Photo Credit: VHF

1969 E Georgia St HERITAGE ENERGY RETROFIT GRANT CASE STUDY

Building at a Glance

Location – 1969 East Georgia Street Size – 173.5 meters squared Style – Single family detached dwelling Built – 1913 Purchased – 1991 GHG reductions – 6.19 tonnes/year Post Retrofit Emissions – 0.2 tonnes/year

Energy Efficiency Retrofits

Insulation - 2nd Floor Gables R0 to R51 Insulation - 3rd Floor Gables R20 to R51 Insulation - 3rd Floor Dormer R12 to R51 Insulation - 1st & 2nd Floor Walls R0 to R12.8 Insulation - 3rd Floor Gable Ends R0 to R12.8 Air Sealing - 15% Improvement (8.02 ACH to 6.79 ACH) HVAC - All Electric Cold Climate Central

System Heat Pump Installation of 4 storm windows Installation of 2 replacement wood windows



VANCOUVER HERITAGE FOUNDATION



Background - Retrofits Completed Before HERG

The homeowners had completed periodic retrofits as they were needed but their recent retrofit program was the largest that they had undertaken. Previously, they had replaced aluminum windows with double glazed wood units, repaired their front porch, and added blownin insulation in parts of the house. Additionally, they upgraded their electrical service and installed an EV charger. These retrofits, occurring over several years, primed the homeowners to take part in the Heritage Energy Retrofit Grant Program where they were able to make targeted, whole home changes, which greatly reduced the 1913 home's carbon emissions.



Photo Credit: VHF

Why Did They Decide to Retrofit?

The homeowners understood how much their home was contributing to their Greenhouse Gas (GHG) emissions, which motivated them to begin this retrofit journey. Much like the motivation of switching to an electric car, considering how their energy consumption and emissions impact the environment was important to them. By improving the energy performance of their house, they would also make their home more comfortable. Another factor motivating the homeowners to begin these retrofits was that they felt that upgrades had to be made in their home in order to live comfortably. Having costeffective heating and sustainable systems by switching fully to electric from natural gas meant that they could do so in the most sustainable way. The incentives available from the City of Vancouver, provincial programs, such as Clean BC, and Vancouver Heritage Foundation solidified their decision to retrofit.





Insulation

Home Energy Evaluation

The primary source of the home's energy consumption was space heating, standing at 71%. The report further identified that the main walls were where most of the home's heat was being lost. Therefore, the first step recommended in the energy efficiency road map was to perform air sealing and to insulate the main walls.

While upgrades like a heat pump reduce the home's GHG emissions dramatically, efforts to air seal and insulate will mean that the home uses the new heat source efficiently. It is important to follow an energy efficiency roadmap that considers the home as a complete system.

The home energy evaluation revealed that 1969 E Georgia St used 101.4% more energy compared to a typical new house.

The evaluation provided the homeowners with information on the energy usage of their home, the areas of heat loss, as well as a roadmap to GHG reductions.



Photo Credit: VHF

Fiber glass insulation was put in the attic with blown-in insulation over it (specifically blown-in cellulose, post-consumer fiber). The alternative would be using closed cell foam insulation but that was not recommended as it would greatly restrict the airflow in the cavities of the house, which can cause mold and mildew.

The process of installing foam insulation would also require interior walls to be removed, creating a much greater disturbance in the lives of the inhabitants and necessitating the removal of their original lath and plaster.



Photo Credit: VHF

The blown-in cellulose insulation installation took only one day but increased the r-value of the main walls from 0 to 12.8, a significant improvement. The process began with the installers puncturing holes every 16 inches in the exterior of the house, blowing the loose fill insulation through those small holes and then patching them up. The stucco patches are shown in the image above and are very discreet.

The HERG program requires blown-in cellulose insulation but most contractors recommend it as it's easier. Often the only time it is not used is in the case of exposed flooring or large open spaces, such as crawl spaces and attics.

Heat Pump Installation

To move away from using natural gas, the homeowners began contemplating upgrading to a heat pump. They knew others who had done likewise and had very positive experiences which motivated them to make the switch. Heat pumps are endorsed by BC Hydro and switching from using natural gas to an electric heat pump would result in dramatic greenhouse gas reductions, which was very important to the homeowners.

Their cold climate heat pump was installed in autumn of 2020, using the existing ventilation system from their gas furnace. A heat pump usually takes less total vent square footage than a natural gas furnace, so minimal reconstruction was needed, and the heat pump installation was completed in one day. If existing venting is not an option, mini-split heat pumps can be used but are more visually disruptive to the interior of the house.

A common concern with switching to a heat pump from a gas or oil furnace is the worry that it could fail in the wintertime; however, this heat pump can function up to -30°C, a temperature rarely experienced in Vancouver. There are other options available to address this concern, such as getting a backup furnace or a backup generator. The homeowners opted for not getting a backup furnace, but they do have an additional generator that kicks in if it gets very cold.

<u>*https://www.nrcan.gc.ca/energy-efficiency/energy-star-canada/about/energy-star-announcements/publications/heating-and-cooling-heat-pump/6817</u>



What is a Heat Pump?

A heat pump is an electrically driven device that extracts heat from a low temperature place (a source), and delivers it to a higher temperature place (a sink).*

Photo Credit: VH



Air Handler: PVA-A36AA7



Photo Credit: VHF

A heat pump also has the added advantage of functioning as an airconditioner. The pump essentially just runs in reverse, switching the source and the sink of the heat.

This was very useful for the homeowners during an extreme heat wave the first summer after the heat pump was installed.

The air handler the heat pump uses also functions to circulate and filter air in the home. This can provide relief during BC's active wildfire seasons, when outdoor air quality is low.



Future Work

The entirety of the home's GHG emissions are now from the gas stove (pictured below). Replacing it with an induction stove is a part of the homeowners' future plans.



Any Advice?

"Make a plan! When it comes to starting a retrofit project, going through the Heritage Energy Retrofit Grant program made the process much easier. The Vancouver Heritage Foundation provided recommendations and advice, including referring specialists for tricky retrofits, such as carpenters who have experience with traditional wood windows. Conducting the pre-retrofit evaluation provided us with a roadmap to undertake the renovation."