

United Way of Long Island

United Veterans
Beacon House
Deer Park, NY



BUILDER PROFILE

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

Project Data:

- Name: United Veterans Beacon House
- Location: Deer Park, NY
- Layout: 4 bdrm, 2 bath, 2 fl + bsmt, 1,890 ft²
- Climate Zone: IECC 4A, mixed-humid
- Completion: May 2016
- Category: affordable

Modeled Performance Data:

- HERS Index: without PV 32, with PV 9
- Projected Annual Energy Costs: without PV \$2,283, with PV \$676
- Projected Annual Energy Cost Savings: (vs home built to 2009 IECC) without PV \$873, with PV \$2,567
- Projected Annual Energy Savings: without PV 4,364 kWh, with PV 12,833 kWh
- Added Construction Cost: without PV \$17,000, with PV \$44,500

“Curb appeal” may not be a major factor for most affordable housing projects, but for this home located on tiny Long Island, home to some of the most expensive real estate in the country, having a home design the neighbors won’t object to was a serious consideration. United Way of Long Island Housing Development Corporation chose a traditional Cape Cod look to help the two-story home blend in with its setting in the coastal, south-shore village of Patchogue.

While its shingle siding and wrap-around covered porches exude local charm, the home’s high energy-efficiency performance, not its good looks, are what earned it a U.S. Department of Energy 2016 Housing Innovation Award, according to Rick Wertheim, program director for the Housing Development Corporation. Wertheim’s crews constructed the home to the strict performance requirements of DOE’s Zero Energy Ready Home program. The home is so energy efficient that the 6.9 kW of solar electric panels on the roof generate as much power as the home consumes, netting home owners a zero balance on their electric bills.

This is United Way’s third home built to the DOE Zero Energy Ready Home program specifications and they have seven more in the planning stages. Every DOE Zero Energy Ready Home must meet a host of efficiency criteria including all of the requirements of ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency’s Indoor airPLUS, as well as the hot water distribution requirements of the EPA’s 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 it. This was not the first home to have solar PV for the Housing Development Corporation. Wertheim explained, “We’ve been committed to PV for a long time. Long Island has the second highest utility rates in the United States—18 to 21 cents per kWh—so solar PV really helps offset cooling costs.”



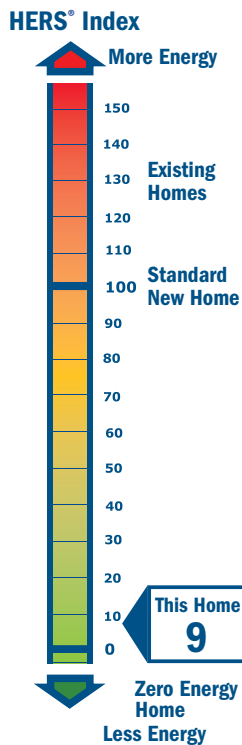
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE’s Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0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

United Way built this 1,890 ft² home in Deer Park, New York, to the performance criteria of the DOE Zero Energy Ready Home (ZERH) program. The home was equipped with a high-efficiency ENERGY STAR-rated refrigerator and dishwasher and LED lighting for water savings. The home's exterior lighting is motion sensor-controlled and the interior bedroom and utility room lights have occupancy and vacancy sensors to turn lights off when not needed. The home also met the requirements of the EPA WaterSense program with water-saving fixtures and plumbing.



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.



The DOE Zero Energy Ready Home certifications may help United Way overcome the negative connotations that affordable housing can sometimes have in a community. United Way's DOE Zero Energy Ready homes have gotten a lot of positive press with stories on major network TV, cable news programs, online news clips, and in local newspapers and magazines. Several news outlets carried stories about United Way's first Housing Innovation Award winner, a retrofit home certified in 2015. The exceptional energy performance of these homes has helped United Way "re-brand" affordable housing to what United Way calls "attainable housing," which it describes as "the convergence of affordable and sustainable housing" or simply "better housing that lives well."

The positive press is a plus for United Way's clients which include 126 nonprofit agencies, many of whom provide transitional and long-term housing for residents with special needs. But the biggest benefit may be the long-term affordability that energy-efficient housing offers. "Our decision to move forward with ZERH is made on the life cycle cost benefits," said Wertheim. "Nonprofit housing developers are very worried about running houses for special needs and affordable rental clients because of escalating energy costs. Operational costs and sustainability are becoming more of the driving force for decision making and project budgeting versus just the upfront square-foot building costs," added Wertheim, who pointed out "it costs LESS for nonprofits to own a ZERH than a code-built low-cost-per-square foot home, over time."

Wertheim noted that the award-winning house has been a showcase for other nonprofit developers working with United Way agencies. He said that DOE ZERH construction may also represent the "perfect solution" for the housing needs of the working poor on Long Island, couples whose combined income is still below the area's \$91,000 median income. "The struggling middle class and young couples in their first home are particularly vulnerable to rising energy costs that affect their monthly bottom line. The ZERH provides sustainable energy savings, helping to lower monthly expenses and reduce ongoing costly maintenance," said Wertheim.

The 1,890-ft², four-bedroom, two-bath award winning home demonstrates that sustainability with exceptional performance. With Long Islanders still rebuilding from Superstorm Sandy, disaster resistance was an important consideration. A home site was selected that was not in a flood plane and the home's elevation was raised above typical construction height so that the first-floor walls would sit well above normal flood events. The above-grade walls are double-wall



Two layers of rigid foam insulation over 8-inch-thick double walls dense-packed with blown cellulose provide a quiet, comfortable environment for the disabled veterans who will call this house home. The rigid foam is topped with 1x3 furring strips that create an air gap to help ensure effective water drainage behind the siding.

construction using two sets of 2x4 walls set one inch apart to form an 8-inch wall cavity that was filled with dense-packed cellulose. The studs were placed 24 inches on center rather than 16 inches on center and advanced framing details were employed to provide more space for insulation while reducing the amount of lumber used. On the outside, the studs were covered with ½-inch coated OSB sheathing covered with two layers of ¾-inch rigid foam with seams staggered and taped so that the rigid foam could serve as an air barrier and weather-resistant barrier. 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. This continuous rigid foam layer reduces thermal bridging through the walls and increases the total wall insulation value to R-42.

The poured concrete basement walls were insulated along the interior with 2.5 inches of polyisocyanurate rigid foam providing an R-12.5 insulation value. The exterior was covered down to the footing with a fiber protection board that has an elastomeric waterproofing membrane. The elastomeric capillary break was also installed on top of the footing to prevent water migration up into the walls through capillary action.

The attic was constructed with engineered roof trusses and raised-heel energy trusses that provide space for a full 16 inches (R-60) of loose-fill blown cellulose at the eaves as well as 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. 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.

The home's heating system is a 95 AFUE wall-hung boiler that supplies hot water to a hydro-coil in the central air handler. Air conditioning is provided by a 16 SEER air conditioning unit. All of the ducts are sealed with mastic, wrapped with R-8 of insulation, and located within the conditioned space of the home. The wall-hung boiler feeds a super-insulated storage tank for domestic hot water.

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 $U=0.2$ and a solar heat gain coefficient (SHGC) of 0.24.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program

ENERGY STAR Certified Homes

Version 3.0

EPA Indoor airPLUS

EPA WaterSense



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.



Space and water heating are both provided by a high-efficiency, wall-mounted, gas-fired boiler.

Despite the corner-lot orientation limitations, space was planned on the south-facing roofs for a 6.9-kW PV panel array. “The PV system should offset the home’s connected loads, resulting in no electric bills, under normal use,” said Wertheim. With the solar panels, the home is expected to reduce energy costs by about \$2,500 compared to a similar sized home built to the 2009 International Energy Conservation Code.

Wertheim worked with a landscape wholesaler to identify drought-resistant plants that could provide shade and wind protection without blocking the PV. Minimal turf was used and any irrigation equipment that was installed was certified to the EPA WaterSense program. On-site underground water management systems were installed to collect water from gutters and leaders as well as storm water from impervious surfaces.

A unique aspect of the project, dubbed the United Veterans Beacon House, is that it was built by veterans for disabled veterans. VetsBuild is one of several construction training programs operated by the United Way of Long Island Housing Development Corporation. Wertheim, who is the program director, explains that the Corporation’s VetsBuild, YouthBuild, Green Job Corps, Weatherization Boot Camp, and Green Construction programs 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 the training programs, as well as low-cost housing for United Way partner agencies.

The Housing Development Corporation also 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, flashing, and mechanical systems. The center also serves as a BPI (Building Performance Institute) training and testing center. Wertheim’s staff developed a Quality Assurance checklist for their student construction teams that incorporates the requirements of the DOE Zero Energy Ready Home program and its accompanying certifications (ENERGY STAR Ver.3, Indoor airPLUS, WaterSense, etc.). This checklist is loaded into an online project management portal (liquidPlanner) so the entire construction team can share in the quality control process.

Photos courtesy of United Way of Long Island

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Double 2x4 24" o.c. stud wall for 8" cavity filled with dense-packed cellulose, advanced framing, ½" coated OSB sheathing, two layers of ¾" rigid insulation, furring strips, vinyl siding.
- **Roof:** Ice-and-water shield at valleys, drip line, roof edges, 30# felt, architectural fiberglass shingles.
- **Attic:** Vented attic, raised-heel trusses, R-60 blown cellulose.
- **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=0.2, SHGC=0.24.
- **Air Sealing:** 3.25 ACH 50.
- **Ventilation:** ERV, MERV 13 filter.
- **HVAC:** Hydrocoil split air system attached to 95 AFUE wall-hung gas-fired boiler, 16 SEER AC.
- **Hot Water:** Wall-hung boiler.
- **Lighting:** 85% LED, 15% fluorescent, motion controlled exterior lighting.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, and clothes washer.
- **Solar:** 6.9-kW PV.
- **Water Conservation:** WaterSense fixtures and irrigation.
- **Energy Management System:** Wifi-enabled thermostat.
- **Other:** Low-VOC paint and finishes, formaldehyde-free furnishings.

“The DOE Zero Energy Ready Home program is the best solution for our type of housing. It is the convergence of the vast knowledge of the national labs coupled with the innovative strategies of the ZERH program components. Best of all for not-for-profits—it’s FREE!”

—Rick Wertheim
United Way of Long Island
Housing Development Corporation