

United Way of Long Island

United Veterans
Beacon House
Huntington Station, NY



BUILDER PROFILE

United Way of Long Island
Deer Park, NY
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: United Veterans Beacon House
- Location: Huntington Station, NY
- Layout: 5 bdrm, 2.5 baths, 2 fl + bsmt, 3,719 ft²
- Climate Zone: IECC 4A, mixed-humid
- Completion: June 2017
- Category: affordable

Modeled Performance Data:

- HERS Index: without PV 31, with PV -5
- Projected Annual Energy Costs: without PV \$1,750 with PV \$-200
- Projected Annual Energy Cost Savings (vs typical new homes): without PV \$3,900, with PV \$5,850
- Projected Annual Energy Savings: with 4900 kWh, 1,300 therms; without PV 17,100 kWh, 1,600 therms
- Added Construction Cost: without PV \$7,350, with PV \$39,000; solar thermal = \$11,000

“Everyone deserves to live in a healthy home.” This has become the operating slogan for United Way of Long Island Housing Development Corporation, a nonprofit organization that builds homes for local governments and several of the 126 agencies funded under the United Way of Long Island umbrella. To fulfill this “healthy housing for all” vision, United Way began constructing homes to meet the guidelines of the U.S. Department of Energy Zero Energy Ready Home program in 2014, and has certified five homes so far, including this 3,719-ft² two-story home in Huntington Station that won a DOE Housing Innovation Award in 2017 in the affordable home category.

Every DOE Zero Energy Ready Home must meet the requirements of the U.S. Environmental Protection Agency’s Indoor airPLUS, as well as a host of efficiency criteria. The homes must be certified to ENERGY STAR Certified Homes Version 3.0 and meet the insulation requirements of the 2012 International Energy Conservation Code and the hot water distribution requirements of the EPA’s WaterSense program. In addition, homes are required to have solar electric panels installed or have the conduit and electrical panel space in place if needed for a future installation.

In 2015, United Way of Long Island committed to building all of its homes to DOE’s Zero Energy Ready Home program and currently has eight homes under construction. “High-performance homes are by design, healthier, more comfortable, and provide a better living experience,” said Rick Wertheim, Senior Vice President of the Housing Development Corporation and Housing and Green Initiatives. “Nonprofit housing agencies are very worried about escalating energy costs,” said Wertheim, who noted that operational costs are becoming more of a driving force in the agency’s decision making process than up-front construction costs, especially in light of the high utility costs on Long Island. “It costs LESS for nonprofits to own a ZERH than a just-to-code home,” said



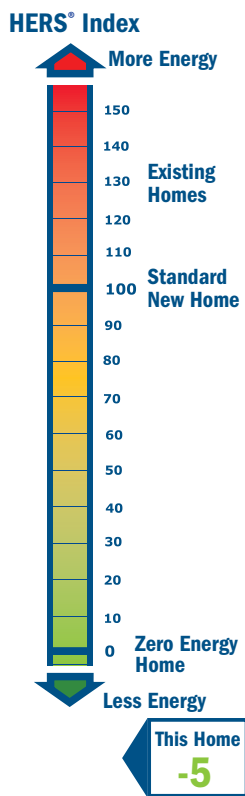
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE’s Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 for an energy-efficient home built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

United Way of Long Island’s Housing Development Corporation built this 3,719-ft² two-story, 5-bedroom home in Huntington Station, New York, to the rigorous performance requirements of the U.S. Department of Energy’s Zero Energy Ready Home Program. The home is packed with high-performance features like LED lighting and ENERGY STAR appliances. The asymmetrical, optimally angled roof provides plenty of space for roof-mounted solar panels for electric generation and hot water.



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.



Wertheim. He has used the United Veterans Beacon House project as a model to showcase healthy home and zero-energy features for other nonprofit developers under United Way’s umbrella.

One unique aspect of this home is that it is built by veterans for veterans. The residents, who moved in June 2017, are veterans with various types of disabilities. The builders who constructed the home included veterans enrolled in United Way of Long Island’s “VetsBuild” program, a 6-week class to learn the principles of building science, energy retrofit, and weatherization as well as green and high-performance home building. “We are very proud of the homes we build, but are even more proud of the training these vets get so they can enter the high-performance home building industry as a skilled workforce,” said Wertheim.

The Housing Development Corporation, which Wertheim directs, also operates YouthBuild, Green Job Corps, Weatherization Boot Camp, and Green Construction programs that train dozens of individuals each year, preparing them for skilled jobs in the construction industry. Homes like the United Veterans Beacon House serve as instructional projects for its training programs, as well as low-cost housing for United Way partner agencies. The Housing Development Corporation conducts classroom and hands-on training in its 5,000-ft² E3 (Energy Efficiency Education) SmartBuild Center, which is cosponsored by the New York State Energy Research and Development Authority (NYSERDA). The Center has the region’s only “House of Pressure Lab House” which gives students hands-on opportunities for training in air sealing, insulation, waterproofing, building diagnostics, and mechanical systems. The center also serves as a BPI (Building Performance Institute) training and testing center.

The student builders helped put together a very high performing home. The home achieved a Home Energy Rating System (HERS) score of -5, which means it performs as a true net zero energy home or one that produces at least as much energy as it uses in a year. Monthly energy costs should average \$-17. The home is expected to save \$2,050 in energy costs per year compared to a home built to the local code, which is the already rigorous 2015 International Energy Conservation Code. Solar energy systems, including an 8.5-kW photovoltaic electric generation system and an evacuated tube hot water heating system, helped achieve the net zero energy performance but, even without the solar systems, the home’s energy-efficiency features helped it to achieve a HERS 31, far lower than the HERS 80 to 100 of typical new homes.



Rigid foam lines the basement walls and covers the exterior above-grade walls to wrap the house in a blanket of continuous, sound-proofing, heat-blocking insulation. Seams are taped in the above-grade insulation so that the rigid foam also serves as an air- and water-barrier.

The 3,719-ft², five-bedroom, two-and-a-half-bath, two-story home features 2x6 walls that are constructed using advanced framing techniques, such as spacing the studs at 24 inches on center rather than 16 inches on center, using 2-stud corners rather than 3- or 4-stud corners, minimizing studs around windows, and using open rather than solid wood headers over doors and windows. These steps reduce lumber, leaving more space in wall cavities for insulation. The 5-½-inch-deep wall cavity was dense-packed with cellulose for an R-19.8 insulation value. The studs were covered with ½-inch coated OSB sheathing, which was topped with two layers of ¾-inch rigid foam with the seams staggered and taped so that the rigid foam could serve as an air barrier and weather-resistant barrier, replacing house wrap. Furring strips were installed over the foam to provide a ventilation gap under the vinyl siding; they also allow the rigid foam to serve as a drainage plane. The insulation types combined to provide a total wall value of R-30.

The poured concrete basement walls were insulated along the interior with 2.5 inches of polyisocyanurate rigid foam (R-15.5 total). The exterior was covered down to the footing with a fiber protection board. An elastomeric membrane protects the fiber board and provides a capillary break on top of the footing.

While not adhering strictly to the Insurance Institute for Business & Home Safety (IBHS) Fortified Homes protocol, the home incorporates severe-weather-resistant details. Examples include a code-plus roof nailing schedule, 120-mph windows, moisture-resistant below-grade materials, and impact-resistant siding.

The engineered roof and floor trusses are strong and straight and can be made using less lumber and less waste than standard lumber. The attic trusses have raised heels to allow room for a full 14 inches (R-50) of loose-fill blown cellulose at the eaves and across the attic floor plane. The attic was vented with a continuous ridge vent and soffit vents. Baffles were installed at each soffit vent to prevent wind washing and to direct venting air up along the underside of the roof deck. The vaulted ceiling was insulated with open-cell spray foam and had a one-inch airspace at the underside of the roof sheathing. All of the top plates, plumbing penetrations, and rough electrical ceiling boxes were air sealed with one-part foam and the attic hatch was gasketed and insulated with two inches of polyiso rigid foam board. Ice-and-water shield was installed at the roof's rakes and valleys as well as at the dripline and under the solar panels. The 8.5-kW PV and solar thermal panels were mounted in an ABS plastic tray installed on the large, optimally angled, south-facing side of the asymmetrical roof. This tray is not installed over the roofing shingles but instead takes the place of the shingles so

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program, 100% Commitment

ENERGY STAR Certified Homes Version 3.1

EPA Indoor airPLUS

EPA WaterSense

"With standard construction, these large group homes would have utility bills of over \$600/month, or more than \$7,000 a year. With energy costs like that, agencies are constantly fundraising just to keep the lights on. This is why I'm so committed to zero energy construction. By building in the energy efficiency and solar from the start, when it's most cost-effective to do so, we're giving our partner agencies zero energy bills now and far into the future, so they can focus their resources on other important services. And, we're providing their residents with bright, healthy, comfortable living spaces."

Rick Wertheim, Senior Vice President of the United Way of Long Island Housing Development Corporation and Housing and Green Initiatives



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.



Solar thermal panels and a high-efficiency boiler provide hot water for the hydrocoil heating system, while an ERV provides fresh air ventilation.

storage tank is also filled from the evacuated-tube roof-mounted solar thermal panels, which are expected to meet 85% of the home's hot water needs.

Vinyl-framed double-pane windows were installed that have invisible low-emissivity coatings and an argon gas fill to slow heat transfer. The windows have an insulation value of $U=0.17$ and a solar heat gain coefficient (SHGC) of 0.20.

A home automation system controls all of the mechanical devices—the boiler, fan coil, A/C, and ERV for whole-house ventilation and humidity control. The internet-accessed system tracks energy use and indoor air quality and provides alerts for mechanical issues and maintenance reminders. Supply and return duct sensors monitor temperature changes and provide remote diagnostic functionality. Occupancy and vacancy sensors control lights.

The home is situated on a corner lot on the community's main road and replaces an older, abandoned home in a revitalization zone in the older downtown part of this otherwise upscale community. The home's exterior design incorporates many traditional colonial features typical of the village, with one twist—an asymmetrical roof with a large south-facing side to capture maximum southern exposure for the solar panels. The design incorporated moisture-resistant details like pan flashing at windows and doors, a drainage plane under the siding, non-paper-faced gyp board, and surface grading to divert runoff. Xeriscaping minimizes maintenance and irrigation. Window placement and porches encourage cross ventilation. Large roof overhangs provide protection and shading. Sustainable materials and low-VOC finishes were used. Best of all, from United Way's perspective, the home will provide veterans with comfortable, healthy housing and zero power bills for years to come.

Photos courtesy of United Way Long Island

the PV panels don't need to be removed if the shingles are replaced at some point during the life of the solar panels.

The home's heating system consists of a 95 AFUE wall-hung boiler that supplies hot water to a hydro-coil in the central air handler. Conditioned air is distributed through small-diameter high-velocity ducts, which are located within the conditioned space of the home. Air conditioning is provided by a 13 SEER air conditioning unit. The air handler is zoned to condition the first and second floor independently. There is a central return with jumper ducts into the bedrooms for pressure balancing. The wall-hung boiler also feeds a super-insulated storage tank for domestic hot water. This 120-gallon double-coil

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Advanced framed 2x6 24" o.c. stud wall w/5.5" R-19.8 dense-packed cellulose plus two ¾" sheets R-10 foam insulation for total R-30. Coated taped OSB, PVC siding.
- **Roof:** 5/8" plywood decking; ice-and-water shield at valleys, drip line, and roof edges, 30# felt, architectural fiberglass shingles.
- **Attic:** Vented attic, raised-heel trusses, 14" R-50 blown cellulose in flat ceiling; open-cell spray foam in vaulted ceiling.
- **Foundation:** Basement, poured concrete with 2.5" R-12.5 polyiso on interior. Exterior covered with elastomeric waterproofing membrane plus fiber protection board to footing.
- **Windows:** Vinyl-framed, double-pane, low-e, argon-filled windows, $U=0.17$, SHGC=0.20.
- **Air Sealing:** 2.06 ACH 50.
- **Ventilation:** ERV, MERV 13 filter.
- **HVAC:** Hydrocoil split-air system attached to 95 AFUE wall-hung gas-fired boiler, 13 SEER AC.
- **Hot Water:** Solar thermal water heating; wall-hung boiler for backup.
- **Lighting:** 100% LED, occupancy and vacancy sensors.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, and clothes washer.
- **Solar:** 8.5-kW PV.
- **Water Conservation:** WaterSense fixtures; central manifold distribution. Drip irrigation.
- **Energy Management System:** Internet controlled HVAC; tracks energy use, temp, humidity, maintenance.
- **Other:** Low-VOC finishes, formaldehyde-free furnishings, extra fasteners, 120-mph windows, impact-resistant siding.