



United Way of Long Island

Suffolk County
LandBank Attainable
Housing
East Patchogue, NY



BUILDER PROFILE

United Way of Long Island
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Suffolk County LandBank Attainable Housing
- Location: East Patchogue, NY
- Layout: 3 bdrm, 2 bath, 1 fl, 1,360 ft²
- Climate: IECC 4A, mixed-humid
- Completed: May 2019
- Category: affordable

Modeled Performance Data:

- HERS Index: without PV 51; with PV -15
- Projected Annual Energy Costs: without PV \$1,700; with PV \$50
- Projected Annual Energy Cost Savings: (vs typical new homes) without PV \$1,600; with PV \$3,200
- Projected Annual Energy Savings: without PV 8,646 kWh; with PV 2,785 kWh
- Added Construction Cost: without PV \$9,000; with PV \$23,000
- Savings in the First 30 Years: \$136,900

United Way of Long Island Housing Development Corporation turned a zombie house into a zero house when they tore down a neighborhood eyesore in East Patchogue, Long Island, New York, and built a community asset in its place, a new house certified to the U.S. Department of Energy Zero Energy Ready Home program that will provide an energy-efficient, healthy place to live for a qualifying first-time home buyer.

The new home replaces a boarded-up, abandoned house that the United Way had purchased at a reduced cost through the Suffolk County LandBank and had hoped to renovate, but the foundation was found to be too unstable. That paved the way for tearing down the old house and building a new home in its place, which actually provided the opportunity to incorporate more advanced detailing from the ground up, according to Rick Wertheim, senior vice president of Housing and Green Initiatives for the United Way of Long Island Housing Development Corporation. The nonprofit organization typically builds or renovates homes for use as group or transitional housing for several of the 126 agencies funded under the United Way of Long Island umbrella. This house will instead be sold to a qualifying low-income first-time home buyer.

Affordable housing is rare on Long Island which has some of the most expensive property values in the world. It also has some of the country's most expensive utility rates, with electricity averaging \$18 cents per kWh. That is one reason this home was built to the performance criteria of the DOE Zero Energy Ready Home program. Every DOE Zero Energy Ready Home is built to meet a list of mandatory efficiency requirements including meeting the latest code requirements for insulation, meeting all of the requirements for certification to ENERGY STAR Certified Homes Version 3.0 or 3.1, and meeting climate-specific requirements for HVAC efficiency. Homes must also meet the requirements of the U.S. Environmental Protection Agency's Indoor airPLUS program for cleaner indoor air. This home was also certified to EPA's



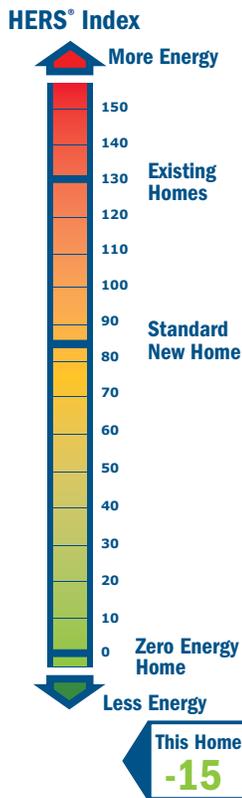
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0/3.1/3.2 for an energy-efficient home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

United Way of Long Island’s Housing Development Corporation built this 1,360-ft² one-story-plus-basement home in East Patchogue, Long Island, New York, to the high performance requirements of the U.S. Department of Energy’s Zero Energy Ready Home program. The home is packed with high-performance features to provide its homeowners with a comfortable, healthy living environment and solar panels cover the entire south-facing side of the roof to meet all of the electric needs of the home with enough left over to power an electric car.



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.



WaterSense, an optional certification in the DOE program. The home was constructed to DOE’s optional Zero Energy Ready Home Quality Management Guidelines. The construction crews on the job included students from United Way’s construction training programs. In 2014 United Way of Long Island committed to building all of its homes to the DOE ZERH program criteria and it has certified 15 homes so far.

To be zero energy ready, homes in the DOE program must either have solar photovoltaic panels installed or be ready for their installation with conduit installed from the roof to the electrical panel as well as panel space for inverters. Wertheim said the home’s simple-rectangle ranch design was the perfect solution for providing a roofline that maximizes solar capacity. The builder was fortunate with this infill lot to be able to orient the home so that half of the gabled roof has direct southern exposure. The entire south-facing roof of the 1,360 ft² home is covered with 9.8 kW of PV panels. These panels will provide enough energy to power the heating, cooling, domestic hot water, lighting, appliances, plug loads, and cooking in this all-electric home, with power left over for electric vehicle charging. The home more than achieves the net zero energy goal of producing as much power as it uses in a year. With the 9.8 kW of PV added, the home scores an impressive minus 15, saving its homeowners an estimated \$3,200 a year in energy bills compared to a home built to code.

Even without PV, the efficient home would achieve a score of 51 on the Home Energy Rating System (HERS) index. For comparison typical new homes built just to code would score about a HERS 80 to 100.

The single-story home sits on a raised basement foundation of 8-inch poured concrete walls with the top 24 inches exposed above grade. Although the interior basement walls are unfinished, the basement is insulated with 2 inches of rigid extruded polystyrene (XPS) installed along the exterior of the walls. The above-grade portions of the foundation walls are also covered with light gray-colored fiberglass-reinforced polyester resin (FRP) panels.

The above-grade walls consist of 2x6 wood studs at 24 inches on center wrapped with 5/8-inch CDX plywood sheathing and house wrap, which is topped with 2 inches of XPS rigid foam that is taped at the seams and covered with vinyl siding. This wall combination provides an R-31 wall insulation value, well above the R-20 or R-13+5 (R-13 cavity+5 rigid) required by the 2015 International Energy Conservation Code (IECC) for the mixed-humid IECC 4 climate zone.



Rigid foam covers the exterior of the basement walls and will also cover the exterior above-grade walls to wrap the house in a continuous blanket of moisture-resistant thermal protection. Seams are taped in the above-grade insulation so that the rigid foam also serves as an air and weather barrier.

The gabled roof is sheathed with 5/8-inch CDX plywood and topped with a roof membrane underlayment and architectural shingles. Ice and water shield adds protection along all eaves and rake ends. The home has flat ceilings over the bedrooms and vaulted ceilings over the living room, dining room, and kitchen area. The roof trusses over this great room area have been designed as parallel chord trusses to provide space for 18 to 30 inches of loose-fill fiberglass insulation providing an R-74 insulation value in the rafter cavities. Insulation baffles or chutes provide a clear path for ventilating air flow from the soffit vents to the ridge vent.

Over the flat ceiling area the builder designed a unique mechanical chase to house all of the home's HVAC equipment. The 2-foot by 4-foot chase is constructed of 2-inch-thick rigid foam board that is air sealed to the ceiling deck to provide an R-14 insulated and air-tight HVAC enclosure that is thermally coupled to the home's conditioned living space. An attic hatch is provided for technician access without the need to crawl into the chase. The flat-ceiling portion of the attic is insulated to R-50 around the chase with blown-in fiberglass. Plywood panels were installed around the chase in the attic as dams to keep the blown-in insulation piled up over the tops and sides of the HVAC chase. Wertheim felt the insulated HVAC chase was a successful experiment that he plans to repeat on future homes.

A 9.8 HSPF, 16.2 SEER heat pump with a low-silhouette air handler and one outdoor compressor was selected and installed in the attic chase to provide all of the home's space heating and cooling. Four 8-inch rigid metal trunk lines come off of this heat pump air handler and are independently dampered to provide zoned supply air to the great room and bedrooms via short branch ducts. As designed, the system provides longer run times for a more comfortable occupant experience, greater dehumidification, fewer drafts, low noise, and little room-to-room temperature variations. To control fall and spring "swing season" humidity, a separate whole-house dehumidifier is installed in the basement; it is electronically programmed to not conflict with the heat pump. An energy recovery ventilator (ERV) is tied to the dehumidifier to bring in fresh air while ensuring that a call for ventilation does not bring in excessively humid air in the summer. Spot ventilation is handled by ENERGY STAR rated bathroom exhaust fans with plug-in modules that sense motion and humidity and have fan speed settings for timed additional ventilation as needed.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program - 100% Commitment

ENERGY STAR Certified Homes Version 3.1

EPA Indoor airPLUS

EPA WaterSense

DOE Zero Energy Ready Home Quality Management Guidelines

"Each not-for-profit ZERH project will provide a legacy of sustainable energy efficiency." *United Way of Long Island*



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.



A unique HVAC chase was designed into the roof trusses and constructed of 2-inch-thick XPS rigid foam providing a conditioned space for the highly efficient heat pump.

Bearing in mind that some Long Islanders are still struggling with the challenges of rebuilding their homes after Superstorm Sandy, Long Island United Way determined that its high-performance homes must also be able to withstand the impacts of weather events. The triple-pane windows used on this project use glass with a 120-mile-per-hour impact rating. The window frames are made of corrosion-resistant vinyl and the frames are a tight-fitting casement style although the window design includes mullions and check rail to mimic the traditional look of a double-hung windows. The triple-pane glass package includes two layers of low-emissivity coating, which helps boost the windows' insulation value to an overall value of R-5.5 (U-0.19).

For siding, the builder chose an upgraded vinyl product that has increased wind resistance. Advanced flashing and waterproofing details were employed to drain away any bulk water or vapor moisture within the walls. The finished floor elevation is raised to ensure flood resistance and the grade is pitched away from the house on all sides to drain water away from the foundation on the otherwise flat lot. Foundation walls use moisture-resistant exterior rigid foam rather than interior fibrous insulation. Other water proofing and moisture management details include pan flashing at windows and doors and a drainage plane behind the siding.

Extensive air sealing also improves moisture resistance by keeping moisture-laden air out of wall cavities. Air sealing details included installing gaskets under the wall bottom plates and along the sides of the top and bottom plates before hanging drywall, taping the exterior rigid XPS boards that wrapped the walls, spray foaming along the top plates of all interior walls, installing rigid foam blocking between the trusses at the eave and sealing it in place with canned foam, and sealing the floor at the rim joists with closed-cell spray foam where the gasketed plates and floor joists meet the foundation wall. All of these steps helped the home achieve an air tightness of 1.75 air changes per hour at 50 Pascals.

"Our goal is to build highly durable and low-carbon-footprint homes that are comfortable, healthy, and have low operational expenses." said Wertheim. "The DOE Zero Energy Ready Home program is the best solution for us. It couples the the innovative energy-efficiency strategies of the ZERH program, with the HERS system, and EPA indoor airPLUS and WaterSense. Best of all, for a not for profit—it's FREE!"

Photos courtesy of United Way of Long Island

KEY FEATURES

- **Walls:** 2x6 24" o.c. advanced framing, R-31 total: 5.5" blown fiberglass; 5/8" CDX plywood sheathing, house wrap, 2" XPS taped rigid foam, vinyl siding.
- **Roof:** Gable roof; 5/8" CDX plywood sheathing, underlayment, ice-and-water shield, architectural shingles, ridge vent. Truss design has insulated chase for HVAC.
- **Attic:** Vented attic, 15" R-50 to R-74 blown fiberglass, trusses designed with center chase for HVAC; 2" R-14 rigid foam plus 15" blown fiberglass over HVAC chase; 18" raised heel trusses.
- **Foundation:** Insulated basement, 8" poured concrete wall, 2" XPS exterior rigid foam.
- **Windows:** Triple-pane, argon-filled, low-e2, vinyl casement frames, U=0.19, SHGC=0.21.
- **Air Sealing:** 1.15 ACH 50.
- **Ventilation:** ERV, MERV 12 filter, whole-house dehumidification, motion and humidity sensors on spot ventilation fans.
- **HVAC:** Ducted mini-split heat pump, 9.8 HSPF, 16.2 SEER; rigid metal ducts.
- **Hot Water:** Heat pump water heater, 3.45 EF, 50-gal.; compact plumbing with PEX piping.
- **Lighting:** 100% LED, integrated lighting controls.
- **Appliances:** ENERGY STAR refrigerator, dishwasher, and clothes washer.
- **Solar:** 9.8-kW PV system.
- **Water Conservation:** EPA WaterSense fixtures, smart irrigation, structural drainable driveway, below grade storm drainage rings.
- **Energy Management System:** Smart energy monitoring system, indoor air quality monitors.
- **Other:** Electric vehicle charging station, low-threshold entries, wider doors, low-to-no-VOC paints, CARB-compliant cabinets, aerobic on-site wastewater treatment.