

# Written Submission

to the

## Newfoundland and Labrador Public Utilities Board

### Phase I

#### Investigation and Hearing

into the

*Supply Issues and Power*

*Outages on the Island Interconnected System*

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## Evidence-based Efficiency Improvements

In late 2013, I decided to "takeCHARGE" and have a mini-split heat pump installed in my 33-year old home (no insulation upgrades since my home's construction in 1981).

Below, is an info-graphic (Figure 1.) which shows the average energy use reductions for the first full 12 month periods following a mini-split heat pump installation.

It should be noted that although the installed outdoor unit has been rated at a 24,000 BTU output capacity and the unit is capable of supporting up to three indoor units, to date I have installed and am utilizing only one 12,000 BTU indoor unit which limits the overall benefits of the mini-split heat pump (I expect to install another indoor 12,000 BTU after future renovations).

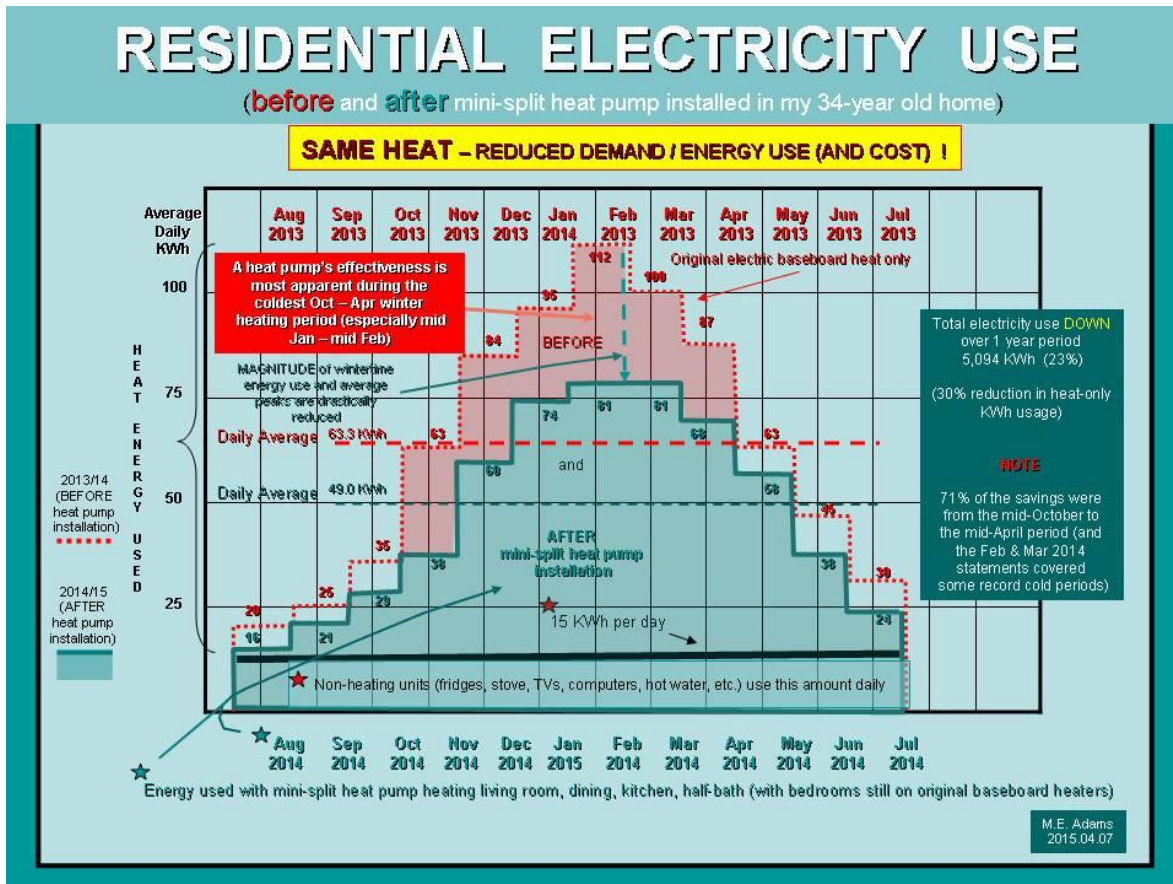


Figure 1.

NOTE: The data source ---- Newfoundland Power monthly power bills for billing dates February 13, 2014 to January 14, 2015 inclusive (copies of bills available on request).

## Summary Points

- mini-split heat pump supply and installation cost --- \$4,733
- one year energy savings 5,094 KWh
- estimated 15-year life cycle energy savings 76,410 KWh
- supply and installation cost for mini-split heat pump energy over 15 year period -- - 6.2 cents per KWh (approximately three times less than Muskrat Falls or Holyrood energy generation costs)
- for the entire 12 month period (some of which included record cold winter temperatures) living/dining rooms, kitchen, half bath areas were maintained at temperatures between 20 and 25 degrees Celsius
- the installed mini-split unit is specified to operate and did operate effectively down to -15C (and maintained the above-referenced areas at a minimum 20C even when outdoor temperatures reached -19C)
- backup heat (kerosene) was needed for only one 12-hour period (caused by DarkNL)
- while actual daily peak demand information was not available, it would appear highly unlikely that such significant and substantial reductions in average daily energy use could be achieved unless accompanied by significant (even if somewhat less) peak demand reductions

## Nalcor's 2014 Position re Heat Pump Technology

In response to a 2014 Annual General Meeting online question concerning the potential for energy efficient mini-split heat pumps to reduce demand and energy use during cold winter weather, Nalcor stated:

1. *Existing rebate programs offered through the joint utility takeCHARGE program have seen strong uptake resulting in the potential additional savings through those programs to be declining as we move forward in time.*
2. *The savings from heat pumps are primarily from energy savings and not demand reductions.*
3. *While the full impact on the system winter peak has not yet been fully studied, it is expected that at certain winter peak conditions customers using heat pumps would have to rely on a back up heat source.*
4. *The resulting use of back up heating has the potential to result in a higher winter peak.*
5. *There are a number of types of heat pumps and there is a research study underway to assess the impact of the mini split heat pumps on residential energy consumption and peak demand in Newfoundland and Labrador*

## Summary Comments

1. Since the question from the online questioner was in relation to the potential for energy efficiency improvements other than those being attained "through those (existing takeCHARGE) programs", Nalcor's comment that "the potential for additional savings through those (takeCHARGE) programs to be declining as we move forward" is not relevant to the actual or potential benefit of programs such as mini-split heat pumps --- such programs are not included in the takeCHARGE program
2. Figure 1. info-graphic (above) shows that 71% of energy savings (and any average daily demand reductions) occur during the coldest, peak demand wintertime heating periods. This appears to bring into question the relevance of Nalcor's claim that savings are primarily energy savings and not "demand reductions". Nevertheless, even if Nalcor's claim that demand reduction would not exceed 49%, a demand reduction of 49% or even less, is far from insignificant or less than, a substantial number.
3. During the 1-year period shown in Figure 1. (and even though the 2014/15 heating period shown in Figure 1. included some record cold, -19C temperatures), at no time (with the exception of a 12-hour period in January when backup kerosene heat was used during DarkNL) was backup heat required to maintain my living/dining, kitchen and half bath areas between 20-25C temperatures.
4. Nalcor provides no evidence to support the position that a need for backup heat actually exists or if so, that the use of heat pumps has the potential to increase winter peak demand. Heat pumps work best when they are set at a desired temperature, when up and down temperature fluctuations are avoided. As such, large surges of early morning energy use (as suggested by Nalcor) is avoided. Nevertheless, it has been suggested that Nalcor's electronic thermostats (which automatically turn on inefficient baseboard heaters in early morning hours to warm up a cold house) do indeed increase peak demand.
5. Figure 1. suggests that energy efficient mini-split heat pump technology can provide residential electricity customers with substantial energy savings (and potential peak demand reductions). I would further suggest that it is not by accident that mini-split heat pump technology is not part of the utilities' takeCHARGE program. Widespread use of mini-split heat pump technology presents a major threat to the revenue potential of the province's utilities, and combined with the Muskrat Falls power purchase agreement (where substantial reductions in energy use must translate into higher electricity rates) it will require (not "a research study" bought and paid for at this late stage by self-interested utilities), but the wisdom of Solomon if low and middle income ratepayers are to be protected from an energy conundrum created by Nalcor.

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