Northwest ENERGY STAR® Single-Family Homes Requirements

Effective Date: July 1, 2014

Single-Family
Washington, Oregon, Idaho, Montana

Effective November 1, 2014, the use of Northwest REM/*Rate*™ will be the required means for Northwest ENERGY STAR® Homes certification for single-family homes. This document outlines the programmatic and technical requirements for building and qualifying homes for certification, including measures used to establish the Reference Home for your state.

Qualifying Homes

In Washington, Oregon, Idaho and Montana, the following homes are eligible for Northwest ENERGY STAR Homes certification:

- Detached dwelling units[1] (e.g., single-family homes) **OR**
- Dwelling units in any townhome building with four units or less

Note that compliance with these guidelines is not intended to imply compliance with all local code requirements that may be applicable to the home.[2]

Northwest ENERGY STAR Compliance Requirements

Modeling in Northwest REM/*Rate*™ provides flexibility to select a custom combination of measures for each home that is equivalent in performance to the minimum requirements of the Northwest ENERGY STAR Reference Home for your state, listed in Exhibit 1. Equivalent performance is assessed through energy modeling.

Follow the steps below:

1. Using the Northwest REM/*Rate*™ software program, configure the preferred set of energy measures for the rated home according to the program requirements[3] and limitations set forth in the Modeling Guidelines for Northwest REM/*Rate*™. Regardless of the measures selected, all homes must meet the mandatory requirements listed in Exhibit 2. Note that the Thermal Enclosure System Rater Checklist requires that all insulation, windows, doors and skylights meet or exceed 2009 IECC requirements.[4,5,6,7]
2. Verify that the resulting Normalized, Modified End-Use Loads[8] are less than or equal to those of the Reference Home. This can be verified with the Northwest ENERGY STAR Homes Compliance Report.
    - The Compliance Report generates Normalized, Modified End-Use Loads in MMBtu/yr for heating, cooling, water heating and lights/appliances, and flags errors or non-compliance issues.
    - A home may also be constructed prescriptively according to all of the building measures listed for the appropriate Reference Home, as outlined in Exhibit 1, and qualify for certification. The listed building measures are considered minimums; no trade-offs below the building measures are available if choosing this path.
        i. All other requirements listed in this document must still be met, including producing a Northwest REM/*Rate*™ .blg file.
        ii. If your state code requires additional energy credits for homes exceeding a certain conditioned floor area,[9] building prescriptively to the Reference Home is not an acceptable means of qualifying for certification. Certification of these projects is dependent upon results of the Compliance Report.
        iii. If the same floor plan is used to construct multiple homes, only one .blg file must be created. The Rater may re-use this .blg file for all subsequent homes rather than creating a new one each time from scratch. This allowance will be made providing RESNET procedures for worst case analysis are used. (http://www.resnet.us/about/worst-case_analysis.pdf)
    - If the resulting total annual energy use is less than or equal to that of the Reference Home, proceed to step 3. If not, reconfigure the energy measures for the rated home. The Rater can view a comparison of each detailed input between the Rated home and the Reference Home by running a Building File Report in Northwest REM/*Rate*™.
3. Construct the home according to the measures selected in Step 1 and the Northwest Checklists outlined in Exhibit 2.
4. The Rater[10] shall verify that the home meets all aforementioned requirements, as well as:
    - On-Site Minimum Rated Features for duct leakage,[11] heat pump efficiencies,[12,13] ventilation strategy,[14,15,16] water fixtures,[17] slab insulation, built-in appliances, programmable thermostats,[22] and hot water pipe insulation specified on the state-specific Reference Home (Exhibit 1); **AND**
    - Northwest REM/*Rate*™ Modeling Guidelines ; **AND**
    - Northwest Checklists

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Exhibit 1: Northwest ENERGY STAR Reference Homes

The Reference Home measures will be adjusted and updated as new energy codes are adopted. While the table below will be updated periodically, Raters will have real-time access to the current Reference Homes by running a Building File Report in Northwest REM/*Rate*™.

Building Measures	Reference Home Oregon Requirements (NG Furnaces and Electric HPs)	Reference Home Washington Requirements (NG Furnaces and Electric HPs)	Reference Home Montana and Idaho Requirements (NG Furnaces and Electric HPs)
Furnace	≥ 92 AFUE	≥ 95 AFUE	≥ 90 AFUE
Heat pump[12]	8.5 HSPF (9 climate zone 5) / 14.5 SEER / 12 EER	9.0 HSPF / 14.5 SEER / 12 EER	9.0 HSPF / 14.5 SEER / 12 EER
AC	≥ 13 SEER	≥ 13 SEER	≥ 13 SEER
NG water heater	0.61 EF	0.62 EF gas tank	0.61 EF
Electric water heater[19]	0.93 EF	.93 EF electric storage tank	0.93 EF
Lighting - CFL	≥ 80%	≥ 90%	≥ 80%
Spot and whole-house exhaust fans[14, 16]	Reference Home assumes exhaust fan for whole-house ventilation, high efficacy (2.857 CFM/Watt)	Reference Home assumes exhaust fan for whole-house ventilation, high efficacy (2.857 CFM/Watt)	Reference Home assumes exhaust fan for whole-house ventilation, high efficacy (2.857 CFM/Watt)
Walls[2]	U≤ .051	U≤ .051	U≤ .051
Below grade wall	R-19	R-19	R-19
Flat ceilings	R-49 with ≥ R-21 at edge	R-49 with ≥ R-21 at edge	R-38 (R-49 in climate zone 6) with ≥ R-21 at edge
Scissor truss vault	R-38	R-38	R-38
Rafter vault	R-30	R-30	R-30
Floors	R-30	R-38	R-30
Slab	R-10 full+R-15 per.+R-15 break	R-10 full+R-5 break	MT: R-10, 4 ft/R-15 heated slab ID: R-10, 2 ft per
Infiltration rate[20, 21]	≤ 4 ACH@50	≤ 3 ACH@50	≤ 4 ACH@50
Duct leakage[11]	Leakage to outside = (.015 x conditioned floor area)	Leakage to outside = (.015 x conditioned floor area)	Leakage to outside = (.015 x conditioned floor area)
Duct location[21]	Conditioned space	Conditioned space	Matches design home
Windows	≤ 0.30 U value	≤ 0.28 U value	≤ 0.30 U value
Skylights	≤ 0.50 U value	≤ 0.50 U value	≤ 0.50 U value
Glazing percentage[21]	≤ 21%	≤ 21%	≤ 15%
Doors	≥ R-5	≥ R-5	≥ R-5
Water Fixtures[17]	1.75 gpm showerheads 1.5 gpm kitchen faucet 1.0 gpm bathroom faucets	EPA WaterSense models	1.75 gpm showerheads 1.5 gpm kitchen faucet 1.0 gpm bathroom faucets
Appliances	Built-in appliances ENERGY STAR qualified	Built-in appliances ENERGY STAR qualified	Built-in appliances ENERGY STAR qualified
Programmable thermostats[22]	Required	Required	Required
Hot water pipe insulation	R-4, pipes in unconditioned spaces only	R-4, all pipes	R-4, pipes in unconditioned spaces only

Exhibit 2: Mandatory Requirements for All Qualified Homes

Area of Improvement	Mandatory Requirements
1. Thermal Enclosure System	▪ Completed Northwest Thermal Enclosure System Checklist
2. Heating, Ventilation and Air Conditioning (HVAC) System	▪ Completed Northwest HVAC System Quality Installation Contractor Checklist ▪ Completed Northwest HVAC System Quality Installation Rater Checklist
3. Water Management System	▪ Completed Northwest Water Management System Builder Checklist

Partnership, Training and Credentialing Requirements

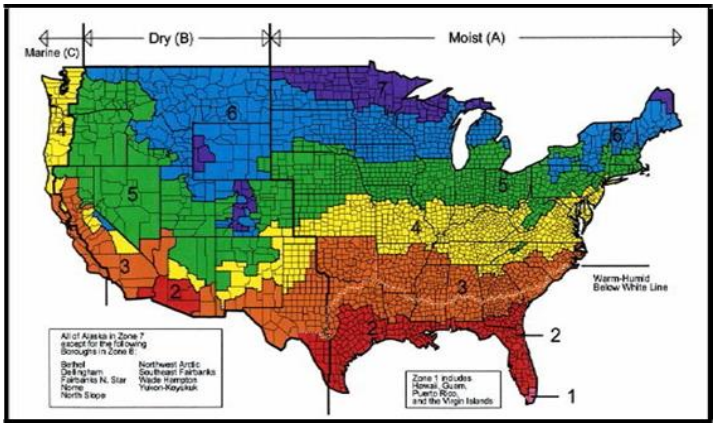
Prior to home qualification, builders, Raters, HVAC contractors and performance testers must become Northwest ENERGY STAR Partners by satisfying all training requirements detailed at http://www.northwestenergystar.com/partners/join-program.

Footnotes

1. A dwelling unit, as defined by the 2009 IECC, is a single unit that provides complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.
2. Where requirements of the local codes, manufacturers' installation instructions, engineering documents or regional ENERGY STAR programs overlap with the requirements of these guidelines, the EPA offers the following guidance:
   - In cases where the overlapping requirements exceed the ENERGY STAR guidelines, these overlapping requirements shall be met;
   - In cases where overlapping requirements conflict with a requirement of these ENERGY STAR guidelines (e.g., slab insulation is prohibited to allow visual access for termite inspections), then the conflicting requirement within these guidelines shall not be met. Qualification shall only be allowed if the Rater has determined that no equivalent option is available that could meet the intent of the conflicting requirement of these ENERGY STAR guidelines (e.g., switching from exterior to interior slab edge insulation). Note that under the Performance Path, a home must still meet its Annual Energy Use Target. Therefore, other efficiency measures may be needed to compensate for the omission of the conflicting requirement.
3. Program requirements are defined as items listed in the Northwest ENERGY STAR Single-Family Homes Requirements document, Modeling Guidelines for Northwest REM/*Rate*™ document, Northwest Checklists, PTCS requirements, and RESNET requirements.
4. Insulation levels in a home shall meet or exceed those specified in the state energy code. Note that the U-factor for steel-frame envelope assemblies shall be calculated using the ASHRAE zone method, reduction of ceiling insulation in space-constrained roof/ceiling assemblies shall be limited to 500 ft^2 or 20% of the ceiling area, whichever is less. Slab insulation is required for slab floors with a floor surface less than 24 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Slab insulation must meet the requirements of the Northwest ENERGY STAR Homes Reference Home and Northwest Thermal Enclosure Checklists.
5. Insulation shall be verified by a Rater/Field Inspector to achieve a Grade I installation as defined in the RESNET Standards for ceilings and walls. Floor insulation must be installed to manufacturer's specifications. For ceiling, wall and floor assemblies with continuous rigid insulated sheathing, a Grade II installation is acceptable for the cavity insulation only if the rigid insulation sheathing meets or exceeds the following levels: R-3 in Climate Zones 1 to 4; R-5 in Zones 5 to 8. Note that insulation can be verified by a Field Inspector as long as they are working under the supervision of a Rater.
6. All windows, doors and skylights shall meet or exceed the component U-factor and SHGC requirements specified in the 2009 IECC – Table 402.1.1. If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U-factor and SHGC value from Tables 4 and 14, respectively, in 2005 ASHRAE Fundamentals, Chapter 31. Select the highest U-factor and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color and presence of low-e coating). Note that the U-factor requirement applies to all fenestration, while the SHGC only applies to the glazed portion. The following exceptions apply:
   - An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;
   - An area-weighted average of fenestration products more than 50% glazed shall be permitted to satisfy the SHGC requirements;

- 15 square feet of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above;
- One side-hinged opaque door assembly, up to 24 square feet in area, shall be exempt from the U-factor requirements and shall be excluded from area-weighted averages calculated using a) and b), above;
- Fenestration utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true South and directly coupled to thermal storage mass that has a heat capacity > 20 btu / ft3xOF and provided in a ratio of at least 3 sq. ft. per sq. ft. of south-facing fenestration. Generally, thermal mass materials will be at least 2 in. thick.

7. The following map depicts Climate Zone boundaries based on 2009 IECC Figure 301.1. It is for illustrative purposes only.



8. Normalized, Modified End-Use Loads are used and reported in the Compliance Report, which are adjusted to maintain consistency when comparing homes with differing heating fuels. Annual Consumption for the Rated home is exported into Axis and used to quantify predicted annual energy use for a particular home, but cannot be used when comparing homes with differing heating fuels.
9. Washington State Energy Code requires additional energy credits for homes depending on size. Homes in Washington with CFA in excess of 5000 square feet are not eligible for certification by building prescriptively to the Reference Home.
10. The term 'Rater' refers to the person completing the third-party inspections, modeling the home using NW REM/*Rate*™ and the procedures detailed above, and submitting the .blg file to a Northwest Rating Provider for certification. The Rater must be a Northwest ENERGY STAR Partner as per the training requirements detailed at www.northwestenergystar.com/partners/join-program and be certified by RESNET.
11. Certification of a duct system under the Northwest ENERGY STAR Homes program is consistent with the Performance Tested Comfort Systems® (PTCS®) specifications and requires testing of each system. A PTCS-certified technician shall complete the testing and certification process and shall provide documentation of the test results showing compliance with Northwest ENERGY STAR Homes standards to the Rater. For certification, the measured CFM50 shall not exceed 0.06 x floor area served by the system (in square feet) or 75 CFM50, whichever is greater, and the factory-supplied air handler shall be in place at the time of the test, with the following exceptions:
    - If both the ducts and equipment are located within the conditioned space, the system is exempted from the duct-testing requirement. Up to five percent (5%) of the linear feet of the duct system may be located outside the thermal and/or air barriers of the house, or in exterior cavities of the house.
    - If the air handler is located completely within conditioned space, it is not required to be in place during the test.
    - If the air handler is located in unconditioned space, it is not required to be in place during the test. However, the leakage limit shall be decreased to 0.04 x floor area served by the system (in square feet) or 50 CFM50, whichever is greater.
12. The efficiency for air source heat pumps in Climate Zones 4, 5 and 6 shall exceed the ENERGY STAR minimum of 8.0 HSPF.
13. A ductless mini-split heat pump system's rated heating capacity shall meet or exceed the minimum heating size (output) as specified below (depending on the climate of the installation).
    - Coastal zones west of the Cascades (Zone 4), 6 Btu/h/ft^2 of heated floor area;
    - Intermountain zones of eastern Washington, Oregon, and southwestern Idaho with less than 7000 heating degree days (Zone 5), 8 Btu/h/ft^2 of heated floor area;
    - Mountain zones of eastern Idaho and western Montana with more than 7000 heating degree days (Zone 6), 10 BTUh/ft^2 of heated floor area

    In addition to the ductless mini-split heat pump system, the home may include supplemental electric unit heaters or zone heaters. Electric unit or zonal heat sources complying with this specification shall have a total capacity NOT to exceed the amounts specified below (depending on the climate of the installation):

- Coastal zones west of the Cascades (Zone 4), ≤ 3 W/ ft^2 of heated floor area;
- Intermountain zones of eastern Washington, Oregon and southwestern Idaho with less than 7000 heating degree days (Zone 5), ≤ 4 W/ ft^2 of heated floor area;
- Mountain zones of eastern Idaho and western Montana with more than 7000 heating degree days (Zone 6), ≤ 5 W/ ft^2 of heated floor area.

Each room in which the heaters are located shall have a thermostat capable of controlling the room heaters separately from other zones in the house.

14. Commissioning is required when a whole-house exhaust fan is used:
    - Using a flow hood or similar method that accurately measures airflow, verify that the minimum airflow is met by the exhaust fan.
    - An exhaust fan rated for continuous operation with a sone rating of 1.0 or less located in a central location providing an airflow rate meeting ASHRAE 62.2 2010 requirements must be provided and must run continuously. Alternatively, programmable timer controls may be installed to operate an exhaust fan with a sone rating of 2.0 or less intermittently on a schedule that provides the specified ventilation rates required by ASHRAE 62.2 2010.
15. Air-to-air HRV/ERV installations shall:
    - Include documentation that units are installed according to manufacturer's instructions.
    - Include a fully ducted (both supply and exhaust) ventilation system with both exhaust and supply airflow. A minimum rating of 60% sensible heat recovery efficiency is required with the unit operating in its installed fan speed mode at 32 deg. F. Units shall be third-party tested in accordance with C439-06.
    - Be sized and set to operate in accordance to ASHRAE Std 62.2 2010.
    - Have a minimum fan efficacy of 1.33 cfm/W measured at the most typical operational flow rate.
    - Supply air to at least one central location in the home or the return side of the home's central duct system. For maximum effectiveness, the system should supply air to individual bedrooms as well as other general living spaces.
    - Have an easily accessible filter. When such filter is not integral to the HRV/ERV, filters should be installed on the upstream side of the heat exchanger in the intake airstream.
    - Provide protection against ice buildup that does not disable the unit during freezing weather.

    Connections to the HRV/ERV shall be made with flexible connectors to reduce vibration. Ductwork shall be located within the conditioned envelope to the maximum extent possible. All ductwork located outside the conditioned building envelope, or between the outside wall and the HRV/ERV, shall also be fully insulated to R-8 minimum. All ducting should be adequately supported and sealed. Duct testing is not required unless ventilation ducts are conjoined with space conditioning ducts.
16. All exhaust fans, both spot and whole-house ventilation, shall be high efficacy (2.857 cfm/watt) fans, except in kitchens and half bathrooms and must be rated at ≤1.0 sones when set to run continuously, ≤2.0 sones when set to run intermittently. A half bathroom is any bathroom that does not contain a bathtub, shower, spa or similar source of moisture. Additional exhaust fans that are not ENERGY STAR qualified must meet the efficacy requirement of 1.4 cfm/w.
17. Faucets and showerheads should be installed as follows: 1.75 gpm showerheads, 1.5 gpm kitchen faucet, 1.0 gpm bathroom faucet. Faucet aerators are permitted. An exception to 1.0 gpm faucets in bathrooms: 1.5 gpm faucets may be used if showerheads are 1.5 gpm or below. In Washington, any EPA WaterSense labeled products are acceptable.
18. The Rater may define the 'permit date' as either the date that the permit was issued or the date of the contract on the home. In cases where permit or contract dates are not available, Providers have discretion to estimate permit dates based on other construction schedule factors. These assumptions should be both defensible and documented.
19. Domestic hot water systems that are integrated with the space-heating system are permitted to be used in the following two scenarios:
    - Either the space-heating system (e.g., furnace or boiler) shall heat and circulate a fluid through an indirect storage tank, OR a single integrated/combined product intended for both space heating and domestic hot water shall be used. A "tankless coil water heater," where domestic water flows through a coil installed in the space-heating system, is not permitted.
    - Heat pump water heaters shall not be installed inside the thermal and pressure boundary of the home unless both intake and exhaust air is ducted directly to the outside according to manufacturer's specifications. Heat pump water heaters used to meet this requirement must be selected from NEEA's Qualified Products List (http://neea.org/docs/northern-climate-heat-pump-water-heater-specification/qualified-products-list.pdf?sfvrsn=6) and installed using the recommendations set forth in the Smart Water Heat Best Practices Installation Guide (http://smartwaterheat.org/sites/default/files/Smart_Water_Heat_Best_Practices_Installation_Guide.pdf).
20. Envelope leakage shall be determined by a Rater using a RESNET or PTCS®-approved testing protocol.
21. Conditioned Floor Area for calculation of window to floor area (WFA), building leakage rates and duct leakage rates shall include conditioned basements. Conditioned basements are defined by Northwest ENERGY STAR Homes as occupiable space located below grade, or partially below grade and is included within the home's thermal and pressure boundary. Conditioned, attached garages shall not be included in the CFA. Up to 15 square feet of "decorative" glazed fenestration per dwelling unit may be exempted from the U-value and SHGC requirements, and shall be excluded from area-weighted average calculations, but shall be included in calculating the total WFA ratio.
22. Programmable thermostat shall be installed unless the thermostat controls a zone with electric radiant heat, for which a manual adjustable thermostat is allowed. Ductless heat pumps are not required to have programmable thermostats.