



Energy



Transportation



Buildings



Industrial



Agriculture



Sequestration

Habitat for Humanity

Client: PG&E/California Energy Commission

2015–ongoing

The State of California has a goal that all new residential buildings be zero net energy (ZNE) by 2020. Frontier Energy partnered with Habitat for Humanity of San Joaquin County (HHSJC) to demonstrate that affordable housing could reach ZNE status. HHSJC is building a neighborhood of homes in a Stockton, CA neighborhood; a perfect living laboratory to compare new energy technologies with existing code requirements.

In phase one of the project, Frontier Energy collaborated with HHSJC to identify energy efficient measures that could be implemented in the standard three-bedroom floor plan. Measures included additional insulation, air sealing, LED fixtures, and using a mini-split heat pump for HVAC coupled with moving the air ducts to condition spaces. The ZNE measures reduced the net cost of the home by nearly \$3,000, which was made possible by a holistic, highly integrated approach. As a result, HHSJC made these measures standards on every home.

We're in the middle of phase 2 of the project that includes two identical houses: one all electric and one gas and electric. When finished, each house will use cutting-edge heat pumps for air and water heating. Frontier Energy will remotely monitor each home's energy use over a year to understand the energy use and cost of each home and how it compares to the other homes in the neighborhood. This real-world use data contributes to benchmarks that can be used in future energy modeling.



Frontier Energy:

- Conducted energy modeling in both phases. The team produced two distinct sets of modeled results for the homes. The first established a ZNE design according to the California Energy Commission's TDV metric, the energy metric used to regulate energy use by the building code in California. With a code-based ZNE design established, the second translated the TDV into a site energy model to represent actual projected energy use.
- Participated on the design team to determine the specific measures to implement into each home in both phases.
- Install remote monitoring equipment and analyze data.
- For phase one, monitored energy use and modeled monthly energy consumption, and compared to the performance of an exemplar as reported in *The Technical Feasibility of Zero Net Energy Buildings in California*. HHSJC used these results to continuously improve construction techniques for each subsequent house. We will do the same for phase two.
- Volunteer at the building site—Frontier Energy's staff and family have logged more than 250 hours swinging hammers, setting walls and windows, pulling wires, and completing finish work that transforms a house into a home.



Bill Dakin
Davis Office
530-316-1522