



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

These Program Requirements shall only be used in the State of California.

1. Building Eligibility Requirements

The following homes are eligible to participate in the DOE Zero Energy Ready Home (ZERH) Single Family Homes California Program Version 2: Detached dwellings¹ (e.g., single-family homes, duplexes) and Townhomes.² These homes may be site-built or modular construction.³

To determine the required version and revision of DOE ZERH program requirements to use based on a project's location, building type, and permit date⁴, 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.

To qualify for the DOE ZERH Single Family for California program, an eligible home shall meet the minimum requirements specified below, be verified and field-tested by an approved Rater⁵, and meet all applicable codes. 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.⁶

Throughout these requirements there are references to various standards, including the California 2022 Title 24, Building Energy Efficiency Standards (BEES), which may be accessed at energy.ca.gov.

2. Partnership, Training, and Credentialing Requirements

The following requirements must be met prior to certification:

- The builder [or developer for the building] must [register as a ZERH partner](#) and sign the ZERH Builder Partner Agreement, available in [Partner Central](#) on the ZERH website.
- Energy Rating Companies (e.g., rater companies and Providers⁷) are required to [register as a ZERH partner](#) and sign a ZERH Partnership Agreement, available in [Partner Central](#) on the ZERH website.
- Raters are required to complete all ZERH training modules applicable to the ZERH SF V2 CA program specifications (according to the timeline posted on the [ZERH website](#)) prior to completing a ZERH project's first inspection. Please note that required training modules are subject to change and Raters will have an allocated transition period to complete additional or updated training modules as they become available. If a Rater does not successfully complete these modules before the end of the allocated transition period, they may not certify ZERH projects until the modules are complete.
- Raters⁵ must be credentialed by a Home Certification Organization for the Zero Energy Ready Home program (HCO for ZERH). The HCO for ZERH must be recognized by DOE as a group that implements the ZERH Certification System in California. Learn more and find a current list of HCOs for ZERH [here](#).

3. DOE Zero Energy Ready Home Certification Process

1. Projects must meet the Mandatory requirements listed in Exhibit 1.
2. Projects must select a combination of measures that meet or exceed (as assessed through energy modeling) one of the following performance targets:
 - An Energy Design Rating, Energy Efficiency (EDR2 Efficiency) that is ≥ 7 points better than that of the Standard Design corresponding to the home, as defined by the 2022 Building Energy Efficiency Standards (BEES) and determined by a CEC-approved software program⁸
 - A Compliance Margin (EDR2) that is $\geq 15\%$ compared to the Compliance Total of the Standard Design TDV Energy corresponding to the home, as defined by the 2022 Building Energy Efficiency Standards (BEES) and determined by a CEC-approved software program



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3. Configure the preferred set of efficiency measures for the home to be certified and verify that the resulting performance meets or exceeds the applicable performance target using the applicable software program, as determined in Step 2. Note that, regardless of the measures selected, the Mandatory Requirements in Exhibit 1 are also required and impose certain minimum performance levels for the efficiency measures selected.
4. Construct the home using the measures selected in Step 2 and the Mandatory Requirements in Exhibit 1.
5. Using a Rater, verify that all requirements have been met in accordance with the Mandatory Requirements for All Certified Homes and with Data Input requirements and On-Site Inspection Procedures for California HERS Ratings. This will require a minimum of two inspections: one at pre-drywall and the other at final. All ZERH requirements shall be verified for each certified home and sampling protocols shall not be used to verify ZERH requirements. For modular homes, a Rater must verify any requirement in the plant not able to be verified on-site because a feature will be concealed prior to shipment. Finally, submit the home to the HCO for ZERH for final certification and follow the HCO for ZERH's certification and oversight procedure (e.g., quality assurance, recordkeeping, and reporting). The Rater is required to keep electronic or hard copies of the completed and signed ZERH Single Family Homes California Program Version 2 Rater Field Checklist.
6. The Rater must review all items on the ZERH Single Family Homes California Rater Checklist Version 2 to verify that each inspection checklist item has been met within program-defined tolerances.
7. In the event that a Rater determines that a program requirement has not been met, the home cannot be ZERH certified until the item is corrected.⁹ If correction of the item is not possible, the home cannot earn ZERH certification.
8. The submission of qualifying DOE ZERH projects to DOE occurs through the HCO for ZERH.

Exhibit 1: Mandatory Requirements

Area of Improvement	Mandatory Requirements
1. ZERH Single Family Homes California Rater Checklist Version 2	1.1 Rater completes the DOE ZERH – Single Family Homes California Version 2, Rater Checklist
2. ENERGY STAR Single-Family New Homes Baseline	2.1 Home shall be certified under ENERGY STAR Single Family New Homes California Program Requirements, Version 3.4
3. Envelope	3.1 Window meet high performance requirements based on climate zone ¹⁰
4. Duct System and Air Handler Location	4.1 All heating and cooling distribution ducts and the space-conditioning system air handler are located within the thermal and air barrier boundary ¹¹
5. Water Efficiency	5.1 Hot water distribution system (HWDS) qualifies as a HERS-Verified Compact HWDS as specified in the BEES Reference Appendix RA3.6.5 ¹² or 5.2 Water heaters and fixtures meet efficiency criteria ¹³ or 5.3 Home is certified under WaterSense Labeled Homes Version 2.0
6. Lighting & Appliances¹⁴	6.1 All builder-supplied and -installed refrigerators, dishwashers, clothes washers, and clothes dryers are ENERGY STAR certified ^{15, 16} 6.2 100% of builder-installed lighting fixtures and lamps (bulbs) provided are LEDs ^{17, 18} 6.3 All installed bathroom ventilation fans are ENERGY STAR certified ¹⁹
7. Indoor Air Quality	7.1 Certified under EPA Indoor airPLUS ²⁰ 7.2 Energy efficient balanced ventilation (HRV or ERV) is provided in 2021 International Energy Conservation Code Climate Zones 6-8 ²¹



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8. Renewable Ready	8.1 Provisions of the DOE Zero Energy Ready Home PV-Ready Checklist Version 2 (most recent revision) are completed ²²
9. Electric Vehicle Ready	9.1 One parking space is provided per dwelling unit that includes a powered 208/240V, 40A 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". ²³ For other parking configurations, see endnote. ²⁴
10. Heat Pump Water Heating Ready	10.1 For homes using gas or propane water heating systems to serve individual dwelling units, compliance with 2022 California Building Energy Efficiency Standards Section 150.0(n)1 is required.
11. Electric Ready Space Heating	11.1 For homes using gas or propane furnaces to serve individual dwelling units, compliance with 2022 California Building Energy Efficiency Standards Section 150.0(t) is required.

Endnotes:

¹ 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.

² 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.

³ 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.

⁴ The permit date⁷ is the date on which the permit authorizing construction of the building was issued. Alternatively, the date of the Rater's first site visit or the date of the contract on the home is allowed to be used as the 'permit date'. The permit application date is not allowed to be used.

⁵ A Rater is defined as the person(s) completing the third-party verification required for certification. The person(s) shall be a Certified Rater, which is defined as an individual who has become qualified to conduct California HERS Ratings through certification under a "Home Certification Organization for ZERH" recognized by DOE to implement a ZERH certification program in California. A list of DOE-recognized "HCOs for ZERH" is posted here: <https://www.energy.gov/eere/buildings/doe-recognized-zerh-certification-organizations>

⁶ Where requirements of the local codes, covenants, manufacturers' installation instructions, or engineering documents overlap with the ZERH requirements, DOE offers the following guidance:

- a. In cases where the overlapping requirements exceed the ZERH requirements, these overlapping requirements shall be met;
- b. In cases where overlapping requirements conflict with a ZERH requirement, then the home is exempt from the conflicting ZERH requirement. However, certification shall only be allowed if the Rater has determined that no equivalent option is available that could meet the conflicting ZERH requirement. Note that a home must still meet



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the required performance target listed in these requirements. Therefore, other efficiency measures may be needed to compensate for the omission of the conflicting requirement.

⁷ The term 'Provider' refers to an Approved Rating Provider defined as an Approved entity responsible for the certification of raters working under its auspices and who is responsible for the Quality Assurance of such Certified Raters and for the Quality Assurance of Energy Ratings produced by such Certified Raters.

Approved shall mean approved by an HCO for ZERH recognized by DOE to implement an ZERH certification program in California.

Quality Assurance is defined as the systematic processes intended to ensure reliable compliance with applicable standards.

An Energy Rating is defined as an unbiased indication of a Dwelling Unit's relative energy performance based on consistent inspection procedures, operating assumptions, climate data and calculation methods in accordance with the Data Input requirements and On-Site Inspection Procedures for California HERS Ratings.

⁸ CEC-approved computer programs can be found at: <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency-1>. Any measure that contributes to the Efficiency EDR (EDR2 Efficiency) or Compliance Margin (EDR2), as recognized by CEC-approved computer programs, is permitted to be used to meet these performance targets.

⁹ In the event that a Rater is not able to determine whether a program requirement has been met (e.g., an alternative method of meeting a checklist requirement has been proposed), then the Rater shall consult their Provider. 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 and will receive an initial response within 5 business days. If DOE believes the current program requirements are sufficiently clear to determine whether the item in question has been met, then this guidance will be provided to the partner and enforced beginning with the house in question. In contrast, if DOE believes the program requirements 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 after the release of the revised program requirements, typically 60 days in length. This will allow DOE to make formal policy decisions as partner questions arise and to disseminate these policy decisions through the Policy Record and the periodic release of revised program documents to ensure consistent application of the program requirements.

¹⁰ Windows shall meet the U factor and SHGC specifications of 2022 BEES, Table 150.1-A Component Package – Single-Family Standard Building Design.

The following exceptions apply:

- a. An area-weighted average of windows shall be permitted to satisfy the U-factor requirements;
- b. An area-weighted average of windows shall be permitted to satisfy the SHGC requirements;
- 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 / ft³ x °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.



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Advisory: DOE is monitoring the implementation of ENERGY STAR product specifications for residential windows (V7.0), and may adopt these in a future program version update.

¹¹ Exceptions and alternative compliance paths:

- a. Ducts and/or the space-conditioning system air handler may be located in ventilated attic spaces if the roof and ceiling insulation level from 2022 BEES Table 150.1-A, Option B are met. Duct insulation levels must also meet the requirements in Table 150.1-A.
- b. Ducts and/or the space-conditioning air handler may be located within an unvented, insulated attic assembly.
- c. 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
- d. 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.

¹² To meet the Compact Hot Water Distribution System credit requirements, the system’s Weighted Distance must be less than the Qualification Distance based on the calculation procedures in RA4.4.6 of the 2022 Building Energy Efficiency Standards Reference Appendices. In addition, these HERS field verifications are required:

- a. No hot water piping larger than 1 inch diameter is allowed.
- b. Length of 1 inch diameter piping is limited to 8 ft or less.
- c. Two and three story buildings do not have hot water distribution piping in the attic, unless the water heater is also located in the attic.
- d. Eligible recirculating systems must be HERS-Verified Demand Recirculation: Manual Control conforming to RA4.4.17

¹³ 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. WaterSense label may be verified in one of two ways:
 - 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.



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- 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
- 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, 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.

In the calculation method, the Rater 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 1.8 gallon 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 2.0 gallons 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 2.0 gallon limit, Raters 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 2.0 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 2.0 gallons 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. The Rater 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.

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.

¹⁴ ENERGY STAR product certification must be verified with a visual confirmation that installed product is listed in the online ENERGY STAR product registry.

¹⁵ For products in categories which are not covered by ENERGY STAR product criteria, these products are exempt.

¹⁶ 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 still achieve the required performance target. DOE advises partners that this alternative may be rescinded in a future program update.

¹⁷ Up to 5% of lighting, for task or decorative lighting, may be exempt from this provision.



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¹⁸ Builder-installed lighting does not include lighting inside appliances (e.g., refrigerator, laundry, microwave, cooking equipment).

¹⁹ This provision does not apply to H/ERVs that are used to provide exhaust ventilation for bathrooms.

²⁰ 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 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>

²¹ Alpine and Mono Counties in California are classified as 2021 IECC Climate Zone 6, and no California counties are classified as being in IECC Climate Zones 7 or 8. The HRV or ERV must meet or exceed the following specifications: $\geq 65\%$ SRE (@ 32 °F) and ≥ 1.2 CFM/Watt (at one or more rating points).

²² Homes must complete the provisions of the PV-Ready Version 2 Checklist, 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 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.

²³ 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.

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.

Where 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.

²⁴ 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:

- 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:



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- 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.