

Carl Franklin Homes, L.C./ Green Extreme Homes, CDC

McKinley Project
Garland, TX



BUILDER PROFILE

Carl Franklin Homes, L.C.
& Green Extreme Homes, CDC
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: McKinley Project
- Location: Garland, TX
- Layout: 3 bedrooms, 2.5 baths, 2 floors
- Conditioned Space: 1,594 ft²
- Climate Zone: IECC 3A, hot-humid
- Completion: January 2015
- Category: Affordable

Modeled Performance Data:

- HERS Index: without PV 56, with PV 26
- Projected Annual Utility Costs: without PV \$1,875, with PV \$1,167
- Projected Annual Energy Cost Savings (compared to a home built to the 2009 IECC): without PV \$1,450, with PV \$1,905
- Builder's Added Cost Over 2009 IECC: without PV \$2,000, with PV \$10,000
- Annual Energy Savings: without PV 6,194 kWh, with PV 13,047 kWh

Veterans Day 2014 was a memorable day for a young couple in Texas, both of whom are U.S. military veterans. The couple, were among those recognized at a special event honoring veterans who had served our country and now were about to receive a new affordable energy-efficient home. The homes were constructed through a unique public-private partnership including the for-profit builder Carl Franklin Homes, L.C., the non-profit 501c-3 Green Extreme Homes Community Development Corporation, the City of Garland, Home Depot, Citi Veteran's Network, United Way's Veteran's Day Event 2015 and its partners, Texas Instruments, Frito-Lay, LaQuinta, Dr Pepper, CitiBank and former Dallas Cowboy Roger Staubach's organization "Allies in Service."

Together, these entities helped construct the Steep's 2-story, 3 bedroom, 2.5 bath home with a 1-car garage, which was built to meet the high performance criteria of the U.S. Department of Energy Zero Energy Ready Home program. This project is one of approximately 75 affordable homes that Steve Brown, owner of Carl Franklin Homes, has constructed in collaboration with Green Extreme. The partners won a DOE Housing Innovation Award in September 2014 for an existing home that they retrofitted for another veteran that also met the DOE Zero Energy Ready Home criteria.

The DOE Zero Energy Ready Home program requires homes to meet all of the requirements of ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency's Indoor airPLUS, as well as the hot water distribution requirements of the EPA's WaterSense program and the insulation requirements of the 2012 International Energy Conservation Code. In addition, homes are required to have solar electric panels installed or have the conduit and electrical panel space in place for it.



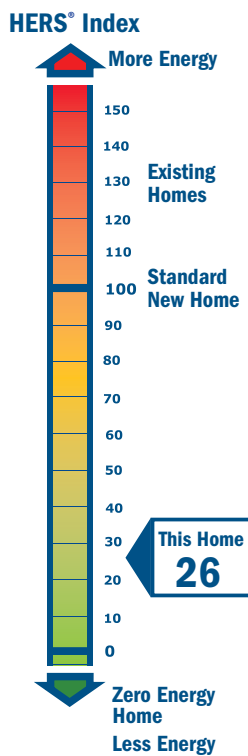
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 for an energy-efficient home built on a solid foundation of building science research. Advanced technologies are designed in to give you superior construction, durability, and comfort; healthy indoor air; high-performance HVAC, lighting, and appliances; and solar-ready components for low or no utility bills in a quality home that will last for generations to come.

The two-story home was built by Carl Franklin Homes and Green Extreme Homes to meet the high performance criteria of the U.S. Department of Energy Zero Energy Ready Home program. The builder chose to build the home's walls and roof with SIP panels.



What makes a home a DOE ZERO ENERGY READY HOME?

- 1 **BASELINE ENERGY STAR Certified Homes Version 3.0**
- 2 **ENVELOPE** meets or exceeds 2012 IECC levels
- 3 **DUCT SYSTEM** located within the home's thermal boundary
- 4 **WATER EFFICIENCY** meets or exceeds the EPA WaterSense Section 3.3 specs
- 5 **LIGHTING AND APPLIANCES** ENERGY STAR qualified
- 6 **INDOOR AIR QUALITY** meets or exceeds the EPA Indoor airPLUS Verification Checklist
- 7 **RENEWABLE READY** meets EPA Renewable Energy-Ready Home.



“These veterans, along with their young son and new baby daughter, have an energy-efficient home that provides them with low-maintenance exterior cladding, low utility costs, a clean air environment for their young family, and a drought-tolerant low-maintenance landscape—all of the features needed for a great home, and at an affordable cost,” said builder Brown.

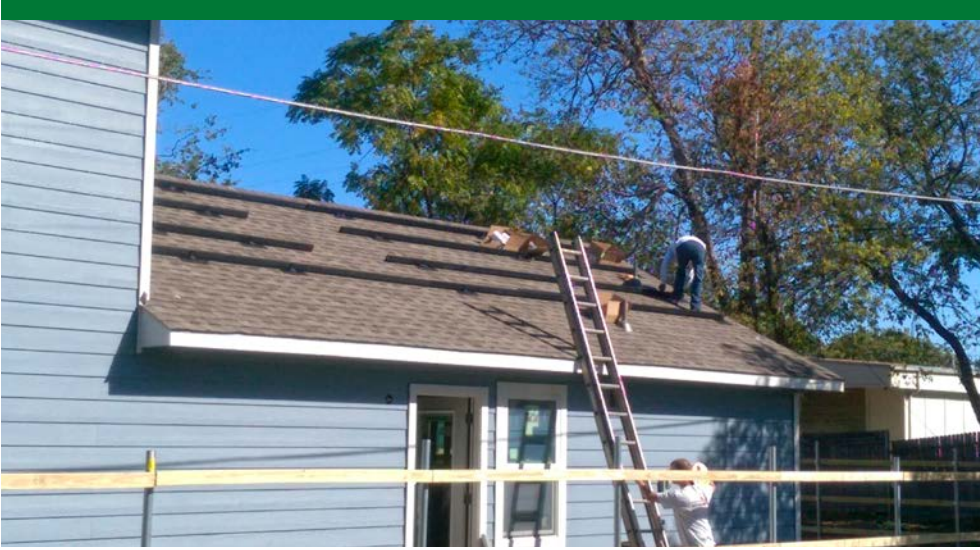
The couple was able to purchase the home at a discounted rate of approximately \$125,000. They also received down-payment assistance from the city totaling approximately \$10,000. The home will be inexpensive to operate as well. The energy-efficiency features and the solar electric panels on the roof will provide the home owners with estimated annual utility savings of \$1,160 per year compared to a similar sized home built to the 2009 International Energy Conservation Code.

The City of Garland offered the site for the home from the city’s inventory at a reduced price. The builder’s biggest challenge was meeting the city’s setback requirements. Originally, since it was a corner lot, the setbacks left only a 17-foot-wide building pad, plus the room required for storm drainage. This did not leave enough space for the house to meet the 1,500 ft² minimum livable square footage requirement for the zoning. Carl Franklin applied to the City for a variance and received one that added 11 feet to the building pad, leaving 28 feet of width for the house. They used the entire width and chose a 2-story house plan to meet the livable space requirement.

Next came the design. Steve Brown is a big fan of SIP construction. “Since SIPs give us the highest quality energy envelope (and we’ve been a SIP builder for over 23 years), we naturally went with SIPs,” said Brown. The builder oriented the house with the fewest number of windows facing west and south, and those have shed roofs over them to divert the sunlight after 10 am in the morning during the summer months. The style of the home was picked to blend in with the existing stock of the neighborhood. The foundation was elevated to accommodate the lack of flood control storm sewers in the area in case of high water.

The high-performance home starts with an engineered post-tensioned slab foundation, which is not insulated so that the ground can act as a heat sink in the hot climate.

The building enclosure includes 4.5-inch-thick walls made from structural insulated panels (SIPs) set on a bottom plate sealed against the slab with a foam membrane.



A 3.5-kW solar photovoltaic system was installed to help offset electricity usage and contributed to annual energy savings of \$1,905.

The SIPs have a 2x4 spline system installed between each panel using elastomeric caulk, which glues and air seals the pieces together. The SIPs have a double top plate and the joint between the roof panel and the wall panel is caulked and sealed with foam.

Over the SIP walls, the builder wrapped the house in a wrinkled draining house wrap then installed engineered wood siding, fascia, soffit, and trim for a totally warranted exterior cladding (the product comes with a 40-year warranty).

The team used 8.35-inch, R-38 SIP panels for the roof, creating an airtight structure with cathedral ceilings.

SIPs come to the jobsite precut to the dimensions needed so they are assembled at the job site quickly with very little material waste. They can be installed with unskilled labor, thus saving on framing costs.

“SIPs are the perfect product for the hot climate of Texas,” said Steve Brown, whose company Carl Franklin, has been constructing workforce and custom market-rate SIP homes for more than 23 years. “For roofing, we used a “water and ice” adhesive shield under a 30/yr comp shingle to ensure against leakage on the SIP roof panel. It also handles the summer heat load better and protects the shingles.”

The SIP roof and walls helped the builders achieve a very airtight house with less than 0.4/air changes per hour at 50 Pascals pressure difference.

For the windows, the builders selected composite-framed, double-paned windows with an argon gas fill between the panes and a low-emissivity coating on the glass to slow heat losses. The high-performance windows have an insulation U-factor of 0.29 and a solar heat gain coefficient (SHGC) of 0.21. The home’s exterior doors are all metal clad and foam filled, contributing to the home’s high-performance shell.

The HVAC system is a “state of the art” ductless mini-split heat pump, which has a 15.5 SEER cooling efficiency, with one outside compressor and 5 inside air handler units. Ventilation is provided by an energy recovery ventilator. An ERV brings in fresh air and exhausts stale air. The two air streams pass through a heat exchanger and the warmer stream passes some of its heat to the cooler air stream, which helps to keep out unwanted heat in the summer and retains heat

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program, 100% commitment

ENERGY STAR Certified Homes Version 3.0

EPA Indoor airPLUS



Every DOE Zero Energy Ready Home combines a building science baseline specified by ENERGY STAR Certified Homes with advanced technologies and practices from DOE’s Building America research program.



Textured house wrap provided a weather-resistant barrier over the SIPs and a drainage plane and slight air gap behind the vinyl siding.

ENERGY STAR-rated appliances include an ENERGY STAR-labeled dishwasher, four ceiling fans, and two exhaust fans.

EPA WaterSense water-saving plumbing fixtures were installed throughout the home including a low-flow kitchen faucet, low-flow bathroom sinks and tubs, and low-flow 2-button toilets.

To conserve water outside the home, the landscape was planted with a mix of native, drought-tolerant plants and river stone was used in place of grass for ground cover.

The home met all of the EPA's Indoor airPLUS program requirements, including use of paints and sealants that were either low VOC or no VOC, to help with indoor air quality.

To offset electricity use, 3.5 kW of solar photovoltaic panels were installed on the south side of the roof. There is room on the back of the roof for an additional 4-kW system to be added at a later date, which would bring the home to net zero performance, i.e., a HERS score of 0.

“Our new home owners are currently living in their new home with energy-use monitoring taking place. We expect to have a complete set of data on the functioning of the home and its equipment by early January 2016, giving us a full view of performance for both cold and hot months,” said Brown.

Photos courtesy of Carl Franklin Homes & Green Extreme Homes

in the winter. An ERV also allows some humidity to pass from the more humid path to the drier path, which helps to keep humidity out of the indoor air.

All lights in the home have either compact fluorescent lamps (CFLs) or linear fluorescent tubes, except for two LED-based lights in the kitchen. Use of energy-efficient CFLs rather than incandescent or halogen light sources not only uses less energy but also helps to minimize the heat produced by the bulbs. Windows provide natural daylighting to the bedrooms, living areas, and stairwells.

The home's hot water is provided by a high-efficiency electric water heater with an energy factor of 0.95.

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** 4.5" SIPs (R-18); wood chip-resin siding; bottom sill gasket.
- **Roof:** 8.35" SIPs (R-38); ice and water shield over roof; 30-year composite shingle.
- **Attic:** Sealed conditioned attic or cathedral.
- **Foundation:** Uninsulated slab.
- **Windows:** Double-pane; composite framed; argon-filled; low-e; U=0.29; SHGC=0.21.
- **Air Sealing:** 0.4 ACH 50.
- **Ventilation:** ENERGY STAR-rated ERV; exhaust fans.
- **HVAC:** Ductless mini-split; 15.5 SEER.
- **Hot Water:** Tankless water heater; 0.95 EF.
- **Lighting:** CFLs, linear fluorescents, and LEDs.
- **Appliances:** ENERGY STAR-rated dishwasher, ceiling fans, and exhaust fans.
- **Solar:** 3.5 kW.
- **Water Conservation:** Low-flow fixtures; 2-button toilets; native drought-tolerant plants.
- **Other:** No-VOC.