Guidehouse

Regulated Price Plan Pilot Meta-Analysis

Stakeholder Presentation

ONTARIO ENERGY BOARD

December 16, 2021

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2	Methods & Findings
3	Recommendation 1: Existing TOU Structure & Price Differentials
4	Recommendation 2: The Path Forward for Mobile Applications
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6	Recommendation 4: Overnight Pricing and Decarbonization

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The OEB's RPP pilots tested a variety of price structures, non-price tools, and enrolment strategies

LDC	Treatment Group	Mobile App	Enhanced TOU Ratios	New TOU Structure	VPP	CPP	DR Enabling Tech	Enrolment Type	Achieved Enrolment
alectra Discover the possibilities	Enhanced TOU		●					Opt-Out	7000
	Dynamic				●	●	●	Opt-In	770
	Overnight			●				Opt-In	440
CustomerFirst **	Enhanced TOU		●					Opt-In	529
	Seasonal TOU			●				Opt-In	562
London Hydro	Fast-Ramp CPP and CPP/RT	●				●	●	Opt-In	658
	RT-Only	●						Opt-In	1135
Oshawa Power	Super-Peak	●		●				Opt-Out	1906
	Seasonal TOU with CPP	●		●		●		Opt-In	508
	Information Only	●						Opt-In	512

** Since rebranded to Ecobility. Four of Ecobility's client utilities participated in the pilots: Greater Sudbury Hydro, North Bay Hydro Distribution, PUC Services, and Northern Ontario Wires

After an analysis of the pilot outputs, Guidehouse made four recommendations, the focus of this presentation

1

Make the default TOU rate more cost-reflective
Increase summer price differentials, start evening Off-Peak later

2

Convene a stakeholder working group to discuss mobile apps
Mobile apps can provide important non-energy benefits to consumers, policy-makers, and utilities. Data availability via Green Button is a necessary but insufficient condition for ensuring development and deployment of apps that deliver these benefits.

3

Apply critical peak pricing to those that received smart thermostats from provincially-funded programs
With automatic response capabilities enabled, considerable DR capacity could be available very quickly

4

Understand the decarbonization potential of Overnight pricing
EV-targeted overnight pricing may provide (currently uncounted) system benefits by shifting public peak time charging overnight. Such pricing could also encourage greater use of electricity for home heating

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Guidehouse combined an in-depth review of evaluation reporting with a structured "scoring" analysis

1 Method 1:

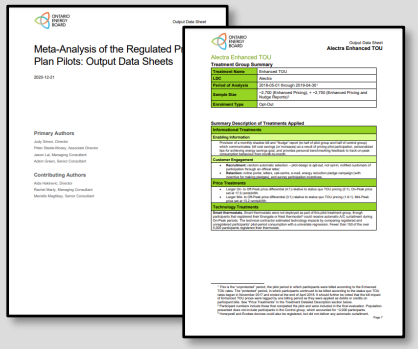
In-depth review of evaluation reports (interim & final) and direct engagement with pilot evaluators, as needed.

2 Method 2:

Comparison (quantitative and qualitative) of pilots across **seven** scoring metrics; the scoring metrics were developed based on the RPP Objectives identified in the RPP Manual

Using a transparent formal approach to deconstruct the pilots into key elements of interest was essential given the range of treatments tested, and LDC-specific differences in implementation

The need for a formal structure motivated the inclusion of Method 2, and the development of the Output Data Sheets (ODS)



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The seven scoring metrics are:

1	**Cost Recovery**	"*Set prices to recover the full cost of RPP supply, on a forecast basis, from the consumers who pay the prices.*"
2	**Cost Reflectiveness**	"*Set the price structure to reflect current and future RPP supply costs.*"
3	**Cost Minimizing**	"*Set the price structure to support the achievement of efficient electricity system operation and investment.*"
4	**Predictability**	"*Provide fair, stable and predictable commodity prices to consumers.*"
5	**Comprehensibility**	"*Create a price structure that is easily understood by consumers.*"
6	**Opportunity for Bill Savings**	"*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.*"
7	**Ease of Implementation**	*[Not an RPP Goal]:* This scoring metric is not directly based on the RPP objectives, but on the implicit assumption that implementation of recommendations must recognize real-world constraints

Results of structured analysis: no one-size solution

The RPP objectives are in tension with one another by design

When consumers realize significant bill savings then costs are under-recovered; targeting the uncertain timing of system peak with a rate reduces pricing predictability, etc.

Treatment Group	Cost Recovery	[Long-Term] Cost Reflectiveness	Cost Minimizing	Predictability	Comprehens-ibility	Opportunity for Bill Savings	Ease of Implementation
Alectra Enhanced TOU	4	3	2	4	4	1	5
Alectra Dynamic	2	5	4	1	2	5	1
Alectra Overnight	1	3	1	3	4	5	4
CustomerFirst Enhanced TOU	5	3	1	4	4	2	3
CustomerFirst Seasonal TOU	5	1	1	5	4	1	3
London Hydro CPP and CPP/RT	3	2	5	2	3	4	2
London Hydro RT-Only	**	**	2	4	5	2	4
Oshawa Super-Peak	3	4	3	3	5	3	5
Oshawa Seasonal TOU with CPP	5	4	3	2	3	4	2
Oshawa Information-Only	**	**	1	4	5	1	4

** Not applicable, as these are information only treatments that do not involve a price structure change.

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What do the pilot results suggest as the most appropriate default price structure?

Should the default RPP structure…

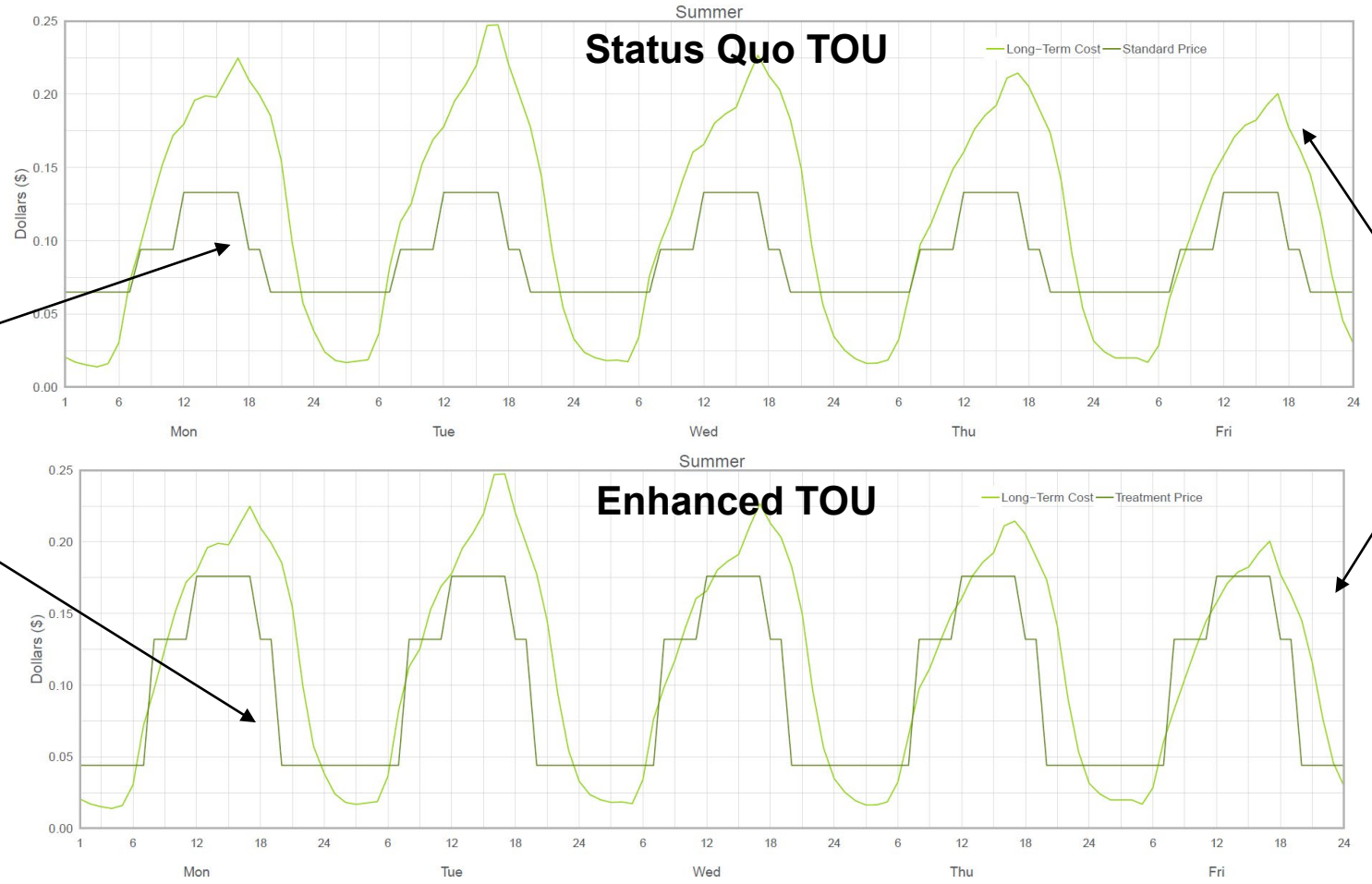
	Include CPP or VPP?	Include a Super-Peak Period?	Use Enhanced TOU Differentials?

Benefits	• Targeted non-scheduled event pricing is:
	  • Most reflective of long-term system costs and;
	  • Can significantly reduce long-term system costs
		• Scheduled Super-Peak pricing is:
		  • Quite reflective of long-term system costs and;
		  • Can somewhat reduce them
			• Enhanced TOU prices more reflective of long-term costs than status quo
			• No impact on predictability or comprehensibility
			• Simple to implement

Challenges	• Requires ownership of central A/C for effective response • Neither predictable nor comprehensible to most consumers	• Price response was driven entirely by the 20% of most engaged participants • Pilot attrition was very high (33%)	• No statistically significant incremental impact on average demand in short term for the differentials tested in pilot (less than 4:1).
Recommendation	• Not recommended for inclusion in default price plan ✗	• Not recommended for inclusion in default price plan ✗	• Summer: Increase On-Peak and Mid-Peak differentials • Winter: Increase On-Peak differential ✓

How big a difference is there in long-term cost-reflectiveness between Enhanced and Status Quo TOU?

In the summer?



RPP Price

Long-term cost-reflective price

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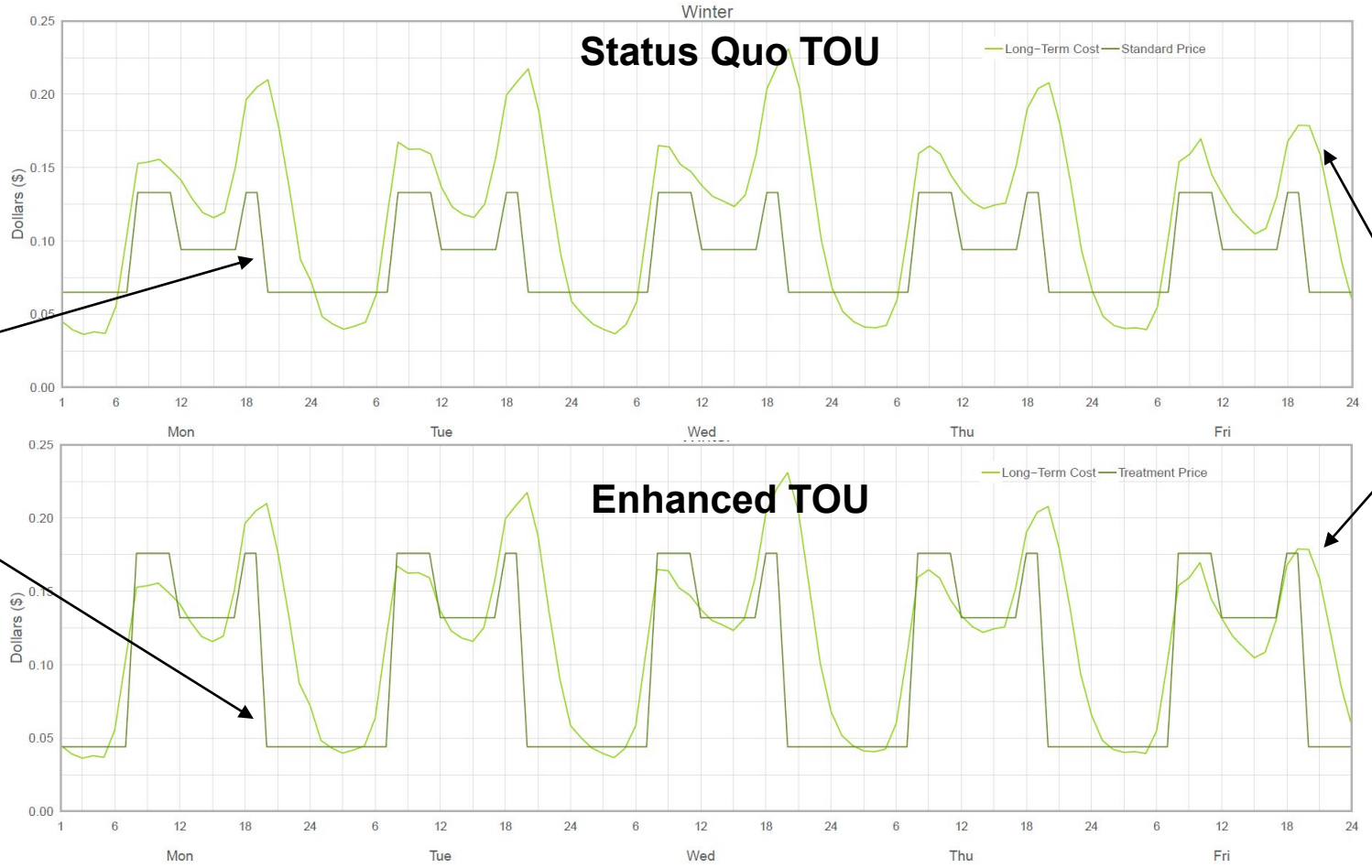
How big a difference is there in long-term cost-reflectiveness between Enhanced and Status Quo TOU?

In the winter?



RPP Price

Long-term cost-reflective price

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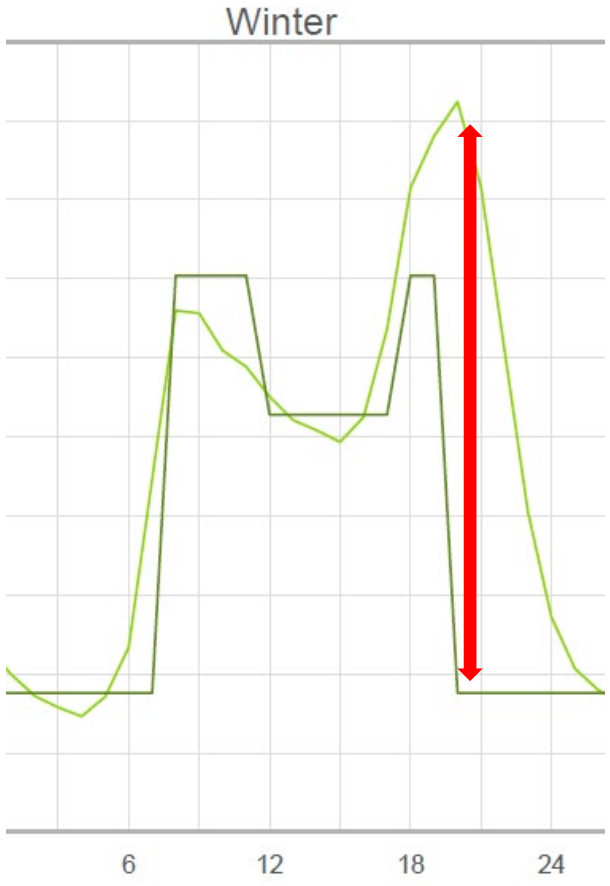
Is there an opportunity to improve cost-reflectiveness even more?



- The **gap between long-term costs and prices** is **largest** during the first few hours of the **evening Off-Peak**
- A **later Off-Peak** period would substantially **improve cost reflectiveness**

1 Make the default TOU rate more cost-reflective

Increase summer price differentials, start evening Off-Peak later

Guidehouse recommends that the OEB considers:

- Increasing the summer On-Peak and Mid-Peak, and the winter On-Peak price differentials
- Restoring the pre-May 2011 TOU period definitions and beginning the weekday Off-Peak period at 9pm instead of 7pm

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Consumers expect a mobile app to help track and manage energy use to be part of their information ecosystem.

TOU prices provide motivation, smart thermostats provide means, mobile apps provide validation

Alectra's customer research explicitly flagged desire for apps:

"Channels for communication need to evolve to reflect changing behaviour. Furthermore, **many would like and expect their smartphones to be their hub (namely via an App)** for managing and tracking their energy consumption."
- Ipsos Public Affairs, *Alectra Utilities Advantage Power Pricing Qualitative Research Report,* October 2018

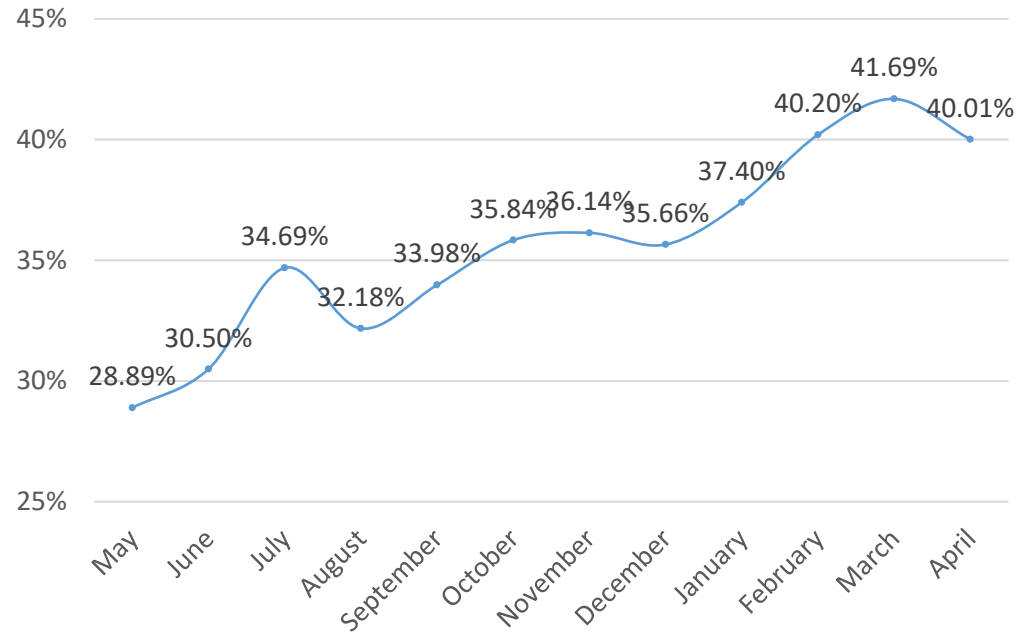
Consumers use mobile apps, to:
- do their banking,
- book or plan their immediate travel needs,
- monitor and control their home's temperature,
- monitor their doorbell camera or "nanny cam",
- Etc.

Most Ontario consumers **cannot**:
- access their electricity bills via an app,
- receive push notifications of bill due dates,
- navigate hourly historical consumption directly through an app.

The lack of an app to allow consumers to track their consumption in near-real-time acts as an implicit signal to consumers that **there is little value in monitoring their energy consumption.**

Most crucial feature is usage monitoring - Green Button may make providing this feature easier

By far the **most-used feature** of the Oshawa app was **viewing usage**; by pilot end, ~40% of app visits included a review of usage



Source: Publicis Sapient, *RPP Pilot Program – Final Results Report, August 2020*

Green Button Download My Data ®

The Green Button initiative is a data standard intended to allow consumers to authorize and enable the transfer of usage data to third parties (e.g., to populate app data)

The legislation mandating Green Button came into effect on November 1, 2021. Utilities have two years from this date to implement Green Button.

App users are engaged consumers; engaged consumers are vectors for impact

The app isn't driving savings; the **participants that care enough to use** the app are driving savings

Seasonal TOU periods	All participants			Digitally engaged			Non-Digitally engaged		
Participant count	1271			247			1024		
	kWh	%	p-value	kWh	%	p-value	kWh	%	p-value
Summer super-peak	-0.197	-2.23	0.0006	-0.860	-9.46	0.0000	-0.037	-0.42	0.5848

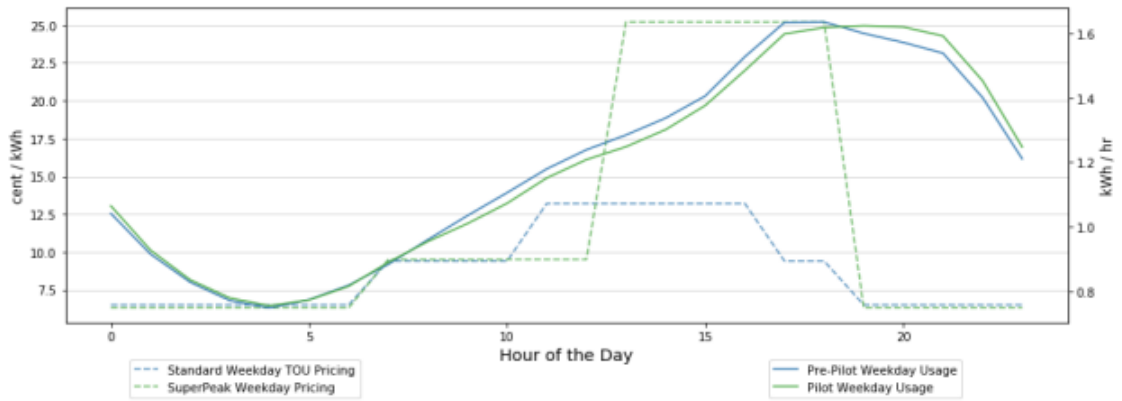
Source: Publicis Sapient, *RPP Pilot Program – Final Results Report, August 2020*

Not statistically significant

For opt-out Super-Peak, **all** impact came from just 20% of participants

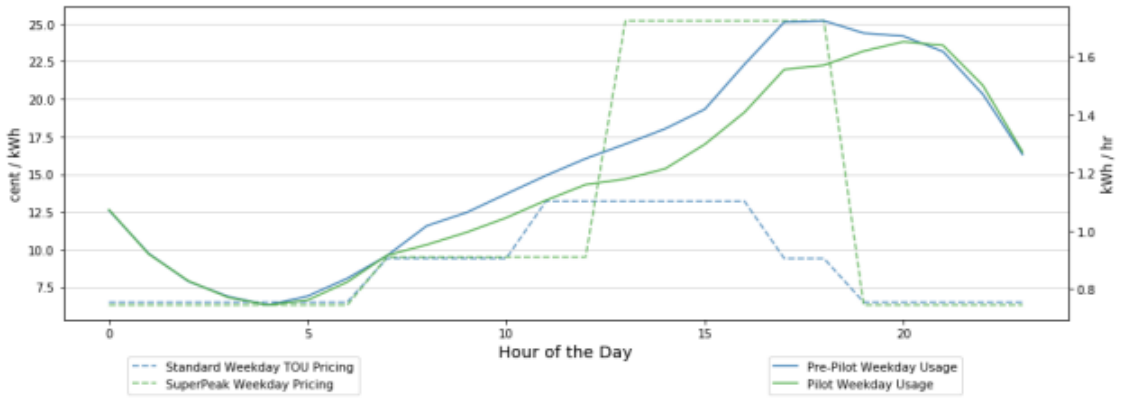
All Participants (incl. Digitally Engaged)

Figure 26. Super-Peak TOU – Summer weekdays hourly impact for all participants



Only Digitally Engaged

Figure 27. Super-Peak TOU – Summer weekdays hourly impact for Digitally Engaged Participants



The core value of apps to utilities & agencies comes from engagement & improved recruitment cost-effectiveness

Enhancing Program Delivery with Engagement Data

- App use identifies the most active program participants
- Typically, savings/achievement driven by most active participants
- Identifying engaged participants allows for more nuanced understanding of program response; improves program design

A Secure and Trusted Communication Channel to Customers

- Much more trustworthy communication channel than phone calls & email (scams/phishing)
- Improve Customer Choice transition through price plan recommendations
- Assist vulnerable consumers through cross-promotion, e.g., Oshawa PUC promotion of Affordability Fund Trust

A secure communication channel available to the most engaged participants provides opportunities for spillover marketing – reduce programmatic CDM acquisition cost

2 Convene a stakeholder working group to discuss mobile apps

Mobile apps can provide important non-energy benefits to consumers, policy-makers, and utilities. Data availability via Green Button is a necessary but insufficient condition for ensuring development and deployment of apps that deliver these benefits.

Guidehouse recommends that the OEB considers:

Working with a targeted group of stakeholder experts representing public agencies, government, consumers, and business to:

- Specify a list of app principles and objectives
- Define app features that will deliver on those principles
- Articulate barriers to implementation
- Identify appropriate delivery models to overcome those barriers

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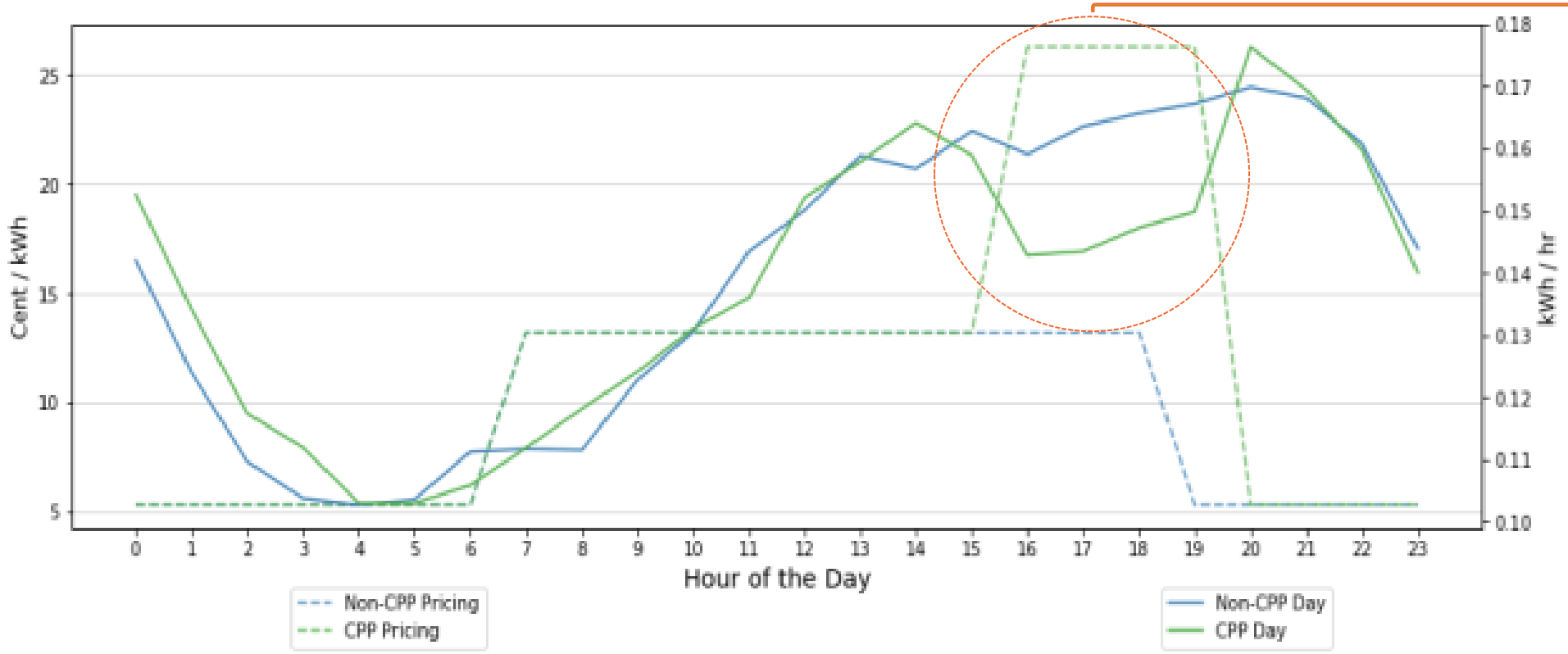
Event-based peak pricing delivers capacity

Behavioural CPP

Figure 15. Seasonal TOU with CPP – Summer CPP event day hourly impact for all participants

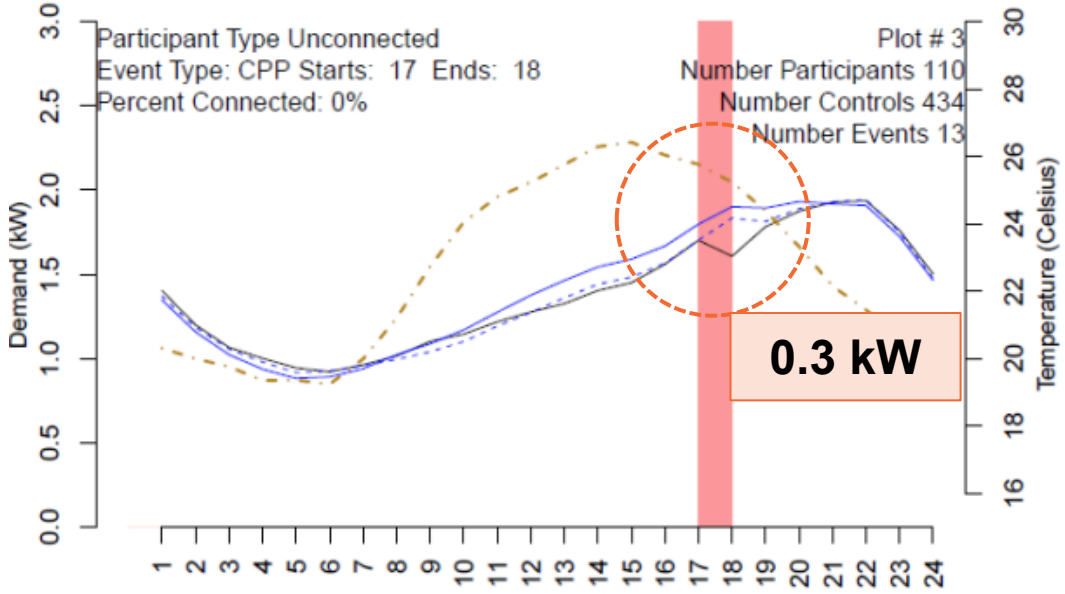


0.2 kW

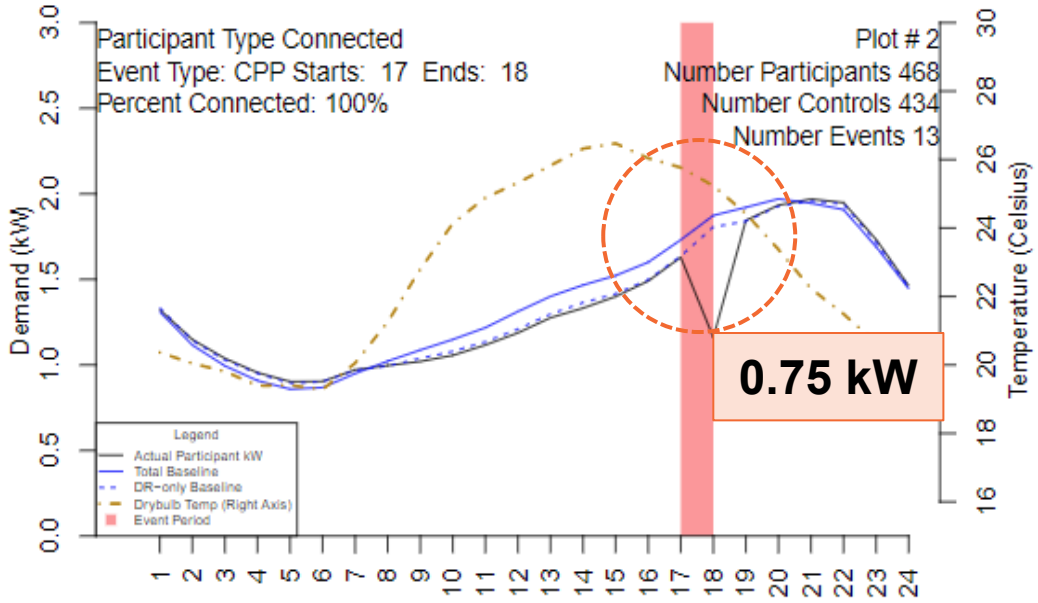
Source: Publicis Sapient, *RPP Pilot Program – Final Results Report, August 2020*

Tech-enabled peak pricing delivers even more capacity

Purely Behavioural CPP



Technology Assisted CPP



Although all participants in the London Hydro CPP pilot were equipped with enabling technology, apparently **random connectivity issues created** a **natural experiment** to **compare** the purely **behavioural** and the **technology enhanced response**.

The finding that **technology-enabled response is 2 – 3 times higher than purely behavioural** is well-established in the evaluation literature, e.g., results of 2016 evaluation of OG&E's SmartHours program, results of 2017 evaluation of Alectra's Advantage Power Pricing.

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CPP events should be confined to summer and, to be cost-reflective, should last more than one hour

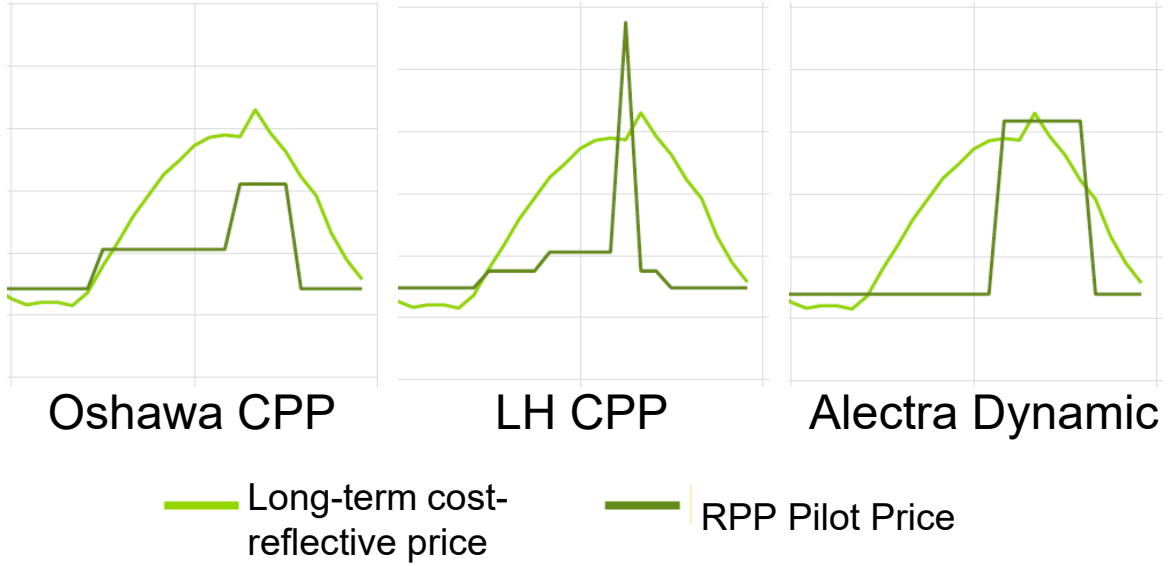
Average Participant Capacity to Respond is Strongest in Summer

Price Plan	Summer (kW)	Winter (kW)
Alectra Dynamic (12-month)	-0.354	-0.168
Oshawa CPP	-0.193	-0.07
LH CPP	-0.671	-0.134

While Ontario remains summer peaking, the value from CPP-based DR is delivered in summer months

The long-term cost-reflective price plateaus more than it peaks

Example CPP Event, 2018-06-30



Multi-hour CPP events are much more price-reflective than single-hour events & reduce probability of snapback in high-cost hours

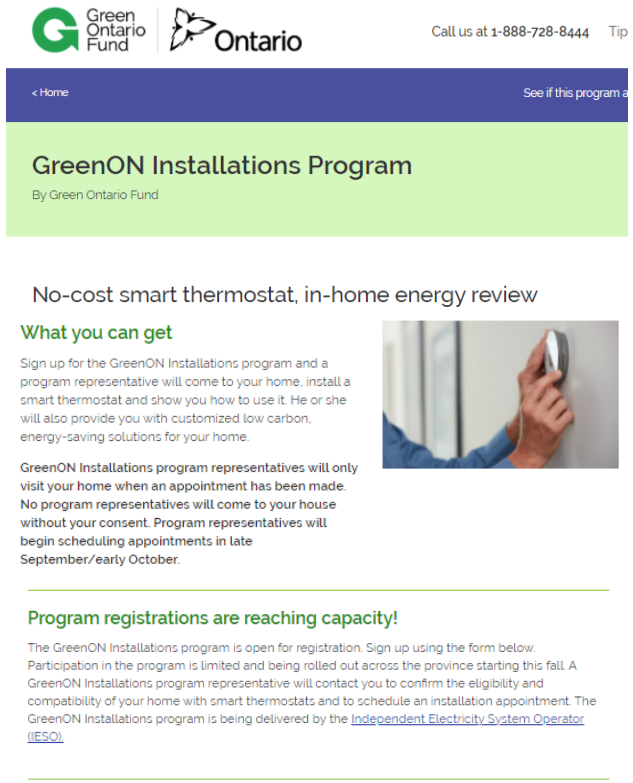
Deploying enabling technology can be extremely costly; why not use technology already deployed?

Custom solutions requiring home visits are expensive

London Hydro Example

Installation cost:	$350/home
In-Home Support:	$50/year
Other customer Support	$25/year

Previous government programs have already distributed >100,000 smart thermostats, all capable of direct load control

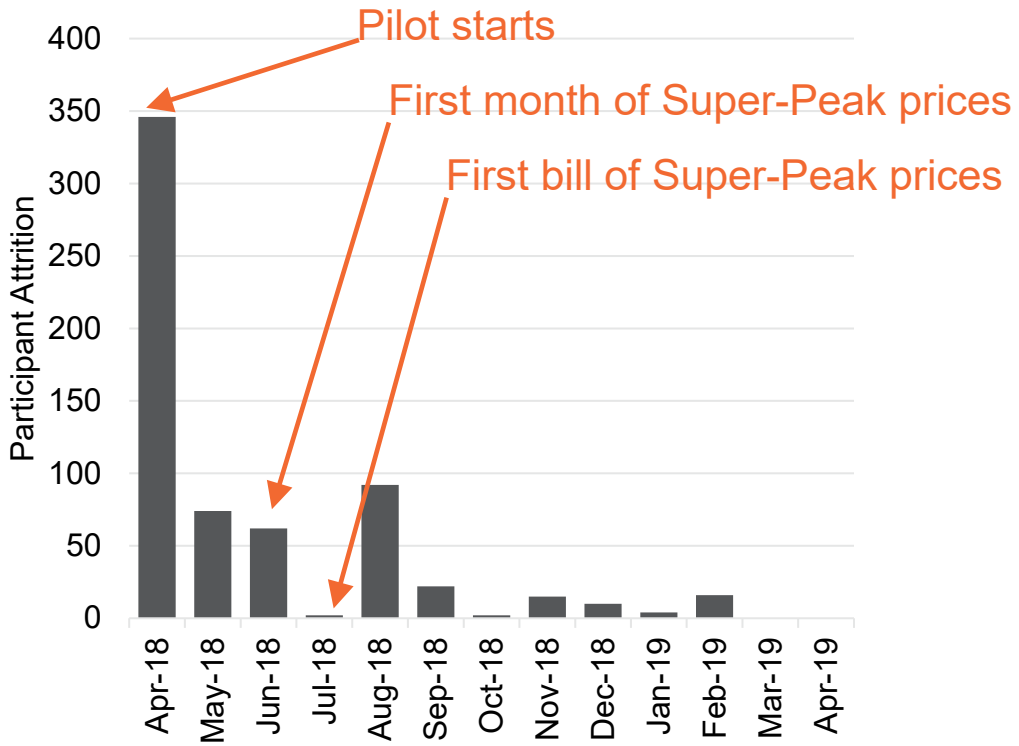


Source: Internet Archive/Government of Ontario

Source: Toronto Star

Consumers tend to be risk-averse and dislike price changes - risk-free trials vastly improve retention

Attrition – Opt-Out Super-Peak Price Plan



Source: Publicis Sapient, *RPP Pilot Program – Final Results Report, August 2020*

Consumers are risk-averse

Most involuntary (opt-out) Super-Peak price plan participants exited the program before they ever experienced a higher price

Offering a single year of bill protection – a risk-free trial – is a guarantee of good faith and substantially improves retention:

Alectra, Legacy Dynamic Price Plan

- "Legacy" Dynamic participants enrolled 2015 – 2016
- Provided bill protection from enrolment through to start of May 2018 (RPP pilot start)
- 12 months after protection removed, only 82 of 1,765 opted out (4.6%) - lowest rate of any pricing treatment

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3 Apply critical peak pricing to those that received smart thermostats from provincially-funded programs

With automatic response capabilities enabled, considerable DR capacity could be available very quickly

Guidehouse recommends that the OEB consider:

- Working with LDCs to deploy a CPP price plan adder. This would not be a separate price plan, but rather an additional layer that could be applied to any consumer's existing price plan, analogous to a rate rider.
- Whether deploying such an adder would be most appropriate as an opt-out adder (faster ramp, lower marketing costs), but also could be applied on an opt-in basis.
- Encourage participants to register their thermostats for automatic response during peak events.
- Encourage adoption and retention by offering some limited bill protection – a risk-free trial.

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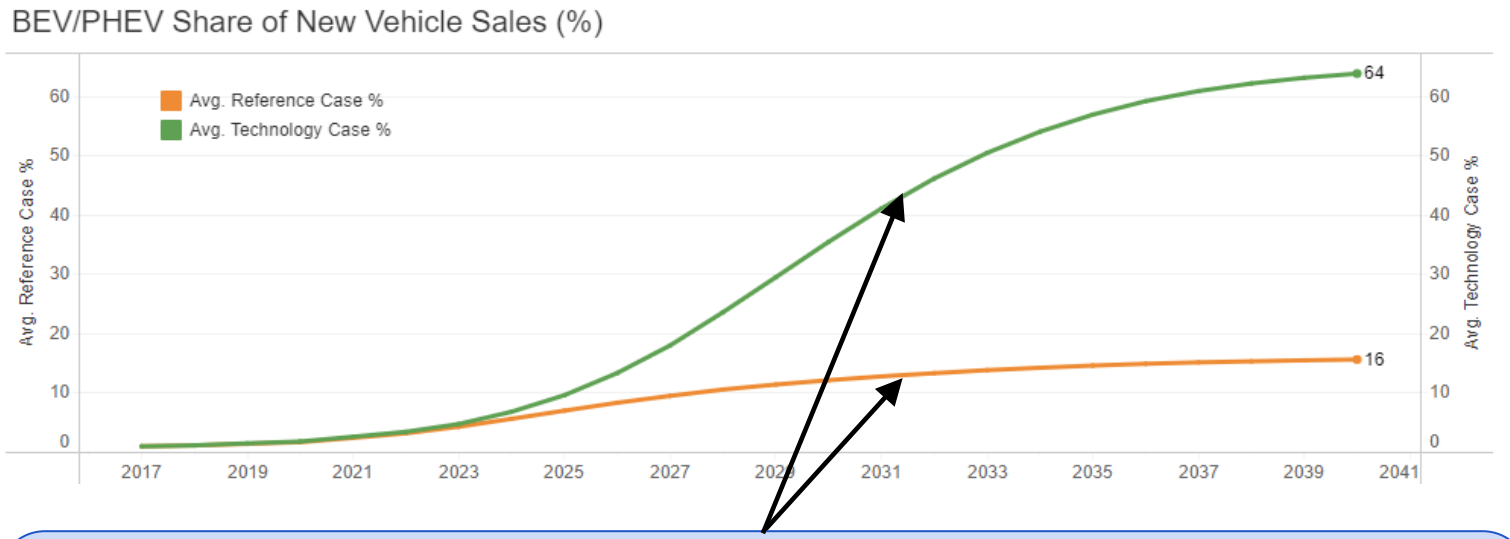
Increased overnight consumption and low prices resulted in the Overnight price plan under collecting average supply cost

	Prices (cents/kWh)	
TOU Period	Standard TOU (May 2018 – April 2019)	Overnight Price Plan
On-Peak	13.2	18.4
Mid-Peak	9.4	9.2
Off-Peak	6.5	6.5
Overnight Off-Peak	N/A	2.0

- **Overnight consumption increased** >50%, **On-Peak summer consumption fell** by ~10%
- As a result, the **price-plan under-collected** by approximately 15%
- If short-term cost recovery is crucial, **price-setting must account** for some **changes in behaviour**
- Accounting for changes in behaviour when setting price may impact consumers' opportunity for bill savings

The Overnight pilot struggled with enrolment - EV ownership growth may mitigate this



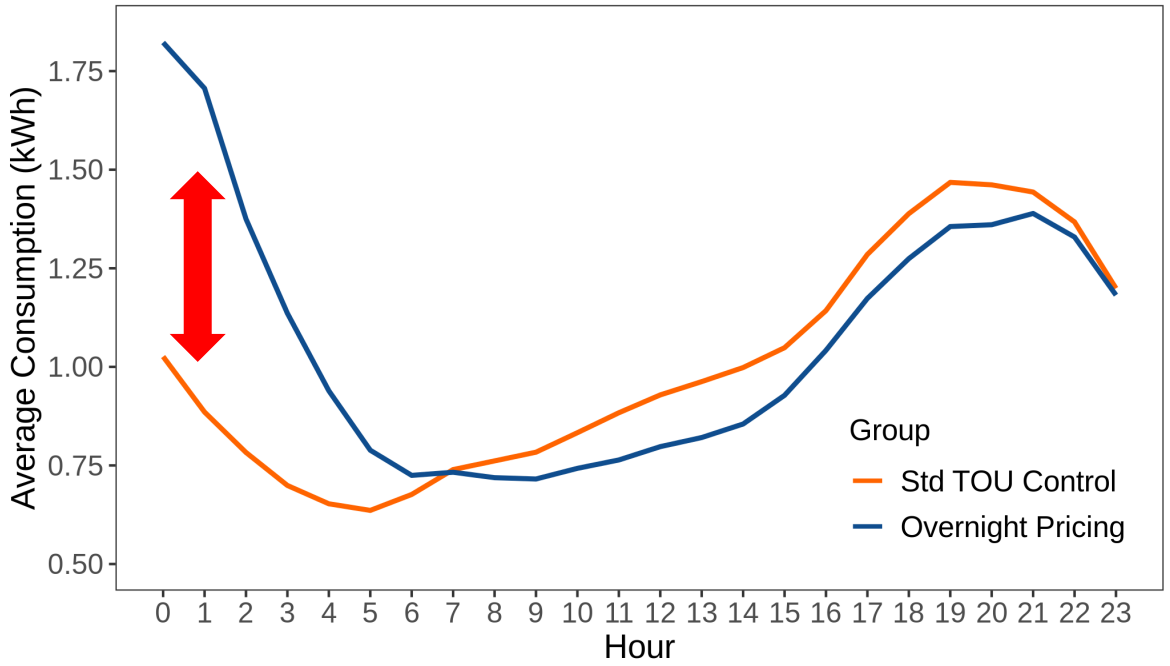
Growth of EV ownership is highly uncertain

- The pilot succeeded in **recruiting only 64% of target** by deadline
  - With a deadline extension 88% of target enrolment achieved
- **43%** of participants **own or lease** an **electric vehicle**
  - At present only ~2% of residential households in Ontario own an EV
- Uptake of an Overnight rate would likely depend on growth in EV sales

Source: Canada Energy Regulator

Net consumption under the rate increases due to substantial increases in overnight consumption

Summer Weekdays



- **Net annual energy consumption increase** of 15% (~1,000 kWh).
- Increases all occur between **midnight and 6am**
- Increases overnight are **50% higher in winter**
- 43% of participants own or lease electric vehicles

Source: BEWorks, *Appendix: Regulated Price Plan Pilot – 12 Month Report, August 2020*

Net increases in consumption yield negative avoided cost benefits - is this because some benefits aren't considered?

- Magnitude of overnight consumption increases suggests introduction of new loads to household, coincident with adoption of price plan
- If these new loads are shifted from sources not measured by household AMI meter, the analysis will not capture benefits of the shift
- Two possible shifts hypothesized:

Shifting EV Charging Location. Previously used public or workplace charging shifted to overnight home charging. Benefits of reduced day-time demand not captured

Behavioural Fuel Switching. Increased use of auxiliary electric space heat displacing some natural gas use. Benefits of reduced gas use not captured

Source: BEWorks, *Appendix: Regulated Price Plan Pilot – 12 Month Report, August 2020*

4 Understand the decarbonization potential of Overnight pricing

EV-targeted overnight pricing may provide (currently uncounted) system benefits by shifting public peak time charging overnight. Such pricing could also encourage greater use of electricity for home heating

Guidehouse recommends that the OEB considers:

- Conducting additional analysis to determine whether the hypothesis of shifted EV charging or behavioural fuel switching can be rejected
- Undertake a new Overnight price plan pilot in one or more utility service territories for EV owners, and monitor *vehicle* not household demand

Questions?