



Hydro Ottawa THE SMART GRID



A leading, trusted, integrated utility services company

The electricity system across Ontario is becoming “smarter”, in that it is adopting new technologies, both on the distribution company’s grid system and at the customer’s location.

OVERVIEW

During the last century, the traditional electricity distribution system in Ontario and globally was designed to move power from large generators through transmission and distribution systems to customers. Distributors such as Hydro Ottawa had limited information on the power moving along the distribution lines. Customers received only monthly or bi-monthly information on their electricity usage in their bills.

The new smart grid is designed to be a “two-way” system, so that electricity may flow either from the grid to the customer, or from customers who choose to generate, back to the grid. In addition, distribution companies can now also provide continuous information to customers about their usage — including when the power was used, and at what price — through the use of communications technology and smart meters. Distribution companies are also receiving much more data on the state of their networks through new smart grid technologies, which enhance their operations and allow them to deliver energy more efficiently.

SMART GRID BENEFITS FOR DISTRIBUTION COMPANIES

Part of Hydro Ottawa’s capital program is dedicated to investing in a smart distribution grid, adding communications and power system control technologies to the existing distribution system. It features digital sensors and monitoring devices, communications networks, automation and computers to control the flow of power and to sense disturbances on the lines.

As the distribution system becomes smarter, Hydro Ottawa system operators will have much more information available to them about the power flowing on the grid. As a result, the distribution system of the future will be even more reliable and more secure, with higher degrees of operational flexibility, efficiency, operational information and safety.

Smart meters are a key part of the smart grid. Hydro Ottawa now receives detailed customer data every day, indicating when power was used throughout the previous 24-hour period. This enables the utility to produce time-of-use bills, which will have the effect of lowering peak demands on the system. With lower peak demands, there will be a reduced need for new generation to be built. This is expected to result in lower environmental impacts across the electricity system. In the near future, smart meters may also be able to inform Hydro Ottawa when power goes out at a customer’s home or business, thus speeding power restoration.



SMART GRID BENEFITS FOR CUSTOMERS

With virtually all Hydro Ottawa customers having smart meters and being billed using time-of-use rates, they are now shifting their electricity usage to lower-peak periods. In this way, they are gaining more control over their electricity usage and their bills.

Customers should benefit even more in the future as smart technologies for homes and businesses evolve.

Power monitoring devices are already available that can warn customers when electricity prices are high during times of peak demand, and can help customers understand their own consumption patterns. Technologies are also available for customers to control lights, temperature and other amenities from their wireless devices. Smart appliances are being developed that will sense when power prices are at peak levels; they can be programmed to automatically cycle off non-essential functions (such as by delaying a freezer defrost cycle) to save electricity costs for the customer.

Electric vehicles are an excellent complement to the new smart grid. Customers will save on fuel costs by charging their batteries overnight when power rates are much lower — and when Ontario's power system has very low greenhouse gas emissions. The environment will also benefit since the new vehicles result in very low emissions compared to gasoline or diesel engines.

Some electricity customers are also becoming electricity generators — for example, selling electricity from their solar installations to Hydro Ottawa. In the future, they may even sell electricity stored in their electric vehicles back to Hydro Ottawa to profit when electricity prices are highest.

The new smart grid, with enhanced protection and control capability and tolerance for two-way flow of electricity, will be better able to accept power generated by customers into the distribution system without causing system disturbances.

SUMMARY: OVERALL BENEFITS OF A SMART GRID

In summary, there are three major benefits of a smart grid:

- > **1 Distribution companies** such as Hydro Ottawa will become more efficient and cost-effective as the levels of automation, control, operational information and customer information expand.
- > **2 Customers** will gain more control over their electricity usage and bills as they are provided more information about their electricity usage, more options to use electricity more efficiently, and a greater ability to shift usage to lower-priced periods.
- > **3 The electricity system** will benefit as consumers shift usage from higher-peak to lower-peak periods, because fewer new electricity generation facilities will have to be built. This will lower system costs for all Ontario customers and benefit the environment. The electricity system will also become “greener” as it is able to accept more renewable electricity generation on the distribution grid.

HYDRO OTTAWA SMART GRID DEVELOPMENT

In addition to installation of smart meters at virtually all customer locations, moving customers to time-of-use rates, and other enhancements such as home monitoring devices for *peaksaver* PLUS™ program customers, Hydro Ottawa has developed a plan for its smart grid development.

The company's Grid Transformation Action Plan (GTAP) will be a "roadmap" to direct the rollout of various smart grid applications over the next five years.

The Plan will ensure that expenditures are prudent by examining costs and benefits on a consistent set of criteria. It will also respond to the mandated provincial requirements relating to the development of smart grids.

A key part of Hydro Ottawa's plan is to undertake pilot projects and evaluate projects undertaken by other Local Distribution Companies (LDCs), to demonstrate the viability of new technologies. At the same time, the company will examine its communication infrastructure requirements to support smart grid technologies.

Hydro Ottawa has partnered with Carleton University to establish a Smart Grid Laboratory. It will allow students the opportunity to both study and develop smart grid applications in a controlled environment. It will also enable Hydro Ottawa to work with the university to analyze smart grid trials and develop a pool of potential engineering recruits.

The company is also part of a new \$7.8 million Ontario Consumer Engagement for the Smart Grid project, with Energate Inc., the Ontario Ministry of Energy and a number of Ontario LDCs. The partners will evaluate energy management solutions such as smart thermostats, mobile smartphone applications, energy "dashboards" and Web portals. These new technologies will be tested in more than 1,000 homes across Ontario over an 18-month period.



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