Zero Energy Now Eligibility Standards & Definitions

7/21/2020

This document attempts to clarify Zero Energy Now program eligibility to ensure consistency and uniformity for potential projects.

Certified Zero Energy Now projects are those that meet the "10-50-50" program standards (defined in detail below), regardless of where they are and when the home started down the energy efficiency path. *Incentives for Zero Energy Now participants* are based on energy improvements made in meeting these Zero Energy Now standards *after* the Zero Energy Now contractor engages and performs the energy audit.

1. Building Types and Location

a. Any residential house or qualifying small commercial or municipal structure[1] in Vermont can participate in the Zero Energy Now Program.
b. Zero Energy Now General Contractors can offer the Program anywhere in Vermont to any customer.

2. Timing and Sequencing of Improvements

The normal sequence of a Zero Energy Now project involves engaging a Zero Energy Now General Contractor who will inspect the house, and then design and develop a custom project work scope that applies the optimal combination of weatherization, high-efficiency mechanicals, and renewable energy to achieve the greatest savings at the best potential cost/benefit to the homeowner. Effective project customization usually requires an energy audit, detailed information from the homeowner, and energy usage records dating from three years prior to the start of the project. These records must be very accurate and are usually obtained (with homeowner permission) directly from fuel dealers and utilities. If these records are not available, alternative strategies for developing an energy history of the house may be applied.

The Zero Energy Now program seeks to encourage homeowners who have already completed one or more of the eligible components of Zero Energy Now to continue on the path to zero energy. Zero Energy Now eligible improvements to the home that have been previously completed may be applied towards meeting the standards of Zero Energy Now, provided that:

a. Continuous, accurate fuel records can be obtained dating from a period of *at least two heating seasons prior* to the completion of any previous work;

[1] See Appendix D for specific non-residential qualifications.

b. Any weatherization work to be included was performed by a certified Building Performance Institute (BPI) contractor;
c. Accurate and complete cost data for any eligible weatherization improvements, and mechanical or renewable energy installations to be included are also available.
d. Eligibility of previous work has been approved by a trained Zero Energy Now contractor and integrated into the design of a new Zero Energy Now work scope that meets the Zero Energy Now standards.

Previous work of this nature may be used to meet program threshold qualifications, and to determine total savings*. Available Zero Energy Now incentives (see Section 5. below) will be applied only to savings projected from the time of entry into the Zero Energy Now program.*

For the purpose of determining program eligibility and savings under these circumstances, the "base case" which may be considered as the "existing condition" of the building and its systems (e.g. building envelope, PV, heating system, hot water system) is its condition as of:

a. the date of an energy audit undertaken before any included weatherization work, or
b. the date prior to the earliest eligible mechanical or renewable installation undertaken.

A certified Zero Energy Now General Contractor must be the primary point of contact on any Zero Energy Now qualified project. The sequence of work (e.g., renewables, heat pumps, or weatherization first) may not be critical, but eligibility review, savings analysis, formal project design, and approval by the contractor is required. It is up to the Zero Energy Now General Contractor to determine--and be responsible for--eligibility of the project.

Engagement with this Zero Energy Now General Contractor by the customer in order to provide an analysis of energy options and a complete work scope design is required before any further work starts.

3. Zero Energy Now 10-50-50 Criteria

In order to be certified and eligible for incentives for the Zero Energy Now program, participants must achieve at least the following "10-50-50" minimum standards:

i. Test 1: At least a 10% reduction in envelope heat loss;
ii. Test 2: At least a 50% reduction in combined fossil fuel and grid electricity;

iii. Test 3: At least 50% of the building's total post-project energy load is derived from renewable electric, biomass, or other recognized renewable sources.
iv. All consumption and reductions shall be measured in MMBtu/year.

It should be noted that these standards are minimums that allow the homeowner access to program certification[2] and incentives. Since the goal of the program is to maximize fossil fuel reductions, it is recognized that most projects will achieve far better results than these minimum standards. The Zero Energy Now contractor will be able to optimize the best combination of project components to achieve the best fossil fuel and emissions savings and earn the highest incentives for the homeowner.

a. Test 1 - 10% Envelope Heat Loss Reduction

i. This standard is to ensure that all reasonable, cost effective shell efficiency measures are in place in the building. This is particularly critical to occupant comfort and effective performance of point-source heat such as heat pumps or wood stoves.
v. Often, this can be achieved through comprehensive air leakage reduction in an existing building, or by standard insulation improvements in an attic or basement.
vi. Test 1 is based on "post-efficiency MMBtus", i.e., after accounting for system efficiencies. Only by including the efficiency of the heating equipment can the envelope load of the building be properly determined for these tests.
vii. This standard is set at 10% to allow recently constructed buildings – where there may not be a lot of opportunity if they were built relatively efficiently – to participate.
viii. If the Zero Energy Now contractor determines that the home cannot meet this 10% threshold, there are additional "alternative paths" by which it may meet program requirements. See section 6 below.

b. Test 2 - 50% Fossil Fuel and Grid Electricity Reduction

i. Existing fossil fuel and grid electricity (as measured in MMBtu) is compared in the modeling software to projected post-retrofit usage to determine whether 50% savings can be achieved.

[2] Certification will allow the home to be recognized as a Zero Energy Now home,. It can be used to promote the home as an example of a successful Zero Energy Now project, which potential customers can look at, as well as providing a certification to the homeowner, which may be useful for their own promotional purposes – e.g. at time of sale.

ii. For example, a 150 MMBtu/year consumption house would need to end up at 75 or less, or a 100 MMBtu/year house would need to end up at 50 MMBtu/year or less;
iii. This test does not include in the calculations any existing renewable energy usage, such as wood stoves, solar hot water systems or solar photovoltaic systems.
iv. Test 2 is based on "pre-efficiency" or "consumption" MMBtus, i.e., the amount of MMBtus in the fuel itself (before applying any system efficiencies). This allows improved fossil fuel equipment efficiencies to be used to help reduce the amount of fuel that is burned (and fossil fuel MMBtus consumed) and allows credit for more efficient equipment in Test 2.
v. This Test 2 is the basis for all claimed savings and the basis for the base incentive.

c. Test 3 – 50% Renewable Energy

i. Test 3 examines the total energy load of the building (in MMBtu), to determine whether at least 50% of the total post retrofit usage will be met with renewables. Both existing and newly installed renewable components – biomass, solar hot water, or renewable electric systems (PV, wind, or micro hydro) can be included in the post-retrofit renewable contribution.
ii. Total energy load includes heating, cooling, hot water, lights, and appliances.
iii. Test 3, like Test 1, is based on "post-efficiency MMBtus" – i.e. after accounting for system efficiencies. Not to include equipment efficiencies in Test 3 would give an inappropriate advantage to inefficient biomass equipment, as a larger percentage of "renewable" fuel is consumed.
iv. Test 3 is based on the total post-project renewables contribution as a fraction of the total post-project gross energy use (energy use calculated before considering the contribution of renewables).

4. Incentives and Rebates for Zero Energy Now Customers

Incentives available to participants in the Zero Energy Now Program are in a constant state of flux. Some are general incentives available to everyone. Others are targeted toward specific income groups, or utility service territories within the state.

There are incentives available through Efficiency Vermont – for qualified weatherization work on the home. In addition to these, Efficiency Vermont provides incentives for certain specified appliance upgrades.

There are incentives, also provided by Efficiency Vermont, for heating equipment – specifically heat pumps and heat pump water heaters – that are usually available through the equipment installer or contractor.

There are incentives provided through the Biomass Energy Resource Center (BERC) for qualifying biomass heating equipment installed.

There are incentives that are specific to certain utilities and only available in that utility's territory.

There are also the federal tax rebates for energy efficiency material costs (insulation and air sealing products), for equipment upgrades, and for renewable energy installations.

In addition to these, the ZEN program itself has substantial and specific incentives based on energy saved and the renewable percentage of the home's post-project energy portfolio. There are also additional income-based incentives available through the program.

The total of these incentive and rebate opportunities can substantially reduce the outlay of dollars towards the cost of a Zen project – often by ten to thirty percent.

All of these incentives are described in detail in Appendix A.

5. Guarantees for Zero Energy Now Customers

a. The Zero Energy Now Energy Savings Guarantee offers a rebate of all energy costs higher than the projected cost as corrected for climate and occupant usage for one year from the date the project is certified as complete.
b. The Program and the Participating Contractor also offer a Quality Guarantee to correct any deficiencies in the work or problems resulting from the work discovered within one year and 90 days of completion.

6. Alternative Paths to Meeting the 10% Heat Load Reduction Requirement

If a building does not have enough cost-effective building shell energy improvement measures to meet the 10% heat load reduction standard, it can still participate if it meets one of the following standards, after first completing a BPI energy audit (including a blower door test), which is required for every project:

(1)	30 kBtu/ft^2	Maximum Energy Intensity. Calculated using the average fuel consumption over the previous three (3) years for space heating and the intentionally conditioned square footage of the building.
(2)	Home Performance with ENERGY STAR Program Participation & 20% air leakage	The building has completed a Home Performance with ENERGY STAR (or Building Performance) Program project and also achieved at least a 20% air leakage reduction level, and all cost-effective attic & basement measures have been addressed.
(3)	RBES or CBES Certificate	The building has achieved a 2011 Residential Building Energy Standards (2011 RBES) (or Commercial Building Energy Standard, 2011 CBES) or later certificate.
(4)	HERS Index of 76 or less	The building has scored a Home Energy Rating System (HERS) Index of 76 or less by a certified Energy Rater. A score of 76 represents the HERS compliance number required in the 2011 RBES.
(5)	ACH50 < 4	The building has a maximum measured Air Changes per Hour or less than 4 at 50 Pascals (ACH_{50}), following BPI standards.
(6)	DOE Home Energy Score of 6 or higher	The building scores at least 6 or higher on the U.S. Department of Energy's Home Energy Score, on the scale of 1-10 with 5 being an "average" home and 10 the best.

It is important to note that without the MMBtu load reduction provided by improving the envelope, meeting Test 2 of Zero Energy Now will be more difficult – depending entirely on the mechanical efficiencies and renewable capacity designed into the project. Likewise, any envelope improvement undertaken, even if it is below ten percent, will help reduce fossil fuel usage and may need to be included in the work scope to help meet Test 2.

7. Clarification of Standards on Biomass Heating

a. Since sustainably harvested wood is renewable over the long term, it is eligible to receive credit towards the renewable contribution.
b. If biomass usage (cord wood or pellet) is used in the pre-retrofit condition and the occupants plan to keep using the same equipment, it should be included in both pre- and post-retrofit calculations in the same quantity as has been used historically.
c. If customers plan to install a new biomass system (cord wood or pellet stove, or central boiler that meets Renewable Energy Resource Center standards), a

reasonable and realistic estimate of its future use can be included and credited towards the renewable contribution.

d. A homeowner who has an existing *indoor* wood heating system of any type can count the system as a form of renewable heat within the 10-50-50 Zero Energy Now program standards, counting historical wood use at the same rate in the improved building. However, any newly installed wood heating system, must meet minimum efficiency and emissions standards. These are provided in Appendix B. (attached).

8. Clarification of Standards on Renewable Energy Installations

a. On-site renewable energy systems – either off-grid or net-metered – and/or shares purchased in a Vermont-based community installation may be applied toward the building's renewable energy component.

b. Only renewable energy systems with Renewable Energy Certificates (RECs) that are "retired" and not sold outside of Vermont will be credited. This can be confirmed by examining the Certificate of Public Good (CPG) which is filed with each renewable energy system.

c. For Test 2 (50% reduction in combined fossil fuel and grid electricity), only the electricity purchased from the grid, as determined by reviewing the customer's electric bills is counted (along with fossil fuel usage) in determining whether this goal is met. If, in the base case, a renewable system is already installed for a building, and offsets a portion of the electricity use, only the net "purchased" electricity plus other fossil fuels is considered as the base case for calculating whether this test is met. A building that saves at least 50% of this purchased energy would meet Test 2.

    i. For example, a house that, in base case, uses 100 MMBtu total annual energy, with a PV system that displaces 20 MMBtu of this, the basis for determining Test 2 compliance would be 80 MMBtu (100 minus 20). Therefore, the Zero Energy Now project would need to save at least 40 MMBtu (50% of 80) to qualify.

    Renewable systems already in place at the time of the Zero Energy Now project count towards the 50% renewables contribution (Test 3).

9. Clarification of Standards for Heat Pumps

More than any other element of a Zero Energy Now project, heat pumps require design sensibilities well beyond the scope of these eligibility standards and of the software tools provided. While either ground-source or air-source heat pumps can be good

choices for Zero Energy Now homes, the lower cost of cold climate air-source heat pumps (also known as ductless mini-split heat pumps) make them a popular choice.

Many of the concerns around specific size, type, design, or layout of heat pump systems are dependent on the specific layout of the occupied spaces of the house or building, the existence and potential use of alternate or existing heating systems in the building, and occupant preferences, needs, and habits of use.

Good heat pump design is quite different from other central heating system design. In particular, heat pumps operate less efficiently as the outdoor temperature drops and will therefore have lower seasonal efficiencies if their sizing is based upon the coldest design temperature for the location. Their overall performance will be greatest if they are sized for temperatures at which they most commonly operate – i.e. more *average* winter temperatures – rather than the coldest winter temperatures likely to be encountered. Over-sized systems end up cycling and using more electricity during the more average winter days than "right-sized" systems. For the coldest temperatures, it may be best to have alternative heating options in place – wood or pellet stoves, electric resistance baseboard, or fossil-based back-up heat which may already be in place in the house.

Air-source heat pumps also operate more efficiently if they are single-zone (i.e., one outdoor compressor and one indoor head) rather than multi-zone systems with a single outdoor compressor and multiple indoor heads. To serve multiple zones or floors in a building, the more efficient approach is to install multiple single-zone systems rather than a multi-zone system.

Another good option and alternative to multi-zone systems is a compact-ducted heat pump system, such as those designed to allow a single interior head to provide ducted heat to two or more adjoining rooms. These function very similarly to single head systems but enable the capacity to be dispersed through multiple rooms, minimizing the oversizing we often see with a single room being supplied by a ductless head. These compact-ducted systems are able to supply from a couple of rooms to a complete floor of a building. Proper ductwork design and installation is critical to good performance of these systems.

Heat pumps also work best as the primary heat in the building – meaning other heat sources such as central heating, wood or pellet stoves should generally run to "back-fill" during colder times that heat pumps can't meet the heat load or to serve parts of the home not heated with the heat pump. Thermostats for central heating systems should

be set at lower temperatures (typically 3-5 degrees lower) so that boilers or furnaces do not come on unless the heat pump system cannot keep up with the load. The best approach for heat pump operation is to "set it and forget it"; let it run all winter but use the other heating systems in the house to make up for when it can't deliver enough heat.

All air-source heat pumps installed as part of any new Zero Energy Now project work scope must meet the Northeast Energy Efficiency Partnerships (NEEP) standards found at https://neep.org/initiatives/integrated-advanced-efficiency-solutions/air-source-heat-pumps/air-source-heat-pump .

Until more data becomes available, and we have better guidance, the following seasonal "coefficient of performance[3]" (or COP) values, provided by Efficiency Vermont, should be used in modeling "cold climate" heat pump efficiencies. Efficiency Vermont shall be the authority providing current or updated COP standards.

System Type	**Seasonal COP**	
	Sized to meet <100% of building peak design loan	**Sized at >100% of building peak design load**
Air-Source Single Zone (1:1)	2.0 - 2.4	2.0 - 2.4
Air-Source Multi Zone (1:>1)	1.6 – 2.0	1.2 – 1.6
Air-Source Compact Ducted	2.0 – 2.4	2.0 – 2.4
Air-Source Central Ducted	2.0 – 2.4	2.0 – 2.4
Air-Source Air-to-Water	2.0 – 2.4	2.0 – 2.4
Ground-source (closed loop)	3.0 – 4.0	3.0 – 4.0
Ground-source (open loop)	3.5 – 5.0	3.5 – 5.0

These are guidelines only. They cannot be counted on to represent the real or effective efficiencies of these pieces of equipment when they are installed in a home. Use you experience and best judgement depending on the specific house and circumstances.

[3] A COP of 1.0 = 100% efficiency. Therefore a COP of 2.4 = 240% efficiency.

Given that there are performance guarantees, and that there are always potential complicating circumstances in homeowner energy use, contractors should use lower, more conservative efficiency values – especially with point-source heat pumps – until substantial experience indicates otherwise.

10. Clarification of Standards for Heat Pump Water Heaters

As with heat pumps, there are regular and ongoing advances in heat pump domestic hot water technologies. See Appendix B. and and also the link in Appendix C. for more details on available options. Care must be taken to enter appropriately moderated efficiencies for this equipment. For modeling purposes, it is important to refer to the NEEA chart in Appendix B. If the Tier designation of the water heater is not known, it should be assumed to be Tier 1.

11. Accounting for Electric Vehicles

Many homeowners, especially those interested in the Zero Energy Now program, are also interested in electric vehicles. These are not, strictly speaking, part of the home's energy use, and are not considered as such in the Zero Energy Now Program. However, they interface with the home's energy use in two specific ways:

- Electric vehicles are often charged at home, and thus use a portion of the kilowatt hours attributed to the home's utility account;
- Electric vehicles also provide an opportunity to actively utilize excess energy generated by a home renewable energy installation.

They must therefore be accounted for and isolated from the home's actual kilowatt hour usage. In general, average usage is around 3.4 miles per kWh. In winter it is as low as 2.2 miles per kWh; in summer as high as 4.0 miles per kWh. Other factors affecting actual usage include the percentage the vehicle is charged at home, how much a homeowner pre-heats their vehicle in the winter, and, of course, the miles traveled annually (or since the vehicle was purchased and put into service).

Plug-in hybrid vehicles are slightly less efficient, averaging 3.1 miles per kWh. They have a smaller battery which requires more frequent charging for full electric usage.

The CLEAR tool has a built-in formula which takes all of this into consideration. For more specific information, see Appendix E.

Appendices

Appendix A: Incentives available exclusively through the Zero Energy Now Program.

a. **The base financial incentive is $50 per million Btus (MMBtus) of fossil fuel and grid-sourced electricity saved.** As noted above, eligibility for this incentive begins at the time and point of entry into the Zero Energy Now Program and is based on Test 2.

b. **Additional bonus incentives – for renewable systems – of $50 for each percentage point above 70% renewability.** This incentive is based upon Test 3, and reflects the post-project renewable percentage of the home's entire energy portfolio. All currently active renewable systems – whether existing or newly installed – may be applied in determining this incentive.

c. The total of base and bonus incentives cannot exceed $5,000.

d. Additional income-based incentives are available as follows:

- **i. Household gross income less than $60,000 per year: above total base and bonus incentives multiplied by 150%.**
- **ii. Household gross income $60,000 - $90,000 per year: above total base and bonus incentives multiplied by 125%]**

e. Other incentives may be available through Efficiency Vermont, through the Renewable Energy Resource Center (for biomass installations), and through local utilities. The federal energy tax rebates on home efficiency related materials, and renewable energy installations are also available.

f. There may be different incentives available to different customers, depending on location, and utilities serving the structure. Incentives may also vary from time to time.

Appendix B. Heat Pump Water Heater Specifications

Like many products, heat pump water heaters are a rapidly evolving technology. Specifications and standards applied here include standards of performance efficiency, seasonal efficiency (COP), sound levels, and whether the heat pump is "demand-response enabled". (This allows its energy usage to be correlated to periods of non-peak demand as much as possible.) Information on seasonal performance from the Northwest Energy Efficiency Alliance (NEEA) Advanced Water Heating Specification is provided below.

Table 1 and Table 2 summarize NEEA's Tier requirements for integrated units and split-systems respectively. The requirements are further elaborated throughout the specification (https://neea.org/img/documents/Advanced-Water-Heating-Specification.pdf).

Table 1. Integrated Heat Pump Water Heater Product Tier Overview

	Minimum Cool Climate Efficiency (CCE)*	Minimum Features	Sound Levels**	Demand Response-Enabled?
Tier 1.0	2.0	• ENERGY STAR compliance • Freeze protection	dBA < 65	Optional
Tier 2.0	2.3	**Tier 1 plus:** • Minimal use of resistance heating elements (see Section 5.1) • Compressor shut-down/notification • 10 year warranty • Condensate management	dBA < 60	Optional
Tier 3.0	2.6	**Tier 2 plus:** • Simultaneous intake and exhaust ducting capabilities • Air filter management • Override and default mode behavior as per Section 6.1	dBA < 55	Required
Tier 4.0	3.0	**Tier 3 plus:** • Physical design or default controls that limit resistance element heating to less than upper 50% of tank	dBA < 50	Required
Tier 5.0	3.5	**Tier 4 plus:** • No resistance element usage in default	dBA < 50	Required

Source - https://neea.org/img/documents/Advanced-Water-Heating-Specification.pdf

Table 2. Split-System Product Tier Overview Minimum Seasonal COP

	Minimum Seasonal COP	Minimum Features	Sound Levels	Demand Response -Enabled?
Tier 1.0	2.1	• ENERGY STAR compliance • Freeze protection	dBA < 65	Optional
Tier 2.0	2.4	**Tier 1 plus:** • Minimal use of resistance heating elements (see Section 5.1) • Compressor shut-down/notification • 10 year warranty • Condensate management	dBA < 60	Optional
Tier 3.0	2.7	**Tier 2 plus:** • Override and default mode behavior as per Section 6.1	dBA < 50	Required
Tier 4.0	3.1	**Tier 3 plus:** • Physical design or default controls that limit resistance element heating to less than upper 50% of tank	dBA < 50	Required
Tier 5.0	3.6	**Tier 4 plus:** • No resistance element usage in default mode unless outside ambient air temperature is below -5°F	dBA < 50	Required

Source - https://neea.org/img/documents/Advanced-Water-Heating-Specification.pdf

Appendix C. Qualifying Products List – from Efficiency Vermont

Rather than reproduce the lists here, which are changing all the time, contractors and homeowners are referred to the following URL at Efficiency Vermont for specific information on a wide range of heating, water heating, and other appliances:

https://www.efficiencyvermont.com/trade-partners/retailer-qualified-products

Appendix D. Commercial Buildings – Eligible through Efficiency Vermont's Building Performance Program

Among the buildings that are not single-family homes or small multifamily structures (i.e. not candidates for Home Performance with ENERGY STAR incentives), certain criteria must be met to qualify for incentives through Efficiency Vermont's **Building Performance Program**. For example, a building that was built as a residential dwelling, but is now used for commercial or mixed uses, would be eligible for customer incentives through the Building Performance Program. However, structures that serve as residential dwelling, but have home offices or studios, will NOT qualify for Building Performance incentives, and should instead proceed as Home Performance with ENERGY STAR projects.

If a building does not fit within the guidelines described below, or the participating contractor is unable to confidently determine eligibility, please contact an Efficiency Vermont energy consultant.

Small Businesses

Generally, buildings lacking bedrooms and full kitchens that are not currently used for a business registered with the State of Vermont, would be classified as a "non-house" and would be eligible to participate in the Building Performance program.

For small businesses, ELIGIBLE buildings will have:

- Less than 10,000 square feet of conditioned space*
- Wood-framed walls
- Masonry walls

*For eligibility information on buildings that are greater than 10,000 SF, but meet all other criteria, please contact your designated energy consultant

Small businesses that are typically INELIGIBLE for Building Performance incentives typically include metal-framed buildings and any building containing large process equipment (i.e. large refrigeration or ventilation systems). Examples include:

- Industrial buildings
- Manufacturing facilities
- Warehouses
- Municipal water/wastewater facilities
- Hospitals
- Grocery, convenience, and general stores
- Restaurants

Rental Properties & Multifamily Buildings

Rental properties and multifamily buildings will be eligible to receive incentives through the Building Performance program if they meet certain specifications and use cases. If a building does not fit within the guidelines described below, or the participating contractor is unable to confidently determine eligibility, please contact your designated energy consultant.

Rental properties and multifamily buildings eligible for the Building Performance program must:

- Have 5 or more apartments OR be mixed-use (combination of a commercial use and any number of apartments)
- Be 3 stories or less
- Have less than 10,000 square feet of conditioned space*
- Have wood-framed or masonry walls
- Fall under one of the following use cases:
    - Residential multifamily apartments
    - Bed-and-breakfasts
    - Condominiums
    - Common spaces associated with multifamily buildings (community rooms, central hallways and stairs, laundry rooms, mail rooms, etc.)
    - Mixed-use (combined commercial and residential uses

*For eligibility information on buildings that meet all other criteria but are greater than 10,000 square feet, please contact the Efficiency Vermont Building Performance Program Manager

Appendix E. Electric Vehicles – all electric & plug-in hybrids

To be updated with information in the future.

Appendix F. Zero Energy Now Quality Guarantee – see separate attachment

Appendix G. Zero Energy Now Savings Guarantee – see separate attachment

Appendix H. Wood Heating Standards and Requirements

H.a. Estimated Seasonal Average Efficiency for Existing Wood Heat Systems

(To Be Used When Establishing Existing Building Performance)

Appliance	Fuel	Age	Estimated seasonal average efficiency
Boiler	Pellets	new	82%
	Pellets	1-10 years old	80%
	Pellets	10+ years	75%
	Cordwood	New (with thermal storage)	78%
	Cordwood	1-10 years old	65%
	Cordwood	10+ years	55%
Furnace	Pellets	new	78%
	Pellets	1-10 years old	75%
	Pellets	10+ years	65%
	Cordwood	new	76%
	Cordwood	1-10 years old	63%
	Cordwood	10+ years	52%
Stove	Pellets	new	75%
	Pellets	1-10 years old	70%
	Pellets	10+ years	70%
	Cordwood	new	70%
	Cordwood	1-10 years old	65%
	Cordwood	10+ years	60%

H.b. Required Efficiency and Emissions Standards for New Wood Heat Systems

(To Be Used to Determine Which Systems May Receive a Zero Energy Now! Incentive for Wood Heating)

Appliance Type	Recommended Minimum Peak Efficiency Rating on HHV Basis	Recommended PM 2.5 Emissions Limit
Pellet Boiler	85%	0.08 lbs/MMBtu
Pellet Furnace	85%	0.08 lbs/MMBtu
Pellet Stove	78%	2.0 grams per hour
Cordwood Boiler (with required thermal storage)	75%	0.15 lbs/MMBtu
Cordwood Furnace	75%	0.15 lbs/MMBtu
Cordwood stove	75%	2.0 grams per hour