Regulated Price Plan Pilot – Interim Report Addendum

Submitted to the Ontario Energy Board

Alectra Utilities with its partner BEworks

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Note: This is the addendum to the *Regulated Price Plan – Interim Report* which was submitted to the Ontario Energy Board in April 2019.

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Legacy Dynamic Impact Analysis

Legacy Dynamic Plan Overview

The results of the *New Dynamic Pilot* estimated the effects of Dynamic Pricing on newly enrolled households during the summer of 2018. However, there exists approximately 1,500 households who enrolled in Dynamic Pricing between 2015-2016 (hereafter 'Legacy Dynamic' customers) and have been exposed to Dynamic Pricing over a longer period of time. The purpose of this section is to estimate how Dynamic Pricing affects customers over this extended period of time in order to determine whether the original effects found were sustained, increased over time, or whether there were habituation effects in behavioural responsiveness to Dynamic Pricing.

The procedure for measuring effects of the Legacy households will differ slightly compared to the estimation used in the New Dynamic Pilot. The Legacy analysis will compare consumption between the Treatment and Control group for each year between 2014-2018, meaning this procedure ***will not*** include a difference-in-difference approach. Furthermore, as participants in the Legacy Dynamic Pilot were entered into the pilot on different dates, a procedure for measuring the varying durations of exposure to Dynamic Pricing within the Legacy group is required. Registration dates for Legacy Dynamic customers are shown in Table 1**.**

Table 1: Breakdown of Registration Dates for Legacy Dynamic Participants

	On or Before May 1st, 2015	October 1st, 2015 – May 4th, 2016	After June 1st, 2016
Number of Registrations	992	816	55

Based on the observed registration dates in Table 1, we observed three natural distinctions in the registration dates. 992 households were signed up when the pilot was first introduced on May 1st, 2015. The next major registration period was between October 1st, 2015 – May 4th, 2016. These 816 households would ***not*** have been exposed to Dynamic Pricing in the Summer of 2015, but would have been exposed to Dynamic Pricing during the Summer of 2016. The remaining 55 households signed up after June 1st, 2016, meaning that 2017 would have been the earliest full summer registration. Based on this data, we created two bins of households: **Registration Bin 1** (registration date on or before May 1st, 2015) and **Registration Bin 2** (registration date between October 1st, 2015 and May 4th, 2016). Households in **Registration Bin 3 (registration after June 1st 2016)** were excluded from the analysis as the sample size was too small to allow for the derivation of meaningful impacts.

The final number of participants for the Legacy Dynamic Pilot (N size) is displayed in Table 2. The Legacy Dynamic Pilot began with 1,863 participants, each treatment participant was assigned a matched control

for summer and winter separately Potter et al., (2016)[1]. Table 2 shows the breakdown of the total number of participants attrition rates due to either households moving out of the service territory, households opting out of the program, missing data[2], or because household consumption was deemed to be an outlier[3]. Furthermore, we observed that some households participated in more than one pilot group (overlap with Enhanced, Dynamic, and Overnight) the numbers of these households were relatively small and so were simply removed from the estimation.

Table 2: Number of Participants for Dynamic Pilot

	Starting N	Opt-Outs	Move-Outs	Conflict with Other Pilots	Outliers[3]	Missing Data[2]	Interim Impact Total
Bin 1							
Legacy Dynamic Pricing	992	6	42	7	25	31	915
Summer Control	823	0	4	14	22	25	771
Total	1,815	6	46	21	47	56	1,685
Bin 2							
Legacy Dynamic Pricing	816	47	44	9	50	26	672
Summer Control	632	0	4	7	28	17	568
Total	1,448	47	48	16	78	43	1,240

*Note: As some households may have been removed for multiple criteria, Final (N) may be greater than the total number of ineligibilities

Next, in Table 3 we present a summary of average hourly consumption for the Legacy Dynamic Pilot from 2014 through 2018 divided by the two registration bins. Note that the baseline year for Registration Bin 1 was 2014, whereas the baseline years for Registration Bin 2 were 2014 and 2015.

[1] Potter, Candice., Jain, Ankit., Thompson, Daniel., and Cumming, Trevor., (2016) "peaksaverPLUS Program 2015 Load Impact Evaluation" *Nexant, Inc.*

[2] Any household who had missing data for any hour throughout the period of analysis was removed.

[3] An outlier was defined as any household who consumed more than 15kWh per hour, less than 0.05kWh per hour during any hour in the analysis period

Table 3: Summary of Average Hourly Consumption (kWh/h) per Condition for Legacy Dynamic Pilot

	Legacy Dynamic Peak	Legacy Dynamic Off Peak	Control Peak	Control Off Peak
Registration Date Bin 1				
2014	1.303	0.903	1.236	0.866
2015	1.230	0.956	1.486	0.888
2016	1.437	1.039	1.690	0.947
2017	1.103	0.919	1.292	0.806
2018	1.499	1.021	1.586	0.916
Registration Date Bin 2				
2014	1.238	0.878	1.180	0.844
2015	1.486	0.922	1.388	0.863
2016	1.479	0.990	1.572	0.903
2017	1.203	0.878	1.236	0.789
2018	1.497	0.983	1.520	0.909

Results for Legacy Dynamic

Results for Peak (High, Medium, Low), Off-Peak, CPP Days, and Peak-System Load Impacts for Registration Bin 1 are displayed in Table 4 and in Table 5 for Registration Bin 2.

High On-Peak

For households in both Registration Bins we observed the following trends for High Peak impacts: Consumption of electricity during High Peak hours was *lower* for customers in the Legacy Dynamic Treatment group relative to control ***in all years after the Baseline Year (2014 or 2015).*** This indicates that the effect persisted even well after the initial sign-up. However, this effect showed a clear and robust habituation effect over time. For Registration Bin 1, households in the Treatment group consumed on average -0.37kWh, -0.35kWh, -0.29kWh, and -0.15kWh less energy (relative to Control) during High Peak hours in 2015, 2016, 2017, and 2018 respectively. For Registration Bin 2, the effect was -0.15kWh, -0.07kWh, and-0.05kWh in 2016, 2017, and 2018 respectively.

To control for seasonal variation, we also observed the effects as a percentage decrease (to account for lower expected savings in milder Summers). In this case, savings measured as a percentage remained consistent from 2015-2017 (2016-2017 in Registration Bin 2), ***until 2018*** where we observed a

habituation effect relative to previous years. For example, in Registration Bin 1 the effects as a percentage of consumption were -24%, -21%, -24%, and -9% in 2015, 2016, 2017, and 2018 respectively.

Moreover, we observed a significant difference between **the Baseline Years** between Control and Treatment. In both Registration Bins, High Peak consumption was ***higher in the Treatment*** before the program began. The implication of this does not alter the habituation effect observed. However, this would suggest that the estimates shown are likely *underestimating* the true impact. For example, households in the Treatment condition used 3.56% more High On-Peak energy in the baseline year, therefore if the Treatment condition used 8.87% less High On-Peak in 2018, incorporating the difference-in-difference approach would result in a 12.43% reduction rather than an 8.87% reduction. Given that the baseline year (2014) is 4 years removed from the most recent results (2018), we recommend discretion when discounting for the 2014 baseline year.

Overall, we conclude that a clear reduction in High Peak consumption was observed between Treatment and Control in all years, with a habituation effect occurring over time, meaning that as exposure duration to Dynamic Pricing Treatment increases, behavioral response to Dynamic Pricing during Peak hours decreases.

<u>Medium On-Peak</u>

With respect to the Medium Peak days, in Registration Bin 1, the effects were similar to the effects observed during High Peak hours. There was a reduction ***in all years*** compared to the Control group and a strong habituation effect occurring in 2018.

In Registration Bin 2, there was a reduction in consumption during Medium Peak hours for the Treatment Group in 2016, but not in 2017 or 2018. However, after controlling for the Baseline difference (Treatment had a higher baseline consumption than Control) these differences were significant. In this group, the habituation effect was strongest after Year 1.

Overall, we conclude that there was a reduction in consumption during Medium Peak hours in the Treatment Group relative to Control in all years (when controlling for baseline differences). This reduced consumption during Medium Peak hours decreased overtime indicating a small habituation effect occurred.

<u>Low On-Peak</u>

With respect to consumption during Low Peak hours, Treatment households in Registration Bin 1 consumed less Low Peak energy than the Control group in 2015 and 2017. However, in 2018 the Treatment Group consumed ***more*** during Low Peak hours than the Control group.

With respect to Registration Bin 2, the Treatment group used ***more*** Low Peak energy than Control in all years 2014-2018 (including baseline). We observed a small increase over time in usage (compared to Control) for households in the Treatment Group.

Overall, we conclude that a small reduction in Low Peak consumption was observed in the Treatment Groups, which over time changed to a relative ***increase*** in consumption compared to the Control group.

Off-Peak

During Off-Peak hours, the pattern was consistent across the two Registration Bins. In general, we observed an increase in Off-Peak consumption in the Treatment group compared to Control, and this increase ***increased*** over time. The increase appears to peak in the third year of participation.

Overall, we conclude that the Treatment group consumed more Off-Peak energy than the Control group. Moreover, this behavioural response to Off-Peak consumption ***increased*** over time, leading to higher Off-Peak consumption in the Treatment group in each subsequent year.

Critical Peak Period

With respect to CPP events, the pattern was consistent across the two Registration Bins. We observed large decreases in consumption relative to Control during CPP hours in the first year. Consumption in the Treatment Group was less than Control in all years, but with a diminishing effect over time. For example, in Registration Bin 1 the year-to-year effect (relative to Control) was a 52% decrease in 2015, a 46% decrease in 2016, a 33% decrease in 2017, and a 20% decrease in 2018.

Overall, we conclude that the Treatment group lead to significant savings during the CPP hours in each year. However, we observed that these savings ***decreased*** in each subsequent year, meaning we found a small habituation effect. Despite the habituation effect, savings during CPP hours were still statistically significant in 2018.

System Coincident Peak

During the System Coincident Peak we see a slight difference between Registration Bins 1 and 2. In registration Bin 1 we see a large decrease in consumption during 2015 and 2016 of 17% and 20% respectively. This decrease decreases to 8% and 8% in 2017 and 2018 respectively.

In Registration Bin 2, the Treatment group used ***more*** than Control in all years 2014-2018 (including baseline). We observe a small increase in usage over time (compared to Control) for households in the Treatment Group.

Overall, we conclude that there is a diminishing impact on System Coincident Peak savings over time. This effect appears to stabilize at around 8% in both Registration Bins 1 and 2 when controlling for differences in baseline consumption.

Monthly Impacts

Monthly impacts are shown in Table 6. Overall, Treatment customers consumed more electricity than Control customers ***in all years, including Baseline.*** The monthly impact ***increased over time*** in both Registration Bins 1 and 2. This coincides with our findings that Peak Savings diminished over time, while Off Peak usage increased over time (i.e., load-shifting).

Overall, we conclude that monthly consumption ***increases*** over time for households participating in the Dynamic Pilot. This is noteworthy because, in Year 1 of participating in the Dynamic Pilot, we observed large savings during High On-Peak, Medium On-Peak, and CPP hours due to Pilot price changes. However, overtime households conserve less during the higher priced hours and instead consume more during lower priced hours, leading to a ***higher overall consumption*** after 3-4 years of exposure on the pilot.

Table 4: Dynamic Pilot Average Hourly Consumption per TOU Period (Summer Impacts) (Bin 1)

Consumption Relative to Control					
TOU Period	**Baseline 2014**	Dynamic Pricing (Main Effect) 2015	Dynamic Pricing (Main Effect) 2016	Dynamic Pricing (Main Effect) 2017	Dynamic Pricing (Main Effect) 2018
High Peak (kWh)	**+0.066*** **	**-0.366*** **	**-0.350*** **	**-0.286*** **	**-0.149*** **
High Peak (%)	**+3.56*** **	**-23.96*** **	**-20.97*** **	**-24.31*** **	**-8.87*** **
Medium Peak (kWh)	**+0.070*** **	**-0.121*** **	**-0.150*** **	**-0.114*** **	**-0.0760*** **
Medium Peak (%)	**+3.65***	**-9.79*** **	**-10.82*** **	**-11.70*** **	**-5.07*** **
Low Peak (kWh)	**+0.060*** **	-0.020	-0.007	**-0.045** **	+0.025†
Low Peak (%)	**+3.33** **	**-3.22** **	-1.62	**-6.47*** **	**+2.73***
CPP (kWh)	N/A	**-0.721*** **	**-0.700*** **	**-0.437*** **	**-0.265*** **
CPP (%)	N/A	**-51.67*** **	**-45.50*** **	**-33.15*** **	**-19.96*** **
Off Peak (kWh)	**+0.036*** **	**+0.067*** **	**+0.090*** **	**+0.114*** **	**+0.102*** **
Off Peak (%)	**+2.41***	**+6.09*** **	**+8.25*** **	**+12.97*** **	**+10.41*** **
System Coincident Peak (kWh)	0.054	**-0.170*** **	**-0.266*** **	**-0.076***	**-0.097** **
System Coincident Peak (%)	2.58	**-16.63*** **	**-20.08*** **	**-7.70** **	**-8.22** **

*** p < 0.001; ** p < 0.01; * p < 0.05; † p < 0.1*

Table 5 Dynamic Pilot Average Hourly Consumption per TOU Period (Summer Impacts) (Bin 2)

Consumption Relative to Control					
TOU Period	**Baseline 2014**	**Baseline 2015**	Dynamic Pricing (Main Effect) 2016	Dynamic Pricing (Main Effect) 2017	Dynamic Pricing (Main Effect) 2018
High Peak (kWh)	**+0.053***	**+0.113*****	**-0.145*****	**-0.070***	**-0.045†**
High Peak (%)	**+4.30***	**+7.01****	**-9.10*****	**-7.82*****	**-3.69***
Medium Peak (kWh)	**+0.052***	**+0.102*****	**-0.043†**	+0.004	-0.020
Medium Peak (%)	**+4.07***	**+8.02*****	**-3.47***	-0.74	-1.51
Low Peak (kWh)	**+0.049****	**+0.090*****	**+0.038***	**+0.031****	**+0.053****
Low Peak (%)	**+3.79****	**+7.98*****	**+3.33***	+2.47	**+5.69*****
CPP (kWh)	N/A	+0.065†	**-0.348*****	**-0.181*****	**-0.144*****
CPP (%)	N/A	+2.39	**-23.63*****	**-16.43*****	**-10.05*****
Off Peak (kWh)	**+0.037****	**+0.065*****	**+0.095*****	**+0.096*****	**+0.091*****
Off Peak (%)	**+4.09****	**+7.37*****	**+9.98*****	**+10.59*****	**+10.45*****
System Coincident Peak (kWh)	+0.021	+0.053	**-12.28****	-1.89	-4.99
System Coincident Peak (%)	+1.63	+4.29	**-10.22****	-3.46	-5.51

**** p < 0.001; ** p < 0.01; * p < 0.05; † p < 0.1*

Table 6: Dynamic Pilot Average Hourly Consumption per Season

TOU Period	Consumption Relative to Control 2014	2015	2016	2017	2018
Bin 1					
Summer Impact (kWh)	**+0.040*** **	**+0.036*** **	**+0.050*** **	**+0.071*** **	**+0.078*** **
Summer Impact (%)	**+2.76***	**+2.88****	**+4.40*** **	**+7.13*** **	**+7.81*** **
Bin 2					
Summer Impact (kWh)	**+0.039****	**+0.069*** **	**+0.073*** **	**+0.079*** **	**+0.077*** **
Summer Impact (%)	**+4.08****	**+7.43*** **	**+7.33*** **	**+8.16*** **	**+8.62*** **

*** p < 0.001; ** p < 0.01; * p < 0.05; † p < 0.1*

Daily and Substitution Elasticities are reported in Table 7. Daily elasticity of demand was estimated at -0.056. The daily elasticity of demand was negative and less than 1, indicating an inelastic daily demand curve. Substitution elasticity of demand was estimated at -0.0023 indicating a very inelastic substitution elasticity.

Table 7: Dynamic Pilot Daily and Substitution Elasticities of Demand

Elasticity Estimate	(%)
Daily Elasticity	**-0.056*** **
Substitution Elasticity On/Off-Peak	**-0.0023*** **

*** p < 0.001; ** p < 0.01; * p < 0.05; † p < 0.1*

Communication Analysis

In this section we report consumption impacts attributable to the Nudge Reports that were distributed to households in the Legacy Dynamic Group. Starting in May 2018 we randomly selected half of the Legacy Dynamic group to receive Nudge Reports. We report the effects of the Nudge Reports between Legacy Dynamic households who did not receive nudge reports (Control Group) to the households who did receive the Nudge Report (Treatment). For this section we used a difference-in-difference methodology to compare 2018 vs. 2017 consumption changes.

Results of the Nudge Report are shown in Table 8. Overall, we saw ***no effects*** of the Nudge Reports on consumption for households in Registration Bin 1 and ***very minor effects*** of the Nudge Report on consumption for households in Registration Bin 2. For households in Registration Bin 2 we observed a small increase in consumption during Low Peak hours, which translated to a small increase in the overall monthly consumption.

Table 10 shows the results of the Pledge analysis for households in the Nudge Report condition. In this scenario, households were asked to sign a pledge to commit to saving energy during On-Peak hours. Households who signed the pledge received a $5 rebate on a subsequent electricity bill. Only a small number of households signed the pledge Table 9, which restricted the power of the impact analysis. However, households who signed the pledge used less energy than those who did not during Low Peak hours, CPP hours, and System Peak hours (of which only system peak hours were significant at the 5% level).

Table 8: 2017-2018 Consumption Difference – Legacy Dynamic Customers Nudge Report vs. No Nudge Report

Difference-in-Difference Consumption Relative to Legacy Dynamic Customers with No Nudge Report						
High Peak (kWh)	Medium Peak (kWh)	Low Peak (kWh)	Off Peak (kWh)	CPP (kWh)	Month (kWh)	System Coincident Peak (kWh)
Bin 1						
-0.060	+0.019	-0.009	-0.006	+0.028	-0.010	+0.025
Bin 2						
+0.004	+0.019	**+0.04****	+0.014	-0.019	**+0.035*****	+0.008

Table 9: Pledge Numbers – Dynamic Condition

Control	Dynamic Pricing Pledge Not Signed	Dynamic Pricing Pledge Signed

888	826	56

Table 10 : Pledge Analysis – Dynamic Condition

Peak Period	Year-Year Average Hourly Consumption Change			
	No Communication (kWh)	Pledge not Signed (kWh)	Signed Pledge (kWh)	P-Value
Bin 1 and 2 Combined				
High	0.518	0.441	0.606	0.12
Medium	0.436	0.438	0.420	0.83
Low	0.119	0.129	0.083	0.06†
Off	0.101	0.103	0.127	0.21
CPP	0.264	0.282	0.131	0.08†
Month	0.118	0.134	0.122	0.51
System Peak	0.218	**0.245**	**0.124**	**0.03***

Summary of Dynamic Legacy Impacts

Based on the data presented we note two clear patterns observed in the Legacy Dynamic data. First, we observed that customers begin to habituate to the pricing differential between Dynamic Pricing and Standard TOU Pricing and as a result, the savings observed during CPP, High, and Medium Peak hours during Year 1 diminished by 2018. Households in Legacy Dynamic still continued to use less energy during CPP, High, Medium and System Coincident peak hours compared to Control, however at a diminished level in each subsequent year. Moreover, we observed the opposite pattern with respect to Low and Off-Peak hours. Households began to use more energy during Low and Off hours over time. The result of diminished Peak hour savings and higher Low and Off-Peak usage led to an ***increase*** in overall Monthly consumption in the Treatment relative to the Control group that emerged over time.

Based on this data, we conclude that as households remain in the program, they slowly adapt their consumption to consume more Low and Off-Peak energy, and focus less on conserving electricity during CPP, High, and Medium Peak hours.

Survey Summary

In addition to conducting the impact analysis to assess load shifting and conservation behaviour, surveys were sent to all participating RPP customers along with households in the control groups. The purpose of the surveys was to measure overall levels of comprehension of TOU pricing, RPP Pilot pricing plans (for treatment households), motivation to change behaviour, as well as to capture relevant demographic data and household characteristics (e.g. electric vehicle (EV) ownership and use of a programmable thermostat).

To estimate effects of the RPP Pricing pilots over time on the above metrics, surveys were deployed at the beginning of the pilot April 2018 at the six month mark October 2018, and a final survey will be deployed at the end of the pilot (slated for deployment on June 01, 2019). This interim report will discuss the results of the first two surveys compared across time and between participant groups in order to assess potential changes in comprehension, motivation, and self-reported behavior change between Treatment and Control groups within each pricing pilot.

Overall, there were 1,492 survey completes submitted by 1,191 unique households. Table 11 and Table 12 show the rates of completion across groups and between time periods. Two main goals of the survey were to assess levels of comprehension and motivation of the households, pre and post, and across groups. The results of these two measurements will be discussed next.

Table 11: Number of Unique Survey Responses per Condition

Pricing Group	Control (No Nudge Report)	Nudge Report	**Total**
Enhanced Control	129	275	**404**
Enhanced Pricing	161	152	**313**
New Dynamic Control	11	8	**19**
New Dynamic Pricing	139	146	**285**
Overnight Control	11	N/A	**11**
Overnight Pricing	159	N/A	**159**
Total			**1,191**

Table 12: Number of Survey Responses per Condition Baseline and Midterm

Number of Completions for Baseline Survey			
Pricing Group	Control (No Nudge Report)	Nudge Report	**Total**
Enhanced Control	90	99	**189**
Enhanced Pricing	92	80	**172**
New Dynamic Control	10	8	**18**
New Dynamic Pricing	102	112	**214**
Overnight Control	11	N/A	**11**
Overnight Pricing	77	N/A	**77**
Total			**681**
Number of Completions for Midterm Survey			
Enhanced Control	82	222	**304**
Enhanced Pricing	105	103	**208**
New Dynamic Control	5	0	**5**
New Dynamic Pricing	78	88	**166**
Overnight Control	0	N/A	**0**
Overnight Pricing	128	N/A	**128**
Total			**811**

Comprehension

To answer the first research question, the surveys sought to shed light on is whether households who received a price treatment and/or a Nudge Report had higher levels of comprehension regarding energy prices and the TOU structure in the Province of Ontario. To answer this question households were asked the same four comprehension questions on both the baseline and interim surveys. This allowed us to measure baseline responses before treatment, and responses six months after receiving the pricing/Nudge Report treatment for all groups. The four comprehension questions that appeared on the Baseline and Interim surveys are listed below:

1. Please select the pricing model that you think best describes how electricity is currently priced for the majority of residential customers in Ontario **(Answer : "Time-Of-Use: The price of electricity varies depending on the time of day")**
2. Electricity usage is split into different Time-Of-Use periods. The cost of electricity varies between these periods. What do you think the daily Time-Of-Use Periods are called in Ontario? **(Answer : "Three different TOU periods: Off-Peak, Mid-Peak, On-Peak")**
3. Select the top 3 household items that you believe consume the most electricity **(Answer: "Washing machine / Dryer, Heating and Cooling unit, Fridge")**
4. What do you think is the most effective way to reduce your electricity bill in the Summer time? **(Answer : Raise the temperature on your A/C unit by 2 degrees Celsius between the hours of 1pm and 7pm during hot months)**

Each survey response was combined to give a final comprehension score out of 4. Survey respondents were given one mark for correct answers on questions 1, 2, and 4 and 1/3 of a mark for each correctly listed item in question 3. The final comprehension score was then converted into a percentage.

This section will compare percentage of correct responses between the Baseline and Interim Survey for the Price Treatment and Nudge Report Groups separated by each pricing pilot (e.g. Enhanced, Dynamic, Overnight).

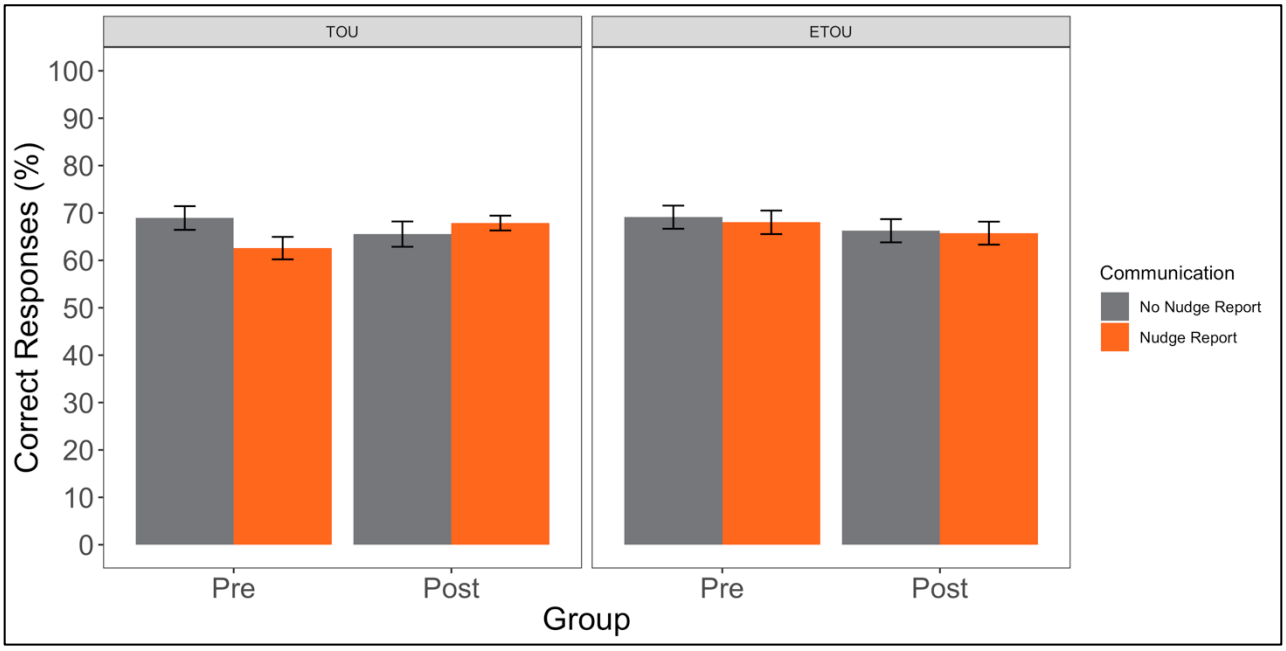
Enhanced

Table 13 and Figure 1 show the Comprehension scores for the Enhanced Pilot. Overall, the data shows no significant effect for price treatment (TOU vs. ETOU) or time (Baseline vs. Interim Survey). There is however, a marginally significant positive interaction effect between **Time and Communication**. This suggests that households who receive a Nudge Report perform marginally higher over time on the comprehension questions than households who do not receive the Nudge Report. Results of the statistical model for the Enhanced Pilot is shown in Appendix A.

Table 13: Comprehension Scores for Enhanced Pilot

Pricing Group	**Baseline Survey** No Nudge Report	**Interim Survey** No Nudge Report	**Baseline Survey** Nudge Report	**Interim Survey** Nudge Report	**Total**
Enhanced Control	68.9%	65.5%	62.6%	67.9%	66.6%
Enhanced Pricing	69.1%	66.2%	68.0%	65.7%	67.2%
Total	69.0%	65.9%	65.0%	67.2%	66.9%

Figure 1: Comprehension Scores for Enhanced Pilot



Dynamic

Table 14 and Figure 2 show the Comprehension scores for the *Dynamic* Pilot. Overall, the data shows no significant effect for price treatment (TOU vs. ETOU), time (Baseline vs. Interim Survey) or Communication (Nudge Report vs. No Nudge Report). It should be noted that no households from the Dynamic Control group (with communication) completed the interim survey.

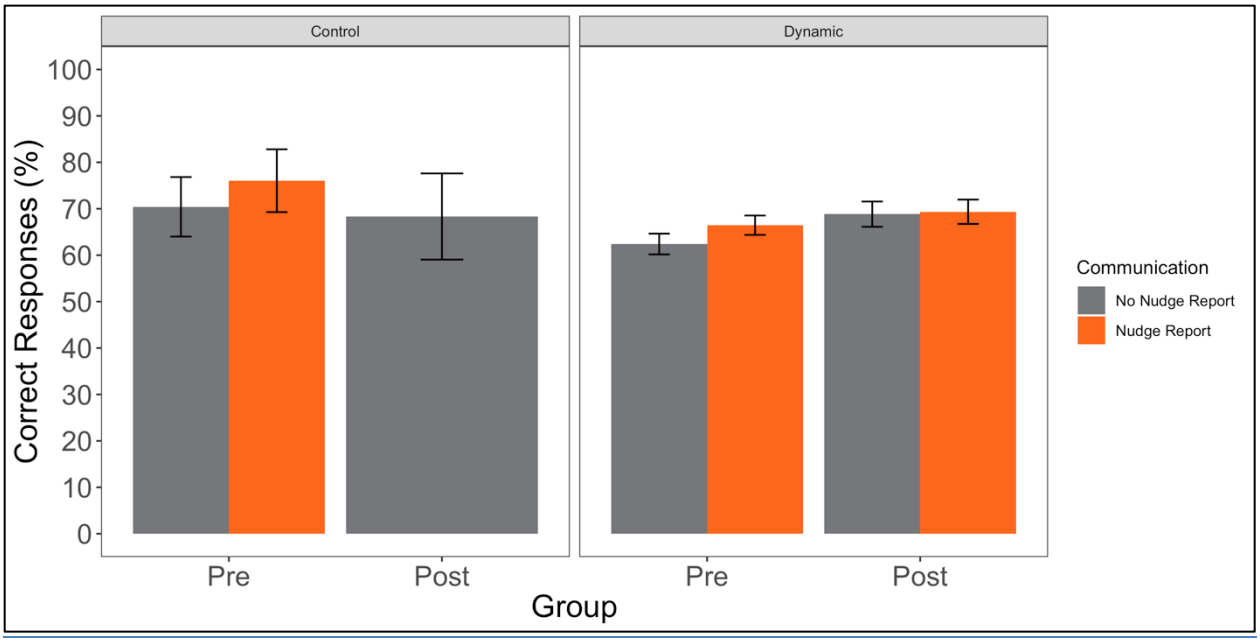
In summary, for households in the Dynamic Pilot we observed a *small increase* in the comprehension score from baseline to interim, however this increase was not statistically significant. For households in the Control group, comprehension *decreased* from baseline to interim, however this decrease was not statistically significant. One more survey will be collected at the end of the 12-month pilot. This data may provide a clearer indication as to whether the effects seen become statistically significant, as it is hypothesized that comprehension scores increase slowly over time. Results of the statistical model for the Dynamic Pilot is shown in Appendix B.

Table 14: Comprehension Scores for Dynamic Pilot

Pricing Group	**Baseline Survey** No Nudge Report	**Interim Survey** No Nudge Report	**Baseline Survey** Nudge Report	**Interim Survey** Nudge Report	**Total**
Dynamic Control	70.4%	68.3%	76%	N/A	71.9%[1]
Dynamic Pricing	62.4%	68.8%	66.5%	69.4%	66.4%
Total	63.1%	68.8%	67.1%	69.4%	66.8%

[1]Value may be biased due to lack of completes on the interim survey from the Dynamic control (with communication) group

Figure 2: Comprehension Scores for Dynamic Pilot



Overnight

Table 15 and Figure 3 show the Comprehension scores for the Overnight Pilot. Overall, the data shows a significant difference between the Control and Overnight Group ***on the baseline survey***. This suggests households who signed up for the pilot may have had higher levels of comprehension on energy rates than the matched control group. There was no difference in the Overnight Group between baseline and interim survey on measures of comprehension. No households in the Overnight Control group completed the interim survey. Results of the statistical model for the Enhanced Pilot are shown in Appendix C & D.

Figure 3: Comprehension Scores for Overnight Pilot

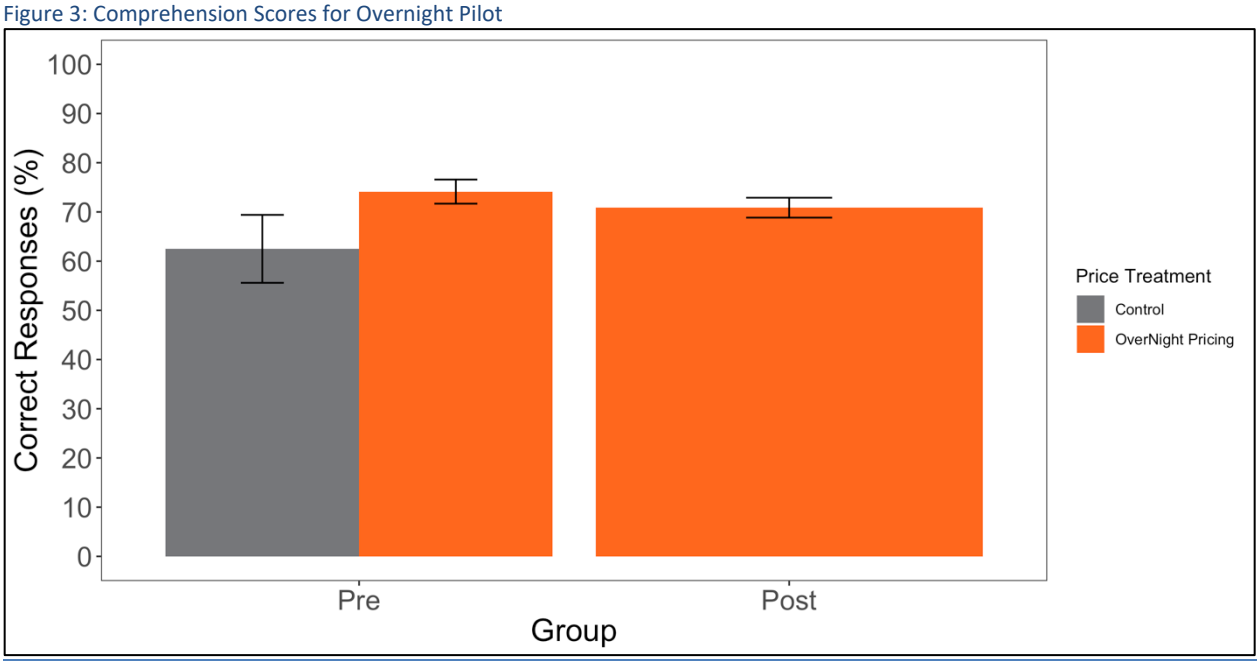


Table 15: Comprehension Scores for Overnight Pilot

Pricing Group	**Baseline Survey** No Nudge Report	**Interim Survey** No Nudge Report	**Total**
Overnight Control	62.5%	N/A	62.5%[1]
Overnight Pricing	74.1%	70.9%	72.1%
Total	72.7%	70.9%*	66.8%

[1] Value may be biased due to lack of completes on the interim survey from the Overnight control group

Conclusions

Based on the survey completes, survey responses in the Enhanced Pilot were well balanced between treatment and control groups allowing for a complete analysis. However, in both Dynamic and Overnight pilots, responses from the control group were too low to perform the complete analysis.

In the Enhanced Pilot, we saw small marginally significant interaction effects between Nudge Report and time. Meaning that the Nudge Report was successful at improving the comprehension score in the Enhanced Pilot. The effect was stronger in households who did not receive the pricing treatment (only the Nudge Report) improving their comprehension score by an average of approximately 5%.

In the Dynamic group, we observed there was a small increase in comprehension over, along with a small increase in comprehension for households who received the Nudge Report, however neither of these results were statistically significant.

In the Overnight group there was a small decrease in comprehension scores overtime in the pricing treatment, however this result was not statistically significant.

Motivation

Motivations to Shift Energy Consumption

The second research question addressed whether the pricing treatment and/or the Nudge Report were able to increase household motivation regarding load shifting behaviour. Households were asked for their opinions regarding their motivation to either shift or not shift their energy usage in accordance with their TOU schedule. The purpose of this measurement was to assess whether any of these expressed feelings of motivations were affected by the pricing treatments or Nudge Report communications. These analyses also allow for the comparison between respondents' perceptions of their behaviour and the actual behaviour assessed in the load impact analysis. To measure motivation, respondents were asked the following six questions:

Respond with "Yes" or "No":

1. Has TOU pricing affected your energy consumption?

*Rate your level of agreement with the following statements on a **scale of 1-7**:*

2. I feel motivated to conserve On-Peak electricity and/or shift my electricity usage to Off-Peak.
3. I don't think it is fair for the utility company to ask me to change my energy consumption behaviour.
4. I feel like I am already doing everything I can to conserve energy.
5. How much do you agree or disagree with each of the following reasons for why you have shifted your consumption behaviour from On-peak to Off-peak?
    a. To save money on my monthly bills
    b. It was the environmentally responsible thing to do
    c. To be a good role model for others
    d. Because others I know were also doing it
    e. It was convenient for me to shift my electricity consumption
6. How much do you agree or disagree with each of the following reasons for why you have NOT shifted your consumption behaviour from On-peak to Off-peak?
    a. I didn't know Ontario had a Time-of-use pricing structure for electricity consumption
    b. It is too difficult for me to schedule electricity consuming activities during Off-Peak hours (such as overnight)
    c. I don't think the cost savings are worth the effort
    d. I don't think it contributes much to the province's electricity conservation efforts
    e. I'm not too concerned about the environmental impact of my electricity consumption
    f. I don't think anyone else does it, so I don't either
    g. It's too complicated for me to understand

<u>Enhanced</u>

Question 1: *Has TOU affected your energy consumption?*

Households in the Enhanced TOU group were less likely than those in the control group to report that TOU affects their energy consumption (Figure 4, Table 16, Appendix E). The Enhanced TOU group also showed a decrease in these scores from baseline to midterm, while there was no change across time in the control group. The nudge report did not significantly influence scores on this measure.

Figure 4: % of households for each condition who responded that TOU pricing affected their energy consumption

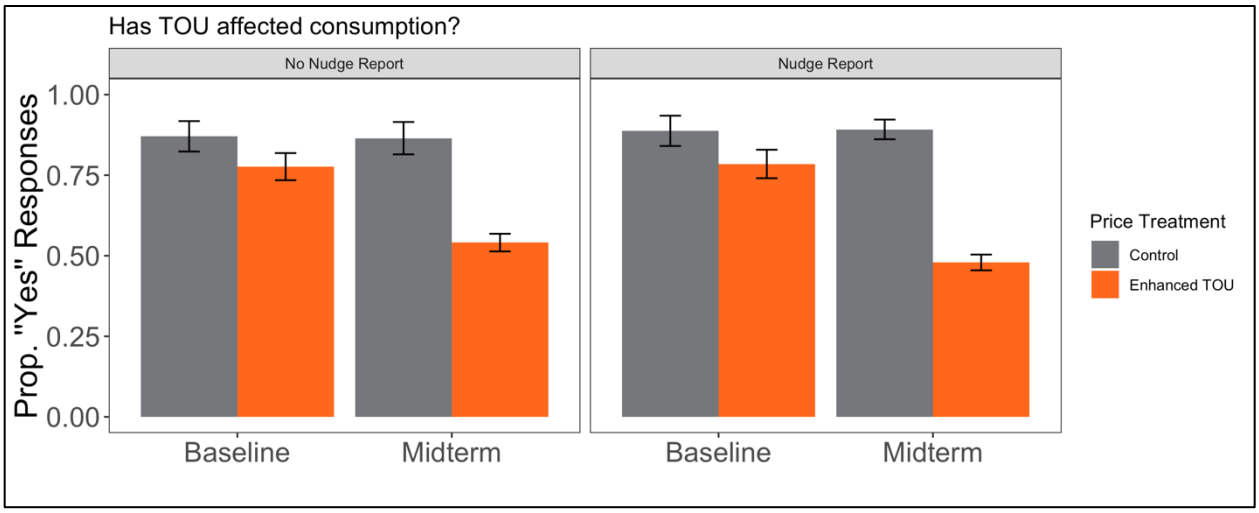


Table 16: Percentage of households for each condition who responded that TOU pricing affected their energy consumption

Pricing Group	**Baseline Survey** No Nudge Report	**Interim Survey** No Nudge Report	**Baseline Survey** Nudge Report	**Interim Survey** Nudge Report	**Total**
Enhanced Control	87.1%	86.5%	88.8%	89.2%	87.9%
Enhanced Pricing	77.6%	54.1%	78.5%	47.9%	75.0%
Total	82.4%	70.3%	83.7%	68.5%	

Question 2: *I feel motivated to conserve On-Peak electricity and/or shift my electricity usage to Off-Peak.*

There were no significant differences between pricing treatment and control conditions, baseline or midterm responses, or Nudge Report conditions.

Question 3: *I don't think it is fair for the utility company to ask me to change my energy consumption behaviour.*

There were no significant differences between pricing treatment and control conditions, baseline or midterm responses, or Nudge Report conditions.

Question 4: *I feel like I am already doing everything I can to conserve energy.*

There were small increases in all scores on "I feel like I am already doing everything I can to conserve energy" (Already) from baseline to midterm (Figure 5, Table 17, Appendix F). There were no differences

in household responses to this statement between the Enhanced TOU treatment and control groups, or between nudge report groups.

Figure 5: Average household agreement rating (1-7 scale) to the statement "I feel I am already doing everything I can to conserve energy."

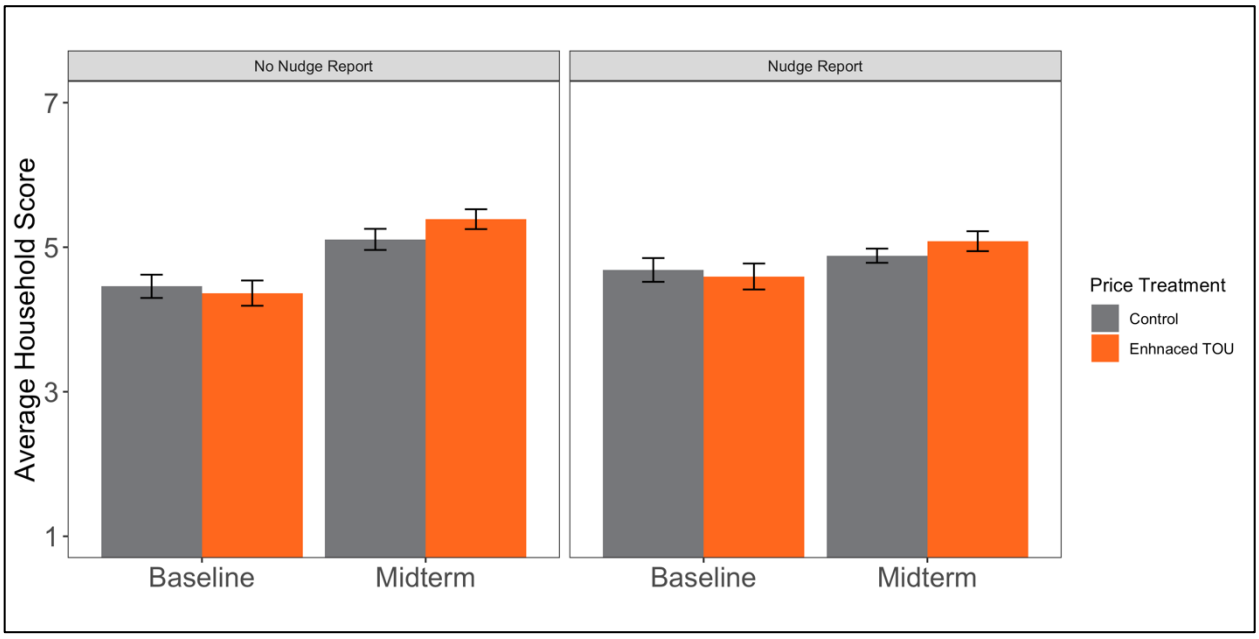


Table 17: Average household agreement rating (1-7 scale) to the statement "I feel like I am already doing everything I can to conserve energy."

Pricing Group	**Baseline Survey** No Nudge Report	**Interim Survey** No Nudge Report	**Baseline Survey** Nudge Report	**Interim Survey** Nudge Report	**Total**
Enhanced Control	4.46	5.11	4.59	4.88	4.76
Enhanced Pricing	4.36	5.38	4.60	5.08	4.86
Total	4.41	5.25	4.60	4.98	

$F(7,811)=5.345$, $p < .001$

Question 5: Factors that affect shift in consumption from On-Peak to Off-Peak

We investigated how the three independent variables (***Time****, *Price Group, Communication*) differed on five motivational factors:

1. **To save money on my monthly bills ***
2. **It was the environmentally responsible thing to do ***
3. To be a good role model for others
4. Because others I know were also doing it

5. **It was convenient for me to shift my electricity consumption ***

*** indicates significant factor**

There were no overall differences between any of the motivational factor scores themselves, indicating that no particular factor was reported as influencing On-Peak to Off-Peak load shifting behaviour more than others; p=.39). Results of our analysis showed that cost, environment, and convenience factors all decreased across time (Figure 7A,B,C; Wilk's .984, $F(5,750)=2.43$, $p = .034$, $R^2 = 0.126$), but there were no other differences between pricing treatments or Nudge Report. This indicates that these self-reported measures were not impacted by price treatment or Nudge Report.

Figure 6: Participant reported scores (1-7 scale) decreased over time on these factors for how much they felt each factor influenced them to switch TOU energy consumption behaviour

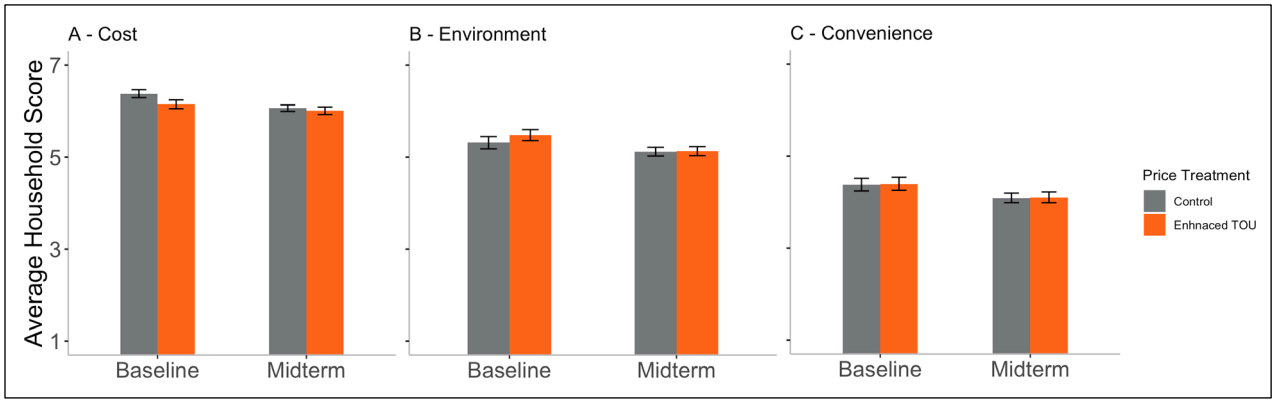


Table 18: Participant reported scores (1-7 scale) decreased over time on these factors for how much they felt each factor influenced them to switch TOU energy consumption behaviour

	Cost		Environment		Convenience	
Pricing Group	**Baseline Survey**	**Interim Survey**	**Baseline Survey**	**Interim Survey**	**Baseline Survey**	**Interim Survey**
Enhanced Control	6.38	6.06	5.31	5.12	4.38	4.09
Enhanced Pricing	6.15	6.01	5.48	5.13	4.40	4.10

Question 6: Factors that influence why participants reported they *did not* shift their energy consumption behaviour.

We conducted an analysis to examine the differences between the groups for Time, Price Group, and Communication Group on responses given for why participants reported they did not shift their energy consumption behaviour (1-7 rating scale):

1. I didn't know Ontario had a Time-of-use pricing structure for electricity consumption

2. It is too difficult for me to schedule electricity consuming activities during Off-Peak hours (such as overnight)
3. **I don't think the cost savings are worth the effort (*cost*) ***
4. **I don't think it contributes much to the province's electricity conservation efforts (*provincial*) ***
5. I'm not too concerned about the environmental impact of my electricity consumption
6. I don't think anyone else does it, so I don't either
7. **It's too complicated for me to understand (*comprehension*) ***

*** indicates significant factor**

We found that scores on *cost* decreased from baseline to midterm in both groups (Figure 7A; Wilk's = .976, $F(7,524) = 1.823$, $p = .081$, $R^2 = .023$). We also found that Enhanced TOU households had higher scores on *cost*, *provincial efforts,* and *comprehension* than the Control group (Figure 7A,B,C; Wilk's = .971, $F(7,524) = 2.21$, $p = .032$, $R^2 = .029$).

Figure 7: Participants reported scores on how much they each factor influenced them to not switch TOU energy consumption that increased over time (A) and were higher in the Enhaced TOU price treatment compared to control (A,B,C)

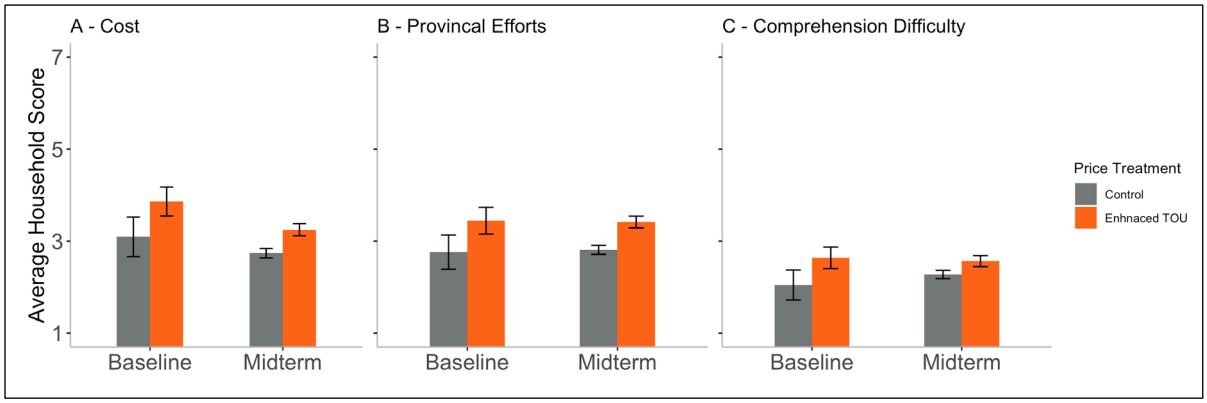


Table 19: Average household reported score (1-7 rating scale) for how much each factor influenced them to not switch TOU energy consumption compared to control (A,B,C)

	A - Cost		B - Provincial		C - Comprehension	
Pricing Group	Baseline Survey	Interim Survey	Baseline Survey	Interim Survey	Baseline Survey	Interim Survey
Enhanced Control	3.10	2.74	2.76	2.81	2.05	2.28
Enhanced Pricing	3.86	3.25	3.44	3.42	2.64	2.57

Summary - Enhanced TOU Motivations

Households in the Enhanced TOU pricing treatment responded at a lower rate than the control group that TOU pricing affected their energy consumption. These scores decreased across time in the Enhanced TOU treatment group but remained similar from baseline to midterm in the control TOU

group. ETOU and TOU both reported increases in feelings that “I already do enough to conserve energy” across time. We examined multiple potential factors that could have influenced changes in electricity consumption from On-Peak to Off Peak. There was no single factor that stood out as having a larger influence than the others. However, we did observe that all households (ETOU & TOU) reported that cost benefits, concern for the environment and convenience factors had lower influence on their energy consumption behaviours at midterm compared to baseline. Households also reported which factors potentially prevented their consumption switching behaviour. We found that the Enhanced pricing group felt more influenced than the control group by the low cost-benefits of switching, low effect of switching on provincial conservation efforts, and comprehension difficulty than the control group. There was also an increase in the influence of low cost-benefits as preventing switching in both price treatments from baseline to midterm.

Dynamic

A limited number of surveys were completed for the New Dynamic pricing group (see pages 12 & 13). Therefore, we were able to examine how scores within the New Dynamic treatment plan were affected by time and nudge report, but we were unable to compare these scores with the control group due to insufficient sample size.

Question 1: *Has TOU affected your energy consumption?*

Households in the New Dynamic price group who received the nudge report (M=85.1%) were marginally ($p<.10$) less likely than those who did not (M=91.9%) to report that TOU affected their energy (Appendix G).

Question 2: *I feel motivated to conserve On-Peak electricity and/or shift my electricity usage to Off-Peak.*

There were no significant changes in scores on this measure from baseline to midterm in the New Dynamic price treatment group.

Question 3: *I don't think it is fair for the utility company to ask me to change my energy consumption behaviour.*

Households who received the nudge report had decreased feelings of unfairness at midterm compared to baseline (Figure 8, Table 20, Appendix H).

Figure 8: Average New Dynamic household reported score (1-7 rating scale) for agreement with the statement "it is unfair for the utility company to ask me to change my energy consumption behaviour."

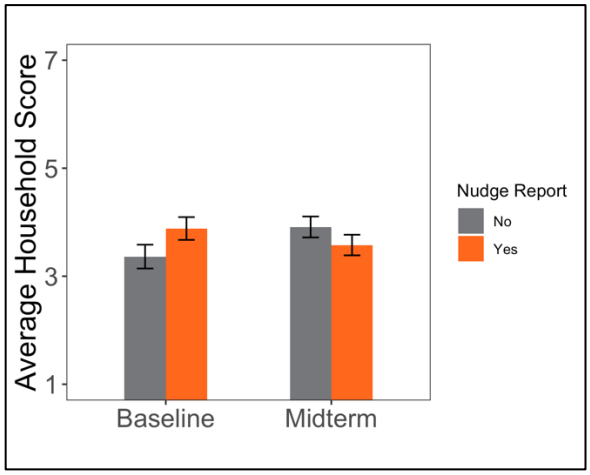


Table 20: Average New Dynamic household reported score (1-7 rating scale) for agreement with the statement "it is unfair for the utility company to ask me to change my energy consumption behaviour."

	Feelings of unfairness	
Pricing Group	**Baseline Survey**	**Interim Survey**
No Nudge Report	3.36	3.91
Nudge Report	3.88	3.58

Question 4: *I feel like I am already doing everything I can to conserve energy.*

Scores on feelings of already conserving energy increased from across time in the New Dynamic price treatment group (Figure 9, Table 21, Appendix I). New Dynamic households who received the nudge report scored higher on this measure than households who did not.

Figure 9: Higher feelings of already doing everything to conserve energy from baseline to midterm, and in household who received the nudge report

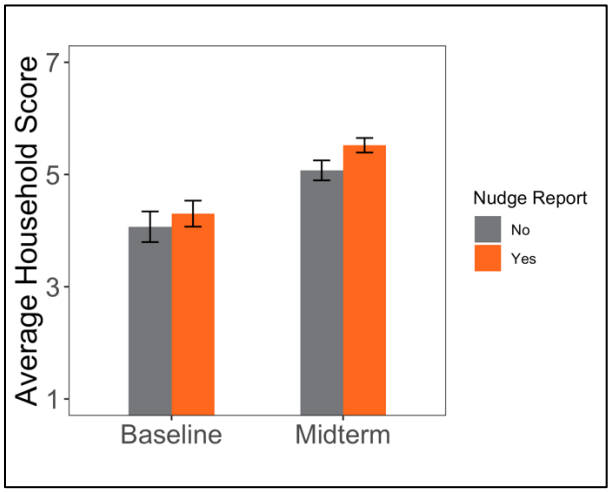


Table 21: Average New Dynamic household ratings (1-7 scale) of feeling that they are already doing everything to conserve energy

	Already conserving	
Pricing Group	**Baseline Survey**	**Interim Survey**
No Nudge Report	4.09	5.07
Nudge Report	4.30	5.52

Question 5 & 6: Factors that affect shifts in consumption from On-Peak to Off-Peak; Factors that influence why participants reported they DID NOT shift their energy consumption behaviour.

We were unable to conduct these analyses due to the small sample size. Because these analyses include multiple variables, they are more sensitive to the lower sample size than the other univariate analyses conducted to investigate the motivation responses.

Summary - Dynamic Motivations

Based on the small sample size of surveys received in the control group we were unable to compare treatment to control groups for this pricing scheme; therefore, we examined the effects of time and nudge report within the New Dynamic treatment group. We found that households who received the nudge report were marginally less likely to report that they feel motivated to conserve On-Peak electricity and shift usage to Off-Peak. We also found that New Dynamic households reported increases in feelings of "already conserving energy" from baseline to midterm, and households who received the nudge report scored higher on this measure than households who did not.

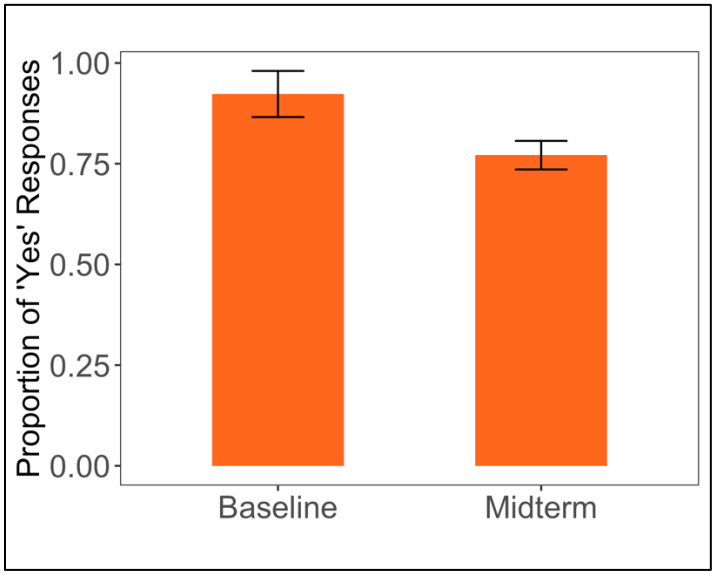
Overnight

A limited number of surveys were completed for the Overnight pricing groups (see pages 12 & 13). Therefore, we were only able to examine how scores on motivational factors changed across time within the Overnight treatment group.

Question 1: *Has TOU affected your energy consumption?*

Overnight households were less likely to report that TOU affected their energy consumption at midterm (M=77.1%), compared to baseline (M=92.3%) (Figure 10, Appendix J).

Figure 10: Household ratings for their agreement (1-7 rating scale) to the statement "I feel like I am already doing everything I can do conserve energy."



Question 2: I feel motivated to conserve On-Peak electricity and/or shift my electricity usage to Off-Peak.

There were no significant differences between treatment groups or baseline or midterm responses.

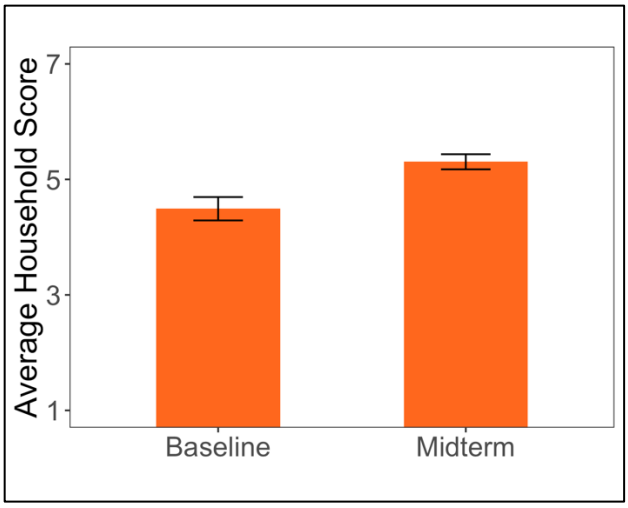
Question 3: I don't think it is fair for the utility company to ask me to change my energy consumption behaviour.

There were no significant differences between treatment groups or baseline or midterm responses.

Question 4: I feel like I am already doing everything I can to conserve energy.

Overnight households reported higher feelings of "already doing everything to conserve energy" at midterm (M=5.31) relative to baseline (M=4.49), (Figure 11, Appendix K).

Figure 11: Feelings of already doing everything to conserve energy increase over time in Overnight households



Question 5 & 6: Factors that affect shift in consumption from On-Peak to Off-Peak; Factors that influence why participants reported they DID NOT shift their energy consumption behaviour.

Due to the multivariate nature of these analyses, they were unable to be conducted on the small sample size of survey responses in the New Dynamic and Overnight groups.

Summary - Overnight Motivations

Based on the small number of surveys completed by the control group we were unable to compare Overnight treatment to the control. We found significant effects on two of the motivational factors in the survey for the Overnight price treatment across time. First, Overnight households were less likely to report that TOU affected their energy consumption at midterm, compared to baseline. Second, these households were more likely to report that they felt they were already doing everything they can to conserve energy at midterm.

Technology Impact Analysis

In this section we present the results for the impact of technology (i.e. smart thermostats) on electricity consumption behaviour. Here, we estimate whether households participating in one of the three pricing pilots who have smart thermostats installed exhibit electricity consumption behavior that differs from households who are participating in the pricing pilots, but do not have smart thermostats installed.

In this analysis, we tracked household thermostat data using two data sources. The first being whether or not participating households registered a smart thermostat with Alectra as part of their registration process (for Dynamic and Overnight pricing pilots). The second being whether the household indicated via survey that they owned a smart thermostat (for all three pricing pilots). Households who ***did not*** complete the survey and did not register a thermostat through Alectra are assumed to be ***non-thermostat*** owners for the purpose of this analysis. Implications of this assumption will be discussed in the summary portion of this section. See Table 22 for a breakdown of households with smart thermostat technology by pilot.

The technology impact analyses compared electricity consumption between households who reported or registered possession of a smart thermostat to those that did not among ***only those households participating in the pricing treatments.*** The purpose of including only households participating in a pricing treatment (Controls excluded) was to observe whether the pricing treatments were more effective in driving conservation impacts for households with thermostat technology.

Table 22: Number of Participants with or without Technology per Pilot

	Enhanced Pilot	Dynamic Pilot	Overnight Pilot
Technology (As indicated by Survey or Alectra)	328	328	159
No Technology (As indicated by survey)	60	36	15
No Data (Treated as no technology)	5,572	319	166

Enhanced Pilot – Technology Impact Analysis

Results for the Enhanced Pilot are shown in Table 23. Using the difference-in-difference approach, we saw a statistically significant decrease in on-peak and mid-peak consumption for households who reported having smart thermostat technology relative to the remainder of the Enhanced pricing treatment participants. Moreover, the difference between off-peak consumption was not different between Technology and No Technology groups. This indicates that households who have smart

thermostat technology showed small, but statistically significantly levels of *load clipping* relative to households without such technology (or for whom no technology data was available).

Table 23: Enhanced Pricing Technology Impact Analysis

	Difference-in-Difference in kWh (Change from 2017 to 2018)			
Enhanced Pricing Households	On-Peak Consumption	Mid-Peak Consumption	Off-Peak Consumption	Total Consumption
No Technology	+0.17	+0.14	+0.14	+0.14
Technology	+0.11	+0.11	+0.14	+0.13
Difference	**-0.06*** **	**-0.03***	0.00	-0.01

Dynamic Pilot – Technology Impact Analysis

Results for the Dynamic Pilot are shown in Table 24 and Table 25. Using the difference-in-difference approach, we saw a statistically significant decrease in High On-Peak and Medium On-Peak consumption for households who reported having smart thermostat technology relative to Dynamic pricing participants without such technology (or for whom no data was available). Moreover, the difference between Low On-Peak and Off-Peak consumption was not different between Technology and No Technology groups. This indicates that again, similar to the Enhanced Pilot, households who have smart thermostat technology showed small, but statistically significantly levels of *load clipping* relative to households without such technology (or for whom no technology data was available).

This pattern replicated during the 6 CPP Days shown in Table 25, as we observe households who reported having smart thermostat technology had greater electricity consumption savings during CPP events compared to those who did not.

Table 24: Dynamic Pricing Technology Impact Analysis

	Difference-in-Difference in kWh (Change from 2017 to 2018)				
Dynamic Pricing Households	High On-Peak Consumption	Medium On-Peak Consumption	Low On-Peak Consumption	Off-Peak Consumption	Total Consumption
No Technology	+0.59	+0.25	-0.08	+0.12	+0.12
Technology	+0.44	+0.16	-0.11	+0.13	+0.11
Difference	**-0.15*** **	**-0.09*** **	-0.03	+0.01	-0.01

Table 25: Dynamic Pricing CPP Days Technology Impact Analysis

	2018 Consumption (kWh)		
Dynamic Pricing Households	Technology	No Technology	Difference
CPP Day 1	+1.32	+1.66	**-0.34*** **
CPP Day 2	+1.59	+2.17	**-0.58*** **
CPP Day 3	+1.41	+1.82	**-0.41*** **
CPP Day 4	+0.99	+1.30	**-0.31*** **
CPP Day 5	+1.20	+1.66	**-0.46*** **
CPP Day 6	+1.46	+1.91	**-0.45*** **

Overnight Pilot – Technology Impact Analysis

Results for the Overnight Pilot are shown in Table 26. Using the difference-in-difference approach, we found no statistically significant difference between Technology and No Technology groups for On-Peak or Mid-Peak consumption. However, we observed an increase in consumption for Off-Peak and Overnight Off-Peak consumption for the Technology group relative to the No Technology group.

Table 26: Overnight Pricing Technology Impact Analysis

	Difference-in-Difference in kWh (Change from 2017 to 2018)				
Overnight Pricing Households	On-Peak Consumption	Mid-Peak Consumption	Off-Peak Consumption	Overnight Off-Peak Consumption	Change in Total Consumption
No Technology	+0.11	+0.08	+0.18	+0.37	+0.18
Technology	+0.08	+0.07	+0.24	+0.52	+0.23
Difference	-0.03	-0.01	**+0.06****	**+0.15*****	**+0.05****

Summary and Discussion

In summary, for households who reported having a smart thermostat, we found a decrease in consumption during Peak Consumption in the Enhanced and Dynamic Pilot relative to pricing participants who do not possess a smart thermostat (or for whom no data on smart thermostat possession was available). In addition, we observed an increase in consumption during the Off Peak hours in the Overnight Pilot for smart thermostat participants relative to Overnight pricing participants without such technology (or for whom no possession data was available). This pattern is congruent with the general price incentive structure in the pilots, meaning that in the Enhanced and Dynamic Pilots households with thermostats were more likely to reduce their consumption during the higher priced hours. In the Overnight pilot, households with thermostats were more likely to increase their consumption during the lower priced overnight off-peak hours.

Here we note two potential limitations with the technology impact analysis described in this section. First, there were many households for which we did not have self-reported thermostat technology possession data via survey or thermostat registration with Alectra. For the purposes of the present analyses, these households were designated as ***no technology*** households. The implications of this coding are that the incremental changes in consumption behavior due to technology possession are most likely an ***underestimate of*** the true impact of technology on responsiveness to pricing treatments. The second limitation relates to the potential causal relationship between smart thermostats and electricity consumption savings. It is possible that households who are more likely to save (i.e. higher comprehension, larger household, more motivation, etc.) are more likely to purchase a smart thermostat, meaning it is not possible to tell whether it is the smart thermostat itself creating the behaviour change, or whether the smart thermostat is simply a proxy for other relevant demographics which lead to behaviour change.

Appendix A

Enhanced Comprehension Scores

	Dependent variable:
	Comprehension Score %
CommunicationYES	-6.3510*
	(3.4268)
PriceGroupETOU	0.1771
	(3.4884)
PrePostPost	-3.4002
	(3.6036)
CommunicationYES:PriceGroupETOU	5.2595
	(4.9680)
CommunicationYES:PrePostPost	8.6877*
	(4.5941)
PriceGroupETOU:PrePostPost	0.5337
	(4.9594)
CommunicationYES:PriceGroupETOU:PrePostPost	-8.1012
	(6.7251)
Constant	68.9352****
	(2.4802)
Observations	859
R^2	0.0070
Adjusted R^2	-0.0012
Residual Std. Error	23.5288 (df = 851)
F Statistic	0.8515 (df = 7; 851)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix B

Dynamic Comprehension Scores

	Dependent variable:
	Comprehension Score %
CommunicationYES	0.0563
	(0.1072)
PriceGroupDynamic	-0.0801
	(0.0749)
PrePostPost	-0.0208
	(0.1237)
CommunicationYES:PriceGroupDynamic	-0.0157
	(0.1115)
CommunicationYES:PrePostPost	-0.0353
	(0.0480)
PriceGroupDynamic:PrePostPost	0.0851
	(0.1285)
CommunicationYES:PriceGroupDynamic:PrePostPost	
Constant	0.7042****
	(0.0714)
Observations	389
R^2	0.0183
Adjusted R^2	0.0028
Residual Std. Error	0.2259 (df = 382)
F Statistic	1.1844 (df = 6; 382)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix C

Overnight Comprehension Scores: Treatment versus Control, Baseline

	Dependent variable:
	Comprehension Score %
PriceGroupMixOvernight	0.1163*
	(0.0698)
Constant	0.6250****
	(0.0653)
Observations	88
R^2	0.0313
Adjusted R^2	0.0200
Residual Std. Error	0.2165 (df = 86)
F Statistic	2.7785* (df = 1; 86)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix D

Overnight Comprehension Scores: Baseline versus Interim, Treatment Only

	Dependent variable:
	Comprehension Score %
PrePostPost	-0.0327
	(0.0320)
Constant	0.7413****
	(0.0250)
Observations	198
R^2	0.0053
Adjusted R^2	0.0002
Residual Std. Error	0.2195 (df = 196)
F Statistic	1.0416 (df = 1; 196)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix E

Enhanced Motivation Results – Q1: "Has TOU pricing affected your energy consumption?

	Dependent variable:
	TOU affect consumption %
PriceGroupETOU	-0.6610
	(0.4150)
TimePOST	-0.0499
	(0.4691)
CommunicationYES	0.1607
	(0.4659)
PriceGroupETOU:TimePOST	-1.0317*
	(0.5735)
PriceGroupETOU:CommunicationYES	-0.1120
	(0.5998)
TimePOST:CommunicationYES	0.0945
	(0.6176)
PriceGroupETOU:TimePOST:CommunicationYES	-0.3903
	(0.7791)
Constant	1.9062****
	(0.3231)
Observations	819
Log Likelihood	-386.5984
Akaike Inf. Crit.	789.1967
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix F

Enhanced Motivation Results – Q4: "I feel I am already doing everything I can to conserve energy."

	Dependent variable:
	Already conserving %
PriceGroupETOU	-0.0941
	(0.2232)
TimePOST	0.6493***
	(0.2313)
CommunicationNudge Report	0.2266
	(0.2207)
PriceGroupETOU:TimePOST	0.3738
	(0.3163)
PriceGroupETOU:CommunicationNudge Report	0.0037
	(0.3168)
TimePOST:CommunicationNudge Report	-0.4520
	(0.2954)
PriceGroupETOU:TimePOST:CommunicationNudge Report	-0.0826
	(0.4273)
Constant	4.4588****
	(0.1578)
Observations	819
R^2	0.0441
Adjusted R^2	0.0359
Residual Std. Error	1.4550 (df = 811)
F Statistic	5.3459**** (df = 7; 811)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix G

Dynamic Motivation Results – Q1: “Has TOU pricing affected your energy consumption?

	Dependent variable:
	TOU affect consumption %
TimePOST	-0.8796
	(0.8264)
CommunicationNudge Report	-1.4069*
	(0.8333)
TimePOST:CommunicationNudge Report	1.0502
	(0.9849)
Constant	3.0445****
	(0.7237)
Observations	226
Log Likelihood	-78.6424
Akaike Inf. Crit.	165.2849
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix H

Dynamic Motivation Results – Q3: "I don't think it is fair for the utility company to ask me to change my energy consumption behaviour."

	Dependent variable:
	Feelings of unfairness %
TimePOST	0.5481*
	(0.2976)
CommunicationNudge Report	0.5201
	(0.3299)
TimePOST:CommunicationNudge Report	-0.8544**
	(0.4207)
Constant	3.3636****
	(0.2319)
Observations	226
R^2	0.0197
Adjusted R^2	0.0064
Residual Std. Error	1.5384 (df = 222)
F Statistic	1.4843 (df = 3; 222)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix I

Dynamic Motivation Results – Q4: "I feel like I am already doing everything I can to conserve energy."

	Dependent variable:
	Already conserving %
TimePRE	-1.0053****
	(0.2804)
CommunicationYES	0.4476*
	(0.2459)
TimePRE:CommunicationYES	-0.2135
	(0.3963)
Constant	5.0735****
	(0.1757)
Observations	226
R^2	0.1387
Adjusted R^2	0.1270
Residual Std. Error	1.4492 (df = 222)
F Statistic	11.9143**** (df = 3; 222)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix J

Overnight Motivation Results – Q1: "Has TOU pricing affected your energy consumption?"

	Dependent variable:
	TOU affect consumption %
TimePOST	-1.2699**
	(0.5145)
Constant	2.4849****
	(0.4655)
Observations	183
Log Likelihood	-81.0923
Akaike Inf. Crit.	166.1846
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix K

Overnight Motivation Results – Q4: "I feel like I am already doing everything I can to conserve energy."

	Dependent variable:
	Already conserving %
TimePOST	0.8128^{****}
	(0.2311)
Constant	4.4923^{****}
	(0.1856)
Observations	183
R^2	0.0640
Adjusted R^2	0.0588
Residual Std. Error	1.4963 (df = 181)
F Statistic	12.3660^{****} (df = 1; 181)
Note:	*p<0.1; **p<0.05; ***p<0.01