# CERTIFIED PASSIVE HOUSE

## 1994 Orchard Street, Eugene

architectural rendering by hopper design + illustration


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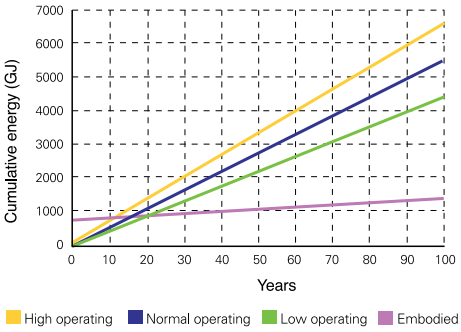
In housing, being passive puts you in the forefront of change. The **Passiv Haus** movement, inspired by experimental building in North America in the 1970's, took root in Germany in the early 1990's. To date, more than 15,000 buildings in Europe have been certified.

## A Passive House is "passive" because it does not require an active heating system.

Instead, you invest in insulation, super-efficient windows and doors, and a tight shell, with the costs recouped by savings on your heating system and a smaller photovoltaic array.

**Passive House** design uses comprehensive modeling software to tune passive solar heat gains and avoid overheating. It cuts energy used for space heating up to 90%.

A recent surge in interest in the United States, particularly high in our region, indicates that architects and builders are ready to consider **Passive House** design standards. With our relatively mild winters, the Pacific Northwest is well suited to this building system. It is adaptable for both new construction and retrofit / remodel projects. In a **Passive House**, you enjoy a modern standard of living with a very low carbon footprint.

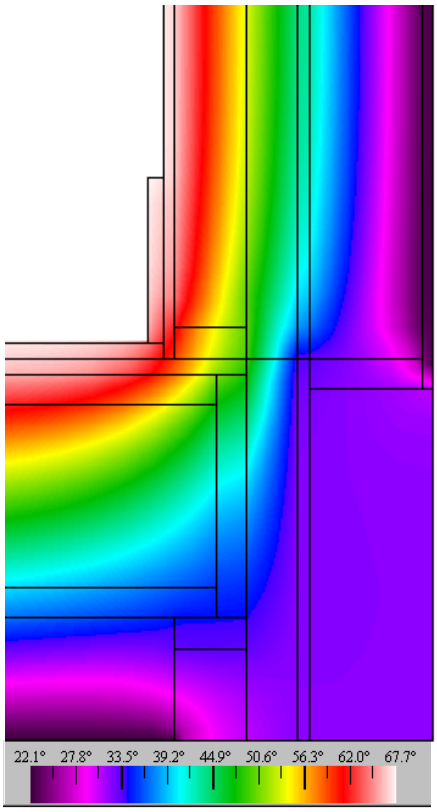



**Passive House** is an integrated set of design principles for lowering energy demand to a practical minimum. In the Orchard Street Passive House, primary elements include:

- **Ultra-low energy use** (maximum of 4.75kBtu/sq. ft. per year for space heating)
- **Super Insulation** (combinations of closed cell and open cell spray foam, cellulose and rigid board insulation for R-85 Roof / R-70 Walls / R-90 Floor)
- **Thermal Bridge-Free Construction** (double 2x4 wall assembly modeled in THERM 5.2)
- **Air Tightness** (must achieve maximum 0.6 air changes per hour - 0.60 ACHS - for certification)
- **High Performance Windows and Doors** (Unilux UltraThermo triple pane, with U-0.12 and SHGC 0.5)
- **High Efficiency Heat Recovery Ventilation** (Zehnder ComfoAir 350, 84% efficient)

## The energy to operate a conventional home far outweighs the initial embodied energy to build it.

By putting attention and resources upfront during design and construction, Passive House offers minimal impact. As Katrin Klingenberg, Director of **Passive House Institute US** states, "In Europe PH is the cheapest way to build when taking life cycle cost into account."




*Top: Graph showing embodied energy vs. operational energy, source CSIRO.*

*Left: Preliminary (pre-certification) verification box from Passive House Planning Package software.*

*Above: Therm 5.2 Two-Dimensional Building Heat-Transfer Modeling analysis of wall/floor/foundation connection.*

**Energy Demands with Reference to the Treated Floor Area**

Treated Floor Area: 1141 ft²

| | Applied: | Monthly Method | | PH Certificate: | Fulfilled? |
|---|---|---|---|---|---|
| Specific Space Heat Demand: | 4.57 | kBTU/(ft²yr) | | 4.75 kBTU/(ft²yr) | Yes |
| Pressurization Test Result: | 0.60 | $ACH_{50}$ | | 0.6 $ACH_{50}$ | Yes |
| Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity): | 36.3 | kBTU/(ft²yr) | | 38.0 kBTU/(ft²yr) | Yes |
| Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity): | 21.8 | kBTU/(ft²yr) | | | |
| Specific Primary Energy Demand Energy Conservation by Solar Electricity: | 29.4 | kBTU/(ft²yr) | | | |
| Heating Load: | 3.24 | BTU/(ft²hr) | | | |
| Frequency of Overheating: | 0 | % | over 77.0 | °F | |
| Specific Useful Cooling Energy Demand: | | kBTU/(ft²yr) | | 4.75 kBTU/(ft²yr) | |
| Cooling Load: | 0.61 | BTU/(ft²hr) | | | |

## Passive House pushes the greenbuilding envelope. The Orchard Street Passive House goes further with these additional features:

- On-site reclaimed lumber
- Preservation of a huge Black Walnut Tree on-site
- Rain garden rain catchment strategy
- 5 kw PV system to achieve Net-Zero-Energy performance
- Continuous monitoring through Web Energy Loggers
- Double gypsum board interior finish for thermal mass
- Solar Thermal hot water
- Compact layout < 1250 sf
- Beautiful hand crafted detailing
- Compact edible landscape custom designed for intensive food production