



Green Upgrade Report Electric Baseboard Heated Two Storey Townhouse

September 30, 2019

Introduction

Jade Environmental Services offers ways in which people can reduce carbon emissions to fight climate change and save money at the same time. The main focus is to upgrade homes through conservation of energy and switch from fossil fuel burning devices to renewable and/or clean Ontario grid electricity.

We also help reduce the risk of flood damage due to extreme weather events by providing emergency backup solutions.

We appreciate your participation in our program and ask that you permit us to conduct ongoing monitoring of your electricity use as part of a pilot study. This is at no cost to you and we hope to receive a government grant to help offset some of the capital costs for those who participate. We will keep you informed of our progress.

Energy Use and Costs

We have conducted an analysis of the existing and future energy use and cost below. For comparison purposes, we modelled the current condition assuming you had window air conditioning units.

Green Upgrades

Our analysis indicates that the best improvements for your house are to:

- Add a heat pump that will supply all your cooling loads and about 70% of your heating loads. When the heat pump is not effective, the baseboard heaters will take over.
- Add additional insulation in the attic.
- Seal gaps and holes identified during our audit
- Add a small battery storage unit that will power your refrigerator and other essential loads when the power goes out.
- Insulate your water heater and hot water lines.
- Add a surge suppressor to your electrical panel to absorb lightning strikes and power surges.

Heat Pump

The Mitsubishi Mr. Slim cold climate air source heat pump provides heating when the temperature is above -20C. During the summer the heat pump provides all your cooling

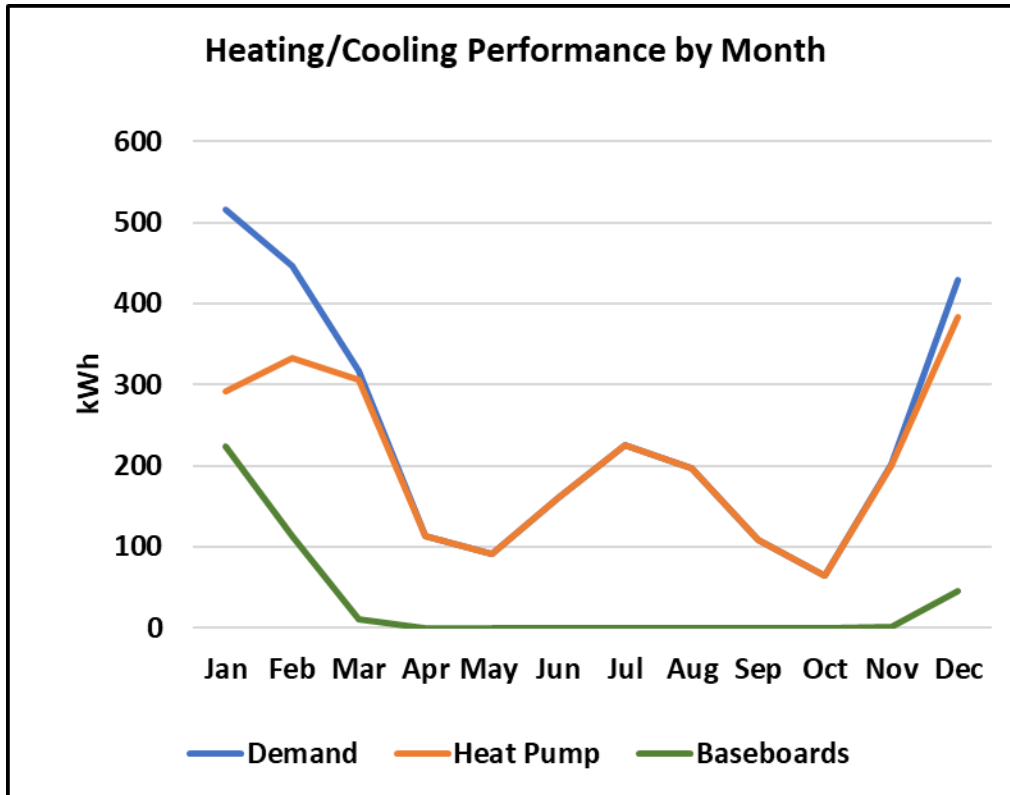


needs. It consists of an outdoor unit and one or more indoor units depending on house layout and individual heating and cooling needs.



Mitsubishi Heat Pump	
Outdoor Unit	18,000 BTUH (1.5 tons)
Main Floor Indoor Unit	9,000 BTUH (0.75 tons)
Rear Bedroom Indoor Unit	5,000 BTUH (0.4 tons)
Front Bedroom Indoor Unit	5,000 BTUH (0.4 tons)

The chart below shows how the heating and cooling works.



The cost of electricity for all uses in addition to heating and cooling, with the window air conditioners, have been modelled for your use based on our interview and estimates of the water heating, lighting, appliances and ventilation to be about \$1544, and the heating and cooling portion to be approximately \$955.

Item	Current		Future (insulation and heat pump)	
	kWh/yr.	Cost	kWh/yr.	Cost
Heating	6514	\$847	2039	\$265
Cooling	831	\$108	831	\$108
Subtotal		\$955		\$373
Hot Water	4589	\$597	4589	\$597
Lights & Appl.	7117	\$925	7117	\$925
Ventilation	172	\$22	172	\$22
Total	19223	\$2,499	14748	\$1,917

Adding insulation and using the heat pump along with your baseboard heaters would cost \$373 per year in electricity and save you money. It is expected that electricity prices will rise so the difference will become greater over time. Further savings can be achieved by using a setback thermostat.



Insulation

We have accounted for added insulation in the attic equivalent to R-60.

Emission Reduction

We have determined the carbon emission reductions for the above would be about **400 kilograms equivalent carbon dioxide per year**.

Upgrade Comparison

The table below shows the difference in energy and costs before and after implementing the upgrades.

Month	Current Estimate	Future (insulation and heat pump)
Jan	\$354	\$228
Feb	\$302	\$193
Mar	\$260	\$176
Apr	\$171	\$142
May	\$131	\$142
Jun	\$125	\$145
Jul	\$126	\$154
Aug	\$126	\$150
Sep	\$123	\$136
Oct	\$144	\$136
Nov	\$212	\$125
Dec	\$303	\$217
Total	\$2,377	\$1,944

Capital Costs

The costs for supply and installation are given below:

3 Mini Split Heat Pumps

Air sealing (materials)

Insulation

Total \$11,860 including HST



Financing

We provide third party financing over a time period that makes your net situation close to cash flow positive.

Of course, using a line of credit or mortgage would be less costly on a monthly basis. Paying some money down would also improve the cash flow.

Emergency Power Backup

Using a small battery power supply can provide power for basic needs such as a sump pump, lighting, refrigerator and microwave oven. The best products use a pure sine wave inverter that does not affect sensitive electronics that way the less expensive modified sine wave inverter products do. These systems are automatic and are charged when power is available from the grid. When the power goes off, the unit supplies the power. The current models use lithium maintenance free batteries that last for up to ten years. You don't have to be home to switch them on. Our recommended units permit adding additional batteries for long power outages of more than a week. We offer two models of high and medium power.

The emergency power is not typically considered an energy saving device but more of an insurance that can result in considerable savings by preventing damage as a result of power outages.

Emergency Battery Backup Unit

a) Inergy Apex, 1500 Watts \$2200.00 + HST





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b) Jackery, 500 Watt \$670 + HST



Electrical Surge Suppressor

Lightning strikes and power surges when hydro transformers explode can cause significant damage to computer controlled devices such as furnaces, heat pumps, appliances and computers. We recommend the installation of a surge suppressor on your electrical panel. They cost approximately \$400 when installed by an electrician.



<https://www.eaton.com/Eaton/ProductsServices/Electrical/ProductsandServices/Residential/SurgeProtection/CompleteHome/index.htm#tabs-3?playlistVideoid=3700746150001>



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Benefits

By accepting our proposal, you would receive peace of mind knowing that you are protected from power outages and you would be reducing carbon emissions that are creating climate change. The costs to do this can be financed to make monthly payments as low as possible.

If you wish to proceed, we will prepare a detailed quote for supply and installation for what you decide on.