

# Mantell- Hecathorn Builders

McElmo Canyon Custom  
Cortez, CO



## BUILDER PROFILE

Mantell-Hecathorn Builders, Durango, CO  
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## FEATURED HOME/DEVELOPMENT:

### Project Data:

- Name: McElmo Canyon Custom
- Location: Cortez, CO
- Layout: 2 bdrm, 2 bath, 1 fl, 1,559 ft<sup>2</sup>
- Climate Zone: IECC 5B, cold
- Completion: May 2015
- Category: custom for buyer

### Modeled Performance Data:

- HERS Index: without PV 45, with PV -13
- Projected Annual Energy Costs: without PV \$1,252, with PV -\$101
- Projected Annual Energy Cost Savings (vs home built to 2006 IECC): without PV \$1,219, with PV \$2,572
- Projected Annual Energy Savings: without PV 11,080 kWh, with PV 23,380 kWh
- Added Construction Cost: without PV \$1,186, with PV \$11,562

Other builders might say they are high performance, but Mantell-Hecathorn Builders of Durango, Colorado, can point to the third-party verification required by the U.S. Department of Energy Zero Energy Ready Home program to prove that they meet a higher level of building performance. Mantell-Hecathorn, a long-time ENERGY STAR builder, committed to building all of its homes to the requirements of the DOE Zero Energy Ready Home program in 2014 and has since certified five homes through the program, including this 1,559-ft<sup>2</sup> custom home in McElmo Canyon, in Cortez, Colorado, that was selected by DOE as a 2016 Housing Innovation Award winner.

Mantell-Hecathorn's commitment to the DOE program puts them far above the competition in a state that has no state-wide building code and no licensing requirement for general contractors, and in a county that operates under the 2003 International Energy Conservation Code (IECC). Montezuma County, where the McElmo Canyon home is located, does not even require building permits and the only inspections performed are by the state of Colorado for plumbing and electrical work.

The lack of local enforcement is no deterrent for Mantell-Hecathorn, which has set its sights on something higher. "Every house we build is a high-performance house. We are the only custom builder in southwest Colorado 100% committed to DOE Zero Energy Ready," said Greg Mantell-Hecathorn who founded the company with his wife Tara in 1975. "We focus on high performance, not just energy efficiency and lower utility costs but also building durability, something home owners can pass down to future generations," said their son and co-principal Hunter Mantell-Hecathorn.



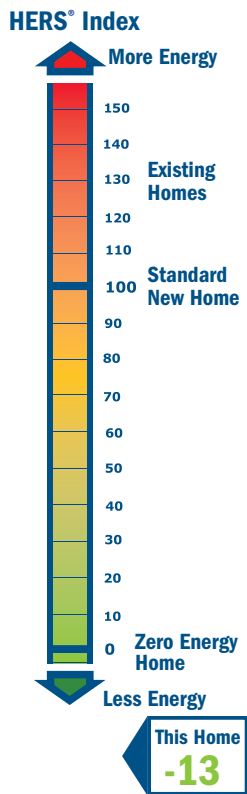
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0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

Mantell-Hecathorn Builders built this 1,559-ft<sup>2</sup> home in Cortez, Colorado, to the performance criteria of the DOE Zero Energy Ready Home (ZERH) program. The double-wall construction and triple-pane windows help keep this Colorado home warm in the winter.



### 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.



“We have long felt that a third-party-verified home that is certified under a nationally recognized program provides the best assurance that our homes meet our high-performance and sustainability goals. The DOE Zero Energy Ready program provides that assurance,” said Greg Mantell-Hecathorn.

Home buyers couldn’t agree more. The Mantell-Hecathorn Builders website is full of glowing testimonials from happy clients and the company has projects under contract into 2018.

To get the quality it’s after, the company follows its motto, “personal attention to detail, one home at a time,” limiting the number of projects to two or three per year so that Greg or Hunter can personally be on site daily to ensure that quality standards are being met by the subcontractors and crews. Mantell-Hecathorn Builders employs five full-time carpenters who receive training, construction documents, and daily oversight. “We don’t experience much turnover in our employees as we always have interesting, challenging, and fun projects to work on. They can feel pride in their work, and we treat them as valued, respected members of our company,” said Hunter Mantell-Hecathorn. Mantell-Hecathorn puts effort into finding subcontractors willing to meet their standards. The company meets with subs during budget formation and plan development, provides written scopes of work for each trade detailing construction methods and materials, requests the best crews, and meets regularly with both the principals and the onsite supervisors for each subcontractor trade during construction. “Our subcontractors understand that all of our homes are third-party tested and verified, which provides further motivation for making sure things are done right,” said Hunter Mantell-Hecathorn.

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 program 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 future photovoltaic panel installation.

A 6.8-kW solar PV system was installed on the McElmo Canyon home. Together with the energy-efficiency features of the home, this PV system helped the home achieve a Home Energy Rating System score of *minus* 13. That equates to an





The vaulted ceilings are insulated with 7 inches of closed-cell spray foam plus an R-22 fiberglass batt for a total insulation value of R-68. The vented attic is insulated with 22 inches of blown fiberglass for an R-70 insulation value. The home's double-wall construction provides 9-inch-deep exterior wall cavities that are first air sealed and insulated with 3 inches of closed-cell spray foam then filled with 6 inches of blown fiberglass for a total of R-42 insulation.

annual *credit* from the utility company of \$101 or enough electricity to power the all-electric home plus an electric car. Even without the PV, the home would achieve a HERS score of 45, far better than the HERS 80 to 100 or higher of a typical Colorado home.

To achieve these high performance levels, Mantell-Hecathorn started with a highly efficient building shell. Mantell-Hecathorn chose to construct a double-walled enclosure with a load-bearing outer wall consisting of 2x6 wood studs set 24 inches on-center and a 2x4 24-inch on-center inner wall separated by 1 inch to form a 10-inch wall cavity. After installing the OSB sheathing, the cavity was sprayed with 3 inches of closed-cell spray foam against the backside of the exterior wall sheathing then filled with 7 inches of blown loose-fill fiberglass for a total wall insulation value of R-42. The coated OSB sheathing was taped at the seams to serve as the moisture-resistant barrier. A  $\frac{3}{8}$ -inch woven plastic rain screen provided a drainage gap behind the fiber cement lap siding.

The roof deck was protected with 6 feet of ice-and-water shield at the eaves and a synthetic vapor-permeable underlayment under the standing seam metal roofing. The vented attic was insulated to R-70 with 22 inches of blown fiberglass. The vaulted ceilings were insulated with 7 inches (R-46) of closed-cell spray foam plus R-22 unfaced formaldehyde-free fiberglass batts for a total insulation value of R-68.

Mantell-Hecathorn used insulated concrete forms (ICFs) to build the foundation walls of the conditioned crawl space with an insulation value of R-22. Four inches of rigid foam were installed under the garage slab for an insulation value of R-20.

Highly efficient aluminum-clad, triple-pane windows and sliding doors provide extensive daylight. Most of the glass is south-facing, although some smaller windows are placed on the north side to capture views. The windows have low-emissivity coatings to prevent heat transfer and are air-filled in this high-altitude location.

The tight home was tested per DOE Zero Energy Ready Home requirements and showed air leakage of only 1.6 air changes per hour at 50 Pascals. That's twice as tight as required by the newest energy code. (The 2015 International Energy Conservation Code requires 3 ACH 50 or less.)

## HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program

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.



Flashing around the windows and doors, and tape over the seams in the wall sheathing help to form a continuous draft and moisture barrier.

To provide good ventilation for the home, an energy recovery ventilator (ERV) was installed. The ERV brings in fresh air from an outside air intake and exhausts stale air. The fresh air and stale air ducts pass through a heat exchanger in the ERV where heat is transferred from the warmer stream to the colder stream so the incoming air is warmed in the winter and cooled in the summer.

The home is heated and cooled with two ductless mini-split heat pumps that have a heating season performance factor of 12 HSPF and a seasonal energy efficiency ratio of 26 SEER (far above the federal standard of 13 SEER).

A 58-gallon heat pump water heater provides hot water with an efficiency factor of 3.00 EF. For water conservation, all of the faucets are EPA WaterSense certified. The home meets all of the requirements of an EPA Indoor airPLUS qualified home. All of the home's lighting uses LEDs. The home was equipped with an ENERGY STAR refrigerator, clothes dryer, and ceiling fan.

The 6.8 kW of PV panels are mounted on the garage roof. An electric car charging station uses some of the surplus kilowatts of power produced by the solar system.

Mantell-Hecathorn is currently the only local builder building to the high efficiency levels of the DOE Zero Energy Ready Home program. Although this puts them in a unique position, Mantell-Hecathorn is more than happy to share their knowledge with the local building community. Hunter and Greg have spoken with the city and county building departments as those departments consider adoption of a new building code and they've worked with the local Home Builders Association on providing training for builders on newer versions of the IECC.

Mantell-Hecathorn's marketing efforts are devoted to promoting the benefits of living in a home built to the DOE Zero Energy Ready Home standards through their website, social media, YouTube videos, press releases, and display ads in local and online publications. They've entered their high efficiency homes in the local Parade of Homes where they've used extensive signage and DOE brochures to promote DOE Zero Energy Ready Homes. Mantell-Hecathorn also supports a non-profit organization, the Four Corners Office for Resource Efficiency (4Core), which promotes energy-efficient construction.

"This commitment has helped to establish us as experts on high-performance home construction in our community. Local realtors and bankers are prime sources of referrals for new clients," said Greg Mantell-Hecathorn.

*Photos courtesy of Mantell-Hecathorn Builders and Marona Photography*

## KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** R-42 double-wall with 2x6 24" o.c. outer wall, 2x4 24" o.c. inner wall for 9" cavity with 3" closed-cell spray foam plus 6" blown fiberglass; coated OSB sheathing with seams taped, 3/8" woven plastic rain screen, fiber cement lap siding.
- **Roof:** 6' ice-and-water shield at eaves, synthetic vapor-permeable underlayment, standing seam metal roofing.
- **Attic:** R-70 22" blown fiberglass in vented attic; 7" R-46 closed-cell spray foam + R-22 batt in vaulted ceilings total R-68.
- **Foundation:** Conditioned crawl space with R-22 ICF walls, R-20 4" rigid foam under garage slab.
- **Windows:** Vinyl-framed, triple-pane, low-e, air-filled, U=0.20, SHGC=0.26.
- **Air Sealing:** 1.59 ACH 50.
- **Ventilation:** ERV.
- **HVAC:** Ductless mini-split heat pumps, 12 HSPF, 26 SEER.
- **Hot Water:** 58-gal heat pump water heater, 3.00 EF.
- **Lighting:** 100% LED, ENERGY STAR ceiling fan.
- **Appliances:** ENERGY STAR refrigerator, clothes dryer.
- **Solar:** 6.8-kW PV.
- **Water Conservation:** All faucets EPA WaterSense certified.
- **Energy Management System:** None.
- **Other:** Low-VOC, electric car charging station, EPA Indoor airPLUS qualified home.