Ontario Energy Board

Regulated Price Plan Roadmap

Report of the Board

EB-2014-0319

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Contents

INTRODUCTION

What is the RPP?

Since April 2005, the Ontario Energy Board (OEB) has administered an electricity price plan that provides stable and predictable electricity pricing, encourages conservation and ensures the price consumers pay for electricity better reflects the price paid to generators. This pricing plan is known as the Regulated Price Plan (RPP). About 4.9 million residential and low-volume business consumers are eligible for the RPP.

Today, almost all RPP-eligible consumers have smart meters, and over 96 percent pay under the time-of-use (TOU) structure in the RPP. The remaining RPP-eligible consumers are billed under the RPP's tiered pricing structure or a separate retail contract.

There are three TOU pricing periods. Off-peak, when energy demand is low and less expensive sources of electricity are used. Mid-peak, when the cost of energy and demand are moderate. And on-peak, when demand is highest and more expensive forms of electricity production are used to meet demand.

RPP consumers who are charged RPP tiered prices, pay prices based on per kilowatt hour (kWh) consumption thresholds.

The RPP was established by the OEB in 2005. The objectives of the RPP, which remain unchanged from 2005, are set out in the OEB's Regulated Price Plan Manual (the RPP Manual) as follows:

- Set prices to recover the full cost of RPP supply; that is, the price structure must, on a forecast basis, recover all of the RPP supply costs from the consumers who pay the prices;
- Set the price structure to reflect RPP supply costs; that is, the prices should reflect the differences in cost of supply at different times of the day and year;
- Set both prices and the price structure to give consumers incentives and
- opportunities to reduce their electricity bills by shifting their time of electricity use; and
- Create a price structure that is easily understood by consumers.

Regulatory Framework for the Regulated Price Plan

The OEB's responsibilities and authorities for setting RPP pricing are set out in legislation, regulation, and the OEB's own codes. This legislative framework informs the ways in which RPP is recovered and the adjustments that the OEB can currently make to the pricing scheme.

Under Section 79.16 of the Ontario Energy Board Act, 1998 (the Act), the OEB assumed responsibility for setting electricity commodity prices for eligible consumers effective April 1, 2005. Section 79.16 of the Act requires that the OEB make

adjustments to RPP prices with a view to recovering costs within 12 months or such shorter time as the Minister may direct.

Ontario Regulation 95/05 requires the Board to forecast the cost of electricity to be consumed by RPP consumers and to ensure that RPP prices reflect those costs.

The Standard Supply Service Code (SSS Code) makes provisions for two RPP pricing arrangements: two-tiered prices and TOU prices. The methodology for setting both types of RPP prices is set out in the RPP Manual.

RPP consumers who are not on TOU prices are charged tiered prices, which are based on per kilowatt hour (kWh) consumption thresholds established by the OEB. The price threshold – the amount of electricity that is charged at the lower price –changes twice a year for residential consumers: 600 kWh per month in the summer (May 1st to October 31st) and 1,000 kWh per month in the winter (November 1st to April 30th). The threshold for non-residential RPP consumers remains constant at 750 kWh per month for the entire year.

RPP prices are set so that the "average consumer" would pay the same for their electricity (commodity only) regardless of whether they are charged tiered or TOU prices, if they do not change their consumption patterns.

RPP prices combine both the market price for electricity and the Global Adjustment (GA). The GA is a charge that accounts for the differences between the market price and the rates paid to regulated and contracted generators and for conservation and demand management programs.

The Global Adjustment was originally constructed as a uniform volumetric charge for all electricity consumers. Effective January 1, 2011, changes were made to the Global Adjustment mechanism resulting from amendments to the Ontario Regulation 429/04 (O. Reg. 429/04). The change dealt with the manner in which the GA is allocated to different classes of consumers:

- Class A: Comprised of consumers with a maximum hourly demand for electricity in a month of 5 MW or more (recently changed to 3 MW or more for certain eligible customers[1]); and
- Class B: Comprised of all other consumers, including RPP consumers.

The changes to O. Reg. 429/04 resulted in changes in the allocation of GA costs between the two classes of consumers. Class A consumers began being charged based on their contribution to Ontario's system peaks for their GA costs, while all Class B consumers continued to be charged based on their energy consumption.

[1] The government of Ontario expanded the initiative to include eligible consumers with a peak demand greater than 3 MW but less than or equal to 5 MW effective July 2015.

Effective May 1, 2011, following amendments to Ontario Regulation 95/05, the off-peak period for TOU prices was required to start on weekdays no later than 7 p.m. throughout the year, and also during weekends and statutory holidays.

RPP Supply Costs and Price Setting

The RPP Manual was developed by the OEB in 2005 and describes the methodology for determining RPP supply costs and prices. These prices are reviewed and may change every six months. The review process ensures that full supply cost recovery is achieved in accordance with both the legislation and the objectives of the RPP.

The OEB bases prices on an estimate of how much it will cost to supply the province with electricity for the next year. Many factors go into this estimate including:

- The amount of power consumers are expected to use;
- The cost of electricity generated by different sources (e.g., nuclear, hydroelectric, natural gas, wind, solar, etc.) over that time. This includes regulated costs for most of Ontario Power Generation's generators and contracted costs for others, costs for conservation and demand management programs paid for by the IESO; and,
- The variance between the actual costs and the forecast costs used at the time of the last price setting.

As described in the RPP Manual, "[t]he RPP supply cost is the cost of electricity supply for RPP consumers," including the costs of the Global Adjustment. Initially, the OEB allocated GA costs uniformly on a per kilowatt-hour basis across all TOU supply. However, the decrease in volatility in market prices that resulted from improved supply-demand balances and greater reliance on long-term supply contracts reduced the spread between TOU prices ("price convergence"); between May 2005 and November 2009, the difference between on- and off-peak prices decreased from a ratio of 3.2:1 to 2:1.

In response to the observed price convergence, following a review of the RPP in 2009, the OEB revised the RPP Manual[2] to allocate the components of the Global Adjustment costs to TOU consumption periods reflecting the system purpose for which many of the facilities were initially contracted. This change to the method of allocating costs was intended to preserve load shifting incentives in TOU prices while maintaining supply cost recovery.

The RPP Manual[3] was further revised in 2011 to reflect amendments to Ontario Regulation 429/04 related to the change to off-peak periods as discussed above and to

[2] http://www.ontarioenergyboard.ca/oeb/_Documents/EB-2007-0672/notification_of_revision_RPP-manual_20090513.pdf

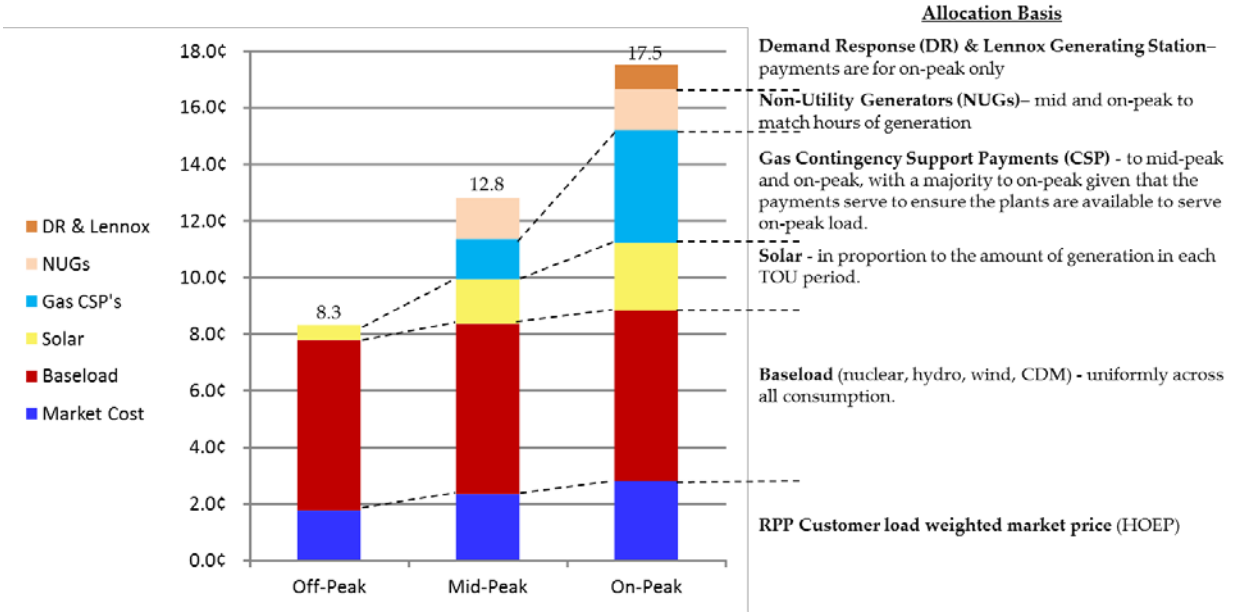
[3] http://www.ontarioenergyboard.ca/oeb/_Documents/EB-2004-0205/Letter_20110822.pdf

include in the Global Adjustment amounts approved by the OEB for OEB approved conservation and demand management programs undertaken by electricity distributors.

In 2015, the OEB made changes in the allocation of the costs of natural gas generators into the mid-peak and on-peak periods, reflecting the system purpose for which many of the facilities were initially contracted: ensuring reliability of supply and being a dispatchable source of power at times of higher demand. This change in allocation expanded the ratio between on and off peak prices providing greater rewards to consumers who shift use to evenings and weekends, and was a first step towards taking a longer term approach to system supply costs and efficiency.

The current approach to allocating RPP supply costs as set out in detail in the RPP Manual, is described in Figure 1.

Figure 1. Current Allocation of Supply Costs to TOU Periods (cents/kWh)



Why the need for a review?

TOU pricing has been fully implemented in Ontario since 2012. The IESO[4] and the OEB have now assessed the impacts of TOU pricing on residential and small business consumers. Both assessments provided similar results: TOU pricing has been moderately effective in influencing residential consumers to load shift, and that small business consumers appear to be responding very little or not at all.

The Environmental Commissioner and the Auditor General have also recently assessed the effectiveness of Ontario's TOU pricing structure on consumer behavior.

[4] http://powerauthority.on.ca/sites/default/files/conservation/Preliminary-Report-First-Year-Impact-Evaluation-of-Ontario-TOU-Rates.pdf

In his 2014 Annual energy conservation report, *Planning to Conserve*, the Environmental Commissioner called on the OEB to significantly widen the peak and off peak price differential. Similarly, the 2014 Annual Report of the Office of the Auditor General of Ontario noted that the ratio between on and off peak prices may not be sufficient to encourage ratepayers to shift their electricity use behaviour.
The OEB's assessment in 2013 was the first step in the RPP review process. It provided evidence that while TOU pricing is incenting some change in consumer behavior, more can be done.

Now is an appropriate time to evaluate the RPP's successes and shortcomings and begin making adjustments that will facilitate the achievement of policy objectives and better serve RPP consumers. A new Long Term Energy Plan was released by the Minister of Energy in 2013 (LTEP). The 2013 LTEP balances five principles that will guide future Government decisions: cost-effectiveness, reliability, clean energy, community engagement, and an emphasis on conservation and demand management before building new generation. Effective TOU pricing could have a particular impact on conservation and demand management. That is, the more RPP consumers reduce their use or shift their use away from peak demand time, the less new investment is needed to accommodate peaks in demand.

The Conservation First policy released by the Ministry of Energy in 2013 also looks to effective pricing as a means of reducing system costs and costs to consumers. The report notes that building on the existing TOU structure, by offering new pricing options, such as critical peak pricing or critical peak rebates, could result in further conservation and consumer benefits.

Ontario electricity procurement has also changed significantly since 2005. Today, almost all of Ontario's total supply resources are under long-term contract or regulated pricing. As a consequence, the costs that RPP customers pay are largely independent of the market price.

Ontario's supply has also changed significantly since 2005 – supplies have increased and demand has fallen meaning that we have plentiful supply for the short term. Supply will remain stable and adequate for the next several years. As noted in the 2013 LTEP, "Ontario is currently in a strong supply situation and has time to consider how to address future needs." According to the IESO, "[u]pdated supply and demand forecasts result in a need for additional capacity […] beginning in 2021, as opposed to the 2019 date stated in the 2013 LTEP."[5]

Given the supply situation described above, now is the time to take a comprehensive approach to the redesign of RPP, which takes into consideration the longer-term needs of the system as reflected in the LTEP.

[5] http://www.ieso.ca/Documents/generation-procurement/NUG-Framework-Assessment-Report.pdf

APPROACH

The OEB undertook analytical research, consumer research and a jurisdictional review to explore how the RPP has performed, how it is serving consumers and how others have managed similar challenges. To help determine future policy directions, the OEB commissioned studies that looked backward – to explore how the RPP has performed and how consumers perceived the RPP; and studies that looked forward – exploring potential changes in pricing information and options that have helped determine future policy objectives for RPP.

Navigant Consulting was engaged to undertake a study of TOU rates, and how TOU could be improved through structural changes. They reported back with two documents: *Time of Use Rates in Ontario – Part 1: Impact Analysis* (Part 1 Report), and *Time of Use Rates in Ontario – Part 2: Alternative Scenario Analysis* (Part 2 Report).

The OEB commissioned Ipsos Reid to conduct exploratory qualitative research, using both online and traditional focus groups. A second phase conducted quantitative research using a telephone survey, which was developed based on the results of the focus groups. They reported back with *Consumer Perceptions Research: Qualitative Exploration*, *Business Perceptions Research: Qualitative Exploration*, and *Time of Use and Electricity Bill Research: Residential & Business Survey*.

The OEB commissioned BEworks to apply a behavioural economics approach to review and assess the ways in which consumers are, and are not, responding to the current pricing structure in Ontario. They reported back with *Analyzing and Nudging Energy Conservation and Demand Shifting Through Time of Use Compliance*.

Power Advisory conducted a review of leading jurisdictions in North America and beyond and reported back with *Jurisdictional Review of Dynamic Pricing of Electricity*.

All of these research studies are available on the OEB's website.

STUDIES AND FINDINGS

Assessing the Impacts of Existing TOU on Consumption

Navigant Consulting was engaged in the spring of 2013 by the OEB to undertake a study of TOU rates. As part of this study the OEB has made available to Navigant the hourly consumption data of approximately 14,000 consumers, 10,000 of which are residential, the rest of which are general service less than 50 kW consumers.

Key Findings:

TOU rates have led to a 3.3% reduction in residential summer On-Peak consumption.

TOU rates have led to an average demand reduction of 179 MW during the summer On-Peak period.

Residential consumers appear to be reducing their on-peak consumption and increasing their off-peak consumption in response to TOU prices in the summer (June, July, August) and summer shoulder (May, September, October) seasons.

Navigant was unable to draw a robust conclusion about the impact of TOU rates for general service consumers, i.e. small business consumers.

Assessing Alternative TOU Structures To Improve Results

Navigant's second report estimated the benefits and impacts of a number of alternative pricing scenarios (See Table 1) to help inform the design of future pricing pilots.

Key Findings:

Increasing the price differentials of the current TOU structure could yield material peak demand reductions.

There is potential value in assessing the impacts of Critical Peak Pricing and Critical Peak Day pricing.

Expected embedded solar PV production could significantly change Ontario's system demand peak by 2020 and, by extension, yield significant influence over how the future TOU structure should be designed.

Table 1. Alternative TOU Pricing Scenarios

Scenario	**Description**
Status Quo TOU with Voluntary Critical Peak Pricing ("CPP")*	*RPP Summer Months:* Discounted Off-Peak rate and a critical peak rate over four hours on up to 15 summer weekdays *RPP Winter Months:* Status Quo TOU
Two Prices Winter/Summer, One Price Shoulder ("Flat")	*Dec – Feb and June - Aug:* On-Peak rate from 7am to 7pm on weekdays and an Off-Peak rate the rest of the time *March – May and Sept – Nov*: A single rate in all hours

Scenario	Description
Summer Super-Peak ("Super-Peak")[6]	*June – Aug:* On-Peak rate from 7am to 1pm, Super-Peak rate from 1pm to 7pm and an Off-Peak rate at all other times *Sept – May:* On-Peak rate from 7am to 7pm on weekdays and an Off-Peak rate the rest of the time
Status Quo with Voluntary Critical Peak Days ("CPD")*	*RPP Summer Months:* Discounted On-Peak and Mid-Peak and a critical peak rate over 12 hours on five summer weekdays *RPP Winter Months:* Status Quo TOU
Enhanced Status Quo ("ESQ")	*All Year:* Time periods identical to Status Quo. Prices set using Off-Peak : Mid-Peak : On-Peak ratios of 1:3:4
**For voluntary CPP and CPD options, Navigant assumed a participation of 5% of residential consumers and 2.5% of GS<50 consumers.*	

Assessing Consumer Awareness and Understanding of Existing TOU

Ipsos Reid conducted quantitative and qualitative research to obtain a better understanding of electricity consumer's awareness, preferences, and behaviours. The qualitative research included online sessions with residential consumers in Northern and Southern Ontario as well as traditional focus groups in Toronto and London. Ipsos Reid also conducted interviews with senior decision makers at small businesses. The qualitative research informed the quantitative research component, which consisted of a 2014 survey of 800 residential consumers and interviews with 300 business consumers across all of Ontario.

Key Findings:

Residential and business consumers displayed confusion and a lack of understanding about the electricity system in Ontario.

Many consumers do not understand the charges on their electricity bills.

[6] A "Super-Peak" pricing plan augments a TOU structure with significantly higher "super-peak" rates that apply to peak hours.

Businesses mentioned most often that they cannot control their hours of operation to meet the TOU schedule, that they need to operate during peak periods, or that TOU is not business friendly.

By the numbers:

- 49% of consumers indicate that they are satisfied with Time of Use pricing with most being somewhat satisfied and 9% ‘very satisfied’. 18% of consumers are neutral and 32% indicate that they are dissatisfied with Time of Use pricing

- 66% of electricity consumers believe that Time of Use pricing is an effective strategy to shift their electricity consumption from the daytime and early evening to later in the evening, with 31% indicating that it is ‘very effective’, while 32% feel that Time of Use pricingis ineffective.

- 58% of consumers who indicate that Time of Use pricing is ineffective mention that the pricing system is not practical or does not work with their schedule or lifestyle. 12% mention that the savings potentially gained from shifting usage is not worth the effort to them.

- Although half of consumers mention that they are satisfied with TOU, 65% provide a negative comment about the pricing system. Among these, 26% mention that TOU is not practical for their lifestyle. Among those who mention something positive, 5% or fewer mention that TOU has changed their usage times, that it has saved them money, or that it is effective or that they like the idea.

- Consumers between the ages of 18 and 54, and those who work full time are significantly more likely than those over the age of 55 to mention that Time of Use pricingis not practical for their schedule or lifestyle (65%, compared to 50% respectively).

- 31% of consumers believe that the single most important action that they could take to conserve electricity is to turn off items when they are not in use, while 27% believed shifting electricity use to off-peak or later times of the day is most effective.

- 57% of consumers would be interested in having a larger difference between on-peak and off-peak rates, while 50% are interested in having multiple pricing plans to choose from for people to use electricity at different times of the day. 44% of consumers would be interested in having fewer price-periods (i.e., eliminating the mid-peak period) in the day.

Identifying Opportunities to Improve Consumer Response to Existing TOU

BEworks applied behavioural economics[7] to conduct experiments and consumer research to review the ways in which consumers are, and are not, responding to the current pricing structure in Ontario.

BEworks electricity consumer survey assessed participants' awareness (recall of the TOU model) and comprehension (understanding of electricity usage and the TOU model) of TOU pricing in order to inform their nudge panel experiments. This survey was distributed to:

- An online sample of 666 Ontario residents,
- An online group of 341 small business consumers in Ontario, and
- A small group of 67 Toronto residents (the survey was conducted in person).

BEworks also conducted a series of experiments that looked at varying specific elements of a typical electricity bill. Ten nudge panel experiments were carried out with the objective of trying to increase participants' awareness and/or comprehension of TOU via information that is displayed on an electricity bill.

Key Findings:

Awareness of TOU pricing is high while comprehension about the scheme is low. While people may say they understand the time periods, they have trouble interpreting the current communications tools such as the TOU period clock.

When consumers are asked anything besides what the TOU periods are named, awareness falls off drastically. Even consumers who are aware of TOU pricing may still not understand when and how it operates or what behaviours are necessary to reduce their bill.

Making TOU information more salient on the bill increases peoples' comprehension of TOU pricing and improves recall of information.

Changes to the naming schema, TOU period clock, electricity consumption graphs, benchmarks, and the way pricing information is presented, can potentially influence consumers likelihood to align with TOU schedules and reduce consumption compared to what exists today.

[7] Behavioural economics is a multidisciplinary approach that combines the fields of psychology, neuroscience, economics, and marketing. Its fundamental premise is that people rely on mental shortcuts ("heuristics") in their everyday life to help them make day to day decisions, resulting in decision making processes that lead to systematic errors which are not what would be predicted by traditional economic models.

Table 2 – BEworks insights on bill presentation

Bill Presentment Intervention Point	Main Finding(s)
Unit of Price (pg. 48)	TOU prices displayed in cents (e.g., 7.7¢), are easier to process than prices expressed in dollars ($0.077).
TOU Naming Schema (pg. 52)	Price Focused naming schema conditions (e.g., Peak Price, High Price, Standard Price) are easier to recall than the current TOU period names (On-peak, Mid-peak, Off-peak).
TOU Visual (pg. 55)	A linear visual presentment of the TOU time period schedule is easier to comprehend than the current 24-hour clock-based visual.
Price Clarity (pg. 59)	Simplified bill presentment improves comprehension: • TOU charges should be displayed in a block design on the front of the bill. • Fixed charges should be displayed next to their definitions on the back of the bill.
Historical Consumption Visual (pg. 65)	Presenting historical information in a vertical bar graph (time on the x-axis) improves comprehension of the information. Consumption visuals displaying historical data should make year-over-year comparisons.
TOU Period Consumption Visual (pg. 73)	Conditions where the consumption bar graphs displayed a single TOU period (e.g. On-peak only) found easier to understand by consumers
Consumption Benchmarks (pg. 79)	Consumers should be provided with some form of benchmarking information (e.g., comparisons to one's own past behavior).
Pricing Extremes (pg. 93)	Participants were more likely to recognize that they were consuming too much on-peak electricity when exposed to a 5:1 on-to-off peak TOU price ratio than when exposed to the current 1.8:1 ratio.
PeaksaverPLUS offer (pg. 98)	Regardless of the PeaksaverPLUS offer they saw (e.g. loss aversion messaging), participants were undecided about their participation in the program.

Power Advisory Jurisdictional Review of dynamic pricing options

This study undertook a comprehensive jurisdictional review of dynamic electricity pricing to help inform the OEB's considerations of pricing options for Ontario. Power Advisory reviewed different dynamic pricing programs that have been employed in six North American jurisdictions including California, Florida, Georgia, Illinois, Missouri, and Washington D.C. Power Advisory also looked at the experience in New South Wales, Australia.

Key Findings:

Reducing peak demand and the corresponding need for new peaking capacity could save Ontario consumers many millions of dollars. For example, Gulf Power's TOU-CPP program in Florida has seen a 20 MW reduction in summer peak. There may also be benefits from shifting demand from high-value to low-value times outside of the system peaks that drive the need for new peaking capacity, but these benefits are likely modest, given the fairly low volatility of electricity costs in Ontario.

The current TOU program requires a sustained effort to produce a small reduction in peak demand and peak-period consumption, resulting in a small bill reduction. CPP programs in other jurisdictions, like California, Missouri, Florida, and Washington D.C. suggest that a relatively large reduction in peak demand can be achieved with much less effort than Ontario's current TOU program, over a relatively few hours out of the year, because of the more targeted approach with very high prices for very limited periods.

The availability of enabling equipment for consumers appears to increase program effectiveness and consumer satisfaction. The consumers participating in the Washington D.C. PowerCentsDC pilot reduced summer peak demand by up to 50% with the greatest reductions occurring when dynamic prices were combined with automated air conditioner control via smart thermostats. Similarly, in the Missouri pilot, participants with enabling technology had a much stronger response (more than double) during CPP events when compared to the CPP without enabling technology group.

The most effective programs have included extensive consumer education prior to and throughout the program. The successful programs in Florida and Washington D.C. undertook robust consumer education initiatives.

Consumers are more likely to participate in a program they understand. Florida and Washington D.C. implemented programs that emphasized simplicity in rate structure and making use of automation through enabling equipment. In contrast, in the New South Wales project, the target for participation was 8,000 households, however only 3,400 consumers enrolled (with 2,400 remaining in the trial until program close). The low engagement was partially attributed to consumers having a limited understanding of the choices available to them.

REGULATORY BARRIERS TO THE EFFECTIVENESS OF RPP

TOU pricing is intended to incent consumers to change their pattern of consumption and enhance electricity system efficiency. The original RPP methodology and objectives outlined in the RPP Manual were designed to support those objectives. However, some regulations and legislative requirements, limit the OEB's flexibility to set optimal prices.

Regulated Off-Peak Period

Ontario Regulation 95/05 specifically requires that regulated prices must set an off-peak price that begins no later than 7pm and ends no earlier than 7am on weekdays. However, a material number of system peak hours now occur after 7pm (see Table 3).

Ontario's electricity system load shape is evolving with changes in the nature of our electricity supply and consumer response to TOU pricing. The existing TOU time periods do not match well with the existing system load shape and even less so with the expected system load shape of the future. Currently, the Ontario electricity system peak is a prolonged plateau rather than a short period of time in the afternoon.

Table 3. Weekday Frequency Distribution of Ontario Electricity Demand > 22,000 MW, 2011-2014

Months → Hours ↓	1	2	3	4	5	6	7	8	9	10	11	12
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	2	0	0	0	0	0
9	0	0	0	0	0	2	5	0	0	0	0	0
10	0	0	0	0	0	2	8	0	0	0	0	0
11	0	0	0	0	0	2	11	0	0	0	0	0
12	0	0	0	0	0	4	15	0	1	0	0	0
13	0	0	0	0	0	5	14	1	1	0	0	0
14	0	0	0	0	0	5	15	4	1	0	0	0
15	0	0	0	0	0	6	16	4	2	0	0	0
16	0	0	0	0	0	7	18	6	2	0	0	0
17	0	0	0	0	0	7	18	2	1	0	0	0
18	8	0	0	0	0	4	14	1	1	0	0	1
19	12	0	0	0	0	3	12	1	1	0	0	1
20	10	0	0	0	0	3	11	0	0	0	0	1
21	5	0	0	0	0	1	6	0	0	0	0	1
22	0	0	0	0	0	0	2	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0

Source: IESO. The off-peak TOU price starts at hour 19.

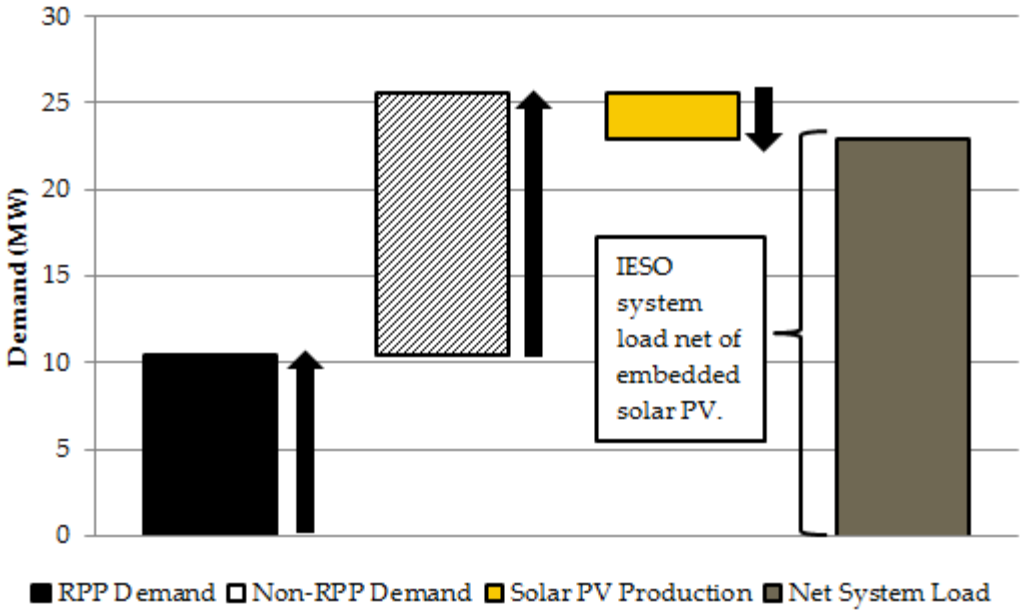
The Navigant Part 2 Report identified that an increase in embedded solar photovoltaic (PV) generation is a driver of future changes to Ontario's system load shape.

It is expected that embedded solar generation will increase, intensifying the difference between total ("gross") peak system demand (i.e., system demand that includes both the demand satisfied by generation served via the bulk transmission grid and that which is supplied by generation embedded in local distribution systems) and "net" peak system demand (the demand which is measured on the bulk grid). Gross peak system demand, which occurs during existing on-peak periods, does not coincide with "net" peak system demand, which can occur much later in the day, because of the

combination of embedded solar generation and consumers shifting use in response to TOU pricing. This phenomenon is relevant to the consideration of options for TOU and other time varying price regimes because it impacts the system load shape and peak period demands that TOU prices are intended to address. What this leads to is the potential for new peaking resources to address the increased demand in later hours in the day. Navigant notes that "the principal effect of increased PV production is to reduce net system load demand during the daylight hours – effectively eliminating the "plateau" of peak demand. There is now a larger differential between the demand in each of the successive top ten peak demand hours, and the peak hours of the peak day are clearly much later in the day – between 7pm and 10pm as opposed to between 11am and 6pm."[8]

The impacts of increased embedded solar PV on system load shape are illustrated in Figures 2 and 3.

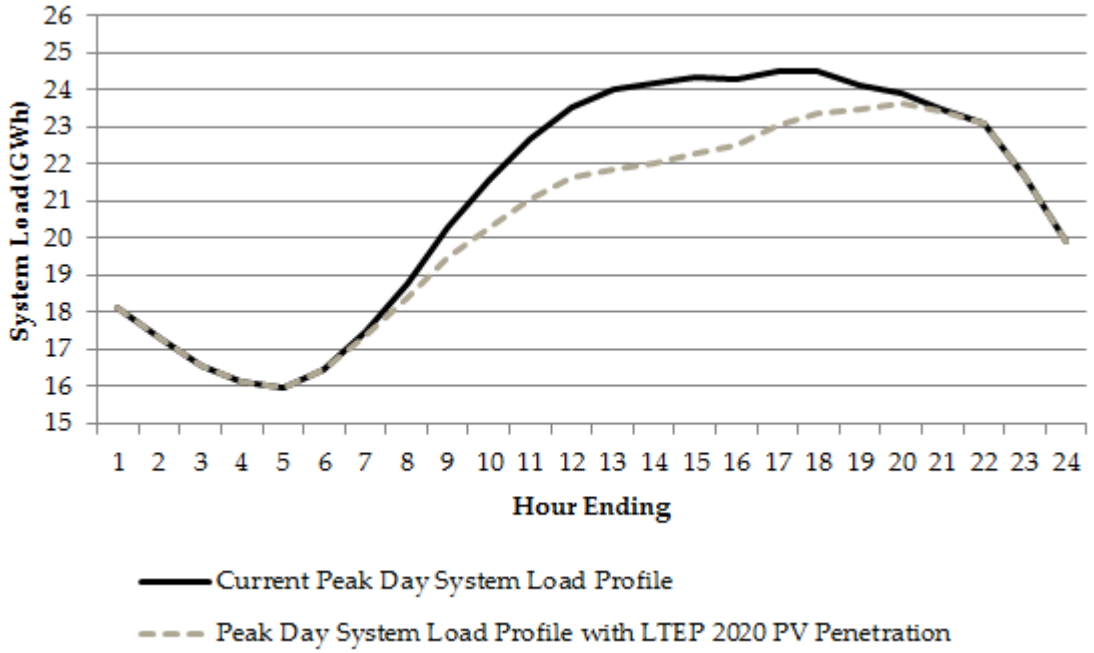
Figure 2. Illustration of Net System Load



Source: IESO, OEB, CWECs, NREL and Navigant analysis

[8] Navigant, Part 2 Report, p. 94.

Figure 3. Comparison of Actual and Forecast PV Peak Day Load Profile (Test Year 2011)



Source: IESO, OEB, CWECs, NREL and Navigant analysis

To enable the most effective pricing design that achieves policy objectives, the OEB requires more flexibility with respect to setting time periods for TOU pricing that is focused more on reducing system peak demand than shifting consumption. For example, a potential alternative to the current regulation could be that consumers must always be presented with an RPP price option with an off-peak period that begins no later than 7pm and ends no earlier than 7am on weekdays, but that alternative options can also be made available.

Changes to Regulation 95/05 would be required to provide this kind of flexibility to develop options.

Misalignment of the Global Adjustment Recovery

Currently, the total GA dollar amount to be recovered is split between Class A consumers (those with an average hourly peak demand over 3 MW) and Class B consumer groups based on the contribution of Class A consumers to system peak. The responsibility for the allocation of GA costs between Class A and Class B consumers is prescribed by Ontario Regulation 429/04 and implemented by the IESO.

While the GA is allocated to the Class B group as a whole based on peak demand, the GA is divided between the RPP (residential and small business consumers) and non-RPP (all other consumers) sub-groups based purely on volume of consumption. The GA that is allocated to RPP Class B consumers is recovered from individual RPP

consumers through TOU rates determined by the OEB. The GA allocated to non-RPP Class B consumers is recovered from non-RPP Class B consumers through a uniform flat rate determined by the IESO. For the non-RPP consumers therefore the GA cost is the same regardless of the time that a customer consumes electricity. This is different than the effective GA cost paid by individual RPP customers through TOU prices, since the price design of TOU allocates some system costs into different time periods.

The recovery method described above means that as RPP consumers take action to reduce their peak demand, they reduce the amount of the GA that is allocated to Class B as a whole. This does little to affect the GA that is recovered from the RPP group from within Class B, since short-term demand response tends to deliver small energy savings. Effectively, some of the value of RPP consumer (residential and small business consumers) response to TOU prices accrues to non-RPP Class B consumers (mid-sized commercial and industrial consumers).

The implementation of a consistent approach to recovery of costs across the Class B consumers would be more equitable and support the development of a range of RPP price options that could more effectively address residential and small business expectations.

A more equitable approach would be to use a similar cost allocation to TOU in order to derive a volumetric charge for non-RPP Class B consumers. This is analogous to that of shaping total RPP system costs to a volumetric electricity charge for RPP consumers. The volumetric GA charge for non-RPP Class B consumers could be shaped to an annual hourly profile or shaped to a simple set of TOU periods. A non-uniform GA charge would also have the benefit of providing a stronger peak demand price signal to this group of consumers.

Changes to the current regulation are needed to address this lack of consistency in the approach to recovery of GA among Class B consumers.

Long-Run Marginal Cost

The OEB's current approach to setting RPP TOU rates delivers prices that are reflective of short-run forecast system costs rather than true long- and short-term marginal costs.

The current RPP TOU rate reflects the existing, embedded costs of serving the RPP consumers. Market costs are assigned to the TOU periods in which they are forecast to occur, and GA costs are allocated to the TOU periods based on the differences in cost of supply at different times of the day and year (e.g., the GA costs associated with the dual-fuel Lennox plant are allocated only to the TOU On-Peak, the GA costs of nuclear generation, most renewables and most conservation are allocated uniformly across the periods, etc.)

However, since the inception of the RPP in 2005, short-run costs have become increasingly fixed. The forecast energy and capacity requirements of the LTEP indicate that this situation is likely to persist for the foreseeable future. Long-term RPP system costs, however, continue to have a significant variable component – the need to invest in additional generation infrastructure as driven by system peak capacity requirements.

Given the substantial nature of these long-term marginal costs, the misalignment between the current approach for setting TOU rates (according to the profile of short-term costs only) and the profile of true costs (i.e., long- and short-term marginal costs) results in the creation of potentially economically inefficient electricity commodity rates.

To address the issue of long-term costs, the total short-term system costs used to set the RPP TOU prices could be allocated to TOU periods based on a system profile determined by the long-run marginal cost of electricity rather than the current approach. That is, the total costs used to determine the RPP TOU prices would be determined in the same way as they currently are, but the allocation of costs to the TOU periods would result in a price that would provide an incentive to consumers to reduce their demand at the time of system peak. The OEB intends to develop a mechanism to implement this approach in future RPP price setting.

WHAT WE LEARNED

Having considered the findings of the research commissioned by the OEB and the regulatory and legislative barriers to the effectiveness of the RPP, the OEB has arrived at the following conclusions:

1. **Of the four objectives originally set out in the RPP, two are not being achieved.**

The current TOU price structure is not:

- Creating a price structure that is easily understood by consumers, or
- Setting both prices and a price structure to give consumers incentives and opportunities to reduce their electricity bills by shifting their time of electricity use.

The research conducted on behalf of the OEB has shown that consumers do not appear to understand how to respond effectively and have limited comprehension of the current RPP/TOU scheme. Evidence suggests that the price ratio and/or TOU structure are not the only factors driving the observed limited response to TOU pricing, but the fact that many consumers do not know how to respond to TOU.

Consumers are not sufficiently embracing RPP to manage their energy costs and reduce the need for system investments. While there is a focus on conservation, the current time-of-use pricing structure has not provided sufficient incentives for consumers to shift and/or reduce use and does not contribute to long-term goals outlined in LTEP, such as targeting infrastructure deferral.

2. The existing RPP objectives do not reflect current public policy objectives

While the new LTEP policy focuses on long term system benefits, cost-effectiveness, and reducing peak demand this focus is not reflected in the current objectives of the RPP as developed by the OEB. The RPP needs to take these policy priorities into account so that the OEB can take a long term view when setting and designing prices. Pricing that reduces peak demand and the corresponding need for new peaking resources could lead to significant electricity system cost savings.

3. Optimal pricing structures can only be achieved with greater flexibility

While the OEB has broad authority to design price structures and address some of the shortcomings of the current RPP, optimal designs may not be achieved without changes to some of the limitations imposed by regulations.

ROADMAP TO RENEWING RPP

The OEB believes that the current stable state of Ontario's electricity system, as indicated by the IESO's most recent forecasts of supply and demand, provides an ideal opportunity to design a multi-year roadmap for the redesign of RPP to achieve optimal results for Ontario's electricity system and energy consumers.

The OEB is laying out a five-point plan to be implemented over the course of the next 3 to 5 years. As part of this plan, the OEB will undertake a comprehensive revamping of the RPP that will make incremental changes over the course of the plan. This staged approach will provide consumers with an adequate amount of time to understand and adapt to any changes in the TOU pricing structure. Through this plan, the OEB will redesign the RPP to respond to policy objectives, improve system efficiency, and give consumers greater control.

The five components of the RPP roadmap are:

1. Renewing the RPP objectives
2. Empowering Consumers: Enhancing energy literacy and non-price Tools
3. Implementing price pilots
4. Engaging with low volume business consumers
5. Working with government to reduce barriers

1. Renewing the RPP Objectives

Based on the results of the five reports and our own analysis, the OEB has concluded that the objectives and goals of the RPP must evolve to enhance its effectiveness. Specifically, the evidence reviewed in this report indicates that the RPP could be more effective and better reflect currently public policy objectives if it placed a greater focus on peak demand reduction, efficient system operation, and long-run system costs. Such a focus best serves the long-term interests of Ontario electricity consumers and the achievement of public policy objectives.

Based on those considerations, the OEB will immediately update the RPP objectives as follows (changes and additions to the original objectives are italicized):

- Set prices to recover the full cost of RPP supply, on a forecast basis, from the consumers who pay the prices.
- Set the price structure to reflect ***current and future*** RPP supply costs.
- ***Set the price structure to support the achievement of efficient electricity system operation and investment.***
- Set both prices and the price structure to give consumers incentives and opportunities to reduce their electricity bills by shifting their time of electricity use ***and reducing their peak demand.***
- Create a price structure that is easily understood by consumers.
- ***Provide fair, stable and predictable commodity prices to consumers.***

2. Empowering Consumers: Enhancing energy literacy and non-price tools

Research findings suggest that consumers do not really understand the current TOU structure at anything beyond a superficial level. Current communication of TOU pricing has not been effective in developing consumer comprehension of the TOU program and how to effectively respond to TOU pricing. Research findings suggest that there are a number of non-price interventions that could increase energy literacy and improve consumer response to TOU pricing (and other CDM programs) in terms of shifting use and/or conservation.

Actions to be taken

There is a need for information to be provided so that a typical consumer can process information more easily, such as improvements to bills, better understanding of energy usage, and knowing which actions to take and when to take them. In other words, the response could be improved though education. Non-price tools will be used to help make TOU pricing more easily understood by consumers. These interventions could potentially be more cost effective than introducing changes to the existing TOU pricing structure. Pricing programs that are easy to understand will likely achieve higher rates of consumer participation. The OEB will monitor results of these efforts to assess their effectiveness at enhancing consumer response to TOU pricing.

<u>The Electricity Bill</u>

The OEB will explore opportunities to improve the communication of TOU pricing through improvements to the electricity bill including:

- Re-naming the TOU time periods.
- Re-designing the TOU time period visuals.
- Modifying the presentation of the electricity bill.
- Providing better information on different appliances, such as the amount of electricity used, the cost of that electricity, and how use and cost can be managed under TOU pricing.

Through online experiments, BEworks found that making TOU and consumption information more salient on the bill has the capacity to increase comprehension of TOU pricing and improve information recall. Given these results, BEworks recommended that consideration should be given to a large-scale in-field test of redesigned bills to assess their effectiveness in motivating conservation and consumption-shifting behaviors.[9]

Technology and Benchmarking

The OEB intends to launch additional non-price pilot initiatives, such as piloting automated load control technology, energy consumption benchmarking, and other behaviour-focused interventions. Pricing that requires less (rather than more) consumer effort and can be coupled with technology may achieve a significant impact in consumer response.

The OEB will look to other projects in the sector in order to gain additional insight when it is developing non-price pilots. The IESO is funding several non-price projects through its Conservation Fund. Hydro One, Milton Hydro, and Horizon Utilities are taking part in social benchmarking pilots. Toronto Hydro is investigating the benefits of new demand response units for commercial and institutional consumers.

The Ministry of Energy's Smart Grid Fund is funding projects "to test technologies that help consumers reduce energy consumption and manage costs while giving them greater control over their day-to-day usage." The OEB will monitor these pilots and incorporate their findings into the RPP review.

Because of the potential for a significant increase in the use of technology to enhance consumer understanding and the ability to respond to price the OEB will also review its conclusions from the *Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach*, which found that the provision of behind-the-meter services is a non-utility activity.

Data Collection

Through surveying the consumers participating in the price and non-price pilots, the OEB intends to collect better data on low volume electricity consumers in order to better understand the primary factors determining their electricity use, and to better inform energy literacy and consumer engagement initiatives. This information will support our analysis of different RPP options and their effectiveness as part of the OEB's ongoing evaluation of the RPP.

3. Price Pilots

Pricing pilots are essential to determining the best pricing options and structures to achieve policy objectives and empower electricity consumers. Conducting rigorous pilots guided by the existing and renewed RPP objectives will ensure that changes to the RPP are evidence-based, well understood by consumers, have persistent impacts

[9] See p. 113 of the BEworks Report for the results of the optimized bill presentations.

on behaviour, and are appropriate to implement across the province. Potential pilots would test alternative pricing plans aimed at achieving the RPP objectives of reducing system peak and long-term infrastructure investment and fostering consumer choice.

The research findings indicated that the response to TOU pricing to date has been moderate and that many consumers may prefer an alternative pricing option. In terms of specific types of pricing pilots, Navigant's Part 2 Report estimated the impact of a number of pricing scenarios and identified potential options that could be tested in future pricing pilots.

Power Advisory's research suggested that three main criteria be considered when developing price options. Pricing that reduces peak demand and the corresponding need for new peaking resources could lead to significant electricity system cost savings. Pricing that requires less (rather than more) consumer effort to achieve a significant impact will likely be more effective in achieving demand reduction targets. Pricing programs that are easy to understand will likely achieve higher rates of consumer participation.

Actions to be taken

The OEB will work with LDCs to undertake several pricing (and non-price) pilots over the next 18 months. The pilots will run for at least one calendar year to assess whether there is persistence in the impact of the intervention. Based on the Navigant and Power Advisory findings, the OEB's approach to different price pilots and options for residential consumers will target two main streams:

1. **Simple Dynamic Peak-Targeting Rate**: This would be a rate designed to target and reduce system peak demand, but it would be simple enough for consumers to understand and respond to price signals efficiently without the need for automation equipment or enabling technology. For example, potential pilots may include testing various CPP options, CPD, or enhancing the existing TOU structure with changes in the time periods or price ratios.

   These pilots would be intended to have a structure that is more closely aligned with system needs than the current TOU structure. For example, potential pilots include the existing RPP-TOU or RPP two-tiered pricing structures with some form of critical peak pricing overlay element. This rate option could include a fixed number of CPP events each year. CPP events would be communicated to consumers a day ahead and would be called when system demand is expected to be unusually high. If overlaid on the RPP two-tiered pricing structures, for all other hours participants would be charged a flat hourly rate, assuming that they remain under a certain level of monthly consumption (e.g., 8 cents/kWh for the first 600 kWh/month), and a higher hourly rate thereafter (e.g., 16 cents/kWh for consumption greater than 600 kWh/month).

2. **Technology-Enabled Dynamic Rate**: This would be a more complex rate designed to reduce system peak and specifically target consumers with some form of home automation or enabling technology to allow for efficient price response. For example, potential pilots include real-time pricing (e.g., prices change on an hourly basis) or a pricing structure with more time periods than the current TOU regime (e.g., more than three price periods).

   Consumers electing to participate in this rate would be equipped with control technology that is capable of receiving price signal transmissions and that would act to reduce consumer demand by interacting with other control devices in the household.

The OEB intends to develop a plan for conducting pilots by collaborating with experts in pilot design along with an industry working group representing electricity distributors, the IESO, and consumer groups. The pilots will be implemented by electricity distributors following a selection process. Participating LDCs will be responsible for conducting evaluations and publicly reporting the results of their pilots. The OEB will expect the evaluations to include an analysis on impacts on peak demand, total electricity use and consumer acceptance and retention. In addition, the OEB envisions that pilots will incorporate a variety of surveys to better understand the consumers participating from a socio-economic perspective, but also to gauge their level of energy literacy overtime. The OEB will also incorporate the findings and lessons learned from current dynamic pricing pilots, such as PowerStream and Hydro One, into its own pricing pilots.

From the pilots that are conducted and evaluated, the OEB will identify options that meet the RPP objectives. The OEB will examine the successful options with a view to making them available to all RPP eligible consumers.

4. Engaging with Low Volume Business Consumers

The need for more information on the GS<50 kW consumer class is strongly supported by the research findings. For example, Navigant reported in its Part 1 Report[10] that its results were not robust because of the extremely limited data and heterogeneous nature of the general service consumer base. Based on the data available, the impact of the transition from tiered to TOU rates on general service consumer consumption are ambiguous. The IESO conducted an assessment of the impacts of TOU for GS<50 kW consumers that are in line with Navigant's findings.[11]

[10] Navigant used two separate econometric methods for estimating the impacts of TOU pricing on consumer demand, using data from 13,500 consumers (9,500 residential and 4,000 general service consumers). Navigant's data sample included data from 16 different LDCs. However, 80% of the general service consumer data came from just one distributor, Hydro Ottawa.

[11] First Year Analysis: http://powerauthority.on.ca/sites/default/files/conservation/Preliminary-Report-First-Year-Impact-Evaluation-of-Ontario-TOU-Rates.pdf
Second Year Analysis: http://powerauthority.on.ca/sites/default/files/conservation/2013-Evaluation-of-TOU-Rates-Year-Two-Analysis.pdf

Ipsos Reid's research also suggests that a significant proportion of small business consumers are not satisfied with the current TOU regime and have not taken measures to respond to TOU, finding that:

- Only one third of businesses that were aware that they participate in TOU pricing indicated that they are satisfied with the pricing structure or that the pricing structure is effective at shifting their consumption to lower peak times (respectively).
- Two thirds of all small and medium business have taken *no* actions within their organization to shift their electricity consumption from high to low peak times.

The BEworks survey of small businesses showed similar results with respect to a lack of response to TOU pricing, finding that:

- Most small business consumers suggested that the main reason for not shifting to TOU is that it conflicts with their business hours.
- A majority of small business consumers surveyed (67%) do not believe that enrolling in a program like PeaksaverPlus will make a difference in their electricity bills.

These research findings indicate that the lack of response by GS<50 kW consumers may be due to the current design of TOU pricing. As a result, the OEB recognizes that becoming more informed on the varying consumption patterns of each of the groups within this class will be an important first step in investigating the potential for a pricing plan option specific to the GS<50 kW consumer class.

Actions to be taken

The OEB intends to undertake a significant data collection initiative to better understand the needs of small business consumers. The OEB will be looking to better understand the varied composition of the GS<50 kW consumer class, potentially through extensive surveys targeting specific groups of consumers and also identifying them through consumer code types (e.g., retail, commercial, and hospitality).
The OEB will seek to engage low-volume business consumers in a series of meetings to discuss high level concerns for this consumer class to help inform the design of future pricing options.

5. Working with Government to Reduce Barriers

This report has noted that the regulations which fix the TOU time periods and the recovery of GA costs limit the OEB's ability to set optimal TOU prices. The OEB is committed to working with the government and the IESO to address the issues identified.

NEXT STEPS

As noted in the LTEP, “Ontario is currently in a strong supply situation and has time to consider how to address future needs”. The OEB is committed to using this time to implement a comprehensive and measured redesign of the RPP that takes into consideration the longer-term needs of the system as reflected in the LTEP.

The OEB will take a phased approach, one that will allow for experimentation and evidence-based decision making. The OEB will assess how much of an impact consumer education is making, and how improvements to the monthly bill are increasing awareness. After assessing options based on the results of pilots, the OEB will consider how to improve pricing structures to give greater consumer control, make it easier for consumers to respond to pricing signals, and incent consumers to do so.

Improving on the RPP is essential to preparing Ontario’s electricity system for the future and providing greater consumer control in their electricity use. Energy is a service, and in today’s economy, consumers expect options. Consumers and business owners need to be engaged, informed and making active choices around their time of use, and they must feel their choices make a difference on their monthly bill, and that their collective choices contribute to a stronger, more efficient energy system.