

Mantell- Hecathorn Builders

Tahoe Inspired Home
Durango, CO



BUILDER PROFILE

Mantell-Hecathorn Builders

Durango, Colorado; m-hbuilders.com

Greg Mantell-Hecathorn, 970-799-0880

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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Tahoe Inspired Home
- Location: Durango, CO
- Layout: 3 bdrm, 2.5 bath, 2 fls, 3,259 ft²
- Climate: IECC 5B, cold
- Completed: December 2019
- Category: Custom for Buyer >3,000 ft²

Modeled Performance Data:

- HERS Index: without PV 44; with PV 14
- Annual Energy Costs: without PV \$2,000; with PV \$600
- Annual Energy Cost Savings: (vs typical new homes) without PV \$1,050; with PV \$2,450
- Annual Energy Savings: without PV 2,600 kWh, \$700 for gas, 15 Therms; with PV 13,200 kWh, 15 Therms
- Savings in the First 30 Years: without PV \$48,300; with PV \$112,700

After years of building upscale high-performance homes for countless satisfied customers, builders Greg and Tara Mantell-Hecathorn finally got to build their own U.S. Department of Energy Zero Energy Ready certified dream home. Located in the beautiful mountains of Durango, Colorado, this 3,259-ft² mountain-modern design incorporates soaring ceilings, exposed beams, oversized triple-pane windows and patio doors, natural stone, Douglas fir and stucco and a standing seam metal roof. Visually stunning inside and out, the home also showcases the building science expertise Mantell-Hecathorn Builders has come to be known for. Colorado has no state-wide building code. La Plata County just went from the 2003 IECC to the 2009 IECC one year ago. The town of Durango adopted the 2015 code in January 2020. Mantell-Hecathorn Builders has been constructing homes to far exceed the code for decades and has constructed homes to the high performance requirements of the DOE Zero Energy Ready Home program since 2012. Mantell-Hecathorn is the only builder in southwest Colorado to commit to constructing all of its homes to the DOE Zero Energy Ready Home criteria, with 17 homes certified to date.

“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. We feel that the DOE ZERH program provides the best verifiable platform for high standards, while allowing the flexibility to be adapted to the wide variety of custom homes that we build,” said Greg Mantell-Hecathorn.

This dedication has paid off. The builder was honored with DOE Housing Innovation Awards in 2015, 2016, 2017 and a Grand Housing Innovation Award in both 2019 and 2020 in the custom home category. The 2017 Housing Innovation Award winner was the personal home of Hunter and Miranda Mantell-Hecathorn, co-principals of the company and son and daughter-in-law of Greg and Tara. The home has been featured in the local Home Builders’ Association Parade of Homes, subdivision Real Estate Tour, and Local Solar Homes Tour.



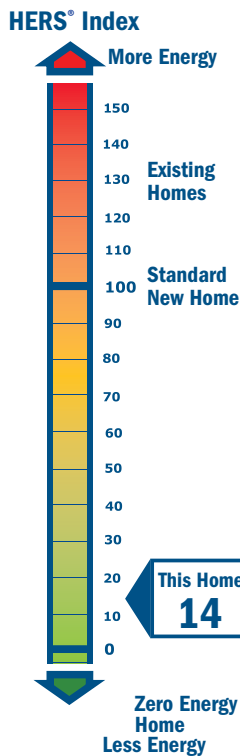
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE’s Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0/3.1/3.2 for an energy-efficient home 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 3,259-ft² two-story home in Durango, Colorado, to the high-performance requirements of the U.S. Department of Energy’s Zero Energy Ready Home program. Boasting an impressive Home Energy Rating System (HERS) score of 14, this home is equipped with triple-paned windows, a hydronic radiant floor heating system, an electric vehicle charging station, and 7.3 kW of rooftop-mounted solar panels.



What makes a home a DOE ZERO ENERGY READY HOME?

- 1 **BASELINE**
ENERGY STAR Certified Homes Version 3.0/3.1
- 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.



“Sam Rashkin of DOE calls a home built to the Zero Energy Ready Home criteria the ‘Home of the Future.’ We built our own ‘Home of the Future’ now. As custom homebuilders for over 45 years, we truly appreciate the value and long-term perspective inherent in homes built under the DOE ZERH program. We value it so much that our family-run company decided early on to commit to building 100% of our custom homes as ZERH homes, and now we feel fortunate to build our own personal home to these certified ZERH standards. For us, there was never any question of the value, quality, positive environmental impact, and desirability of a ZERH home!” said Greg. “This is a showcase home, proving that a unique mountain-modern design can also embody comfort at 0° or 90°, along with tiny utility bills, long-term durability, healthy non-toxic indoor air, low maintenance, high quality, and practicality. We hope this home will help other builders and homeowners to understand the long-term cost benefits and many other advantages of living in a ZERH home,” said Greg, who with his wife Tara has already opened the home up for tours.

The two-story 3,259-ft² home achieved a Home Energy Rating System (HERS) score of 44 not including the PV. A typical code-built home would score an 80 to 100 on the HERS score and a net zero home would score a 0. When the 7.3-kW solar photovoltaic system is included on this house, the HERS score drops to 14, and projected annual energy costs are cut by more than two-thirds... to \$595 per year, or \$50 every month, Even without the PV, the annual energy costs are expected to be \$1,980, a savings of more than \$1,000 per year compared to a home built to the 2015 IECC.

Mantell-Hecathorn Builders committed to building all of its homes to the DOE Zero Energy Ready Home specification in 2012 when the program started and has certified 17 homes. The DOE Zero Energy Ready Home program gives builders a road map to build homes that are more energy efficient, comfortable, and durable than current code requires, and a third-party verification process to help convey confidence to the homeowner that the home will deliver what it promises. That plan starts with certification to the program checklists of ENERGY STAR Certified Homes Version 3.0, 3.1, or 3.2 and the U.S. Environmental Protection Agency’s Indoor airPLUS. Builders must also meet the hot water distribution requirements of the EPA’s WaterSense program, the insulation requirements of the latest IECC, and other mandatory requirements of the DOE program, including ENERGY STAR appliances, windows, and lighting, ducts in conditioned space, and third-party testing for air leakage. In addition, homes are required to have solar electric panels installed or have the conduit and electrical panel space in place for it.



This mountain home was super insulated with 9.5" thick double-stud walls stuffed with 2 inches of closed-cell spray foam plus 7.5 inches of blown fiberglass then wrapped in another inch of rigid EPS foam beneath the stucco, stone, and wood siding. The triple-paned air-filled and low-emissivity coated windows also contribute to the home's highly insulated envelope.

The home has double-walls consisting of an interior 2x4 24-inch on-center stud-framed wall, a half-inch gap, then a 2x6 24-inch on-center stud framed wall. These two walls form a 9.5-inch deep wall cavity that is insulated with 2 inches of closed-cell spray foam plus 7.5 inches of blown fiberglass then wrapped in another inch of rigid EPS foam beneath the stucco, stone, and wood siding. The walls are sheathed with a coated OSB product that is topped with 1 inch of EPS rigid foam under portions of the house with stucco and a 3/8-inch rainscreen behind stone and wood siding.

The vented attic has 23 inches (R-60) of blown fiberglass. Over the living room, the vaulted ceiling trusses are filled with 8 inches of closed-cell spray foam, plus R-19 fiberglass batts for an R-value of R-70. The foundation is an unvented crawlspace, insulated on the interior and exterior with 2 inches of EPS.

The builder used expanding foam to seal every penetration through the floors, walls, and top and bottom plates. He used tape on any stacked studs to seal the gap between the studs. He also used tape along the top plate on the outside from the top of the wall sheathing to the top plate. Fire-rated can covers were installed over every can light and spray foamed to air seal around them to the drywall in the attic.

The home achieved an air tightness of 1.25 air changes per hour at 50 Pascals. To provide ventilation, a heat recovery ventilator (HRV) was installed to bring in fresh air through a MERV 12 filter and to exhaust stale air. The HRV was separately ducted to provide fresh air to every room in the house and to exhaust air from several locations including the kitchen and bathrooms, which have boost switches to more quickly remove steam.

A 95% efficient boiler provides domestic and hot water for the hydronic radiant floor heating for both floors, controlled by four smart thermostats. Cooling is provided by a SEER 16 wall-mounted mini-split heat pump installed in the living room and three ceiling cassette style mini-splits installed in the upstairs hall, upstairs bunk room, and master bedroom.

The windows are triple-paned with an insulation value of U-0.19 (R-5.26). The windows have two low-emissivity coatings to help minimize radiative heat transfer through the glass. The windows are not gas filled due to the high altitude. All of the windows have aluminum-clad wood frames. The windows have a high solar heat gain coefficient (SHGC) of 0.50 to allow in beneficial solar heat gain in the winter.

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.



Radiant floor heat and a highly insulated draft-free building envelope keep the owners wrapped in warmth throughout the Colorado winters.

and formaldehyde-free products. ENERGY STAR appliances, LED lighting, and low-flow WaterSense-labeled fixtures add to energy and water savings.

“This is truly the home of our dreams with a stunning crisp modern look that incorporates a blend of classic materials including natural stone, Douglas fir siding, sheets of steel panels, stucco, and a standing seam metal roof,” said builders and homeowners Greg and Tara Mantell-Hecathorn.”

The company lives up to its motto, “personal attention to detail, one home at a time,” by limiting the number of projects it takes on to three to five per year so that Hunter or Greg can personally be on site daily to ensure that quality standards are being met by the subcontractors and crews. “Quality construction is something we take a lot of pride in and our company is known for that dedication,” said Hunter Mantell-Hecathorn. “The goals, philosophy and construction specifications of the DOE program align very well with our long-term focus on the high-quality construction that provides the best value to our clients, and also is best for the housing industry in general.”

Photos courtesy of Mantell-Hecathorn Builders and Marona Photography

Motorized blinds were installed on the interior side of the windows and can be set to operate automatically on a schedule to keep out unwanted summer solar heat gain. Deep overhangs and covered balconies also minimize heat gain from high overhead summer sun. Lighting controls are integrated with the home automation and energy management system.

An open floor plan with few obstructions and few high kitchen cabinets and countertops are among the aging-in-place features designed into the home.

The home meets all of the requirements of the EPA Indoor airPLUS program including the use of low and no-VOC

KEY FEATURES

- **Walls:** Double wall, R-44 total: 2x4 stud 24" o.c., ½" gap, 2x6 stud 24" o.c., 7.5" blown fiberglass, 2" closed-cell spray foam, ½" coated OSB sheathing, 1" EPS foam under stucco, ¾" rainscreen behind stone and wood siding.
- **Roof:** Shed truss roof, ¾" roof sheathing, standing seam metal roof, 24" raised heel.
- **Attic:** Vented: 23" R-70 fiberglass. Vaulted, R-70: 8" CC spray foam + R-19 batt.
- **Foundation:** Unvented crawlspace: 8" poured-in-place concrete, 2" EPS on interior and on exterior, liquid-applied crystalline waterproofing.
- **Windows:** Triple-pane, low-e2, aluminum-clad wood casement frames, U=0.19, SHGC=0.50. Automated interior motorized blinds.
- **Air Sealing:** 1.25 ACH 50. Foam sealed all top plate, wall, and floor penetrations.
- **Ventilation:** HRV, ducted to each room, switch-activated boost mode, 12 MERV filter.
- **HVAC:** Radiant floor heat from a 95 AFUE boiler. 16 SEER AC.
- **Hot Water:** Combi uses HVAC boiler to heat 50-gal tank, 0.88 EF. PEX, recirc pump.
- **Lighting:** 100% LED. Lighting controls. Automated window blinds. Daylighting.
- **Appliances:** ENERGY STAR dishwasher, clothes washer, and refrigerator.
- **Solar:** 7.3 kW. 24 305-W rooftop panels, central inverter.
- **Water Conservation:** EPA WaterSense fixtures and toilets. Drought-resistant landscaping.
- **Energy Management System:** Smart thermostats. Cell to lighting, windows, security equipment, sound, HVAC.
- **Other:** Electric vehicle charging. Accessibility features. Reclaimed redwood. No/low-VOC/formaldehyde cabinets, sheathing, floor finishes, mastics, paints, caulks, carpet.