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Ontario

Backgrounder

July 26, 2007

Ontario Energy Board Smart Price Pilot

Background

In June 2006, the Ontario Energy Board (the Board) launched the *Ontario Energy Board Smart Price Pilot* project, with the support of Hydro Ottawa, to test the reactions and impacts on consumer behaviour of different time-sensitive price structures. By August 1, 2006, approximately 375 of Hydro Ottawa's electricity customers had been placed into one of three pricing groups and were receiving monthly electricity usage statements in addition to their bi-monthly electricity bills.

The pilot was designed to help the Board learn about consumers' ability to "shift" and "reduce" electricity consumption using smart meters and Time-of-Use (TOU) prices in advance of the province's plan to provide smart meters to all homes and small businesses by 2010.

The pilot ran for seven months until February 28, 2007 with the intent to assess:

1. The extent to which various time-sensitive pricing structures cause a shift of electricity consumption to off-peak periods as measured by the reduction in peak demand
2. The extent to which each price structure causes conservation or a reduction in total monthly consumption
3. The subsequent effect on consumers' electricity bills
4. The understandability of and acceptability to residential consumers of each pricing structure and the communications associated with each

Participation

Participants were randomly selected from the population that would have smart meters installed in Hydro Ottawa's territory by August 1, 2006. Due to high consumer interest, as illustrated by a response rate of almost 30%, the original size of the pilot was increased from 225 to 375 participants. A response rate of about 10% was expected.

The control group is a sample of 125 customers selected randomly from the population of Hydro Ottawa residential customers who had smart meters installed prior to the August 1, 2006 start of the pilot but were not paying TOU prices. The consumption patterns and levels of the three groups of participants on TOU pricing were compared against the "control" group to estimate the amount of electricity usage shifted and conserved.

Pricing differences

The Board's pilot is a first in North America to simultaneously look at changes in consumption behaviour in response to the following three separate pricing structures:

- The Board's standard TOU pricing (where commodity prices change in relation to periods of off-peak, mid-peak and on-peak);
- The standard TOU pricing with critical peak pricing (CPP), and;
- The standard TOU pricing with critical peak rebates (CPR)

Participants received fridge magnets that spelled out the TOU prices that applied to them.

Time	Summer Hours (Aug 1 - Oct 31)	Price/ kWh	Winter Hours (Nov 1 - Feb 28)	Price/ kWh
Off-Peak	10 pm - 7 am weekdays; all day on weekends and holidays	3.5¢	10 pm - 7 am weekdays; all day on weekends and holidays	3.4¢
Mid-Peak	7 am - 11 am and 5 pm - 10 pm weekdays	7.5¢	11 am - 5 pm and 8 pm - 10 pm weekdays	7.1¢
On-Peak	11 am - 5 pm weekdays	10.5¢	7 am - 11 am and 5 pm - 8pm weekdays	9.7¢

Critical Peak Pricing (CPP) & Critical Peak Rebate (CPR)

On a handful of critical peak days each year, some participants saw a higher electricity price for three to four on-peak hours. Others could earn a special rebate by reducing electricity use during those on-peak hours. Critical peak days tend to occur when temperatures are extreme and electricity use is high. Affected participants were informed the day before each critical peak day by a call to their homes (using an automated phone call), by e-mail, or by text message, whichever they chose.

In the pilot, participants' electricity prices changed throughout the day, reflecting the cost to supply electricity, which changes by time of day. The pilot examined whether participants used less electricity or shifted some of their usage away from on-peak to mid- or off-peak hours and how that affected their costs and their total power consumption.

One group of participants (CPR) benefited from a refund of 30 cents per kilowatt hour for reducing use during critical peak times. Another group of participants (CPP) paid as much as 30 cents per kilowatt hour at peak times. The results from this group showed the greatest amount of shifting of electricity consumption. All consumers paid the same TOU prices at mid-peak and off-peak hours, except the off-peak price was reduced to 3.1 cents for the CPP group to compensate for the high CPP price. Those prices are listed in the table above.

The impacts on customers' bills were calculated using the hourly electricity usage information collected via the smart meters.

Pilot Operation

At the end of the pilot, participants received a final statement comparing their electricity charges on the TOU pilot prices with what their charges would have been on the regulated prices charged by Hydro Ottawa.

As an incentive to enrol, participants received a cheque in an amount equal to the base "thank you" payment of $75 adjusted by the amount of their savings or expenditures on TOU pricing.

Consumer Impacts

"*Demand Response*" Effect (*shifting* consumption away from peak periods)

Over the course of the entire pilot period, on average, participants shifted consumption and paid 3.0% or $1.44 less on monthly bills with the TOU pilot prices than they would have paid on the regular electricity prices charged by their utility.

About 75% of participants paid less on the TOU pricing (compared to their charges on the usual regulated utility commodity price) due to shifting away from critical peak or on-peak periods.

The average reduction in consumption in the summer due to shifting usage during critical peak hours among participants in the three pilot groups was 5.7%, 25.4%, and 17.5% for the TOU, TOU+CPP, and TOU+CPR groups, respectively. It is during critical peak hours that reductions in consumption are most beneficial.

This shifting of electricity consumption away from peak periods to off-peak periods is called the "demand response effect" in the study.

"*Conservation*" Effect (*overall reduction* in electricity consumption)

Results also indicated participants conserved (or reduced overall electricity consumption at any time) an average of 6.0%.

Price Group	Percent reduction in total electricity use
TOU Only	6.0%
TOU + CPP	4.7%
TOU + CPR	7.4%
Average	**6.0%**

Conservation Effect (total usage reduction) for the full pilot period

When the impact of shifting consumption was combined with the impact of reducing their overall consumption, there was a total average monthly saving of over $4.00 and about 90% of participants paid less on the TOU price plans offered as part of the pilot (compared to 75% due to shifting alone).

This overall reduction in electricity consumption is called the "conservation effect" in the study.

Survey Results

A survey was completed by 298 participants, for an overall response rate of 79%. The margin of error for overall results is ± 5.7%.

The survey found that 78% of participants would recommend Time-of-Use pricing to their friends. The three top reasons given for recommending TOU pricing were: *(1) "More aware of how to reduce bill;" (2) "Greater control over costs;" (3) "Benefits the environment."*

The survey also found that less than 20% would want to return to regular prices. Some 71% felt the current difference between the off-peak to on-peak TOU prices is about right while 16% felt the difference should be increased to provide the necessary incentive to shift consumption from peak periods.

Focus Group Results

When asked what tools helped them the most during the pilot, participants identified the Fridge Magnet as the most important tool, followed closely by the monthly electricity usage statement. There was a consensus view that bi-monthly billing would not be sufficient when TOU pricing is implemented province-wide.

There was also a consensus that the most valuable part of the monthly statement was the daily usage breakdown (bar chart) by TOU price. Participants suggested that a similar chart should be added to "regular" utility bills, when mandatory TOU pricing is implemented.

No participants in the Focus Groups desired a change to a two-period (from the current three-period) TOU price structure.

In describing how they tried to shift their consumption during a critical peak event, participants indicated that they ran only "non-negotiable" appliances such as their fridges.

Participants also indicated they shifted activities, such as running dishwashers or doing laundry, away from on-peak or critical peak hours. They also indicated they found it easier to shift consumption at peak times in the summer than they did in the winter. A specific example provided is they could shut-off their air-conditioner but they can't shut off the heat.

OSPP Team

The Board Pilot was a coordinated effort that drew on the expertise of the following organizations:

- *Ontario Energy Board*
  - Oversaw OSPP program management
- *Hydro Ottawa*
  - Supplied and installed smart meters
  - Provided smart metering data and customer information
- *IBM Canada - Global Business Services (Ontario office)*
  - Prime contractor; conducted surveys through IBM's National Survey Centre
  - Experience on the real-time pricing pilot with the Pacific Northwest GridWise™ Demonstration Project.
- *eMeter Strategic Consulting (ESC)*
  - Led the overall program design, pilot execution and operations
  - Experience on other TOU pricing pilots including the California Statewide Pricing Pilot, SmartPowerDC project in Washington, D.C. and the Residential Advanced Metering Systems and Critical Peak Rebate pilot in Anaheim, California
- *Professor Frank Wolak, Stanford University*
  - Evaluation of pilot results
  - Professor Frank Wolak is also Chairman of the Market Surveillance Committee of the California Independent System Operator (ISO) and worked with eMeter on the SmartPowerDC and Anaheim pilots discussed above

The Ontario Energy Board regulates the province's electricity and natural gas sectors in the public interest. It envisions a healthy and efficient energy sector with informed consumers, and works towards this vision through regulatory processes that are effective, fair and transparent.

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Sample of Refrigerator Magnet

HydroOttawa

Ontario

ONTARIO SMART PRICE PILOT / PROJET PILOTE DE PRIX INTELLIGENT

TIME OF USE PERIODS AND RATES / PÉRIODES D'UTILISATION ET PRIX

Day of the Week Jours de la semaine	Time Heures	Time of Use Périodes d'utilisation	Price/Prix* (¢/kWh)
Weekends & Holidays Fins de semaine et fériés	All Day / Toute la journée	Off-peak / Période creuse	3.5 ¢
Summer Weekdays (May 1st - Oct 31st) Jours de semaine l'été (du 1er mai au 31 octobre)	7 am to 11 am / 7 h à 11 h	Mid-peak / Période moyenne	7.5 ¢
	11 am to 5 pm / 11 h à 17 h	On-peak / Période de pointe	10.5 ¢
	5 pm to 10 pm / 17 h à 22 h	Mid-peak / Période moyenne	7.5 ¢
	10 pm to 7 am / 22 h à 7 h	Off-peak / Période creuse	3.5 ¢
Winter Weekdays (Nov 1st - Apr 30 th) Jours de semaine l'hiver (du 1er novembre au 30 avril)	7 am to 11 am / 7 h à 11 h	On-peak / Période de pointe	10.5 ¢
	11 am to 5 pm / 11 h à 17 h	Mid-peak / Période moyenne	7.5 ¢
	5 pm to 8 pm / 17 h à 20 h	On-peak / Période de pointe	10.5 ¢
	8 pm to 10 pm / 20 h à 22 h	Mid-peak / Période moyenne	7.5 ¢
	10 pm to 7 am / 22 h à 7 h	Off-peak / Période creuse	3.5 ¢

Effective August 2006 / Efficace le 2006 août