



NYSERDA

Renewable Heat NY Small Biomass Boiler Program Manual (Program Opportunity Notice 3010)

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1.0 Program Summary

1.1 What is the Renewable Heat NY Small Biomass Boiler Program?

The New York State Energy Research and Development Authority (NYSERDA) provides incentives toward the installed costs of high-efficiency, low-emission wood heating systems across New York State through the Renewable Heat NY (RHNY) program. Recent biomass technologies, which have higher efficiency and lower emissions, are a cleaner way to use wood for heat than traditional wood stoves and boilers, making them a viable alternative to propane or fuel oil. The high-efficiency systems also provide more automation, use less fuel, and often save Customers money.

The goal of the RHNY program is to spur wider market adoption of high-efficiency, low-emission wood heating through education, Customer support, and helping the development of New York-based advanced technology heating products. RHNY also aims to reduce wood smoke, fine particles, and carbon monoxide emissions. This program strongly encourages the retirement and proper recycling of old wood heating systems and replacement by advanced technologies.

The RHNY initiative includes the following individual programs:

- Small Biomass Boiler Program (residential and small commercial)
- Large Biomass Boiler Program (large commercial)
- Residential Pellet Stove Program

In the Small-Scale Biomass Boiler Program incentives are available, and paid directly to the Participating Contractor, for the installation of qualified residential and small commercial (1) [advanced cordwood boilers](#) with thermal storage and (2) [high-efficiency wood pellet boilers](#) with thermal storage that have been tested by the Brookhaven National Lab method and accepted by the New York State Department of Environmental Conservation (NYSDEC). The incentives are targeted towards retirement of high-emitting outdoor wood boilers (OWB), indoor wood boilers (IWB), and older wood stoves.

The incentives are available for the installation of qualified wood or pellet boiler systems, at eligible residential or commercial sites¹, through applications submitted by a Participating Contractor. Incentives are granted on a first-come, first-served basis, and applications will be accepted through December 31, 2021, or until funds are fully committed, whichever comes first. Low-interest rate loans are also available through the Green Jobs Green New York (GJGNY) Financing Program.

¹ A limited amount of funding is available for sites that do not pay into the System Benefits Charge (i.e. sites on Long Island or in municipalities). If your site does not pay into the SBC, please contact NYSERDA at RHNY@nyserda.ny.gov to inquire about non-SBC funding availability prior to applying.

1.2 How to Participate in the Program

The forms and documentation described in the following steps can be accessed on the Current Funding Opportunity page for the [Renewable Heat NY Program \(PON 3010\)](#).

How to Become a Participating Contractor

1. Confirm Eligibility

To become a Participating Contractor in the program, the contractor must complete the following training requirements:

- a) Manufacturer's training for the boiler brand(s) that will be installed. A certificate of completion or a letter from the manufacturer must be submitted as evidence of having successfully completed manufacturer's training, for each brand being installed.
- b) One (1) of the following:
 - Renewable Heat NY biomass training: "Hydronics for High-Efficiency Biomass Boilers," or other approved training.
 - An approved instructor-led or online training deemed by NYSERDA to cover the required learning objectives previously established for the "Hydronics for High-Efficiency Biomass Boilers" training. The alternate training must be approved in advance by NYSERDA to qualify for meeting this training requirement.

The "Hydronics for High Efficiency Biomass Boilers" training helps guide contractors to ensure properly sized and safe installation practices, reduced component failure, lower operations and maintenance costs, increased system longevity, and reduced system design and installation costs. Scheduled Instructor-led training will be available, as needed, and online training will be available continuously during the Program period. Registration is available from the website. (<https://www.nyserdera.ny.gov/All-Programs/Programs/Renewable-Heat-NY>)

2. Review and agree to the Program Manual and Contractor Participation Agreement

Prior to submitting a Contractor Participation Application Form, interested participants must review this Program Manual and the Contractor Participation Agreement.

3. Submit the Contractor Participation Application Form and Associated Documentation

To enroll, participants must submit to NYSERDA the Contractor Participation Application Form and all associated documentation, defined below, via email to RHNY@nyserdera.ny.gov.

a) Contractor Participation Application Form

b) Proof of Training Completion

The Participating Contractor must provide proof that the required training, as defined in the “Confirm Eligibility” step, is complete. This includes a certificate of completion or equivalent for both the manufacturer’s training and the “Hydronics for High-Efficiency Biomass Boilers” (or approved equivalent) training.

c) Insurance Certificate

A current Certificate of Insurance, in accordance with Article 5 of the Participation Agreement.

d) Participating Contractor W-9

e) Electronic Funds Transfer Form

Participating Contractors are strongly encouraged to participate in Direct Deposit – Electronic Funds Transfer (EFT). Using EFT reduces transaction time and provides a simpler, more detailed process for all transactions.

f) Energy Finance Solutions (EFS) Contractor Approval (if applicable)

See the “Contractor Applications to Participate in Financing Programs” section for details on how to offer EFS financing.

4. Receive Contractor Participation Approval

The Participating Contractor will receive notification from NYSERDA, providing formal approval to participate in the program. All new Participating Contractors will initially be classified as Participating Contractors with Provisional status. Once Provisional status is achieved, Participating Contractors will be listed on NYSERDA’s website as a Participating Contractor and be limited to three active project applications at a given time.

The first three (3) projects submitted by a Participating Contractor with Provisional Status will be required to have a pre-installation design review and post-installation inspection to verify system design and installation, and compliance with all program requirements. Pre-installation design reviews and post-installation inspections will no longer be required once the Participating Contractor has successfully passed this initial review period and demonstrated competence in the proper design and installation of biomass boiler systems per program requirements.

Thereafter, NYSERDA will select specific “completed” projects for QA field inspection following a sampling protocol. The sampling protocol utilizes random sampling of completed units with sampling rates primarily based upon the program status of the Participating Contractor.

How to Receive a Project Incentive

1. **Find a Participating Contractor**

The Customer should find a Participating Contractor, listed on the RHHY website, to learn about installation options and requirements. Only a NYSEDA Participating Contractor may apply for incentives and assist with Customer financing through the program.

2. **Confirm Project Eligibility**

All projects must satisfy the requirements defined below.

a) **Eligible Project Sites**

Residential or commercial sites that are not currently using natural gas are eligible.

b) **Eligible Technologies**

Eligible heating systems include those that meet the requirements in Table 1.

Table 1: Eligible Technology Requirements

| Advanced Cordwood Boilers | Pellet Boilers |
|--|---|
| ≤300,000 Btu/h of output | |
| Full thermal storage | |
| Must meet the requirements defined in the “Advanced Cordwood Boiler Requirements” section of this manual | Must meet the requirements defined in the “Pellet Boiler Requirements” section of this manual |

3. **Submit the Project Application Form and Associated Documentation**

The Participating Contractor must submit to NYSEDA the Project Application Form and all associated documentation, defined below, via email to RHHY@nyserda.ny.gov.

a) **Project Application Form**

b) **System Schematics**

All applications must include the manufacturer, model number, and capacity of all major components, and the following schematics:

- A piping diagram, including: boiler, thermal storage unit, controls and other pertinent components of a boiler system.
- An electric wiring and control diagram, including temperature controls, sensors, wiring, and other pertinent components of the controls system.

c) **System Operation Description**

Describe the detailed sequence of operations including all actions that initiate demand for heat (space heating, domestic hot water, etc.) and all actions that shut off operations.

d) **Heat Load Calculation**

The Air Conditioning Contractors of America (ACCA), Manual J protocol determines how much heating or cooling a house needs. A Manual J heat load calculation must be performed and submitted to demonstrate proper sizing of the boiler and thermal storage system pursuant to the heating needs in the home. A room-by-room load calculation is required, using ACCA's other design protocols (Manuals S, T, and D) to select equipment and design a duct system that will perform at its maximum efficiency. (<https://www.acca.org/home>)

e) **Customer Utility Bill**

Include a copy of the Customer utility bill as proof that the resident is located at a site that pays the System Benefits Charge (SBC) Clean Energy Fund (CEF) surcharge.

f) **EFS Loan Qualification Letter** (if applicable)

For projects receiving financing, the Participating Contractor will receive a Loan Approval Letter from EFS. The Participating Contractor will need to verify that the loan information is correct on the loan approval letter and contact EFS if it is not. The Participating Contractor cannot alter the loan amount after EFS has issued the loan approval letter, without project cancellation and re-submission.

g) **Proforma Excel File** (if applicable)

Finance tool (Proforma Excel in .xls format) when financing is part of the project.

4. **Receive Project Approval**

The Participating Contractor will receive notification from NYSERDA, providing a project number and formal approval for the project installation to begin. This report should be shared with the Customer. All projects are expected to be complete within 180 days from the date of NYSERDA approval. Project extensions may be granted, upon written request, on a case-by-case basis, if there are legitimate and verifiable issues or delays related to new construction or equipment availability.

Upon receipt of the approval notification, the Participating Contractor may sign a contract with the Customer, schedule an installation, and install the new heating unit for the Customer. The contract between the Customer and Participating Contractor must clearly show the full amount of the requested NYSERDA incentive being applied toward the total installed system cost. Incentives will be paid directly to the Participating Contractor, not to the Customer. For any project, NYSERDA may request the Participating Contractor to

promptly provide to NYSERDA a copy of the written agreement between the Participating Contractor and the Customer.

Changes to Approved Projects with a Project Number

Any changes that will affect total project costs, especially on projects that qualify for loans, will require the Participating Contractor to note the changes to the project when submitting the Payment Request Form in the 'Submit the Payment Request Form and Associated Documentation' step, described below.

In some instances, NYSERDA will allow a no-cost change to a project. These changes must be reviewed by NYSERDA and verified they will not void project eligibility before receiving an incentive payment. Please contact RHNY@nyserda.ny.gov with questions regarding project changes.

Project Cancellation

If prior to submitting the Payment Request Form and Associated Documentation (described below), the Customer or Participating Contractor cancels the project, the Participating Contractor must email RHNY@nyserda.ny.gov with a cancellation notice including:

- a) Project number
- b) Name of Customer
- c) Reason for cancellation

5. Submit the Payment Request Form and Associated Documentation

Upon project completion, the Participating Contractor must submit to NYSERDA the Payment Request Form and all associated documentation, defined below. All the documents must be scanned and sent via email to RHNY@nyserda.ny.gov.

a) Payment Request Form

The Participating Contractor shall provide the Customer with the Operation and Maintenance Manual(s) containing:

- Manufacturer information on all the major system components.
- Contractor system schematics, as provided in the "Submit the Project Application Form and Associated Documentation" step above.
- A schedule of any regularly required system maintenance to be performed.

b) Proof of Recycling

Recycling is not required; however, for projects retiring an outdoor wood boiler (OWB), indoor wood boiler (IWB), or wood furnace, proof that the retired boiler or wood furnace was properly recycled is required. The wood furnace that was recycled must have had a rated output capable of meeting the demand of the residence and

must have acted as a central heating appliance (this will often be in parallel or series with another heating appliance). Non-biomass boilers are not eligible for the recycling incentive.

The Participating Contractor must recycle the old unit at a regional recycling center. The Participating Contractor is responsible for ensuring that destructive recycling of all materials is performed. The Participating Contractor must attach a receipt from the recycling centers that clearly states the following:

- Recycling center name
- Recycling center address
- Recycling date
- Name of Customer

The recycling incentive for proper retirement of the old heating unit will be paid directly to the Participating Contractor and must be passed on in the full amount to the Customer. NYSERDA reserves the right to follow-up with the recycling center/scrap yard to confirm the boiler was properly destroyed. NYSERDA may request photos of a pre-existing installation at any time or as a part of Quality Assurance review for any project where recycling is required or applied. This proof would include:

- A photo of the old unit in working condition at the residence/business, noting the location of the stove/unit in the home
- A photo of the old unit at the recycling center/scrap yard, especially if proof of destructive recycling can be displayed
- A close-up photo of the name-plate photos that would aid in identifying the stove or its age in years

6. Obtain Inspections and Approvals

Upon receipt of the Payment Request Form, NYSERDA will arrange the required inspection(s) and ensure approval(s) are obtained from the authorities having jurisdiction. Participating Contractors with Provisional status will be subject to an inspection by a technical expert provided by NYSERDA, as described in the “Receive Contractor Participation Approval” step of the “How to Become a Participating Contractor” section above.

7. Receive Incentive Payment

Incentive payments will be paid to the Participating Contractor. Payments will be issued according to NYSERDA’s 30-day prompt payment policy (see Exhibit B, NYSERDA Prompt Payment Policy Statement, in the Contractor Participation Agreement). If there is

NYSERDA financing involved, NYSERDA will also send an email to Energy Finance Solutions to initiate payment of loan funds to the Participating Contractor.

2.0 Program Incentives and Financing

2.1 Summary of Program Incentives

Incentives are available on a first-come, first-served basis, and will only be reserved for Customers once the Project Application Form has been approved by NYSERDA. Incentive applications (Project Application Forms) must be submitted by a Participating Contractor. Incentives are paid upon approval by NYSERDA directly to the Participating Contractor and must be passed on in the full amount to the Customer. They will not be provided directly to Customers purchasing or installing the new system.

Any Participating Contractor that moves forward with the installation of a biomass boiler that has not obtained a Project Approved status via email from NYSERDA does so at their own financial risk, as funds are not reserved until the approved project is assigned a project number. NYSERDA reserves the right to deny or place “on-hold” any submitted applications in any NYSERDA program if the Participating Contractor is delinquent on any previously approved projects in the Program.

Incentives are only available for new equipment and systems that have not been installed (partially or completely) prior to NYSERDA approval of a Project Application Form. An additional recycling incentive for proper retirement of an old OWB, IWB, or wood furnace is also paid to the Participating Contractor and must be passed on in the full amount to the Customer.

NYSERDA reserves the right to adjust incentives without notice. Incentives are available for systems meeting requirements of this Program Manual and PON 3010 as outlined in Table 2 below:

Table 2: Incentives for Eligible Equipment

| System Type | Installation Incentive | | Thermal Storage Adder Incentive | Recycling Incentive |
|---|--|---|--|--|
| Advanced Cordwood Boiler with Thermal Storage | 25% installed cost (up to \$7,000 per unit) | | NA | \$5,000/unit for old OWB/IWB <u>or</u> \$2,500/unit for old wood furnace |
| Small Wood Pellet Boiler with Thermal Storage | ≤120 kBtu/h (35 kW) | 45% installed cost (up to \$16,000 per unit) | \$5/gal for each gal above the minimum thermal storage requirement | |
| | ≤300 kBtu/h (88 kW) | 45% installed cost (up to \$36,000 per unit) | | |

2.2 Incentive Payment Options

Payment Option No. 1

Participating Contractor is expected to complete the installation within 180 days of the award date. The incentive will be paid to the Participating Contractor in one final payment, that will be paid after:

- a) The installation is complete.
- b) All materials, described in the “Submit the Payment Request Form and Associated Documentation” step of “How to Receive a Project Incentive” section above, are submitted.
- c) Inspections are complete (if applicable).

Payment Option No. 2

Participating Contractor receives project incentives in two installments, which are tied to specific installation milestones.

Participating Contractor is expected to complete the installation within 180 days of the award date. Participating Contractors who choose this option must submit for the initial 40% incentive payment within 90 days of the award date.

Installment No. 1

The initial incentive payment, totaling **40%** of the total approved incentive amount for the project, will be paid after:

- a) All approved system components have been delivered to a Customer’s site.
- b) The Payment Request Form, with the relevant sections for the 40% payment request is completed and submitted to NYSERDA for approval.

Installment No. 2

The final incentive payment, totaling **60%** of the total approved incentive amount for the project, will be paid after:

- a) The installation is complete.
- b) All materials described in the “Submit the Payment Request Form and Associated Documentation” step of “How to Receive a Project Incentive” section above, are submitted.
- c) Inspections are complete (if applicable).

2.3 Low-Interest Financing

Renewable Heat NY residential and small commercial Customers may be eligible to finance the purchase of their biomass boiler system through NYSERDA’s low-interest financing options.

Financing is available to all New York State electric and natural gas utility Customers who meet the eligibility requirements described herein. NYSERDA, in coordination with Energy Finance Solutions (EFS), offers New York State residents reduced-interest rate loan options to finance qualified biomass boilers, as authorized by the Green Jobs-Green New York Act of 2009 and the Power NY Act of 2011. Participating Contractors may apply to EFS to provide residential and small commercial projects with access to financing.

Residential Financing

NYSERDA offers two loan options, through EFS, to assist eligible Customers with the remainder of the project cost, the On-Bill Recovery Loan or the Smart Energy Loan.

On-Bill Recovery Loan

With the On-Bill Recovery Loan, your loan payments are built right into your utility bill so you will not have an extra bill each month. Your monthly payments may not exceed your estimated average monthly energy cost savings.

Smart Energy Loan

With the Smart Energy Loan, repayments are made directly to NYSERDA's loan servicer via monthly statement billing or automatic bank withdrawal (ACH). The loan is issued to the Customer once the project is completed and approved by NYSERDA.

To apply for financing, please inquire through your Participating Contractor. The following sites provide guidance on the process:

- <https://www.nyserda.ny.gov/All-Programs/Programs/Residential-Financing-Options>
- [Energy Finance Solutions](#)

Small Commercial Financing

Small commercial Customers may use either the On-Bill Recovery Loan or the Small Commercial Participation Loan. On-Bill Recovery Financing, makes it possible for small businesses and not-for-profits to use the savings on their energy bills to pay for their energy-efficiency upgrades. For the Small Commercial Participation Loan, NYSERDA partners with lenders to help small businesses and not-for-profits obtain financing at half the market interest rate and borrowers make loan payments directly to their lender like a typical loan.

For Customers that participate in the GJGNY loan program, the incentive will not be affected by the "buy down" cost or other cost incurred by NYSERDA to make the loan product available, however the total incentive for any Customer, including cash and loan product, cannot exceed the Customer's out-of-pocket system cost. To apply for financing, please inquire through your Participating Contractor. For additional inquiries related to low-interest financing, visit [Energy Finance Solutions](#).

Loan Qualification Financial Tool (Proforma)

A financial tool (Proforma) is available for the Participating Contractor to help the Customer with the process of determining loan qualification and loan terms (5, 10, 15 years) for the loan products. In addition, the Proforma provides a method for determining the fuel cost savings for a biomass boiler project, as required for the On-Bill Recovery loan product. A laptop is recommended for the Customer visit, because the Proforma is an Excel spreadsheet (.xls) and data collected during the home visit can speed the completion of both the Project Application and the Proforma.

Contractor Applications to Participate in Financing Programs

All work financed with a GJGNY loan must be installed by a Participating Contractor. A Participating Contractor must follow the steps on the EFS website to become qualified to offer GJGNY Financing. (<http://www.energyfinancesolutions.com/forcontractors-contractor-qualifications>)

Upon approval to offer GJGNY Financing, the Participating Contractor will receive a confirmation letter and all required forms for participation.

2.4 Tax Credits

Customers may also be eligible for State and Federal tax credits. It is recommended that Renewable Heat NY Program participants contact a tax adviser to determine eligibility for tax credits.

3.0 System Requirements

The following requirements apply to both advanced cordwood boiler and wood pellet boiler installations. The requirements specific to advanced cordwood boiler and wood pellet boiler installations can be found in section 4.0 and section 5.0, respectively.

3.1 New Components

All components installed as part of an approved biomass boiler system must be new. The use of used or refurbished equipment is not permitted under the Program.

3.2 Structural Requirements

The Participating Contractor is responsible for determining that a building is structurally able to support the addition of a biomass boiler and thermal storage system as described in all relevant National and New York State codes and standards. NYSERDA encourages consulting with a Licensed Professional Engineer.

3.3 Other Plumbing and Electrical Components

All plumbing and electrical components of each boiler system including, but not limited to, piping, fittings, tanks, vessels, valves, controls, safety devices, and associated wiring must be certified as meeting the requirements of all relevant national and New York State codes and standards.

Biomass boiler (cordwood and pellet-fired) heating system components, like those of oil-fired boilers, require electricity to power the blower and circulate hot water through the heat distribution system in the home. It is important that a boiler heating system (cordwood only) has a heat dump zone, usually a group of radiators next to the boiler with a valve that opens when the power goes out.

3.4 Compliance with Laws and Codes

All approved biomass boiler systems, system components, and installations must comply with any and all manufacturers' installation requirements, applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality Review (SEQR), the New York State Building Code, New York State Plumbing Code, the National Electric Code, Fire Codes and all applicable State, city, town, or local ordinances or permit requirements.

NYSERDA reserves the right to request copies of all necessary permits, approvals, certificates, etc. All permits must clearly reference installation of the approved system at the Customer site. If permit(s) are not needed for installation, the Participating Contractor may provide a signed letter from the Town Code Officer or Authority Having Jurisdiction (AHJ) stating that no building permit is required. These systems may also require plumbing and electrical permits.

3.5 System Warranty

The Participating Contractor must provide the purchaser of the boiler system with a one-year, full-cost warranty including labor, repair or replacement of defective components or systems, and an additional two-year period for the repair or replacement of all parts. The Participating Contractor is responsible for providing warranty coverage in a timely manner regardless of the level of support from the equipment manufacturer. The Participating Contractor has the option to extend the required warranty through an extended warranty offer via an optional Customer service agreement.

3.6 Mechanical Execution of Work

All boiler equipment and accessories shall be installed in a neat and professional manner according to manufacturers' requirements and instructions. Any manufacturer warranties for workmanship and/or materials that are compromised and/or voided as a result of work performed by the Participating Contractor will become the responsibility of Participating Contractor. Labeling equipment and related controls is encouraged to ensure proper maintenance and design specifications. As with all heating systems, it is important that

installation of all equipment is performed to manufacturer specifications to allow for routine maintenance to be conducted by other heating technicians and/or plumbers.

4.0 Advanced Cordwood Boiler Requirements

4.1 Approved System Design

Advanced cordwood boiler heating systems with full thermal storage must be installed in accordance with the design submitted in the application and approved by NYSERDA. Any change in the cordwood boiler heating system design from the approved design must be approved in writing by NYSERDA prior to installation of the cordwood boiler heating system. Incentives will not be paid for cordwood boiler heating systems that are installed prior to the NYSERDA project approval, or for cordwood boiler heating systems that are not installed according to the design submitted to and approved by NYSERDA. Under no circumstances will cordwood boiler heating systems without full thermal storage be approved.

4.2 Fuel Type (Properly Seasoned Wood)

The eligible fuel type is properly seasoned cordwood. Wood that will be used for fuel in advanced cordwood boilers must be properly dried and seasoned so that the moisture content of the wood is approximately 20%. To properly season the wood, it typically must be dried for at least 2 years. The wood should be stored under cover with sufficient ventilation to allow the wood to dry to approximately 20% moisture content. It is imperative that the wood fuel be at moisture content of 20% or below so that good combustion of the fuel is achieved. When wood above 20% moisture content or greenwood is used in advanced cord wood boilers seasonal efficiency decreases significantly while smoke emissions drastically increases.

4.3 Advanced Cordwood Boiler Performance

All advanced cordwood boilers must be Qualified Technologies for RHHNY. A list of Qualified Technologies can be found on NYSERDA's website. (<https://www.nyserdera.ny.gov/All-Programs/Programs/Renewable-Heat-NY>)

All Qualified advanced cordwood boiler technologies must have been tested by the Brookhaven National Laboratory (BNL) Test Method and approved by NYSDEC and have a minimum annual thermal efficiency of 60% using the higher heating value (HHV) of wood. Any cordwood boilers not tested by the BNL Test Method and approved by NYSDEC will not be considered for incentives in this program. Boilers must have staged combustion, low mass (low volume) and have sensors and controls to optimize combustion performance. This is most easily achieved using a staged combustion design with oxygen sensor and variable fan controls. All projects must also conform to all applicable NYS residential codes.

4.4 Proper Boiler Sizing

Sizing advanced cordwood boilers with thermal storage to the design day heat demand of a home is not done using the boiler's rated output. This is because the heat release rate is variable over the course of the burn of a charge of cordwood fuel and because heat stored in the thermal storage tank will also be used. Instead, size the boiler by the number of batches an operator is comfortable with which will be between two and three batches for a design day.

4.5 Thermal Storage

Thermal storage is a key component of the advanced cordwood boiler heating systems, allowing the boiler to operate at a high burn rate with high efficiency. Heat that is not needed for the building is stored in the thermal storage or "buffer" tank for use at a later time. On the coldest days, this heat may be needed just a few hours after the charge is burned, but during the early and late parts of the heating season, this stored heat may provide several days of heating without the boiler firing. Full thermal storage is required for all advanced cordwood boiler systems in RHNH. Minimum volumes for pressurized and unpressurized tanks are given in the list of eligible boilers. Qualifying thermal storage tanks are engineered with thermodynamic considerations, achieve thermal stratification, and communicate with the heating control system. Thermal storage tanks must be installed vertically and have the supply and return ports placed far apart vertically on the tank (unless engineered to achieve the same performance with an alternative design), have piping, baffles, diffusers, or screens to prevent turbulent mixing, be designed to sense the thermal stratification, and have an insulation of R-24 or greater. Only commercially available vessels designed as thermal storage tanks may be used. No repurposed tanks designed for other uses (such as domestic hot water, propane, oil or agricultural tanks) or thermal storage units that are self-made or fabricated by the Participating Contractor may be used. Some Customers, due to the need to be away from home, may wish to size their thermal storage larger than the full thermal storage required in this program. Additionally, all thermal storage pressure vessels greater than 119 gallons must have American Society of Mechanical Engineering certification. Alternative certification may be considered in residential installations on a case-by-case basis.

5.0 Pellet Boiler Requirements

5.1 Approved System Design

High-efficiency low-emitting pellet boiler heating systems must be installed in accordance with the design and the pellet boiler heating system components submitted in the application and approved by NYSEDA. Any change in the pellet boiler heating system design from the approved design must be approved in writing by NYSEDA prior to installation of the pellet boiler heating system. Incentives will not be paid for pellet boiler heating systems that are installed prior to the NYSEDA project approval, or for pellet boiler heating systems that are not installed according to the design submitted to and approved by NYSEDA.

5.2 Fuel Type

The eligible fuel type is a premium wood pellet (Figure1) delivered in bulk. No systems using bagged pellets will be approved. Premium wood pellets are 100% wood composition with no construction or demolition debris such as pressure treated or painted wood (which may contain heavy metals such as copper, chromium, arsenic, lead and cadmium) or plastic binders or fillers. Pellets must have a calorific value of no less than 8000 Btu/lb, low ash content (<1%), low moisture content (<8%), chlorides less than 300 ppm and no other additives (0%). Other commercially available fuel types in NYS (for example green wood chips and grass pellets) cannot facilitate high-efficiency and low emissions performance even in advanced technology boilers at this time. Customers should identify and obtain a bulk fuel price quote from two pellet suppliers where possible.



Figure 1: Premium Wood Pellets (Photo courtesy of Curran Renewable Energy)

5.3 High-Efficiency and Low-Emissions Pellet Boiler Performance

All advanced pellet boilers must be Qualified Technologies for RHNH as listed on NYSERDA's website. (<http://www.nyserda.ny.gov/renewableheat>)

Boilers must be fully automatic, low mass (low volume) and have sensors and controls to optimize combustion performance (Figure 2). This is most easily achieved using a staged combustion design with lambda control.

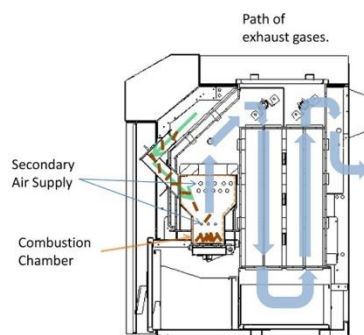


Figure 2: Schematic of a high-efficiency pellet boiler with pellet introduction and exhaust flow path through the heat exchanger (Courtesy of EVOWORLD)

The wood pellet boiler must have a minimum thermal efficiency of 85% at rated output using the higher heating value (HHV) of the pellet fuel if tested using an input/output method as outlined in Table 4.

Table 4: Performance Requirements for High-Efficiency, Low Emissions Pellet Boilers

| | |
|-------------------------------|--------------------------------|
| Thermal Efficiency (HHV) | 85% |
| Particulate Emission | < 0.080 lb/MMBtu |
| Carbon monoxide (CO) Emission | < 270 ppm at 7% O ₂ |

5.4 Proper Boiler Sizing

The high-efficiency wood pellet boiler must be properly sized for the application with particular attention to avoid over-sizing the boiler. Boilers must be sized and systems planned to optimize performance throughout the heating season using thermal storage. A well-designed residential or small commercial system must be sized based on the heat load of the building where the heat load is determined by Manual J of the Air Conditioning Contractors of America (ACCA) or an equivalent energy simulation program. For commercial systems that anticipate keeping an existing oil or propane heating system long term, it is better to size the pellet boiler at 60% of the design heating load as estimated using ACCA Manual J (or equivalent).

5.5 Thermal Storage

Pellet heating systems must include installation of thermal storage to maintain high-efficiency and low emissions performance throughout daily and annual cycles, minimize boiler cycling, maintain optimum combustion conditions, assist in energy management strategies including the quick response to a call for heat, meet intermittent calls for heat without starting the boiler, and temper return water temperatures to prevent thermal shock to the boiler. The minimum size thermal storage for pellet boilers $\leq 25\text{kW}$ (85,000 Btu/h) is 119 gallons or 2.0 gallons per 1,000 Btu/h. For boilers $> 25\text{kW}$, thermal storage cannot be less than 2.0 gallons per 1,000 Btu/h. A thermal storage incentive adder is available for each additional gallon of thermal storage that exceeds the minimum thermal storage volume.

Thermal storage tanks must be engineered with thermodynamic considerations, achieve thermal stratification, and communicate with the heating control system. Thermal storage tanks must be installed vertically, have supply and return placed far apart vertically on the tank, have piping, baffles, diffusers, or screens to prevent turbulent mixing, be designed to sense the thermocline, and have an insulation of R-24 or greater. Only vessels designed as thermal storage tanks may be used. No repurposed domestic hot water tanks, propane tanks, or thermal storage units that are self-made or fabricated by the Participating Contractor may be used.

5.6 Outside Pellet Storage

All bulk pellet storage must be a minimum of 3.5 tons and must be located outside of the building envelope. Pellets can produce high levels of dust and off-gas carbon monoxide (CO) in storage

presenting health and safety concerns. Carbon monoxide is a colorless, odorless gas that has health effects below the levels at which common CO detector alarms are triggered. Research is underway in Europe, Canada and NYS to better understand the chemical reaction that produces the CO. According to the US EPA:

“CO can cause harmful health effects by reducing oxygen delivery to the body’s organs, such as the heart and brain, and tissues. At extremely high levels, CO can cause death. Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. For these people, short-term CO exposure further affects their body’s already compromised ability to respond to the increased oxygen demands of exercise or exertion”.

Due to concerns regarding CO exposure and the absence of a documented effective ventilation strategy for pellet storage, all bulk pellet storage must be outside of the home. A sign communicating potential CO hazards associated with bulk pellet storage must also be posted.

Pellet delivery to outside bulk storage does not require the Customer to be present for the delivery, for the boiler to be turned off during the fill, or create dust or CO in the basement, resulting in quicker, more convenient, and cleaner pellet deliveries.

6.0 Quality Assurance and Compliance

NYSERDA maintains the integrity of its program through an independent Quality, Standards and Compliance (QSC) team which manages the Quality Assurance (QA) system for the program. The purpose of the QA inspection is to provide NYSERDA with an opportunity to evaluate the accuracy of the site analysis and design paperwork, and to verify that the system was installed according to all program requirements. The QA inspection also includes selected health and safety and performance items, and specific compliance items per applicable code.

The QA system has several components, including paperwork audits, establishment of program standards, and comprehensive field inspections. QA field inspections include verification of the contracted scope of work, accuracy of the site analysis, comparison of installation to submitted design drawings, and the overall delivered quality of the installation. The NYSERDA QSC team, or its representatives, may make a reasonable number of visits to the Customer site before, during, and after installation of a system to assess overall compliance.

6.1 Field Inspections

NYSERDA selects specific completed projects for QA inspections following a rational sampling protocol. The protocol utilizes a strategic sampling of completed projects with rates primarily

based on the Participating Contractor's current program status, and recent field inspection scores.

Participating Contractors with Provisional status will initially be subjected to up to 100% inspection rate. After the Provisional status review is completed, their inspection rate will be determined based on their current status.

The inspection report will be sent to the Participating Contractor approximately 15 days after the inspection. The report will be made available to the Customer upon submission of a request directly to NYSERDA. NYSERDA may select any completed project at any point in the future for a field inspection based on Customer complaints, warranty-related issues, or a review of the work done by the Participating Contractor under status review or program disciplinary action. All Participating Contractors are encouraged to perform in-house quality control of their projects.

Field inspections are conducted by a qualified independent third party, using comprehensive field inspection QA checklists and other QA inspection processes approved by NYSERDA. QA field inspections are scheduled at the Customer's convenience. Customers are encouraged to allow the Participating Contractor to attend the inspections, so questions can be answered and minor fixes can be made on site. If the Customer agrees, the Participating Contractor will be notified between 5 and 14 days of the upcoming inspection. Every effort will be made to accommodate the schedule of the Participating Contractor, but the Customer's schedule and efficient scheduling of inspections takes precedence. Customers have the right to request that the Participating Contractor not attend the QA field inspection. In these situations, the Participating Contractor will not be notified of the scheduled inspection but will receive the results within 15 business days.

6.2 Participating Contractor Status Designation

Participating Contractors are assigned one of the Participating Contractor status designations: Full, Provisional, Probationary, Suspended, or Terminated. Each designation shall be subject to the limitations or requirements associated with that designation, as detailed below. NYSERDA reserves the right to modify the definitions, limitations, and requirements of these designations at any time. NYSERDA retains sole discretion for determining the Participating Contractor's progression into and through each designation. If NYSERDA determines that a remedy is required, the Participating Contractor's promptness in response will be considered when evaluating any change in status designation. In all cases, NYSERDA's written decision is final.

Notification of any change in status designation will be provided via letter from NYSERDA Program staff. This letter will provide:

- a. Identification of the Participating Contractor's new status designation.
- b. Explanation of the what caused the designation change.
- c. Limitations, if any, associated with the newly assigned designation.

- d. Identification of specific corrective actions that must be taken, and applicable timelines.

Failures or violations that may result in a loss of applicable Incentives and possible termination from the Small Biomass Boiler Program include, but are not limited to:

- a. Failure to conform to the Participating Contractor responsibilities.
- b. Failure to act professionally, fairly, and in good faith with the Customer, NYSERDA, or NYSERDA's representatives.
- c. Failure to follow the Small Biomass Boiler Program requirements and procedures.
- d. Failure to conform to the Small Biomass Boiler System Requirements, approved incentive applications, and prompt delivery and installation requirements, as set forth herein.
- e. Providing inaccurate, false or misleading information verbally or in writing pertaining to the Small Biomass Boiler Program or the Participating Contractor's status in the Small Biomass Boiler Program to NYSERDA's representatives, Customers, utility staff, local officials, the general public, or others.
- f. Failure to adequately and promptly address Small Biomass Boiler System problems as identified by NYSERDA or the Customer.
- g. Repetitive errors in Small Biomass Boiler System design or performance calculations, or in the Small Biomass Boiler System installation.
- h. Customer complaints that are substantiated and significant or that indicate repetitive failure to conform to Small Biomass Boiler Program requirements.
- i. Failure to honor the required minimum warranty.
- j. Failure to adhere to the requirements of the Small Biomass Boiler Program Manual.

Provisional Status

Participating Contractors shall be assigned the status of Provisional until they have satisfied all requirements to achieve Full status, including demonstration to NYSERDA of their ability to provide quality services utilizing industry standards and best practices. A Participating Contractor with Provisional status who fails to meet all requirements of the RHNYS Small Biomass Boiler Program and abide by all other terms and conditions of the Contractor Participation Agreement and this Program Manual, may be assigned Probationary status.

- a. Participating Contractors with Provisional status are listed on NYSERDA's website.
- b. Participating Contractors with Provisional status are limited to submission of one (1) Project Application Form at a given time. Additional application(s) shall not be submitted to and will not be accepted by NYSERDA until the previous small biomass boiler system installation has been satisfactorily completed by the Participating Contractor, and notification has been provided to the Participating Contractor that NYSERDA has completed a site inspection of the small biomass boiler system to confirm compliance with all RHNYS Small Biomass Boiler Program requirements. Following achievement of this milestone, Participating Contractors with Provisional status may then request NYSERDA evaluate their status designation.

- c. Participating Contractors must have demonstrated successful completion of the *Hydronics for High-Efficiency Biomass Boilers* training for NYSERDA to be achieve Provisional status.

Full Status

Participating Contractors not previously assigned any other designation who have met all requirements of the RHNy Small Biomass Boiler Program, have and continue to demonstrate their ability to provide quality services utilizing industry standards and best practices, and abide by all other terms and conditions of this Program, shall be a Participating Contractor with Full status.

- a. The first three (3) projects submitted by a Participating Contractor with Provisional status will be required to have a pre-installation design review and post-installation inspection to verify system design and installation, and compliance with all program requirements. Once compliance has been verified Participating Contractor status will be changed to Full.
- b. Pre-installation design reviews and post-installation inspections will no longer be required once the Participating Contractor has received Full status.

Probationary Status

Assigning the status of Probationary to a Participating Contractor will be based on their consistent failure to satisfy requirements of the RHNy Small Biomass Boiler Program, including failure to abide by the terms and conditions of the Contractor Participation Agreement and this Program Manual.

- a. Participating Contractors with Probationary status are not listed on NYSERDA's website.
- b. Participating Contractors with Probationary status are not allowed to submit incentive applications.
- c. Participating Contractors with Probationary status are only permitted to complete small biomass boiler system installations associated with previously submitted and approved incentive applications.
- d. Participating Contractors with Probationary status shall complete small biomass boiler system installations associated with incentive applications previously approved by NYSERDA in a manner which meets all RHNy Small Biomass Boiler Program requirements, to NYSERDA's satisfaction.
- e. Participating Contractors with Probationary status will retain that status designation until such time as NYSERDA determines a change in status is in the best interests of the RHNy Small Biomass Boiler Program.

Suspended Status

Participating Contractors that have failed to respond to prescriptive probation or have committed more serious violations of the RHNy Small Biomass Boiler Program rules will be placed in Suspended status. Grounds for suspension include, but are not limited to, the following:

- a. The Participating Contractor with Probationary status fails to adequately fulfill the terms of the probationary period.
- b. A Participating Contractor of any status is under investigation for, or has been determined to have engaged in practices that have put the public or Program at risk.
- c. A Participating Contractor of any status fails to consistently deliver completed projects which pass the QA Checklist standard.

Terminated Status

NYSERDA may, in its sole discretion, terminate the Contractor Participation Agreement. Termination revokes the Contractor Participation Agreement and ends the Participating Contractor's on-going relationship with the Small Biomass Boiler Program. Participating Contractors that receive a Terminated status shall not represent themselves as Participating Contractors nor are they allowed to submit new incentive applications. The Participating Contractor's name will be permanently removed from the list of Participating Contractors posted on NYSERDA's website. Grounds for termination include, but are not limited to, the following:

- a. The Participating Contractor with Probationary status has either been unresponsive to, or failed to adequately fulfill expectations required for their Probationary status to be upgraded.
- b. A Participating Contractor of any status misrepresents the RHN Small Biomass Boiler Program, its relationship to the RHN Small Biomass Boiler Program, or information about the RHN Small Biomass Boiler Program to potential or existing Customers.
- c. A Participating Contractor of any status falsifies documents (e.g. falsifying signatures and/or documents).
- d. A Participating Contractor of any status misrepresents the status of or information regarding a project to RHN Small Biomass Boiler Program staff.

Inactive Status

Participating Contractors 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 website, no longer receive email notifications, nor be eligible for incentives or financing options. Should they wish to participate in the future, they may reapply under the rules in place at that time.

NYSERDA administers change in program status in the following ways:

- a. Request a meeting with the Participating Contractor.
- b. Issue a notice of program violation or compliance resulting in Participating Contractor status change.
- c. Reserves the right to take immediate action on program violation when warranted.
- d. Participating Contractor has 5 business days to dispute the program violation notification.

6.3 Handling Non-Conformance and Corrective Action

The QA report generated from the field inspection will provide details of all evaluated elements of the project and list any non-conformances that were identified and whether this result passes or fails program rule and requirements.

Projects that have non-conformances related to critical (health & safety) or major (system performance) attributes will automatically fail. Projects that have only non-conformances to minor or incidental attributes may pass or fail based upon their overall merits.

All non-conformances are expected to be addressed and corrected for the installed project, and are expected to be addressed during commissioning of future work conducted in the Renewable Heat NY program. Acknowledgement and plans for preventing future problems may be requested with the report.

While some non-conformances 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.

When NYSERDA seeks specific corrective action, a Corrective Action Notice will be provided with the QA report. The Corrective Action Notice must be either disputed within 15 days by contacting NYSERDA or remedied within 30 days. Sufficient evidence of the remediation must be provided to NYSERDA to document the completion of the required corrective action. NYSERDA may at its option conduct a field verification of the remediated installation.

NYSERDA retains the right to provide a copy of the QA report or specific information from the QA Field Inspection directly to the Customer and all authorities having local jurisdiction based upon health, safety, and compliance concerns. In an emergency NYSERDA or its representatives may shut down the system. NYSERDA will notify the Participating Contractor whenever it takes such action as soon as is practicable.

NYSERDA may, at NYSERDA's discretion, communicate by voice and/or written format with any Customer with respect to any matter relevant to a proposed or installed System. Such communications may be in reply to an inquiry from a Customer or at NYSERDA's initiation.

6.4 Prescriptive Probation and Disciplinary Action

When a Participating Contractor either fails to consistently complete projects that pass NYSERDA's QA evaluation or fails to respond to or remedy Corrective Action Notices, NYSERDA will review the Participating Contractor status in the Renewable Heat NY Program.

A Participating Contractor may be moved to either a probation status in which specific results and a timeline for demonstrating those results will be prescribed and monitored or to a disciplinary status such as suspension or termination from the Renewable Heat NY Program.