



U.S. DOE Zero Energy Ready Home Single Family Homes National Rater Checklist Version 2 (Rev. 1)

The program requirements in this checklist must be verified based on as-built conditions unless noted otherwise. Project teams are strongly encouraged to also use this checklist during the project design phase. Raters are reminded that these checklist items must be completed in addition to the items required by ENERGY STAR Single Family New Homes Version 3.2 and Indoor airPLUS. Overlapping requirements are not repeated in this checklist.

DOE Zero Energy Ready Home – Single Family Homes Version 2 Revision 1 National Rater Checklist					
Home Address:	City:	State:	Permit Date:		
			Must Correct	Rater ¹ Verified	Exception or Alternate Used ² (Enter endnote #)
1. Partnership Status					
1.1 Rater has verified that builder is a registered DOE ZERH Builder Partner and identified the builder’s Partner ID. ³					
1.2 Rater has verified and documented that their company has a ZERH partnership agreement using the ZERH Partner Locator . ⁴					
1.3 Rater(s) signing checklists attest that they have completed DOE-recognized training (according to the timeline posted on the ZERH website) and are credentialed by a Home Certification Organization for ZERH (HCO for ZERH).					
2. ENERGY STAR Single Family New Homes Baseline					
2.1 Home is certified under ENERGY STAR Single Family New Homes Version 3.2. ⁵					
3. Building Envelope					
3.1 Ceiling, wall, floor, and slab insulation meet or exceed 2021 IECC UA levels. ⁶					
3.2 Windows meet high performance requirements based on climate zone. ⁷					
4. Duct System					
4.1 All heating and cooling distribution ducts and heating and cooling air-handling equipment are located within the thermal and air barrier boundary. ⁸					
5. Water Heating Efficiency (comply with 5.1, 5.2, <i>or</i> 5.3; mark the other lines N/A)					
5.1 Hot water delivery systems meet efficient design requirements. ⁹					
5.2 Water heater and fixtures meet efficiency criteria. ^{10, 11}					
5.3 Home is certified under WaterSense Labeled Homes Version 2.0.					
6. Lighting & Appliances¹²					
6.1 All builder-supplied and -installed refrigerators, dishwashers, clothes washers, and clothes dryers are ENERGY STAR certified. ^{13, 14}					
6.2 100% of builder-installed lighting fixtures and lamps (bulbs) provided are LEDs. ^{15, 16}					
6.3 All installed bathroom ventilation fans are ENERGY STAR certified. ¹⁷					
7. Indoor Air Quality					
7.1 Certified under EPA Indoor airPLUS. ¹⁸					



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7.2 Energy efficient balanced ventilation (HRV or ERV) is provided in Climate Zones 6 – 8. ¹⁹			
8. Renewable Ready			
8.1 Provisions of the DOE Zero Energy Ready Home Single Family Homes Version 2 (Rev. 1) PV-Ready Checklist are completed. ²⁰			
9. Electric Vehicle Ready			
9.1 One parking space is provided per dwelling unit that includes a powered 208/240V, 30A receptacle installed in dwelling unit's garage or within 6 feet of the dwelling unit's private driveway. The electric service panel identifies the branch circuit as "Electric Vehicle Charging." ²¹ For other parking configurations, see endnote. ²²			
10. Heat Pump Water Heater Ready			
10.1 Individual branch circuit outlet is installed, energized, and terminates within 3 feet of each installed fossil fuel water heater. ²³			
10.2 A space is located within the home or garage that is at least 3' x 3' wide and 7' high surrounding or within 3 feet of the installed fossil fuel water heater, to facilitate future heat pump water heater installation. ²⁴			
11. Heat Pump Space Heating Ready			
11.1 Individual branch circuit outlet or conduit is installed to facilitate future wiring for a heat pump installation. Circuit or conduit labeled as "For future heat pump." ²⁵			
12. Energy Efficiency Threshold			
12.1 Home's ERI value ≤ DOE ZERH Target Home ERI			

Inspection Signoffs		
Rater Name: _____ Rater Company Name: _____	Rater Pre-Drywall Inspection ²⁶ Date(s): _____	Rater Initials: _____
Rater Name: _____ Rater Company Name: _____	Rater Final Inspection Date(s): _____	Rater Initials: _____
Builder/Developer Employee: _____ Builder/Developer Name: _____	Builder Inspection Date(s): _____	Builder Initials: _____
Licensed Professional: _____	LP Inspection Date(s): _____	LP Initials: _____

Endnotes:

The following endnotes are intended to relate the same exemptions and clarifications as noted in the National Program Requirements. However, if there are any inconsistencies the endnotes in the National Program Requirements shall take precedence.



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¹ The Rater is defined as the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by a DOE-recognized Home Certification Organization for ZERH (HCO for ZERH).

² If an exception for a program requirement or an alternate compliance method is used, enter the number of the corresponding endnote from this document that lists the exception or alternate.

³ The DOE ZERH Partner ID number for the builder must be entered in the energy rating software used for ZERH certification.

⁴ Raters are only required to document the partnership status of their company once, for the first home that the Rater certifies for them.

⁵ In some states, an earlier version of ENERGY STAR Single Family New Homes (ESSFNH), such as Version 3.1, may be required by the ENERGY STAR Residential New Construction program. However, compliance with DOE Zero Energy Ready Home Single Family V2 requires compliance with ESSFNH V3.2.

⁶ Building envelope assemblies, including exterior walls and unvented attic assemblies (where used), shall comply with the relevant vapor retarder provisions of the 2021 International Residential Code (IRC).

The total building envelope UA shall be less than or equal to the UA value that results from multiplying the U factors in the 2021 International Energy Conservation Code (IECC) – Table R402.1.2 by the same assembly areas as the home being certified. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method. The performance of components (i.e., fenestration, ceilings, walls, floors, slabs) can be traded off using the UA approach. However, note that the DOE ZERH Mandatory window provisions (Exhibit 1) and Items 3.1 through 3.3 of the ESSFNH National Rater Field Checklist must be met regardless of the UA tradeoffs calculated. Adjustments to the UA calculation related to slab edge insulation details that are permitted by ENERGY STAR Single Family Homes Version 3.2 are permissible for use in meeting this requirement.

For jurisdictions designated by a code official as having Very Heavy Termite Infestation, the slab edge insulation value and depth shall be adjusted in the UA calculation. The code-required insulation level and depth shall be set to the insulation level and depth found in the Rated Home for the purpose of determining compliance with this ZERH requirement.

Any slab edge insulation allowances permitted by the most recent version and revision of the ENERGY STAR Single Family New Homes program are permitted. A list of currently exempted details is available at www.energystar.gov/slabeledge. Note that projects using these exempted details must still achieve the Target ERI and the total building envelope UA requirement, which assume the use of slab edge insulation per the 2021 IECC prescriptive values.

⁷ Windows shall meet the performance criteria below based on climate zone:

Window Specs Required	IECC CZ 1-2	IECC CZ 3,4A, 4B	IECC CZ 4C, 5 (SHGC values listed below may be paired with the U-value in the same row)	IECC CZ 6-8
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for DOE Zero Energy Ready Home Projects	U-Value	SHGC	U-value	SHGC	U-Value	SHGC	U-Value	SHGC
	≤ 0.40	≤ 0.23	[CZ 3] ≤ 0.30 [CZ 4] ≤ 0.30	[CZ 3] ≤ 0.25 [CZ 4] ≤ 0.40	≤ 0.27 = 0.28 = 0.29 = 0.30	Any ≥ 0.32 ≥ 0.37 ≥ 0.42	≤ 0.25	Any

The following exceptions apply:

- a. An area-weighted average of windows shall be permitted to satisfy the U-factor and SHGC requirements;
- b. 15 square feet of windows per dwelling unit shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a), above;
- c. Windows 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 / ft³x°F and provided in a ratio of at least 3 sq. ft. per sq. ft. of South facing windows. Generally, thermal mass materials will be at least 2 in. thick.
- d. For project sites located at an elevation ≥ 5,000 feet above sea level and located in Climate Zones 5 – 8, windows with a maximum U factor of 0.30 (with any SHGC) may be used to satisfy this program requirement. For project sites located at an elevation ≥ 8,000 feet above sea level and located in Climate Zones 5 – 8, windows with a maximum U factor of 0.32 (with any SHGC) may be used to satisfy this program requirement.

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 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. 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).

More information on the ENERGY STAR V7.0 residential window specification may be found here:

https://www.energystar.gov/products/res_windows_doors_skylights/partners DOE may initially consider phase in of the ENERGY STAR V7.0 window specifications prioritizing Climate Zones 7 and 8, due to the significant benefit of advanced windows in these very cold climate zones.

⁸ Exceptions:

- a. Up to 10 ft. of total duct length is permitted to be outside of the home/unit’s thermal and air barrier boundary.
- b. Ducts (but not air handlers) may be located in a vented attic if minimum R-8 duct insulation is used, duct leakage to outdoors is measured ≤ 3 CFM25 per 100 ft² of conditioned floor area, and:
 - o In Moist (A) climate zones (per 2021 IECC Figure R301.1), an additional 1.5 in. (min.) of closed-cell spray foam encapsulates the ducts and ductwork is buried under 2 in. (min.) of blown-in insulation; OR
 - o In Dry (B) and Marine (C) climate zones (per 2021 IECC Figure R301.1), ductwork is buried under at least 3.5 in. of blown-in insulation.
- c. Systems which meet the criteria for “Ducts Located in Conditioned Space” as defined by 2021 IECC Section R403.3.2.
- d. Jump ducts which do not directly deliver or return conditioned air from/to the heating/cooling equipment may be located in attics if all joints, including boot-to-drywall, are air sealed and the jump duct is fully buried under the attic insulation.



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- e. Ducts and air-handling equipment associated with rooftop make-up air units or dedicated outdoor air systems (DOAS) that provide ventilation, and may also provide supplemental heating and cooling, are permitted to be outside of the building's thermal and air barrier boundary.

This provision does not apply to equipment or ductwork that only provides ventilation.

Ducts located in unvented attic assemblies meeting the requirements of Section 806.5 of the 2021 IRC satisfy this provision. Note that homes with unvented attic assemblies must follow the appropriate envelope air leakage testing provisions in Standard ANSI/RESNET/ICC 380.

⁹ Hot water delivery systems meet the following efficiency requirements:

To minimize water wasted while waiting for hot water, the hot water distribution system shall store no more than 0.5 gallons (1.9 liters) of water in any piping/manifold between the hot water source and any hot water fixture. System options include manifold-fed systems; structured plumbing systems; core plumbing layouts, and on-demand recirculation systems. The following requirements apply to recirculation systems:

- a. Recirculation systems must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom which is located beyond a 0.5 gallon stored-volume range from the water heater.
- b. Recirculation systems which operate based on "adaptive" scheduling, meaning that they "learn" the hot water demand profile in the home and adapt their operation to anticipate this profile, are permitted at this time, and do not require the use of occupant-controlled switches or occupancy sensors.
- c. Recirculation systems that are activated based **solely** on a timer and/or temperature sensor are not eligible.

To verify that the system stores no more than 0.5 gallons (1.9 liters), verifiers shall either use the Calculation method or the Field Verification method. In the Calculation method, the verifier shall calculate the stored volume between the hot water source and the furthest fixture using the piping or tubing inside diameter and the length of the piping/tubing. In the case of on-demand recirculation systems, the 0.5-gallon (1.9 liter) storage limit shall be measured from the point where the branch feeding the furthest fixture branches off the recirculation loop, to the fixture itself. An Excel-based tool is available on the DOE ZERH website for this calculation.

Using the Field Verification method, no more than 0.6 gallons (2.3 liters) of water shall be collected from the hot water fixture before hot water is delivered. Only the fixture with the greatest stored volume between the fixture and the hot water source (or recirculation loop) needs to be tested. To field-verify that the system meets the 0.6-gallon (2.3 liter) limit, verifiers shall first initiate operation of on-demand recirculation systems, if present, and let such systems run for at least 40 seconds. Next, a bucket or flow measuring bag (pre-marked for 0.6 gallons) shall be placed under the hot water fixture. The hot water shall be turned on completely and a digital temperature sensor used to record the initial temperature of the water flow. Once the water reaches the pre-marked line at 0.6 gallons (approximately 24 seconds for a lavatory faucet), the water shall be turned off and the ending temperature of the water flow (not the collection bucket) shall be recorded. The temperature of the water flow must increase by ≥ 10 °F in comparing the final to the initial temperature reading. Under the DOE ZERH Single Family program, the approved verifier must confirm compliance with these requirements.

For production builders with house plans that offer an optional bathroom that does not include a shower or tub, the hot water distribution to this bathroom, when included, is not required to be evaluated under this requirement.



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¹⁰ Water heaters and fixtures meet the following efficiency criteria:

- a. Gas water heaters, if present, shall have a Uniform Energy Factor ≥ 0.87
- b. Electric water heaters, if present, shall have a Uniform Energy Factor ≥ 2.2
- c. Solar water heating systems, if present, shall have a minimum solar fraction, as follows:

2021 IECC Climate Zone	1, 2	3, 4A, 4B	4C, 5, 6	7, 8
Minimum Solar Fraction (SF)	0.80	0.64	0.47	0.28

- i. The solar water heating system’s Solar Fraction (SF) must be documented by an OG-300 certification. Alternatively, projects may find an equivalent system in the [OG-300 directory](#) which contains the same OG-100 elements as the chosen system and meets or exceeds the minimum required solar fraction. In this situation, documentation of the OG-100 elements and the comparable OG-300 system must be provided. All systems must be made up of OG-100 tested components.
- ii. When a solar water heating system meeting these specifications is used, gas and electric water heaters used for backup are exempt from the Uniform Energy Factor (in the two prior sub-items) requirements of 0.87 and 2.2, respectively.
- d. All showerheads and bathroom sink faucets and aerators shall be WaterSense labeled.
- e. The hot water distribution system shall store no more than 1.8 gallons between the hot water source and the furthest fixture. In the case of on-demand recirculation systems, the hot water source is considered as the point at which the branch feeding the fixture branches off the recirculation loop. This storage limit shall be verified by either 1) a calculation using the piping or tubing interior diameter and the system length based on plans, or 2) by a field verification test, using the protocol described in the prior endnote, which demonstrates a minimum temperature rise of 10 °F by the time 2.0 gallons of water is delivered to the furthest hot water fixture.

Projects using this compliance option are not permitted to use hot water recirculation systems which operate continuously or operate based solely on a timer or temperature sensor.

¹¹ WaterSense label may be verified in one of two ways:

- a. A cut sheet for the installed product indicates that it is WaterSense labeled and field verification shows that the installed product is the one described on the cut sheet.
- b. The installed product can be found in the most recent WaterSense Product Search tool (<https://lookforwatersense.epa.gov/products/>) and field verification shows that the installed product matches the product described in the search tool.

¹² ENERGY STAR product certification must be verified with a visual confirmation that installed product is listed in the online ENERGY STAR product registry.

¹³ For products in categories which are not covered by ENERGY STAR product criteria, these products are exempt.

¹⁴ Due to industry supply chain challenges, DOE is temporarily allowing the use of non-ENERGY STAR certified refrigerators. Any project utilizing this temporary alternative must account for the non-ENERGY STAR certified refrigerator in the energy model and achieve an ERI value equal to or lower than the ERI of the DOE ZERH Target Home. DOE advises partners that this alternative may be rescinded in a future program update.

¹⁵ Up to 5% of lighting, for task or decorative lighting, may be exempt from this provision. The Target Home specification for lighting will remain at 100% regardless of whether this exemption is used (Exhibit 2).



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¹⁶ Builder-installed lighting does not include lighting inside appliances (e.g., refrigerator, laundry, microwave, cooking equipment).

¹⁷ This provision does not apply to H/ERVs that are used to provide exhaust ventilation for bathrooms.

¹⁸ Homes permitted on or before 12/31/2024 must certify under the Indoor airPLUS Version 1 program requirements. For homes permitted after 12/31/2024, DOE will specify a revision to these program requirements that updates the mandatory IAQ provisions. See the Indoor airPLUS program site for information on program updates: <https://www.epa.gov/indoorairplus/indoor-airplus-version-2>

¹⁹ An HRV or ERV is required to provide whole-house mechanical ventilation for homes in Climate Zones 6 – 8 and must meet or exceed the following specifications: $\geq 65\%$ SRE (@ 32 °F) and ≥ 1.2 CFM/Watt (at one or more rating points).

²⁰ The DOE ZERH Single Family program requires that the provisions of the PV-Ready Version 2 Checklist are completed, unless one or more of the exceptions below applies in which case the PV-Ready features in the Checklist are not required. The exceptions are:

- a. The home already includes an on-site PV system.
- b. The home receives renewable energy from a community solar system, and there is a legally binding agreement in place for the provision of this energy to the home with a duration ≥ 15 years and written to survive a full or partial transfer of ownership of the property.
- c. The location has significant natural shading (e.g., trees, tall buildings impacting the south-facing roof).
- d. The home as designed does not have at least 500 square feet of roof area oriented in between 110 degrees to 270 degrees of true north.

The Rater shall document which, if any, exceptions apply.

²¹ The following exceptions apply:

- If the addition of the 30-amp Electric Vehicle Charging branch circuit increases the electrical service to the next nominal size (i.e., from 200-amp to 400-amp service), connecting the circuit to the electrical panel is not required. The conductor shall be labeled as “electrical vehicle charging.” The Rater shall retain a copy of the electrical sizing calculations or statement from the electrical designer for their records but need not evaluate the documentation.
- Where the local electric distribution entity has certified in writing that it is not able to provide 100% of the necessary distribution capacity that would be needed according to this requirement within 2 years after the estimated date of the certificate of occupancy, the required EV charging infrastructure shall be reduced based on the available existing electric distribution capacity. The Rater must include the utility’s written explanation in the project records. When meeting the capacity requirements to satisfy this requirement will alter the local utility infrastructure design requirements on the utility side of the meter so as to increase the utility side cost to the builder or developer by more than \$450 per dwelling unit, the required EV charging infrastructure shall be reduced based on the available existing electric distribution capacity. The Rater must include documentation from the utility regarding added costs in the project records.
- Dwelling units for which no parking is provided by the builder are exempt from this requirement.

²² Dwelling units in communities that include parking for the dwelling unit (assigned or non-assigned) but do not include a private driveway or garage for the individual dwelling unit must use the following compliance path:



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- Allocated parking for dwelling units shall be provided with an EV Capable space, EV Ready space, or Electric Vehicle Supply Equipment (EVSE) space for 20% of units or automobile parking spaces, whichever is less. To meet this 20% threshold, the following minimum types of spaces are provided:
 - 10% of parking (based on automobile parking spaces for the dwelling units or the number of dwelling units, whichever is less) shall be EVSE spaces. Round up to the next whole number of parking spaces.
 - The remaining 10% of the total shall be any combination of EVSE, EV Capable, or EV Ready spaces. Round up to the next whole number of parking spaces.

When determining the total number of spaces, do not include in the calculation spaces in parking lots or parking garages where the cost of the energy use of the parking lot or garage is not the responsibility of the Builder/Developer, Building Owner or Property Manager.

Electric Vehicle Supply Equipment Installed Space (EVSE space) is defined as: "An automobile parking space where operational EVSE has been installed."

Electric Vehicle Supply Equipment (EVSE) is defined as: "Equipment for plug-in power transfer including the ungrounded, grounded, and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, personal protection system and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle." Under this compliance path, installed EVSE must be located within 3 feet of each EVSE space it serves. The branch circuit serving an individual space EVSE shall have a rated capacity not less than 8.3kVA (40A at 208/240V). EVSE serving multiple EVSE spaces is permitted.

An Electric Vehicle Ready Space (EV-ready space) is defined as: "An automobile parking space provided with a branch circuit and either an outlet or enclosure for connection to EVSE." Under this compliance path, branch circuits serving EV Ready spaces must terminate at an outlet or enclosure located within 3 feet of each EV Ready space it serves. The branch circuit serving an EV Ready space must have a rated capacity not less than 8.3kVA (40A at 208/240V).

An Electric Vehicle Capable Space (EV-capable space) is defined as: "An automobile parking space provided with electrical infrastructure such as, but not limited to, raceways, cables, enclosures, electrical capacity, and electrical distribution equipment space, necessary for connection to EVSE." Under this compliance path, EV Capable Spaces must consist of a continuous raceway or cable assembly installed between an enclosure or outlet located within 3 feet of the EV Capable space and a suitable panelboard or other onsite electrical distribution equipment. The following exceptions to the 3 feet requirement apply:

- Parking spots in a covered garage are deemed EV-Capable if the conduit terminates anywhere within the garage on that parking level.
- Projects with a common area electrical room may have the conduit terminate anywhere within the electrical room.

²³ The individual branch circuit shall have a rating not less than 240V/30A or 120V/20A. Installed water heaters using a branch circuit meeting one of these ratings satisfy this requirement.

²⁴ The 3' x 3' x 7' volume may contain the existing water heater. An exception to the requirement for the 3' x 3' x 7' space is provided when the installed water heater is an electric system or a fossil fuel tankless water heater.

²⁵ If a branch circuit outlet is installed, it shall be in compliance with 2021 IRC Section E3702.11 based on heat pump space heating equipment sized in accordance with 2021 IECC R403.7 and shall terminate within three feet



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of each fossil fuel space heater. Alternatively, code-compliant wiring conduit to facilitate future wiring for a heat pump installation may be installed and shall terminate within three feet of each fossil fuel space heater.

Homes utilizing electric heating systems as the primary heating for the home are exempt from this requirement.

²⁶ Any Item that will be concealed by drywall (e.g., wall insulation) must be verified during the pre-drywall inspection. If drywall is installed prior to the inspection, then it must be entirely removed to fully verify all Items. It is not sufficient to remove only portions of drywall to inspect a subset of areas. Additional information is available in the ENERGY STAR Technical Bulletin: Pre-Drywall Inspection Is Always Required. Some Items can typically only be verified at a later stage of construction than when the pre-drywall inspection occurs (e.g., bath fan airflow). Any Item that has not been verified during the pre-drywall inspection must be verified prior to or during the final inspection.