

DRIVING CHANGE IN CONSUMER BEHAVIOR TO CREATE A CULTURE OF CONSERVATION

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The Province of Ontario has identified a significant gap in its generation capacity and, accordingly, has drafted an Integrated Power System Plan to address this situation. Although new generation capabilities such as nuclear power stations and investments in renewable sources are required, the goal is to address at least 6,300 megawatts (25%) of the supply gap through conservation measures.

This plan is not without its challenges. Ontario has a strong consumer and consumption culture, with a large amount of disposable personal income. Geography, climate and a subsidized, regulated price for electricity contribute to high electricity consumption.

Ontarians are among the largest per capita consumers of electricity in the world, ranking higher than American consumers.

In order to meet the conservation challenge, Ontario must shift to a culture of conservation from a culture of consumption, and smart meters are a key tool in enabling this shift.

SMART METERING IN ONTARIO

During 2004 and 2005, the Government of Ontario mandated that all residential meters in the province should be replaced with smart meters that could measure consumption in hourly intervals. It also mandated that hourly interval data would be gathered and stored centrally in a Meter Data Management and Repository (MDM/R) operated by the Independent Electricity System Operator (IESO).

The intent of this plan was that the regulated price paid by consumers not

enrolled with an electricity retailer would be based on the aggregated consumption in three standard time slots (called time-of-use, or TOU, “buckets”), with different rates for each of the three time slots. The ability to measure electricity consumption at hourly (or finer) levels of granularity allowed for more accurate determination of individual consumption and the ability to create incentives and

deducted by several local distribution companies (LDCs) including Hydro Ottawa, Newmarket Hydro, Oakville Hydro, Veridian Connections and Hydro One Networks.

These pilot projects offered some interesting results:

- Different pricing structures yielded varied consumer behaviour and preferences. While the standard TOU pricing scheme was preferred by the largest consumer segment, it yielded the smallest reduction in overall load and the lowest load shift.

- Other pricing schemes such as critical peak pricing (CPP) and critical peak rebates (CPR) yielded considerably greater conservation and load shifting results, but were preferred by a minority of consumers.

- Consumer awareness of their own consumption resulting from the introduction of smart suite metering in multi-residential dwellings, such as condominiums, caused a considerable reduction in electricity consumption.

- Real-time monitoring tools had a significant impact in driving consumption behaviour towards reducing overall demand.

These results suggest that, in order to achieve the

greatest benefits from smart metering for conservation and load shifting, multiple billing plans/options for different consumer segments are needed.

In addition, consumer awareness of their consumption patterns and the availability of in-home technology to adjust consumption behaviour are critical to leveraging the smart metering infrastructure to achieve demand reduction.

As of mid-2008, 1.4 million of the 4.5 million electricity meters in Ontario have been replaced with smart meters, three mid-sized utilities have begun using the centralized MDM/R to collect data, and a small number of consumers are billed on time-of-use rates. In addition, a number of smart metering and smart suite metering pilot projects were conducted by several local distribution companies (LDCs) including Hydro Ottawa, Newmarket Hydro, Oakville Hydro, Veridian Connections and Hydro One Networks.

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INSIGHTS FROM THE TELECOMMUNICATIONS INDUSTRY

When considering the impact of smart meters on the evolution of the electricity industry, parallels can be drawn with the telecommunications industry. Like electricity, the telecommunications industry was opened up to choice, and consumers view both call minutes and kilowatt-hours (kWh) as commodity products.

Innovation in the telecommunications sector came through packaging of the product (minutes) to meet consumer needs (customized price plans) and add-on technology options, such as call-waiting or caller-identification.

Availability of data was important in order to deliver maximum value from the telecommunications infrastructure. An example is the congestion introduced with free evening and weekend minutes. These products were initially introduced to move congestion in the downtown core from peak to non-peak periods. What was overlooked was that most users left for the suburbs in the evenings, increasing after-hours congestion in areas where the infrastructure was less developed. A similar situation in the electricity industry may be created in the downtown core as plug-in electric vehicles become more prevalent. Since telecommunications providers were able to measure the consumption of their product at a very fine level of granularity, the companies had the data available to diagnose the problem and create consumer-specific billing packages to further modify behaviour.

Consumer awareness was critical in developing and understanding the issue and driving product differentiation. Segmentation was a key strategy in this industry. Packaging of minutes, creating price points and billing options provided strategic differences among the major players and gave consumers the best price and service for their individual circumstances. Providers learned that there were products to be created through bundling – that is, plans – and consumers learned that they could tailor their packages. Key to the success of this approach was consumer understanding of the options available to them.

Infrastructure and technology also evolved to meet new demand, and many new companies, such as Research In Motion, were created as a result. Government intervention in the early stages of telecommunications deregulation also established a platform and a clear set of guidelines that enabled the industry to attract private sector capital.

The overall lessons learned from the telecommunications industry are that mass customization, customer choice designed to drive desired behavioural change, and the need for private investment will ultimately lead to better and more effective utilization of capacity and infrastructure.

SMART METERING DRIVING CONSUMER AND TECHNOLOGICAL CHANGE

We believe that the smart metering and smart grid infrastructure being created today can be leveraged to drive a dramatic change to the electricity industry, similar to that which we have witnessed in the telecommunications industry over the past 20 years. These changes will result in a more effective and efficient use of energy infrastructure and create a culture of conservation. We have identified three key steps that must be taken to enable the desired change.

• Understanding consumer behaviour

In order for providers, such as energy consultants and

retailers, to competitively offer a variety of TOU billing options, they need access to the hourly meter data stored in the MDM/R. Currently, retailers obtain meter data from LDCs through Electronic Business Transaction (EBT) hubs, which are transaction clearinghouses that manage the exchange of standardized transactions underlying the Ontario retail electricity market.

Access to this consumer information is protected by the LDCs, governed by standard agreements between LDCs and energy retailers and consultants, and regulated by the Ontario Energy Board (OEB). LDCs, however, do not store hourly smart meter data. Therefore, integration of EBT hubs to the MDM/R is required so that vendors can provide innovative time-of-use billing plans to targeted consumer segments, while still ensuring the same protection of consumer data that exists in the market today.

• Providing consumers with enhanced information

Smart metering is expected to increase the availability of information and the complexity and variety of billing plans offered. Consequently, consumers need to be more informed of their plans as part of the billing process. This can be accomplished by including additional lines to the standard electricity bill with detailed consumption and billing information. However, it is also important to develop tools, such as online access, that explain how the bill was calculated, different rate plans, options available to reduce bills, detailed consumption information and any other information that may be necessary.

• Developing the infrastructure

Change in consumer behaviour must be supplemented with development of the technology infrastructure for the potential of smart metering to be more fully realized. As consumers begin to understand the implications of TOU rates, and customized rate plans, there will be a desire for more long-term solutions. Standards will need to be established to provide a gateway between the in-home devices (load control units) and the smart meter or smart grid interfaces. It is important to note that security concerns regarding the amount and type of information released will need to be addressed.

By leveraging existing electricity market and distribution network infrastructure, all of these changes can be enabled incrementally. Such changes are, overall, cheaper and more reliably executed than wholesale, “big-bang” implementations. Only then will Ontario be able to reach its conservation goals.

CONCLUSION

The smart meter infrastructure is the foundation that will transform the industry and consumer awareness and interest in electricity. This approach outlines what we can do today, to achieve our conservation goals in the future.

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