

## Everhart Home EnerPHit

Portland, OR

### Single Family Building Renovation

PHI Database ID#: 2324

Certification Goal:



Status: Pending - in Construction

Size: 2,100 FT<sup>2</sup> TFA with One Unit

**Description:** This is a 12 year old future-fitted home that demonstrates Passive House principles and lowers global warming emissions.

DOE Climate Zone: 4c

### Team:

**Owner:**

Maria & Tad Everhart

**Architect/Designer:**

Tad Everhart

**PH Consultant:**

Hayden Robinson, Dylan Lamar,  
Matt Groves, Graham Wright

**MEP Design:**

Peter Reppe and Eric Pine

**Structural Engineer:**

Mark E. Butler, Butler Consulting, Inc.

**Builder:**

Garth Everhart

**Certifier:**

Passive House Institute

**Electrician:**

Gresham Electric



We future-fitted our 12-year old, conventionally, 2X6 framed walls and insulated home as close as we could to the Passive House Standard starting in 2009 to demonstrate Passive House principles and lower our global warming emissions.



We cut air leakage through our house by over 80% by careful sealing of existing exterior wall plywood sheathing, ceiling sheetrock, and ground floor plywood floor to induced 0.75 ACH @ 50 Pa.

We added 10"-deep Larsen Trusses filled with dense-packed cellulose to the outside of our walls. We re-insulated the 2X6 stud cavities with densely-packed cellulose to total R50 walls.

We added 20" of cellulose to existing attic insulation to total R80 attic insulation.

## Thermal Envelope

### Ground:

hardwood: 0.25"  
plywood: 1.24"  
expanded polystyrene between 2X10 joists: 9.25", 23 cm  
expanded polystyrene: 5", 12.7 cm  
U-value = 0.101 W/(m2K); approximate R-value is R-50

### Walls:

GWB: 0.5"  
Cellulose densely-packed in 2X6 stud cavity of framing: 5.5", 14 cm  
Plywood structural sheathing & air barrier: 0.5"  
Cellulose densely-packed in Larsen Trusses: 10", 25cm  
Fiberboard: 0.5"  
Air space: 0.38"  
Cedar lap siding: 0.5"  
U-value = 0.113 W/(m2K); approximate R-value is R-50

### Roof:

GWB: 0.5"  
Fiberglass densely-packed: 5.5", 14 cm  
Cellulose loosely-packed: 20", 51 cm  
U-value - 0.064 W/(m2K); approximate R-value is R-80

### Windows & Doors:

Alepn Windows Model 925  
urethane foam-filled pultruded low-profile fiberglass

### NFRC whole window value:

Fixed: 0.14  
Casement: 0.17

Innotech tilt-turn Trocal non-plasticized hard PVC frames with Cardinal triple-pane low-e glazing  
U d-value - 1.76 W/(m2K)

### Shading Strategies:

Seasonal cloth awnings, aluminized foil outside of East & West windows, and vegetation

## Mechanical Systems:

### Ventilation:

PHI-certified J.E. Storkair & Zehnder, 350 ComfoAir HRV

### Heating:

2500-watt variable output electric resistance in supply air plenum downstream of HRV plus Zehnder Runtal hydronic radiator using hot water from Sanden heat pump water heater

### Cooling/Dehumidification:

Night air flush via Zehnder HRV bi-pass and one Frigidaire window AC for heat waves lasting more than 2 days

### Domestic Hot Water:

Sanden Gen 2 heat pump water heater

### Onsite Renewable Energy:

None, but 100% of electricity is electively purchased as renewably-generated from our utility company to support switch to renewables

## PHPP Values

### Climate:

Warm-temperate

### Airtightness:

0.75 ACH @ 50 Pa

### Annual Heating Demand:

4.75 kBtu/ft2/yr

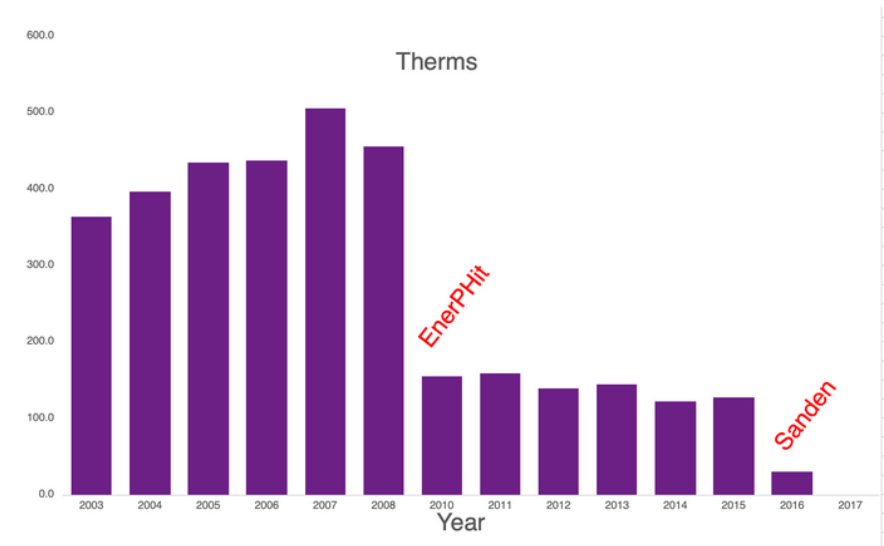
### Cooling & Dehumidification Demand:

0 kBtu/ft2/yr



We reinsulated our ground floor to R50 and added insulation to the inside and outside of our concrete foundations to reduce the thermal bridge through the foundations.

We removed all double-glazed but leaky single-hung windows and replaced with Alpen quad-pane R-11 windows fixed and casement windows. And replaced two of our exterior doors with Innotech airtight tilt-turn doors. And replaced pull-down stairs to attic storage deck.



We installed a Zehnder HRV with built-in 2500-watt electric resistance heater to supply all space heating after removing our gas furnace and fireplace.

We replaced our gas-fired water heater with a Sanden heat pump water heater; gas clothes dryer with an Asko clothes drying cabinet, and gas range/oven with an Electrolux induction range and convection oven. And disconnected gas service in 2016.

Don't delay! Start your EnerPHit renovation today. Hire and buy locally. We'll go faster and farther together. In protecting the Earth, we can find cooperation, build community, and better our future!