NEW GLASGOW BUILDING ARCHTYPES AND HTU DETAILS

A heat transfer unit (HTU), also commonly known as a heat interface unit (HIU) or energy transfer station (ETS), is the interface, or connection point, between the heat network and a building's heating system. For the New Glasgow DHS, most HTUs will connect buildings to the distribution network. There are only a few buildings, such as the hospital, that will connect directly to the transmission network. Just like other heating equipment for buildings, there are many different types of HTUs that are chosen for each building to serve their heating needs. **Error! Reference source not found.** illustrates examples of HTUs with and without the cover. In general, the components of an HTU are:

Heat Exchanger – The component that allows hot water from the DHS to flow through one side and the cooler water from the in-building heat system to flow through the other side. This allows for heat to be transferred from one fluid to the other without the two fluids mixing or coming into direct contact with one another.

Flow Control Valve – The component that controls the amount of water that can flow through the heat exchanger. There is a flow control valve located on the DHS side of the heat exchange and is controlled by the DHS utility to ensure that the correct amount of heat energy is transferred to the building.

Thermal Meter – The component that measures the amount thermal energy (heat) being provided to the building by measuring water flow and temperature. This component serves at the meter for utility billing purposes and provides valuable information to the utility for efficiency and optimization purposes.

Isolation Valves – The components that shut off the flow of water on both sides of the HTU. There will be two isolation valves on the DHS side of the HTU that allow for emergency shut off from the DHS as well as isolation for maintenance or replacement of HTU components. There are also two isolation valves on the home side of the HTU for the same reasons. These valves are manually actuated and owned and operated by the utility.

Figure: Covered and Uncovered HTU Examples

1.1.1 HEATING SYSTEM ARCHETYPES

Four different types of generalized in-building heating systems, or archetypes, were developed to represent the single-family residential buildings in New Glasgow. The four archetypes developed are fossil fuel (heating oil or propane)-fired hot water radiators, fossil fuel-fired steam radiators, fossil fuel-fired forced air, and electric baseboards. Every home will require an HTU to connect it to the DHS.

Fossil Fuel-Fired Hot Water Radiators – These systems burn heating oil or propane in a boiler which heat water that is pumped to hot water radiators throughout the home to provide heat. As the DHS will be utilizing hot water, retrofitting a hot water heated home is the simplest retrofit of all the archetypes. The fossil fuel boiler will be replaced with an HTU, which transfers heat from the DHS to the water heating system of the home. These are anticipated to be the most common systems in New Glasgow. Heat is supplied directly to the DHW system in the home, providing unlimited supply of domestic hot water without a hot water tank.

Fossil Fuel-Fired Steam Radiators – These systems burn heating oil or propane to generate steam for multiple radiators in a home. The DHS will be utilizing a more efficient form of heat distribution that uses hot water rather than steam. Unfortunately steam systems are not compatible with hot water systems as steam requires different pipe sizes and other steam specific components that do not function when water is in them. As a result of this, all steam systems will need to be replaced with hot water-based heating systems (e.g., radiators) connected to an HTU. Few of these systems are anticipated.

Fossil Fuel-Fired Forced Air – These systems burn heating oil or other fossil fuel in a burner that transfers heat to an air stream being forced through it by a fan distributing the warm air throughout the home. A relatively simple retrofit to connect this archetype to a DHS involves replacing the fossil fuel burner with a hot water coil connected to an HTU. The hot water warms the coil which warms the air being forced through it, similar in approach to air conditioning or a central heat pump.

Electric Baseboard – These systems utilize electricity to warm the house with resistive heating elements in baseboard enclosures. Unfortunately, these systems are not compatible with any form of hot water heating retrofit and will need to be replaced with hot water-based heating systems connected to an HTU. Retrofit options could include new radiators or fan coils that use in-vent mini-blowers passing air through a hot water coil. Should the homeowner want to keep the electric baseboards, this will have no impact on the new heating systems performance.

1.1.2 SINGLE FAMILY HOMES

For single-family detached homes, the HTU will be small compared to the existing heating systems it will replace (Figure 1). Finding additional space to locate the HTU is not required. Two pipes from the DHS will enter the home and connect to a new HTU, which will be standardized for many homes. This will ensure the cost for each HTU is minimized. Some larger, older homes may require an upsized HTU to meet their larger heating needs.

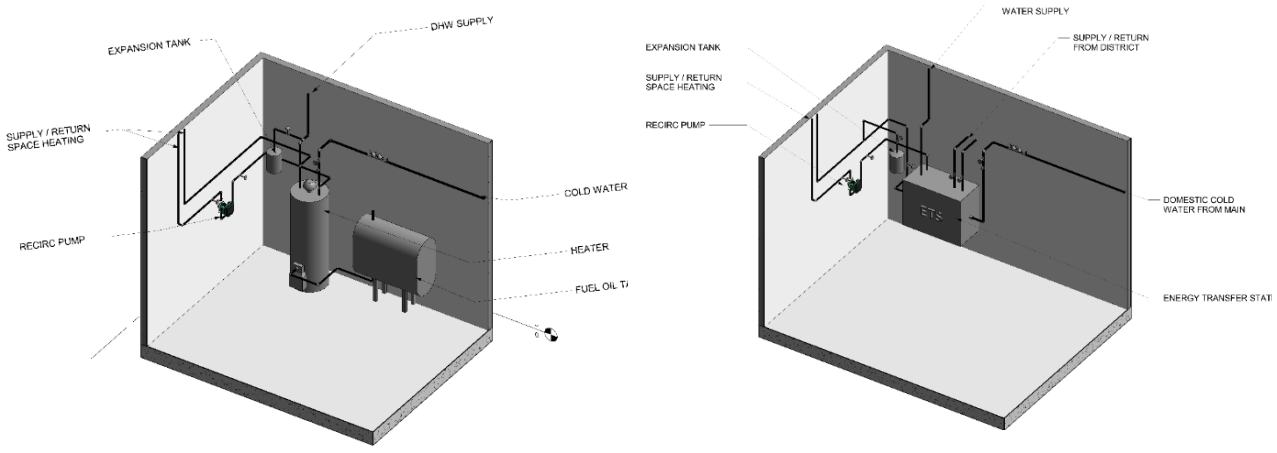

Figure 1: Typical Heating Oil and Hot Water Tanks and Replacement HTU Unit

1.1.3 COMMERCIAL AND INSTITUTIONAL BUILDINGS

For commercial and institutional buildings, HTUs will be standardized like single-family home HTUs, but with some minor customization. The customization will be done on a building-by-building basis as commercial and institutional buildings are somewhat unique with their heating systems. This is due to many factors such as the year the building was constructed, if any modifications have been made to the building, a change in use of the building, and others. Due to the wide variety of fuels consumed in New Glasgow, it is anticipated there will be greater variation from building-to-building than in communities in other provinces.

As would be expected, commercial and institutional building HTUs will be larger than single family home ones, but they will still be smaller than the in-building heating equipment they replace. Two pipes from the DHS will enter the building close to the existing heating system equipment and connect to a new HTU.

The components of a commercial and institutional HTU are the same on a single-family home HTU. A heat exchanger, flow control valve, thermal meter, and isolation valves are all included. A main difference is that these HTUs may have multiples of these components at different sizes to enable better performance and control at different times of the year. The winter months will require larger amounts of heat than the summer when domestic hot water constitutes the bulk of consumption. This could result in an HTU with a large and small heat exchanger with a large and small flow control valve allowing the HTU to achieve higher levels of control and efficiency during both high and low heating loads.