Local Resident Takes the Extra Step

Step 5 with Passive Solar Design and Natural Gas Heating

Kimberley, BC

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THE CHALLENGE

Sanford Brown decided to leverage his experience with inspecting and building other people's homes to design and build his own energy efficient and sustainable home. Although he had very limited experience with Step 5 homes, he understood the principles in both construction and design. It was also important for him to include natural gas to reduce ongoing operating costs.

PRO TIPS

- Where possible, consider your lot prior to designing, and incorporate passive solar into the home's design.
- Insulation is relatively cheap, so add it everywhere you can!

THE SOLUTION

Sanford and his wife purchased a corner lot with southern exposure and began to incorporate passive solar design into their dream home. In addition to maximizing window space in the appropriate areas to ensure lots of natural light and passive solar gains for added winter comfort, the home was oriented to allow for solar PV panels to be added to the roof in the future. The home mimics Scandinavian architecture and minimizes the surface area of exterior walls to help reduce thermal bridging. The home also incorporates a gas-fired combi-boiler, which enables in-floor radiant heating and is an affordable solution for hot water heating.

HOME PROFILE

Location	Kimberley (Climate Zone 6)
Construction	Spring 2019
Size	3,000 ft^2
Bedrooms 4	**Bathrooms** 4
BC Energy Step Code Level	
Targeted	Step 5
Achieved	Step 5

"It was important to my family to invest in our home with better building products that would save money by reducing long term operating costs"

Sanford Brown, Homeowner, Builder & Designer

THE PROJECT UPGRADES

The home's R41 walls are comprised of two 2x4 walls with a 3.5 inch gap in between filled with three layers of R14 Rockwool insulation. Insulated concrete forms (ICF) were employed for the building foundation, providing R22 insulation in the basement and the home includes R27 under-slab insulation.

FINDING THE RIGHT PRODUCTS

Sanford believed the right products could help improve his home's envelope. He understood that a high-quality air barrier on the exterior would help achieve Step 5, so he used air barrier products from Swiss manufacturer Siga to better seal off his home. Sanford also opted to purchase higher quality windows and doors. It took quite a bit of time to find the right products and they were relatively expensive; however, Sanford knows that the home will be more comfortable and the reduced operating costs will pay for these investments quickly.

WORKING WITH AN ENERGY ADVISOR

Having worked in the construction and home inspection space, Sanford knew that the energy advisor would be an important resource. He relied on his advisor throughout the entire process, including during the design phase. The advisor provided support to ensure insulation levels where not applied beyond the point of diminishing returns and that window placement and design specs allowed sufficient natural light and passive heat but not too much that the home might overheat. Furthermore, Sanford conducted a mid-construction blower door test to flag any leaks and repair them prior to drywalling.

PROJECT DETAILS

ENVELOPE	
Airtightness	0.45 ACH_{50}
Attic Insulation	R53
Foundation Insulation	R23 – Insulated Concrete Forms
Under Slab Insulation	R27
Wall Construction	Double frame (2x4) walls with 3.5 inch gap filled with insulation
Wall Insulation	R41
Window/Wall Area	18.3%
Windows	Triple glazed, argon filled, 0.9-1.0 U-value, multiple gaskets to improve airtightness

MECHANICAL SYSTEMS	
Space and Water Heating	Hydronic in-floor heating (AO Smith Vertex condensing natural gas combi-boiler, 189 L, 0.93 EF)
Cooling	Roughed-in
Ventilation	Venmar, 75% efficiency, 64 cfm flowrate
Other Gas Equipment	Hookups for gas BBQ and range

LOADS, COST & REBATES	
Heating Load (TEDI)	16 kWh/m^2 per year
Mechanical Load (MEUI)	32 kWh/m^2 per year
% More Efficient than Home Built to BC Building Code	61%
Incremental Cost	$25,000 (6% more expensive than similar home built to BC Building Code)
Fortis BC Home Performance Rebates	$8,500

FortisBC Energy Solutions Managers are here to help. Contact us to discuss your next new construction project. www.fortisbc.com/energyteam

For rebate information, visit www.fortisbc.com/newhome

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