
Things You Should Know Before Your First Passive House Project

Brittany Porter, AIA, CPHC, LEED Green Assoc.
Weber Thompson, Associate

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What We'll Cover

The Design

The Technical

The Messaging



Pax Futura; Columbia City, Seattle

Commit Early On

The earlier high-performance becomes a design parameter in your project the easier it is to keep costs down, overcome learning curves, and keep systems working together as effectively as possible.

Multifamily Passive House

How it all works.



Photovoltaics

Net-Zero Energy Ready

Passive House building principles reduce energy demand so greatly, that roof-mounted solar panels are able to produce most of the energy needed to operate the building. Plug loads are the primary variable.



Solar Thermal

Heated Water from the Sun

Domestic hot water is heated using evacuated tubes that collect solar energy. Each tube contains a glass outer tube and metal absorber tube attached to a fin. The fin's coating absorbs solar energy but inhibits radiative heat loss.

Heat Pump

Heating and Cooling Ventilation Air

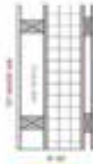
The HRV's keep the fresh filtered indoor air at a consistent 68 degrees year-round. During the summer or winter months, additional heating and cooling is provided through the HVAC system via heat pumps.



Integrated Shading

Optimized Seasonal Daylighting & Individual Control

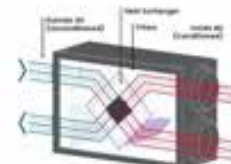
All Passive House buildings are designed to manage daylight and solar energy, capturing it when needed and shielding from it when not.



Thoughtful Envelope

Airtight, Thermal Bridge-Free, Well Insulated

Carefully-modeled and engineered walls, roof, and floor assemblies create draft-free interior spaces that are well-insulated from the outside. Efficiency of the fresh air ventilation by the building's HRV's.



Efficient HVAC

Semi-Decentralized Heat Recovery Ventilators (HRV)

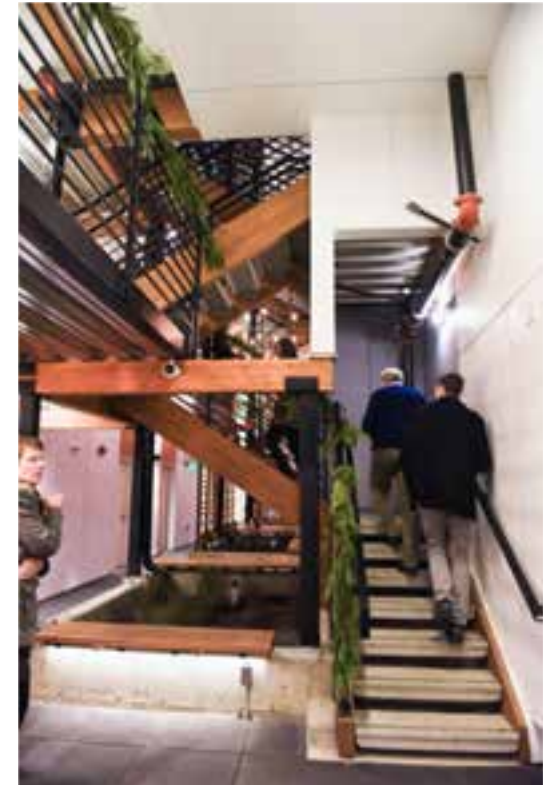
Healthy indoor air is priority #1 in Passive House design. HRV's provide a constant flow of filtered fresh air to residents, ensuring superior indoor air quality year-round. The passive heat exchangers in these HRV's capture 75% of the exhaust air's heat (or cool in the summer) to pre-condition the incoming stream of clean air.

Exterior Circulation

Reduces indoor space that would normally require conditioning and moves it to the exterior.

Creates a unique experience of navigating from the building entrance to your unit. Big step up from the indoor corridor with no daylight.

Lesson Learned: It increased the number of openings in the Passive House envelope - tricky!



West Sliding Screens



Major eye catcher of a west facade!

Eliminates the reliance on a costly, proprietary, mechanized screen system.

Allows tenants to feel a sense of participation in the building's energy conservation. Creates a sense of control and ownership.

Lesson Learned: Reaching out for the exterior screen means no bug screens.



It's Takes a Collaborative Team Effort

Interdisciplinary communication and collaboration can be very powerful when all disciplines prioritize energy. Innovative solutions to project specific problems are much easier to solve with every player at the table working together in the name of high-performance.

ERV Innovation

Dialing in the length of duct runs makes a difference.

Make sure you leave enough room for field fabrication.



Identify and Quantify the Bridges

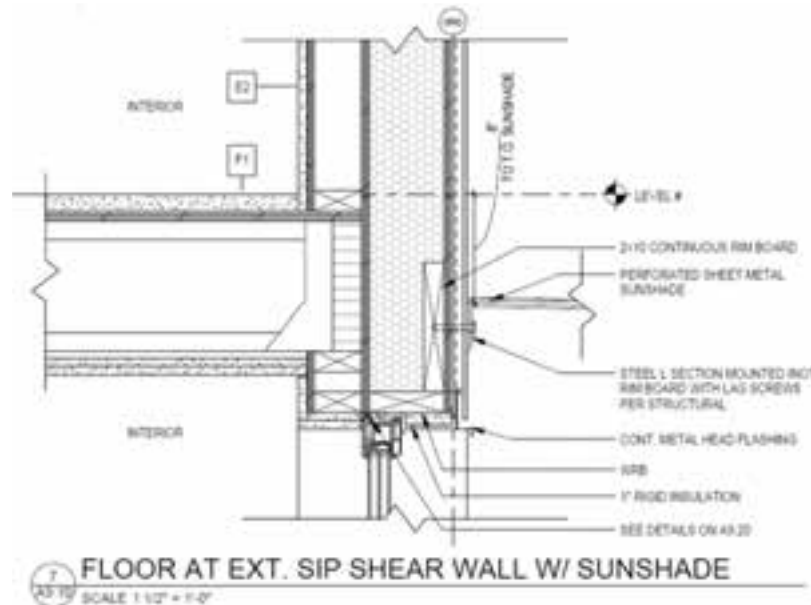
Every instance of connection, change in material, or change in plane in a building is a thermal bridge. Heat transfer modeling tools can be used to study each bridging condition and find the best compromise between constructability, performance and beauty.

Thermal Bridge Free Attachments

Knife plates work well for larger attachments.

This project utilized structurally insulated panels that were able to receive a wood ledger and maintain insulation between the attachment and the interior.

For more significant attachments like balconies there are also fiberglass thermal break components on the market.



Air Sealing and Testing Can Be a Nail Biter!

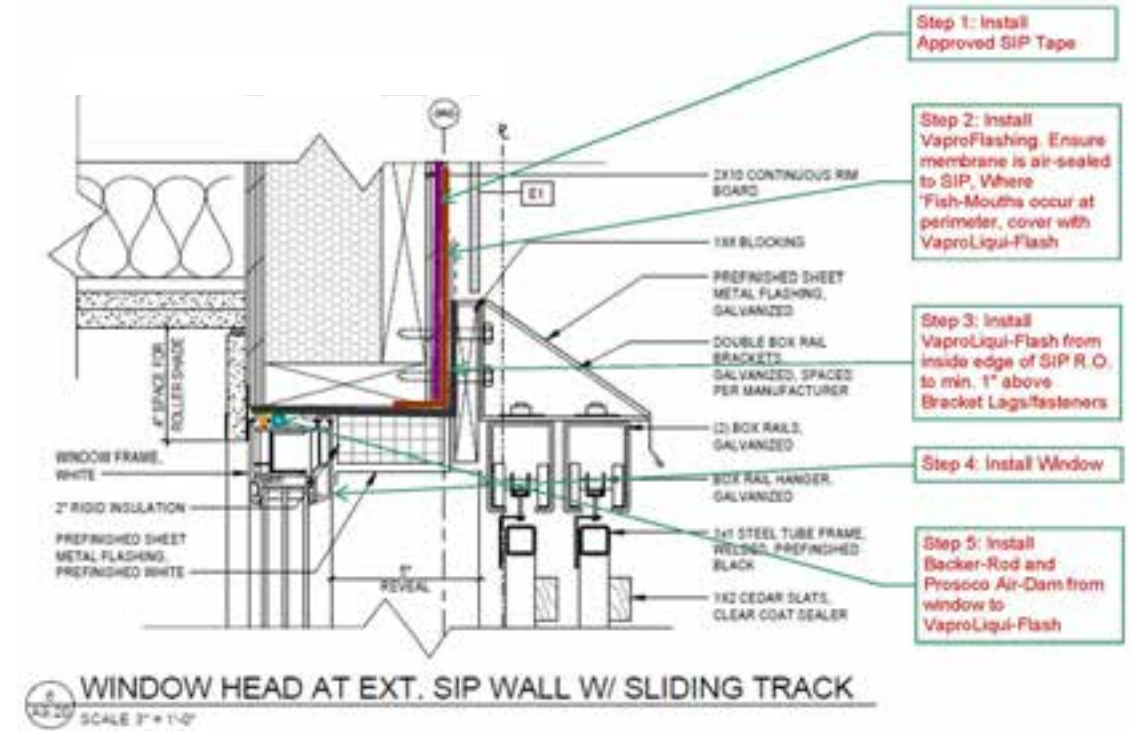
Plan all penetrations in design and try to avoid adding more during the construction process. If you're an architect, having a full construction administration contract matters. If you're a builder, providing training for subs and an on-site building envelope specialist is critical.

Air Sealing

Think carefully about how materials come together.

A fluid applied membrane air barrier is highly recommended.

Color coding your details and adding sequencing notes is helpful.



Know the Value to People

Studies have shown that people respond more favorably to ideas of health and wellness and stories of benefits to the user rather than cases about energy savings or durability. While both are holistically intertwined there are some helpful cases to be made that present Passive House both a healthy and an efficient building.

The COGfx Study

thecogfxstudy.com

COGNITIVE FUNCTION TEST SCORES DOUBLED

The COGfx Study demonstrated that improved indoor environmental quality doubled cognitive function test scores in the 24 study participants. Of note, participants' cognitive performance scores averaged **101 percent higher** in green buildings with enhanced ventilation compared to those in conventional buildings.

The largest improvements in cognitive function occurred with crisis response, information usage and strategy.

- Crisis response scores were **97 percent higher** in the green environment and **131 percent higher** in the enhanced green environment than in the conventional building environment.
- Information usage scores in the green and enhanced green environments were **172 and 299 percent higher** than in the conventional environment, respectively.
- For strategy, green and enhanced green scores were **183 and 288 percent higher** than conventional.



THE IMPACT OF GREEN BUILDINGS ON
COGNITIVE FUNCTION



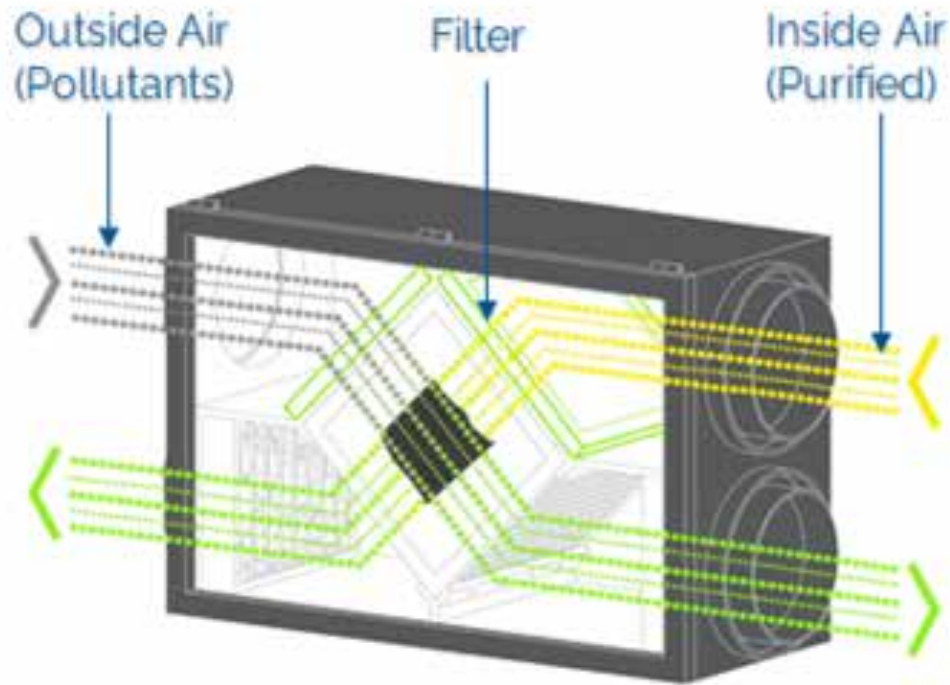
AutomatedLogic

NORESCO

ECOENERGY

Smoke Events

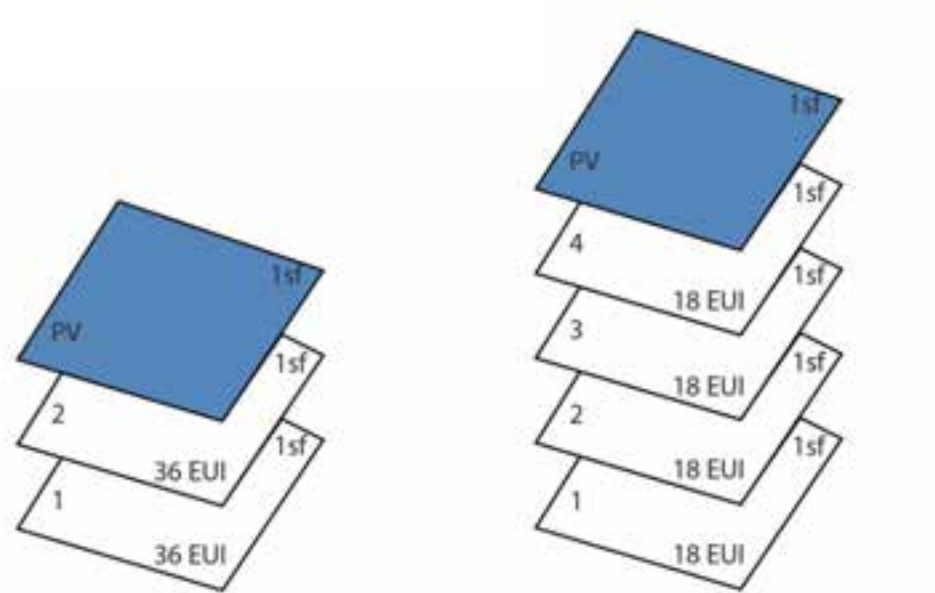
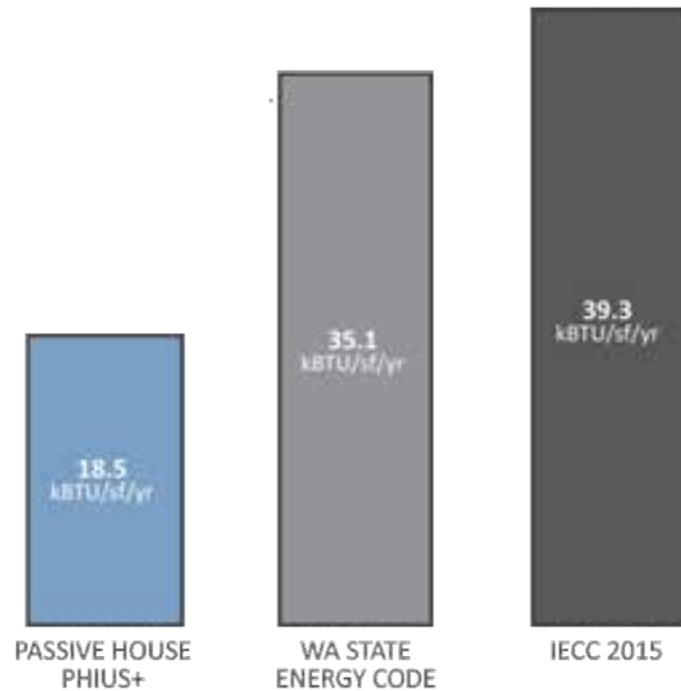
We all deserve to be healthy indoors.



Understand the “Lift” from Code Compliance

In some jurisdictions, the energy code is so progressive that the extra cost to achieve Passive House and reap all of its benefits is much smaller than expected. For a marginal cost add you can build a more durable building, that uses half as much energy, and creates a healthier living environment.

A Pathway to Net Zero



An EUI of 18 (kBTU/sf/yr) 1 SF of Solar PV Can Offset 4 SF of Consumption

Messaging Matters

It is important to understand the value Passive House brings to a project. It often gets equated to other certifications that are less interested in deep energy conservation. Finding ways to visualize or quantify impacts can be very powerful depending on your audience.



Ice Box Challenge - An Exercise in Messaging



Ice Box Challenge - The Big Reveal

Thank you.

Brittany Porter, AIA, CPHC, LEED Green Assoc.
Weber Thompson, Associate

bporter@weberthompson.com
