



# U.S. DOE Zero Energy Ready Home Single Family Homes National Program Requirements Version 2

The following homes are eligible for qualification under the DOE Zero Energy Ready Home (ZERH) Single Family program: Dwellings<sup>1</sup> (e.g., single-family homes, duplexes) and Townhomes.<sup>2</sup> These homes may be site-built or modular construction.<sup>3</sup>

To determine the required version and revision of DOE ZERH program requirements to use based on a project's location, building type, and permit date<sup>4</sup>, partners must reference the DOE ZERH implementation timelines information posted on the [DOE ZERH program requirements website](#). Partners are advised to check the DOE ZERH website and IRS Guidance on the 45L tax credit for further information about tax credit eligibility. Also note 45L tax credit eligibility is based on a project's Acquisition Date.

To qualify for the DOE ZERH Single Family program, an eligible home shall meet the minimum requirements specified below, be verified and field-tested by an approved Rater<sup>5</sup>, and meet all applicable codes.<sup>6</sup> Note that compliance with these guidelines does not imply compliance with all local code requirements that may be applicable to the home to be built. In cases where local codes overlap with and/or exceed the ZERH program requirements, these local requirements shall be met. In any jurisdiction where 2021 IECC Appendix RC Zero Energy Residential Building Provisions have been adopted as a code requirement, homes must comply with both the Energy Rating Index (ERI) requirements of Appendix RC and meet the DOE ZERH Target Home ERI requirements described below, to achieve DOE ZERH certification. The builder and the Rater must both have signed a DOE ZERH partner agreement for a home to be certified.

## DOE Zero Energy Ready Home Certification Process

1. Projects must meet the Mandatory requirements listed in Exhibit 1.
2. Projects conduct energy modeling using an approved software rating tool from a DOE-recognized Home Certification Organization for ZERH Certifications (HCO for ZERH) to establish the home's Energy Rating Index (ERI) value. The home's ERI value must be equal to or lower than the ERI of the DOE ZERH Target Home as defined in Exhibit 2. The ERI value for the Target Home shall be automatically generated by the approved software rating tool.<sup>7</sup>
3. Construct the home using the measures specified in the design that result in an ERI value at or below the DOE ZERH ERI Target, calculated above, **and** incorporate the mandatory requirements listed in Exhibit 1. On-site power generation may not be used to meet the Target ERI.
4. Use a Rater operating under a DOE-recognized HCO for ZERH to verify that all requirements have been met in accordance with the Mandatory Requirements and with the inspection procedures for minimum rated features in ANSI / RESNET / ICC Standard 301-2019, Appendix B.<sup>8,9</sup> Rater must review all items in the ZERH Single Family V2 Rater Checklist.<sup>10</sup> For modular homes, a Rater must verify in the plant any requirement that is not readily verifiable on-site. Submit the home to the HCO for ZERH for final certification and follow the HCO for ZERH's certification and oversight procedures, including those for quality assurance, recordkeeping, and reporting. The Rater is required to keep electronic or hard copies of completed checklists required for the DOE ZERH certification, including those required for prerequisite certifications.
5. The submission of qualifying DOE ZERH projects to DOE occurs through the HCO for ZERH.

### Exhibit 1: DOE Zero Energy Ready Home Mandatory Requirements

Component	Mandatory Requirements
<b>1. ZERH V2 National Rater Field Checklist</b>	<input type="checkbox"/> Rater completes the DOE ZERH – Single Family Homes Version 2 National Rater Field Checklist
<b>2. ENERGY STAR Single Family</b>	<input type="checkbox"/> Certified under ENERGY STAR Single Family New Homes Version 3.2 <sup>11</sup>



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New Homes Baseline	
<b>3. Envelope</b>	<input type="checkbox"/> Ceiling, wall, floor, & slab insulation meet or exceed 2021 IECC UA <sup>12,13,14</sup> <input type="checkbox"/> Windows meet high performance requirements based on climate zone <sup>15</sup> <i>Advisory:</i> DOE is monitoring the implementation of ENERGY STAR product specifications for residential windows (V7.0), and plans to adopt these in a future program version update <sup>16</sup>
<b>4. Duct System</b>	<input type="checkbox"/> All heating and cooling distribution ducts and heating and cooling air-handling equipment are located within the thermal and air barrier boundary <sup>17</sup>
<b>5. Water Heating Efficiency</b>	<input type="checkbox"/> Hot water delivery systems meet efficient design requirements <sup>18</sup> <b>or</b> <input type="checkbox"/> Water heater and fixtures meet efficiency criteria <sup>19</sup>
<b>6. Lighting &amp; Appliances</b>	<input type="checkbox"/> All builder-supplied and -installed refrigerators, dishwashers, clothes washers, and clothes dryers are ENERGY STAR qualified <sup>20, 21</sup> <input type="checkbox"/> 100% of builder-installed lighting fixtures and lamps (bulbs) provided are LEDs <sup>22</sup> . <input type="checkbox"/> All installed bathroom ventilation and ceiling fans are ENERGY STAR qualified <sup>23</sup>
<b>7. Indoor Air Quality</b>	<input type="checkbox"/> Certified under EPA Indoor airPLUS <sup>24</sup> <input type="checkbox"/> Energy efficient balanced ventilation (HRV or ERV) is provided in Climate Zones 6-8 <sup>25</sup>
<b>8. Renewable Ready</b>	<input type="checkbox"/> Provisions of the DOE Zero Energy Ready Home PV-Ready Checklist Version 2 are Completed <sup>26</sup>
<b>9. Electric Vehicle Ready</b>	<input type="checkbox"/> One parking space is provided per dwelling unit that includes a powered 208/240V, 40A receptacle installed in garage or within 3 feet of driveway or dedicated parking space. The electric service panel identifies the branch circuit as "Electric Vehicle Charging." <sup>27</sup>
<b>10. Heat Pump Water Heater Ready</b>	<input type="checkbox"/> Individual branch circuit outlet is installed, energized, and terminates within 3 feet of each installed fossil fuel water heater, and a space located within the home or garage that is at least 3' x 3' wide and 7' high shall be available surrounding or within 3 feet of the installed fossil fuel water heater, to facilitate future heat pump water heater installation. <sup>28</sup>
<b>11. Heat Pump Space Heating Ready</b>	<input type="checkbox"/> Individual branch circuit outlet is installed or conduit is installed to facilitate future wiring for a heat pump installation. Circuit or conduit labeled as "For future heat pump." <sup>29</sup>

## Exhibit 2: DOE Zero Energy Ready Home Target Home <sup>30</sup>

HVAC Equipment <sup>31</sup>			
	Very Hot & Hot Climates (2021 IECC Climate Zones 1,2)	Warm & Mixed Climates (2021 IECC Climate Zones 3, 4A, 4B)	Cold & Very Cold Climates (2021 IECC Climate Zones 4C, 5,6,7,8)
Furnace AFUE	80%	CZ3: 92%; CZ4: 95%	95%
SEER	18	16	16 (ASHP); 14 (A/C)
HSPF	9.2	9.2	9.5
Boiler AFUE	80%	CZ3: 92%; CZ4: 95%	95%
Whole-House Mechanical Ventilation System Efficiency	2.9 cfm/W no heat exchange	2.9 cfm/W no heat exchange	1.2 cfm/W; balanced with heat exchange, 65% ASRE
HVAC Grading			



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<ul style="list-style-type: none"> <li><b>Airflow Deviation:</b> Grade I, -7.5%</li> </ul>		<ul style="list-style-type: none"> <li><b>Watt Draw Efficiency:</b> Grade I, 0.45 cfm/W</li> </ul>		<ul style="list-style-type: none"> <li><b>Refrigerant Grade</b> (as applicable): Grade III</li> </ul>	
<b>Insulation and Infiltration</b>					
<ul style="list-style-type: none"> <li>Insulation levels modeled to 2021 IECC Prescriptive values and achieve Grade 1 installation, per ANSI / RESNET / ICC Standard 301</li> <li>Infiltration – SF Detached Dwelling units<sup>32</sup> (ACH50): CZs 1-2: 2.75   CZ 3,4A, 4B: 2.25   CZs 4C, 5-7: 2.0   CZ 8: 1.5</li> <li>Infiltration – SF Attached Dwelling units (duplexes, townhouses) (ACH50): 3.0 (all Climate Zones)</li> </ul>					
<b>Windows</b>					
2021 IECC Climate Zone	1 – 2	3	4A, 4B	4C, 5	6 – 8
U-Value	0.40	0.30	0.30	0.27	0.25
SHGC	0.23	0.25	0.40	Any	Any
<b>Doors</b>					
Door Type	Opaque	≤ ½-Lite	> ½-Lite		
Climate Zone	All	All	1 – 3	4 - 8	
Door U-Value	0.17	0.25	0.30	0.30	
Door SHGC	Any	0.25	0.25	0.40	
<b>Water Heater</b>					
DHW equipment modeled at the following applicable efficiency levels based on Uniform Energy Factor (UEF): <ul style="list-style-type: none"> <li>Electric Systems: UEF = 2.57</li> <li>Gas / Propane Systems: UEF = 0.95</li> </ul>					
<b>Ducts and Thermostat<sup>33</sup></b>					
<ul style="list-style-type: none"> <li>All ducts and air handlers modeled within conditioned space, uninsulated, with no leakage to the outside</li> <li>Programmable thermostat</li> </ul>					
<b>Lighting &amp; Appliances</b>					
<ul style="list-style-type: none"> <li>For purposes of calculating the DOE ZERH Target Home ERI, homes shall be modeled with an ENERGY STAR dishwasher, ENERGY STAR refrigerator; ENERGY STAR ceiling fans (if used), and ENERGY STAR lamps (bulbs) or fixtures in 100% of Qualifying Light Fixture Locations as defined by ANSI / RESNET / ICC Standard 301-2019.</li> </ul>					

## Endnotes:

<sup>1</sup> A dwelling, as defined by ANSI/RESNET/ICC 301, is any building that contains one or two dwelling units used, intended, or designed to be built, used, rented, lease, let, or hired out to be occupied, or that are occupied for living purposes. A dwelling unit, as defined by ANSI/RESNET/ICC 301 is a single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

<sup>2</sup> A Townhouse, as defined by ANSI/RESNET/ICC 301, is defined as a single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides. Townhomes are also eligible to participate in the DOE Zero Energy Ready Home Multifamily Version 2 program.



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<sup>3</sup> A modular home is a prefabricated home that is made of modules or sections that are manufactured and substantially assembled in a manufacturing plant. These pre-built sections are transported to the building site and constructed by a builder to meet all applicable building codes for site-built homes.

<sup>4</sup> 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.

<sup>5</sup> 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). All Raters for DOE ZERH projects must successfully complete a DOE ZERH orientation course. The Rater shall also have a signed partnership agreement in place with the DOE ZERH program.

<sup>6</sup> Where requirements of the local codes, covenants, manufacturers' installation instructions, or engineering documents overlap with the requirements of these guidelines, DOE offers the following guidance:

- a. In cases where the overlapping requirements exceed the DOE ZERH Single Family guidelines, these overlapping requirements shall be met;
- b. In cases where overlapping requirements conflict with a requirement of these DOE ZERH Single Family program requirements, then the home is exempt from the conflicting requirement within these guidelines. However, certification 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 guidelines. Note that a home must still meet the Target Home Energy Rating Index Target. Therefore, other efficiency measures may be needed to compensate for the omission of the conflicting requirement.

<sup>7</sup> The software program shall automatically determine, without relying on a user-configured Target Home, the ERI target for each rated home by following the DOE Zero Energy Ready Home Target Home Procedure, Version 2.

<sup>8</sup> In the event that a Rater is not able to determine whether an item is consistent with the intent of a provision, (e.g., an alternative method of meeting a checklist requirement has been proposed), then the Rater shall consult their Provider. The term 'Provider' refers to an Approved Rating Provider, as defined by ANSI / RESNET / ICC Standard 301-2019, that is approved by a DOE-recognized HCO for ZERH. If the Provider also cannot make this determination, then the Rater or Provider shall report the issue to DOE prior to project completion at: [zerh@doe.gov](mailto:zerh@doe.gov) and will receive an initial response within 5 business days. If DOE believes the current program guidelines are sufficiently clear to determine whether the intent has been met, then this guidance will be provided to the Partner and enforced beginning with the house in question. However, if DOE believes the program guidelines require revisions to make the intent clear, then this guidance will be provided to the Partner but only enforced for homes permitted after a specified transition period following the release of the revised guidelines, typically 60 days in length. This process will allow DOE to make formal policy decisions as Partner questions arise and to disseminate these policy decisions through the ZERH Policy Record and the periodic release of revised program documents to ensure consistent application of the program guidelines.

<sup>9</sup> Sampling of those requirements for ENERGY STAR Single Family New Homes (ESSFNH) and Indoor airPLUS qualification is allowed to the extent permitted by their respective program requirements and allowances for sampling. Rater-only sampling of features specific to the DOE ZERH Single Family Home qualification may be conducted in accordance with an HCO for ZERH-approved Sampling Protocol.

<sup>10</sup> Raters are expected to use their experience and discretion to verify that the overall intent of each checklist item has been met (i.e., identifying major defects that undermine the intent of the checklist item versus identifying minor defects that the Rater may deem acceptable).



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<sup>11</sup> In some states, an earlier version of ENERGY STAR Single Family New Homes such as Version 3.1 may be required by the ENERGY STAR Residential New Construction program. However, compliance with DOE Zero Energy Ready Home V2 requires compliance with ESSFNH V3.2.

<sup>12</sup> 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).

<sup>13</sup> 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.

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.

<sup>14</sup> 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](http://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.

<sup>15</sup> Windows shall meet the performance criteria below based on climate zone:

Window Specs Required for DOE ZERH Projects	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	
	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:

- An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;
- An area-weighted average of fenestration products ≥ 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;



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- d. 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;
- e. 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  $> 20 \text{ btu} / \text{ft}^3 \times \text{F}$  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.
- f. For project sites located at an elevation  $\geq 5,000$  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  $\geq 8,000$  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).

<sup>16</sup> 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](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.

<sup>17</sup> 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  $\leq 3 \text{ CFM}_{25}$  per 100  $\text{ft}^2$  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 conditioned air from 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
- e. Ducts and air-handling equipment may be located within an uninsulated and unvented crawl space or basement when the applicable dehumidification requirements of the Indoor airPLUS program (Version 1) are met
- f. 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.



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Ducts located in unvented attic assemblies meeting the requirements of Section 806.5 of the 2021 IRC satisfy this provision.

<sup>18</sup> 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  $\geq 10$  °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.

<sup>19</sup> Water heaters and fixtures meet the following efficiency criteria:

- a. Gas water heaters, if present, shall have a Uniform Energy Factor  $\geq 0.87$
- b. Electric water heaters, if present, shall have a Uniform Energy Factor  $\geq 2.2$
- c. All showerheads and bathroom sink faucets and aerators shall be WaterSense labeled.
- d. The hot water distribution system shall store no more than 1.2 gallons between the hot water source and the furthest fixture. In the case of on-demand recirculation systems, the hot water source is



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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 1.4 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.

<sup>20</sup> For products in categories which are not covered by ENERGY STAR product criteria, such as combination all-in-one clothes washer-dryers, these products are exempt.

<sup>21</sup> 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.

<sup>22</sup> 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).

<sup>23</sup> This provision does not apply to H/ERVs that are used to provide exhaust ventilation for bathrooms.

<sup>24</sup> Homes permitted on or before 12/31/2023 must certify under the Indoor airPLUS Version 1 program requirements. For homes permitted after 12/31/2023, DOE may consider a revision to these program requirements that specifies if an updated version of Indoor airPLUS must be used. See the Indoor airPLUS program site for information on program updates: <https://www.epa.gov/indoorairplus/indoor-airplus-program-documents>

<sup>25</sup> 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  $\geq 1.2$  CFM/Watt.

<sup>26</sup> 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  $\geq 15$  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 600 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.

<sup>27</sup> If the addition of the 40-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.





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Homes without a private driveway or garage are exempt from this requirement.

<sup>28</sup> The individual branch circuit shall have a rating not less than 240V/30A or 120V/20A. 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 tankless system or a fossil fuel tankless water heater.

Homes utilizing an electric water heater are exempt from this requirement.

<sup>29</sup> 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 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.

<sup>30</sup> Compliance with DOE ZERH Version 2 program requirements is based on climate zones as defined in the 2021 IECC. Climate Zones as defined by the 2021 IECC may be viewed online: <https://codes.iccsafe.org/content/IECC2021P1/chapter-3-re-general-requirements>. Note that some locations have shifted to a different climate zone in the 2021 IECC as compared to prior versions of the IECC.

<sup>31</sup> HVAC System Type for the Target Home shall be the same as the Rated Home, with the following exceptions. The Target Home is configured with an air-source heat pump when the Rated Home has an air-source or ground-source heat pump, electric strip heat, or baseboard heat. Applicable efficiency levels are based on Exhibit 2.

<sup>32</sup> Envelope leakage shall be determined by using Standard ANSI/RESNET/ICC 380-2019.

<sup>33</sup> In homes with heat pumps with electric resistance back-up heating, programmable thermostats shall have "Adaptive Recovery" technology to prevent the excessive use of electric back-up heating.