20% for all other HVAC types to do the same amount of work.
 - If the equipment is determined to be less than 125% of its EUL, it's not eligible for special circumstance extended life treatment regardless of consumption or any other factor.
4. There must be a history of significant repair or replacement with existing equipment.
 5. Existing equipment must be fully functioning.

A facility's existing cooling and heating systems shall be evaluated separately against the criteria noted above to determine whether each individually qualifies for extended life replacement. It is noted that one or both systems may be eligible.

3.8.4 Required Project Documentation

The minimum documentation required for all extended life replacement projects are listed below. These requirements are in addition to the requirements listed in the NYS Clean Heat Program Manual and any applicable supplementary guidelines issued for the proposed energy conservation measures.

1. Cooling/heating capacity and performance of the existing equipment:
 - Supported by manufacturer's equipment data sheets or industry standard performance testing results for existing equipment
 - Supported by manufacturer's equipment data sheets or AHRI certificate
2. Age of the existing equipment
 - Supported by original invoice, bill of sale, construction permit, service log, or nameplate date
3. Actual repair cost, including component replacement for at least the past 3 years
 - Supported by invoices or proof of payment
 - Total repair cost must be added and summarized in a document

3.8.5 Special Circumstance Savings Baselines

Efficiencies for existing heating and/or cooling equipment that qualify for early replacement or extended life shall be based on the existing equipment's efficiency, in lieu of minimally code compliant equipment.

Efficiencies for eligible equipment may be de-rated in accordance with actual measured equipment efficiency; in accordance with the National Renewable Energy Lab (NREL) degradation rates⁴⁵ over the course of the equipment's age, or in accordance with alternative guidance provided by the program, up to a maximum de-rated value of 70% of the original manufacturer's given efficiency.

Efficiencies for heating and/or cooling equipment that do not meet early replacement eligibility criteria shall be based on minimally code compliant equipment.

4. Participating in the Program

⁴⁵ <https://www.nrel.gov/docs/fy06osti/38238.pdf>

Customers who would like to have a heat pump system installed in their home or property, can learn more about the different technologies and look for an approved Participating Contractor by visiting <https://cleanheat.ny.gov/>.

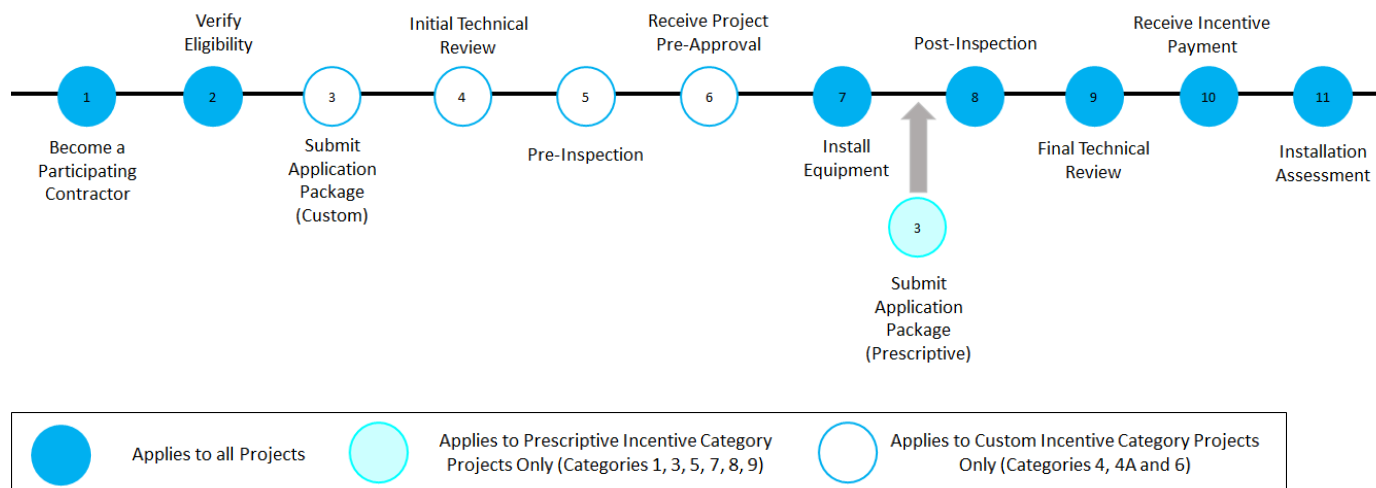
Multifamily and C&I customers seeking incentives under Category 4 *Custom Space Heating Applications* and Category 6 *Custom Hot Water Heating Applications* may choose to be the applicant by submitting an incentive application to the Program directly. The direct applicant must work with a Participating Contractor in accordance with the program rules and requirements of the Program.

Projects submitted to the Clean Heat Program will follow the below general process. Steps are dependent on whether project measures fall under prescriptive incentive categories or custom incentive categories:

Incentive Category Type	Category
Prescriptive	Categories 1, 2, 3, 5, 7, 8, and 9.
Custom	Categories 4, 4A and 6.

Incentive applications qualifying for prescriptive category incentives may be submitted after the installation is complete.

Applications qualifying for custom category incentives or projects that include a combination of prescriptive and custom incentive category measures **must** be submitted prior to installing the proposed energy conservation measures. In the case of Category 4 *Custom Space Heating Applications* GSHP systems, incentive applications will not be accepted if construction of the loop field for such project has begun before the Electric Utilities send the Participating Contractor and/or customer an approval notice.



Please note: new construction Multifamily projects that elect to install Central ccASHP, MSHP, and GSHP systems will be incentivized at the Category 4: Custom Space Heating Applications rate, but would still follow the Prescriptive Incentive path.

Step 1. Become a Participating Contractor

To participate in this Program, ASHP installers, ASHP designers, GSHP installers, GSHP designers, and GSHP drillers⁴⁶ must first become a Participating Contractor in the NYS Clean Heat Participating Contractor Network.

Note: Each GSHP loop field installation must be completed by a participating driller, but participating drillers are not eligible to apply for or receive incentives under this Program. Additionally, contractors installing only HPWH do not need a Participating Contractor to submit an incentive application on behalf of a customer.

To become a Participating Contractor, installers, designers, and drillers must first complete and submit a Participating Contractor Application and Contractor Participation Agreement. Applicants will complete and submit a single statewide Participating Contractor Application, a separate signed Contractor Participation Agreement for each Electric Utility applied for⁴⁷ and all required supporting documentation (including a W-9) listed in the “Participating Contractor Requirements” section to NYSCleanHeat@icf.com. These documents and detailed enrollment instructions can be found at <http://saveenergy.ny.gov/nyscleanheat>.

On the Participating Contractor Application, contractors must indicate the utility service territory(ies) in which they plan to submit incentive applications. They must also indicate contractor type: ASHP Installer, ASHP Designer, GSHP Installer, GSHP Designer <300,000 Btu/h system heating capacity, GSHP Designer ≥300,000 Btu/h system heating capacity, GSHP Driller, GSHP Direct Exchange (DX) Contractor or any combination of the above. Contractors must be approved for each specific contractor type by the Electric Utilities.

A final step in becoming a Participating Contractor is to complete, sign and submit a NYSEDA Participation Agreement also found at <http://saveenergy.ny.gov/nyscleanheat>. This will provide the Participating Contractor the ability to offer residential financing (see Section 2.3 Green Jobs – Green New York Financing) to their customers as well as access NYSEDA Cooperative Advertising cost-share incentives. Additionally, all Participation Contractors will be listed separately on the NYS Clean Heat Contractor Reference web page http://saveenergy.ny.gov/nyscleanheat_searchable by type of contractor as well as servicing utility and county.

The Electric Utilities and NYSEDA will review all applications, agreements and supporting documentation and determine if the contractor is accepted into the NYS Clean Heat Participating Contractor Network. Upon acceptance into the network, the Participating Contractor will receive approval notification emails and be eligible to apply for incentives in the program (except for participating drillers). Incentive applications can be found on each Electric Utility’s website as well as the NYS Clean Heat Contractor Reference web page <https://saveenergy.ny.gov/NYScleanheat/resources/>.

New Participating Contractors (except participating drillers) are initially granted provisional status until the successful completion and field assessment of three projects. New participating drillers approved by the Electric Utilities are immediately granted full status. If the contractor is not approved by Electric Utilities, the opportunity to re- apply is an option. More information on participation status be found in Section 6.

⁴⁶ GSHP Drillers must also be approved by the Electric Utilities through this process to become “participating drillers,” but only participating installers and designers may submit rebate applications.

⁴⁷ The Electric Utilities are working towards a single statewide Contractor Participation Agreement and any updates to the required documents and process will be noted on the Contractor Reference webpage.

Information on the requirements and qualifications for the application—to become a Participating Contractor (installer, designer, or driller)—can be found in the following section of this Program Manual.

Participating Contractor Requirements

Air Source Heat Pump Contractors

ASHP installers and designers seeking to become Participating Contractors must complete and submit to one of the Electric Utilities, a single NYS Clean Heat Program Participating Contractor Application and a separate signed Contractor Participation Agreement for each Electric Utility in whose territory they plan to submit incentive applications. These documents are available on the NYS Clean Heat Contractor Reference web page <http://saveenergy.ny.gov/nyscleanheat>.

The application must include the following corresponding ASHP installer / ASHP designer designation supporting documents:

- ASHP installer only - A copy of the [U.S. Environmental Protection Agency Section 608 Technician Certification](#) that is appropriate for the size of the system being installed.
- ASHP installer only - ASHP Manufacturer-sponsored Installation Training Certificate or comparable proof of training completion documentation covering the following areas:
 - Condensate Management;
 - Controls;
 - Electrical Wiring;
 - Evacuation and Charging;
 - Field Settings;
 - Piping and Charging;
 - Product Introduction;
 - R-410A and PVE Oil;
 - System Start-Up;
 - Tools;
 - Troubleshooting; and
 - Unit Location Considerations.
- ASHP installer only - ASHP Manufacturer-sponsored [Cold Climate Air Source Heat Pump Sizing and Design Training](#) Certificate or comparable proof of training completion documentation⁴⁸ covering the following curriculum areas:
 - Basic Principles of Heat Pump Operation and Energy use
 - Using Load Calculations
 - System Sizing and Specification

⁴⁸ On or after January 1, 2022, all new ASHP installers seeking to become Participating Contractors must include this documentation. Prior to that date, documentation is voluntary.

- System Design Options
 - Thermostats and Controls
 - Recommended Practice Design Examples
- ASHP installer and ASHP designer - A certificate of insurance satisfying the requirements outlined in each of the Electric Utilities' Contractor Participation Agreement is also required.
 - ASHP installer and ASHP designer - Participating Contractors are required to review and use the [*NEEP Guide to Sizing and Selecting Air-Source Heat Pumps in Cold Climates*](#).
 - ASHP designer only – One of the following:
 - An active NYS Professional Engineering license
 - An active NYS Registered Architect license

Ground Source Heat Pump Contractors

Installer Credentials: A GSHP installer seeking to become a Participating Contractor must complete and submit to one of the Electric Utilities, a single Participating Contractor Application and a separate signed Contractor Participation Agreement⁴⁹ for each Electric Utility in whose territory they plan to submit incentive applications.

The application must include the following supporting documents:

- A copy of a current (and in good standing) International Ground-Source Heat Pump Association (“IGSHPA”) accredited installer certificate;
- A certificate of insurance satisfying the requirements outlined in each Electric Utilities' Contractor Participation Agreement; and

The above-mentioned documents can be found at on the NYS Clean Heat Contractor Reference web page <http://saveenergy.ny.gov/nyscleanheat>.

Designer Credentials

Category 3 GSHP: Full Load Heating Incentive Systems: A designer seeking to become a Participating Contractor for GSHP systems qualifying for the *Category 3 GSHP: Full Load Heating Incentive* must complete and submit to one of the Electric Utilities, a single Participating Contractor Application and a signed Contractor Participation Agreement⁵⁰, for each Electric Utility in whose territory they plan to submit incentive applications. Additional required documents include a copy of either a current (and in good standing) IGSHPA accredited installer certificate or an active Certified GeoExchange Designer (“CGD”) certificate from the Association of Energy Engineers (AEE)/IGSHPA. Additionally, a certificate of insurance satisfying the requirements outlined in each Electric Utilities' Contractor Participation Agreement must be provided. The above-mentioned documents can be found on the NYS Clean Heat Contractor Reference web page <http://saveenergy.ny.gov/nyscleanheat>.

⁴⁹ The Electric Utilities are working towards a single statewide Contractor Participation Agreement and any updates to the required documents and process will be noted on the Contractor Reference webpage.

⁵⁰ The Electric Utilities are working towards a single statewide Contractor Participation Agreement and any updates to the required documents and process will be noted on the Contractor Reference webpage.

Category 4 Custom Space Heating Applications GSHP Systems: A designer seeking to become a Participating Contractor for GSHP systems with three-phase heat pump equipment or with total system heating capacity $\geq 300,000$ Btu/h, qualifying for the *Category 4 Custom Space Heating Applications*, must complete and submit to one of the Electric Utilities, a single Participating Contractor Application and a signed Contractor Participation Agreement⁵¹ for each Electric Utility in whose territory they plan to submit incentive applications. Additional required documentation includes a certificate of insurance satisfying the requirements outlined in each Electric Utilities' Contractor Participation Agreement. The above-mentioned documents can be found at on the NYS Clean Heat Contractor Reference web page <http://saveenergy.ny.gov/nyscleanheat>.

The application must include one the following supporting documents:

- An active Certified GeoExchange Designer ("CGD") certificate from the Association of Energy Engineers (AEE)/IGSHPA
- An active NYS Professional Engineering license
- An active NYS Registered Architect license

Designers must have an active CGD certificate from the Association of Energy Engineers (AEE)/IGSHPA to be promoted to full status.

Driller Credentials

Vertical Loop Field Drillers: Drillers seeking to become Participating Contractors (not eligible to receive incentives) must complete and submit to one of the Electric Utilities, a single Participating Contractor Application and a separate signed Contractor Participation Agreement for each Electric Utility in whose territory they wish to submit incentive applications. The above-mentioned documents can be found on the NYS Clean Heat Contractor Reference web page <http://saveenergy.ny.gov/nyscleanheat>.

The application must include one the following supporting documents:

- Active registration (in good standing) and certification for open-loop geothermal well drilling by the NYS Department of Environmental Conservation
- National Ground Water Association Certified Vertical Closed-Loop Driller (CVCLD) certificate

Direct Exchange (DX) Requirements: Since there are currently no available industry trainings or certifications, designers, installers and drillers seeking to become Participating Contractors must submit a training certificate from a DX Ground Source Heat Pump manufacturer. The NY Electric Utilities reserve the right to review the training curriculum provided.

Additional Participation Qualifications:

Additional consideration will be given to applicants who also submit additional documentation verifying completion of training programs, including the following:

- Ground-loop designer
 - CGD

⁵¹ The Electric Utilities are working towards a single statewide Contractor Participation Agreement and any updates to the required documents and process will be noted on the Contractor Reference webpage.

- Geology or engineering degree (BS or higher)
- Heat pump manufacturer/distributor training
- HVAC system designer
 - HVAC excellence residential heat load analyst
 - NYS licensed PE with a focus in mechanical engineering
 - Heat pump manufacturer/distributor training
- Heat pump/mechanical installer
 - North American Technician Excellence (“NATE”) ground source heat pump loop installer
 - NYS licensed PE with a focus in mechanical engineering
 - Heat pump manufacturer/distributor training
- Distributions system installer
 - HVAC excellence duct and envelope testing
 - Plumbing license (hot water pipes)

Heat Pump Water Heater Contractors

Contractors installing HPWHs are not required to submit a Participating Contractor Application or a Contractor Participation Agreement to be eligible to receive incentives under this program.

Contractors installing a HPWH are required to be a NYS Licensed Contractor.

Site owners may install their own HPWH and apply for an incentive independently.

Step 2. Confirm Project Eligibility

Prior to submission of an incentive application, the Participating Contractor or applicant shall confirm that the customer, site, proposed measures, contractors qualify for the program as specified in the listed Eligibility Requirements (see Section 3).

Step 3. Submit Application Package

To apply for an incentive, the applicant (Participating Contractor and/or customer) must submit the incentive application and associated documents to their respective Electric Utility based on directions on the application. Note that these are general requirements applying to all clean heat projects. Additional utility-specific incentive application program requirements may apply. Contact the respective Electric Utility for all utility-specific program requirements.

Documentation Requirements – All Projects

At minimum, **all projects** are required to submit the following documents as part of application package.

- **Completed program application** –Participating Contractors shall to receive log-in credentials for online rebate applications from each Electric Utility whose service territory they work within, as well as to get access to PDF applications for large or custom projects; as required by each

Electric Utility PDF application forms for large or custom projects shall also be posted at the Clean Heat resource site for download by Participating Contractors or project owner Applicants.

- **Cutsheets for Proposed Equipment** – Specific model(s) and product ratings being used in the project must be highlighted on the cutsheets before submission.
- **Cost Estimate for Proposed Work** – Installation cost for the proposed measures. Labor and material costs shall be presented separately, and costs shall be limited to the equipment cost and labor cost. Other costs such as taxes, internal labor costs, shipping, administrative costs, or similar costs will not be included with total project cost when calculating incentive caps. If project is being submitted post construction, these costs shall be the actual itemized as-built costs, supported by invoices.
- **Load Calculations** – Latest Heating and Cooling Load Calculations showing that the heat pump system design and appliance selection has been performed in accordance with ACCA Manual J, ANSI/ASHRAE/ACCA Standard 183-2007 (RA2017) or other code-approved equivalent computational procedure depending on building type. Load calculations should be submitted in PDF format, unless otherwise requested.
- **Photo Submission** – For prescriptive incentive category projects, system installation and nameplate photos shall be submitted to verify proper install of listed equipment

Additional Documentation Requirements – Custom Incentive Category Projects

- **NYS Custom Clean Heat Incentive Application:**
- Detailed Scope of Work: A detailed scope of work that specifies all equipment related to the proposed measure and includes a description of the existing system operation (if applicable).
 - Provide description of existing heating and cooling systems and building envelope, or in the case of new construction, counterfactual heating, cooling, and building envelope baselines.
 - Describe extent of work and indicate whether scope involves new construction or upgrades at an existing facility (retrofit or substantial renovation). Description should specify building type and the floors or building areas impacted by project. Include whether any other measures are being installed to contribute to additional heating or cooling relief, such as building envelope upgrades (e.g. weatherization, sealing, insulation, etc).
 - Specify type of heat pump technology being proposed for installation, quantity of new units, and proposed system application (e.g. domestic hot water heating, space heating and cooling). Specify whether equipment is ducted or ductless.
 - Provide design capacity, efficiencies, and proposed sequence of operations for new heat pump installation.
 - Specify what percentage of the design heating/cooling load the new heat pumps are proposed to accommodate. See Required Equipment Sizing for details regarding equipment sizing.

- Specify whether supplemental heating, via either an existing heating system or new heating system, is required to accommodate the design heating load. If a supplemental heating system is required, provide an explanation as to the following:
 - Why additional electrification above and beyond the proposed design is not feasible
 - How a verifiable and reliable control strategy will be employed to ensure that the heat pump system is prioritized for heating
- For New Construction: Specify which compliance pathway (i.e. Prescriptive or Performance Path) design follows to demonstrate compliance with the applicable 2020 energy code and whether design trade-offs have been taken.
- Approved Department of Buildings Permit Submission: The final approved Authority Having Jurisdiction (AHJ) permit submission including EN-drawings and energy analysis (COMcheck, tabular analysis) must be submitted along with your completion paperwork. If documents are not available at the time of initial review, they may be provided as part of final review.⁵²
- Savings Analysis – All calculations must be clear and transparent, utilizing standard engineering methodologies, including a listing of source values.

Step 4. Initial Technical Review

This step applies to projects whose measures fall under custom incentive categories.

The Electric Utilities will review the application’s technical documentation for completeness to verify equipment technical eligibility, project incentive category, baseline and assumptions used in the energy analysis to determine preliminary savings and incentives for the project.

The Electric Utilities will not approve incentive applications with missing or inaccurate information. The Electric Utilities will contact the applicant (Participating Contractor and/or customer) and request the missing and/or correct information.

Step 5. Pre-Inspection

This step applies to projects whose measures fall under custom incentive categories.

The Electric Utilities will pre-inspect the existing condition of your site. To be eligible for incentives, work may not begin until this pre-inspection has been completed and a Pre-Approval has been issued.

Step 6. Receive Project Pre-Approval

This step applies to projects whose measures fall under custom incentive categories.

⁵² Note: Specific requirement for projects submitted to the Con Edison C&I and Multifamily, and Small-to-Medium Business Clean Heat Program only

Once a project application has been reviewed and pre-inspection has been performed, the Electric Utility will issue an approval notification to the Participating Contractor via email that provides incentive details, including the incentive amount. This approval serves as indication that The Electric Utilities strongly recommend that the Participating Contractor wait to start installation of project measures may begin. The incentive offer expires in 30 days if not signed and returned to the respective Electric Utility within 30 days.

Step 7. Install Equipment

Installation of project measures shall occur according to the following table.

Category	Existing Buildings	New Construction
1, 2, 3, 5, 7, 8, 9	12 months	24 months
4, 4A, 6	24 months	36 months

In the event of unusual delays, the Participating Contractor may request an extension of time to complete the project by submitting an email to their respective Electric Utility listed in Section 9 explaining the reason for the delay. Extensions may be granted or denied at the Electric Utilities' discretion.

Upon project completion, the Participating Contractor in cooperation with the system owner and/or site owner submit completion paperwork. Paperwork should only be submitted after 100% of incentivized measures identified in this Program Manual are installed. The completion paperwork includes:

- Project Completion Form⁵³
- Final itemized invoices and receipts must be submitted, documenting actual material and labor costs for the measure installation. Costs shall be limited to the equipment cost and labor cost. Other costs such as taxes, internal labor costs, shipping, administrative costs, or similar costs will not be included with total project cost when calculating incentive caps.
- Approved Authority Having Jurisdiction (AHJ) Permit Submission including EN-drawings and energy analysis (COMcheck, Tabular, etc) (required only if permit filing was not submitted as part of initial review or if subsequent changes to the permit filing have occurred).⁵⁴
- Revised load calculations (required only when revisions were made to the original load calculations) eligible to receive incentives.

Step 8. Post-Inspection

The Electric Utilities reserve the right to inspect the new condition of any site to confirm that all work

⁵³ Note: Specific requirement for projects submitted to the Con Edison C&I and Multifamily, and Small-to-Medium business Clean Heat Program

⁵⁴ See above

was installed in accordance with the scope of work provided with the initial project application.

Step 9. Final Technical Review

The Electric Utilities will review the completion paperwork and findings from the post-inspection, revising the energy savings calculations, as necessary, to reflect as-built conditions and as-installed costs, and determine the final project savings and incentive.

The Electric Utilities will not approve final incentive payments for projects with missing or inaccurate information. The Electric Utilities will contact the applicant (Participating Contractor and/or customer) and request the missing and/or correct information.

Once the project completion documents are submitted, if the paperwork meets all program requirements and funding remains available, the incentive application will be approved, and full payment will be sent to the applicant (Participating Contractor and/or customer).

Rejection or modification of an incentive application is at each Electric Utility's sole discretion for either of the following reasons:

- The Participating Contractor's past performance on the Joint Efficiency Providers' supported projects did not meet program requirements.
- The quality of the incentive application or responsiveness of the Participating Contractor is insufficient as determined by the respective Electric Utility.

Step 10. Receive Incentive Payment

The Electric Utilities will pay incentives to the applicant (Participating Contractor and/or customer) or to a third party, as designated on the completion paperwork. Each Participating Contractor may retain up to the Participating Contractor Reward amount shown in Table 3. The balance of the Total Incentive less the Participating Contractor Reward must be passed or otherwise credited to the customer in their entirety, documented in the site owner invoice or contract. Multifamily and commercial and industrial (C&I) customers seeking incentives under Custom Categories 4, 4A, and 6 may choose to be the applicant by submitting an incentive application directly. As the applicant, the multifamily and C&I customers choosing this option must have the project installed by a participating contractor and will receive direct payment of the Total Incentive amount listed in Table 2 from the Program.

Step 11. Installation Assessment

Through participation in the program, Participating Contractors will be required to comply with a statewide QA/QC process for the purpose of ensuring quality installations. Please see Section 5 for more details. Additionally, Participating Contractors may be subject to utility-specific reviews and/or assessments for the purposes of verifying program measure implementation and acquisition.

5. Field Assessments and Compliance

5.1 Compliance with Manufacturers' Installation Requirements, Laws and Codes

Under the NYS Clean Heat Program, all ASHPs, GSHPs, HPWHs, system components, and installations must comply with any and all manufacturers' installation requirements and applicable laws, regulations, codes, licensing, and permit requirements. These include the New York State Environmental Quality Review Act, the New York State Building Code, or New York State Residential Code, New York State Plumbing Code, New York State Mechanical Code, New York State Energy Code, the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements. In the City of New York, all relevant New York City Codes and NYC Department of Environmental Protection requirements apply.

5.2 Execution of Work Requirements

All equipment and accessories must be installed in a competent and professional manner.

5.3 Field Assessments Overview

The Electric Utilities will maintain program integrity through the Field Assessment⁵⁵ process consisting of routine and systematic assessment activities to support quality installations and assure that Participating Contractors comply with program rules. The Joint Efficiency Providers developed and will maintain the NYS Clean Heat Assessment process and protocols as described in the New York State Clean Heat Statewide Heat Pump Program Quality Policies and Procedures Manual which will be implemented uniformly by all Electric Utilities and any representatives administering assessment activities on their behalf. These NYS Clean Heat Field Assessment activities will be supplemented by any utility-specific review or assessment of heat pumps that may be conducted for the purposes of program implementation and measure acquisition.

5.3.2 Summary of Field Assessment Process

The Field Assessment process has several components including establishment of program standards, comprehensive, technology-specific documentation requirements, and site assessments. Such approaches are unique to the heat pump technologies and include the review of associated contractor credentials, project specific calculation methods, approved construction permits, accuracy of provided application data, and site assessments to assure optimal heat pump system performance.

The Field Assessment process will employ sampling methods proportionate to the likely program risk associated with each application. Specifically, a site assessment will occur for every project until the Participating Contractor has a proven successful track record under the incentive program, after which a sampling protocol will be followed. Projects contributing a disproportionate share of anticipated savings or employing novel solutions and custom savings estimate methods will receive the increased scrutiny to

⁵⁵ According to the American Society for Quality (ASQ), QA and QC, while both considered aspects of quality management, are distinctly different from each other: QA provides confidence that quality requirements will be fulfilled, whereas QC focuses on fulfilling quality requirements. Retrieved May 28, 2020, from ASQ: <https://asq.org/quality-resources/quality-assurance-vs-control/>.

identify opportunities for improvement as soon as possible. For larger-scale projects that pursue a custom incentive and require additional engineering review, the statewide assessment process (as applicable to the project and technology) will be supplemented with any utility-specific assessments and processes.

Field Assessments will be conducted by qualified independent third party contractors having associated expertise and using the appropriate comprehensive checklists. The checklists include the criteria established for NYS Clean Heat and for each category of technology supported under the program. Checklists will be made available <http://saveenergy.ny.gov/nyscleanheat> for the following technologies:

1. Air Source Heat Pumps
2. Ground Source Heat Pumps
3. Heat Pump Water Heaters

The assessor does not inspect projects for purposes of code compliance or enforcement nor compliance with manufacturers installation requirements. Following a site assessment, the assessor will produce an Assessment Report that will document all evaluated criteria of the project and identify any nonconformances. If the assessor observes an unsafe condition associated with the installation, the contractor shall immediately inform the Electric Utility consistent with their contractual obligations and the utility will in conformance with their own standard operating procedures inform the appropriate authorities and/or conduct a lock-out disabling use of such equipment. Discrepancies identified through the Field Assessment process deemed not to endanger health and safety shall be remedied subject to program implementation rules.

5.4 Field Assessments

The purpose of Field Assessments is to provide the Electric Utility with an opportunity to verify that the heat pump system was installed according to all program requirements, and to assess the quality of workmanship of the heat pump installation.

The Electric Utility or its representative selects both in-progress and completed projects for Field Assessments following a rational sampling protocol with sampling rates primarily based on the Participating Contractor's current program status and whether the incentive application relates to an ASHP system, to a GSHP system, or to a HPWH.

Field Assessments are scheduled at the site owner's convenience. A notice of the scheduled Field Assessments assessment is sent to both the site owner and the Participating Contractor approximately one week in advance. Reasonable effort will be made to accommodate the schedule of the Participating Contractor, but the schedule of the system/site owner and efficient assessment scheduling take precedence.

Following the Field Assessment, the qualified third-party assessor produces a detailed report and determines whether the project fully complies with all program requirements and meets acceptable standards of workmanship. The report is made available to the installer after the assessment, following an internal review and scoring by the Electric Utility or its representative within 15 business days from the date of the assessment. If the site owner wishes to receive a copy of the report, they can submit a request their respective Electric Utility.

The Electric Utility or its representative may select any completed project at any point in the future for Field Assessments based on (1) site or system owner's complaints; (2) warranty

related issues or a review of the work done by a Participating Contractor under status review or program disciplinary action; and (3) for any other cause at the sole discretion of the Electric Utility or its representative.

All Participating Contractors are encouraged to perform in-house quality control of each project.

ccASHP and HPWH Systems (Categories 1, 2, 5, 7, 8 and 9, as applicable)

The Electric Utility or its representative will select each Participating Contractors' initial three (3) completed ccASHP projects or combined ccASHP/HPWH projects for Field Assessments. Full status Participating Contractors are subjected to up to a 7.5% Field Assessment overall. Probationary and suspended status Participating Contractors are subjected to up to 100% Field Assessment on specific projects for cause.

ASHP and HPWH Systems (Categories 4, 6, and 9, as applicable)

All Participating Contractors will have their initial three (3) projects selected for assessment. The Electric Utility or its representative will generally conduct Field Assessments on up to 30% of larger ASHP equipment, and HPWH units installed by full-status Participating Contractor. Probationary and suspended status Participating Contractor are subjected to 30% Field Assessment sampling overall and up to 100% Field Assessment sampling on specific projects for cause.

GSHP Systems (Categories 3 and 4)

All Participating Contractors who are new to installing GSHPs in the Program will have their initial three (3) projects selected for assessment. Based on the results of the assessments completed, the Electric Utilities may reclassify the Participating Contractor to full, probationary, suspended, or terminated status.

For Category 4 *Custom Space Heating Applications* GSHP systems, the Electric Utility or its representative will generally conduct assessments on up to 30% of units installed by full-status Participating Contractors. Probationary and suspended status Participating Contractors are subjected up to 100% Field Assessment overall.

5.5 Photo Assessment (ASHP & GSHP Systems, Category 4 *Custom Space Heating Applications*)

The Participating Contractor is required to take and retain construction photos of each project. The Electric Utility or its representative may request construction photos for purposes of conducting a photo assessment at any time. At present, photo documentation is focused on verifying compliance with program requirements and technical standards related to in progress work such as loop field installation. Photo documentation scores are taken into consideration, along with Field Assessment scores, when evaluating performance.

The minimum number and content of photos required for GSHP projects can be found in the GSHP checklist (in Excel). If selected for photo assessment documentation, Participating Contractors receive an email with instructions from the Electric Utility or its representative detailing where and how to upload the required project photos. The Participating Contractor provides pictures upon request within 10 business days. Failure to provide a complete set of photos may result in disciplinary action. Photos should be submitted in JPEG format or another format approved by the Electric Utility.

5.6 Procedure for Handling Nonconformance and Corrective Action

The Participating Contractor is solely responsible for ensuring compliance of the heat pump system installation with all applicable laws, regulations, rules, and standards, including requirements of the local AHJ. The contractor is responsible for correcting all nonconformances identified in the assessment activities to the satisfaction of the Joint Efficiency Provider. Contractors are required to submit proof demonstrating correction of all items identified. Contractors may also be put on probationary status, suspended or terminated based on the results of Field Assessment activities or otherwise violating program requirements.

The assessment report provided to the Participating Contractor will provide details of all evaluated elements of the project and list any nonconformances that were identified. The report will identify the overall score of the project for the purpose of maintaining good standing in the Participating Contractor Network and specific non-compliance issues that should be addressed.

Projects that have nonconformances related to health and safety (critical) or system performance (major) attributes automatically fail.

When the Electric Utility or its representative seeks specific corrective action, a corrective action response (CAR) form will be provided within the report. The CAR must be either disputed within 15 days by contacting the Electric Utility or its representative or remedied within 30 days. Sufficient evidence, such as photo documentation of remediation must be provided to the Electric Utility or its representative documenting the completion of required actions. If major or critical nonconformances are not disputed or remedied within the stated timeframe, the Electric Utilities will adjust the Participating Contractor status as described in Section 6.

Acknowledgment and plans for preventing future problems may be requested with the report. While some nonconformances cannot be corrected post installation, others can be remedied through corrective action to the documentation, incentive applied to the project, or remediation of the installation or its components.

The Electric Utility or its representative may, at its discretion, conduct a field verification of the remediated installation. The Electric Utility has the right to provide a copy of the Assessment report; CAR; or specific information from the Field Assessments directly to the site owner based on health, safety, and compliance concerns.

If the assessor observes an unsafe condition associated with the installation, the contractor shall immediately inform the Electric Utility consistent with their contractual obligations and the utility will in conformance with their own standard operating procedures inform the appropriate authorities and/or conduct a lock-out disabling use of such equipment.

The Electric Utility or its representative may communicate with any site owner on any matter relevant to a project. Such communications may be in reply to an inquiry from a site owner or at the Electric Utility's initiation.

The Electric Utilities expect Participating Contractors to avoid repeating nonconformances in future projects that were identified in a prior inspection report. Acknowledgement and plans for preventing future problems may be requested with the report.

5.7 Procedure for Contesting a Score

A Participating Contractor may contest the findings of a report by emailing supporting documents and information to the utility. The request must be submitted to the utility within 15 business days of receiving the inspection report.

Upon review, if the utility agrees with Participating Contractor, the non-conformance will be removed. The score may or may not change based on other non-conformances. If the utility agrees with the field assessment, the nonconformance will stand, and the score will remain the same.

5.8 Contractor Feedback and Training

Participating Contractor performance feedback strengthens the effects of learning and has significant, direct positive effects on performance.

Contractors will be evaluated and provided with performance feedback through the assessment report; the Joint Efficiency Providers will develop training and resources to recommend to Participating Contractors for continuous improvement. The Joint Efficiency Providers also will work with AHJ officials to offer training with the goal of increasing the familiarity with heat pump technologies and enhancing the quality of code inspections for these new technologies.

6. Participation Status

Participating Contractors will be classified in one of the following status designations: provisional, full, probationary, suspended, or terminated. Each designation will be subject to limitations or requirements associated with that status. The Joint Efficiency Providers reserve the right to modify the definition, limitations, and requirements of these designations. A Participating Contractor's progression into and/or through any status designation is determined at the sole discretion of the Joint Efficiency Providers. The designation or existence of a Participating Contractor in any status category does not relieve or modify the nature or scope of such Participating Contractor's responsibilities to fulfill any of its outstanding obligations under the program including, but not limited to, those obligations owing or relating to system or site owners.

6.1 Provisional Status

All new Participating Contractors are initially classified as provisional. Following the completion of the third project review, the Joint Efficiency Providers will conduct a formal review to evaluate a change in status. Evaluation for a change to full status will be based upon the quality and consistency of work and full compliance with program rules including current qualifications as previously described.

Special requirements for GSHP Participating Contractors:

- Provisional installers are strongly encouraged to attend at least the first three field inspections as it provides an opportunity to learn the field inspection process.
- Provisional Participating Contractors will be recommended for relevant training.

6.2 Full Status

At the Joint Efficiency Providers' discretion, Participating Contractors may be placed in full status when they have:

- (1) met all program requirements for credentialing and experience and installation quality;
- (2) successfully completed the terms of the provisional period; and
- (3) demonstrated quality services through past performance.

Participating Drillers are automatically deemed to have full status.

Full Participating Contractors must realize the following:

- Consistently deliver projects that pass field inspections consistently.
- Meet program standards in terms of timely responses to Joint Efficiency Provider communications and corrective-action requests related to field inspections.
- Take effective corrective actions to deficiencies in performance as identified by NYSERDA.
- Maintain one of the credentialing standards referenced in Section 4. Failure to satisfy this program requirement and present appropriate documentation results in an automatic downgrade to probationary status.

6.3 Probationary Status

Probationary status is reserved for Participating Contractors who have failed to consistently meet the requirements of the program. Probation is prescriptive in nature with both a specific list of requirements and a time frame for achieving results. Participating Contractors may be placed in probationary status

for any of the following reasons:

- Violation of program rules or ethical standards.
- Failure to consistently deliver completed projects which pass the field assessment standard.
- Failure to take effective corrective actions on a critical or major deficiency or a repeated incidental or minor deficiency in work quality or performance.
- Three or more corrective action notices that have not been responded to, or remain unresolved, for more than 30 days.
- A lapse in required credentials

The probationary period will not be less than 30 days and will not exceed 90 days. Projects completed by a Participating Contractor on probationary status may receive enhanced oversight. During the probationary period, the Participating Contractor can expect the following:

- Continues to be listed on the NYS Clean Heat Contractor Reference web page <http://saveenergy.ny.gov/nyscleanheat>.
- May continue to submit new incentive applications, subject to restrictions based upon the reason for the probationary status.
- Is subject to higher inspection levels as outlined in this manual
- Must remediate all issues related to probation, as directed by the Electric Utility.
- Must submit an agreed-upon action plan in writing designed to ensure future violations are avoided.
- Must demonstrate successful results through a specified number of completed projects.
- Must be mentored on its next installation.

Upon satisfactory completion of the action plan and all remediation and upon review of probationary period assessment results, the Joint Efficiency Providers will determine in their sole discretion whether to return the Participating Contractor to full status, continue the probationary period, or suspend and/or terminate the Participating Contractor from the program.

6.4 Suspended Status

Participating Contractor who have failed to respond to prescriptive probation or commit to more serious violations of program rules will be suspended. Participating Contractor may be suspended from the program in the following situations:

- Fail to adequately fulfill the terms of the probationary period.
- Are placed on probation for a second time within 12 months.
- Are under investigation for (or the determination has been made) engaging in practices that put the public or program at risk.
- Have outstanding and unresolved request(s) for return of incentive payment to Electric Utility due to failure to meet program requirements.
- Have submitted any program application or incentive application documentation falsifying required items, including, but not limited to, permits, approvals, and site owner signatures.
- Fail to consistently deliver completed projects that pass the field inspection standard.
- Have a lapse in required credentials while on probationary status.

During a suspension, at the request of any Joint Efficiency Provider, the Participating Contractor is restricted in the following ways:

- Will be removed from the NYS Clean Heat Contractor Reference web page <http://saveenergy.ny.gov/nyscleanheat>.

- Will not be allowed to submit new incentive applications to the program.
- Must complete any work, with system and/or site owner's consent, that was in progress at the time of suspension.
- Prohibited from being represented as a Participating Contractor except in the execution of remedial action.
- Depending on the reasons for suspension, be directed by any Electric Utility to remediate issues related to the suspension, and may be required to submit to the program, in writing, an agreed-upon action plan that is designed to ensure future violations are avoided

At the Joint Efficiency Providers' sole discretion, suspended Participating Contractor either progress to probationary status upon satisfactory completion of the specified remedial activities or resolution of issues related to the suspension or they are terminated from program participation. Regardless of program status, Participating Contractors will remain responsible for fulfilling any outstanding obligations to the program or site owner.

6.5 Terminated Status

Participating Contractor who fail to respond to prescriptive and disciplinary measures or have committed serious violations of program rules may be terminated. Participating Contractor may be terminated from the program in the following situations:

- Have been on suspended status for more than 30 days and unresponsive or failed to adequately fulfill the terms of their suspension.
- Have had their credentials lapse while suspended.
- Submit falsified documents or unauthorized signatures to the program
- Commit illegal actions while participating in the program
- Are convicted or have a principal who is convicted of a criminal charge that casts the program in negative light or calls the integrity or work of the Participating Contractor into question
- Are in gross violation of program standards
- Bill for measures that are not installed.
- Fail to meet the terms of the provisional period

Terminated Participating Contractors are prohibited from further participation. Site owners with incomplete projects will be notified of the Participating Contractor termination. If appropriate, the Joint Efficiency Providers may notify the New York State Attorney General, the New York State Department of Labor, the Better Business Bureau, or others of their findings and decision to terminate the Participating Contractor.

The officers, directors, and owners of the terminated Participating Contractor are prohibited from holding positions of that nature with any other Participating Contractor. Regardless of program status, Participating Contractor will remain responsible for fulfilling any outstanding obligations to the program or site owner.

6.6 Inactive Status

A Participating Contractor may be declared inactive if they have not had an approved project in the program over a 24-month period of time. They will be removed from the NYS Clean Heat Contractor Reference web page <http://saveenergy.ny.gov/nyscleanheat>, no longer receive email notifications, nor be eligible for incentives. Should they wish to participate in the future, they may reapply under the rules in place at that time.

6.7 Status Review Process

The status review process for administering probationary, suspended, or terminated status is as follows:

- Electric Utility will provide written notice of at least 10 business days of its intention to act. The notice will outline the specifics for disciplinary action along with supporting documentation for the proposed action.
- During this period, the Participating Contractor will have an opportunity to dispute the program violation notification.
- If the Participating Contractor fails to respond to the Electric Utility prior to the end of the notice period, the stated disciplinary action will go into effect without further notice.
- the Electric Utility will promptly review any request for an appeal of the decision received before the end of the notice period.
- the Electric Utility will confirm, reverse, or place its action on hold based upon a review of all information received within 10 business days of receipt.
- Intended and final action letters will be sent via email and U.S. mail. The notice period commences on the date of the email from the Electric Utility.

The Joint Efficiency Providers reserve the right to shorten these notice periods or take immediate action in the event of an emergency, as determined by the Electric Utility.

When a Participating Contractor fails to consistently complete projects that pass Field Assessments or fails to respond to or remedy failed inspections, the Electric Utilities may review their status in the Program and take further action.

A Participating Contractor may be moved to probation or suspended status, in which specific results and a timeline for demonstrating those results will be prescribed and monitored. The Participating Contractor may be terminated from the Program if determined necessary.

7. Recommended Program Guidelines

In addition, the following is a summary of optional, but strongly recommended, program guidelines, installation, and design practices that the Joint Efficiency Providers encourage all Participating Contractor to follow:

- Participating Contractors who submit custom projects should wait to start installation until after the respective Electric Utility has reviewed the application and notified the Participating Contractor whether the incentive application has been approved or rejected.
- Participating Contractors should encourage site and system owners to work with their respective Electric Utility to assess and implement energy efficiency opportunities related to building envelope and HVAC distribution before or in coordination with installing a heat pump system.
- Test boreholes are recommended for GSHP projects with system capacities between 135,000 Btu/h and 300,000 Btu/h.
- The Electric Utilities strongly recommend that Category 4 *Custom Space Heating Applications* systems include a performance monitoring system.
- Installers, designers, and drillers seeking to become Participating Contractors should submit any additional training and certification documentation, beyond the required documentation that would help bolster their credentials.
- The Electric Utilities recommend that, for projects that install heat pump systems to operate in combination with existing heating systems, the Participating Contractor install an integrated multi-stage control, in order to reduce backup heat from the existing system and emphasize heat pump operation. If an integrated multi-stage control is not available, the Participating Contractor should advise the site owner on the effective use of two thermostats to optimize heat pump system use.

8. General Information

8.1 Waiver

The purpose of these requirements is to ensure that heat pump systems installed under this Program are high-performing, high-quality installations that are used for space heating or hot water heating, which is critical to enabling market growth. However, the Electric Utilities encourage innovation in design and installation practices that improve performance and lower costs. If a Participating Contractor can substantiate that a deviation from a specific requirement will maintain or improve performance at a similar or lower cost, the Electric Utilities will consider granting a waiver to that specific requirement.

8.2 Logo Use Disclaimer

Participating Contractors are not permitted to use, reproduce, or otherwise publish any of the Electric Utilities or NYSERDA logo. Contractors are permitted and encouraged to use the “NYS Clean Heat” name.

There are very strict policies regarding use of the Electric Utilities’ and NYSERDA’s logo. There are very few companies that are eligible to use a version of the Electric Utilities’ and NYSERDA’s logo on their marketing materials or for any other purpose. For these purposes, please contact the Electric Utilities or NYSERDA directly at the contact information in Section 9.

9. Contact Information

NYS Clean Heat Contractor Reference Webpage: <https://saveenergy.ny.gov/NYScleanheat/>

Submit questions by email to:

Central Hudson:

Ray Cotto
Associate Energy Efficiency Program Manager
85 Civic Center Plaza
Poughkeepsie, NY 12601
Telephone: (845) 486-5750
Email: RCotto@cenhud.com

Con Edison:

William Xia
Energy Efficiency & Demand Management
Telephone: 646-761-1851
Email: XiaW@ConEd.com

National Grid:

Jennifer Cross
Senior Program Manager
1125 Broadway
Albany, NY 12204
Telephone: (518) 433-5034
Email: Jennifer.Cross@Nationalgrid.com

NYSEG/RGE:

Nicole Williams
Program Manager, Conservation and Load
Management
18 Link Drive, Binghamton, NY 13905
Telephone: (585) 484-6592
Email: Nicole.williams@nyseg.com

NYSERDA

nyscleanheatprogram@nyserdera.ny.gov

Orange & Rockland:

Matthew Siano
Telephone: (845) 532-5971
Email: info@OandRresidential.com

Statewide Program-Related Inquiries:

nyscleanheat@ceadvisors.com

Statewide Participation- or Project-Related Inquiries:

nyscleanheat@icf.com
844-212-7823

10. Appendix: NYS Clean Heat Program - Glossary of Terms

This glossary provides definitions of key terms used in the NYS Clean Heat Implementation Plan and Program Manual.

Air-Conditioning, Heating, and Refrigeration Institute (AHRI): A trade association representing manufacturers of heating, ventilation, air-conditioning, refrigeration, and water heating equipment. AHRI provides the database of equipment performance specifications, which is used in this program to determine the rebate amount.

Air Source Heat Pump (ASHP): An HVAC system that provides space heating using electricity through vapor-compression refrigeration cycle. An ASHP extracts heat from outdoor air and transfers the extracted heat into the conditioned spaces via various means. ASHPs are also used to provide space cooling by reversing the cycle to extract heat from a building and transfer the heat to the outside air.

Btu/h: Unit of thermal power capacity that represents one British Thermal Unit (Btu) of energy transferred per hour.

Building Cooling Load (BCL): Building total sensible and latent heat gain in British Thermal Units per hour (Btu/h). For residential buildings, BCL shall be calculated using ACCA Manual J or another code-approved methodology. For commercial buildings, BHL shall be calculated following ANSI/ASHRAE/ACCA Standard 183-2007 (RA2017), or other code-approved equivalent computational procedure. Calculation of the building's design cooling load shall be at the 1% dry bulb cooling design temperature for the most relevant ACCA location.

Building Equivalent Full Load Hours (BEFLH): is for heating and cooling based on building type and location. It represents the equivalent full load operating hours for HVAC equipment based on 1% design temperature, TMY3 weather data, and the design heating load.

- Old, poorly insulated buildings constructed before 1979, before the NY State Energy Code went into effect. This vintage is referred to as the "old" vintage.
- Existing, average insulated buildings conforming to the 1980s era building codes. This vintage referred to as the "average" vintage, covering buildings constructed from 1979 to 2006.
- New construction conforming to the 2007 Energy Conservation Construction Code of New York State (ECCCNYS) for residential buildings. This vintage is referred to as the "new" vintage, and covers buildings constructed from 2007 to present.

Building Heating Load (BHL): Building heat loss in British Thermal Units per hour (Btu/h). For residential buildings, BHL shall be calculated using ACCA Manual J or another code-approved methodology. For commercial buildings, BHL shall be calculated following ANSI/ASHRAE/ACCA Standard 183-2007(RA2017), or other code-approved equivalent computational procedure. Calculation of the building's design heating load shall be at the 99% dry bulb heating design temperature for the most relevant ASHRAE 2017 location.

Central ASHP: An ASHP system that is typically sized to provide heating and cooling to the whole building through an air duct distribution system.

Coefficient of performance (COP): COP is the ratio of work or useful energy output of a system versus the work or energy input, measured in the same units. It is a measure of performance often used for electrically-powered heating and cooling equipment, with the higher the system COP corresponding to the more efficient operation.

Cold Climate ASHP: A heat pump product designed to identify air-source heat pumps that are best suited to heat efficiently in cold climates (IECC climate zone 4 and higher).

Cold Climate ASHP defined as ccASHP: A heat pump product listed on the Northeast Energy Efficiency Partnership (NEEP) Cold Climate Air Source Heat Pump (ccASHP) Specification and Product List (“NEEP Product List”), designed to identify air-source heat pumps that are best suited to heat efficiently in cold climates (IECC climate zone 4 and higher). The current specification and listed eligible units are available at (<https://neep.org/ASHP-Specification>).

Commissioning Report: A report that shows the results of project start-up tests conducted to ensure the system is operating effectively.

Corrective Action: In the field assessment inspection process, action(s) that must be undertaken by a participant at the direction of NYSERDA or the Electric Utility to correct identified nonconformances (i.e., specific deviations or work that fails to meet the established quality standard).

Commercial Unitary (i.e., Large Commercial) ASHP: Large commercial heat pump systems that include individual heat pump appliances that are powered by three-phase electricity or have rated cooling capacities $\geq 65,000$ Btu/h for the individual appliance.

Custom Incentive Categories: Incentive Categories 4, 4A and 6.

Designer: Individual or company that designs heat pump system. Requirements to be an eligible designer in the NYS Clean Heat Program are described in the NYS Clean Heat Program Manual.

Desuperheater: An optional feature of a GSHP system that takes advantage of waste heat generated by the compressor and transfers the waste heat to a domestic hot water system.

Direct Exchange (DX) GSHP: Direct exchange GSHP systems circulate a refrigerant through a buried, closed-loop copper pipe.

Driller: Individual or entity that drills GSHP systems. Requirements to be an eligible driller in the NYS Clean Heat Program are described in the NYS Clean Heat Program Manual.

Energy Efficiency Ratio (EER): A measure of how efficiently a cooling system will operate when the outdoor temperature is 95 degrees Fahrenheit. It is calculated by dividing the rated cooling output at 95 degrees Fahrenheit by the watts used by the AC/HP system. A higher EER means the system is more efficient. It is an instantaneous measure of electrical efficiency, unlike SEER (Seasonal Energy Efficiency Rating), which is an averaged value of efficiency. This is a term applied to air conditioning equipment.

Full Load Heating System: A system installed that satisfies at least 90% of total system heating load at design conditions. For locations where the total system cooling load is greater than the heating load, the heat pump system cooling capacity shall be as small as possible to satisfy the cooling load, while minimizing oversizing for the heating function to the extent possible.

Ground Source Heat Pump (GSHP) system: An HVAC system comprising one or more heat pumps, ground loops, interior distribution systems and terminal units that enables the air and/or water in buildings to be conditioned by exchanging thermal energy with the ground, ground water, or other natural body of water.

Heat Pump System: One or more heat pump appliances installed in a building to provide partial or full load heating and cooling to the building's conditioned space. The heat pump appliances and associated components may be centrally or separately controlled. In a multifamily building in which a central heating plant serves more than one apartment, the heat pump system must be designed and installed to provide heating to all of the individual apartments and common areas otherwise served by the central heating plant.

Heat Pump System Heating Capacity: For buildings whose BHL exceeds BCL, the heat pump system heating capacity shall be as small as possible to satisfy BHL, while minimizing oversizing for the cooling function to the extent possible with available equipment.

Heat Pump System Cooling Capacity: The sum of the cooling output of all heat pump appliances in the system, expressed in British Thermal Units per hour (Btu/h), at the cooling design temperature used for the building cooling load (BCL) calculation. For buildings whose BCL exceeds BHL, the heat pump system cooling capacity shall be as small as possible to satisfy BCL, while minimizing oversizing for the heating function to the extent possible with available equipment.

Heat Pump Water Heater (HPWH): HPWHs are water heater tanks that heat domestic hot water or process hot water through the use of an onboard air source heat pump that extracts heat from the air in the building surrounding the unit. They use a secondary electric resistance as a back-up to ensure that the water temperature meets the desired setpoint during times of high demand. Air source HPWH models come in two versions (integrated and split-system HPWH) and both versions are eligible for incentives under the program.

Incentive Category: Grouping in the NYS Clean Heat Program reflecting applicable technology type, system size, customer type, and incentive structure.

Installer: Individual or entity that installs a heat pump system. Requirements to be an eligible installer in the NYS Clean Heat Program are described in the NYS Clean Heat Program Manual.

International Ground-Source Heat Pump Association (IGSHPA): An association established to advance GSHP technology, which conduct geothermal research and installer training and accreditation.

Mini-Split Heat Pump (MSHP): A type of cold climate ASHP or ccASHP that can circulate refrigerant between an outdoor unit containing a variable capacity compressor and one or more indoor air handlers. MSHPs are often referred to as “ductless mini-splits” because they are typically ductless. These units can also be installed with short duct runs that enable single air handlers to serve more than one room at a time.

MMBtu of Annual Energy Savings: Estimation of first-year site energy savings, which accounts for both the decreased fuel and the change in electricity consumed at the site.

Nonconformances: In the field assessment inspection process, specific deviations or work that fails to meet the quality standard established for program requirements, industry standards and quality requirements.

Partial Load Heating System: A partial load heating system is a primary, first stage, heat pump system installed alongside a supplemental, second stage, heating system for the purpose of providing heating. The supplemental heating system may be either the existing system or a new system. In this type of system, the total heat pump system heating capacity satisfies <90% of the building's design heating load (“BHL”) at design conditions.

Participating Contractor: ASHP and GSHP designer and installer that is eligible to apply for and receive incentives under the NYS Clean Heat Program. To become a Participating Contractor, an entity must

submit the statewide Participating Contractor Application and a Contractor Participation Agreement for each Electric Utility service territory where work will be performed (available at <https://saveenergy.ny.gov/NYScleanheat/become-participating-contractor/>). Upon approval, the applicant will receive an approval notification from the Electric Utility and become eligible to apply for incentives in the Program. GSHP drillers must also be approved through this process to become a “participating driller,” but are not eligible to submit for and receive incentives. Each GSHP installation must be completed by a participating driller. Contractors installing only HPWH do not have to be a Participating Contractor to submit an incentive application on behalf of a customer.

Packaged Terminal Heat Pump (PTHP): A packaged terminal heat pump is a wall sleeve and a separate un-encased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall, and that is industrial equipment. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of hot water, steam, or electricity. A PTHP utilizes reverse cycle refrigeration as its primary heat source and is equipped with supplementary heating via hot water, steam, or electric resistant heat.

Prescriptive Incentive Category: Incentive Categories 1, 2, 3, 5,7, 8, and 9.

Variable Refrigerant Flow Heat Pump (VRF): VRF systems circulate refrigerant between a variable capacity compressor and multiple indoor air handlers, each capable of individual zone temperature control. VRF systems can be built with heat recovery and cooling capabilities that allow simultaneously heating to some zones and cooling to other zones.

11. Appendix 2: Calculating Sizing Ratios in the New York State Clean Heat Program Guide

1. Cold Climate Air Source Heat Pump / Mini-Splits (Category 2, <65,000 btu/hr)

AHRI Test Method: 210/240

$$\text{Heating Sizing Ratio} = \frac{\text{Max Heating Capacity at Design Temperature, F}}{\text{Calculated Heating Load}}$$

$$\text{Cooling Sizing Ratio} = \frac{\text{Min Cooling Capacity at Design Temperature, F}}{\text{Calculated Cooling Load}}$$

Maximum heating and cooling capacities at design temperatures may be obtained in the following ways:

- a. Download the NEEP certificate for the appropriate make/model heat pump. Linearly interpolate (if necessary) between the known maximum heating capacities at 5 degrees and 17 degrees to obtain the maximum heating heat pump performance at the design temperature. For cooling, linearly interpolate (if necessary) between known minimum cooling capacities at 95 degrees and 82 degrees to obtain the maximum cooling performance at the design temperature.
- b. Obtain manufacturer-specific performance and capacity data at the design temperature or use manufacturer software that provides equipment performance and capacity at the design temperature.

If a heat pump is tested under AHRI 210/240 and is not NEEP certified it would not be eligible for program Category 2 Incentives. Instead, product may be eligible for Category 4 *Custom Space Heating Applications* incentives.

Example using NEEP method: Downstate location with heating design temperature at 12°F.

Heating Design Temperature: 12°F

Proposed Heat Pump Make: Fujitsu

Proposed Heat Pump Model: AOU36RLAVM

Maximum Heating Output at 5°F: 37,900 btu/hr

Maximum Heating Output at 17°F: 42,000 btu/hr

Heating Load at 12°F: 38,500 btu/hr

$$\frac{42,000 \text{ btu/hr} - 37,900 \text{ btu/hr}}{17 \text{ degree} - 5 \text{ degree}} = \frac{42,000 \text{ btu/hr} - x \text{ btu/hr}}{17 \text{ degree} - 12 \text{ degree}}$$

$$x = 40,291.67$$

$$\text{Heating Sizing Ratio} = \frac{40,291.67 \text{ btu/hr}}{38,500 \text{ btu/hr}} = 1.05$$



FUJITSU J-Series
 Multizone All Non-ducted
 AHRI Cert #: **8693480**
 Outdoor Unit #: **AOU36RLAVM**
 Indoor Unit #:

INFINITE COMFORT

- Maximum Heating Capacity (Btu/hr) @5°F: **37,900**
- Rated Heating Capacity (Btu/hr) @47°F: **42,000**
- Rated Cooling Capacity (Btu/hr) @95°F: **36,000**

Information Tables

Brand	FUJITSU
Series	J-Series
Ducting Configuration	Multizone All Non-ducted
AHRI Certificate No.	8693480
Outdoor Unit #	AOU36RLAVM
Indoor Unit Type	Non-Ducted Indoor Units
Indoor Unit #	
Furnace Unit #	
SEER	19
EER	13.3
HSPF Region IV	11.4
Energy Star	✓
Variable Capacity	✓
Turndown Ratio (Max 5°F/Min 47°F)	2.3
Capacity Maintenance (Max 5°F/Max 47°F)	90%
Capacity Maintenance (Rated 17°F/Rated 47°F)	61%
Capacity Maintenance (Max 5°F/Rated 47°F)	90%
Integration	
Connectivity	
Operational Diagnostics	
Refrigerant(s)	

Performance Specs

Heating /Cooling	Outdoor Dry Bulb	Indoor Dry Bulb				
			Unit	Min	Rated	Max
Heating	-4°F	70°F	Btu/h	12,960	-	33,600
			kW	1.13	-	3.74
			COP	3.36	-	2.63
Heating	5°F	70°F	Btu/h	14,860	-	37,900
			kW	1.1	-	4.06
			COP	3.96	-	2.74
Heating	17°F	70°F	Btu/h	16,460	25,800	42,000
			kW	1.2	2.7	4.43
			COP	4.02	2.8	2.78
Heating	47°F	70°F	Btu/h	16,460	42,000	42,000
			kW	0.87	3.2	3.2
			COP	5.54	3.85	3.85
Cooling	82°F	80°F	Btu/h	18,190	-	36,000
			kW	0.95	-	2.37
			COP	5.61	-	4.45
Cooling	95°F	80°F	Btu/h	18,190	36,000	36,000
			kW	1.09	2.71	2.71
			COP	4.89	3.89	3.89

Heating/Cooling Capacity Graph



Figure 1: NEEP Certification ccASHP

2. Category 4: Larger Unitary Heat Pumps (>65,000 btu/hr)

AHRI Test Method: 340/360

$$\text{Heating Sizing Ratio} = \frac{\text{Heating Capacity at Design Temperature}}{\text{Calculated Heating Load}}$$

$$\text{Cooling Sizing Ratio} = \frac{\text{Cooling Capacity at Design Temperature}}{\text{Calculated Cooling Load}}$$

Heating and cooling capacities at design temperatures may be obtained in the following ways:

- a. Download the AHRI certificate for the appropriate make/model heat pump. Extrapolate (if necessary) between the known certified rated heating capacities at 17 degrees and 47 degrees to obtain the heating heat pump performance at the design temperature. For cooling, use AHRI cooling capacity at 95 degrees directly as values cannot be extrapolated from the AHRI certified data.
- b. Obtain manufacturer specific performance data at the design temperature.

Example using AHRI method: Downstate location with heating design temperature 15°F and cooling design temperature 87°F.

Heating Design Temperature: 12°F

Cooling Design Temperature: 87°F

Proposed Heat Pump Make: Daikin

Proposed Heat Pump Model: DPS010AHHE2

Rated Heating Output at 17°F: 62,000 btu/hr

Rated Heating Output at 47°F: 105,000 btu/hr

Rated Cooling Output at 95°F: 119,000 btu/hr

Heating Load at 12°F: 56,000 btu/hr

Cooling Load at 17°F: 118,000 btu/hr

$$\frac{105,000 \text{ btu/hr} - 62,000 \text{ btu/hr}}{47 \text{ degree} - 17 \text{ degree}} = \frac{105,000 \text{ btu/hr} - x \text{ btu/hr}}{47 \text{ degree} - 12 \text{ degree}}$$

$$x = 54,833 \text{ btu/hr}$$

$$\text{Heating Sizing Ratio} = \frac{54,833 \text{ btu/hr}}{56,000 \text{ btu/hr}} = 0.978$$

$$\text{Cooling Sizing Ratio} = \frac{119,000 \text{ btu/hr}}{118,000 \text{ btu/hr}} = 1.008$$



Certificate of Product Ratings

AHRI Certified Reference Number : 5831165

Date : 03-31-2021

Model Status : Active

Brand Name : DAIKIN

Model Number : DPS010AHHE2**-4*

AHRI Type : HSP-A

Refrigerant Type : R-410A

Hertz : 60

Sold In? : USA, Canada, Outside USA and Canada

Rated as follows in accordance with the latest edition of AHRI 340/360 Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment and AHRI 365 and subject to rating accuracy by AHRI-sponsored, independent, third party testing:

Cooling Capacity 95F/Cooling Capacity 95F at 230v : 119000/119000

EER 95F/EER 95F at 230v : 11.70/11.70

Heating Capacity 47F/Heating Capacity 47F at 230v : 105000/105000

COP 47F/COP 47F at 230v : 3.42/3.42

Heating Capacity 17F/Heating Capacity 17Fat 230v : 62000/62000

COP 17F/COP 17Fat 230v : 2.38/2.38

IEER/IEER at 230v : 18.0/18.0

The following data is for reference only and is not certified by AHRI

Full Load Indoor Coil Air Quantity (scfm) : 3850

Figure 2: AHRI Large Unitary Heat Pump

Note that if interpolation/extrapolation of heating capacities using the AHRI method results in irregularities, reviewers shall request manufacturer specific performance data at the design temperature.

If product is not AHRI rated, manufacturer performance-specific data may be used. For non-AHRI rated equipment, performance data should be provided at the same rated conditions as the applicable AHRI test method for the purposes of determining eligibility.

3. Category 4: Air Source Variable Refrigerant Flow

AHRI Test Method: 1230

$$\text{Heating Sizing Ratio} = \frac{\text{Heating Capacity at Design Temperature}}{\text{Calculated Heating Load}}$$

$$\text{Cooling Sizing Ratio} = \frac{\text{Cooling Capacity at Design Temperature}}{\text{Calculated Cooling Load}}$$

Heating and cooling capacities at design temperatures may be obtained in the following ways:

- a. Downloading the AHRI certificate for the appropriate make/model heat pump. Extrapolate (if necessary) between the known certified rated heating capacities at 17 degrees and 47 degrees to obtain the heating heat pump performance at the design temperature. For cooling, use AHRI cooling capacity at 95 degrees directly as values cannot be extrapolated from the AHRI certified data.
- b. Obtaining manufacturer-specific performance data at the design temperature

Note that if interpolation/extrapolation of heating capacities using the AHRI method results in irregularities, reviewers shall request manufacturer specific performance data at the design temperature.

Relevant example showing AHRI method is provided in Section 2 Above.

If product is not AHRI rated, manufacturer performance specific data may be used. For non-AHRI rated equipment, performance data should be provided at the same rated conditions as the applicable AHRI test method for the purposes of determining eligibility.

4. Category 3/4: Geothermal Heat Pumps

Heating and cooling capacities at design temperatures may be obtained in the following ways:

- a. Downloading the AHRI certificate for the appropriate make/model heat pump and pulling the certified full load heating and cooling capacities directly from certificates to calculate sizing ratio.
- b. Obtain manufacturer specific performance data at the design temperature.

Test Method: ANSI/AHRI/ASHRAE/ISO Standard 13256-1

$$\text{Heating Sizing Ratio} = \frac{\text{Full Load Heating Capacity at Design Temperature}}{\text{Calculated Heating Load}}$$

$$\text{Cooling Sizing Ratio} = \frac{\text{Full Load Cooling Capacity at Design Temperature}}{\text{Calculated Cooling Load}}$$

Example:

Make: Ice Air

Model: 8VSHPG12

Full Load Heating Capacity: 9,000 btu/hr

Heating Load: 8,000 btu/hr

$$\text{Heating Sizing Ratio} = \frac{9,000 \text{ btu/hr}}{8,000 \text{ btu/hr}} = 1.125$$

Certificate of Product Ratings

AHRI Certified Reference Number : 205746251

Date : 11-19-2020

Model Status: Active

Old AHRI Reference Number :

Product : Water-to-Air and Brine-to-Air

Model Number : 8VSHPG12**

Brand Name : ICE AIR LLC

Rated as follows in accordance with ANSI/AHRI/ASHARE/ISO Standard 13256-1 Water-to-Air and Brine-To-Air Heat Pumps and subject to verification of rating accuracy by AHRI-sponsored, independent third party testing:

	Full Load	Part Load1	Part Load2	Part Load3
Air Flow Rate - Cooling:	500			
Air Flow Rate - Heating:				



Figure 4: Geothermal AHRI Certificate

If equipment is being installed in non-standard temperatures, option B should be followed to calculate sizing ratio. The participating contractor will be required to submit manufacturer performance data at the specific design conditions. The AHRI method will apply in most circumstances.

If product is not AHRI rated, manufacturer performance-specific data may be used. For non-AHRI rated equipment, performance data should be provided at the same rated conditions as the applicable AHRI test method for the purposes of determining eligibility.