



Garbett Homes

Sterling at Capitol Hill
Salt Lake City, UT



BUILDER PROFILE

Garbett Homes
Salt Lake City, UT; GarbettHomes.com
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Sterling at Capitol Hill
- Location: Salt Lake City, Utah
- Layout: 3 bdrm, 3 bath, 3 fl, 1,857 ft²
- Climate: IECC 5B, cold
- Completed: December 2021
- Category: Attached

Modeled Performance Data:

- HERS INDEX: without PV: 50
- Annual Energy Costs: without PV: \$774
- Annual Energy Cost Savings: without PV: \$630
- Annual Energy Savings: without PV: 3,000 kWh, 450 Therms
- Savings in the First 30 Years: without PV: \$4,300

Panelized construction is one way production home builder Garbett Homes of Salt Lake City is able to cost-effectively produce high-performance homes that meet all of the requirements of the U.S. Department of Energy's Zero Energy Ready Home certification. Garbett's efforts helped the company to win its first Grand award in DOE's Housing Innovation Awards competition in 2022, in the attached homes category.

"Panelized walls are a great way to reduce construction waste and improve building timelines, and they can also improve the homes' energy efficiency," said Damian Mora, Land Acquisition and Energy Coordinator for Garbett Homes.

Garbett Homes is a Utah-based production builder of single-family detached and multifamily homes for sale and for rent. Started by Bryson Garbett in 1983, the builder turned to higher efficiency homes in 2008 and committed to certifying all of its homes as DOE Zero Energy Ready Homes in 2017.

"Garbett is the leading builder of DOE Zero Energy Ready homes in Utah with almost 600 certified homes (the next closest Utah builder has 12 certified homes)," said Mora. "We like that the program sets a standard that is above and beyond local codes but is achievable for any builder interested in achieving high performance. We like that it also goes beyond efficiency and includes comfort, durability, and indoor air quality. DOE Zero Energy Ready Home is recognized locally by loan financing entities and that allows us to get great interest rates on long-term financing for rental projects."

The winning home is an attached home in a 10-lot infill development located in Salt Lake City, Utah, down the street from the Utah State Capitol in the vibrant Capitol Hill neighborhood. The site was on a hillside requiring extensive excavation and the installation of massive retaining walls. The builder also had to plan for the Salt Lake area weather. Salt Lake City is located in the foothills of the Wasatch Mountains and gets 54 inches of snow annually, which influences materials, design, and site planning.



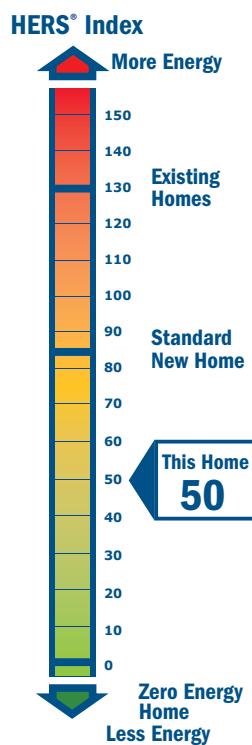
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0/3.1/3.2 for an energy-efficient home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

The builder is began construction on its first all-electric communities in 2022. Garbett has begun installing all-electric ovens and ranges, rather than gas ranges, which are a significant source of indoor pollutants. Garbett is also monitoring the indoor air quality of its model homes and some of the homes it has sold (with the permission of the buyers) to determine the effectiveness of its indoor air quality measures. Garbett meets the requirements of the EPA Indoor airPLUS program including low- or no-VOC-emitting paints and finishes, carpet, carpet pad and adhesives, and cabinetry.



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.



The multifamily units are built to meet the requirements of the DOE Zero Energy Ready Home program, which means that the homes have also been certified to the criteria of ENERGY STAR Certified Homes Version 3.0, 3.1, or 3.2 and the U.S. Environmental Protection Agency’s Indoor airPLUS program. Builders must also meet other efficiency requirements like the hot water distribution requirements of the EPA’s WaterSense program; the insulation requirements of the latest International Energy Conservation Code; HVAC and water heating efficiencies; third-party verified air sealing targets; installation of ENERGY STAR appliances, windows, and lighting; and ducts in conditioned space. In addition, homes are required to have solar electric panels installed or have the conduit and electrical panel space in place for it.

Garbett constructed its homes to be solar ready. All of the homes are pre-wired for solar and the roof is engineered to withstand future solar photovoltaics on any portion of the roof regardless of floor plan. All Garbett Homes are now electric vehicle-ready, with a 220-Volt outlet installed in the garage of every home. “Despite the infill location, the Sterling at Capitol Hill homes have great solar access,” said Mora.

To ensure consistency and help control costs, the builder includes a comprehensive energy-efficiency package with insulation, air sealing, and indoor air quality measures that is implemented on all its homes to ensure the homes achieve ZERH standards. Construction starts with site preparation. All homes come with a lot-specific grading and drainage plan to direct runoff away from the homes and protect them from the damaging effects of water. “We can have several feet of snow on the roof and perimeter of the home during the winter so a comprehensive drainage plan is critical to ensure the longevity of our homes,” said Mora.

To meet the demands of the cold climate, Garbett packed R-23 of blown fiberglass into the 2x6 walls, which were built using advanced framing techniques such as 24-inch on-center stud spacing, 3-stud open corners, and open headers over windows and doors to maximize the room available for insulation. The walls of the attached homes were sheathed with 7/16-inch OSB sheathing and house wrap then covered with 20-gauge stucco netting and 3/8-inch cement base coat stucco, brick, or fiber cement lap siding.

“Advanced framing is not widely used in Utah so Garbett found that training our trade partners was essential. We train regularly to get new framers on board quickly. In a production home setting it is important to have everyone familiar with the techniques to get the most consistent and highest performance out of our homes,” said Mora.



“At Sterling on Capitol Hill, we wanted to incorporate a modern look but we didn’t want to use a flat TPO roof,” said Mora, due to issues they’ve seen with flat roofs leaking in their high-snow-load location. On these homes, the eave of the simple gable roof runs parallel to the front and back elevation. Because the pitch is so low, the roof appears to be flat from the front and rear street level.

Garbett employed a vented attic with 15 inches (R-60) of blown fiberglass insulation on the attic floor. Over the $\frac{7}{16}$ -inch OSB sheathing, the builder installed two layers of #15 roof felt and asphalt shingles. Garbett specified trusses with 12-inch raised heels to allow more insulation over the top plates. All of Garbett’s house plans are designed with raised energy heels to maximize the insulation in the attic and above the exterior walls.

The project used a very simple roof design with one low gable running east-west at a $\frac{3}{12}$ pitch for the full length of the building except for one small section of roof at a different height to separate the two units of this attached dwelling. A simple roof design provides many benefits in terms of cost and labor savings: fewer complicated details for water management and air sealing; simple installation of insulation, sheathing, and siding; more space for solar panels; etc.

The attached homes also have a full daylight basement. The below-grade walls of the walk-out basement are waterproofed with a spray-on sealant. The builder installed R-10 of rigid foam insulation under the full slab. The concrete walls at the back of the basement were covered with framing. The above-grade walls at the front of the lowest level are also 2x6 framed walls at 24 inches on center. All of the framed wall cavities were filled with R-23 of blown fiberglass.

The double-pane, vinyl-framed windows have low-emissivity coatings to discourage heat transmission but no gas fill due to the altitude. They provide a U-factor of U-0.27. Because Salt Lake County is a predominantly heating climate the windows have a higher solar heat gain coefficient of 0.35 in strategic places so they can provide some beneficial solar heat gain to help offset heating demand in the winter.

Garbett has recently shifted its air sealing strategy to include a whole-house technology that consists of spraying an aerosolized acrylic into the home while the home is pressurized. The tiny beads of acrylic adhere to the edges of cracks in the building envelope, accumulating to fill in and seal off air leaks during the 2 to 4 hours the spraying process is occurring. The aerosolized acrylic sealing process can be used on all cracks under 0.5 inch so, before applying the process, the builder’s crew applies canned spray foam and drywall gasket around all penetrations in the building envelope. Correctly installed house wrap with all seams and edges taped is also a critical air sealing measure.

HOME CERTIFICATIONS

ENERGY STAR Certified Homes
Version 3.0

EPA Indoor airPLUS

DOE Zero Energy Ready Home Program
- 100% Commitment

“Our company vision is ‘building a sustainable future for our customers, employees, and the environment.’ The ZERH program helps us do that. We get a lot of praise from our customers for the low utility bills, indoor air quality, comfort, finishes, building process, decreased noise infiltration, and so much more.”

—Damian Mora, Garbett 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.



Garbett packed R-23 of blown fiberglass into the advanced-framed 2x6 walls and blew another 15 inches (R-60) into the vented attic.

Garbett installed a high-efficiency, high-capacity tankless gas water heater in the multifamily unit with an energy efficiency factor of 96%. The water heater is equipped with a button-activated recirculation pump to speed hot water to taps that are further from the water heater. Garbett also installed low-flow EPA WaterSense-labeled plumbing fixtures and ENERGY STAR appliances to reduce water usage in the house.

In order to meet the DOE ZERH specifications, Garbett has made construction quality a particular focus. The construction team meets weekly to discuss quality control measures and also has pre-construction meetings with the homeowners. Site managers are required to go through quality checks at various stages of construction for each home, request fixes if needed, and report on the progress and quality of each home. The sales and construction teams meet periodically to do frame and insulation walks to find any potential problems with processes and plans and to identify ways to improve on them.

“We work closely with all trade partners and energy raters to ensure all aspects of our high-performance standards are met. We have frequent trainings for our construction team and trade partners to keep up to date on all ENERGY STAR and DOE Zero Energy Ready Home standards,” said Mora. Staff are required to attend energy-efficiency trainings and workshops put on locally. “Having everyone educated to know what their part is in building a Zero Energy Ready Home is crucial for maintaining quality construction and consistency. We recently worked with outside consultants to improve our processes to better improve our product and our relationships with our buyers and trade partners.” In addition to the DOE award, Garbett Homes was recognized for their efforts with a Bronze Award in the 2020 National Housing Quality Awards.

“Before, we relied more on spray foam in the rim joists and attic for our air sealing, but we have reduced our use of it because of some issues we had with cracking and ineffective application. However, we will still use spray foam if a portion of the house will be covered before the aerosolized acrylic is applied,” said Mora.

To provide fresh air to the home, Garbett installed an Energy Recovery Ventilator (ERV). The ERV has separate ducts to bring in fresh air and exhaust stale air. The ducts pass in a heat exchanger where heat from the warmer duct is passed to the cooler duct, helping to warm up incoming air in winter and cool incoming air in summer. In addition to the ERV, an exhaust fan in the hall bathroom is set for continuous operation.

KEY FEATURES

- **Walls:** 2x6, 24" o.c., panelized, R-23 total: advanced framed, 5.5" blown fiberglass in cavity, 7/16" OSB, house wrap, 20-gauge lath, 3/8" cement base coat stucco.
- **Roof:** Truss gabled & shed roofs: 16" R-60 blown fiberglass, 7/16" OSB, #15 felt, asphalt shingles.
- **Attic:** Vented attic, 16" R-60 blown fiberglass; 12" raised-heel energy trusses.
- **Foundation:** Slab-on-grade.
- **Windows:** Double-pane, low-e, vinyl frame; single-hung and sliders. U=0.26, SHGC=0.31.
- **Air Sealing:** 3.49 ACH 50. Taped house wrap. Whole house aerosolized acrylic sealant.
- **Ventilation:** ERV, 66% SRE; integrated with central air handler. MERV 8 filter in air handler, MERV 6 filter in ERV. Exhaust fan runs continuously at 50 CFM.
- **HVAC:** Gas furnace, 96.5% AFUE, ECM motor; air conditioner 15 SEER.
- **Hot Water:** Gas tankless, 96% EF. Push-button hot-water recirculation system.
- **Lighting:** 100% LED.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, clothes washer.
- **Solar:** PV ready, wiring in place, roof will support panels.
- **Water Conservation:** EPA WaterSense; push-button recirculation pump. “Localscaped” mix of patios, play areas, bark mulch, local plants, and grass.
- **Energy Management System:** Programmable thermostat.
- **Other:** Panelized walls. No/low-emission products.

Photos courtesy of Garbett Homes