



Dwell Development

Genesee Park Net Zero Seattle, WA



BUILDER PROFILE

Dwell Development

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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Genesee Park Net Zero
- Location: Seattle, WA
- Layout: 4 bdrm, 4 bath, 2 fl, 3,700 ft²
- Climate: IECC 4C, marine
- Completed: July 2017
- Category: custom spec

Modeled Performance Data:

- HERS Index: without PV 35; with PV 0
- Projected Annual Energy Costs: without PV \$1,000; with PV \$10
- Projected Annual Energy Cost Savings: (vs typical new homes) without PV \$1,600; with PV \$2,550
- Projected Annual Energy Savings: without PV 15,800 kWh; with PV 25,600 kWh
- Added Construction Cost: without PV \$76,000, with PV \$131,000
- Savings in the First 30 Years: \$112,300

The 3,700-ft² modern home near the west shore of Lake Washington in Seattle is a showcase, not only of the creative talents of the builder, Anthony Maschmedt and his team at Dwell Development, but also of the principles of zero energy construction. As such the home was honored with a 2018 Housing Innovation Award by the U.S. Department of Energy Zero Energy Ready Home program.

This is one of several homes the builder has certified to DOE's Zero Energy Ready Home program. The program requires every home to be certified to ENERGY STAR Certified Homes Version 3.0 or 3.1 and the U.S. Environmental Protection Agency's Indoor airPLUS program. Each home must meet the hot water distribution requirements of the EPA's WaterSense program and the insulation requirements of the 2012 International Energy Conservation Code. The program also requires homes to have solar electric panels installed or at a minimum to have the conduit and electrical panel space in place for future PV installation.

The builder chose to install solar electric and solar water heating panels on the flat roofs of the home helping it to earn a 5-Star rating from the Master Builder Association of King and Snohomish Counties' Built Green program, which also awarded the home the first Built Green Net Zero energy label in Seattle. The home also earned a national Golden Nugget award for Best Innovative Energy Design and a Green Builder Magazine award for best contemporary home.

The builder held several events at the home before turning it over to the home owners, including a brokers' open house where local realtors were invited to learn about the home's high-performance systems. "Many brokers had never heard of Net Zero, so this was an incredibly educational event. We shared insights on the home's solar panels, solar thermal system, heating/cooling systems, and net zero features," said Maschmedt. The company also created a video about the home that includes



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 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.

Dwell Development built this 3,700-ft² custom home in Seattle, Washington, to the high performance criteria of the U.S. Department of Energy Zero Energy Ready Home (ZERH) program. Builder Anthony Maschmedt purchased the 15,000-ft² lot and subdivided it, carving the new lot as an L-shaped parcel to preserve the existing home, a 1940s-era tugboat-shaped house that he remembered from childhood visits to the neighborhood.



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

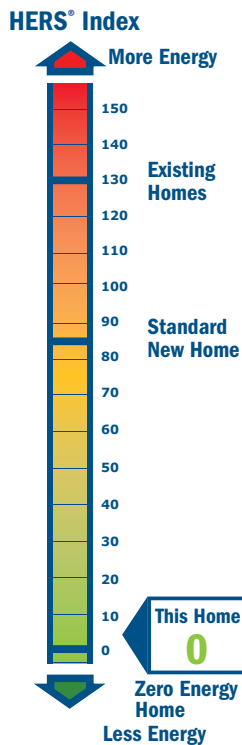
3 DUCT SYSTEM
located within the
home's thermal
boundary

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.



interviews with the principal, the third-party energy verifier, and the solar provider and solar thermal provider.

Dwell Development actually had the custom spec home presold before groundbreaking so they didn't really have to market it, but Dwell founder Anthony Maschmedt is passionate about educating others on the value of zero energy construction. "Every home we build is net zero or net zero ready," said Maschmedt. "[It] is good in so many ways - good for the environment, good for the community, and good for the economy."

Maschmedt noted the company uses social media (Facebook, Instagram, Twitter, and LinkedIn) to educate their audience on green home building. Dwell uses a local communications firm to write stories on their homes' high-performance features for distribution to local and national news outlets. "Our goal is for other home builders to see our work and realize energy-efficient homes are the only way to build a new home," said Maschmedt.

Dwell Development invited the buyers of this home to three informational meetings prior to completion of the home. These included walk-throughs on system orientation, warranty, operating demonstrations, and tutorials. This is not uncommon for Dwell. "We require all of our home buyers, mortgage brokers, and real estate brokers to go through a training program designed to educate and inspire them on what energy-efficient homes are, how they perform, and the benefits of living in a ZERH." Maschmedt takes this passion for education beyond his homes. He speaks at regional trade shows and green building conventions, chairs the executive committee of the Built Green program, which works with the industry, the City, and utility providers on education outreach and incentives to increase green building, and he's been asked to serve on a green building expert panel to educate local real estate appraisers on the value of green certified homes.

Projects like this one serve a valuable purpose, according to the builder, for "showing everyone that you can design and build a net zero ready home and be profitable!" Profitability is an important point for Dwell, which sells most of its homes on spec and therefore has to compete with just-to-code builders. Despite having a 10% to 20% price premium over other builders, Maschmedt said Dwell presells most of its homes before construction, thanks to the strong local following it has developed of buyers interested in high energy efficiency. Maschmedt also notes "We have no problem with project financing, as lenders know our product is high quality and will sell without issues."



Hot water for the home is provided by a roof-mounted passive solar thermal hot water system, with a tankless water heater as a backup for periods of unusually high demand. To cut hot water consumption, all of the fixtures are EPA WaterSense-certified water-saving fixtures, which together are estimated to reduce water consumption by 60% compared to the average code-built home.

Even without the solar panels, this home has exceptional energy performance, achieving a Home Energy Rating System score of 35, far below the typical 80 to 100 of code-built construction. To achieve this exceptional score, Dwell met or exceeded the requirements of DOE's Zero Energy Ready Home program in every area. For the above-grade walls, Dwell employed a double-stud wall consisting of two 2x4 walls set 7 inches apart to provide a 12-inch-deep wall cavity, which was dense-packed with R-44 of cellulose insulation. The studs were sheathed with plywood which was covered with a fluid-applied membrane that replaces house wrap as the weather-resistant barrier under the cladding of reclaimed white oak and fiber cement siding.

The home has no attic; instead it has cathedral ceilings consisting of an unvented roof structure with 16-inch-deep, parallel-chord open-web roof trusses with R-67 of blown-in fiberglass insulation, a 1/2 inch of OSB roof sheathing topped with 3 inches (R-20) of rigid polyiso exterior insulation, a 1/4 inch of protective hard board, and a TPO membrane roofing surface that was rolled out and welded together to make an airtight and waterproof barrier. The roof assembly provides a total insulation value of R-95.

The foundation presented several challenges. The space this home was built on is an L-shaped parcel carved out of a 15,000-ft² lot with an existing home, an iconic 1940s-era tugboat-shaped home that Maschmedt used to visit as a child when his aunt lived next door and his father raced unlimited hydroplane boats on the lake. By making the new lot L shaped, Maschmedt could keep the old house and provide rear access to a new detached garage from the back side of the lot, while providing park- and water-facing views for the new home. While removing a car port from the existing home, Maschmedt found an old bomb shelter built in the 1950s with 12-inch-thick walls. There was also a nearby abandoned landfill that had methane gas issues. Maschmedt installed perforated pipe under the slab to catch any potential methane gas and direct it out to the exterior of the home. The back half of the site had rock-hard soils but the front section butting up to the street and park was part of the old landfill that had soft soil so the builder installed pin piles to support the front of the foundation. To manage all storm water on site (a Seattle city requirement), Dwell installed three massive bio-retention planters in the yard.

Although this house was not certified to Passive House, Maschmedt is familiar with the standard and it inspired some of his design and equipment choices, including the European triple-paned, vinyl-framed windows, with low-emissivity coatings and insulating argon gas fill between the panes. The windows had an average insulating value of U=0.19 and an SHGC of 0.30.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program

ENERGY STAR Certified Homes
Version 3.1

EPA Indoor airPlus

EPA WaterSense

Master Builder Association of King
and Snohomish Counties' Built Green
program, Net Zero Certified and 5-Star
Certified



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.



Dwell Development constructed the energy-efficient home with 12-inch-thick double-stud walls that were air sealed on the exterior and at all window openings with a dark roller-applied liquid flashing. The walls will be packed with R-44 of dense-packed cellulose.

The home is equipped with 100% LED lighting and has an ENERGY STAR refrigerator, dishwasher, and washing machine.

The home's domestic hot water is provided by an evacuated tube solar thermal water heating system with a 100-gallon storage tank. An electric tankless system is installed for backup. The home is equipped with EPA WaterSense-certified low-flow plumbing fixtures, which should use 60% less water than the average to-code home.

The home meets all of the criteria of the U.S. Environmental Protection Agency's Indoor airPLUS program including the use of all no- or low-VOC finishes and site water management practices. Reclaimed white oak lumber is used throughout the home's interior and exterior.

The home's roof-mounted 9.9-kW of photovoltaic panels provide enough electricity over the course of the year to meet the home's electric needs, cutting electric utility costs to under \$50 per year in service charges for this net zero energy home. The home is also equipped with two electric car charging stations. To help track and manage electric usage and PV production, the home is equipped with an adaptive internet-connected home energy management system that communicates with the home's lighting, HVAC, appliances, solar systems, and even car charging stations so they can be optimized to work together for increased efficiency. The system was actually invented by a home owner of one of Dwell's previously built homes.

Photos provided by Dwell Development.

The home has in-floor radiant heating with tubes installed in the slab and under each floor. An air-to-water heat pump provides hot water for the radiant floor heating with a COP of 3.92 (392% efficiency).

Whole-house ventilation for the tightly sealed home (1.0 air changes per hour at 50 Pascals pressure) is provided by a heat recovery ventilator (HRV), which consistently brings in fresh air while efficiently recovering heat from the exhaust air stream. The system is fully ducted to provide fresh air to living spaces and it also helps to maintain a comfortable temperature throughout the home.

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Double 2x4 stud wall, 12" cavity dense-packed with R-44 cellulose, ½" plywood sheathing, fluid-applied weather-resistant barrier, fiber cement and white oak siding.
- **Roof:** Roof sheathing topped with 3" rigid foam, hard board, TPO roof membrane.
- **Attic:** Unvented, vaulted ceiling with dense pack fiberglass.
- **Foundation:** R-20 EPS under heated slab.
- **Windows:** Triple-pane, low-e, argon-filled, vinyl frames, tilt-and-turn, U=0.19 average, SHGC=0.30 average.
- **Air Sealing:** 1.0 ACH 50.
- **Ventilation:** Fully ducted HRV.
- **HVAC:** Air-to-water heat pump, radiant floor heating, COP 3.92.
- **Hot Water:** Passive solar thermal hot water system with electric tankless backup.
- **Lighting:** 100% LED.
- **Appliances:** All ENERGY STAR.
- **Solar:** 9.9-kW PV system, evacuated tube solar thermal for domestic hot water, 100-gallon tank.
- **Water Conservation:** WaterSense fixtures and toilets.
- **Energy Management System:** Smart energy management system to manage heating, cooling, hot water, HRV, lighting, security, etc.
- **Other:** Two electric car charging stations; auxiliary power on solar inverter for power outages.