



Thrive Home Builders

Panacea
Denver, CO



BUILDER PROFILE

Thrive Home Builders

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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Panacea
- Location: Denver, CO
- Layout: 5 bdrm, 4.5 bath, 2 fls + bsmt, 5,142 ft²
- Climate: IECC 5B, cold
- Completed: October 2017
- Category: production

Modeled Performance Data:

- HERS Index: without PV 43; with PV 8
- Projected Annual Energy Costs: without PV \$1,800; with PV \$200
- Projected Annual Energy Cost Savings: (vs typical new homes) without PV \$2,800; with PV \$4,500
- Projected Annual Energy Savings: without PV 10,000 kWh, 600 Therms; with PV 24,200 kWh, 600 Therms
- Added Construction Cost: without PV \$71,000; with PV \$92,000
- Savings in the First 30 Years: \$216,600

When Thrive Home Builders hosts “meet your neighbors” parties for owners of the homes in its “Panacea Collection” in Denver, Colorado, the homeowners rave about all the things they love about their new homes: low energy bills, the continuous fresh air, walls that don’t shake during 70-mph wind storms, hot water that doesn’t run out even when a lot of relatives come to visit. They mention how allergy symptoms seem to go away and asthma attacks are far fewer. They also talk about the open, light-filled interiors and the even temperatures.

What they may be less aware of is the advanced technology and building science know-how that went into making these high-performance homes. Their builder, on the other hand, knows all about high efficiency. Thrive Home Builders is a multi-award winning production home builder in the Denver area who has certified 776 homes to the U.S. Department of Energy’s Zero Energy Ready Home Program since 2013 (as of Aug. 2019). That’s more homes than any other home builder in the country except Mandalay Homes of Prescott, Arizona.

Thrive has committed to building all of its single-family and multifamily homes to the requirements of the DOE Zero Energy Ready Home program, which includes certification to ENERGY STAR Certified Homes Version 3.0 or 3.1 and the U.S. Environmental Protection Agency’s Indoor airPLUS program. Homes must also meet the hot water distribution requirements of the EPA’s WaterSense program and the insulation requirements of the 2015 International Energy Conservation Code.

The DOE program doesn’t require solar panels to be installed on the home; it just requires that the home be ready for them. Thrive installed both solar panels and battery storage. With the addition of 9.92 kW of rooftop solar panels and a 7-kW Tesla Powerwall 2 for storing energy, the Panacea homes achieve an impressive Home Energy Rating System (HERS) score of 8, which is essentially net zero energy performance (meaning a home that produces about as much energy as it uses over the



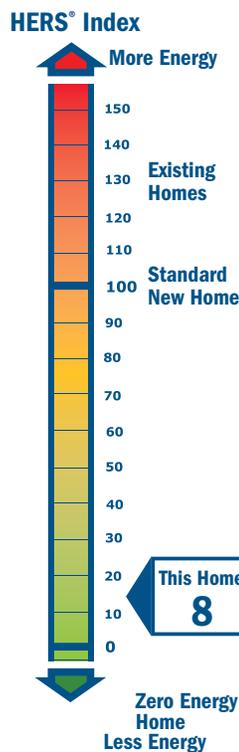
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE’s Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0/3.1/3.2 for an energy-efficient home 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.

Thrive Home Builders built this 5,142-ft² home in Denver, Colorado, to the high performance criteria of the U.S. Department of Energy Zero Energy Ready Home (ZERH) program. In 2012, Thrive became the first production builder to offer a Zero Energy option on all single-family homes in the master-planned community of Stapleton in Denver, Colorado. This zero-energy home is equipped with 9.92-kW of rooftop solar panels and a 7-kW Tesla Powerwall 2 for storing solar energy.



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.



course of the year). For some homeowners, this means the only costs on their electric bill are the monthly service charge. Even without PV, the two-story, 5,142-ft² home is so efficient that it would achieve a calculated HERS score of 43, while typical new homes built to code would have HERS scores of about 80 to 100.

To achieve the high energy-efficiency requirements of this cold climate location, Thrive used WUFI hygrothermic modeling to design a wall that provides a high wall insulation value of R-40 with a low risk of moisture accumulation. Thrive chose double-wall construction consisting of two 2x4 24-inch on-center walls with staggered studs. The walls were spaced 2.5 inches apart to provide a 9.5-inch-deep wall cavity that is stuffed with blown fiberglass to provide a thick blanket of thermal protection while acting as a natural sound dampener ensuring outside noise is kept outside. Crews installed OSB sheathing and used a sprayer-applied sealant to seal all seams. Rim joists were air sealed and insulated with spray foam. Textured house wrap provided a drainage plane behind the fiber cement and brick veneer siding. Thrive employs internal and third-party quality checks on all of its homes, specifically focused on water management to ensure the wall assembly installation is durable and will remain effective for the life of the home.

The home's mid-century modern design helped to achieve the utility bill savings, with a broad low-sloped roof that provides plenty of space for PV panels, high windows to bring in daylight, and deep roof overhangs to keep out unwanted summer solar heat gains.

In addition to reducing noise and increasing home comfort, the extra thick walls accentuate the classic jamb and case trim around the windows while providing a high level of finish and useable window sills. The ENERGY STAR windows are carefully placed throughout the home to take advantage of natural daylight. The double-pane, argon-filled, vinyl-framed windows provide an insulating U-factor of 0.25 and a solar heat gain coefficient (SHGC) of 0.20, meaning the windows perform well at preventing solar heat gain.

The home's vented attic was constructed with 14-inch raised-heel trusses to allow space for the full depth of insulation over the top plates. All of the top plates were air sealed with a sprayer-applied sealant before installing R-50 of blown fiberglass over the ceiling deck. In cathedral ceiling sections, R-49 of batt insulation was installed. The roof was protected with ice-and-water shield at all valleys and from the eaves up 24 inches past the wall line. The deck was covered with a synthetic water-resistant



The home is equipped with LED lighting, ENERGY STAR appliances, and EPA WaterSense-labeled fixtures to increase energy savings. Low to no-VOC products such as Green Guard gold-certified flooring and Kitchen Cabinet Manufacturers Association-certified cabinets, and active radon system, cabinets an active radon system smart indoor air quality monitors, and a MERV 16 air filtration system help to ensure cleaner indoor air.

underlayment and metal drip edge was installed under the asphalt shingles. To protect the home from the high winds and heavy snow loads the Denver area is known for, the homes in the Panacea collection were designed to meet a snow load of 30 pounds per square foot (PSF) and wind speeds of up to 115 miles per hour.

The homes in the Panacea collection have basements with 8-inch concrete slab floors and 8.75-foot-tall basement walls with spray-on damp proofing. Underneath the slab is a 6-mil vapor and radon barrier that is sealed to the foundation with polyurethane sealant. Beneath the barrier is a 4-inch-thick layer of $\frac{3}{4}$ -inch rock over compacted soil. The basement walls have a minimum 3-inch gap from the slab and are anchored to pressure-treated lumber with 6-inch nails to allow for expansion of the soil without affecting the structure. The walls are insulated with R-15 unfaced fiberglass batts.

Because Denver is in an area with a high radon potential, the builder installed an active radon venting system that consists of a 4-inch perforated plastic pipe installed along the inside perimeter of the foundation walls to collect soil gases under the slab. These are vented through the roof by a 4-inch stack pipe with an inline exhaust fan.

The home's heating and cooling is provided by a very efficient central heat pump with an HSPF of 12.5 and a SEER of 18. A highly efficient 97.4 AFUE gas furnace provides back-up heat. All of the mechanical equipment is located in the conditioned basement. A MERV 16 whole-house air purifier is included in every home for enhanced air filtration. A continually operating energy recovery ventilator (ERV) with a MERV 8 filter on the outside air intake provides clean air and draws stale air from the home. Smart indoor air quality monitors sense indoor air quality issues.

The HVAC system's mastic-sealed metal supply and return ducts are located completely within the conditioned space of the home. The tightly air sealed home was tested for overall air leakage and had an air leakage rating of only 1.82 air changes per hour at 50 Pascals pressure difference.

Hot water is supplied by a .96 efficiency factor (EF) tankless gas water heater. The water heater is plumbed with a recirculation loop, which uses "intelligent" technology that recognizes usage patterns to have hot water ready for delivery during high use periods, thus reducing wait times and wasted water. Inside, EPA WaterSense-labeled plumbing fixtures provide water savings while outside the homes are landscaped with drought-tolerant, climate-specific plants that are irrigated with ground-level drip irrigation to minimize evaporation and reduce overall water usage.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program

ENERGY STAR Certified Homes
Version 3.0

EPA Indoor airPLUS

EPA WaterSense

DOE Zero Energy Ready Home Quality
Management Guidelines

LEED for Homes

"We were coming from a home that was about half the size of this and we are spending a fraction of what we did before on our utilities." *Homeowner*



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.



The exterior wall is a double wall consisting of two 2x4 24-inch on-center advanced-framed walls with a 2.5-inch gap between creating a 9.5-inch cavity that was dense packed with blown fiberglass to provide a continuous R-41 layer of thermal protection around the home.

STAR Version 3, and the EPA's Indoor airPLUS and WaterSense programs. Thrive's internal quality assurance program, called FTQ360, assures continuous improvement processes and procedures across all company departments, including construction, purchasing, architecture, warranty, and vendor-partner relations.

Thrive also focuses on educating home buyers on the benefits of zero energy construction. Thrive has set up building science centers at nearly every community where it builds to explain the energy efficiency and health benefits of its homes. The builder also offers "meet your neighbor" nights where new homeowners have a chance to learn more about their high-performance homes while meeting their new neighbors.

Thrive Home Builders also provides homeowners with a one-year limited warranty that includes a 90-day and 11-month warranty review and emergency care as needed. Customer service coordinators follow up with home buyers at 48 hours, two weeks, 90 days, and 11 months after closing to address any issues. Thrive implemented an online punch list program that provides buyers with an easy way to submit their warranty requests and for Thrive to reach out to homeowners with maintenance reminders.

"We are often asked if we are paid for the costs associated with high-performance construction," said Bill Rectanus, vice president of operations for Thrive Home Builders. "Yes, quality pays. In a strong demand environment like Stapleton, we have been able to consistently raise prices to pay for our unique, innovative features and maintain our margin despite the escalating costs in today's market." In each of the previous three years, market studies have shown that Thrive has commanded between a 24% and 33% higher average price per square foot than the average of the top 25 ranked builders in the entire Denver market. "We know we succeed when the market rewards us with sales," said Rectanus.

Photos courtesy of Thrive Home Builders

These features helped the home to achieve a 47% reduction in water use and meet all of the requirements for certification to the EPA WaterSense home program.

Thrive takes quality management seriously. Project specifications, including installation and inspection procedures and specific scopes of work for each trade, are part of contractual agreements. These include specific requirements related to DOE's Zero Energy Ready Homes program, ENERGY

KEY FEATURES

- **Walls:** Double wall of two 2x4 24" o.c. advanced framed walls with 2.5" gap. R-41 total: ½" drywall, 9.5" blown fiberglass, ⅞" OSB sheathing, house wrap, brick veneer and fiber cement siding.
- **Roof:** Gable roof; ⅞" APA-rated sheathing, synthetic underlayment, 40-mil self-adhering bituminous ice-and-water membrane, 30-year asphalt shingles.
- **Attic:** Vented attic, R-49 batt in cathedral and R-50 blown fiberglass on flat ceilings, 14" raised heel trusses.
- **Foundation:** Insulated basement, ½-inch drywall, R-15 fiberglass batt, 8" concrete.
- **Windows:** Double-pane, argon-filled, low-e2, vinyl frames, U=0.25, SHGC=0.20.
- **Air Sealing:** 1.82 ACH 50; flexible top-plate drywall gasket; spray foam at rim joists.
- **Ventilation:** ERV MERV 8 filter, HVAC MERV 16 filter; smart indoor air quality monitors.
- **HVAC:** Central air-source heat pump, 12.5 HSPF, 18 SEER; gas furnace backup, 0.95 AFUE; metal ducts in conditioned space.
- **Hot Water:** Gas tankless, .96 EF, push-button recirculation pump.
- **Lighting:** 100% LED, transom windows, daylighting.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, front load washer, clothes washer, bath fans.
- **Solar:** 9.92-kW PV system, 7-kW battery.
- **Water Conservation:** EPA WaterSense fixtures and toilets, drought-resistant landscaping.
- **Energy Management System:** Smart thermostat, internet-enabled energy monitoring.
- **Other:** KCMA cabinets, Green Guard gold-certified flooring, paint; active radon system.

"It is remarkable. The quality of living for me personally just because of the air quality has really made a big difference in how I live." *Homeowner*