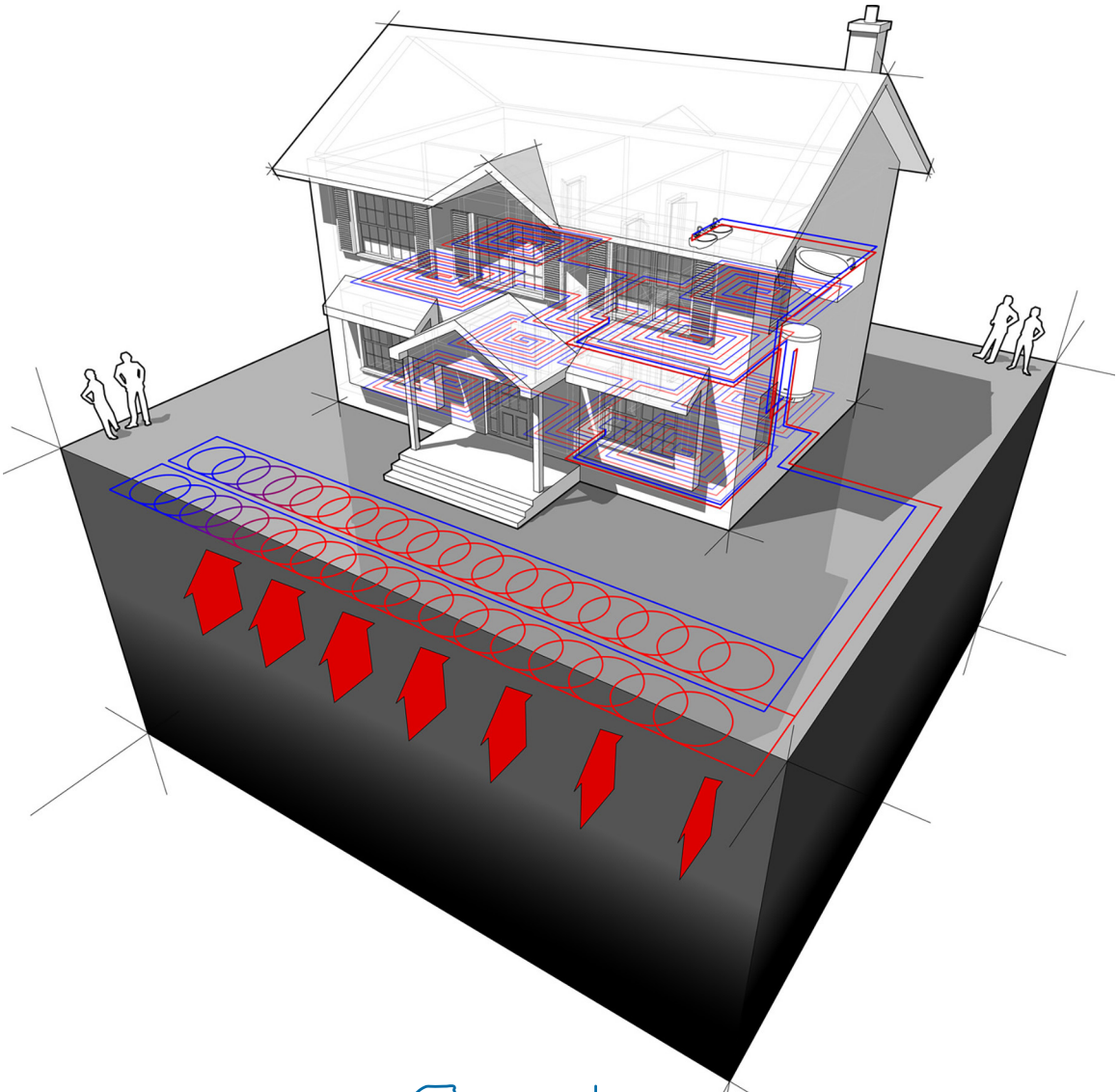
Ground Source Heat Pump Rebate Program

Program Manual

For Participating Contractors

November 2019



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1 Program Summary

The New York State Energy Research and Development Authority (NYSERDA) allocated up to $26.5 million toward rebates for the installation of ground source heat pump (GSHP) systems that meet the requirements set forth in this program manual. GSHP systems transfer thermal energy between the ground and a building to heat and cool without any harmful emissions or additional fuel. By participating in NYSERDA's GSHP Rebate initiative, GSHP professionals will be able to provide customers with multiple benefits at lower costs and reach communities for which this clean technology could otherwise be unaffordable. GSHP technology can provide customers with the following:

- Lower and less volatile annual energy bills, especially advantageous for customers with fixed, low, or moderate incomes and service-oriented institutions like nonprofits, schools, community centers, and houses of worship.
- Greater resiliency and reliability during disruptions to grid-connected heating and cooling sources.
- Greater comfort and health because of added air conditioning and improved indoor air quality delivered by emissions-free technology.
- A long-term solution to heating and cooling needs is easier to maintain than alternatives.

Rebate funding for GSHP systems has been designated by the New York State Public Service Commission through the Clean Energy Fund. Funding is available only for projects located at sites that currently pay or will pay (for new construction projects) the System Benefits Charge surcharge on their electric bills (SBC surcharge).

NYSERDA categorizes GSHP into two tiers.

Tier 1. Small systems, comprising the following:

- GSHP systems installed at any single-family residential site[1] (regardless of GSHP system capacity)
- GSHP systems with 10 tons or less of cooling capacity that are installed at non-residential sites Applications for small system project are eligible for rebates in the following amounts:
    - Projects located in areas affected by a utility company natural gas moratorium can take advantage of enhanced rebates of $1,875 per ton of cooling capacity through the Clean Energy Action Plan. Rebates for GSHP systems installed at single-family residences located in such areas are limited to $18,750.
    - Projects located in areas not affected by a utility company natural gas moratorium are eligible for rebates in the amount of $1,500 per ton of cooling capacity. Rebates for GSHP systems installed at single-family residences located in such areas are limited to $15,000.

Tier 2. Large systems, comprising GSHP systems installed at non-single-family residential sites that have a capacity of more than 10 tons of cooling capacity.

Rebates are granted on a first-come, first-served basis, with applications accepted through March 31, 2020,[2] or until funds are fully committed, whichever occurs first. This rebate is for qualified designers and installers of eligible GSHP systems. Site owners interested in this initiative should find a NYSERDA-approved designer or installer to evaluate a home or business project.

Rebates will be paid to the participating designer or participating installer, but 100% of the rebate amount must be passed along or credited to the GSHP system owner without any right of setoff or deduction.

Visit nyserda.ny.gov/Contractors/Find-a-Contractor/Ground-Source-Heat-Pump-Systems to locate an approved contractor.

Nothing in this rebate manual is intended to violate or supersede applicable laws or regulations. If any provision of this rebate manual contradicts applicable laws or regulations, then those laws and regulations govern; however, if a term or condition provided in this rebate manual is more stringent than the standards established by applicable laws or regulations, then the rebate applicant will comply with the term or condition specified in this manual.

Contact Information

To learn more about NYSERDA's programs and funding opportunities, visit nyserda.ny.gov or follow us on Twitter, Facebook, YouTube, or Instagram.

Questions may be submitted by email to the Clean Heating and Cooling mailbox at gshp@nyserda.ny.gov or directed to Elizabeth Markham at (518) 862-1090 x3386.

2 How to Participate in the Program

2.1 Apply to Become a Participating Installer, Designer, or Driller

To apply for rebates under this program, applicants must first apply to become either a "participating installer" or "participating designer" or both.[3] If you, as a site owner, would like to install a GSHP in your home or property, NYSERDA encourages you to learn more about ground source heat pumps and look for an approved designer or installer to participate. You can also encourage potential designers and installers to apply to become participants in the program.

Visit nyserda.ny.gov/Researchers-and-Policymakers/Geothermal-Heat-Pumps for information on ground source heat pumps.

Visit nyserda.ny.gov/Contractors/Find-a-Contractor/Ground-Source-Heat-Pump-Systems for approved contractors.

Please note that applicants receiving rebates must pass along 100% of the rebate amount to the GSHP system owner without any right of setoff or deduction.

The process by which installers, designers, and drillers are approved by NYSERDA as "participants" is through the submission of the participation application and agreement. The participation applications and agreements can be accessed and submitted on the GSHP website.

Visit nyserda.ny.gov/Participation-Application for the participation application.

Visit nyserda.ny.gov/GSHP-Rebate-Participation-Agreement for the participation agreement.

The participant application requires all interested installers, designers, and drillers to review and agree to the requirements set forth in this program manual as well as the GSHP program participation agreement.

Entities applying to become participating installers or designers (but not drillers) must indicate the program tier (small-scale GSHP system and/or large-scale GSHP system) for which they intend to submit rebate applications.[4] Participants must be separately approved by NYSERDA to apply for rebates under each tier (small-scale or large-scale) and are listed separately on NYSERDA's website by tier if approved.

Information on the requirements and qualifications for the application—to become a NYSERDA-approved participating installer, designer, or driller—can be found in section 5 of this rebate manual. The GSHP Participant Contractor User Guide at nyserda.ny.gov/GSHP-Contractor-User-Guide provides more detailed instructions regarding how to complete and submit the application.

2.2 Receive Status Notification/Approval from NYSERDA

Upon approval, the applicant will receive an approval notification from NYSERDA and become eligible to apply for rebates in the program. New installers and designers are initially granted provisional status until the successful completion of three projects. New participating drillers approved by NYSERDA are immediately granted full status. If the participant is not approved by NYSERDA, the opportunity to re-apply is an option. More information on this process can be found in section 7.

2.3 Confirm Project Eligibility and Apply for Rebate

To apply for a rebate, the applicant must submit the rebate application and associated documents at portal.nyserda.ny.gov/login through NYSERDA's Salesforce application. Detailed instructions for completing and submitting rebate applications for can be access through the following websites:

Visit nyserda.ny.gov/GSHP-Small-System-Incentive-Guide for small GSHP systems.

Visit nyserda.ny.gov/GSHP-Large-System-Incentive-Guide for large GSHP systems.

Rebate applications are accepted for eligible projects that meet the requirements set forth in section 3 of this manual. Rebate applications must include the following:

- Main rebate application: To be completed in Salesforce and signed by the participant, site owner, and the system owner—and includes contact information for key project staff, site information, and data on the proposed GSHP system.
- Evidence: Each heat pump to be installed must be ENERGY STAR® listed on the ENERGY STAR website or must have Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Rating Certification for each heat pump model; provided, however, for units installed in non-residential sites or heat pumps with capacity larger than 135,000 Btu/hr., which are not rated by AHRI, manufacturer specification sheets can be submitted instead. The units must have been tested in accordance with AHRI/ISO 13256-1, 13256-2, AHRI 550/590, or 870/871 as applicable.

Visit https://www.energystar.gov/productfinder/product/certified-geothermal-heatpumps/results for ENERGY STAR's website.

- The following is required for GSHP systems installed at single-family residential sites:
    - The ACCA Manual J (residential) calculation of the heating, cooling, dehumidification, and domestic hot water load, as described in section 3.
    - If a project is selected for a design review, design documents are requested as uploads in the Salesforce portal. Documents should be submitted in PDF format, unless NYSERDA requests an alternative format.

- The following is required for any large-scale systems GSHP system or any GSHP system installed at non-single-family residential sites and:
    - A preliminary assessment of technical viability conforming to section 3 of this manual and the GSHP Rebate Large Project Preliminary Technical Analysis form. Visit nyserda.ny.gov/GSHP-Large-Project-Technical-Analysis on the NYSERDA website.
    - Designs for the GSHP systems. Minimally, the following design documents should be generated and uploaded in Salesforce:
        - Heating and cooling load calculations performed utilizing methodologies in compliance with ASHRAE/ACCA Standard 183
        - Loop field sizing report
        - Equipment schedule
        - Schematic of location of boreholes
        - Piping schematic for piping in loop field
        - Preliminary above-grade mechanical plans

Note: Rebate applications for large GSHP systems will not be accepted if construction of the loop field for such project has begun before NYSERDA sends the rebate application an approval notice.

2.4 Receive Project Approval Notification from NYSERDA

NYSERDA will endeavor to notify rebate applicants of the status of each rebate application within 30 business days of receipt. If the rebate application meets all program requirements and funding remains available, NYSERDA issues an approval notification (for small systems) or an award letter (for large GSHP systems) to the applicant via email that provides rebate details, including the rebate amount.

NYSERDA will not approve rebate applications with missing or inaccurate information. NYSERDA will contact the rebate applicant and request the missing and/or correct information. The rebate application will be rejected if the information is not provided or corrected within 15 business days after the request or after three requests by NYSERDA. A rejected rebate application can be resubmitted.

If the rebate application is for a small project, NYSERDA strongly recommends that rebate applicants wait to start installation until after NYSERDA has reviewed the application and notified the applicant of the approval or rejection. Projects that do not meet the requirements in this manual are not eligible to receive rebates.

2.5 Complete Project

Small Projects must be completed within 12 months of the date of the approval email for projects at existing buildings and within 24 months for projects at to-be-constructed buildings. In the event of unusual delays, the rebate applicant may request an extension of time to complete the project by submitting an email to gshp@nyserda.ny.gov explaining the reason for the delay. Extensions may be granted or denied at NYSERDA's discretion.

Before any milestone payment can be received for closed loop systems larger than 83 tons and for open loop systems larger than 830 tons, the participant must submit a completed Part 1 of the applicable New York State Environmental Quality Review (SEQR) form (see Section 6.1 below for SEQR requirements) to NYSERDA in Salesforce.

Prior to or upon project completion, the applicant submits in Salesforce the building permit(s) issued by the relevant Authority Having Jurisdiction (AHJ). If the AHJ does not require the issuance of a building permit for the project, the applicant submits a letter from the AHJ stating that it does not require the issuance of a permit for the project.

Upon project completion, the participant in cooperation with the system owner and/or site owner completes and submits in Salesforce (1) a copy of the certificate of compliance or certificate of occupancy (as applicable) issued by the AHJ (or a letter from the AHJ stating a building permit for the project will not be issued); (2) the project completion form; and (3) a completed GSHP manufacturer or distributor start-up sheet signed by the technician performing the start-up tests.

Large Projects must be completed within 24 months of the award date on the award letter for projects to be installed at existing buildings and 36 months for projects to be installed at to-be-constructed buildings. In the event of unusual delays, the rebate applicant may request an extension of time to complete the project by submitting an email to gshp@nyserda.ny.gov explaining the reason for the delay. Extensions may be granted or denied at NYSERDA's discretion. Documents and information required to apply for the large-project rebates can be found in section 4.3.

2.6 Receive Rebate Payment

Subject to NYSERDA's review and approval, rebates for small systems are paid in full to the applicant upon project completion. For rebate applications concerning large systems, an applicant receives a portion of the total rebate (a milestone payment) based on the completion of intermediate milestones and submission of deliverables. More information regarding payment (and the terms and conditions related thereto) can be found in section 4. Payments are issued according to NYSERDA's prompt payment policy.

3 Eligibility Requirements

3.1 Project Site Eligibility

Eligible sites include new and existing buildings that (1) are targeted for a GSHP system installation for space heating and cooling, domestic hot water, and/or process heating, and (2) pay or will pay the SBC surcharge on the electric bill. Eligible market segments include the following:

- Single-family residential
- Multifamily residential
- Commercial
- Institutional
- Industrial

Sites must be occupied year-round (or, in the case of planned installations at new construction sites, site owners must plan to have the site occupied year-round). GSHP systems used for processing heat must operate for more than 1,000 hours per year.

Eligible applicants affected by a utility company natural gas moratorium may take advantage of higher rebate caps through the Clean Energy Action Plan (see PON 3620). To learn more about the Clean Energy Action Plan and determine eligibility visit: nyserda.ny.gov/actionplan.

NYSERDA highly recommends that customers work with their preferred contractor and NYSERDA and/or their local utility (www.dsireusa.org/) to assess and implement energy efficiency opportunities related to building envelope and HVAC distribution before, or in coordination with, installing a GSHP system.

3.2 Project and System Eligibility Requirements

Projects and GSHP systems eligible for rebates must comply with the requirements described in this section and those specified in the technical requirements and quality assurance documents.[5] Visit nyserda.ny.gov/GSHP-Design-Review-Inspection-Checklist found on the NYSERDA website.

System Components

For projects installed at new construction sites, all components installed as part of an approved GSHP system must be new. For projects installed at existing sites, the heat pumps must be new and any GSHP system subcomponent or subassembly that is replaced should be replaced by a new subcomponent or subassembly. The use of used or refurbished equipment is not permitted under the program.

Qualified GSHPs

GSHPs must either be ENERGY STAR listed energystar.gov/productfinder/product/certified-geothermalheat-pumps/results or have an Air-Conditioning, Heating, and Refrigeration Institute (AHRI) rating under the following:

- ANSI/AHRI/ASHRAE/ISO Standard 13256-1 for water-to-air models
- AHRI Standard 13256-2 for water-to-water models
- AHRI Standard 550/590 for Heat Recovery Chillers
- AHRI Standard 870/871 for Direct Exchange (DX) models

In addition, for heat pumps that are not ENERGY STAR listed, each heat pump unit must have a Coefficient of Performance (COP) and an Energy Efficiency Rating (EER) that meets or exceeds the requirements listed in the GSHP Efficiency Requirements (see Tables 1 through 4).

Rebate applications for any heat pump less than 10 tons of cooling capacity must include an AHRI rating certificate for each heat pump model to be installed unless such heat pump is ENERGY STAR rated. 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.

Additionally, at the sole discretion of NYSERDA, projects utilizing Heat Recovery Chillers (HRC) and/or ground coupled variable refrigerant flow (VRF) heat pumps are considered for rebates under this program. The HRC must be tested in accordance with AHRI 550/590 and the ground coupled VRF heat pumps must be tested in accordance with ANSI/AHRI/ASHRAE/ISO Standard 13256-1. All units must meet the EER requirements stated in the following GSHP Efficiency Requirements section.

GSHP Efficiency Requirements (applicable to non-ENERGY STAR listed GSHPs)

Calculation of the EER and COP values in Tables 1 through 4 must be determined using the following AHRI-rated data:

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

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 1. 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 = (full load EER + part load EER)/2
- COP = (full load COP + part load COP)/2

GSHP systems that have capacities 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 2. 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.

GSHP systems that have capacities between two and 10 tons must have an AHRI-rated EER and AHRI-rated COP of no less than the following:

Table 3. Efficiency requirements applicable to units with capacities between 2 and 10 tons

System Type	EER	COP
Water-to-Air		
Closed-Loop Water-to-Air	17.1	3.6
Open-Loop Water-to-Air	21.1	4.1
Water-to-Water		
Closed-Loop Water-to-Water	16.1	3.1
Open-Loop Water-to-Water	20.1	3.5
Direct Exchange		
Direct Exchange	16.0	3.6

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

- EER = (full load EER + part load EER)/2
- COP = (full load COP + part load COP)/2

GSHP systems that have capacities greater than 10 tons must have EER and COP values of no less than those shown in Table 4. Because such units 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, or 870/871, as applicable.

Table 4. Efficiency requirements applicable to units with capacities greater than 10 tons

System Type	EER	COP
Water to Air		
Closed-Loop Water-to-Air	14.7	3.3
Open-Loop Water-to-Air	19.3	4.0
Water-to-Water		
Closed-Loop Water-to-Water	14.2	3.0
Open-Loop Water-to-Water	18.0	3.5
Direct Exchange		
Direct Exchange	N/A	N/A

Calculation of EER and COP values in Table 4 must be performed using the full-load EER and full-load COP. Heat recovery chillers must meet water to water heat pump efficiency requirements with similar capacities.

Heating and Cooling Load and Equipment Sizing Requirements for GSHP Systems Installed at Residential Sites

For rebate applications relating to GSHP systems installed as standalone heating or cooling sources at residential sites—unless provided otherwise by applicable laws, regulations, or codes, GSHP systems—must be sized in accordance with the Air Conditioning Contractors of America (ACCA) Manual S procedures and requirements.[6] Furthermore, the heating and cooling load calculation submitted as part of such rebate applications must accomplish the following:

- Perform in accordance with ACCA Manual J procedures (calculation of the building's peak heat load should be at the 99% dry bulb heating design temperature for the most relevant ACCA location).
- Heating set point temperatures may be between 68°F and 72°F and the ACCA Manual J calculations must be performed using software approved by the ACCA at www.acca.org/standards/approved-software listed on their website.

Such rebate applications must include the summary page of the ACCA Manual J analysis.

GSHP Systems Installed in Non-Residential Sites

For rebate applications relating to GSHP systems installed at non-single-family residential sites, the following must be implemented:

- Heating and cooling load calculations must be performed in accordance with the procedures described in the ASHRAE/ACCA Standard 183.
- Calculation of the building's peak heat load should be at the 99% dry bulb heating design temperature for the most relevant ACCA location. Heating set point temperatures may be between 68°F and 72°F.
- GSHP systems must be sized in accordance with C403.2.2 of the NYS Energy Code, which requires, in general, that system be sized no larger than necessary to satisfy the peak heating or cooling (whichever is larger) load.

Such rebate applications should include the heating and cooling load calculations.

Other GSHP Equipment Requirements

All GSHP systems and related building-energy systems must (1) be installed in accordance with the National Electric Code and manufacturer's specifications, and (2) conform to all applicable municipal, State, and federal codes, standards, regulations, and certifications as well as program requirements. Conforming to all codes and standards includes applying for and receiving a building permit, where

required by local code, and upon project completion, when receiving a certificate of occupancy from the applicable local building authority.

At a minimum, a participant or its subcontractor must possess a federal EPA 608 license to handle refrigerant and an electrician's license, where required by local code, to complete the electrical work on the heat pump.

For single-family residential systems, all compressors must use two-stage, multi-speed, or variable-speed drives, unless they are water-to-water units. Single-stage water-to-water systems are eligible for rebates, provided they include buffer/accumulator tanks sized per manufacturer recommendations.

GSHP Controls

For hybrid projects that include non-GSHP central HVAC and GSHP systems, it is recommended that an integrated multi-stage control be used if available. If a multi-stage control is not available, the applicant should advise the site owner on the use of two thermostats. Temperature settings can be adjusted to reduce backup heat and emphasize GSHP operation as desired.

Well/Borehole/Loop Field Requirements

General Requirements

- All projects must comply with New York State Department of Environmental Conservation
- DEC regulations for geothermal well drilling, which can be found at www.dec.ny.gov/energy/43303.html
- For non-DX systems, only polyethylene piping is appropriate for underground loop field piping.
- For large scale systems, applicant 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 as required by OSHA.
- Piping must be stored on site in a manner that prevents damage and the introduction of foreign matter, and grouting and admixtures must be received and stored in a way that protects them from moisture and contamination. Piping shall be kept free from damage, debris, and foreign matter during installation.
- 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 NYSERDA review and observation.
- Projects must meet all setback requirements by the local jurisdiction having authority or those requirements specified in the ANSI/CSA/IGSHPA C448 Series-16 Standard—whichever is stricter—and can be found at nyserda.ny.gov/GSHP-Setback-Requirements.
- 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.

Pumping power at design conditions—rated power (based on duty point):

- Small-scale systems: 100 watts per AHRI rated cooling ton
- Large-scale systems: 85 watts per AHRI rated cooling ton

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 NYSERDA. 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 2015 International Mechanical code and, therefore, maintain a minimum temperature differential between the loop and the flash point of the antifreeze solution of 50°F at all times.

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 applicant 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 applicant should follow the manufacturer's protocols.

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.

Rebate applications must quantitatively explain the method for determining pressure and flow rate. All projects must comply with DEC regulations for geothermal well drilling, which can be found at www.dec.ny.gov/energy/43303.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/IGSHPA C448.7, *Installation of standing column well heat pump system.*

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.

Rebate applications must include the file from the horizontal-loop design software showing inputs and system design specifications.

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:

- DX systems must have a minimum loop field length of 100 feet per 12,000 Btu/hr. 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 NYSERDA
- The entire well depth interval for DX wells is grouted with thermally enhanced grout with hydraulic conductivity below 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 and standards of ASHRAE 15

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 International Mechanical code and, therefore, maintain a minimum temperature differential between the loop and the flash point of the antifreeze solution of 50°F at all times.
- 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 vertically bored, closed-loop project greater than 360,000 Btu/hr. (30 tons) cooling capacity, 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 capacities between 10 and 30 cooling tons. Retrofits of existing GSHP systems are exempt from this requirement.

3.3 Warranty Requirements

Small GSHP Systems

For small GSHP systems (including all systems installed at single-family residential sites), rebate applicants 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 years. In addition, the warranty will cover the full costs, including labor and repair or replacement of components or systems.

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

Large GSHP Systems

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

3.4 Operations and Maintenance Requirements

The rebate applicant must provide a detailed operational handbook for the system owner that includes an overview of system design and operation. Upon final completion of the installation, the participating installer provides the customer with an operation and maintenance manual containing manufacturer's information on all the major components along with a schedule of any required system maintenance.

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

NYSERDA strongly recommends that GSHP systems include a performance monitoring system. Recommended best practices for performance monitoring of GSHP systems can be found at nyserda.ny.gov/GSHP-Best-Practices on the NYSERDA website. Rebate applicants should strongly encourage system owners to purchase a maintenance agreement.

4 Rebates and Awards

4.1 Small GSHP Systems

Rebate applications concerning small GSHP systems (i.e., those of any cooling capacity installed at single-family residential sites or those GSHP systems with less than or equal to 10 tons of cooling capacity that are installed at non-single-family residential sites) are eligible to receive rebates in the following amounts:

- Projects located in areas of affected by a utility company natural gas moratorium are eligible for enhanced rebates in an amount of $1,875 per cooling ton of capacity.
- Projects located in areas not affected by a utility company natural gas moratorium are eligible for rebates in the amount of $1500 per ton of cooling of capacity; subject to the limitations provided in section 4.3.

Rebates relating to projects concerning small GSHP systems are paid in a lump sum payment after, if NYSERDA in its sole discretion determines the project complete. Projects must be completed within 12 months of the date of the approval email for projects at existing buildings and within 24 months for projects at new construction buildings. In the event of unusual delays, the rebate applicant may request an extension of time to complete the project by submitting an email to gshp@nyserda.ny.gov, which may be granted at NYSERDA's discretion.

Prior to project completion, the applicant submits the applicable building permits required by the AHJ in Salesforce. If the AHJ does not require a building permit, then the applicant submits a letter from the AHJ stating a permit is not required for the project. A rebate payment is not made until and unless such permit (or letter from the AHJ stating that it will not require the issuance of a permit for such project) has been submitted to NYSERDA.

Prior to project completion, the applicant, in cooperation with the system or site owner, completes and submits in Salesforce (1) a copy of the certificate of compliance or certificate of occupancy (as applicable) issued by the AHJ (unless the applicant submitted a letter from such AHJ stating a building permit is not required for the project); (2) the GSHP Rebate Small Project Completion Form, which can be found at nyserda.ny.gov/GSHP-Small-Project-Completion-Form on the NYSERDA website; and (3) a completed GSHP manufacturer or distributor start-up sheet signed by the technician performing the start-up tests. A rebate payment will not be made until such deliverables have been submitted to NYSERDA.

4.2 Large GSHP Systems

Projects comprising large-scale GSHP systems (i.e., GSHP systems installed at non-residential sites and have a capacity > 10 cooling tons) are eligible to apply for the following rebates:

- Projects located in areas affected by a utility company natural gas moratorium are eligible for enhanced rebates of $1,500 per ton of cooling capacity.
- Projects located in areas not affected by a utility company natural gas moratorium are eligible for rebates of $1,200 per ton of cooling of capacity, subject to the limitations described in Section 4.3.

Projects must be completed within 24 months of the award date on the award letter for projects to be installed at existing buildings and 36 months for projects to be installed at newly constructed buildings. In the event of unusual delays, the rebate applicant may request an extension of time to complete the project by submitting an email to gshp@nyserda.ny.gov, which may be granted at NYSERDA's discretion. Subject to NYSERDA's review and approval, a portion of the total rebate (a milestone payment) is paid based on the completion of intermediate milestones and submission of milestone deliverables.

Before any milestone payment can be received for closed loop systems larger than 83 tons and for open loop systems larger than 830 tons, the participant must submit a completed Part 1 of the applicable SEQR form (see Section 6.1 below for SEQR requirements) to NYSERDA in Salesforce

The applicant submits in Salesforce, in addition to other required documentation, the applicable building permits required by the AHJ as part of its milestone 1 deliverables (as described below). If the AHJ does not require a building permit, then the applicant submits a letter from the AHJ stating a building permit is not required for the project. As one component of its milestone 3 deliverables, the applicant submits a copy of the certificate of compliance or certificate of occupancy (as applicable) issued by the AHJ, unless the applicant submitted a letter from such AHJ stating a building permit is not required.

Table 5 further describes the various milestones and related deliverables that the applicant must complete and submit:

Table 5. Project Milestones and Related Applicant Deliverables

Project Milestones			
Milestone	Deliverables Summary	% of Award	Time Allowed (from Award Date)

Milestone 1: System design	Completion of system design and details described in section 3, including the following: Loop/site plan Loop sizing report (flexible) Loop field pressure drop calculations Antifreeze type and concentration A piping schematic accurately representing below grade and above grade piping strategy Building permit (or letter from AHJ stating a building permit is not required) Completed Part 1 of SEQR Full Environmental Assessment Form (FEAF) or Short Environmental Form (SEAF) (if applicable)	10%	12 months (existing buildings); 24 months (yet to be constructed buildings)
Milestone 2: Loop field installation and commissioning	Loop field installation and commissioning documentation, including the following: Pressure testing per ASTM standard Flushing to remove any dirt or debris from the system For loop fields with glycol or organic antifreeze, sterilize with a chlorine shocking protocol that is similar to what is required in potable water plumbing systems Proof of flow/pressure drop to compare actual field measured data to design calculations	30%	18 months (existing buildings); 20 months (yet to be constructed buildings)
Milestone 3: Construction and commissioning	Certificate of compliance/certificate of occupancy issued by AHJ (unless applicant has submitted a letter from AHJ stating a building permit is not required) Visit nyserda.ny.gov/GSHP-Large-ProjectCompletion-Form for the GSHP Rebate Large Project Completion Form. Demonstration of start-up (one of the following): Commissioning report Manufacturer start-up sheets signed by the technician performing the startup tests	60%	24 months (existing buildings); 36 months (new buildings)

4.3 Limitations

- For projects comprising GSHP systems installed in single-family residence (regardless of actual installed capacity), the following limitations apply:
  - If the project is located in an area affected by a utility company natural gas moratorium, then the rebates are limited to no more than $18,750 per residence.
  - If the project is not located in an area affected by a utility company natural gas moratorium, then the rebates are limited to $15,000 per residence.
- Rebate amounts for projects comprising large-scale GSHP systems (regardless of actual installed cooling capacity), the following limitations apply:
  - If the project is located in an area affected by a utility company natural gas moratorium, then the rebates are limited to $5,000,000 per site (regardless of the number of buildings on the site).
  - If the project is not located in an area affected by a utility company natural gas moratorium, then the rebates are limited to no more than $500,000 per building but no more than $1,000,000 (regardless of number of buildings located on site).
- No single participant can receive more than 50% ($13.25 million) of the funding available through this program.
- NYSERDA reserves the right to further limit the number of rebates per participating installer, participating designer, site owner, site, or meter.

4.4 Rebate Structure and Modification to Awards

NYSERDA reserves the right to make changes in the rebate amount or availability (including the per project rebate cap) at any time. NYSERDA makes reasonable effort not to decrease rebate levels within the term of the program. If it becomes necessary to decrease the rebate levels, NYSERDA attempts to give reasonable notice to participants. Program changes are posted on NYSERDA's site: nyserda.ny.gov/AllPrograms/Programs/Ground-Source-Heat-Pump-Rebate.

Participants are also informed of any changes via email. Rebate amounts are not changed for any project once approved by NYSERDA. Any rebate application submitted to the program after a rebate change is processed at the new rebate level. Rebate applicants are prohibited from canceling submitted rebate applications and reapplying if the new rebate structure would result in a higher rebate amount. NYSERDA reserves the right to structure rebate payments differently to accommodate unique situations.

Note that if the design changes significantly after the rebate is awarded, but before submission of milestone 1, particularly if different heat pump models are selected, the rebate application form must be resubmitted. NYSERDA reviews the updated rebate application documents according to program criteria and may adjust the rebate amount or elect not to allow a modified or revised rebate.

For large-scale systems, NYSERDA (in its sole discretion) considers modifications to GSHP system designs and rebate awards until the milestone payment relating to the first milestone deliverable is made. Modifications must be substantive (e.g., the addition of heated or cooled space that was not anticipated in the original application). Award modifications for less than $25,000 are not considered. If modifications are approved, NYSERDA issues a revised award letter with the appropriate award amount.

NYSERDA may reject a rebate application or modify an award in its sole discretion for any of the following reasons:

Qualifications: Project participants' qualifications or past performance on NYSERDA-supported projects did not meet program requirements.

Planning: The project has not had sufficient design planning, installation, and/or permitting.

Design: The project design is poor and/or does not meet the intent of the program.

Risks: Sufficient project risks exist with the technology, site, installation, or project participants and/ or there is sufficient risk (in NYSERDA's sole determination) that the project will not be brought to completion.

Cost-effectiveness: The project (1) has not demonstrated sufficient cost-effectiveness to the site owner or to NYSERDA; (2) the project costs are too high; or (3) the rebate level is not appropriate relative to the project costs (NYSERDA will scrutinize all projects with costs greater than $12,000 per cooling ton).

Quality of rebate application: The quality of the rebate application or responsiveness of the applicant is insufficient in NYSERDA's sole determination.

5 Designer, Installer, and Driller Participation

5.1 Installer Credentials

An installer seeking to become a participating installer must complete and submit for NYSERDA's approval a participation application and agreement, with a copy of a current (and in good standing) International Ground-Source Heat Pump Association (IGSHPA) accredited installer certificate.

5.2 Designer Credentials

Small GSHP Systems

A designer seeking to become a participating designer qualified for small GSHP systems must complete and submit a participation application and agreement, including a copy of an International Ground-Source Heat Pump Association (IGSHPA) accredited installer certificate with the participation agreement for NYSERDA approval.

Large GSHP Systems

A designer seeking to become a participating designer for large GSHP systems must complete and submit a participation application and agreement, including a copy of one of the following for NYSERDA approval:

- An active Certified GeoExchange Designer (CGD) certificate from the Association of Energy Engineers (AEE)/IGSHPA
- An active NYS Professional Engineering license and references for at least three GSHP projects designed, each more than 10 tons
- An active NYS Registered Architect license and references for at least three projects designed, each more than 10 tons

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

5.3 Driller Credentials

Vertical Loop Field Drillers

Drillers seeking to become participating drillers must complete and submit for NYSERDA's approval a participation application and agreement, including one of the following:

- 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
- IGSHPA accredited vertical loop installer certificate
- References from three participating installers

Direct Exchange (DX) Requirements

Since there are currently no available industry trainings or certifications, designers, installers, and drillers seeking to become program participants must submit a training certificate from a DX Ground Source Heat Pump manufacturer. NYSERDA reserves the right to review the training curriculum provided and reject manufacturer training certificates at its discretion.

5.4 Additional Participation Qualifications

Experience: Designers, installers, and drillers seeking to become participants are evaluated on past performance in this or other NYSERDA programs (if applicable), installation experience, other relevant credentials, employment history, customer satisfaction, and other relevant experience. Past project experience should be demonstrated by submitting one paragraph project summaries with customer contact information.

Performance in other NYSERDA programs: Neither a participation application nor an agreement will be processed if the applicant is listed as an installer, designer, driller, contractor, or sub-contractor on a delinquent system or project, or where customer unresolved or performance issues exist with respect to this or other New York State programs.

Other training and certification documents: It is optional, but strongly encouraged that applicants also submit additional documentation verifying completion of training programs, including the following:

Table 6. Applicant Qualifications

Applicant Certifications	
Applicant Role	**Certification/License/Degree**
Ground-loop designer (typically the designer)	CGD 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 (typically the 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 EPA 608 certification
Distribution system installer	HVAC excellence duct and envelope testing Plumbing license (hot water pipes)

6 Quality Assurance and Compliance

6.1 Compliance with Laws and Codes

All approved GSHP systems, system components, and installations must comply with any and all manufacturers' installation requirements, applicable laws, regulations, codes, licensing, and permit requirements. These include the New York State Environmental Quality Review (SEQR), the New York State Building Code, or New York State Residential Code, New York State Plumbing Code, New York State Mechanical 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.

For closed loop projects larger than 83 tons and open loop projects larger than 830 tons, the participating installer or designer is responsible for initiating the SEQR process with the Lead Agency (typically, the local AHJ). The participating installer or designer must complete Part 1 of the applicable SEQR form (FEAF for Type I Actions or SEAF for Unlisted Actions) (found on dec.ny.gov), submit it to the local AHJ, and ensure a Lead Agency is identified. The participating installer or designer will be required to submit the completed Part 1 of the FEAF or SEAF to NYSERDA.

For projects where the local AHJ declines to be the lead agent for GSHP systems, NYSERDA shall issue an independent review.

6.2 Mechanical Execution of Work

All equipment and accessories shall be installed in a professional manner.

6.3 Quality Assurance

NYSERDA maintains the integrity of the program through third-party design review services and an independent Standards and Quality Assurance (SQA) team. The QA system has several components including review of applicant professional qualifications and credentials, establishment of program standards and a comprehensive design review, and field and photo inspections. The requirements for and list of documents the applicant must provide for the design reviews and photo and field inspections can be found in the technical requirements and quality assurance documents on NYSERDA's website: nyserda.ny.gov/GSHP-Design-Review-Inspection-Checklist.

Field inspection includes verification of contracted scope of work, accuracy of site analysis, comparison of installation to submitted design drawings, and the delivered quality of the GSHP installation. The photo inspections are currently focused on loop fields as part of the overall QA efforts.

The NYSERDA SQA team or its representatives as well as NYSERDA's GSHP program team may make a reasonable number of visits to the customer site before, during, and/or after installation of a GSHP system. NYSERDA may contact the customer, system owner, or site owner independently on its own

initiative. QA inspections are typically conducted by a qualified independent third party competitively selected by NYSERDA.

Projects that have nonconformances related to critical (health and safety) or major (system performance) attributes will automatically fail. For a short summary of the QA process, please see "What to Expect When You Are Inspected" on NYSERDA's website: nyserda.ny.gov/GSHP-Inspection-Expectations.

6.4 Design Reviews; Field Inspections

The purpose of design reviews and field inspections is to provide NYSERDA with an opportunity to evaluate the accuracy of the site analysis, design paperwork, and the installed GSHP system to determine the actual energy savings for program evaluation purposes as well as verify the system was installed according to all GSHP program requirements.

NYSERDA selects both in-progress and completed projects for design reviews and/or field inspections following a rational sampling protocol with sampling rates primarily based on the participants current GSHP program status and whether the rebate application relates to a small or large GSHP system.

QA field inspections are scheduled at the site owner's convenience. The site owner is given the option of having the participating installer attend the field inspection. If the site owner declines to have the participating installer present at the time of the field inspection, no notice of scheduled field inspections is sent to the installer. If the site owner accepts the attendance of the participating installer, a notice of the scheduled field inspections is sent to both parties approximately one week in advance. NYSERDA makes a reasonable effort to accommodate the schedule of the installer, but the schedule of the system/site owner and efficient inspection scheduling take precedence.

Following the field inspection, NYSERDA 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 inspection following an internal review and scoring by NYSERDA. The report is made available to the site owner upon submission of a request at gshp@nyserda.ny.gov directly to NYSERDA.

NYSERDA may select any completed project at any point in the future for field inspection based on (1) site or system owner's complaints; (2) warranty related issues or a review of the work done by a participant under status review or program disciplinary action; and (3) for any other cause at the sole discretion of NYSERDA.

Small and Large Systems with Capacities up to 75 Tons

All participants who are new to the GSHP Rebate program have their first three projects design reviewed and/or field inspected. Small systems are subject to design reviews at NYSERDA's discretion. Based on the results of the reviews and/or inspections completed, NYSERDA may reclassify the participants to full, probationary, suspended, or terminated status.

For large systems with cooling capacities of 75 tons or less, NYSERDA generally conducts design reviews and/or field inspections on 15% of units installed by full-status participants. Probationary and suspended status participants are subjected to 30% inspection overall and up to 100% inspection on specific projects for cause.

Large Systems with Capacities over 75 Tons

All large projects over 75 tons are design reviewed and field inspected regardless of the status of the applicant.

6.5 Photo Inspections

The rebate applicant is required to take and retain construction photos of each project. The program may request construction photos for purposes of conducting a photo inspection at any time. These photos exhibit the important aspects of the work.

The minimum number and content of photos required by NYSERDA can be found in the worksheet "Minimum Required Photos" included in the technical requirements and quality assurance documents, found at nyserda.ny.gov/GSHP-Design-Review-Inspection-Checklist on the NYSERDA website.

If selected for a photo inspection, applicants receive an email with instructions from NYSERDA detailing where and how to upload the required project photos through Salesforce. The applicant 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 NYSERDA.

Photo inspection scores are taken into consideration, along with QA field inspection scores, when evaluating performance. At this time NYSERDA only conducts photo inspections to verify compliance with program requirements and technical standards related to the loop field installation. The program may request construction photos for purposes of conducting a photo inspection at any time.

6.6 Nonconformance and Corrective Actions

NYSERDA summarizes the results of the design reviews and/or photo and field inspections in an inspection report. The inspection report provides details of all nonconformances that were identified, an overall score of the project on a one to five scale, and identifies a pass or fail.

A project passes if there are no nonconformances or the nonconformances are only incidental or minor. A project fails if there are two or more major nonconformances identified or there is one critical nonconformance identified. Projects that have nonconformances related to critical (health and safety) or major (system performance) attributes automatically fail. All nonconformances are expected to be addressed and corrected in future work conducted in the program. Acknowledgment and plans for preventing future problems may be requested with the report. Participants are required to submit photo documentation of the resolution for all major and/or critical failures. Reports must be either disputed within 15 days or remedied within 30 days. If major or critical nonconformances are not

disputed or remedied within the stated timeframe, NYSERDA adjusts participant status as described in Section 7.

NYSERDA expects participants 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.

While some nonconformances cannot be corrected post-installation, others can be remedied through corrective action to the documentation, rebates applied to the project cost, or remediation of the installation or its components. NYSERDA may conduct a field verification of the remediated installation.

NYSERDA retains the right to provide a copy of the inspection report or specific information from the inspection directly to (1) the system and/or site owner; (2) all authorities having local jurisdiction based on health, safety, and compliance concerns; or (3) other entities at the sole discretion of NYSERDA. In an emergency NYSERDA or its representatives may shut down the system. NYSERDA notifies the participant as soon as possible whenever it takes such action.

NYSERDA may, at its sole discretion, communicate by voice and/or written format with any site or system owner about any matter relevant to a proposed or installed GSHP system. Such communications may be in reply to an inquiry from a customer or at NYSERDA's initiation.

7 Participation Status

Participants are classified in one of the following status designations: provisional, full, probationary, suspended, or terminated. Each designation is subject to limitations or requirements associated with that status.

NYSERDA reserves the right to modify the definition, limitations, and requirements of these designations. A participant's progression into and/or through any status designation is determined at NYSERDA's sole discretion. The designation or existence of a participant in any status category does not relieve or modify the nature or scope of such participant's responsibilities to fulfill any of its outstanding obligations under the program including, but not limited to, those obligations owing or relating to GSHP system or site owners.

7.1 Provisional Status

All new participating designers and installers are initially classified as provisional.

Requirements are as follows:

- Provisional designers and installers are limited to having 10 rebate applications in design review at a given time. Additional rebate application(s) may be submitted after the provisional designer or installer has been notified that previous projects or application(s) have passed NYSERDA's review.
- Provisional participants are strongly encouraged to attend at least the first three QA field inspections as it provides an opportunity to learn the field inspection process.
- Provisional installers and designers may be recommended for mentoring.

Following the completion of the third project review, NYSERDA conducts a formal review to evaluate a change in status. Evaluation for a change in status to full designer or installer is based on the quality and consistency of work and full compliance with program rules, including current qualifications.

7.2 Full Status

At NYSERDA's discretion, participants who 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 may be placed in full status.

Participating drillers are automatically deemed to have full status. Full designers, full installers, and full drillers (full participants) are listed on NYSERDA's website and may be denoted as such.

Full participants must realize the following:

- Consistently deliver projects that pass QA field inspections.

- Meet program standards in terms of timely responses to NYSERDA communications and corrective action requests relating to QA field inspections.
- Take effective corrective actions to deficiencies in performance as identified by NYSERDA.
- Maintain one of the credentialing standards referenced in section 5. Failure to satisfy this program requirement and present appropriate documentation results in an automatic downgrade to probationary status.

7.3 Probationary Status

Probationary status is reserved for participants 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 those results. Participants 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 QA field inspection standard
- Failure to take effective corrective actions on a critical or major deficiency or a repeated occurrence of 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 is not less than 30 days. Projects completed by participants on probationary status may receive enhanced QA oversight. During the probationary period, the participant can expect the following:

- Continues to be listed on the NYSERDA website
- May continue to submit new rebate applications, subject to restrictions based on the reason for the probationary status
- Is subject to higher QA inspection levels as outlined in this manual
- Must remediate all issues related to probation, as directed by NYSERDA
- Must submit to the program, in writing, an agreed-upon action plan designed to ensure future violations are avoided
- Must demonstrate successful results through a specified number of completed projects

Upon satisfactory completion of the action plan and all remediation and upon review of probationary period QA results, NYSERDA determines in its sole discretion whether to return the participant to full status, continue the probationary period, or suspend and/or terminate the participant from the program.

7.4 Suspended Status

Participants who have failed to respond to prescriptive probation or have committed more serious violations of program rules are placed in suspended status.

Participants 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 requests for return of rebate to NYSERDA due to failure to meet program requirements
- Have submitted any program or rebate application documentation in which any required items—including permits and approvals, and customer signatures—are falsified
- Have a lapse in required credentials while on probationary status
- Fail to consistently deliver completed projects that pass the QA inspection standard

During a suspension, at NYSERDA's request, the participant is restricted in the following ways:

- Not allowed to submit new rebate 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 participant except in the execution of remedial action
- Depending on the reasons for suspension, may be directed by NYSERDA 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 NYSERDA's sole discretion, suspended participants 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.

7.5 Terminated Status

Terminated status is reserved for participants—referred to as terminated participants—who have failed to respond to prescriptive and disciplinary measures or have committed serious violations of the program rules.

Participants may be terminated from the program in the following situations:

- Have been on suspended status for more than 30 days and have been unresponsive to 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 participant into question
- Are in gross violation of program standards
- Repeatedly bill for uninstalled measures
- Fail to meet the terms of the provisional period

Terminated participants are prohibited from participation in the program. Customers with incomplete projects are notified of the participant's termination. If appropriate, NYSERDA may notify the New York State Attorney General, the New York State Department of Labor, the Better Business Bureau, or others of NYSERDA's findings and decision to terminate the participant.

The officers, directors, and owners of the terminated participant are prohibited from being or becoming officers, directors, or owners of any other participant.

7.6 Status Review Process

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

- NYSERDA provides written notice of its intention to take action. This notice outlines the specifics for disciplinary action along with supporting documentation for the proposed action.
- During this period, the participant has five business days to dispute the program violation notification.
- If the participant fails to respond to NYSERDA prior to the end of the notice period, the stated disciplinary action goes into effect without further notice.
- NYSERDA endeavors to timely review any request for an appeal of the decision received before the end of the notice period.

NYSERDA reserves the right to shorten these notice periods or take immediate action if an emergency situation exists or is imminent.

8 Recommended Program Guidelines

NYSERDA encourages all participants to follow the best practices guide, which can be found at nyserda.ny.gov/GSHP-Best-Practices on NYSERDA's website. In addition, the following is a summary of optional, but strongly recommended, program guidelines, installation, and design practices that NYSERDA encourages all participants to follow:

- Rebate applicants wait to start installation until after NYSERDA has reviewed the application and notified the applicant whether the rebate application has been approved or rejected.
- Site and system owners work with NYSERDA and/or their local utility (www.dsireusa.org) to assess and implement energy efficiency opportunities related to building envelope and HVAC distribution before or in coordination with installing a GSHP system.
- Projects with capacities between 10 and 30 cooling tons should have test boreholes drilled and analyzed. Projects with capacities greater than 30 cooling tons to have test boreholes drilled and analyzed.
- NYSERDA strongly recommends that GSHP systems include a performance monitoring system.
- Rebate applicants seeking to become participating installers, designers, or drillers should submit any additional training and certification documentation, beyond the required documentation that would help bolster their credentials.
- Hybrid projects that include non-GSHP central HVAC systems and GSHP systems should use an integrated multi-stage control, if available. If a multi-stage control is not available, the applicant should advise the site owner on the use of two thermostats. Temperature settings can be adjusted to reduce backup heat and emphasize GSHP operation as desired.

9 Program Definitions

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.

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

Business Day: All days excluding Saturday or Sunday, or a day on which the Federal Reserve Bank of New York is closed.

Coefficient of Performance (COP): The ratio of heating provided to electrical energy consumed.

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

Cooling Load: The rate at which sensible and latent heat must be removed from the space to maintain a constant space design dry-bulb air temperature and humidity.

Cooling Ton: Unit of measure of rate of thermal energy equal to 12,000 British Thermal Units of energy removed per hour.

Corrective Action: Action(s) that must be undertaken by a participant at NYSERDA's direction to correct systematic deficiencies.

Designer: The entity responsible for project design and engineering.

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

Driller: The entity responsible for drilling boreholes and installing the ground-loop in connection with a project.

Energy Efficiency Ratio (EER): A measure of efficiency in the cooling mode that represents the ratio of total cooling capacity to electrical power input.

Full Designer: Designer who has met the requirements to be moved from provisional to full status.

Full Installer: Installer who has met the requirements to be moved from provisional to full status.

Full Status: The status participants achieve at successful completion of the provisional period, demonstrating through past performance quality service as described in section 6.

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 Recovery Chiller: A chiller capable of high efficiency with simultaneous cooling and heating.

Heating Load: The rate at which sensible and latent heat must be added to the space to maintain a constant space design dry-bulb air temperature and humidity.

Installer: The entity responsible for project installation.

International Ground-Source Heat Pump Association (IGSHPA): An association that conducts installer training and accreditation, which may be used as an installer qualification for this program.

Manual CS: The procedure for equipment selection provided through the methodology of the Air Conditioning Contractors of America (ACCA) Manual CS.

Manual J Heat Load Calculation: The calculation of a building's heating and cooling loads using the methodology of the Air Conditioning Contractors of America (ACCA) Manual J (Residential). This heat load represents a building's heating, cooling, and dehumidification capacity needed for a heating and/or cooling unit under design conditions.

Milestone Deliverables: Documents submitted to NYSERDA certifying that the project has met one of the two payment milestones—system design and equipment purchase, or construction and commissioning.

Participating Designer: A designer that has completed, executed, and submitted a participation agreement and been approved by NYSERDA to participate in the program.

Participating Driller: A driller that has completed, executed, and submitted a participation agreement and been approved by NYSERDA to participate in the program.

Participating Installer: An installer that has completed, executed, and submitted a participation agreement and been approved by NYSERDA to participate in the program.

Participation Agreement: The document that defines the terms and conditions of being a designer, installer, or driller in the program. The participation agreement outlines the roles and responsibilities of the designer, installer, or driller in the program and must be signed by the designer or installer before applications can be submitted to the program.

Participation Application: The form that a potential enrollee must complete and submit as part of applying to become a participant.

Project: The equipment and services required to design, build, and install the GSHP system (identified and contemplated in the application) and includes all the labor, permits, materials, equipment, and services relating to the GSHP system.

Project Completion: The status of a project at the stage the GSHP has been fully installed and operable, and, if applicable, the GSHP system has been commissioned.

Project Completion Date: The date on which project completion occurs.

Rebate: The amount awarded to the applicant and to be paid by NYSERDA to the applicant for installing the project.

Rebate Application: Documentation submitted on behalf of system owner to the program by the applicant requesting an award. The application consists of an application form, project narrative, participant's agreement, electric bill, heat load summary report, rating certificate, and other technical documentation.

Site: Collectively, the parcel or parcels of land on which the GSHP system ground loop(s) are to be constructed and the building or buildings the GSHP system heat pumps are to be installed are located.

Single-Family Residential System: A GSHP system serving a detached one-family dwelling or townhouse not more than three stories above-grade in height with a separate means of egress and their accessory structures and one-family dwellings converted to bed and breakfast dwellings.

Site Owner: The entity (or entities) that has (or will have) title to the project site(s).

Surcharge: The System Benefits Charge surcharge collected on a customer's electric utility bill.

System Owner: The entity (or entities) that has (or have) post-project completion date ownership rights to the project.

10 General Information

10.1 Waiver

The purpose of these requirements is to ensure that GSHP systems installed under this program are high-performing, high-quality installations, which is critical to enabling market growth. However, NYSERDA encourages innovation in design and installation practices that improve performance and lower costs. If a rebate applicant can substantiate that a deviation from a specific requirement will maintain or improve performance at a similar or lower cost, NYSERDA will consider granting a waiver to that specific requirement. NYSERDA strongly recommends all projects seek compliance with ANSI/CSA/IGSHPA C448.

10.2 NYSERDA Logo Use Disclaimer

There are very strict policies regarding use of NYSERDA's logo. There are very few companies that are eligible to use a version of NYSERDA's logo on their marketing materials or for any other purpose. For these purposes, there are three distinctive attribution marks: "Sponsored by NYSERDA", "Supported by NYSERDA," and an "Independent Contractor to NYSERDA." These attribution marks are distributed by NYSERDA and are evaluated on an individual basis for their appropriateness.

The Sponsored by NYSERDA logo is specifically for events that NYSERDA has provided funding to sponsor. The Supported by NYSERDA logo is intended specifically for companies that have received a contract award from NYSERDA, or in instances where NYSERDA is funding specific research, development, or deployment of an energy-efficient technology or service. The Independent Contractor logo is reserved for those contractors who have been tasked specifically with customer outreach on NYSERDA's behalf. In the case of geothermal Installers, ESCOs, participating builders, building contractors, and other organizations that have been qualified by NYSERDA, but not contracted or funded by NYSERDA, it is not appropriate for them to use NYSERDA's logo on their organizations' website or any marketing materials including business cards. In the future, visit nyserda.ny.gov/About/Resources/Logo-Requests.aspx should you have a need for NYSERDA's logo.

10.3 About NYSERDA

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

11 End Notes

1. "Residential sites" are sites with buildings that are subject to the requirements of the Residential Code 2015 of New York State (as amended periodically). Residential sites are detached one- and two-family dwellings and townhouses not more than three stories above-grade in height with a separate means of egress and their accessory structures and one-family dwellings converted to bed and breakfast dwellings.
2. The NYS Public Service Commission has directed NYSERDA and the State's utilities to develop a common state-wide heat pump program. NYSERDA anticipates that the state-wide program will be available in 2020. Should launch of the state-wide program be delayed NYSERDA may extend the open date for this PON.
3. Drillers must also be approved by NYSERDA through this process to become "participating drillers," but only participating installers and designers may submit rebate applications.
4. Entities applying for approval as participating installers/designers/drillers for ***both*** *the small- and large-scale tiers* should *only complete and submit* ***one*** participation agreement.
5. The Quality Assurance and Technical Requirements Lists are incorporated herein by reference and made a part hereof. If there is a conflict between the Quality Assurance and Technical Requirements Lists and the terms of this rebate manual, then the Quality Assurance and Technical Requirements Lists shall govern.
6. In general, heat pumps installed in residences 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. Manual S requires the minimum heat pump size be 120% of total cooling load for Multi-Speed and 130% for Variable-Speed Compressors. For open loop systems, the maximum size is 130% of total cooling load for Multi-Speed
7. Compressors and 135% for Variable-Speed. The minimum size of the heat pump (excludes supplemental electric resistance heat coil) is 90% of the total cooling load and 90% of the heating load (heat loss calculation). In heating only applications, the above limits apply to the Manual J Heat Loss Calculation. Where Manual J calculations clearly demonstrate latent loads less than 5% of total cooling load, the maximum sizing permitted is Manual J total cooling load plus 15,000 Btuh. Applicants must highlight Latent Loads if less than 5% in the Manual J Calculations.

State of New York
Andrew M. Cuomo, Governor

New York State Energy Research and Development Authority
Richard L. Kauffman, Chair | Alicia Barton, President and CEO