

Thrive Home Builders

Courtyard Rows
Lone Tree, CO



BUILDER PROFILE

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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Courtyard Rows
- Location: Lone Tree, CO
- Layout: 2 bdrm, 2 bath, 2 fl + bsmt, 2,780 ft²
- Climate Zone: IECC 5B, cold
- Completion: August 2016
- Category: multifamily

Modeled Performance Data:

- HERS Index: without PV 41, with PV 8
- Projected Annual Energy Costs: without PV \$1,200, with PV \$150
- Projected Annual Energy Cost Savings (vs typical new homes): without PV \$1,750, with PV \$2,850
- Projected Annual Energy Savings: without PV 6,300 kWh, 360 therms, with PV 15,300 kWh, 360 therms
- Added Construction Cost: without PV \$11,445, with PV \$20,745

Thrive Home Builders could rest on its laurels. After all, the Denver-based company has won grand awards for housing innovation from the U.S. Department of Energy four years in a row. Thrive has built more DOE Zero Energy Ready certified homes than any other builder in Colorado and has the second highest number of homes certified nationally, with 280 homes as of August 2017. Gene Myers the owner and CEO of Thrive Home Builders was awarded the Denver area Home Builders Association 2016 Builder of the Year Award in December 2016. Thrive was the first “solar standard” builder in Colorado and the first production home builder to include DOE Zero Energy Ready certification as a standard feature for an entire series of homes.

With the Courtyard Rows townhomes at RidgeGate, Thrive is also the first builder in Colorado to offer net zero energy construction in a townhome community. “Denver’s suburbs have never seen anything like this before,” said Bill Rectanus, Vice President of Operations for Thrive Home Builders, of the Courtyard Rows townhomes, which have won a 2017 DOE Housing Innovation Award. Every one of the 86 townhomes will have solar photovoltaic panels. “Designing a multifamily product with sufficient roof space for a meaningful system is a major design challenge. With RidgeGate’s large, monolithic roof plane design and a site plan that enabled strong solar access, Thrive was able to reach 6.2-kW PV arrays on this residence at Courtyard Rows, which is virtually unheard of in multifamily construction,” said Rectanus. Courtyard Rows is part of RidgeGate, a 3.45-acre site that will include 86 townhomes when completed in the Lone Tree suburb south-east of Denver. “Thrive Home Builders believes in the importance of solar readiness so strongly that we have installed solar arrays as a standard feature on every home at RidgeGate,” said Rectanus. All of Thrive’s homes in RidgeGate will be equipped with at least 2.44 kW of PV panels; an upgrade to 6.2 kW is available.



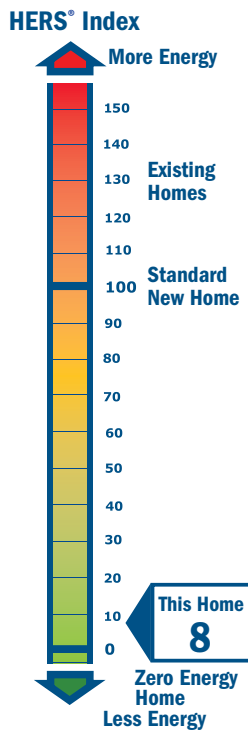
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE’s Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 for an energy-efficient home built 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 2,780-ft² townhome in Lone Tree, Colorado, to the high-performance requirements of the U.S. Department of Energy's Zero Energy Ready Home Program.



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.



With the addition of 6.2 kW of solar panels, the Courtyard Rows homes achieves an impressive Home Energy Rating System (HERS) score of about 8, or net zero energy performance (meaning a home that produces about as much energy as it uses over the course of the year). Fortunate homeowners are likely to pay no more than service charges on their utility bills. Even without PV, this two-story, 2,780-ft² townhome is so efficient that it would achieve a calculated HERS score of 41, while typical new homes built to code would score about 80 to 100.

Every home Thrive builds at RidgeGate will be certified to the U.S. Department of Energy's Zero Energy Ready Home program. The DOE Zero Energy Ready Home program is a high-performance home labeling program that requires every certified home to meet all of the requirements of ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency's Indoor airPLUS, 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 it.

RidgeGate is Thrive's first townhome development to use double-wall construction. The double walls consist of two 2x4 walls set 2.5 inches apart to create a 9.5-inch wall cavity that is filled with blown fiberglass insulation. The studs are set at 24 inches on center and staggered so the inner wall studs and outer wall studs don't align. Advanced framing details were used including open two-stud corners, right-sized headers over windows and doors on non-load-bearing walls, and open-framed interior-exterior wall intersections. All of these steps reduced the amount of lumber used while maximizing the space for insulation, resulting in a total R-value for the exterior walls of R-40.7. Thrive used framing wood that was locally harvested and locally milled from standing dead trees that had been killed by a beetle infestation in the mountains of Colorado. Thrive's crews carefully applied closed-cell foam sealant around electrical boxes, wall penetrations, and at the joint between the bottom wall plates and the floor. They also used a sprayer-applied sealant to form a gasket along all top plates before installing the drywall, which served as the wall's air barrier. The half-inch OSB exterior sheathing was covered with a textured house wrap, which provided a weather-resistant barrier and drainage plane under the fiber cement and synthetic stone siding.



Thrive's Courtyard townhomes start with double-wall construction which provides 9.5 inches of space for blown fiberglass insulation. Advanced framing techniques like open headers, two-stud corners, and ladder blocking at wall intersections allow even more space for insulation. ENERGY STAR-labeled windows provide daylighting while their low-emissivity coatings help prevent heat loss and unwanted solar heat gain.

To protect the roofs through Denver's hard winters and daily temperature extremes, the crews installed self-adhering ice-and-water shield extending from the roof edge up at least 24 inches past the wall line and at all valleys. All roof edges are protected with a metal drip edge. The deck is covered with a waterproof underlayment and 30-year asphalt shingles. RidgeGate's vented attics are insulated with R-50 blown fiberglass insulation. Truss heel heights are raised to 14 inches to maximize the insulation depths to the outside edge of the top plate. Crews used sprayer-applied sealant to air seal all top plate-attic ceiling junctions. "This reduces air infiltration at one of the homes' most leak prone areas," said Rectanus. Thrive installed air-tight can lights and sealed them to the drywall with caulk.

The party walls in townhomes can be challenging to air seal. However, the RidgeGate townhomes were tested for whole-house airtightness and easily met the code-required air-leakage limit of < 7 air changes per hour at 50 Pascals (ACH 50). The award-winning townhome tested at 4.35 ACH 50.

Basement walls were insulated with R-15 fiberglass batts in the finished walls. Under the basement slab, the home is separated from the soil by 4 inches of clean gravel and a vapor barrier which helps to keep radon gas from entering the homes. The soils on the site presented a high risk of expansion after construction. To mitigate that risk, the site was over-excavated by as much as 30 feet and the excavated material was replaced with soil at optimal moisture and compaction, which reduced the risk of soil expansion at a lower cost than a friction pier foundation. Groundwater was encountered during the excavation process; after dewatering, an underdrain system was installed to mitigate future groundwater issues. Retaining walls were installed throughout the sloped site and a detailed grading plan was engineered to accommodate positive drainage away from the home foundations.

The homes are equipped with highly efficient heat pumps having an HSPF of 9.0 and a SEER of 15.5. Back-up heating is provided by a gas furnace with a 97.4 AFUE (annual fuel utilization efficiency). The HVAC system and metal supply and return ducts are sealed with mastic and located within the home's conditioned space. The homes use ENERGY STAR-rated exhaust fans set for continuous ventilation. High-efficiency (EF .97) tankless gas water heaters with "Smart" recirculation loops provide endless hot water without the wait.

HOME CERTIFICATIONS

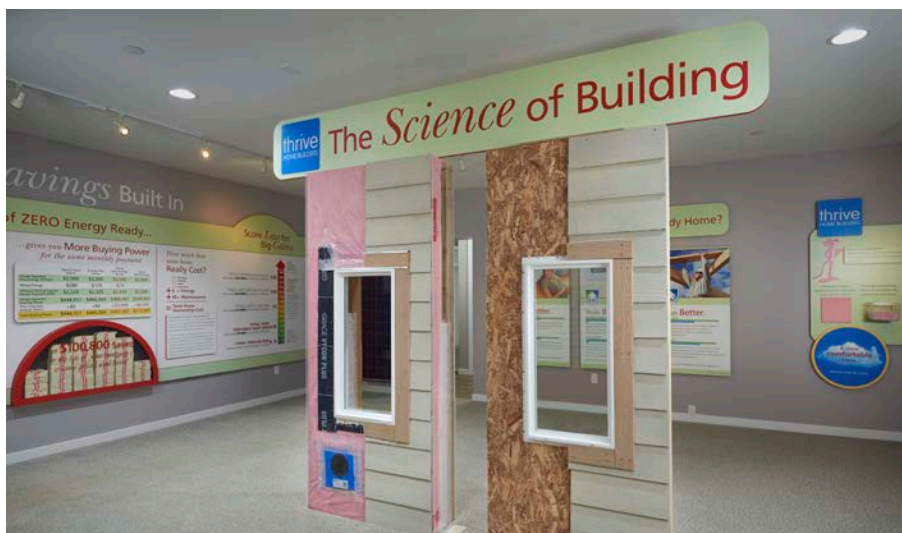
DOE Zero Energy Ready Home Program, 100% Commitment

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.



Thrive's sales center educates home buyers on all the benefits of DOE Zero Energy Ready Home construction.

ENERGY STAR windows, appliances, and efficient lighting further energy savings. Each home is equipped with an internet-based system to track the home's solar energy production and electric consumption.

Rectanus credits Thrive's commitment to DOE Zero Energy Ready Home certification with helping to position Thrive as a forward-thinking, conscientious builder, which helped to secure Thrive's selection as the builder for RidgeGate from a field of much larger competitors. Rectanus credits Thrive's success at RidgeGate (they sold 47 of the 57 units before the model was completed) with gaining them the opportunity to acquire a parcel across the street to construct an additional 29 units.

While Thrive could just stay the course, they have charted a path of continuous improvement. In 2017 Thrive created an internal Quality Assurance Department to develop continuous improvement across all of its departments including construction, purchasing, architecture, warranty, and vendor-partner relations. The QA department has implemented an inspection software called FTQ360, worked with project managers to develop new quality inspection checklists, established a process for internal audits of the inspections, worked with other departments to review warranty issues, and established new training programs for staff, vendors, and trades. Thrive reviews its construction processes continuously with weekly visits to all construction sites. A QA consultant does annual spot checks to benchmark progress on quality and safety initiatives. In addition, as a DOE Zero Energy Ready Home builder, Thrive Home Builders has every one of its homes performance tested by a third-party home energy rater. "The ultimate objective is to deliver the highest level of excellence for our customers through exceptional performance by every member of Thrive Home Builders," said Rectanus.

Photos courtesy of Thrive Home Builders

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Double walls, 2x4 24" o.c. advance framed, staggered studs, 9.5" R-41 blown fiberglass. Sprayer applied sealant; ½" OSB; corrugated house wrap; fiber cement & stone siding.
- **Roof:** Ice-and-water shield; waterproof underlayment; metal drip edge; 30-yr asphalt shingles.
- **Attic:** Vented attic; R-50 blown fiberglass; 14" raised heel trusses; sealed top plates.
- **Foundation:** Basements with R-19 blanket insulation on interior of unfinished walls; R-15 in cavity of finished walls; 4" gravel and vapor barrier under slab.
- **Windows:** ENERGY STAR double-pane, argon-filled, vinyl-framed; U=0.21, SHGC=0.28.
- **Air Sealing:** 4.35 ACH 50.
- **Ventilation:** Continuous exhaust fans.
- **HVAC:** Central air-source heat pump HSPF 9.0, SEER 15.5, plus 97.4 AFUE backup gas furnace. Ducts in conditioned space.
- **Hot Water:** .97 EF tankless gas water heater.
- **Lighting:** 100% CFL.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, exhaust fans.
- **Solar:** 6.2-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. Shear walls; reinforced framing and roof. Excavation to 30-ft depth to replace high-expansion soils. Active radon ventilation system. Ducts cleaned.