



Building America Case Study Whole-House Solutions for New Homes

Artistic Homes

Albuquerque, NM

PROJECT INFORMATION

Construction: New home

Type: Single-family

Builder: Artistic Homes (now Palo Duro Homes), Albuquerque NM, 505-750-7256, www.palodurohomes.com

Size: 1,305-2,905 ft²

Price Range: \$160,000 - \$300,000

Date Completed: 2011

Climate Zone: Hot-Dry/Mix-Dry, IECC 3A/4A

Team: Building Science Corporation, BIRA

PERFORMANCE DATA

HERS Index: <60 without PV, 0 with PV

Projected annual energy cost savings:
\$341 without PV, \$2,310 with PV

Added first cost of efficiency measures:
\$20,000 without PV, plus \$49,550 for 5.5 kW PV, not counting incentives; plus \$811 for 5.5 kW PV with incentives.

Annual mortgage increase: \$1,626 without PV; \$5,544 with PV, without incentives; \$1,656 with PV with incentives (\$200,000 base house, 30-yr fixed at 7% interest)

Annual net cash flow to homeowner:
-\$1,285 with no PV; -\$3,234 with PV with no incentives; +\$654 with PV, with incentives

Billing data: approx \$200 avg savings

Artistic Homes of Albuquerque was the first production home builder in the United States to offer a true net-zero upgrade option on all of its homes. According to co-owner Tom Wade, in 2010, 45% of the homes Artistic sold were built to near or at true zero net energy (with HERS scores of under 5). Artistic's standard home averaged a low HERS score of 51. "Zero energy was not much harder than what we were already doing. When we sat down with our subs and told them our goals, they got excited about hitting that zero too," said Wade.

Standard features in Artistic's homes include advanced framed 2x6 24-inch on-center walls with R-21 blown insulation in the wall cavities, high-efficiency windows, slab-on-grade foundations with R-10 rigid foam insulation under the slab and R-5 rigid foam insulation at the slab edge. Ducts are located in conditioned space in a dropped ceiling in the hallway and the air handler is located inside the utility room. In 2009, Artistic made R-50 blown fiberglass attic insulation standard (up from R-32).

To improve air quality, every home has a heat recovery ventilator with a HEPA filter, radon mitigation with a passive pipe venting from below the slab to the roof, and a garage venting system that uses a motion sensor to switch on a garage fan mounted to an outside wall.

Air sealing details include gasketing the sill plate and caulking or foam sealing all wiring and piping holes. Every home is tested for whole house and duct leakage. Whole house air leakage ranges from 500 to 800 cfm: a code-built house would typically be about 2,700 cfm, according to Wade, who said Artistic's goal was to get every home below 500 cfm in 2011.

(Photo top left) Artistic Homes, a New Mexico production builder, completed this true zero-energy home in summer 2008, the first in the country to qualify for the U.S. Department of Energy Builders Challenge, as well as LEED platinum level and the ENERGY STAR Indoor airPlus certifications. Local and federal tax incentives slashed costs for a 5.5-kW PV system from \$49,550 to \$811.

KEY ENERGY-EFFICIENCY MEASURES

HVAC:

- Heat pump: 15 SEER AC and 9.0 HSPF
- Ducts in dropped ceiling, air handler in utility room
- Heat recovery ventilator with HEPA filter
- Fresh air inlet; jump ducts

Envelope:

- Attic: R-50 blown fiberglass ceiling insulation in vented attic
- Walls: Advanced framed stud walls with R-21 blown fiberglass
- Foundation: Slab on grade with R-10 rigid foam under slab and R-5 rigid foam at slab edges
- Windows: Double-pane, low-e, Fibrex-framed windows. U = 0.34, SHGC = 0.26
- Blower door test: 500 to 800 cfm air leakage

Lighting, Appliances, and Water Heating:

- 100% CFL lighting
- ENERGY STAR® ceiling fans
- ENERGY STAR® refrigerator
- Heat pump water heater

Solar (optional)

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

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www.buildingamerica.gov



Artistic increased the efficiency of its heating and cooling systems by putting ducts in conditioned space in a central chase down the main hallway.

Lessons Learned

- The biggest energy savings probably come from locating the ducts in conditioned space. Most of the home's heating and cooling registers come directly off a main duct trunk line that runs through a dropped ceiling in the hallway. The airhandler is also located inside conditioned space in a utility room.
- Advanced framing techniques included 2x6 24-inch on center walls, California (3-stud) corners, and open headers, which use less lumber and provide more space for insulation in the wall cavity.
- The downturn in the real estate market had a positive side for Artistic. "When money was easy, people didn't care about energy efficiency. Some buyers were more interested in big foyers and vaulted ceilings, which we don't do. In 2010-2011, 100% of our buyers came to us for the energy efficiency," said Wade.
- "The HERS index is the very best measuring stick we could use to see if we are improving. We use it for ourselves and we'd like to see other builders use it so homebuyers can compare," said Wade.
- Techniques like the location of the air handler and furnace in the home's conditioned space, timed ventilation with a fresh air intake, extensive envelope air sealing, jump ducts to balance indoor air pressure, high efficiency HVAC with a HEPA filter, an ERV, and blower door and duct blaster testing of every home help to ensure efficiency and a comfortable and healthy indoor air environment.

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

Tom Wade, co-owner of Artistic Homes of Albuquerque

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