

- 1 **Q. (2021 Electrification, Conservation and Demand Management Application, Volume**
2 **2, Footnote 59) The footnote discusses penetration of heat pumps replacing electric**
3 **space heating in the residential sector. The Dunsky report (page 28 of 325) states**
4 **“customer’s economics do favour heat pumps in existing electric resistance heated**
5 **households”.**
6 **(a) How much is the forecast penetration of heat pumps impacting capacity and**
7 **energy demand in the Province?**
8 **(b) Would a financial incentive to defray capital costs of such conversions make**
9 **economic sense going forward? Would such a program be considered a CDM or**
10 **electrification program?**
11 **(c) Please provide a cost/benefit analysis for a typical customer with electric**
12 **resistance heating converting to a heat pump.**
13 **(d) Based on the Dunsky and Newfoundland Power analyses, would conversion of**
14 **electric resistance heating to heat pumps be a customer’s best opportunity for**
15 **energy savings? How do such conversions compare to other programs**
16 **considered by Newfoundland Power?**
17
18 **A. (a) The 2020–2034 Potential Study (the “Study”) forecasts that, by 2034, 68,900**
19 **residential customers with electric baseboard heating will install a mini-split heat**
20 **pump.¹ By 2034, the Study estimates this penetration could result in annual energy**
21 **savings of nearly 140 GWh and peak demand reduction of 80 MW.²**
22
23 **(b) A financial incentive to help customers with electric heating install a heat pump**
24 **would be considered a Conservation and Demand Management (“CDM”) Program.**
25
26 **A heat pump incentive for customers with electric baseboard heating does not make**
27 **economic sense primarily because incentives are not required to encourage customers**
28 **to adopt heat pumps. Over the past 6 years, approximately 34,000 heat pumps have**
29 **been installed in homes within Newfoundland Power’s service territory.³ The Study**
30 **estimates that approximately 70,000 customers will supplement baseboard heating**
31 **with a heat pump by 2034 without a rebate program in place. Based on current and**
32 **forecasted heat pump adoption levels, free ridership for such a program would be**
33 **high.⁴ Energy savings cannot be claimed for free riders.**

¹ See the *2021 Electrification, Conservation and Demand Management Application*, Volume 2, Schedule C, page 83.

² Newfoundland Power is currently completing a heat pump load research study which will permit a better understanding of the energy and demand impacts of heat pump technology in the province. The research is being completed over 2 winter seasons and 1 summer season and is expected to be completed in 2021.

³ Information collected through an annual MQO Research survey of residential customers.

⁴ Free ridership occurs when participants would have chosen the more energy-efficient product even without availing of a program.

1 (c) Table 1 provides a *pro forma* cost benefit analysis for a customer installing a heat
 2 pump.⁵ The analysis is based on: (i) the cost of a mini-split heat pump of \$5,000;⁶ (ii)
 3 expected annual savings of 2,600 kWh;⁷ and (iii) an expected useful life of the heat
 4 pump of 15 years.⁸

Table 1:
Pro Forma Customer Heat Pump Analysis

Year	Electricity Rate (\$/kWh)⁹	Annual Energy Savings (kWh)	Annual Savings (Costs) (\$)¹⁰	Cumulative Nominal Value of Annual Bill Savings (Costs) (\$)	Cumulative NPV of Annual Savings (Costs) (\$)¹¹
0			(5,000)	(5,000)	(5,000)
1	0.12478	2,600	373	(4,627)	(4,385)
2	0.12758	2,600	381	(4,245)	(4,065)
3	0.13045	2,600	390	(3,855)	(3,756)
4	0.13339	2,600	399	(3,457)	(3,458)
5	0.13639	2,600	408	(3,049)	(3,170)
6	0.13946	2,600	417	(2,632)	(2,893)
7	0.14260	2,600	426	(2,205)	(2,625)
8	0.14581	2,600	436	(1,769)	(2,367)
9	0.14909	2,600	446	(1,324)	(2,118)
10	0.15244	2,600	456	(868)	(1,878)
11	0.15587	2,600	466	(402)	(1,647)
12	0.15938	2,600	477	75	(1,423)
13	0.16296	2,600	487	562	(1,208)
14	0.16663	2,600	498	1,060	(1,000)
15	0.17038	2,600	509	1,570	(799)

5 Under the *pro forma* scenario, the customer would see cumulative savings on a
 6 nominal basis and cumulative costs on a net present value (“NPV”) basis.

⁵ As outlined in part (d), savings from heat pumps are dependant on a customer’s individual circumstances. As such, a cost-benefit analysis for a “typical customer with electric resistance heating converting to a heat pump” as requested cannot be completed.

⁶ A mini-split is the most common type of heat pump installed in Newfoundland. The cost estimate includes installation and tax.

⁷ Electricity use for an average electrically heated customer in 2020 (weather adjusted) was 17,212 kWh. For the purposes of the analysis, 15% in energy savings was assumed (17,212 kWh x 15% = 2,582 kWh, or approximately 2,600 kWh). The 15% estimate is based on energy savings indications from Newfoundland Power’s heat pump financing program.

⁸ Average life of a heat pump is typically 10-15 years.

⁹ Based on current domestic energy rates, increasing annually at 2.25%.

¹⁰ Includes tax.

¹¹ NPV, assuming a discount rate of 6%.

1 (d) Energy saving opportunities are dependent on a customer’s particular circumstances.
2 For example, part (c) provides that overall heat pump savings are not cost effective
3 for every customer.¹² Newfoundland Power will continue to provide comprehensive
4 information to help customers make informed decisions regarding heat pumps, as
5 well as financing to help with upfront capital costs.¹³

6
7 Depending on the customer’s individual circumstances, other CDM programs may
8 provide larger energy savings than a heat pump. For example, adding basement
9 insulation could save a customer \$7,000 with an investment of \$3,400.¹⁴

¹² Factors to consider when installing a heat pump would include: (i) how air tight the home is based on insulation levels and weatherproofing; (ii) the efficiency of the heat pump model; and (iii) installation and operation of the heat pump. The home layout and placement of the unit are also important for mini-split heat pumps. Open concept rooms and layouts provide for more savings. The indoor unit should be placed to optimize air flow from the heat pump to maximize savings.

¹³ Heat pump information is available on TakeChargeNL.ca, including an energy savings calculator, information to help customers identify if a heat pump is right for them, how to identify an energy efficient model and provides information on proper installation.

¹⁴ On an NPV basis. Insulation provides savings for 25 years.