

- 1 **Q. Please provide in Excel format, if applicable, any information, data, analyses,**  
2 **projections, evaluations, or other insights into Newfoundland Power’s assessment of**  
3 **the potential role and implementation details concerning possible time-of-use rate**  
4 **structures in their service territory.**  
5
- 6 A. Newfoundland Power completed a 2-year study of time-of-use rates from December 2011  
7 to November 2013. A copy of the study results is provided as Attachment A to this  
8 response.



**Time of Day Rates Study Results**



# Time of Day Rates Study Results

November 2015



WHENEVER. WHEREVER.  
We'll be there.

NEWFOUNDLAND  
**POWER**  
A FORTIS COMPANY

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## 1. Executive Summary

Newfoundland Power Inc. (“Newfoundland Power” or the “Company”) completed a 2-year study of Time of Day (“TOD”) rates beginning in 2011 (the “Study”). The primary purpose of the Study was to determine how TOD rates would impact customers’ usage, particularly whether TOD rates would incent customers to reduce their usage during periods of peak demand.

The Study included over 200 Domestic customers. Domestic participants were divided into a Study Group on a TOD rate and a Control Group on a standard rate.

The results showed that, in comparison to the Control Group, Domestic participants on the TOD rate were able to achieve some reductions in usage during the morning peak period, but no reductions in usage during the evening peak period. Average billings to Domestic participants on the TOD rate were 1.6% less than what they would have experienced under standard rates.

Participation was limited among Large General Service customers. Feedback from these customers indicated no perceived opportunity to shift their load.

The results showed 3 Large General Service participants reduced their usage during the morning peak period and 2 reduced their usage during the evening peak period. However, the small sample size limited the conclusions that could be drawn from the Study.

Overall, participant feedback on the TOD rate was positive. Of Domestic participants on the TOD rate, 80% believed it should be made available as an option. Large General Service participants also believed it should be an option, but indicated they would only prefer the rate if it reduced their bills.

A comparison to other studies of TOD rates indicated that the results of Newfoundland Power’s study are broadly comparable to the results of other studies in Canada and internationally.

## 2. Study Methodology

### a) Background

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TOD rates are a common rate option in North America. Under TOD rates, electricity customers are charged higher prices during periods of peak demand and lower prices during other times of the day. The price differential incents customers to save money by using less electricity during periods of peak demand.

By reducing peak demand on the electrical system, TOD rates can reduce the overall cost of providing service to customers. However, implementation of TOD rates requires more expensive metering infrastructure and billing systems in comparison to standard pricing. An evaluation of potential costs and savings is therefore necessary to justify their use.

In 2009, Newfoundland Power completed a comprehensive Retail Rate Review in consultation with the Consumer Advocate and Newfoundland and Labrador Hydro. Following completion of the review, in March 2011 the Company filed an application with the Newfoundland and Labrador Board of Commissioners of Public Utilities (“the Board”) for approval of costs to conduct a study of TOD rates. The Board approved the application in Order No. P.U. 8 (2011).

The Study aimed to evaluate how TOD rates would impact customers’ usage patterns during the winter heating season and to provide experience to the Company in administering TOD rates.

The Study was conducted over approximately 2 years from December 2011 to November 2013.

### b) Study Participation

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#### *Domestic*

The Study included 2 groups of Domestic customers: (i) a Study Group of customers on a TOD rate; and (ii) a Control Group of customers on a standard rate.





1 Participants in the Study Group and Control Group were classified based upon their source of  
 2 space heating.<sup>1</sup> Participants were classified as either: (i) Electric, meaning their primary heating  
 3 source was electric; (ii) Dual Fuel, meaning they used electric heat with a supplementary heating  
 4 source; and (iii) Non-Electric, meaning they used oil or another alternative source of heating. To  
 5 the extent possible, the Study Group and Control Group included equal numbers of each  
 6 classification.

7  
 8 Table 1 shows the number of participants included in the Study.<sup>2</sup>

Table 1: Study Participants by Classification				
Group	Classification			Total
	Electric	Dual Fuel	Non-Electric	
Control	40	37	33	110
Study	32	30	37	99

9 In addition to classification by heating source, participants were selected from throughout  
 10 Newfoundland Power’s service territory. Participants were included from Western (Corner  
 11 Brook and Stephenville), Central (Gander and Grand Falls-Windsor) and St. John’s.

12  
 13 All participants in the Study Group and the Control Group were provided with home energy  
 14 monitors to understand their energy consumption and assist conservation and load-shifting  
 15 efforts. The metering of participants was completed using load recording meters originally  
 16 purchased for a load research program spanning 2003 to 2006.

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<sup>1</sup> Approximately 11,000 Domestic customers were initially contacted to participate in the study. Approximately 1,400 of those customers were interested in participating and completed an online survey providing their demographic and home characteristics. This information was then used to select customers for participation.

<sup>2</sup> The Study was designed to include 120 participants in both the Study Group and the Control Group. However, data from 31 participants was excluded from the analysis because the participants either moved or made a major change to their end-use for reasons other than the Study.

1 **Large General Service**

2 The Study aimed to evaluate the impact of TOD rates on Newfoundland Power’s Large General  
3 Service customers (i.e. those served under Rate 2.4). The Company contacted approximately 40  
4 Large General Service customers to participate in the Study, including hospitals, offices and retail  
5 buildings. Only 4 customers opted to participate in the study. Feedback indicated the low  
6 participation rate was due to customers believing they had no opportunity to shift their load.

8 **c) Study Rates**

9 The TOD rates used in the study were based on the Marginal Cost Study conducted as part of the  
10 Retail Rate Review completed in 2009. The rates were designed to obtain the same revenue  
11 relative to standard rates if applied to all customers in the applicable rate class.

12  
13 Because the Marginal Cost Study showed TOD cost differences only in the winter, the TOD rate  
14 only applied during winter months (i.e. December through March).

15  
16 Table 2 provides the TOD rates approved for use in the study.<sup>3</sup>

Table 2: Study Rates			
Rate Class	Energy Charges (¢ per kWh)		Demand Charge \$ per kVA
	Non-Winter	Winter	
Domestic	9.166 all kWh	15.271 on-peak kWh 10.266 off-peak kWh	-
Large General Service (>1000 kVA)	7.637 all kWh	13.343 on-peak kWh 8.538 off-peak kWh	1.84

17 The TOD on-peak rates were approximately 49% and 56% higher than off-peak rates for  
18 Domestic and Large General Service participants, respectively.

<sup>3</sup> These rates were updated on July 1, 2012 and July 1, 2013 to reflect annual rate adjustments and the results of Newfoundland Power’s 2013 General Rate Application, and experienced the same percentage change as the Domestic class.

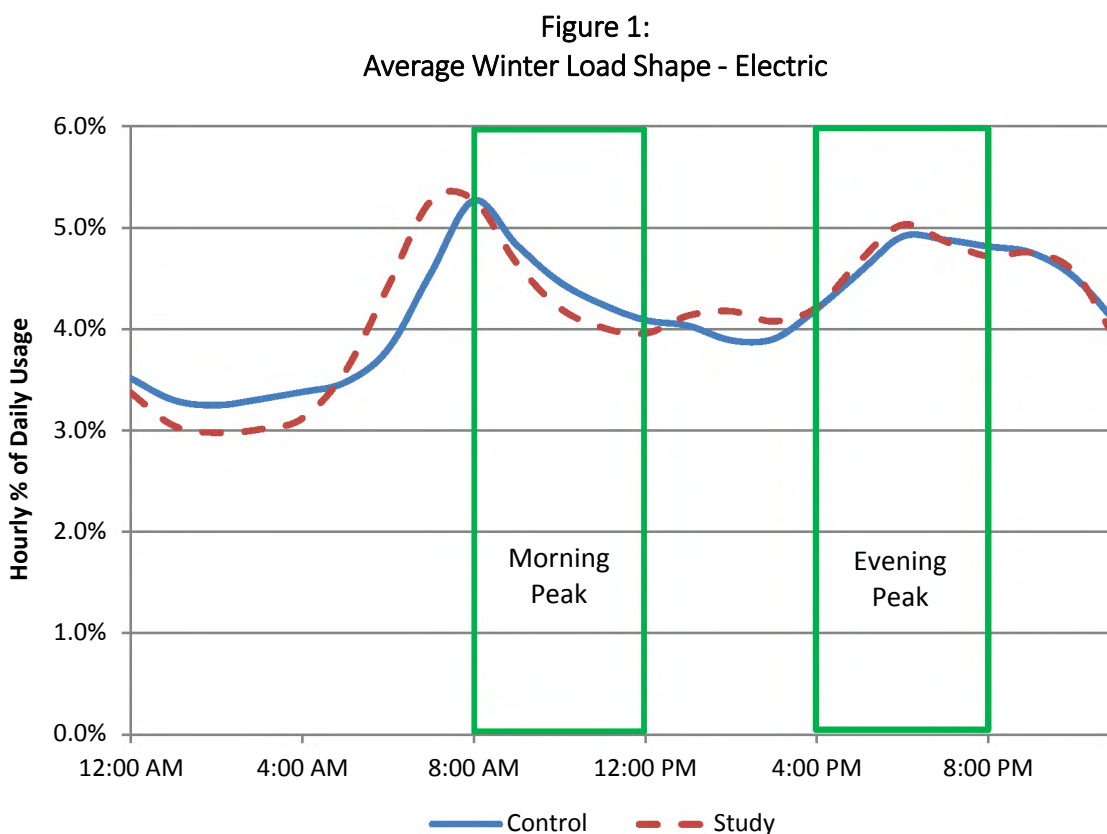
### 3. Results – Domestic Customers

#### a) Analysis of Load Data

The usage patterns of participants in the Study Group and the Control Group were compared to assess whether the TOD rates encouraged customers to reduce their consumption during peak periods.<sup>4</sup> Usage patterns were analyzed based upon the percentage of participants’ daily usage that occurred each hour. The results were plotted as average winter load shapes for each of the 3 classifications: (i) Electric; (ii) Dual Fuel; and (iii) Non-Electric.

##### i. Electric

Figure 1 shows the average winter load shape for Electric participants.<sup>5</sup>



<sup>4</sup> Newfoundland Power’s electrical system experiences 2 peak periods each weekday during the winter: (i) a morning peak that occurs between 8:00am and 12:00pm; and (ii) an evening peak that occurs between 4:00pm and 8:00pm.

<sup>5</sup> The hourly data for Figure 1 is provided in Table A-1 of Appendix A.

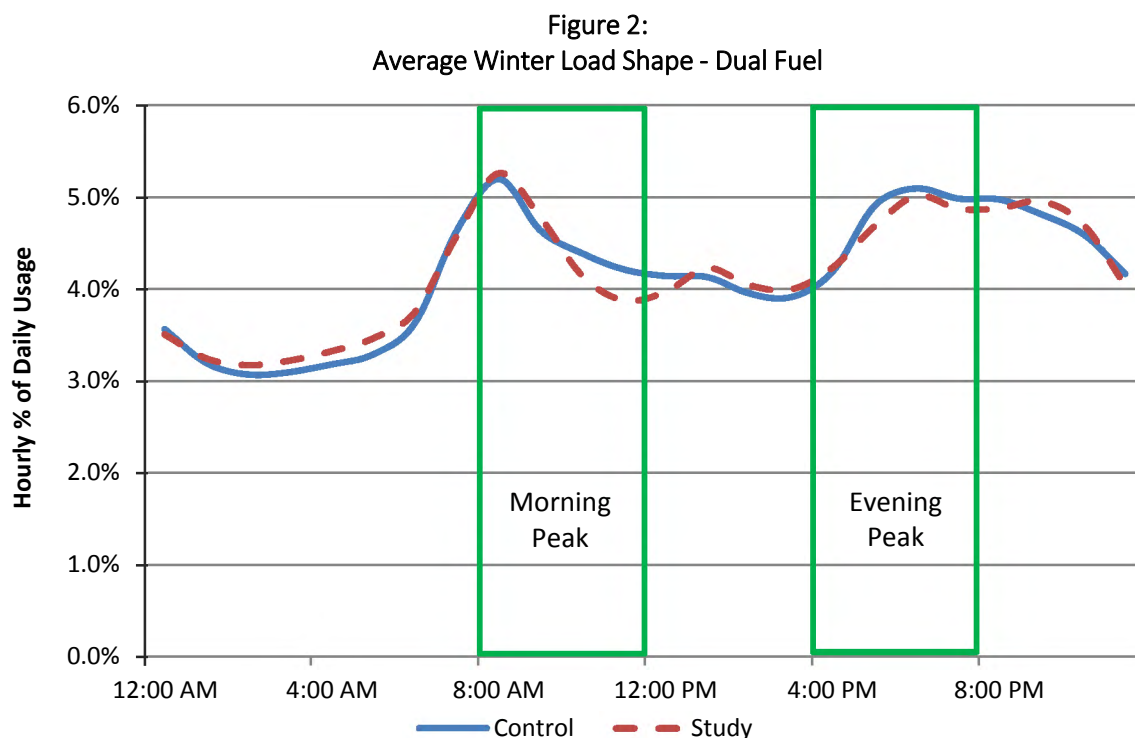
1 Figure 1 shows that, in comparison to the Control Group, Electric participants on the TOD rate  
 2 consumed less of their daily usage during the morning peak period. This corresponded with a  
 3 shift in their usage to an earlier period and a reduction in their overnight consumption. The shift  
 4 was most prominent among participants with programmable thermostats.<sup>6</sup>

5  
 6 The reduction in usage during the morning peak period equates to a reduction of 1.29 kWh per  
 7 customer, or 0.32 kW per hour.<sup>7</sup> This represents a 7% decrease in total usage during the  
 8 morning peak period.

9  
 10 No material differences in usage were observed during the evening peak period.

11  
 12 **ii. Dual Fuel**

13 Figure 2 shows the average winter load shape for Dual Fuel participants.<sup>8</sup>



<sup>6</sup> See Appendix B for this analysis.

<sup>7</sup> 1.29 kWh / 4 hours = 0.32 kW per hour.

<sup>8</sup> The hourly data for Figure 2 is provided in Table A-2 of Appendix A.

1 Figure 2 shows that, in comparison to the Control Group, Dual Fuel participants on the TOD rate  
 2 consumed less of their daily usage during the latter half of the morning peak period. However,  
 3 the result was not statistically significant.<sup>9</sup>

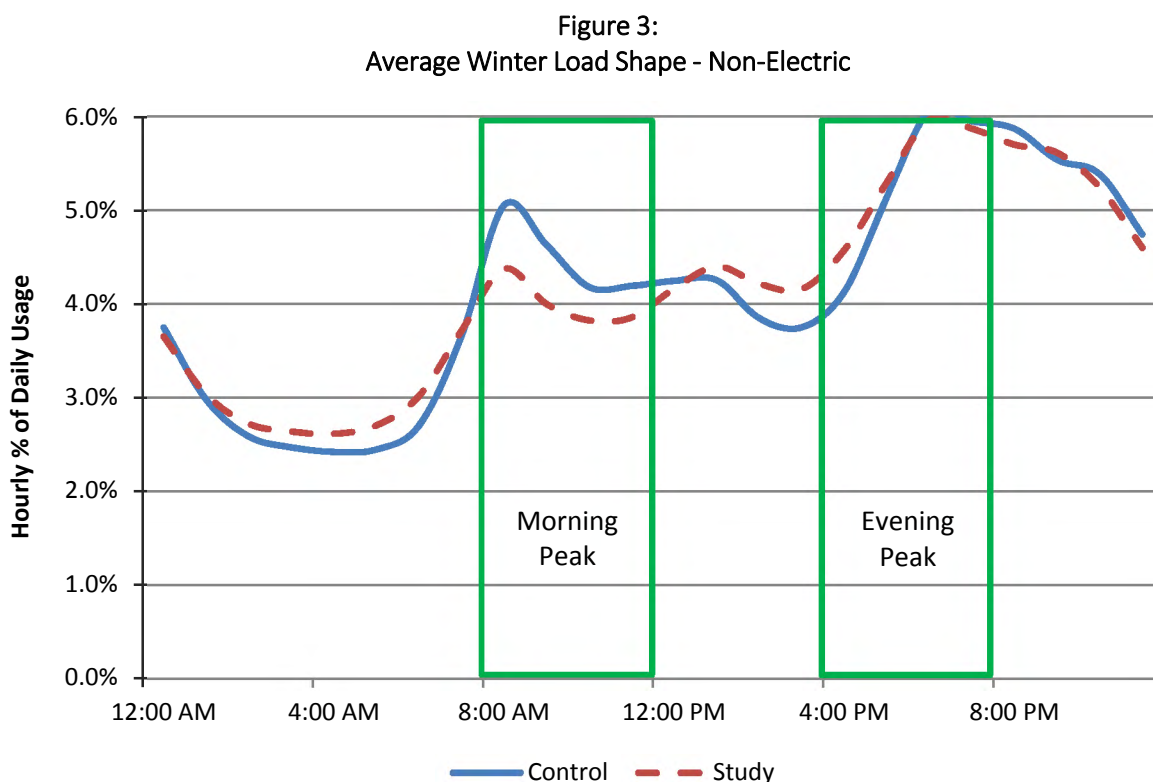
4

5 No material differences in usage were observed during the evening peak period.

6

7 **iii. Non-Electric**

8 Figure 3 shows the average winter load shape for Non-Electric participants.<sup>10</sup>



9 Figure 3 shows that, in comparison to the Control Group, Non-Electric participants on the TOD  
 10 rate consumed less of their daily usage during the morning peak period. This appears to reflect a  
 11 shift in usage to the afternoon off-peak period.

<sup>9</sup> The statistical analysis did not find the differences in consumption during the morning on-peak period to be statistically significant at the 90% confidence level and that the differences may be due to random variations in results.

<sup>10</sup> The hourly data for Figure 3 is provided in Table A-3 of Appendix A.

1 The reduction in usage during the morning peak period equates to a reduction of 0.8 kWh per  
 2 customer, or 0.2 kW per hour.<sup>11</sup> This represents a 15% decrease in total usage during the  
 3 morning peak period.

4

5 No material differences in usage were observed during the evening peak period.

6

## 7 **b) Billing Impacts**

---

8 Customers who were part of the Study Group were given the opportunity to retain any cost  
 9 savings they achieved. Any billing increase resulting from participation in the Study was  
 10 refunded at the end of each year.

11

12 Table 3 shows the customer billing impact of the TOD rate by classification for the study period.

Table 3: Study Group - Overall Bill Impact				
Impact	Electric	Dual Fuel	Non-Electric	Total
Bill Decreased	84%	87%	100%	91%
Bill Increased	16%	13%	0%	9%

13 For those on the TOD rate, the majority of participants in all classifications received a billing  
 14 decrease. This ranged from 100% of Non-Electric participants receiving a billing decrease, to  
 15 84% of Electric participants.

---

<sup>11</sup> 0.8 kWh / 4 hours = 0.2 kW per hour.

1 Table 4 breaks down the scale of billing decreases experienced by Study Group participants.

Table 4: Study Group – Breakdown of Billing Decreases				
Annual Impact (%)	Electric	Dual Fuel	Non-Electric	Total
-5 to -4	-	-	3%	1%
-4 to -3	-	10%	43%	19%
-3 to -2	-	17%	40%	20%
-2 to -1	22%	30%	11%	20%
-1 to 0	62%	30%	3%	31%
<b>Total</b>	<b>84%</b>	<b>87%</b>	<b>100%</b>	<b>91%</b>

2 Half of the billing decreases experienced by participants equaled 2% or less. On average, billings  
 3 to customers decreased by 1.6% from what they would have experienced under standard  
 4 customer rates. Average billings for Electric, Dual Fuel and Non-Electric participants decreased  
 5 by 0.5%, 1.2%, and 2.8%, respectively.

6

### 7 **c) Participant Feedback**

8 Newfoundland Power conducted participant surveys in April 2013 following the second winter  
 9 season of the study period. Participants in both the Study Group and the Control Group were  
 10 surveyed.<sup>12</sup>

11

12 Participant feedback on the TOD rate was generally positive. Participants generally responded  
 13 that the TOD rate was easy to understand and that they would like to see it available as a rate  
 14 option. About 35% of the Study Group indicated that they would choose the TOD rate over the  
 15 standard rate. When asked if the TOD rate should be mandatory, only 18% responded positively.

<sup>12</sup> Approximately 87% and 75% of the Study Group and Control Group responded to the survey, respectively.



1 Participant feedback on the ease of shifting their load was not entirely consistent with the load  
 2 data analysis. Approximately 68% of participants responded positively when asked how easy it  
 3 was to shift their usage during the morning period. While the analysis of load data did not show  
 4 any decreases in consumption during the evening peak period, about 62% of participants  
 5 responded positively when asked how easy it was to shift their usage during the evening period.

6  
 7 Participants were asked if they altered the time of use of specific end-uses as a result of  
 8 participation in the Study. Table 5 shows which end-uses the Study Group reported that they  
 9 shifted to a different period.

Table 5: Study Group - Load Shifting by End-Use	
Household End-Use <sup>13</sup>	Overall
Dishwasher	89%
Washer	83%
Dryer	85%
Shower/Bathtub	32%
Electric Heaters	40%
Electric Range	12%
Electric Oven	24%

10 Participants indicated that it was easiest to shift their load by altering their use of dishwashers,  
 11 washers and dryers. Altering use of showers/bathtubs, electric heaters and electric  
 12 ranges/ovens was reported as less easy.

---

<sup>13</sup> The data excludes Study Group participants for which the end-use was not applicable.

1 Both the Study Group and the Control Group participants were asked how often they completed  
 2 various end-uses during the peak periods. Table 6 compares the portion of participants who  
 3 always or usually completed specific end-uses during the morning and evening peak periods.

Table 6: Frequency of End-Uses (Always or Usually) - Morning and Evening Peak Period						
Household End-Use	Morning Peak Period			Evening Peak Period		
	Control Group	Study Group	Change	Control Group	Study Group	Change
Dishwasher	9%	0%	-9%	47%	25%	-22%
Washer	23%	5%	-18%	31%	28%	-3%
Dryer	20%	5%	-15%	31%	28%	-3%
Shower/Bath	74%	40%	-34%	33%	18%	-15%
Electric Heaters	58%	46%	-12%	61%	69%	+8%
Electric Range	33%	23%	-10%	90%	81%	-9%
Electric Oven	8%	7%	-1%	64%	62%	-2%

4 During the morning peak period, participants in the Study Group reported performing all end-  
 5 uses less frequently than those in the Control Group. The largest difference was reported for  
 6 showers/baths.

7  
 8 During the evening peak period, participants in the Study Group reported performing all but 1  
 9 end-use less frequently than the Control Group (running electric heaters). The largest difference  
 10 between the Study Group and the Control Group during the evening peak period was reported  
 11 for dishwasher use.

12

### 13 **d) Impact of Energy Monitors**

14 Surveys were used to determine how energy monitors may have influenced customers' usage.  
 15 Detailed survey results are provided in Appendix D.

1 Overall, the survey results showed:

2 (i) **Use of the energy monitor varied.** Approximately 55% of participants indicated they  
3 viewed the energy monitor at least several times per month, with 21% less than once  
4 a month and 24% indicating never.

5 (ii) **The energy monitor was easy to understand.** Approximately 92% of participants  
6 assigned a rating of Excellent, Good or Fair in terms of understandability.

7 (iii) **The energy monitor was perceived as useful in conserving energy.** Approximately 82%  
8 of participants assigned a rating of Excellent, Good or Fair in terms of how useful the  
9 monitor was in supporting conservation efforts.

10 (iv) **The energy monitor was perceived as useful in shifting load.** Approximately 85% of  
11 participants assigned a rating of Excellent, Good or Fair in terms of how useful the  
12 monitor was in supporting load shifting.

13 (v) **Participants were pleased with their energy monitor overall.** Approximately 89% of  
14 participants rated the device as Excellent, Good or Fair in terms of their overall  
15 satisfaction.

16

17 The impact of the energy monitors was also evaluated by comparing participants' monthly  
18 consumption during the Study to their consumption for the previous 2 years. Weather and other  
19 variables were used when assessing the results.<sup>14</sup>

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<sup>14</sup> The weather variables included heating degree days and wind speed. Square footage and number of persons in the home were also included as variables.

1 Table 7 shows how the energy monitors impacted the daily usage of participants.

Table 7: Impact of Energy Monitors on Daily Usage (Average Annual kWh/day)			
Heating type	Average Daily Usage (kWh)	Change in Daily Usage (kWh)	Change (%)
<b>ELECTRIC</b>			
Study Group	72.6	-1.12	-1.5%
Control Group	74.1	-0.50	-0.7%
<b>DUAL FUEL</b>			
Study Group	63.4	-3.12	-4.9%
Control Group	65.0	-3.67	-5.7%
<b>NON-ELECTRIC</b>			
Study Group	26.1	1.08	4.1%
Control Group	26.5	0.96	3.6%

2 Comparison of the data for the Study Group and the Control Group shows that the change in  
3 usage for each classification was similar. This suggests there were no added conservation effects  
4 associated with the energy monitors for participants on the TOD rate.

5  
6 While participants' feedback on the energy monitors were positive, the analysis of load data  
7 shows little impact on consumption. The only statistically significant reduction in daily usage  
8 occurred for Dual Fuel participants. This occurred for both Dual Fuel participants in the Study  
9 Group and the Control Group. Non-Electric participants actually experienced an *increase* in  
10 average daily use during the Study in comparison to their historical consumption.

## 4. Results - Large General Service

### a) Analysis of Load Data

---

To assess the impact of TOD rates on Large General Service customers, their hourly consumption during the Study was compared to their consumption for the previous 2 years.<sup>15</sup> The analysis was completed on a customer-by-customer basis.

Prior to the beginning of the Study, discussions with participants allowed the Company to collect relevant information on participants' operations.

Participant 1 indicated their demand was unnecessarily affected by the operation of water heating equipment. They subsequently modified how this equipment operated.

Participant 2 indicated they start heavy power processes before the beginning of the morning peak period and most of their primary processes for the day are completed by 4:00pm.

Participant 3 indicated they run a 24-hour-a-day operation with little flexibility to schedule operations in a way that complements TOD pricing.

Participant 4 did not provide information on their operations and did not indicate any action was taken to shift load away from peak periods.

---

<sup>15</sup> Customers served under Rate 2.4 are metered using interval metering. As a result, the Study had detailed consumption data for these customer for years prior to the Study.

1 Table 8 shows the change in consumption during peak periods for each Large General Service  
2 participant.

Table 8: Change in Portion of Usage During Peak Period for Large General Service Participants		
	Morning Peak	Evening Peak
Participant 1	-2.8%	-1.1%
Participant 2	-2.1%	+3.8%
Participant 3	-1.7%	-1.7%
Participant 4	+3.9%	+2.1%

3 Three Large General Service participants reduced the portion of their consumption during the  
4 morning peak by between 1.7% and 2.8%. Only 2 Large General Service participants reduced  
5 their consumption during the evening peak period. Reductions during the evening peak period  
6 were somewhat smaller in scale than those during the morning peak, ranging from 1.1% to 1.7%.

## 8 **b) Billing Impacts**

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9 All participants achieved billing decreases under the TOD rate. Savings averaged 2.9% (ranging  
10 from 1.2% to 4.7%) compared to what they would have experienced under standard rates.

## 12 **c) Participant Feedback**

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13 Three of the participants provided feedback regarding their opinion on the appropriateness of  
14 TOD rates for Large General Service customers. All 3 respondents indicated that a TOD rate  
15 should be made available as an optional rate. However, these participants also indicated they  
16 would only prefer the rate if it reduces their annual bills. All 3 respondents indicated they had a  
17 positive experience as a participant in the Study.

## 5. Comparison to Other Studies

Newfoundland Power reviewed studies of TOD rates in other jurisdictions to assess the comparability of the results obtained as part of this Study. To do so, the Company looked at studies where the TOD rate price differential was comparable to that used in this Study (i.e. 48% to 56%).

A study of TOD rates in Ontario was completed by The Brattle Group for the Ontario Power Authority in November 2013. In this case, the TOD rate price differential was approximately 50%. The results of that study showed reductions in usage under TOD rates ranging from 2.6% to 5.7% in the summer and 1.6% to 3.2% in the winter, depending on the utility.<sup>16</sup>

The Brattle Group compared the results of their study to 42 other studies of TOD rates globally. The analysis showed the effects on usage vary depending on the scale of price differentials. For jurisdictions with price differentials of approximately 50%, there was an average reduction in usage of approximately 3% during the summer, appearing to range between 2% and 8%.<sup>17</sup> This compares to reductions in usage observed by Newfoundland Power of 7% to 15% in the winter morning peak periods.

Overall, while system characteristics and study methodologies differ, the analysis suggests the changes in usage observed among Newfoundland Power's customers on TOD rates are broadly comparable to what has been experienced in other jurisdictions.

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<sup>16</sup> The Brattle Group, *Impact Evaluation of Ontario's Time-of-Use Rates: First Year Analysis*, prepared for the Ontario Power Authority, November 26, 2013, page 19.

<sup>17</sup> *Ibid.*, pages 20-21 (figure 6.4).

## Appendix A: Load Data Analysis

Tables A-1 through A-3 provide the hourly data shown in the Average Winter Load Shapes provided as Figures 1 through 3 of this report.

<b>Table A-1: Electric – Percentage of Usage Per Hour</b>		
<b>Hour Beginning</b>	<b>Control Group</b>	<b>Study Group</b>
12:00am	3.52%	3.37%
1:00am	3.30%	3.05%
2:00am	3.25%	2.98%
3:00am	3.31%	3.01%
4:00am	3.38%	3.12%
5:00am	3.47%	3.58%
6:00am	3.80%	4.42%
7:00am	4.55%	5.27%
8:00am	5.27%	5.27%
9:00am	4.83%	4.65%
10:00am	4.47%	4.21%
11:00am	4.24%	4.02%
12:00pm	4.09%	3.96%
1:00pm	4.03%	4.13%
2:00pm	3.89%	4.18%
3:00pm	3.90%	4.08%
4:00pm	4.20%	4.22%
5:00pm	4.56%	4.67%
6:00pm	4.91%	5.03%
7:00pm	4.88%	4.87%
8:00pm	4.82%	4.72%
9:00pm	4.75%	4.75%
10:00pm	4.51%	4.56%
11:00pm	4.06%	3.87%
Total	100%	100%



<b>Table A-2: Dual Fuel – Percentage of Usage Per Hour</b>		
<b>Hour Beginning</b>	<b>Control Group</b>	<b>Study Group</b>
12:00am	3.57%	3.51%
1:00am	3.20%	3.25%
2:00am	3.07%	3.17%
3:00am	3.10%	3.22%
4:00am	3.18%	3.33%
5:00am	3.29%	3.47%
6:00am	3.64%	3.76%
7:00am	4.64%	4.59%
8:00am	5.20%	5.26%
9:00am	4.64%	4.78%
10:00am	4.39%	4.15%
11:00am	4.21%	3.88%
12:00pm	4.14%	3.97%
1:00pm	4.13%	4.23%
2:00pm	3.95%	4.04%
3:00pm	3.91%	4.00%
4:00pm	4.19%	4.24%
5:00pm	4.91%	4.69%
6:00pm	5.10%	5.02%
7:00pm	4.99%	4.88%
8:00pm	4.97%	4.88%
9:00pm	4.81%	4.96%
10:00pm	4.60%	4.70%
11:00pm	4.17%	4.04%
Total	100%	100%

<b>Table A-3: Non-Electric – Percentage of Usage Per Hour</b>		
<b>Hour Beginning</b>	<b>Control Group</b>	<b>Study Group</b>
12:00am	3.75%	3.65%
1:00am	2.98%	3.04%
2:00am	2.59%	2.72%
3:00am	2.47%	2.64%
4:00am	2.42%	2.62%
5:00am	2.45%	2.71%
6:00am	2.70%	3.02%
7:00am	3.66%	3.72%
8:00am	5.05%	4.38%
9:00am	4.63%	4.00%
10:00am	4.18%	3.83%
11:00am	4.19%	3.86%
12:00pm	4.25%	4.17%
1:00pm	4.25%	4.40%
2:00pm	3.85%	4.22%
3:00pm	3.75%	4.16%
4:00pm	4.13%	4.58%
5:00pm	5.14%	5.30%
6:00pm	6.06%	5.97%
7:00pm	5.95%	5.87%
8:00pm	5.87%	5.70%
9:00pm	5.54%	5.61%
10:00pm	5.38%	5.24%
11:00pm	4.74%	4.60%
Total	100%	100%

## Appendix B: Analysis of End-Uses

### a) General

Additional analyses were completed to determine what contributed to the statistically significant changes in consumption for Electric and Non-Electric participants during the morning peak period. The analysis focused on: (i) changes in consumption for Electric participants with and without programmable thermostats; and (ii) changes in consumption for Non-Electric participants with and without electric water heating.

Table B-1 shows the number of Electric participants with and without programmable thermostats in the Control Group and the Study Group.<sup>18</sup>

<b>Table B-1: Electric Participants with Programmable Thermostats</b>		
	<b>Control Group</b>	<b>Study Group</b>
With Programmable Thermostats	15	16
Without Programmable Thermostats	12	12
<b>Total</b>	<b>27</b>	<b>28</b>

Table B-2 shows the number of Non-Electric participants with and without electric water heating in the Control Group and the Study Group.<sup>19</sup>

<b>Table B-2: Non-Electric Participants with Electric Water Heating</b>		
	<b>Control Group</b>	<b>Study Group</b>
With Electric Water Heating	13	10
Without Electric Water Heating	20	26
<b>Total</b>	<b>33</b>	<b>36</b>

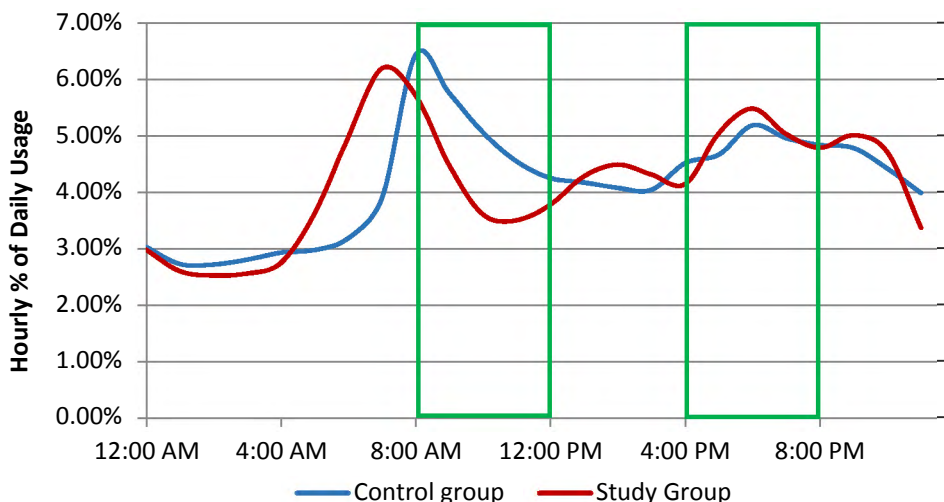
<sup>18</sup> Information on participants' thermostats was collected through surveys. For the Electric category, the type of thermostat was not known for 12 participants in the Control Group and 4 participants in the Study Group. Data for these participants was therefore excluded from this analysis.

<sup>19</sup> Information on participants' water heating was collected through surveys. For the Non-Electric category, the type of water heating was not known for 1 participant in the Study Group. Data for this participant was therefore excluded from this analysis.

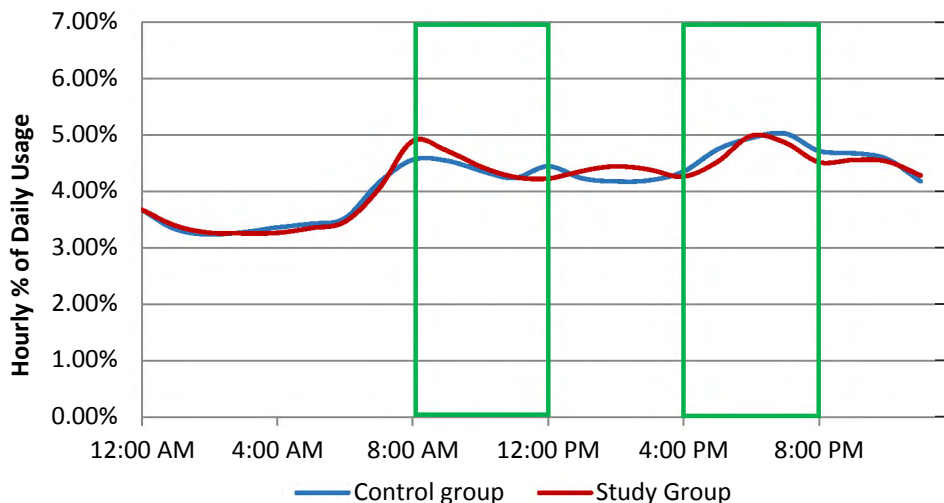
## b) Programmable Thermostats

Figures B-1 and B-2 provide average winter load shapes<sup>20</sup> for Electric participants with and without programmable thermostats, respectively.

**Figure B-1: Average Winter Load Shape - Electric Participants with Programmable Thermostats**



**Figure B-2: Average Winter Load Shape - Electric Participants without Programmable Thermostats**



A comparison of Figures B-1 and B-2 show: (i) Electric participants with programmable thermostats use more of their daily consumption during the morning peak period in comparison to those without; and (ii) load shifting was more pronounced during the morning peak period among Electric participants with programmable thermostats on the TOD rate.<sup>21</sup>

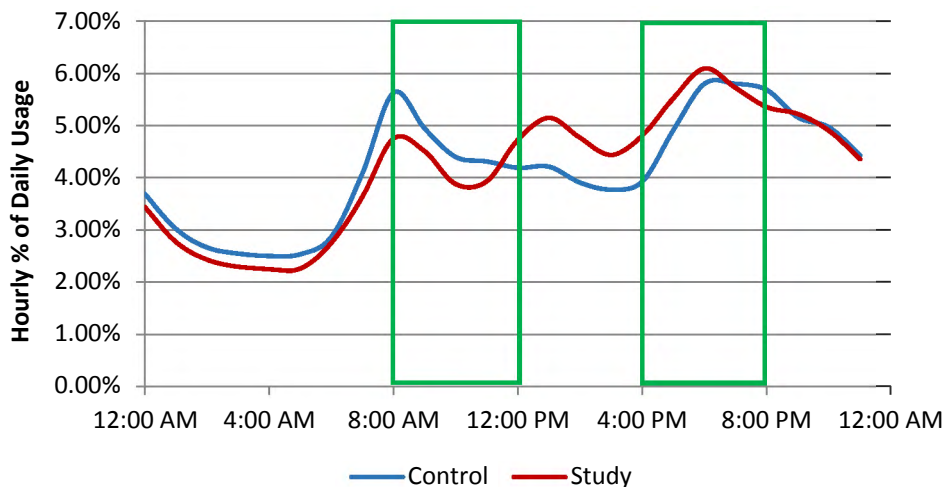
<sup>20</sup> Load data from January 2012 was used here.

<sup>21</sup> Statistical analysis determined there is a greater than 95% confidence that the difference in morning on-peak consumptions in Figure B-1 is not due to random variations in results. The difference observed in Figure B-2 was determined not to be statistically significant.

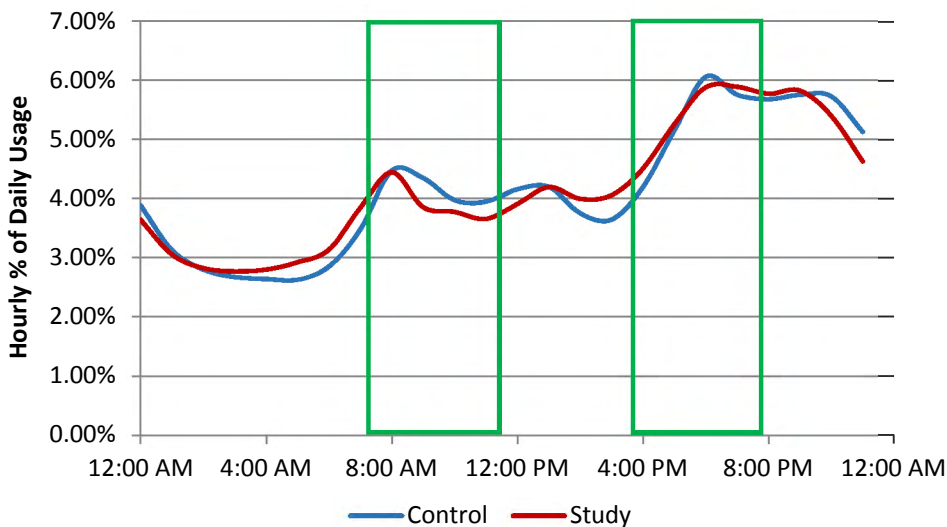
### c) Electric Water Heating

Figures B-3 and B-4 provide average winter load shapes<sup>22</sup> for Non-Electric participants with and without electric water heating, respectively.

**Figure B-3: Average Winter Load Shape – Non-Electric Participants with Electric Water Heating**



**Figure B-4: Average Winter Load Shape – Non-Electric Participants without Electric Water Heating**



A comparison of Figures B-3 and B-4 show similar load shifting during the morning peak period for participants with and without electric water heating. This suggests the load shifting observed for Non-Electric participants was due to an end-use other than water heating.<sup>23</sup>

<sup>22</sup> Load data from December 2011 to March 2012 was used here.

<sup>23</sup> A statistical analysis found there is slightly less than 90% confidence that the differences in morning peak consumption observed in Figure B-3 is not due to random variations in results, while the difference in the morning peak consumption in Figure B-4 is not statistically significant.

## Appendix C: Participant Feedback on TOD Rates

Newfoundland Power surveyed Study Group participants in April 2013 to assess their opinions of the Study and TOD rates. In total, 85 participants completed the survey. The results of the survey are provided in Tables C-1 through C-7.

<b>Table C-1: Preference for TOD Rate</b>	
Question C-1: Given the option, I would prefer the Time of Day Rate over the Standard Residential Rate, even if there was no guarantee that my annual billing would not increase.	
<b>Response</b>	<b>Number of Responses</b>
Strongly Agree	4
Agree	26
Neutral	33
Disagree	16
Strongly Disagree	6

<b>Table C-2: Ease of Understanding TOD Rate</b>	
Question C-2: The Time of Day Rate structure is easy to understand.	
<b>Response</b>	<b>Result</b>
Strongly Agree	37
Agree	36
Neutral	6
Disagree	5
Strongly Disagree	1

<b>Table C-3: High Winter Bills on TOD Rate</b>	
Question C-3: During the winter months, my bills under the Time of Day Rate were very high.	
<b>Response</b>	<b>Result</b>
Strongly Agree	11
Agree	22
Neutral	29
Disagree	21
Strongly Disagree	2

**Table C-4:  
TOD Rate Should Be an Option**

Question C-4: The Time of Day Rate should be made available as an option for all customers.

<b>Response</b>	<b>Result</b>
Strongly Agree	17
Agree	51
Neutral	12
Disagree	5
Strongly Disagree	0

**Table C-5:  
TOD Rate Should Be Mandatory**

Question C-5: The Time of Day Rate should be mandatory for all customers.

<b>Response</b>	<b>Result</b>
Strongly Agree	3
Agree	12
Neutral	39
Disagree	24
Strongly Disagree	7

**Table C-6:  
Ease of Shifting Morning Usage**

Question C-6: How easy was it for you to shift your usual morning electricity usage to off-peak times during the winter months?

<b>Response</b>	<b>Result</b>
Very Easy	20
Somewhat Easy	38
Somewhat Difficult	15
Very Difficult	6
Didn't Try	6

**Table C-7:  
Ease of Shifting Evening Usage**

Question C-7: How easy was it for you to shift your usual evening electricity usage to off-peak times during the winter months?

<b>Response</b>	<b>Result</b>
Very Easy	8
Somewhat Easy	45
Somewhat Difficult	20
Very Difficult	6
Didn't Try	6

## Appendix D: Participant Feedback on Energy Monitors

Newfoundland Power surveyed participants in the Study Group and the Control Group to assess their use of the energy monitors that were provided. In total, 169 of 209 participants responded to the survey. The survey results are provided in Tables D-1 through D-4.

<b>Table D-1: Energy Monitor - Frequency of Use</b>	
<b>Response</b>	<b>Result</b>
Daily	15%
Several Times a Week	21%
Several Times a Month	19%
Less Than Once a Month	21%
Never	24%

<b>Table D-2: Energy Monitor – Easy to Understand</b>	
<b>Response</b>	<b>Result</b>
Excellent	25%
Good	44%
Fair	23%
Poor	4%
Very Poor	4%

<b>Table D-3: Energy Monitor – Useful in Helping Conserve Energy</b>	
<b>Response</b>	<b>Result</b>
Excellent	16%
Good	38%
Fair	28%
Poor	13%
Very Poor	6%

<b>Table D-4: Energy Monitor – Useful for Helping Shift Energy Usage (Study Group Only)</b>	
<b>Response</b>	<b>Result</b>
Excellent	18%
Good	38%
Fair	29%
Poor	10%
Very Poor	6%