

Palo Duro Homes

Via del Cielo
Santa Fe, NM



BUILDER PROFILE

Palo Duro Homes, Albuquerque, NM
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Via del Cielo
- Location: Santa Fe, NM
- Layout: 4 bedrooms, 2 ½ baths, 2 floors
- Conditioned Space: 2,215 ft²
- Climate Zone: IECC 4B, mixed-dry
- Completion: August 2014
- Category: Production

Modeled Performance Data:

- HERS Index: without PV 48
- Projected Annual Utility Costs: without PV \$1,483
- Projected Annual Energy Cost Savings (compared to a home built to the 2012 IECC): without PV \$833
- Annual Energy Savings: without PV 78,373 kWh, 114 Therms

Palo Duro Homes of Albuquerque, New Mexico, has built more homes to the U.S. Department of Energy's (DOE) Zero Energy Ready Home program requirements than any other builder in the nation.

The father and son team of Jerry and Tom Wade has over 55 years of experience in the custom home building industry. For over 20 of those years, the builders have worked with DOE's Building America program to build high-performing, energy-efficient homes. The builders have made a commitment to build all of their homes to the performance criteria of the DOE Zero Energy Ready Home program. Under the Palo Duro name, the Wades have certified 178 homes to the DOE Zero Energy Ready Home program criteria as of September 2015. Operating previously under the name Artistic Homes, they certified 235 homes to the DOE Builders Challenge, the precursor program to the DOE Zero Energy Ready Home program.

Artistic Homes built a reputation for high-quality, single-family homes that offered entry-level home buyers energy-efficient construction. In fact, Artistic was the first production home builder in the country to offer a zero energy upgrade on every home model it produced. A zero energy home is one that is so energy efficient that, with a small amount of roof-mounted photovoltaic solar panels, the home can produce as much power as it consumes in a year.

Under the Palo Duro brand, the Wades continue to market to first-time home buyers while also reaching out to middle- and upper-end markets with larger floor plans and upscale finishes. The builder has made the DOE Zero Energy Ready Home program a standard on all its homes built throughout New Mexico and southwestern Colorado.



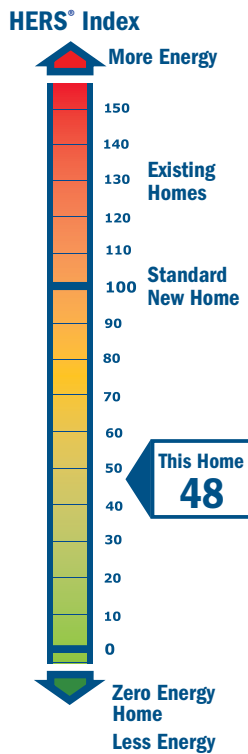
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 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.

Palo Duro Homes built this 2,215-ft², two-story, four-bedroom home in Santa Fe, New Mexico, to the U.S. Department of Energy's (DOE) Zero Energy Ready Home program requirements. Palo Duro has certified more homes to the DOE program than any other builder in the nation. All of their homes feature advanced framed walls, high insulation levels, insulated slab floors, and energy recovery ventilators for balanced fresh air.



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.



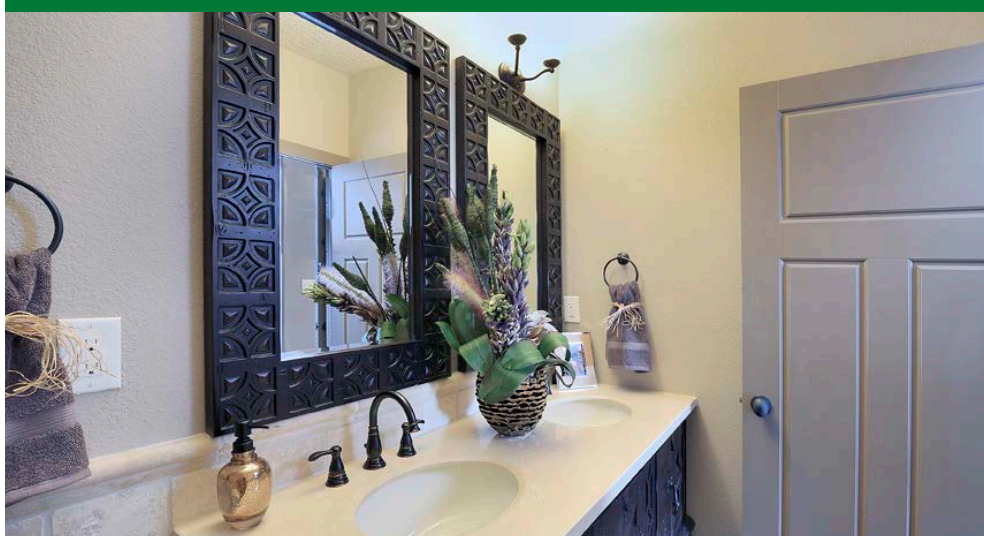
Homes certified to the DOE Zero Energy Ready Home program meet all of the requirements of ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency's Indoor airPLUS, as well as the hot water distribution requirements of the EPA's WaterSense program and the insulation requirements 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.

“Palo Duro Homes offers our southwest home buyers eco-friendly, sustainable, high-performance homes that qualify for the DOE Zero Energy Ready Home program, ENERGY STAR, Indoor airPLUS, EPA WaterSense, and LEED for Homes,” said Tom Wade. “For home owners, the benefits are life-long energy efficiency and savings, a healthier living environment due to better indoor air quality, and less impact on our environment overall. And there’s tax incentives.” Palo Duro’s homes qualify for the New Mexico Sustainable Building Tax Credit (SBTC) and Palo Duro Homes passes this tax credit on to the purchaser. Buyers who install solar electric systems qualify for the Federal 30% tax credit.

Palo Duro continues to offer a zero energy (0 HERS) home upgrade option. This package includes roof-mounted, grid-tied photovoltaic solar panels enabling the home to achieve a HERS score of 0; a solar thermal hot water system, and a high-efficiency heat pump with a cooling efficiency of SEER 15 and a heating efficiency of HSPF 9.0 (exceeding the federal minimum requirements of SEER 13 and HSPF 7.7 for cooling and heating equipment). Palo Duro’s zero energy homes are 40% to 100% more energy-efficient than a code-built home.

To certify to the DOE Zero Energy Ready Home program, homes must be tested by a third-party energy rater, who will determine the home’s Home Energy Rating System (HERS) score. All of Palo Duro’s homes score between 0 and 57. A typical home built to the 2006 International Energy Conservation Code would score 100.

The 2,215-ft² craftsman style home at Via del Cielo was built in the historic village of Agua Fria, which served as the last stop on the Camino Real before arriving at the Plaza in Santa Fe; this historic designation added design requirements. The City of Santa Fe also requires that new home builders have their homes third-party tested and provide the HERS scores to potential home buyers. The Via del Cielo home boasts a HERS score of 48. For comparison, a standard new home would achieve a HERS of 100. With this low score, the home’s utility bills come to an average of \$124 per month, for an annual savings of over \$800.



Palo Duro certifies all of its homes to the EPA WaterSense criteria to conserve this vital resource through the use of low-flow plumbing fixtures. ENERGY STAR appliances, lighting, and windows add to energy savings. An on-demand gas-fired water heater is centrally located in the home to provide instant hot water with 95% efficiency. EPA WaterSense-labeled plumbing fixtures add to water and energy savings.

The Palo Duro home starts with a slab-on grade foundation. A 1-ft by 1-ft trench was dug and a conventional stem wall was poured, then insulated along the exterior of the stem wall with R-5 of rigid XPS foam up to the bottom plate. Perforated pipe was laid along the inside perimeter of the stem wall in a bed of large aggregate for radon and soil gas collection. The pipe connects to a vent stack that goes out through the roof. This passive radon removal system can easily be converted to an active system with the addition of an in-line electric fan if later testing should reveal the accumulation of radon in the home. After backfilling, a vapor barrier is laid over the soil and extended up to the top of the stem walls. Then, 4x8 sheets of 4-inch-thick, rigid XPS foam are laid along the inside perimeter of the stem wall, providing R-10 of insulation extending 4 feet in from the stem walls. This insulation is covered by a 4-inch concrete floor slab.

The stud-framed walls are constructed with 2x6 studs spaced at 24 inches on-center rather than 16 inches on-center, allowing for a deeper wall cavity with fewer studs to provide more space for the R-21 of blown fiberglass insulation. Other advanced framing techniques like open corners, Ts at interior-exterior wall intersections, and open headers over windows allow additional space for insulation where insulation is usually lacking in standard construction. Recycled-content finger-jointed studs and engineered roof trusses minimize bowing and warping while also reducing the use of old-growth timber. Framing lumber is treated with borate to discourage termites. Palo Duro uses blown-in rather than batt insulation for more complete insulation coverage; the fiberglass insulation is Green Guard certified for low toxicity. On the exterior of the walls, the builder installed a double layer of tar paper house wrap over the OSB sheathing to serve as a drainage plane behind the stucco siding.

When constructing the vented attic, Palo Duro used a sprayer-applied flexible sealant to seal all wood-to-wood joints and penetrations, and to seal the drywall to the top plates in these leak-prone attic areas before installing R-75 worth of blown fiberglass on the ceiling deck. Baffles keep wind from blowing insulation away from the soffit vents and direct ventilating air to flow up the underside of the attic to the ridge vents. On the OSB roof deck, the builder installed ice-and-water shield along roof valleys and 4 feet in from the eaves to protect the roof edges and minimize the potential for ice dam formation. The roof was topped with asphalt shingles.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program, 100% commitment

ENERGY STAR Certified Homes Version 3.0

EPA Indoor airPLUS

EPA WaterSense

LEED for Homes



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.



Palo Duro uses xeriscaping with native plants and water-conserving irrigation practices to limit water usage.

The home's high-efficiency heating and cooling system includes mini-split heat pumps with a heating efficiency of 9.5 HSPF and a cooling efficiency of 16.5 SEER. The minisplits were installed above the main floor ceiling and ducts were run between the floors of the two-story home. Keeping the ducts out of the unconditioned attic minimizes the number of holes in the ceiling deck, which could be air leakage points, and also improves the efficiency of the heating and cooling system, which doesn't have to overcome the temperature extremes often found in unconditioned attics. To help ensure healthy air in the draft-free home, Palo Duro installed an energy recovery ventilator (ERV).

Design requirements from the City of Santa Fe, including a 24-foot height limit, a limit on the building foot print to 40% of the total lot space, and a requirement that the second story be nested 5 feet inside the perimeter of the first floor challenged the builder in terms of air barriers, duct runs, and space for solar panels. The home's location within the historic Village of Agua Fria placed additional limitations on construction practices. The Wades' desire to meet their energy performance goals necessitated several design meetings with the architect, the energy rater, the insulation and air sealing vendor, the developers, the city of Santa Fe, and the historic Village of Agua Fria, to negotiate the restrictions and still achieve a DOE Zero Energy Ready home.

The care that Palo Duro Homes takes in building high-performance homes has paid off. Said Tom Wade, "Our measure of success is sales. In our markets, we are either the leading builder or in the top three. Since going 100% zero energy ready we have seen our average sales price increase by \$30,000!"

Photos courtesy of Palo Duro Homes

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Advanced framing; 2x6; 24" on center; blown-in fiberglass (R-21); double-layer tar paper; stucco.
- **Roof:** 4' ice and water shield; asphalt shingles.
- **Attic:** Vented; 14" raised heel trusses; blown-in fiberglass (R-75); spray-on air sealant.
- **Foundation:** Slab on grade; 4" (R-10) rigid foam under slab extending 4 feet in from slab perimeter; slab edge insulation (R-5).
- **Windows:** Double-pane; vinyl-framed; U=0.30; SHGC=0.21.
- **Air Sealing:** 2.02 ACH 50.
- **Ventilation:** Exhaust fan.
- **HVAC:** Ducted mini-split; 16.5 SEER; 9.5 HSPF.
- **Hot Water:** 95% efficient tankless water heater.
- **Lighting:** 100% CFL; exterior sensors.
- **Appliances:** ENERGY STAR-rated refrigerator and dishwasher.
- **Solar:** 3.0 kWh.
- **Water Conservation:** All EPA WaterSense-rated fixtures.
- **Other:** Energy management system; low-VOC.