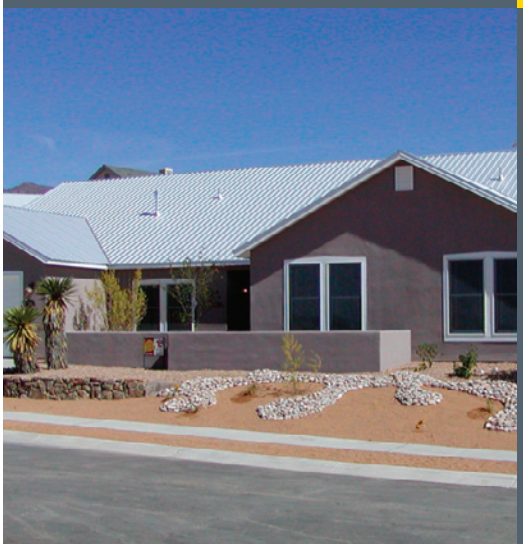

BUILDING AMERICA TOP INNOVATIONS HALL OF FAME PROFILE

INNOVATIONS CATEGORY:

2. House-as-a-System Solutions
2.1 New Homes with Whole-House Packages

Affordable High Performance in Production Homes:

Artistic Homes, Albuquerque, NM

With help from Building America, Artistic Homes built affordable, high-performance homes in New Mexico and Colorado with HERS scores of 0 to 60.

Artistic Homes, now under the name Palo Duro Homes, has demonstrated how a successful production builder of 500 to 800 homes per year can take its product from code minimum to a HERS under 50 standard on all homes, with optional PV upgrades to HERS 35 or true net zero on every home plan offered.

BUILDING AMERICA TOP INNOVATIONS

Recognizing Top Innovations in Building Science – The U.S. Department of Energy's Building America program was started in 1995 to provide research and development to the residential new construction and remodeling industry. As a national center for world-class research, Building America funds integrated research in market-ready technology solutions through collaborative partnerships between building and remodeling industry leaders, nationally recognized building scientists, and the national laboratories. Building America Top Innovation Awards recognize those projects that have had a profound or transforming impact on the new and retrofit housing industries on the road to high-performance homes.

Many builders remain resistant to adopting high-performance innovations based on misconceptions about high cost and design challenges. Thus, Building America projects such as Artistic Homes have had an extraordinary impact, demonstrating the mainstream builder's business case for adopting proven innovations such as efficient thermal enclosures and ducts inside the conditioned space, even in entry-level homes.

The U.S. Department of Energy's Building America program has helped develop best practices for creating efficient thermal enclosures and locating HVAC ducts inside the conditioned space. These measures cost-effectively reduce heating and cooling loads while improving comfort, indoor air quality, and durability. The next step in market transformation has been for Building America to demonstrate the application of these innovations in a production builder setting.

One builder that embraced this concept was Artistic Homes, a production builder in Albuquerque, New Mexico. Artistic began working with Building America in 1998. Over the next 13 years, Artistic built affordable homes with progressively higher performance.

When Artistic first began adding energy-efficient features to its Albuquerque homes in the late 1990s, it met success despite an increased home price of about 5%. By 2005, however, Artistic faced stiff competition from national builders moving into Albuquerque. Rather than backing away from its commitment to energy efficiency, Artistic brought in consultants from Building Science Corporation, a Building America research partner, to improve home performance while keeping costs competitive. The company also expanded outside the Albuquerque market to areas where it could offer a high-performance product at a price that was competitive with local builders.

In November 2008, Artistic committed to building all its homes to a HERS score of 60 or lower. In fact, its standard home averaged a HERS score of 51. In the same year, Artistic became the first production home builder in the United States to offer a true zero net energy upgrade package on every home plan.

"We continually look at what we are doing to see how we can improve our product. Everything we do is geared toward improving energy efficiency, indoor air quality, and affordability."

Tom Wade, co-owner of Artistic Homes

A year later, the builder completed and sold 11 true zero net energy homes. The builder also sold another 18 homes under its "solar 30" plan that brought the HERS score down to 35 with photovoltaics.

Key Lessons Learned

The design of the HVAC system is a key factor in energy efficiency. Locating ducts in the dropped hallway ceiling and the air handler in a utility room protected them from temperature extremes in the attic. Getting the duct chases airtight was important but difficult. The builder's first approach—having the framer box it in with Thermo-ply and the HVAC contractor later seal it with mastic—wasn't good enough. "So, we switched to drywalling the chase—one trade, one detail, one solution," said Tom Wade, co-owner of Artistic. The sealed and insulated ducts were then tested for leakage.

Affordability was not lost in the quest for high performance. On the contrary, in markets outside of Albuquerque, Artistic's 1,305 to 2,905 ft^2 homes often sold for less, sometimes several thousand dollars less, than local builders' homes. Wade credited this to economies of scale (they averaged 500 to 800 homes per year) and to good building science construction methods. Frequent training and supervision of personnel, subcontractors, and suppliers were essential. "The commitment," said Tom Wade, "has to go from top to bottom."

Artistic's combination of high performance and affordability enabled the company to weather the recent drop in the housing market.

"2010 was the worst housing economy on record," said Tom Wade. "We increased our prices and were still able to sell homes."

In fact, the slow market had a positive side for Artistic.

"When money was easy, people didn't care about energy efficiency," Wade said. "Some buyers were more interested in big foyers and vaulted ceilings. Now at least half the buyers coming in are looking for energy efficiency. Our largest demographic is people nearing retirement who are shoring up their finances and see the value in an energy-efficient home."

When owner Jerry Wade retired in 2011, his son Tom assumed full ownership of the company and renamed it Palo Duro Homes. Tom is carrying on the tradition of building homes with high-performance features, including ducts inside conditioned space.

Artistic locates the air handler in a utility room and ducts in a dropped hallway ceiling to protect them from temperature extremes in the attic.

KEY ENERGY-EFFICIENCY MEASURES

- Ducts in conditioned space
- Air handler in sealed utility closet
- R-21 blown insulation in walls, R-50 blown insulation in attic
- Advanced framing
- Heat recovery ventilator with HEPA filter
- Fresh air inlet; jump ducts
- 3rd party HERS rater blower door and duct blaster testing of every house
- 15 SEER AC and 9.0 HSPF electric heat pump
- Gasketing, foam sealing, and caulking of all envelope penetrations
- Low-e, dual-pane, wood-vinyl composite windows
- Borate treatment of studs and bottom plate
- Low- and no-VOC products

Optional true zero net energy upgrade package

- Roof-mounted photovoltaic power system (4.2 to 7.0 kWh)
- Solar thermal hot water heating

REFERENCES

PNNL. 2009. "Building America Best Practices Series, Volume 9. Case Study: Artistic Homes, Albuquerque NM." Prepared by Pacific Northwest National Laboratory for the U.S. Department of Energy, http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/ba_cs_new_artistic_homes.pdf

Palo Duro Homes, Inc. http://palodurohomes.com/

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

DOE Building Technologies Program
www.buildings.gov

Building America Solutions Center
www.buildingamerica.gov/solutionscenter

PNNL-SA-90555 January 2013

Building America U.S. Department of Energy
www.BuildingAmerica.gov