The Consumer Benefits of Interval Metering

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Preuve conjointe GRAME et SÉ-AQLPA

GRAME-3 document 3

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PREFACE

During the week of November 11, the Ontario government took action to deal with the failure of the electricity market to deliver on its intended objectives: lower prices, sustained reliability, consumer choice and environmental protection. Among many other initiatives at this time, was the direction that that all new homes to should have the opportunity to take advantage of interval metering.

The Canadian Energy Efficiency Alliance supports this policy but believes it does not go far enough. The ultimate goal ought to be that all electricity metering in the province be switched to interval metering. In the short term, phasing in interval metering through new home construction, however, is a wise choice.

Had all customers had the benefit of interval metering when the electricity market opened on May 1st, there would have been a better balance between demand and supply. Customers could have acted on price signals and derived financial benefits from altering their energy use. Under the net system load shape default for residential and small commercial customers, this was not possible.

We offer this paper to the Government of Ontario to assist its further deliberations on how the benefits of interval metering can be expanded and how vital such meters will be in the monitoring and evaluation of demand side management programs.

ABOUT THE ALLIANCE

The Canadian Energy Efficiency Alliance is the leading independent voice in Canada promoting energy efficiency and its related benefits to the economy and the environment. The Alliance works in partnership with manufacturers, utilities, governments, the design and construction industry, labour, consumer groups, and environmental organizations to facilitate the adoption of practical and cost-effective energy efficiency measures in Canada.

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INTRODUCTION

On May 1st, 2002, Ontario opened its electricity market to competition on the assumption that the combined effects of competition in the wholesale generation of electricity and the retail sale of electricity would be sufficient to deliver the expected benefits of a competitive market: lower prices, sustained reliability, consumer choice and environmental protection. However, even after a few months of deregulation, some failures are evident:

- Typical residential consumers were charged on the basis of the average system load shape, or they have signed a fixed price contract. Although confused about the market place, they were savvy enough to understand that when the IMO made an urgent appeal to reduce their air conditioning load, most of the benefit of their doing so went to the market as a whole rather than to themselves.

- The IMO's Import Price Guarantee foiled commercial customers who have negotiated a unique contract, using a block structure to enable them to use load management strategies to reduce their bills even when rates go up. The Import Price Guarantee added higher cost imported electricity to all market participants as an inescapable uplift charge. If a higher peak electricity charge had been added instead of the Import Price Guarantee, customers would have had the opportunity to mitigate the effects of the rising rates through effective load management. No mitigation was possible in response to the Import Price Guarantee as there was no individual customer control over how large it was.

- Large industrial customers found that altering their consumption patterns in response to day ahead, or even four hours a-head price predictions, was rendered meaningless, when the actual peak price rarely approached the predicted peak price.

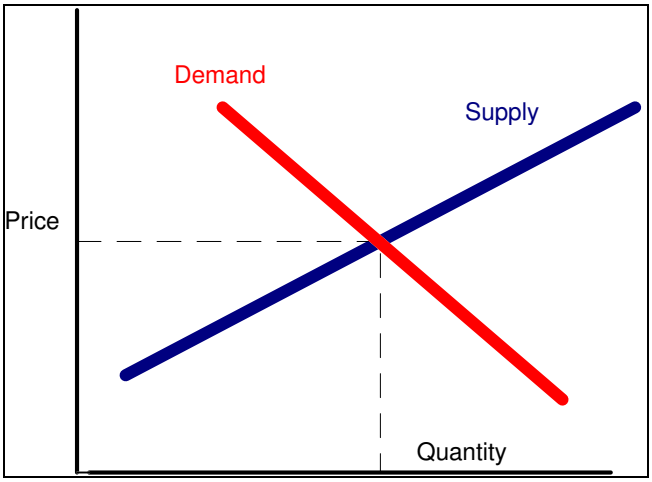
- Large commercial and industrial customers had access to interval metering, which allowed them to manage, at least, the commodity price by shifting times when they use electricity. On the other hand, smaller customers who did not have access to interval metering were collectively the most sensitive to weather impacts. They may best equipped to alter behaviour and thereby alter their load shapes in response to rising bills had they received timely price signals.

- New generators eager to enter the Ontario market had their financial estimates downgraded by the Import Price Guarantee and the IMO's continued use of "voltage reduction potential" as a hedge for reliability, which dampened the incremental value of new generation.

> "Without the ability of end-use customers to respond to price, there is virtually no limit on the price suppliers can fetch in shortage conditions." FERC Commissioner Massey, 2002.

MARKET FUNDAMENTALS – PRICE AFFECTS CONSUMPTION

The first lesson in any introductory economics course is that prices are set by the intersection of supply and demand. Suppliers respond to increasing prices by increasing supplies of their product. Buyers respond to increasing prices by buying less. The relative slopes of the demand curve and the supply curve will determine price, but all things being equal, prices will tend to find equilibrium. The degree to which changes either on the demand side or the supply side affect the change in price of the product is known as price elasticity.



Long time tradition has told us that because electricity could not be easily stored and because it flows across a network of transmission lines in a manner determined by the laws of physics, not price, electricity demand is inelastic. While few, if any modern economists would assert that demand for electricity is fixed, there remains a stubborn mindset within the energy industry that for all intents and purposes, only such things as weather, and economic activity drive changes in energy demand. Any tinkering on the demand side is assumed to be small and marginal. Studies have usually looked at behaviour within a single pricing jurisdiction. However, examining electricity consumption across different geographical regimes – low priced North American regions vs. higher priced European and Far Eastern regions - clearly demonstrates that there is a price effect, and that increased electricity prices do result in reduced consumption in the consumer markets.[1]

Since increasing electricity prices do result in reduced consumption, programs that improve the price signal to consumers, rather than mask or muzzle the effect will assist consumers in lowering their electricity bills. Such programs should be encouraged even under a price cap. In addition to benefiting consumers, these programs will also improve the functioning of the electricity market as better information about price improves market allocations and increases the efficiency of the market once the price cap is lifted.

[1] Larry Ruff: Economic Principles of Demand Response. 2002 Report for Edison Electric Institute: The events [of the late 1980s and early 1990s],,,demonstrated conclusively that electricity demand is strongly affected by prices and that ignoring this reality will lead to costly mistakes; today, nobody would think of forecasting electricity demand without considering prices as critical explanatory variables – and everybody is more modest about their ability to forecast at all. More importantly for the purposes here, these events also demonstrate the importance of correctly understanding and applying basic economic principles in the design of demand reduction policies and programs.

INTERVAL METERING: AN ENABLING TECHNOLOGY

Electricity is too valuable a resource not to meter it right!

Although a price cap[2] is in place for the next four years, interval metering remains one of the most critical technologies to enable the full range of the benefits of both demand side management and ultimately for a competitive market to be realized. Good information is critical to the successful working of any market. In the electricity market, price and consumption data are the most critical and the most time sensitive. Interval metering can translate price signals to consumers in a timely and accurate manner and enable them to gain advantages by using electricity when it is cheaper, and reducing their use when it is expensive.

New technologies and electricity deregulation have opened the door to a variety of options for measuring and monitoring power use at customers' facilities. An avalanche of choice, however, can sometimes become a pile of confusion. For decades, larger power customers (over 1 MW) have been routinely using utility meters that measure usage in short time intervals that find the time and magnitude of peak demands under time of use electricity rates. Such interval metering, (generally called automated meter reading or AMR) used phone lines to report data from each meter back to a central utility monitoring system.

The expense of such systems and relatively low demand charges in most of the United States limited AMR to only a very small portion of the customer base (less than 1%).[3] Increasing costs for power and the volatility of power price have not led many customers to look for more sophisticated ways to understand and control their demand in real time.

"Our conservative estimate is that the wide-scale (i.e., national US) implementation of dynamic pricing would result in annual electricity cost savings on the order of $10 billion to $15 billion." "Approximately 20 percent of total financial savings comes from individuals reducing their consumption during peaks; the remaining 80 percent is generated by the lower wholesale peak prices that result from reducing peak load and accrues to all consumers."
McKinsey and Company, May 2001

[2] Even with a price cap, customers who alter their consumption may benefit from reduced bills from time of use rates.
[3] Lindsay Audin, CEM, CEP: *The Energy Wiz*, www.esmagazine.com

With technological advancement it is now possible to enable a standard meter that measures electricity use without considering the time at which it is used, to operate as an interval meter. With a simple-add on to the equipment and at a dramatically reduced cost[4] compared to a standard interval meter, standard metered customers can enjoy the benefits of interval metering.

BENEFITS OF INTERVAL METERING

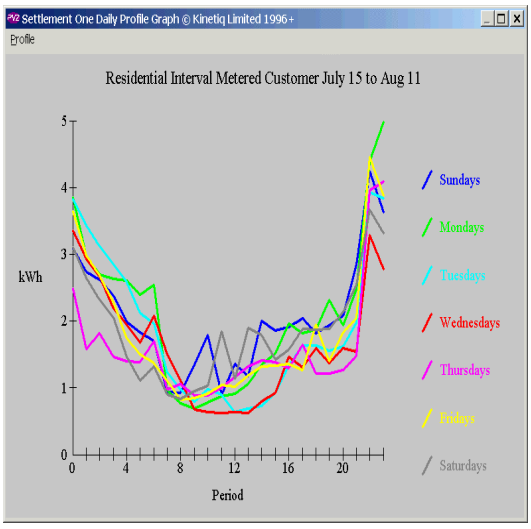
Market Benefits

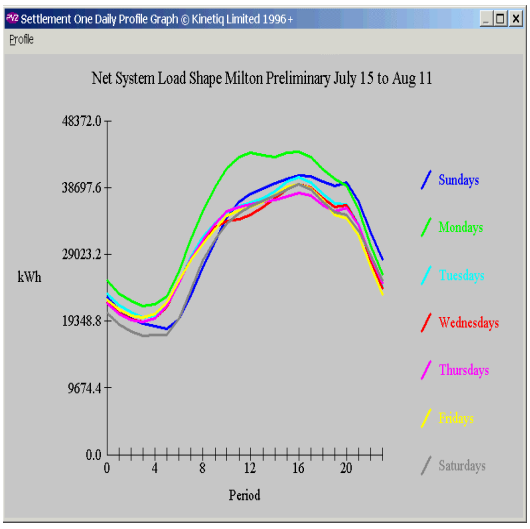
Information reduces risk. Interval metering is not really about metering – it is all about injecting the information into the market that is critical to making the market work and enabling the individual market participants to fulfill their roles more efficiently. Interval metering data streams will also have the impact of shifting risk from those least able to mitigate it to those most able to do so.

Customer Benefits

Customers who take active control of their electricity use can avoid peak periods and exploit off peak periods thereby reducing their energy bills. The charts below show the difference in load shapes for interval metered residential customers in Milton, compare to the net system load shape, which is used to bill non-interval metered customers.[5]

Demand response programs[6] that pay customers for not using capacity at peak times could be readily implemented, enhancing the responsiveness to price in emergency situations. Potential for multi utility billing will reduce costs.





[4] A new interval meter costs in the range of $1000, however the conversion of a standard meter costs around $350.(This needs to be checked with Don.)

[5] Don Thorne, Milton Hydro Distribution Inc., Presentation on Milton Hydro Customer Load Shapes. 2002.

[6] See Canadian Energy Efficiency Alliance Paper: *How to Reward and Encourage Consumers to Conserve Energy.*

Retailer Benefits

Retailers could offer a broader array of product choices to customers.

LDC Benefits

Capacity constraints drive distribution system expansion and upgrade, yet a significant portion of the market only gets energy related signals. Improved analysis of distribution system losses is possible.

Transmission Benefits

Capacity constraints drive transmission system expansion and upgrade, yet significant portion of the market only gets energy related signals.

Improved analysis of transmission system losses is possible.

Generator Benefits

Pricing signals reach consumers.

IMO Benefits

Pricing signals reach consumers.

OEB Benefits

Basing electricity pricing on actual load profiles will result in better allocation of costs than the past practice of cost allocation studies, or the current practice of net system load shape.

The impact of DSM can be monitored more effectively than traditional DSM program evaluation based on engineering estimates.

Encouraging more widespread use of interval metering assists the OEB in facilitating competition, promoting economic efficiency, and facilitating energy efficiency.[7]

BARRIERS TO INTERVAL METERING

Nevertheless barriers to the full utilization of interval metering remain, particularly in Ontario:

- **Fragmentation of Costs and Benefits**: While customers who install interval metering may reduce their own costs, the larger portion of the savings is of the collateral type. These benefits derived by the entire market place when the combined impact of price response lowers the market-clearing price. Perhaps because of this poor match of costs and benefit, the cost of installing interval metering should be borne by all customers. Ultimately, interval metering will result in better allocation of costs– specifically, user pay.

[7] These are all objectives of the OEB as mandated in Section 1(6) of the *Ontario Energy Board Act, 1998*.

Who should pay? Meter users get 20% of benefits; System gets 80% of benefits. E-source

- **Retailers:** some electricity retailers include a penalty if a customer switches to an interval meter.

- **Regulatory**: structure of Standard Supply Service; ownership of meters and billing data, whose costs/whose savings.

- **IMO**: focus on the supply side; customers and consumers viewed as "loads".

- **Legal**: ownerships of meters, no requirement to keep interval meters.

Fortunately some past problems are gradually being overcome:

- Meter costs are dropping; in the US, state energy agencies are providing incentives to customers to subsidize interval meters, e.g. New York State. In Ontario, with reasonable volumes – 10's of thousands, not 100's of thousands or millions – of installations, the monthly charge to a residential customer of an interval meter would be less than the cost of three good cups of coffee!

- New customer load management (demand response) programs will require interval metering which will increase the supply.

- ANSI level standards now exist.

Broad based application of low cost interval metering would empower customers to take an active role in managing their energy use and enable retailers to offer a wider arrange of product options including demand response programs. However, it is recognized that a staged approach to installation, over say three to five years, would obviate many of the difficulties that could be expected with a mandatory, fast track program.

REAL-TIME COMMUNICATION STRENGTHENS IMPACT OF INTERVAL METERING

When combined with software that digests such a data stream, interval metering may reveal ways for customers to control demand much more precisely than ever before. Traditionally electricity consumers who tracked their annual consumption and compared it year over year, or month over month were viewed as doing a good job in tracking energy costs; even a better job if weather corrected data were also used. If this data were then used as the basis for an energy conservation plan, then future savings were possible. For the competitive electricity market to deliver on its promised benefits, consumers must have the opportunity to lower their electricity consumption before it takes place.

Interval metering supported by real time communication will be the next step. Such real time communication is possible now and access to the data can be readily provided to customers privately over the Internet. Customers will be able to review their consumption patterns and identify trends. Based on this information, customers will be able to develop effective strategies to lower their consumption and save money on their electricity bills.

In the near future, residential customers will be able to have enhanced electricity management capabilities. They will be able to automate their consumption reduction strategies. For example, residential customers will be able to automatically turn off their electric appliances in response to the IMO spot market price reaching certain levels.

Interval metering opens the door to new opportunities for customers to reduce their electricity bills. Enhanced by real time communication customers will be able to have more control over their electricity consumption. Better information and more effective response will improve the electricity market for all participants.

RECOMMENDATIONS

Recommendations to the Ontario Energy Board

1) Revise the Distribution System Code to facilitate the introduction of interval metering beyond the current limits. Consider making the inclusion of interval meters mandatory for all new ICI and residential development in 2004.

2) Revise the Distribution System Code to facilitate embedded generation. Consider the development of a minimum set of standard requirements for connecting the generator with the LDC.

Recommendations To the Independent Market Operator

3) Establish Demand Response programs and encourage LDCs to be aggregators on behalf of their customers.

Recommendations to the Ontario Government

4) Include interval metering in the *Ontario Building Code*.

Recommendations to the Federal Government

5) Make interval metering eligible for Accelerated Depreciation Allowance under Class 43.

6) Revise *EnerGuide for Housing Standard* to include interval metering.

7) Support the development of smart appliance and equipment technologies that can receive and adapt to energy price signals.

Recommendations to Energy Retailers

8) Develop product offerings that support rather than penalize interval metering.