



HOW PROPANE HOMES CAN BE ZERO NET ENERGY READY

**BUILDERS AND DESIGNERS ACROSS THE COUNTRY
ARE ACHIEVING ZERO NET ENERGY PERFORMANCE
WITH PROPANE**

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Zero Net Energy (ZNE) homes or buildings are designed to produce as much energy as they consume through a combination of well-insulated building envelopes, highly efficient mechanical systems and on-site renewable energy.

The energy cost savings these homes promise is cause for their growing popularity. Navigant Research projected the count of ZNE homes to increase from 750 in 2015 to 27,000 in 2025. By 2037, the market value for ZNE homes could surpass \$33 billion, according to the Rocky Mountain Institute.

Building to ZNE can be a challenge, especially when high-intensity energy requirements like space and water heating quickly drain photovoltaic-powered batteries, but in ZNE, we see how a low-carbon fuel like propane can be a great partner energy to renewables like solar and wind.

SCORING ZNE HOME EFFICIENCY

Most states use the International Energy Conservation Code (IECC) as the model for their energy codes. The 2015 version of the IECC adds a compliance path called the Energy Rating Index (ERI) based on a project's HERS (Home Energy Rating System) score, which is a measure of its energy performance compared with a reference model.

The lower the score, the more efficient the home. New homes typically score from the low 70s to 100 (depending on the stringency of applicable energy codes) and existing homes around 130 and up. ZNE homes score 0.

DESIGN-BUILD FOR ZNE

California leads U.S. states in the number of ZNE projects and builders. Oregon, Massachusetts, Vermont, New York, New Mexico, Texas, Mississippi and Florida also have high ZNE project counts. Yet ZNE projects are still in the minority among new construction.

Architect Mary Ann Schicketanz strives to make all the custom homes she designs energy neutral. The large, luxury homes she builds in Big Sur and on the California coast are designed to be healthy for the occupant, for the surrounding ecology and for the climate. Independence from the grid is also a necessity. Many of the homes she builds in the remote region are off the electric grid, necessitating an energy-neutral approach.

Like most designers and architects, Schicketanz relies on solar photovoltaic (PV) panels and battery storage as a source of renewable power. Schicketanz, however, has learned that it isn't practical to rely on electricity alone. She specifies low-carbon propane for energy-intensive systems such as space and water heating because its use yields a particularly effective formula for zero energy homes. Cooking, fireplaces and clothes drying are also high-intensity applications propane can serve with greater efficiency and lower carbon emissions than other energy sources.

Schicketanz's work dispels a common misconception that ZNE homes are all-electric. In fact, mixed-fuel solutions work well because they give homeowners the opportunity to lower overall energy use and therefore emissions.

Chris Trolle, co-founder of BPC Green Builders in Wilton, Connecticut, has built 11 such projects to date, about half of which use propane. He said, "An instantaneous propane heater that can do space and domestic water heating is a game-changer versus an old, inefficient oil-[powered] boiler that's 70 percent or 80 percent efficient and probably considerably oversized."

One of his projects is a lakeside home in New Fairfield, Connecticut. It features highly insulated double-wall construction with R-33 blown cellulose insulation, an R-72 roof and triple-pane low-e windows. An energy recovery ventilator brings in fresh air while an air source heat pump heats and cools the space with nearly zero duct leakage. To keep the home warm during Connecticut's cold winters, a 90 percent AFUE propane boiler with a 40-gallon tank serves an in-floor radiant heating system on the first level. It also provides domestic hot water.

Those features made it possible for the home earn a HERS score of 39. At the time it was completed, adding a 9kW PV system would have brought it down to a HERS score of 2.

OPTIMIZING ENERGY USE

Although ZNE construction relies heavily on the efficiency of the building envelope, the home's performance benefits from optimizing energy systems as well. Instantaneous gas combination boilers are an energy-efficient option for space and water heating. Because of their compact size, tankless units can be located close to the point of use to reduce energy lost while transferring hot water throughout a home. The numbers matter to those who work in the architectural and construction trades. It's easy to understand why when these points are factored into a ZNE home:

- Propane-fueled space and water heating contribute 50 percent and 46 percent fewer GHG emissions than electric alternatives, respectively.
- When compared with electric, propane-fueled cooking ranges produce 83 percent fewer GHGs and SOx emissions.
- Propane clothes dryers contribute 42 percent fewer GHG emissions than electric dryers.

To learn more about how propane can help achieve ZNE and Zero Energy Ready (ZER) status, check out our course: "Introduction to Net Zero Energy Homes, and Opportunities to Leverage High Efficiency Propane Systems" on [PropaneTrainingAcademy.com](https://propanetrainingacademy.com).