

Thrive Home Builders

Elements Collection
Denver, CO



BUILDER PROFILE

Thrive Home Builders

Denver, CO, thrivehomebuilders.com

Bill Rectanus

brectanus@thrivehomebuilders.com

303-707-4400

Rater: Energy Logic, Steve Eagleburger
steve.eagleburger@nrglogic.com

FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Elements Collection
- Location: Denver, CO
- Layout: 2 bdrm, 2.5 bath, 2 fl, 1,725 ft²
- Climate Zone: IECC 5B, cold
- Completion: April 2018
- Category: affordable

Modeled Performance Data:

- HERS Index: without PV 48; with PV 28
- Projected Annual Energy Costs: without PV \$850; with PV \$450
- Projected Annual Energy Cost Savings: (vs typical new homes) without PV \$1,150; with PV \$1,600
- Projected Annual Energy Savings: without PV 6,300 kWh, 400 therms; with PV 15,300 kWh, 400 therms
- Added Construction Cost: without PV \$11,400, with PV \$20,700
- Savings in the First 30 Years: \$78,000

Housing affordability in Denver is more important than ever. With 100,000 more people living in the city than just a decade ago, Denver's housing stock is struggling to keep pace with the community's needs. This boom has increasingly made rental and for-sale housing unaffordable for many of Denver's residents. Thrive Home Builders is helping to fill the void with 250 income-qualified row homes. The builder has already closed on 50 of the row homes and has over 200 more lots scheduled to be built out in the coming years, making Thrive one of the largest builders of for-sale affordable housing in the Denver-Metro area.

Because the homes are being built to the U.S. Department of Energy's Zero Energy Ready Home criteria, they should be not only affordable to buy but also affordable to live in, with estimated energy bills of about \$36 per month for the two-story 1,725-ft², 2-bedroom, 2.5-bath townhomes.

The homes are being built at Stapleton, a master-planned community located on the 7.5-square-mile former Stapleton International Airport site in northeastern Denver. The community includes affordable and for-rent along with market-rate homes in its mixed-use community of architecturally diverse homes, all of which are to be ENERGY STAR qualified, meaning that every home consumes at least 30% less energy than a typical new home in Denver.

That requirement should be no problem for Thrive Home Builders, which has built nearly 1,400 ENERGY STAR certified homes since 2003. ENERGY STAR certification is one of the requirements of DOE's Zero Energy Home program, and Thrive has made a 100% commitment to building its homes to the DOE high-performance home labeling program. Other requirements of the program include meeting all of the requirements of the U.S. Environmental Protection Agency's Indoor airPLUS, as well as the hot water distribution requirements of the EPA's



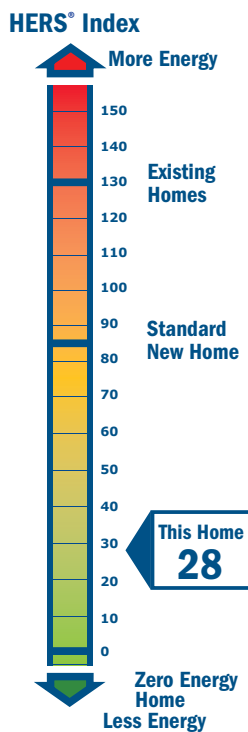
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0/3.1 for an energy-efficient home built 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 1,725-ft² affordable home in Denver, Colorado, to the high performance criteria of the U.S. Department of Energy Zero Energy Ready Home (ZERH) program. The townhomes should save nearly \$1,600 per year in energy bills thanks to a highly efficient building envelope and the 2.56-kW photovoltaic panels installed on each home's roof, which are offered to home owners through a \$0 down lease arrangement.



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.



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 them.

Thrive has certified more DOE Zero Energy Ready homes than any other builder in Colorado and has the second highest number of homes certified nationally with 584 homes certified as of September 2018. *Professional Builder Magazine* recognized Thrive Home Builders' efforts in housing innovation and energy efficiency by naming Thrive Home Builders their Builder of the Year in 2017.

Thrive has made a name for itself through its offerings of market-rate high-performance homes offering exceptional energy efficiency and solar power production. The affordable townhomes at Stapleton are no exception. Although solar panel installation is not required to meet the DOE Zero Energy Ready Home criteria, Thrive chose to install a 2.56-kW solar photovoltaic system on each roof top, which will bring each unit's Home Energy Rating System (HERS) score down from a HERS 48 to 28 and cut its energy costs in half, from annual bills of an estimated \$850 down to \$450. Thrive Home Builders partnered with a solar vendor to provide home owners with a "Zero-Down 20/20 Solar Lease," a 20-year power purchase agreement allowing for purchase of energy produced by the photovoltaic system at 20% less than the current market rate.

Before installing solar panels, however, the builder sought to reduce the homes' energy usage as much as possible. These two-story, 1,725-ft² townhomes are built using double-wall construction, a technique Thrive has perfected on several previous projects. The double walls consist of a 2x4 inner wall and a 2x6 outer wall separated by a 1-inch air gap, providing an 8-inch cavity that can be filled with blown fiberglass insulation. The 2x6 exterior bottom plate is cantilevered out from the foundation wall to extend 2 inches over the top of the slab-edge R-10 rigid foam foundation insulation. The builder uses several advanced framing techniques including 24-inch rather than 16-inch on-center stud spacing, two-stud open corners rather than three-stud solid corners, open-framed rather than stacked-stud interior-exterior wall intersections, and open or insulated headers rather than solid lumber headers over doors and windows. These steps reduce the amount of lumber in the walls, which is a cost and labor savings but more importantly they free up more space in the walls for insulation. The R-value for these walls is calculated at R-40.7, well above the code-required R-20.



The kitchen has an ENERGY STAR-rated refrigerator and dishwasher. Plumbing fixtures are EPA WaterSense certified for water savings and hot water is provided by a tankless gas water heater with “intelligent” technology that learns the occupant’s hot water use patterns and activates the recirculating pump during times of predicted high use to reduce wait times and water waste at the tap. All of the home’s lighting is provided by highly efficient LED bulbs.

To make sure no air leaks through the walls robbing them of their insulating value, Thrive’s contractors carefully applied closed-cell foam sealant around electrical boxes, wall penetrations, and at the joint between the bottom wall plate and the floor, and applied beads of sealant along the face of the top plate before installing the drywall. The exterior sheathing of half-inch OSB was covered with a textured house wrap, which provides a weather-resistant barrier and drainage plane under the fiber cement and synthetic stone siding. Thrive used WUFI modeling to analyze various levels of air tightness, moisture events, and interior relative humidity and showed that this wall system should not have problems with interior moisture or condensation in Denver’s dry, sunny climate.

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. The 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. Thrive installed air-tight can lights and sealed them to the drywall with caulk.

The foundations are a structural slab-on-grade with R-10 of rigid XPS foam slab edge insulation to protect the homes from heat loss to the ground. Thrive specifies rigid insulation from the top of the foundation to the top of the footer to ensure the slab is sufficiently insulated. In addition to the slab edge insulation, the foundation design incorporates a vapor barrier installed over 4 inches of clean gravel as part of the radon-resistant construction. Thrive provides a fully active radon mitigation system with the addition of perforated pipe in the gravel connected to solid pipe and an inline fan vented through the roof. The soils on the site presented a high risk of expansion after construction. To mitigate that risk, Thrive implemented a raised structural concrete slab with an 8-inch void between the bottom of the slab and the top of the gravel bed. After the disintegration of the cardboard void, there is space for the soils to expand and contract without affecting the home above. This technique ensures the long-term stability of the homes in an area with expansive soils.

The homes are equipped with a high-efficiency 92.1 AFUE gas furnace and a 13 SEER air conditioner, which the builder considered a good compromise between affordability and performance. The HVAC systems and mastic-sealed metal ducts

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program
- 100% Commitment

ENERGY STAR Certified Homes
Version 3.1

EPA Indoor airPlus

LEED for Homes



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 ducts for the high-efficiency sealed-combustion gas furnace are located between the floors in conditioned space.

.97. The builder installed a recirculation loop that uses intelligent technology to recognize high usage patterns to have hot water ready at the tap when use is expected. Plumbing fixtures are EPA WaterSense-certified for water and energy savings. The landscaping at RidgeGate includes drought-tolerant and climate-specific species that are individually irrigated with drip irrigation to reduce water usage.

The windows for this project are ENERGY STAR-qualified double-pane, argon-filled, vinyl-framed windows with a U-factor of 0.28 and an SHGC of 0.41. The design of the RidgeGate townhomes includes strategically placed efficient expanses of windows that provide natural light throughout the units. The homes are equipped with 100% LED lighting and ENERGY STAR appliances for further energy savings.

Each residence is equipped with an internet-based live monitoring system to track the home's solar energy production and electric consumption. This information can help home owners better understand how behavioral changes can improve their home's efficiency and cut costs.

The Elements townhomes are available to home buyers who are at 80% or below of the area median income. These new high-performance homes are offered at a price that is more than 50% less than the average new home sales price in Denver.

“When it came to affordable row homes, no one would have expected Thrive to build them with the same energy and health features found in our typical homes. But we did,” said Bill Rectanus, Thrive’s Vice President of Operations. “We chose to provide extraordinarily energy-efficient homes with HERS scores in the 20s to 30s equipped with solar and healthy home features because it is the right thing to do. Our vision for Thrive is ‘to be a force for good’ in the community, and we fundamentally believe in the transformative power of home ownership and the stability that comes with owning a home.”

Although Thrive did not necessarily intend to turn a profit on the project, they ended up showing, with proper project management and value engineering processes in place, a builder could provide high-performance affordable housing that also makes sense from a business standpoint. “Since its opening in May 2016, there has been such a high consumer demand for the Elements affordable homes, we have waiting lists for the next finished lot releases. We sold 102 homes without a model home,” said Rectanus.

and returns are all located within the home’s conditioned space. ENERGY STAR-rated exhaust fans are set for continuous ventilation. The fans are individually tested to ensure compliance with the ASHRAE 62.2 residential ventilation standard.

The townhomes have tankless gas water heaters with an efficiency factor (EF) of

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Double walls, 2x6 exterior and 2x4 interior 24" o.c. advanced framed, staggered studs; 10" R-40.7 blown fiberglass. Sprayer-applied sealant; ½" OSB; corrugated house wrap; fiber cement.
- **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:** Slab on grade, R-10 slab edge insulation.
- **Windows:** ENERGY STAR double-pane, argon-filled, vinyl-framed; U=0.28, SHGC=0.41.
- **Air Sealing:** 3.2 ACH 50.
- **Ventilation:** Continuous exhaust fan, meets ASHRAE 62.2.
- **HVAC:** 92.1% AFUE furnace, 13 SEER air conditioner; mastic-sealed ducts in conditioned space.
- **Hot Water:** Tankless gas water heater, .97 EF.
- **Lighting:** 100% LED.
- **Appliances:** ENERGY STAR-rated refrigerator, dishwasher, and 4 exhaust fans.
- **Solar:** 2.56-kW PV system.
- **Water Conservation:** WaterSense fixtures, recirculation pump, drought-tolerant and climate-specific plants.
- **Energy Management System:** Internet-based tracking of PV production.
- **Other:** Low-VOC paints, low-formaldehyde wood; WUFI modeled wall designs.

Photos provided by Thrive Home Builders.