



ROB DUMONT

Recovering heat from drain water saves money

After space heating, water heating is the biggest user of energy in most Canadian homes, accounting for between 20-30% of total energy consumption. In fact, Canadians spend billions every year to heat water for bathing, laundry, dishwashing and many other uses.

Typically, this hot water goes down the drain after a few minutes of use. Now a simple, low-cost technology is available that allows homeowners and businesses to capture the heat in drain water and reuse it to heat more water.

Rising energy costs are creating a strong interest in waste heat recovery as a low-cost energy "source." Air-to-air heat exchangers, for example, have been in use for several decades and are now common in energy-efficient homes and buildings throughout Saskatchewan. This technology extracts the warmth from air being vented from a building in cool weather and transfers it to fresh air being brought in, significantly reducing the cost of reheating cold outside air. In summer, air-to-air exchangers can also be used to reduce air conditioning costs.

Drain-water heat exchangers work on the same principle as air-to-air exchangers, but are much simpler and work year round to save you money. Essentially, cold water is run through a copper pipe coiled around a drainpipe, typically the main plumbing drainpipe for the house. Since there is no contact between the fresh water and the drain water, there is no possibility of contamination. As you take a shower and the warm water flows down the drain, some of the heat from the drain water is transferred to the cold water running through the copper pipe. The preheated water then runs into the water heater. The energy savings can be impressive.

Typically, the temperature of municipal water as it enters a building averages about 12°C over the year. The water heater heats this water by about 38°C, to about 50°C. When you take a shower, the water temperature is approximately 41°C and the water runs down the drain at about 37°C.

Using a drain water energy recovery system, cold water can be warmed from 12°C to about 25°C. This warmed water then

goes into the water heater and instead of having to heat water 38°C – from 12°C to 50°C, the water heater just needs to raise the temperature 25°C – from 25°C to 50°C. The result is significant savings in water heating.

Savings on residential water heating can be 25% or more. The more showers that are used in the home, the greater the savings. The installed cost for a residential system is typically between \$500 and \$1000 dollars. Payback on energy savings ranges from about four to 16 years depending on the fuel source used and the installed cost. For some commercial and industrial applications that use a lot of hot water over long periods, such as laundromats, the energy savings can be substantial, with a shorter payback period.

Drain-water heat exchangers also benefit the environment. Since they reduce overall energy use, they reduce combustion related fossil fuel emissions of greenhouse gases (GHGs) that contribute to global warming and other air pollutants. In Saskatchewan homes with electric water heaters, the emissions reductions can be greater than those with natural gas heaters due to the fact that such a large amount of coal is burned to create electricity. For industrial applications, substantial GHG emission reductions can be achieved.

Drain-water heat recovery is one of the features of the Factor 9 Home currently being built in Regina. This innovative, energy-efficient house is expected to use about 90% less energy than a typical Saskatchewan home built in 1970 and 50% less water than a house of the same size. For more information visit www.factor9.ca.

A number of Canadian companies produce drain-water heat recovery systems. For information on a Saskatchewan manufacturer, visit www.watercycles.ca or consult your local plumbing and heating supplier.



Rob Dumont is Principal Scientist at the Saskatchewan Research Council Building Performance Unit.