

Health-E- Community Enterprises

The Villas
at Rocketts Landing
Richmond, VA



BUILDER PROFILE

Health-E-Community Enterprises of Virginia,
Williamsburg, VA

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Rater: Top Build Home Services
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: The Villas at Rocketts Landing
- Location: Richmond, VA
- Layout: 3 bdrm, 2.5 bath, 2 fl, 2,170 ft²
- Climate Zone: IECC 4A, mixed-humid
- Completion: May 2016
- Category: custom spec

Modeled Performance Data:

- HERS Index: without PV 42, with PV 0
- Projected Annual Energy Costs: without PV \$1,151, with PV \$163
- Projected Annual Energy Cost Savings (vs home built to 2012 IECC): without PV \$1,257, with PV \$2,609
- Projected Annual Energy Savings: without PV 11,425 kWh; with PV 21,020 kWh
- Added Construction Cost: without PV \$13,019; with PV \$36,315

Getting acknowledged as builder of the most energy-efficient home in the state was not good enough for Jay Epstein, owner of Health-E-Community Enterprises of Virginia. When he heard about the U. S. Department of Energy Zero Energy Ready Home program from Sam Rashkin in 2015, Epstein jumped on board. His first home constructed to the program specifications, a 2,170-ft² two-story in his Villas at Rocketts Landing development in Richmond, achieved a net zero and won Epstein a DOE 2016 Housing Innovation Award. Epstein is so sold on the program that he is already planning to make sure that the 75 homes at his next development, Walnut Farms in Williamsburg, will all be certified as DOE Zero Energy Ready.

Epstein is no stranger to energy-efficient home construction. He began constructing efficient homes in the 1970s. “I won the first Energy Value Housing Award the first year it came out in 1997, for affordable homes, and I won another EVH award the next year for production homes,” said Epstein. He has been an EarthCraft builder since 2002 and it was that organization that acknowledged him as builder of the most efficient home in Virginia in 2014 and builder of seven of the most efficient homes on Virginia’s top ten list in 2015. All of those homes, located at the Villas at Rocketts Landing, had Home Energy Rating System (HERS) scores of 16 to 18. With the DOE ZERH home, Epstein achieved a HERS score of 0, meaning the home will produce as much power as it uses in a year.

All DOE ZERH homes must be ENERGY STAR certified homes. The program also requires that homes be certified to the U.S. Environmental Protection Agency’s Indoor airPLUS program. In addition, homes must meet the hot water distribution requirements of the EPA’s WaterSense program and the insulation requirements of the 2012 International Energy Conservation Code. Homes must also have solar electric panels installed or have the conduit and electrical panel space in place for future installation of solar panels.



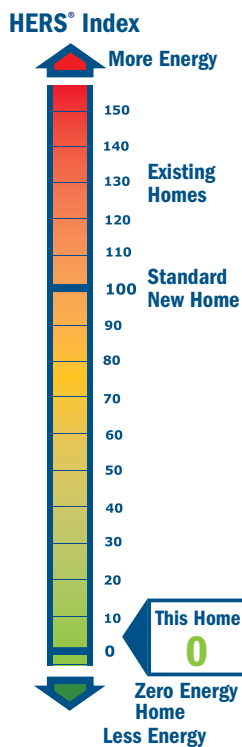
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE’s Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 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.

Health-E-Community Enterprises constructed this 2,170-ft² home in Richmond, Virginia, to the performance criteria of the DOE Zero Energy Ready Home (ZERH) program. The home's 6.8-kW solar electric system makes it a true zero energy home. The home's high-performance triple-pane, vinyl-framed windows; LED lighting; and ENERGY STAR-rated ceiling fans and appliances increase the energy efficiency and comfort of the home.



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.



Epstein installed 6.8 kW of solar panels on the DOE ZERH award-winning home to achieve the HERS 0. What Epstein really likes about the DOE Zero Energy Ready Home program is that every home is energy efficient and ready for solar, even if the solar isn't installed yet. Epstein's plan with the Villas at Rocketts Landing was to put solar panels on every one of the 45 homes. He found that this move limited buyers in the local market. "The appraisers felt we were limiting ourselves to the 1% of the market that wants solar. Sam (Rashkin the DOE chief architect for the Zero Energy Ready Home program) has opened the market place from that 1% to 100%, by getting the baseline raised to HERS 40s. With future communities, I'll build the certified energy-efficient homes and let the buyers decide when they want to add the solar. With the DOE ZER homes we hit 100% of the market because home buyers can choose what level of PV they want at the time of purchase but they will all have a HERS rating in the 40s," said Epstein.

At Rocketts Landing, Epstein sold 28 of the homes with solar panels installed. Buyers had a choice of purchasing a home with a 4.2-kW, 5.4-kW, or 6.8-kW PV system. The 6.8-kW system would yield a net zero energy home while the 4.2-kW or 5.4-kW system (depending on home size) would cut energy costs to less than \$1.50 per day. Epstein is so certain of the bill savings that his company offers home buyers a guarantee—if their energy bills exceed \$1.50 per day averaged over the course of a year, Health-E-Community Enterprises will pay the difference. The award-winning home, built on spec, was the first home built as net zero. At his newest development, Walnut Farms in Williamsburg, all 75 homes will be DOE Zero Energy Ready certified and home owners will have three options: zero energy-ready, \$1.50/day (with 5.4 kW of solar panels installed), or net zero (with 6.8 kW of solar panels installed). Even without the PV installed, all of the homes will have HERS ratings in the 40s.

To achieve these high energy efficiency levels, Health-E-Community Enterprises starts with a highly insulated thermal building envelope. The foundation is a sealed, insulated crawl space that is constructed using all of the water-management techniques required by the EPA's Indoor airPLUS program including good site grading, footing drains, and exterior below-grade water proofing. Health-E-Community Enterprises insulated and air sealed the rim band with closed-cell spray foam and insulated the crawl space sidewalls along the interior with R-11 fiberglass blankets. The crawl space access door is air sealed with a commercially available gasket. "Conditioned crawl spaces virtually eliminate moisture problems experienced with conventional crawl spaces. We bring the crawl space into



The advanced-framed walls are constructed with 2x4 studs spaced 24 inches on center. California corners; ladder blocking at interior-exterior wall junctions; and open, insulated headers make more room in the wall cavities for spray foam insulation. Health-E-Community Enterprises also uses engineered wood products like laminated veneer lumber (LVL), I-beams, I-joists, and open-web floor joists. According to Epstein, these products combine efficient raw material use with adhesives for improved strength with less shrinking, twisting, splitting, and warping.

the thermal envelope with a supply line from the air handler and a return and essentially convert it into a conditioned shallow basement. The crawl space is now conditioned and dry, winter and summer,” said Epstein.

Instead of OSB, Health-E-Community Enterprises sheathed the advanced-framed walls with R-5 graphite-enhanced rigid foam sheathing then filled the wall cavities with 2.5 inches (R-17) of polyurethane closed-cell spray foam, which provides insulation and air sealing, and adds some structural strength to the walls. The sheathing is covered with durable fiber cement siding. These protection layers combined provide a total wall insulation value of R-22.

The first-floor wall studs are aligned with the second-floor wall studs and the 24-inch on-center roof trusses to help transfer roof loads to the ground. The roof is set at an 8:12 pitch, which closely matches the optimal angle for solar power production. The OSB roof decking is covered with 30-lb roofing felt and 30-year architectural shingles, with ice-and-water shield at the eaves and valleys. Soffit vents and a continuous ridge vent provide venting for the attic. The trusses have a 14-inch raised heel, which raises the roof height over the exterior wall top plates allowing the full depth of R-50 blown cellulose. Before installing the blown insulation, the top plates over the exterior walls and interior partition walls were sealed with open-cell spray foam, which both air seals and insulates these wall-to-ceiling junctures. The attic access ladder has an air-sealing zippered cover that is topped with R-50 of batt insulation. Jump ducts were installed in the upper floor ceiling to equalize air pressures between the bedrooms and hallways. Caulk and spray foam were used to carefully seal around these and other penetrations through the ceiling.

The spray foam insulation and air sealing measures contributed to an air-tight draft-free home. As part of the home energy rating assessment, the home was tested for whole-house air tightness and found to have an air leakage rate of only 1.23 air changes per hour at 50 Pascals, well below the 3 ACH 50 required in the 2015 International Energy Conservation Code. To provide fresh air, an energy recovery ventilator (ERV) was installed. The ERV directs outside air to the return side of the heating system air handler where it is filtered with a MERV 13 filter then circulated throughout the house. “Buildings can never be built too tight. However, they can be under ventilated,” said Epstein.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program

ENERGY STAR Certified Homes

Version 3.0

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.



Ducts are sealed with mastic and located within the conditioned space of the home in open-web floor joists.

home owner with a yearly savings of \$100 for water and sewage treatment. The system is also expected to save the household 8,000 to 10,000 gallons of water that they don't need to buy and the local municipality doesn't need to treat. "This is a win for the municipality, the home owner, and the environment," said Epstein.

An energy management system was installed that tracks energy usage and solar power production. The system can provide trouble shooting, remote capabilities, and data reporting on past performance, among other features. To help control phantom power losses from cell phone chargers, Epstein installed three USB electric outlets that can accommodate a USB charger directly.

The home's 6.8-kW PV system was sized to meet all of the home's power demand over the course of the year. The grid-tied system uses a new inverter technology that allows it to provide power to the home even if the grid goes down. Standard inverters will shut down if grid power is shut off due to an outage and will stay off until grid power is restored by the utility company. The new inverter realizes that no power is coming in from the grid and comes back on to send the PV power to a dedicated sub-panel for critical uses in the home, without sending power offsite. The inverter is also wired to move power to a storage system, should the home owner wish to add battery storage in the future.

With the PV system and all of the energy-efficiency features installed, power bills should be about \$14 a month. The home owners are expected to save \$2,600 per year in energy costs compared to a home built to the 2012 International Energy Conservation Code.

"The overall objective when designing these homes was to successfully integrate high levels of comfort and indoor air quality with low energy usage enhanced by a PV system. Health-E-Community Enterprises takes pride in building an exceptional home that can perform at this level for middle-income customers," said Epstein.

Photos courtesy of Health-E-Community Enterprises of Virginia

The HVAC system consists of an air-source heat pump with a heating efficiency of 8.5 HSPF and a cooling efficiency of 15.3 SEER.

The home has a 50-gallon heat pump water heater with an efficiency of 3.25 EF. "They are up to 70% more efficient than a standard electric water heater," said Epstein. The heat pump is equipped with a push-button-activated on-demand pump system that delivers hot water to any location in less than 5 seconds. LED lighted buttons indicate when the hot water is ready at each fixture. According to Epstein, besides the energy savings, this provides the

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** R-22 walls of 2x4 24" o.c. studs, advanced framed, house wrap. 2.5" R-17 polyurethane closed-cell spray foam, R-5 graphite-enhanced rigid foam sheathing, fiber-cement siding.
- **Roof:** 30-yr architectural shingles, continuous ridge vent.
- **Attic:** Vented with R-50 blown cellulose, 14" raised heel trusses. All top plates sealed with open-cell foam, attic stair has air-sealing insulated cover.
- **Foundation:** Sealed, conditioned crawl space. R-11 fiberglass blanket sidewalls, rim band insulated with closed-cell spray foam.
- **Windows:** R-5 triple-pane, vinyl-framed, low-e, argon-filled, U=0.20, SHGC=0.24.
- **Air Sealing:** 1.23 ACH 50.
- **Ventilation:** ERV, MERV 13 filters.
- **HVAC:** Heat pump, 8.5 HSPF, 15.3 SEER, all ductwork between floors, transfer grilles for pressure balancing from bedrooms.
- **Hot Water:** 50-gal heat pump water heater, 3.25 EF.
- **Lighting:** 100% LED, two ENERGY STAR ceiling fans.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, clothes washer & dryer.
- **Solar:** 6.8-kW PV with storage-capable inverter.
- **Water Conservation Features:** Push button recirculating pump.