

Thrive Home Builders

Lowry Plan
Denver, CO



BUILDER PROFILE

Thrive Home Builders
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Lowry Plan
- Location: Denver, Colorado
- Layout: 4 bdrm, 4.5 bath, 2 fl + bsmt, 4,119 ft²
- Climate Zone: IECC 5B, cold
- Completion: October 2016
- Category: production

Modeled Performance Data:

- HERS Index: without PV 38, with PV 4
- Projected Annual Energy Costs: without PV \$1,550, with PV \$-11
- Projected Annual Energy Cost Savings (vs typical new homes): without PV \$2,550, with PV \$4,100
- Projected Annual Energy Savings: without PV 9,200 kWh, 610 therms; with PV 22,200 kWh, 610 therms
- Added Construction Cost: without PV \$13,324; with PV \$31,916

Zero energy construction is front and center at the Lowry site in Denver, Colorado, where Thrive Home Builders has constructed 34 single-family homes to the high energy-efficiency criteria of the U.S. Department of Energy's Zero Energy Ready Home Program.

All 34 homes are expected to perform as zero energy homes—a home that makes as much energy as it uses, netting its owners \$0 in energy costs over the course of a year. DOE selected one of the 34 homes as a winner in its 2017 Housing Innovation Awards. The winning home achieved a calculated Home Energy Rating System (HERS) score of 4, with projected annual energy costs of \$-11/year.

This home, like all 34 of the homes at Lowry, and like every home Thrive builds, is constructed to the DOE Zero Energy Ready Home program criteria, providing a highly energy-efficient, solar-ready home. 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.

The single-family detached homes at Lowry feature a modern style with large mono-truss or simple gable roofs to accommodate solar panels. The 40-foot lot widths in this urban Denver setting required some creativity to incorporate master bedrooms on the main floor along with a kitchen, dining, and living area. Thrive came up with Z-shaped lots where homes touch lot lines and connect around courtyards. Tall ceilings add a feeling of spaciousness while finished basements increase square footage. This unit is 4,119 ft² with 4 bedrooms, 4.5 baths and two floors above grade.



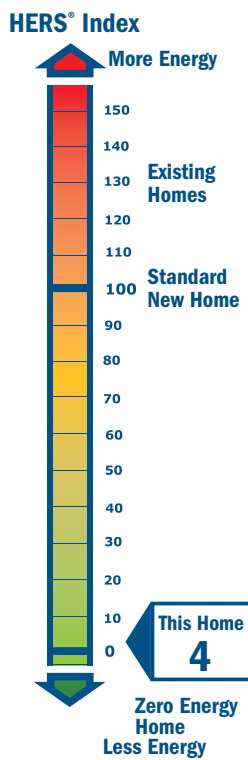
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 for an energy-efficient home built 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 4,119-ft² home at the Lowry development in Denver, Colorado, to the high performance criteria of the U.S. Department of Energy's Zero Energy Ready Home Program. Despite the dense positioning of the homes, mono-plane roof designs afforded plenty of space for the 8.68 kW of photovoltaic panels. With the PV, the home achieves a Home Energy Rating System (HERS) score of 4 and the home owners should enjoy energy bills of about \$-11 a year. Without the PV, the home would score a HERS 38 (far lower than the HERS 80 to 100 of typical new homes).



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.



To achieve the high energy-efficiency requirements in this cold climate location, Thrive used WUFI hygrothermic modeling to come up with a wall design 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. Crews installed .5-inch sheathing and used a sprayer-applied sealant to seal all seams. The wall cavities were filled with blown fiberglass. Textured house wrap provided a drainage plane behind the fiber cement and brick veneer siding.

The home's vented attic was constructed with 14-inch raised-heel trusses to allow space for insulation at the eaves. All of the top plates were air sealed with a sprayer-applied sealant before installing the R-50 of blown fiberglass. The roof was protected with ice-and-water shield at all valleys and from the eaves up 24 inches past the wall line. After installing metal drip edge, the deck was covered with synthetic underlayment and asphalt shingles.

The home has an unfinished, conditioned basement with 8.75-ft ceilings. Underneath the slab is a 6-mil vapor and radon barrier that was sealed to the foundation with polyurethane sealant. Beneath the barrier is a 4-inch-thick layer of ¾-inch rock over compacted soil. The basement was insulated along the inside of the poured concrete foundation walls with R-19 perforated vinyl-faced drape insulation.

The home is equipped with an active radon venting system. Soil gases are collected in a 4-inch perforated plastic pipe installed along the inside perimeter of the foundation walls and vented through the roof via a 4-inch solid plastic pipe with a fan. Thrive tests all homes for radon after construction; this home measured only 0.5 pCi/L.

Most of the home's heating and cooling is provided by a very efficient heat pump with an HSPF of 12.2 and a SEER of 18.9. A highly efficient 97.4 AFUE gas furnace provides back-up heat for those rare very cold Colorado nights. All of the mechanical equipment is located in the conditioned basement.

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 1.77 air changes per hour at 50 Pascals pressure difference.



ENERGY STAR appliances, WaterSense fixtures, energy-efficient lighting, and ENERGY STAR double-pane, vinyl-framed windows help cut energy use in these high-performance homes. The homes also meet the criteria of the EPA's Indoor airPLUS program, which promotes good indoor air quality with low or no-VOC products and finishes; moisture management to reduce the likelihood of mold; and good ventilation practices.

This home is supplied with continuous hot water with a .97 EF tankless gas water heater. Water conservation features include WaterSense plumbing fixtures and a hot water recirculation loop that minimizes wait times for hot water delivery. Outside, drip irrigation and drought-tolerant plants minimize water use.

Every home is equipped with an internet-based monitoring system to help home owners track their electricity production and consumption.

Thrive also incorporated disaster-resistance features. This home includes shear walls and framing and roof reinforcement to accommodate 100 psf snow loads and wind resistance for 100 mph gusts. To reduce the risk of fire damage, Thrive specified fire-resistant siding and shingles.

In 2014 Thrive began building its homes to the high performance criteria of the DOE Zero Energy Ready Home program. "Home owners have told us that Thrive's energy efficiency was the primary reason for seeking out and buying a Thrive home," said Bill Rectanus, vice president of operations for Thrive Home Builders. Thrive's efforts have been rewarded with the second highest sales price per square foot in the Denver metro area. "We have found great success in selling the additional benefits of a Zero Energy Ready home including airtightness, high-performance windows and insulation, improved comfort and health, disaster resilience, less dust indoors, and a quiet indoor environment," said Rectanus.

This high level of construction quality doesn't happen by chance. Thrive Home Builders has been designing, building, and selling high-performance homes for 25 years and is committed to continuous training of its staff, vendors, trades, and even home owners. Thrive recently began conducting weekly "Building Science 101" classes, which are taught by in-house staff and cover topics like energy efficiency, indoor air quality, construction best practices, and details of the DOE Zero Energy Ready Home Program. The training classes are offered to all employees, and are required for the sales and construction departments.

Thrive spends even more time educating home buyers on the benefits of zero energy construction. Thrive has set up Building Science Centers at nearly every community where it builds. The centers are packed with educational displays on the benefits of owning a zero energy home. Thrive uses interactive displays and informative handouts like DOE's "A Symbol of Excellence" consumer brochure, the DOE Zero Energy Ready Home Point of Sale display, the ENERGY STAR "Better is Better" brochure, the Indoor airPLUS "Breathe Easy" brochure, and information about the solar energy systems. Side-by-side

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program, 100% Commitment

ENERGY STAR Certified Homes Version 3.1

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.



The double walls are advanced framed with 2-stud corners, ladder blocking at wall intersections, and open headers over windows to provide more room for the blown fiberglass insulation.

“Most of our competitors claim to build an energy-efficient home, so creating awareness and understanding of the HERS score is essential to help our buyers appreciate just how much more efficient our homes are,” said Rectanus.

Thrive appreciates the third-party evaluation that certification programs like DOE’s Zero Energy Ready Home program, ENERGY STAR, and EPA’s Indoor airPLUS require, and the consumer confidence they inspire. “We strongly believe in the power of the credible, third-party endorsements that these standards offer,” said Rectanus.

In addition to all the other benefits, there are of course the utility bill savings. Thrive has a unique way of driving home the impact of those savings. A display in its Building Science Centers asks home buyers, “What will you do with the savings?” Play dollars are stacked up to represent 30-years’ worth of energy savings. The display shows the energy savings can add up to real dollars that can really impact the home owners’ lives.

“Our homes offer a potentially staggering amount of energy savings, especially for those moving from older, inefficient homes. Whether it’s saving for your children’s college education, saving for retirement, or being able to afford a bigger home or special upgrades, it is important to characterize how those savings can be put to better use,” said Rectanus. “The Power of Zero Energy Ready gives you more BUYING POWER for the same monthly payment.”

Photos courtesy of Thrive Home Builders

displays compare Thrive’s energy-efficient features with standard construction. “We have received feedback from both buyers and realtors about how this demonstration was the deciding factor in the buying decision,” said Rectanus.

Thrive teaches buyers about the HERS score, how it’s calculated, and how it translates into cost savings in operating their Thrive home. Thrive sees the HERS score’s value as a third-party validated method customers can use to objectively compare Thrive homes to homes by other builders. Thrive tells home buyers, “Every home has a HERS Score. Don’t buy a home until you know The Score!”

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Double walls; 2x4 24" o.c. advance framed; staggered with space for 9.5" R-41 blown fiberglass; sprayer applied sealant; ½" OSB sheathing; corrugated house wrap; fiber cement and synthetic stone siding.
- **Roof:** Ice-and-water shield at roof edge; waterproof underlayment; metal drip edge; 30-yr asphalt shingles.
- **Attic:** Vented attic; R-50 blown fiberglass, 14" raised heel trusses; sprayer-applied sealant at all top plates.
- **Foundation:** Basements with perforated vinyl-faced R-19 blanket insulation on interior of unfinished walls. 4" gravel and vapor barrier under slab.
- **Windows:** ENERGY STAR double-pane; argon-filled; vinyl-framed windows; U=0.25, SHGC=0.30.
- **Air Sealing:** 1.77 ACH 50.
- **Ventilation:** Continuous exhaust fans.
- **HVAC:** Central air-source heat pump; HSPF 12.2, SEER 18.9; plus 97.4 AFUE backup gas furnace. Ducts in conditioned space.
- **Hot Water:** .97 EF tankless gas water heater.
- **Lighting:** 100% LED; daylighting.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, exhaust fans, ceiling fans.
- **Solar:** 8.68-kW solar PV.
- **Water Conservation:** WaterSense fixtures; “smart” hot water recirc; drought-tolerant plants, drip irrigation.
- **Energy Management System:** Internet monitoring of PV production and energy use.
- **Other:** EPA Indoor airPLUS, low-VOC paints, low-formaldehyde wood products. Active radon ventilation system; radon testing prior to closing. Ducts cleaned. Shear walls; reinforced framing and roof. Excavation to 30-ft depth to replace high-expansion soils.