
The Vocabulary of **ZNE** A Guide to Zero Net Energy Terminology in California¹

*A ZNE building produces as much energy
as it consumes over the course of a year*

What is a ZNE Building?

A **zero net energy (ZNE) building** is an energy-efficient building that produces as much energy as it consumes over the course of a year, usually by incorporating renewable energy generation on-site.

ZNE (also known as a Zero Energy Building [ZEB] or Net Zero Energy Building [NZE]) is a fast growing segment of the nation's building industry and it is hard to keep up with the new and changing terminology. California has set bold goals to achieve zero net energy for all new residential buildings by 2020 and all new commercial, as well as 50% of existing buildings, by 2030. This fact sheet provides an explanation of the language and terms people commonly use when they discuss zero net energy buildings.

Scales of ZNE

When defining ZNE, clear boundaries are critical for consistent measurement and comparison. Different policies and organizations may focus ZNE objectives on a building, community, campus, district, or portfolio scale.

- **ZNE Building:** An energy-efficient building that, over the course of a year, consumes an amount of energy less than or equal to the renewable energy generated onsite.
- **ZNE Portfolio:** An energy-efficient portfolio or group of buildings that together consume an amount of energy less than or equal to the renewable energy generated onsite on an annual basis. The buildings included in the portfolio may be located apart from each other.
- **ZNE Campus/District:** An energy-efficient campus or district comprised of multiple buildings that annually consumes an amount of energy less than or greater to the renewable energy generated on-site.
- **ZNE Community:** An energy-efficient community that annually consumes an amount of energy less than or greater to the renewable energy generated onsite.

While definitions vary, industry professionals agree that these buildings achieve ZNE by first incorporating high levels of energy efficiency followed by the addition of onsite renewable energy.

The CA Department of General Services White Paper² on Compliance with Governors Executive order for all new state agencies to achieve ZNE beginning in 2025 provides the following definitions for CA state buildings:

- **ZNE Source:** A building that produces at least as much energy as it uses in a year, when grid-supplied energy is accounted for at the source (including primary energy for generation, transmission, and delivery to the site).
- **ZNE Site:** The building produces at least as much energy as it uses in a year, when grid-supplied energy is accounted for at the site boundary.
- **Time Dependent Valuation (TDV)³:** A metric used in California's Title 24 Building Energy Code to quantify the value of energy and energy savings in residential and non-residential buildings. TDV takes into account time-of-use, CO₂ emissions retail power cost adjustment, transmission and distribution costs, grid capacity, ancillary services, line losses and energy cost, as well as other secondary cost factors. A ZNE Code building uses this metric.
- **ZNE Emissions Building:** A building that produces or purchases enough emissions-free renewable energy to offset emissions from all energy used by the building over the course of a year.
- **ZNE Code:** A building designed to meet the Time Dependent Valuation (TDV)-based definition for ZNE as used by the California Energy Commission for codes compliance.

Broader ZNE definitions

Any selection of a metric between fuels and their emission impacts (eg. site, source, carbon) requires selecting appropriate scope-dependent values to ensure comparability between fuels consumed. Further metric equivalence is

¹ The presence or absence of a term in this glossary does not necessarily reflect the endorsement of any particular definition by NBI or any other organization herein referenced.

² The CA Department of General Services White Paper on Compliance with Governors Executive Order: <https://www.calstate.edu/cpdcae/documents/ZNE-Definition-EO-B-18-12-20160519.pdf>

³ For more information on TDV: http://www.energy.ca.gov/title24/2013standards/preulemaking/documents/general_cec_documents/Title24_2013_TDV_Methodology_Report_23Feb2011.pdf

required when cost are used to measure comparability among the fuels used. To understand these values broader definitions as those below help account for the environmental or financial impacts of fuel use.

- **ZNE Electric:** a ZNE building that does not offset direct use of gas or other fossil fuels.
- **ZNE Cost⁴:** An energy-efficient building where the actual cost of annual energy consumption is offset by the value of onsite renewable energy production.
- **REC Zero Energy Building (REC-ZEB)^{5,6}:** U.S.DOE definition of an energy-efficient building where the actual annual source energy consumption is supplied by onsite renewable energy production to the maximum extent possible and then offsets fossil energy use with the purchase of Renewable Energy Credits (RECs) from certified sources to achieve a ZNE performance level.

Verifying Zero Energy Performance

- **ZNE Verified⁷:** A building that has 12 months of metered data that show zero net or positive energy production over a given consecutive 12 months.
- **ZNE Emerging⁷:** A building that has a publically stated goal of ZNE but has not yet demonstrated achievement of that goal. This building may be in the planning or design phase, under construction or have been in operation for less than a year. An Emerging building may have been operating for 12 months or longer, but the measured performance energy has not yet documented zero net energy performance for 12 consecutive months.

- **Net Zero Certified (ILFI):** A building certified under the International Living Future Institute's (ILFI) Net Zero Energy Building Certification (NZEB) program⁸.
- **Net Positive:** A building that produces more energy than it consumes over 12 consecutive months.

Related Terms

Understanding other common terminology and metrics in the building community is also helpful. Here are some important ones:

- **Energy Use Intensity (EUI)⁹:** A common metric to measure energy consumption is the Energy Use Intensity (EUI) metric, which is measured in kBtu/square foot/year. Different metrics are used to calculate EUI site and EUI source.
- **Renewable Production Intensity (RPI)¹⁰:** A metric also measured in kBtu/square foot/year representing renewable energy generated at the site.
- **A DOE Zero Energy Ready Home¹¹:** A high performance home which is so energy efficient, that a renewable energy system can offset all or most of its annual energy consumption.
- **Ultra-low Energy⁷:** A building that has demonstrated significant technical progress toward goals of energy use reduction, even though it may not have pursued a ZNE energy path by investing in onsite renewables.

For more information on zero net energy please visit: newbuildings.org/hubs/zero-net-energy/

4 Defining Net-Zero Energy Buildings: https://bdcnetwork.s3.amazonaws.com/s3fs-public/1.%20Defining%20Net-Zero%20Energy%20Buildings_0.pdf

5 DOE Definition of REC-ZEB: http://energy.gov/sites/prod/files/2015/09/126/bto_common_definition_zero_energy_buildings_093015.pdf

6 In order to count the renewable energy generation for a building toward a net zero goal, RECs must be retained or retired. If an owner has not retained or retired the RECs associated with their onsite renewable energy system, other parties may be claiming the RECs toward their own environmental goals. The intent is to prevent double counting of the environmental attributes of on-site renewable generation.

7 ZNE Verified, ZNE Emerging and Ultra-low Energy Definitions: http://newbuildings.org/wp-content/uploads/2016/06/ZNE_Tracker_FAQ_201609.pdf

8 For more information: <http://living-future.org/netzero>

9 EUI: https://newbuildings.org/wp-content/uploads/2016/07/FAQs-for-ZNE-Schools-Recognition-Program_FINAL_8-22.pdf

10 RPI: http://newbuildings.org/wp-content/uploads/2016/06/ZNE_Tracker_FAQ_201609.pdf

11 A DOE Zero Energy Ready Home: <http://energy.gov/eere/buildings/zero-energy-ready-home>