



Energy Choice Overlays (ECO) v2.0

For use with the 2024 International Energy Conservation Code



Technical document / May 2026

About this resource

Energy Choice Overlays (ECO) recognize the efficiency of electric heat pumps and encourage their installation while preserving building owners' fuel and equipment type choices. This proposal is intended for jurisdictions considering the adoption of the **2024 International Energy Conservation Code (2024 IECC)**. Comparable amendments may be adopted by jurisdictions considering the **2027 IECC**, as the 2024 and 2027 code editions are likely to have similar structures and base stringency levels as of this proposal's publication.

Why? Even minimum-efficiency electric heat pump equipment uses far less energy than high-efficiency combustion equipment because heat pumps move energy, rather than extract it by combusting fuel. The model energy code does not recognize this efficiency, however. Builders are not allowed to count the efficiency of heat pumps as a product class toward code compliance: this means buildings using heat pumps are effectively required to use far less energy than buildings using other types of space and water heating equipment. This matters for home energy efficiency: Pacific Northwest National Laboratory's energy modeling of 2024 IECC prototype homes suggests that the **whole-home energy use of mixed fuel homes may be up to 50% higher than the energy use of homes with heat pump equipment**. This leaves cost-effective energy savings and flexibility on the table and misses an opportunity to encourage low-pollution new construction.

Electric ready. This proposal additionally adopts appendices to provide infrastructure for efficient electric alternatives to combustion equipment installed at the time of construction: [Appendix RK](#) for low-rise residential buildings, and [Appendix CH](#) for other buildings. Installing this infrastructure at the time of construction preserves future building owners' choices by reducing the need for disruptive retrofits and significantly reduces the cost of future electrification.

Proposed code text is depicted through underlining, and proposed deletions are depicted through ~~strike-through formatting~~. Explanatory text, not intended to be part of the code, is depicted in italics. In the context of code text, italics indicate the use of a term defined in code.

How it works: Residential low-rise buildings

Prescriptive pathway. It is standard practice for credit values to be determined by calculating the savings from the measure compared to a baseline model building using the same fuel for the relevant end use. The baseline model compares heat pump measures to a minimum-efficiency heat pump, while gas furnace measures are compared to a minimum-efficiency gas furnace. This suggests that a home complying with the prescriptive pathway using a natural gas furnace and gas tank water heater may be less energy efficient than an otherwise identical home using an air source heat pump and heat pump water heater.

The prescriptive pathway in this proposal includes a new measure to award credits based on the energy savings from using an air source heat pump rather than a gas furnace, where the installed and comparison systems each meet and do not exceed federal minimum appliance efficiency standards. No analogous measure is included for heat pump water heaters for two reasons: first, there is no federal minimum efficiency standard for heat pump water heaters, only electric water heaters in general. Second, the credits available for a minimum-efficiency electric water heater would be negligible in most situations.

Energy rating index (ERI) pathway. The ERI metric is a relative rating against a building of the same fuel type complying with the 2006 IECC. For example, a home earning an ERI score of 48 that uses gas for space and water heating may therefore be less efficient than an otherwise similar home with an ERI score of 48 that uses electric heat pumps. To compensate for this issue and ensure all homes reach the same conservation outcome regardless of fuel type, this proposal's ERI pathway allows a higher maximum ERI score if a building uses electric heat pumps for primary space and water heating. The amount of the ERI value increase is calculated such that mixed-fuel and electricity-heated buildings will be required to attain equal site energy use in each climate zone. Maximum ERI values have been informed by licensed HERS Rater modeling.

Performance pathway. In lieu of varying the standard reference design and performance threshold by fuel type, this proposal uses natural gas space and water heating products for the standard reference design, regardless of the fuels used in the proposed design. This ensures homes of any fuel type must meet the same conservation objective. Additionally, performance is quantified in site energy use, rather than energy cost. Site energy use is the performance metric over which the designer has the greatest control. Site energy use can also be estimated with greater confidence than energy cost because the occupant's energy provider or rate will not affect it.

Finally, both the ERI pathway and the simulated building performance pathway increase the stringency of the envelope backstop to ensure other code amendments do not inadvertently allow installation of an outdated envelope.

Methodology: This proposal adapts [PNNL energy modeling methods](#) to calculate the energy use reduction when a baseline mixed fuel home installs a federal minimum-efficiency heat pump instead of a federal minimum-efficiency furnace. Using EnergyPlus and US Department of Energy 2024 IECC prototype models, dwelling units with four different foundation types across single-family and low-rise multifamily typologies are compared. The energy use differences across mixed fuel and heat pump heated homes are averaged, weighted by frequency of construction in each climate zone, to arrive at the overall energy use reduction percentage used in this proposal. This percentage is operationalized as the number of credits heat pumps may earn through Section R408.2.2.1.

Note on compliance tools. Compliance with the amended prescriptive pathway may be demonstrated with [REScheck](#) and a brief companion compliance worksheet. Compliance with other pathways may be demonstrated with standard tools and software packages.

Higher stringency option. To minimize discrepancies in performance between buildings of differing equipment types while maximizing affordability benefits, this set of amendments has the effect of requiring all covered dwelling units to meet the 2024 IECC's level of stringency for buildings heated primarily with combustion or electric resistance equipment. Jurisdictions that wish to retain instead require all covered dwelling units to meet the 2024 IECC's level of stringency for heat pump heated buildings can adjust stringency as follows:

- **Prescriptive pathway:** Increase the number of credits required by Section R408.2 by an amount equal to the credit value of Measure R408.2.2.1.
- **ERI pathway:**
 - Calculate the maximum ERI score difference between heat pump and non-heat-pump units in the amended Table R406.5 ("the difference"). Retain the 2024 IECC's maximum ERI scores for heat pump units. Decrease the maximum ERI scores for non-heat-pump units by the difference.
 - Consider retaining the 2024 IECC's level of envelope backstop stringency to avoid inadvertently increasing stringency more than indicated.
- **Performance pathway:**
 - Decrease Section R405.2's maximum percentage of standard reference design site energy allowed in the proposed design by a percentage equal to the credit value of Measure R408.2.2.1. For example, if the measure's credit value were 10, the maximum percentage of standard reference design energy would be reduced by 10% compared to its current value of 80%. Ten percent of 80% is 8%, so the new maximum percentage of standard reference design energy would be 72%.
 - Consider retaining the 2024 IECC's level of envelope backstop stringency to avoid inadvertently increasing stringency more than indicated.

Code language: Residential low-rise buildings

General

Adopt the **2024 IECC**, including **Appendix RK**, as modified. Amend as follows:

R101.2 Scope. This code applies to the design and construction of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) and Group R-2, R-3 and R-4 buildings three stories or less in height above *grade plane*.

R101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted and referenced as a requirement of a compliance option. **Appendix RK** is required for compliance paths as specified in **Section R401.2**.

Amend as follows.

R401.2 Application. Residential buildings shall comply with **Appendix RK** and one of Sections R401.2.1, R401.2.2, R401.2.3 or R401.2.4.

ERI Compliance

Amend as follows.

R406.3 Building thermal envelope. The proposed total *building thermal envelope* thermal conductance (TC) shall be less than or equal to the required total *building thermal envelope* TC using the prescriptive *U*-factors and *F*-factors from **Table R402.1.2** multiplied by ~~1.08~~ 1.05 in Climate Zones 0, 1 and 2, and by ~~1.15~~ in Climate Zones 3 through 8, in accordance with ~~Equation 4.2 and Section R402.1.5~~. The area weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.

Amend as follows. The ERI values in the new **Table R406.5** columns were calculated such that they result in equivalent site energy outcomes for a dwelling unit that uses natural gas for space and water heating and attains the ERI indicated in the model code's **Table R406.5** and a dwelling unit that meets the enumerated requirements and attains the increased, heat-pump-heated ERI.

R406.5 ERI-based compliance. Compliance based on an *Energy Rating Index* (ERI) analysis requires that the *rated design* and each confirmed as-built *dwelling unit* be shown to have an ERI less than or equal to the applicable value indicated in **Table R406.5** where compared to the *ERI reference design* as follows:

1. Where the dwelling unit uses equipment that is not an electric heat pump for primary space conditioning or service water heating and on-site renewables are not installed, the maximum ENERGY RATING INDEX NOT INCLUDING OPP, NON-HEAT-PUMP UNIT applies.
2. Where the dwelling unit uses electric heat pump equipment for primary space conditioning and service water heating and on-site renewables are not installed, the maximum ENERGY RATING INDEX NOT INCLUDING OPP, HEAT PUMP UNIT applies.
- ~~2.~~ 3. Where the dwelling unit uses equipment that is not an electric heat pump for primary space conditioning or service water heating and on-site renewables are installed, the maximum ENERGY RATING INDEX WITH OPP, NON-HEAT-PUMP UNIT applies.
4. Where the dwelling unit uses electric heat pump equipment for primary space conditioning and service water heating and on-site renewables are installed, the maximum ENERGY RATING INDEX WITH OPP, HEAT PUMP UNIT applies.

Amend table as follows.

TABLE R406.5 MAXIMUM ENERGY RATING INDEX				
CLIMATE ZONE	ENERGY RATING INDEX NOT INCLUDING OPP		ENERGY RATING INDEX WITH OPP	
	<u>NON-HEAT-PUMP UNIT</u>	<u>HEAT PUMP UNIT</u>	<u>NON-HEAT-PUMP UNIT</u>	<u>HEAT PUMP UNIT</u>
0 and 1	51	<u>56</u>	35	<u>40</u>
2	51	<u>56</u>	34	<u>39</u>
3	50	<u>55</u>	33	<u>38</u>
4	53	<u>58</u>	40	<u>45</u>
5	54	<u>59</u>	43	<u>48</u>
6	53	<u>58</u>	43	<u>48</u>
7	52	<u>57</u>	46	<u>51</u>
8	52	<u>57</u>	46	<u>51</u>

Prescriptive Compliance

Add a row to **Table R408.2** as follows. The credit values for this new measure were calculated to reflect site energy improvements compared to a standard reference design that uses a natural gas furnace and a natural gas tank water heater, neither of which may exceed the US Department of Energy's currently effective minimum efficiency standard for those products.

MEASURE NUMBER	MEASURE DESCRIPTION	CREDIT VALUE								
		Climate Zones 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 Except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
<u>R408.2.2.1</u>	<u>Federal Minimum-Efficiency Heat Pump</u>	<u>2</u>	<u>6</u>	<u>11</u>	<u>17</u>	<u>14</u>	<u>19</u>	<u>20</u>	<u>20</u>	<u>20</u>

Add new section under **R408.2.2** as follows:

R408.2.2.1 Federal Minimum-Efficiency Heat Pump: A dwelling unit is permitted to earn credits for this measure in addition to no more than one other measure in **Section R408.2.2**. Air source heat pump(s) shall meet all of the following:

1. Heat pumps shall be no less efficient than applicable Federal minimum energy efficiency standards for the geographic location where the equipment is installed.
2. Heat pumps shall be sized in accordance with **Section R403.7**. If heat pump capacity is insufficient to meet 95% of heating load according to ACCA Manual J or other approved heating calculation methodologies, the amount of the credit shall be multiplied by the percentage of heating load the heat pumps are sized to meet.
3. Heat pumps shall be configured to provide both space heating and space cooling.
4. Heat pumps shall be configured as the primary space heating equipment. Heat pumps shall be permitted to be installed with supplementary heat in accordance with **Section R403.1.2**.

Simulated Building Performance Compliance

Amend **Section R202** as follows:

SITE ENERGY USE. The metric indicating the total amount of energy consumed by a *building* in 1 year.

Amend as follows:

R405.2 Simulated building performance compliance. Compliance based on *simulated building performance* requires that a *building* comply with the following:

1. The requirements of the sections indicated within **Table R405.2**.
2. The proposed total *building thermal envelope* thermal conductance, TC, shall be less than or equal to the *building thermal envelope* TC using the prescriptive *U*-factors and *F*-factors from **Table R402.1.2** multiplied by ~~1.08~~ 1.05 in Climate Zones 0, 1 and 2, and 1.15 in Climate Zones 3 through 8 in accordance with **Equation 4-2** and **Section R402.1.5**. The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.
3. ~~For each dwelling unit with one or more fuel-burning appliances for space heating, water heating, or both, the~~ The annual ~~energy cost~~ site energy use of the ~~each dwelling unit~~ shall be less than or equal to 80 percent of the annual ~~energy cost~~ site energy use of the *standard reference design*. ~~For all other dwelling units, the annual energy cost of the dwelling unit shall be less than or equal to 85 percent of the annual energy cost of the standard reference design.~~ For each *dwelling unit* with greater than 5,000 square feet (465 m²) of *living space* located above *grade plane*, the annual ~~energy cost~~ site energy use of the *dwelling unit* shall be reduced by an additional 5 percent of annual ~~energy cost~~ site energy use of the *standard reference design*. Energy prices shall be taken from an *approved source*, such as the US Energy Information Administration's state energy data system prices and expenditures reports. ~~Code officials shall be permitted to require time-of-use pricing in energy cost calculations.~~

Exceptions:

1. ~~The energy use based on source energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 2.51. The source energy multiplier for fuels other than electricity shall be 1.09.~~
2. ~~The energy use based on site energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost.~~

Amend **Table R405.4.2(1)** to require a standard reference design that uses minimum-efficiency natural gas equipment for space and water heating as follows. Rows not depicted, including sub-rows, are unchanged.

TABLE R405.4.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{d, e, j-k}	Fuel type/capacity: <u>natural gas, with output capacity the same as proposed design.</u>	As proposed.
	Product class: if the <u>proposed design uses only natural gas heating systems</u> , same as proposed design. For any proposed heating systems that do not use natural gas, the <u>standard reference design shall include a heating system of a product class that uses natural gas. For proposed designs with forced air or electric resistance radiative heating systems, substitute a furnace.</u> <u>For proposed designs with hydronic heating systems, substitute a boiler.</u>	As proposed.
	Efficiencies:	
	Heat pump: complying with 10 CFR §430.32.	As proposed.
	Fuel gas and liquid fuel furnaces: complying with <u>and having efficiency ratings equal to the minimum requirements of 10 CFR §430.32.</u>	<u>Forced air and/or electric resistance heating systems</u> as proposed.
	Fuel gas and liquid fuel boilers: complying with <u>and having efficiency ratings equal to the minimum requirements of 10 CFR §430.32.</u>	<u>Hydronic heating systems</u> as proposed.
Service water heating ^{d, g, k}	Fuel type <u>and product class: same as proposed design</u> <u>natural gas storage water heater complying with and having efficiency ratings equal to the minimum requirements of 10 CFR §430.32.</u>	As proposed.
Thermal distribution systems	Duct insulation: in accordance with Section R403.3.3.	Duct insulation: as proposed. ^{m-k}
	Duct location:	Duct location: as proposed. ^{l-j}

SI unit information and footnotes a, b, and c are unchanged. Amend footnote d as follows:

d. For a proposed design with multiple heating, cooling or water heating systems using different ~~fuel types-product classes~~, the applicable standard reference design system capacities and ~~fuel types-product classes~~ shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each ~~equipment and fuel type-product class~~ present.

Footnotes e and f are unchanged. Amend footnote g as follows:

g. For a proposed design without a proposed water heater, the following assumptions shall be made for ~~both the proposed design and the standard reference design. For a proposed design with a heat pump water heater, the following assumptions shall be made for the standard reference design, except the fuel type shall be electric.~~

Fuel type: for the standard reference design, natural gas. For the proposed design, the same as the predominant heating fuel type in the proposed design.

Rated storage volume: 40 gallons Draw

pattern: medium

Efficiency: Uniform Energy Factor complying with and not exceeding the minimum efficiency requirements of 10 CFR § 430.32

Footnotes h and i are unchanged. Delete footnotes j and k. Renumber footnote l as footnote j. Renumber footnote m as footnote k.

Electric Readiness Including Space Heating

Amend as follows.

RK101.1 Electric readiness. Water heaters, household clothes dryers, ~~and~~ cooking appliances, and space heating systems that use fuel gas or liquid fuel shall comply with Sections RK101.1.1 through ~~RK101.1.4~~RK101.1.5.

Amend as follows.

RK101.1.4 Space heating systems. Where a dwelling unit includes equipment that uses fuel gas or liquid fuel for space heating, it shall comply with the following:

1. Natural drainage for condensate or a condensate drain location shall be located within 3 feet (914 mm) of the combustion equipment.
2. A designated outdoor location appropriate for the siting of a heat pump condenser shall be provided, including natural drainage for condensate or a condensate drain location located within 3 feet (914 mm) of the location.
3. A dedicated branch circuit shall be provided in compliance with either IRC Sections E3702.11 and E3702.12 or NFPA 70 based on heat pump space heating equipment sized to meet heating load in accordance with Section R403.7 and terminating within 3 feet (914 mm) of the location with no obstructions.

Exception: Where a dwelling unit includes an outdoor air conditioning condenser that meets these requirements, an additional dedicated branch circuit is not required.

~~RK101.1.4~~**RK101.1.5 Electrification-ready circuits.** The unused conductors required by Sections RK101.1.1 through ~~RK101.1.3~~RK101.1.4 shall be labeled with the word “spare.” Space shall be reserved in the electrical panel in which the branch circuit originates for the installation of an overcurrent device. Capacity for the circuits required by Sections RK101.1.1 through ~~RK101.1.3~~RK101.1.4 shall be included in the load calculations of the original installation.

How it works: Commercial and taller multifamily buildings

The language in this proposal was adapted from a proposed IECC 2027 Appendix that RMI submitted as part of the IECC 2027 development process. [You can find the most recent version of that proposal linked here.](#)

Prescriptive pathway. It is standard practice for credit values to be determined by calculating the savings from the measure compared to a baseline model building using the same fuel for the relevant end use. The 2024 IECC compares heat pump measures to minimum-efficiency electric space heating equipment, while gas furnace measures are compared to a minimum-efficiency gas furnace. This suggests that a building complying with the prescriptive pathway using a natural gas boiler and gas tank water heater may be less energy efficient than an otherwise identical building using an air source heat pump and heat pump water heater.

The prescriptive pathway in this proposal adds a new measure to award credits based on the site energy savings from using heat pump equipment rather than gas equipment, where both appliances meet and do not exceed federal minimum appliance efficiency standards. It additionally increases credit requirements by the number of credits associated with the measure when minimum-efficiency equipment is used. This ensures that the stringency of the amended code is equal to the stringency of the base code for buildings with heat pumps.

Performance pathway. The simulated building performance pathway sets the performance metric to be site energy use intensity (EUI) and the standard reference design building to be a mixed fuel building using gas space and water heating. This allows as-designed buildings utilizing heat pumps to earn credit toward compliance proportionate to the energy efficiency of those systems. This pathway also ensures that the performance pathway and prescriptive pathway are of similar stringency by requiring the as-design model to exceed performance of the baseline building through an equation that includes the additional energy credits required in Section C406.

ASHRAE 90.1 Appendix G pathway. This pathway amends ASHRAE 90.1 Informative Appendix I and Appendix G, and removes ASHRAE 90.1 prescriptive and energy cost budget compliance options. The modifications adjust Appendix G's building performance factors (BPFs) to reflect site EUI differences instead of energy cost differences. The BPF required depends on building type and climate zone, and are TBD by PNNL analysis, such that this pathway will be equally stringent to the prescriptive pathway.

Code language: Commercial and taller multifamily buildings

General

Adopt the **2024 IECC**, including **Appendix CH**, as modified. Amend as follows:

C101.2 Scope. This code applies to the design and construction of buildings not covered by the scope of the IECC — Residential Provisions.

C101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted and referenced as a requirement of a compliance option. Appendix CH is required for compliance paths as specified in Section C401.2.

Amend as follows:

ENERGY USE INTENSITY (EUI). The metric indicating the total amount of site energy consumed by a *building* in 1 year divided by the gross floor area of the *building*.

Amend as follows:

C401.2 Application. *Commercial buildings* shall comply with Appendix CH and either **Section C401.2.1** or **C401.2.2**.

C401.2.1 International Energy Conservation Code. *Commercial buildings* shall comply with one of the following:

1. **Prescriptive Compliance.** The Prescriptive Compliance option requires compliance with **Sections C402** through **C406** and **Section C408**. *Dwelling units* and *sleeping units* in Group R-2 buildings shall be deemed to be in compliance with this chapter, provided that they comply with **Section R406**.
2. **Simulated Building Performance.** The *Simulated Building Performance* option requires compliance with **Section C407**.

C401.2.2 ASHRAE 90.1 Appendix G. *Commercial buildings* shall comply with the requirements of **ANSI/ASHRAE/IES 90.1 Appendix G**, as amended by the following:

1. **ANSI/ASHRAE/IES 90.1 Appendix G** is modified to be based on Site Energy Use Intensity in accordance with Section I6 of Informative Appendix I.

Prescriptive Pathway

Delete existing **Table C406.1.1(1)** and replace with modification below. The intent of this change is to prevent this proposal's provision of due credit to heat pump measures from inadvertently reducing the energy efficiency required by the code.

TABLE C406.1.1(1)—ENERGY CREDIT REQUIREMENTS BY BUILDING OCCUPANCY GROUP																			
BUILDING OCCUPANCY GROUPS	CLIMATE ZONE																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R-2, R-4 AND I-1	65	66	67	78	83	94	104	90	99	122	98	110	144	112	112	132	128	132	139
I-2	50	53	48	50	63	55	63	52	51	81	57	75	108	78	86	104	87	105	115
R-1	63	62	66	65	72	74	92	89	87	106	100	109	119	112	123	119	122	127	139
B	62	62	65	68	72	70	123	84	73	179	109	159	193	149	179	203	175	162	153
A-2	70	70	72	72	79	77	125	98	91	181	128	166	205	149	192	214	193	228	256
M	80	79	83	79	81	84	151	91	87	268	117	219	307	194	281	286	238	271	286
E	56	57	55	58	68	57	118	77	66	123	105	147	147	148	153	148	133	143	148
S-1 and S-2	61	60	61	60	57	57	167	92	64	302	180	251	299	241	228	289	275	279	284
All other	31	31	31	32	37	36	86	51	43	134	77	119	154	111	134	153	133	145	15

Modify **C406.2.2** as follows:

C406.2.2 More efficient HVAC equipment performance. All heating and cooling systems shall meet the minimum requirements of **Section C403** and efficiency improvements shall be referenced to minimum efficiencies listed in tables referenced by **Section C403.3.2**. Where multiple efficiency requirements are listed, equipment shall meet the seasonal or part-load efficiencies including SEER, integrated energy efficiency ratio (IEER), integrated part load value (IPLV) or AFUE. Equipment that is larger than the maximum capacity range indicated in tables referenced by **Section C403.3.2** shall utilize the values listed for the largest capacity equipment for the associated equipment type shown in the table. Where multiple individual heating or cooling systems serve the project, the improvement shall be the weighted-average improvement based on individual system capacity. Systems are permitted to achieve HVAC energy credits by meeting the requirements of one of the following:

1. **C406.2.2.1** H01.
2. **C406.2.2.2** H02.
3. **C406.2.2.3** H03.
4. **C406.2.2.4** H04.
5. **C406.2.2.5** H05.
6. **C406.2.2.6** H06.
7. Any combination of H02, H03, H04, ~~and~~ H05, and H06.

Amend as follows:

C406.2.2.6 H06 High-Efficiency Heating Equipment Credit Alignment. In accordance with Section C406.1.1, not less than 90 percent of the total HVAC heating capacity serving the total conditioned floor area of the entire building or tenant space shall comply with the requirements of this section. This credit is available for all projects that utilize equipment whose heat efficiencies are listed in tables referenced by Section C403.3.2. Energy efficiency credits for heating shall be determined using **Equation 4-19**, rounded to the nearest whole number. Supplemental gas and electric heat for heat pump systems shall be excluded from the weighted-average. This credit may be used in any combination with credits H02, H03, H04, H05 and H06.

Equation 4-19
$$\frac{EEC_{HEHE}}{EEC_{Base}} = \frac{EQ_{Design} - 0.8}{2.1} \quad (\text{not less than zero})$$

where:

EEC_{HEHE} = Energy efficiency credits for utilizing high-efficiency equipment listed in the tables referenced by Section C403.3.2.

EEC_{Base} = **C406.2.2.6** credits from **Tables C406.2(1)** through **C406.2(9)**.

EQ_{Design} = Minimum required efficiency metric, part-load or annualized where available from Section C403.3.2, for the proposed piece of equipment. For heat pumps rated at multiple ambient temperatures, the efficiency at 47°F (8.3°C) shall be used. E_t , E_c , or AFUE efficiency metrics are allowed to be used for combustion appliances. For heat pumps, COP_H shall be used. HSPF₂ values shall be divided by 3.412 to calculate approximate COP_H .

Modify **Section C406.2.3.1.2** as follows. The purpose of this change is to address a known error in the model code version of the credit that prevents the credit's use.

C406.2.3.1.2 W02 Electric hHeat pump water heater. Air-source electric heat pump water heaters shall be installed according to the manufacturer's instructions and at least not less than 30 percent of designed end-use service water heating load requirements shall be met using only heat pump heating at an ambient condition of 67.5°F (19.7°C), db without supplemental electric resistance or fossil fuel heating. ~~For a~~ Where heat pump water heater with supplemental electric resistance heating is installed, the heat pump-only capacity shall be deemed at 40 percent of first-hour draw. Where the heat pump-only capacity exceeds 50 percent of the design end-use load, excluding recirculating system losses, the credits from the Section C406.2 tables shall be prorated as follows:

Equation 4-1920
$$EC_{HPWH} = (EC_{BASE}/0.5) \times \{(CAP_{HPWH})/(Endload) \} \quad [\text{not greater than } 2]$$

where:

EC_{HPWH} = Energy credits achieved for W02.

EC_{BASE} = W02 base energy credits from Tables C406.2(1) through C406.2(9).

Endload = End-use peak hot water load, excluding load for heat trace or recirculation, Btu/h or kW.

CAP_{HPWH} = The heat pump-only capacity at 50.6°F (10.3°C) entering air and 70°F (21°C) entering potable water without supplemental electric resistance or fossil fuel heat, Btu/h or kW.

The heat pump service water heating system shall comply with the following requirements:

1. For systems with an installed total output capacity of more than 100,000 Btu/h (29 kW) at an ambient condition of 67.5°F (19.7°C) db, a preheat storage tank with greater than or equal to 0.75 gallons per 1,000 Btu/h (≥ 9.7 L/kW) of design end-use service water-heating requirements shall be heated only with a heat pump ~~heating~~ when the ambient temperature is greater than 45°F (7.2°C).
2. ~~For systems with~~ Where system piping temperature maintenance is installed, either a heat trace system or ~~a separate water heaters~~ in series for a recirculating system and final heating shall be installed.
3. Heat pump water heater efficiency shall ~~meet or exceed~~ be equal to or greater than one of the following:
 - 3.1. Output-capacity-weighted-average UEF of 3.0 in accordance with 10 CFR 430 Appendix E.
 - 3.2. Output-capacity-weighted-average COP of not less than 4.0 tested at ~~50~~80.6°F (~~10~~27°C) entering air and 70°F (21°C) entering potable water in accordance with ANSI/AHRI 1300.

~~Where the heat pump capacity at 50°F (10°C) entering air and 70°F (21°C) entering water exceeds 50 percent of the design end-use load, excluding recirculating system losses, the base credits from Section C406.2 shall be prorated based on Equation 4-20.~~

~~**Equation 4-20** ——— $W02\text{ credit} = \text{base } W02\text{ table credit} \times (HP_{if}/50\%)$~~

~~where:~~

~~HP_{if} = Heat pump capacity as a fraction of the design end-use SHW requirements, excluding recirculating system losses, not to exceed 80 percent.~~

Add Credit H06 to **Tables C406.2(1) through C406.2(9)** as follows. The credit values for these measures were calculated to reflect site energy improvements compared to a standard reference design that uses natural gas space heating and a package terminal heat pump, neither of which may exceed the US Department of Energy's currently effective minimum efficiency standard for those products.

TABLE C406.2(1)
BASE ENERGY CREDITS FOR GROUP R-2, R-4 AND I-1 OCCUPANCIES

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H06	High-Efficiency Heating Equipment Credit Alignment	C406.2.2.6	0	0	0	1	3	8	24	9	9	36	8	20	58	22	22	62	39	52	51

TABLE C406.2(2)
BASE ENERGY CREDITS FOR GROUP I-2 OCCUPANCIES

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H06	High-Efficiency Heating Equipment Credit Alignment	C406.2.2.6	7	11	10	13	27	17	31	20	21	45	21	40	65	35	42	58	40	55	62

TABLE C406.2(3)
BASE ENERGY CREDITS FOR GROUP R-1 OCCUPANCIES

TABLE C406.2(4)
BASE ENERGY CREDITS FOR GROUP B OCCUPANCIES

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H06	<u>High-Efficiency Heating Equipment Credit Alignment</u>	<u>C406.2.2.6</u>	0	0	1	2	6	5	59	20	5	109	37	85	122	76	102	132	101	88	82

TABLE C406.2(5)
BASE ENERGY CREDITS FOR GROUP A-2 OCCUPANCIES

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H06	<u>High-Efficiency Heating Equipment Credit Alignment</u>	<u>C406.2.2.6</u>	0	0	0	0	4	2	55	25	9	112	54	88	138	77	114	154	126	171	205

TABLE C406.2(6)
BASE ENERGY CREDITS FOR GROUP M OCCUPANCIES

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H06	<u>High-Efficiency Heating Equipment Credit Alignment</u>	<u>C406.2.2.6</u>	0	0	0	0	0	0	84	17	0	188	51	154	228	132	231	211	171	196	228

TABLE C406.2(7)
BASE ENERGY CREDITS FOR GROUP E OCCUPANCIES

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H06	<u>High-Efficiency Heating Equipment Credit Alignment</u>	<u>C406.2.2.6</u>	0	0	0	0	10	0	59	15	7	62	39	85	83	81	86	83	66	80	90

TABLE C406.2(8)
BASE ENERGY CREDITS FOR GROUP S-1 AND S-2 OCCUPANCIES

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H06	High-Efficiency Heating Equipment Credit Alignment	C406.2.2.6	0	0	0	0	0	0	123	38	2	217	112	176	209	159	156	199	186	189	194

TABLE C406.2(9)
BASE ENERGY CREDITS FOR OTHER OCCUPANCIES

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H06	High-Efficiency Heating Equipment Credit Alignment	C406.2.2.6	0	0	0	0	5	3	56	19	7	99	42	84	117	75	98	117	96	109	122

Simulated Building Performance Compliance

Modify **Section C407.2** as follows. These changes set the Simulated Building Performance section to be based on site energy use reduction instead of energy code reduction.

C407.2 Mandatory requirements. Compliance based on simulated building performance requires that a proposed design meet all of the following:

1. The requirements of the sections indicated within Table C407.2(1).
2. An annual site energy use that is less than or equal to the percentage of the annual energy use (PAEU) of the standard reference design as calculated using Equation 4-34.

~~An annual energy cost that is less than or equal to the percentage of the annual energy cost (PAEC) of the standard reference design calculated in Equation 4-34. Energy prices shall be taken from a source approved by the code official, such as the Department of Energy, Energy Information Administration's State Energy Data System Prices and Expenditures reports. Code officials shall be permitted to require time-of-use pricing in energy cost calculations. The reduction in energy cost of the proposed design associated with on-site renewable energy shall be not more than 5 percent of the total energy cost. The amount of renewable energy purchased from off-site sources shall be the same in the standard reference design and the proposed design.~~

Equation 4-34 $PAEU\% = 100 \times (0.80 + 0.025 - EC_r/1000)$

where:

PAEU% = The percentage of the annual energy ~~use~~cost of the standard reference design.

EC_r = Energy efficiency credits required for the building in accordance with **Section C406.1** (do not include load management and renewable credits).

Exceptions:

1. ~~_____ Jurisdictions that require site energy (1 kWh = 3413 Btu) rather than energy cost as the metric of comparison.~~
2. ~~_____ Where energy use based on source energy expressed in Btu or Btu per square foot of conditioned floor area is substituted for the energy cost, the energy use shall be calculated using source energy factors from Table C407.2(2). For electricity, US locations shall use values from eGRID subregions. Locations outside the United States shall use the value for "All other electricity" or locally derived values.~~

Modify Tables C407.4.1(1) and C407.4.1(2) as shown below. The purpose of these edits is to set the standard referenced design to be equivalent to a mixed fuel baseline building.

TABLE C407.4.1(1)—SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS		
BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems	Fuel type: same as proposed design <u>As specified in Table C407.4.1(2)</u>	As proposed
	Equipment type ^a : as specified in Tables C407.4.1(2) and C407.4.1(3)	As proposed
	Efficiency: as specified in the tables in Section C403.3.2.	As proposed
	Capacity ^b : sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet heating load hours and no larger heating capacity safety factors are provided than in the proposed design.	As proposed
Service water heating ^e	Fuel type: same as proposed <u>fossil fuel</u>	As proposed
	Efficiency: as specified in Table C404.2	For Group R, as proposed multiplied by SWHF. For other than Group R, as proposed multiplied by efficiency as provided by the manufacturer of the DWHR unit.
	Capacity: same as proposed	As proposed
	Where no service water hot water system exists or is specified in the proposed design, no service hot water heating shall be modeled.	As proposed

Table C407.4.1(2) HVAC SYSTEMS MAP				
CONDENSER COOLING SOURCE ^a	HEATING SYSTEM CLASSIFICATION ^b	STANDARD REFERENCE DESIGN HVAC SYSTEM TYPE ^c		
		Single-zone Residential System	Single-zone Nonresidential System	All other
Water/ground	Electric resistance	System 5	System 5	System 1
	Heat pump	System 6	System 6	System 6
	Fossil fuel	System 7	System 7	System 2
Air/none	Electric resistance	System 8	System 9	System 3
	Heat pump	System 8 System 10	System 9 System 11	System 3 System 4
	Fossil fuel	System 10	System 11	System 4

Erin Sherman and Jonny Kocher, *Energy Choice Overlays (ECO) v2.0*, RMI, 2026,
<https://rmi.org/insight/the-energy-code-safe-harbor>.

Note: Prior versions of this resource were named Zero Fuel Bias Overlays v1.0.

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