Jade
Environmental
Services

304 Seneca Avenue
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Green Upgrade Report
123 My Street, Anytown

April 28, 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 audit of your energy use and cost and compared the existing and future energy use and cost below. For comparison purposes, we modelled the current condition assuming you had standard central air conditioning.

Green Upgrades

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

- Add a hybrid heat pump that will supply all your cooling loads and about 70% of your heating loads. When the heat pump is not effective, the propane furnace will take over. It will last much longer because it is not used as often.
- Seal all major areas of air leakage.
- Add a small battery storage unit that will power your propane furnace and other essential loads when the power goes out.
- Insulate your water heater and hot water line and when it is ready for replacement, purchase a heat pump water heater.
- Add a surge suppressor to your electrical panel to absorb lightning strikes and power surges.

<u>Heat Pump</u>

The Midea hybrid heat pump works with your propane furnace to provide heating when the temperature is above -20C. During the summer the heat pump provides all your cooling needs.

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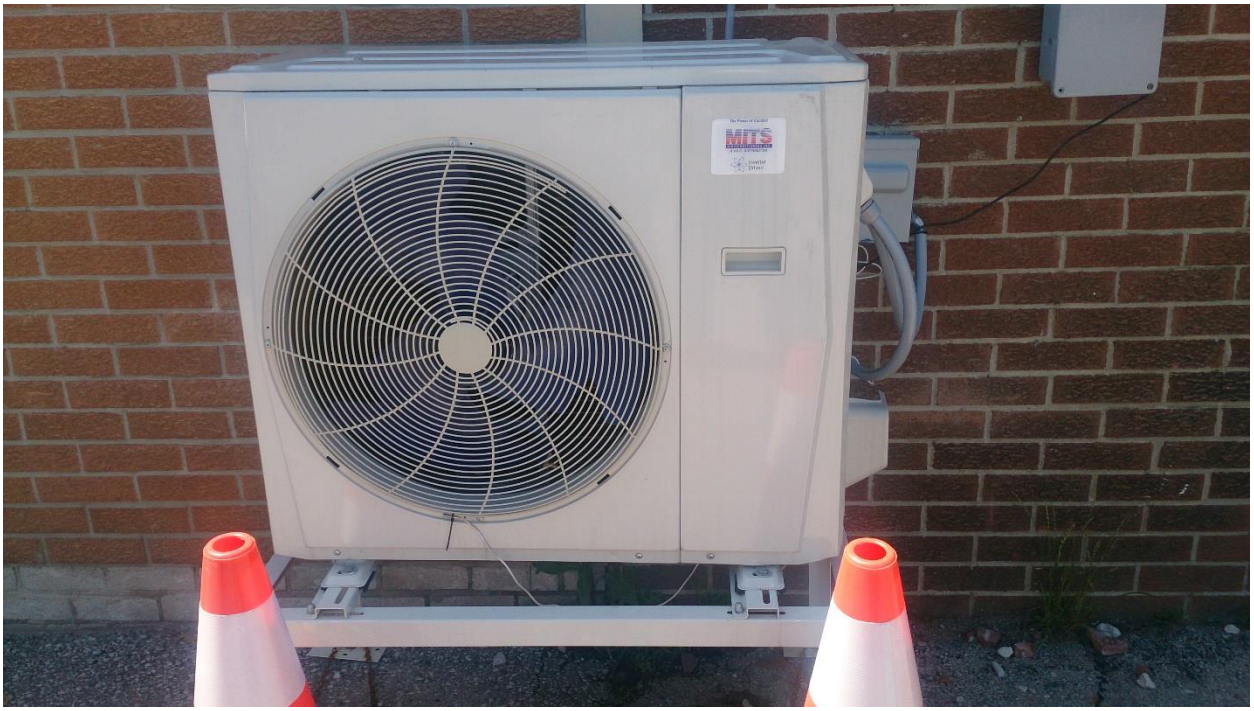
Midea Heat Pump 48CSH2H
Cooling: 48,000 BTUH (4 tons, 14 kW)
Heating at 47F (8C): 49,500 BTUH (4.12 tons, 14 kW)
Heating at 17F (-8C): 32,000 BTUH (2.7 tons, 9 kW)



Thermostat

The charts below show how the heating and cooling works. The first shows the heating cost before and after adding the heat pump. The second shows the contribution between heat pump and propane furnace for heating and cooling.

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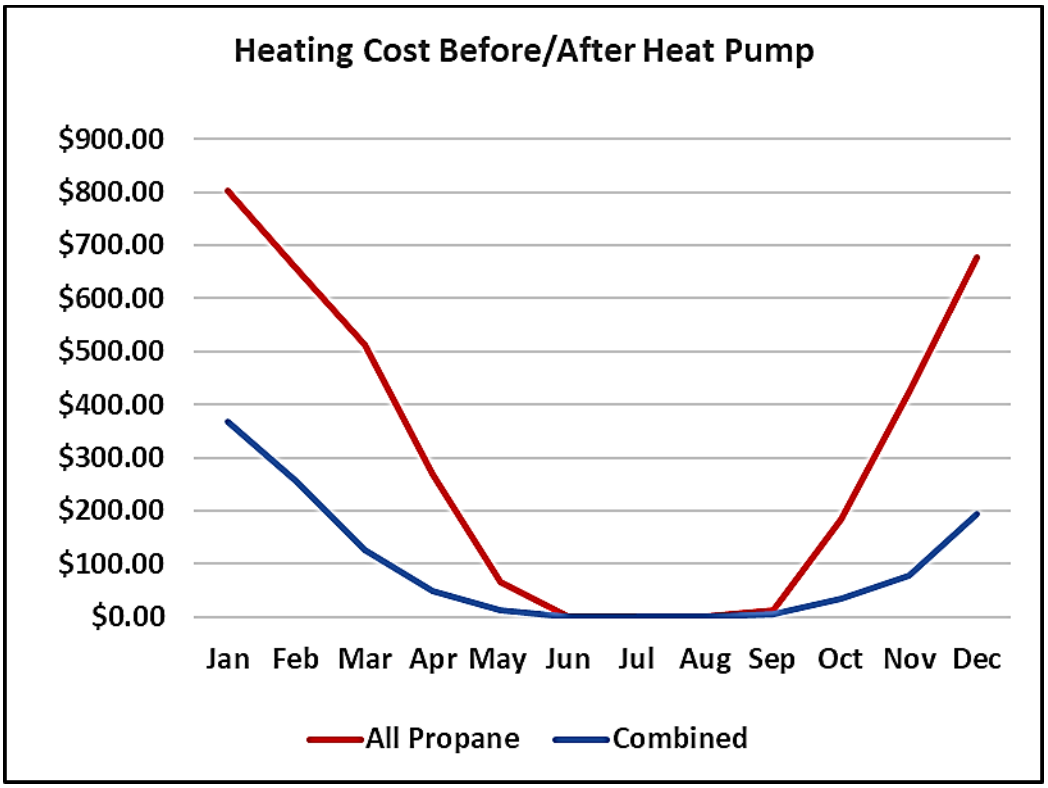

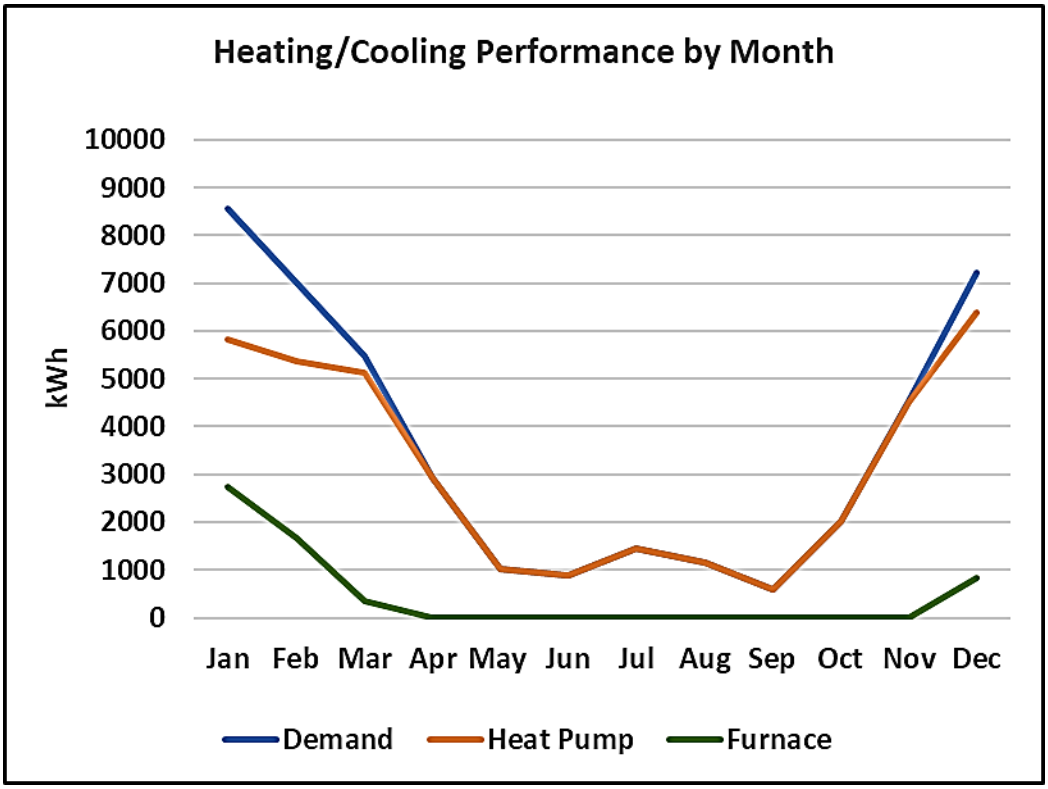

The cost of heating and cooling, if you added a conventional electric air conditioner, would be $3875 per year if prices stay the same. Using the hybrid heat pump along with

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your propane furnace would cost $1353 per year and save you $2522 a year. It is expected that propane costs will rise and electricity prices will drop so the difference will become greater over time. The cost can be reduced by using a setback thermostat and improving air leakage.

Sealing Gaps

We have identified areas where air leakage occurs and recommend the following:

1. The entrance door on the main floor needs weather stripping all around as a minimum. Consider replacing this wood door with a single glazed window with an insulated metal door and double glazed window.
2. The wood stove does not close tightly and does not have a well fitting damper in the chimney flue. Consider replacing this unit with an air tight model.
3. Various openings were found during construction for access to plumbing and wiring. They should be insulated and closed off with drywall.
4. Seal area of air leakage such as at electrical outlets on the exterior walls and window frames

Emission Reduction

We have determined the carbon emission reductions for the above would be about **7 tonnes equivalent carbon dioxide per year**. This represents more than half the amount from using propane heating and electric cooling.

Upgrade Comparison

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

A savings of $2522 a year will be achieved.

Condition	**Current (added insulation)**		**Future (sealing gaps, heat pump)**	
Energy, kWh per year	**Propane**	**Electricity**	**Propane**	**Electricity**
Heating	38487		5605	4619
Cooling		2091		1754
Hot Water		4846		4846
Lights & Appl.		7117		7117
Ventilation		2651		2651
Total	38487	16706	5605	20987
	55193		26592	

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Cost per year				
Heating	$3,603		$525	$600
Cooling		$272		$228
Hot Water		$630		$630
Lights & Appl.		$925		$925
Ventilation		$345		$345
Total				
	$3,603	$2,172	$525	$2,728
	$5,775		$3,253	
	Savings	$2,522		

Capital Costs

The costs for supply and installation are given below:

Midea 4 ton Heat Pump	$9,500 + HST
Sealing Gaps	$350 + HST
Total	$9,850 + HST

Financing

We provide third party financing over a time period that makes your net situation cash flow positive. For example, we can finance all of the above with no down payment for 10% over 13 years for $1771 per year including HST. The annual savings per year would be approximately $751.

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 lighting, sump pump, refrigerator and operation of your propane furnace. Depending on size, it can also power a microwave oven. The best products use a pure sine wave inverter that does nor 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 unit permits adding additional batteries for long power outages of more than a week.

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.

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Emergency Battery Backup Unit

$2200.00 + 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 less than the energy savings and being cash flow positive from day one.