

Thrive Home Builders

The E-PWR Volt
Townhome at
Loretto Heights
Denver, CO



BUILDER PROFILE

Thrive Home Builders
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FEATURED HOME/DEVELOPMENT:

Project Data:

- **Project name:** The E-PWR Volt Townhome at Loretto Heights
- **Location:** Denver, CO
- **Layout:** 2 bdrm, 4 bath, 3 fl, 1,669 ft²
- **Climate:** IECC 5B, cool-dry
- **Completed:** April 2022
- **Category:** Production

Modeled Performance Data:

- **HERS Index:** without PV 41; with PV -1
- **Annual Energy Costs:** without PV \$1,100; with PV \$0
- **Annual Energy Cost Savings:** (vs typical new homes) without PV \$2,150; with PV \$3,200
- **Annual Energy Savings:** without PV 10,050 kWh; with PV 17,600 kWh
- **Savings in the First 30 Years:** without PV \$89,600; with PV \$134,850

Thrive Home Builders of Colorado has indeed risen to new heights with its E-PWR Volt TownHomes at Lorreto Heights, in Denver, Colorado. Perched high on a hilltop southwest of downtown, the historic site is making history again as the site of one of Thrive's most energy-efficient communities yet. The 148 townhomes and 140 single-family homes by Thrive will meet all of the high performance criteria of the U.S. Department of Energy's Zero Energy Ready Home, representing a high level of energy efficiency, sustainability, health, and cost effectiveness for local home buyers. The regional builder of single-family and multi-family market-rate and affordable homes also achieved a DOE Zero Energy Ready Housing Innovation Grand award on the townhomes. With a Home Energy Rating System (HERS) score of -1, the winning home should provide its first-time home buyers with nearly zero energy bills for years to come.

"Thrive's slogan is 'Homes that do more,'" said Bill Rectanus, Thrive's vice president for operations. "This 'Do more' townhome shows how it can accommodate growing families, pay for its own energy, improve the health and comfort of its occupants, and play an important role in disaster resistance. Thrive has achieved a home with an annual energy bill of \$7 using readily available materials and simple construction methods that any builder and any subcontractor can reliably execute. Through its groundbreaking performance and durability, it can also be the best investment of its owners' lives."

Like all homes certified through the voluntary DOE program, the home has ENERGY STAR Version 3.2 and EPA Indoor AirPlus home certifications and the latest energy codes as its baseline, providing its home buyers with the health, resiliency, and utility bill savings these programs offer. Other DOE Zero Energy Ready Home criteria help ensure water savings; HVAC and water heating efficiencies; and third party-verified air sealing to minimize drafts and keep out bugs, dust, smoke, and pollens. While homes aren't required to have solar electric panels, this voluntary program specifies installation of the electrical infrastructure and space in the home for future installation



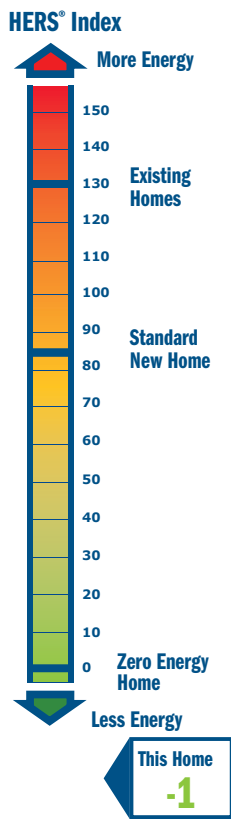
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.2 for an energy-efficient home built 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 constructed this 1,669-ft² townhome in Denver, CO, to the high performance criteria of the DOE Zero Energy Ready Home (ZERH) program. The home is expected to save its home owners over \$3,200 per year in utility bill savings, compared to a typical home built to code in Denver. ENERGY STAR-labeled lighting and WaterSense-certified plumbing fixtures will save energy and water throughout the home.



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.



of PV, as well as electric vehicle chargers, heat pumps, and heat pump water heaters, offering homeowners the option and ease of future installation should they choose it.

“This home serves as a template that will be replicated dozens of times in the future within Thrive’s Loretto Heights community,” said Rectanus. The townhome is one of 92 three-story townhomes, 56 two-story townhomes, and 140 single-family homes (288 total) that will circle the hilltop, which provides commanding panoramic views of both downtown Denver and the surrounding mountains and prairies.

The townhome’s modern aesthetic includes both flat and pitched roofs and composite wood lap siding along with patches of red brick, a nod to the historic red brick buildings on the site, the former campus of Loretto Heights College, founded by the Catholic order of the Sisters of Loretto in the 1880s. While the site was sold to a local developer in 2018, many of the historic buildings have been retained and repurposed as community buildings or affordable housing.

Beneath the modern façade of Thrive’s townhomes, the builder showed how their focus on quality management yielded high performance results with mostly traditional methods. The builder achieved R-23 walls with 2x6, 16-inch on-center construction that incorporated advanced framing techniques like three-stud insulated corners, open and insulated headers, and ladder blocking at interior wall intersections that allowed more room for the dense-packed fiberglass. Half-inch structural OSB sheathes the walls and, according to Rectanus, “expensive rain screen systems were replaced with low-cost corrugated draining housewrap.” The builder followed a total UA performance path rather than prescriptive path, which enabled them to meet the overall insulation level specified by the 2021 International Energy Conservation Code (a program requirement) while avoiding the need for exterior rigid insulation.

The wall’s insulation performance was maximized through the use of extensive traditional air sealing methods, such as a top plate gasket at the ceiling-to-attic interface, foam sealant at electrical boxes and the bottom plate of exterior walls, taping of all house wrap seams, tape flashing around doors and windows, and gaskets around all exterior wall penetrations. For an extra measure of air sealing, the builder used a whole-house aerosolized acrylic air sealant process that helped bring the three-story home’s overall air leakage down to 2.92 air changes per hour at 50 Pascals of pressure.

The home designs used a standard vented attic with R-60 of blown-in fiberglass insulation. The truss design incorporated 14-inch raised-heel trusses providing plenty of space for insulation over the exterior-wall top plates. Roofs were topped with ¾-inch OSB, a self-adhered membrane, and asphalt shingles.



To help maintain indoor air quality, the home meets all of the requirements of EPA's Indoor AirPlus program. Balanced ventilation is provided by paired ENERGY STAR-rated supply and exhaust fans. The heat pump is equipped with a MERV 13 filter with activated carbon media to reduce ozone, a frequent air quality issue in metro Denver. Smart switches in the bathrooms automatically turn on bath exhaust fans if humidity levels get too high.

The foam-wrapped slab-on-grade foundations reduce both excavation costs and concerns about radon. Since the Denver area has high potential for radon, an active radon mitigation system was also installed, with a simple manometer indicator to provide homeowners with easy verification of system performance.

Moderately priced vinyl-framed windows with a higher performance glass unit and an insulation value of U-0.25 complete the building envelope. In Denver's litigious housing market, Thrive took the unusual step of hiring a third-party inspector well known as an expert witness for homeowners associations that sue builders for construction defect claims. Among the many extra steps of inspection, the reviewer subjected the townhome to water-resistance testing using the ASTM-E1105 test method, which involves putting the home in negative pressure while spraying high-pressure water at the windows and wall penetrations after flashing and house wrap have been installed but before siding is put on to test for leaks. "This rigorous testing is done in addition to normal building inspections, inspections by our energy rater partner, and Thrive's own quality assurance system. It not only reduces Thrive's risk of construction defects slipping through our multi-step inspections, but also provides a "belt and suspenders" approach to delivering a home of superior quality, durability, and performance to our homeowners," said Rectanus.

The top two floors of the home are heated and cooled with a central ducted air source heat pump with a heating efficiency of 10.7 HSPF efficiency and a cooling efficiency of 22.4 SEER, with electric resistance for emergency backup. Thrive also installed a ductless heat pump in the ceiling of the lowest floor.

For hot water, Thrive installed an efficient heat pump water heater. With space at a premium in the townhome, Thrive worked with the manufacturer to plan adequate incoming air to the small utility closet housing the water heater through an air-transfer grill and undercut in the closet door. They also ducted the cold exhaust air outside through the exterior wall.

A 5.2-kW roof-mounted solar array helps to produce enough electricity to net the home owners near-zero energy bills over the course of the year. This moved the HERS rating for the home from a very efficient 41 to (-)1. A mobile application provided with the panels allows homeowners to track their energy consumption and production. The PV panels can also help power the homeowner's transportation via the 220-volt electric vehicle power charger installed in the garage.

"The path for achieving our purpose is and has been the path towards continuously improved DOE Zero Energy Ready Homes. Beginning with our first DOE Grand

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program - 100% Commitment

ENERGY STAR Certified Homes Version 3.2

EPA Indoor AirPlus

ENERGY STAR Next Gen, LEED Platinum

Thrive Home Builders' 100% commitment to certifying homes to the DOE Zero Energy Ready Home program criteria dates back over a decade. The builder has certified more homes to the DOE criteria than any other builder in Colorado.



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.



Baffles and wind dams provide a path for airflow from soffit vents to ridge vents, cooling the underside of the roof to reduce the risk of ice dams in winter.

Home standards by assisting in the development of online and in person-training with the Energy and Environmental Building Alliance (EEBA); as a founding member of the EEBA Builder Benchmark Group; through seminars, presentations and trainings conducted at the National Renewable Energy Laboratory, the South by Southwest Conference, and the Home Builders Association of Metro Denver; through the RESNET and Zonda podcasts; and as a frequent contributor to ProBuilder Magazine.

Thrive is constructing its second ProBuilder Idea Home featuring DOE Zero Energy Ready Home, Indoor AirPlus, ENERGY STAR Next Gen, and LEED certifications. Thrive has collaborated with Xcel and the Colorado Public Utilities Commission in setting rebate and certification standards. Thrive currently is the Xcel Energy All-Electric and Mixed-Fuel Builder of the Year. Thrive is an active contributor to the education of future leaders, through its participation as the longest serving judge in the DOE Solar Decathlon Student Design Competition and as a frequent collaborator with the University of Denver Real Estate and Construction Management programs.

Thrive's efforts have been recognized with more DOE Housing Innovation Awards and Grand Awards than have been won by any other builder. They have also been recognized with the Pacific Coast Builders Conference Gold Nugget Award Home of the Year, the Best in American Living Platinum Award, the Best in Green Awards at the International Builders Show, and the RESNET Presidents Award and Cross Border Challenge twice as the most energy-efficient production builder in the U.S. and Canada, most recently in 2023.

Despite the successes, Rectanus notes that Thrive must still be cost-competitive with national builders who construct just to code and who can spread losses across multiple markets when meeting the challenges of Denver's high prices and lagging sales.

"If anything," said Rectanus, "the challenging market and competition have pushed Thrive to double-down on everything we do to make a better, healthier, more efficient, more comfortable, more resilient, and more cost-effective home."

Winner in 2013, we have focused on improving the energy performance of our homes, their indoor air quality, and their resilience—all at prices that everyday homeowners can afford," said Rectanus.

"With high mortgage interest rates and a median new home price in Denver of \$650,000, Thrive must be focused on affordability. For us, building a better home does cost more, but this cost is offset by the lower monthly cost of ownership Thrive provides its homeowners thanks to \$0 utility bills. The energy savings have a present value of almost \$40,000, i.e., giving homeowners \$40,000 more in buying power," said Rectanus.

Thrive has sought to assist other builders in achieving DOE Zero Energy Ready

KEY FEATURES

- **Walls:** 2x6 16" o.c., advanced framed, R-23 total: 5.5" R-23 blown fiberglass, 1/2" OSB, draining house wrap, composite wood siding.
- **Roof:** Gable truss roof, 3/4" OSB, ice and water shield membrane, synthetic underlayment, composite shingles.
- **Attic:** Vented attic: 16" R-60 blown-in fiberglass. 14" raised-heel energy truss.
- **Foundation:** Slab on grade. R-10 rigid foam along perimeter. R-68 blown fiberglass in first-floor joists.
- **Windows:** Double-pane windows, U=0.25, SHGC=0.3.
- **Air Sealing:** 2.92 ACH50; Bottom plate and electrical boxes foam sealed; top plate gaskets; polypropylene gaskets for exterior wall penetrations; draining house wrap taped; windows tape flashed; whole-house aerosolized acrylic sealant.
- **Ventilation:** Fan-powered supply ventilation balanced to exhaust fans. Humidity sensors. Active radon mitigation system.
- **HVAC:** Central air-source heat pump, 9.5 HSPF, 23 SEER2.
- **Hot Water:** Heat pump water heater, 65-gal, 3.55 UEF, in 9-ft² closet with transfer grill and door undercut and ducted exhaust. Demand recirculation.
- **Lighting and Appliances:** ENERGY STAR appliances and lighting.
- **Solar:** 5.2 kW, no battery.
- **Energy Management System:** Indoor air quality and solar power monitoring.
- **Other:** Electric vehicle charger. Extensive in-house quality management and training.

Photos courtesy of Thrive Home Builders