

2016 WOOD DESIGN AWARDS - WINNER

Environmental Performance

Karel & Karen Jonker, Owners, Whistler, BC

Matheo Durfeld, BC Passive House, Whistler, BC

Alta Lake Passive House, Whistler, BC



*“A perfect fusion of aesthetics
and performance...captivating.”*

- jury comments

High resolution images
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The design objective for this lakeside home was to create a modern, high-end interpretation of “greenhousing.” Focusing foremost on reduction, the clients mandated that the project embody the Passive House (PH) standard with the caveat that there would not be a compromise on design. The use of wood was a natural choice for the design team to fulfill these requirements and expectations.

The topography and compact nature of the site posed significant challenges. Fortunately, the desired placement of windows complemented the need to optimize passive solar gains and losses. Windows are a significant contributor to the overall performance of a building. Here they are also the focal point of the design strategy to capture and highlight the surrounding views. Aluminum clad, PH-rated wood windows were used for their unmatched efficiency, beauty and thermal performance that eliminate the need to compromise between aesthetics and performance. Shading from a neighbouring property interfered with solar gains on the lower levels of the south orientation. Therefore, the massing of the home was stepped and jogged on the upper floor to optimize the glazing and views without sacrificing privacy. Exterior window blinds and overhangs prevent overheating in the shoulder and summer months.

Analysis forecasts that by constructing to the PH standard, the clients will save approximately 50,000 kWh/year on energy required for heating and cooling compared to an equivalent residence built to code. This represents an 80-90 per cent reduction, achieved through efficient design, the use of passive heating and cooling techniques, an optimized, super-insulated airtight building envelope fitted with high performance windows, and a heat recovery ventilation system.

The use of wood was pivotal in achieving the PH efficiency requirements with an envelope system that was healthy, sustainable, comfortable and architecturally pleasing.

BC Passive House’s high performance, prefabricated panel package was used for the envelope. The main structural wall consists of standard stud 2x10 framing (16-inch TJI for floor and roof) sandwiched between oriented strand board (OSB) and a wood fibre diffusion board. OSB used for the interior sheathing provides structure, shear and both an air barrier and vapour retarder. All panel connections and penetrations to the OSB were taped and sealed to provide a continuous, robust air barrier, critical in reaching the required air-tightness thresholds.

A combination of blown cellulose, recycled paper products, and rockwool batts were used for insulation. The effective R-value is 44 for the walls and 69 for the roof and floor.

The team optimized the use of building materials, reducing construction waste to less than three per cent, adding further to environmental performance. Prefabrication also increased efficiency, quality control and precision while reducing the occurrence of changes (swelling, mould growth, warping) in the material from exposure to weather.

Significant environmental and architectural value was achieved for a modest premium compared to conventional construction using wood and other ecologically responsible materials. The use of wood fulfilled the aspiration for high performance design – energy performance, comfort, quality of construction, accuracy and low environmental footprint compared with alternative materials. The high performance, double wall system for this PH home used approximately 26 per cent more wood than a similar sized code structure.