Grandview-Woodland

HERITAGE ENERGY RETROFIT GRANT CASE STUDY

Photo Credit: VHF

Building at a Glance

Location – Grandview-Woodland
Size – 155.9 meters squared
Style – Single family detached dwelling
Built – 1908
Purchased - 2010
GHG reductions – 2.78 tonnes/year
Post Retrofit Emissions – 0.2 tonnes/year

Energy Efficiency Retrofits

Installation of 10 storm window inserts

HVAC - Central Air Source Heat Pump

DHW - 80 Gallon HP Water Heater

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Background

The homeowners at this Grandview-Woodland home were very motivated to lower their Greenhouse Gas (GHG) emissions. Chris Higgins (pictured above) is concerned about the climate crisis and how buildings are contributing to the City's emissions. His top priority was to electrify their 1908 home, which would drop their GHG emissions to near-zero.

Previously, the home was insulated in the attic and most walls have cellulose loose fill insulation, so the focus of this retrofit process was on heating and windows, with air sealing to come.

Heat Pump Installation

Before installing a heat pump in this residence, the homeowners installed a heat pump in their rental property, as the furnace was old and due to be replaced. Seeing the performance of the heat pump further motivated them to make the switch for their own dwelling as well. They sought out and compared four quotes before ordering the work in February 2022, which was completed in March.

The homeowners replaced the condensing (92% efficient) gas furnace with a Mitsubishi Heat Pump (Mitsubishi PUZ-HA30NKA, 381% efficient at +8°C, 227% efficient at -8°C and heats down to -25°C outside temperature), they also installed an air handler, a grey box about the same size as a furnace (PVA-A36AA7 variable speed air handler). The new system was able to reuse existing ductwork, making the switch a simple two-day installation. The unit is quiet in operation, which was a motivating factor in selecting Mitsubishi.

The homeowners have noticed that the heat from the new heat pump is more even than the hot air coming from a furnace and there are no longer hot and cold spots throughout the house. They also believe the furnace (140,000 BTUs) was not sized properly for their home, whereas the heat pump was more carefully considered (36,000 BTUs)

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By re-using the existing venting, the homeowners were able to keep these original 1908 vent covers operational.

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Hot Water Heater

The homeowners replaced an on-demand hot water heater with an 80-gallon Rheem ProPH80. This is a larger tank, as the home has six people living there. As they were transitioning from an on-demand gas hot water heater, the homeowners wanted to ensure that they maintained plenty of hot water. To extend the tank further, the temperature is set at 140°F. The installation took about half a day.

"We went from on-demand gas hot water heater, where there's essentially infinite hot water, to an 80-gallon tank. 'Will there be enough?' There are 6 residents in this house..." The 80-gallon tank is large, and they have had no issue with running out of hot water.

Cooled air is created by the hot water heater and the air handler pulls that air into the return duct, giving free cooling in summer, and in winter the heat pump warms the air at 200-300% efficency. Overall the cost of heating and hot water is similar or slightly less than heating with gas.

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Upgrades to the main panel

An upgrade from a 40 amp main panel to 125 amp from a previous renovation in 2010 meant there was no need for any upgrade to the electrical service for the heat pump with a 30 amp circuit. The heat pump's electrical draw is 21 amps.

The homeowners plan to upgrade their main panel in the future in order to put in an EV charger and upgrade their dryer and stovetop.

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Natural Gas

The homeowners have a gas dryer and a gas stovetop that are currently the home's entire GHG output. They plan to switch their gas stove to an induction cooktop. However their current gas range is 40" wide, most ranges are now made in 30", 36" or 48", so a replacement will need to be part of other kitchen changes.

The homeowner's plan to replace the gas dryer and have had an electrician wire for an electric dryer outlet. To lower their GHG emissions prior to these replacements, the homeowners were keen to join the BC Renewable Natural Gas program but unfortunately, it was at capacity.

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Renewable Natural Gas (RNG)

The homeowners were unable to join Fortis BC's Renewable Natural Gas program, which has seen huge demand. In the program, the cost for the gas itself is 4-5 times higher but it is technically not a fossil fuel, which is attractive in instances where replacing gas appliances isn't feasible, but homeowners would still like to reduce their carbon impact.

*"Renewable Natural Gas is produced in a different manner than conventional natural gas. It's derived from biogas, which is produced from decomposing organic waste from landfills, agricultural waste and wastewater from treatment facilities. The biogas is captured and cleaned to create low-carbon Renewable Natural Gas (also called biomethane)" **

It is important to note that Renewable Natural Gas is still a greenhouse gas and is not a substitute for zero-carbon options. It offers a lower GHG emissions options in cases where electrification is not yet possible.

*https://www.fortisbc.com/services/sustainable-energy-options/renewable-natural-gas/so-what-is-renewable-natural-gas-anyway

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Storm Windows

The homeowners ordered 10 interior insert storm windows to use with existing wood single glazed windows that are in good condition. These inserts are measured to fit snugly into the frame without any mechanical fasteners. They are easy to install and remove, but they don't have the air flow of traditional wood storm windows. This means that there is some cleaning needed when condensation forms behind the airtight seal. The upside of that is installation takes just a couple of hours and the cost is significantly less than traditional storm windows.

Future Work

The homeowners don't consider their retrofit journey over just yet. They plan to address the air sealing issues in the house over time. As pictured (right), there are several large holes in the envelope that need to be addressed, remaining from previous utilities. The current air changes are 10.3 per hour at 50 pascals. Sealing up these holes and improving weatherstripping should improve the air sealing significantly, which will improve the performance of their heat pump and lower their energy consumption.

They also eventually plan to disconnect the gas line altogether. As mentioned earlier, the gas stove and dryer are the last remaining GHG emitters and the homeowners plan to replace them as soon as it is feasible. With that change, their home will reach 0 GHG emissions.

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