

## Delivering Fairness and Choice

### LTEP 2017

#### Chapter 5. Preparing for the Future / Innovation

##### **Modernizing the System**

Electricity distribution is a critical piece of Ontario's grid. Ontario's utilities are the final step in a system that delivers electricity from large generators, like a Nuclear Plant and small generators, such as solar panels, to our homes and businesses.

Commented [LT1]: It is...?

The way we deliver that electricity is changing. New tools and devices are appearing on smartphones and in homes, giving customers greater choice and control over their energy use. Customers' expectations of their utilities are increasing.

Distributors, though, do not have the right incentives to pursue grid modernization. Both the regulatory rules and the way utilities do business encourage traditional patterns of investment in poles, boxes, and wires.

The government will work with the OEB, utilities and other agencies and energy sector partners to explore and remove the barriers to grid modernization. By creating a culture of innovation, the government intends to set the course for a modern distribution system that empowers customers to become full participants in their energy future.

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##### **Renewing the Smart Grid Fund**

Ontario leads the world in deploying a smart grid, the communications network that shares information about what is happening on the electricity networks.

Now is the time to build on our investments in Smart Meters and the smart grid. An independent study in 2015 found that modernizing the grid over the coming decades would deliver \$6.3 billion in economic, environmental, and reliability benefits to Ontario's consumers and businesses.<sup>1</sup>

<PLACEHOLDER FOR GRAPHIC ON GRID MODERNIZATION, ONE HALF-PAGE SPREAD.

##### Details

- Graphic shows a network with the images of digital devices that now connect to it, including smart meters, smartphones, etc.

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<sup>1</sup> [Navigant Roadmap](#), p.2.

The Smart Grid Fund was launched in 2011 to support innovation in Ontario's electricity sector. Through the Fund, we learned about how technologies can be applied to distribution grids and address problems or challenges. Ontario's businesses have found the support they need to turn a pilot into commercial success. We've created jobs and growth for all Ontarians.

As Ontario's embarks on grid modernization, the time is right to renew the Smart Grid Fund. A renewed Smart Grid Fund will focus on ways to encourage a culture of innovation within the electricity sector, look at innovative processes, and generate new ideas for advancing grid modernization.

#### Smart Grid Fund Success Stories

##### Essex Energy and Utilismart

With the support of the Smart Grid Fund, Essex Energy and Utilismart have developed and deployed SmartMAP, a software application that uses smart meters to pinpoint power outages and areas where the local system is under stress.

Utilities can combine SmartMAP with other tools to analyze and optimize their current system and model the effect of changes before they buy costly equipment and put shovels in the ground. This promotes sound planning and asset investment and saves customers money.

##### Panasonic

TBA (likely eCamion or Varentec)

## N-Dimension Solutions

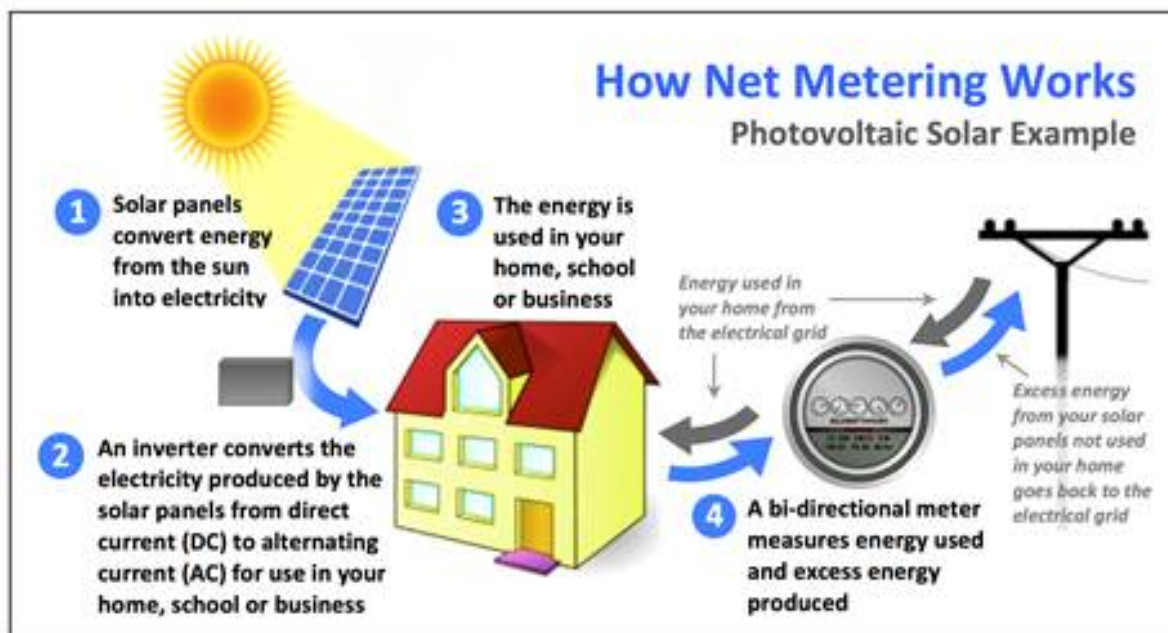
Ontario's smart meters and our modern electricity networks must protect the data they generate.

With support from the Smart Grid Fund, N-Dimension worked with Burlington Hydro to demonstrate and validate their cyber security technology on Burlington Hydro's smart meters and the communications networks.

N-Dimension's N-Sentinel Monitoring continuously scans network traffic, detecting and analyzing possible cyber security vulnerabilities. When a threat is detected, alerts are sent to the utility and the customer, who gets a detailed analysis and guidance on the steps to take to reduce risks.

## **Net Metering**

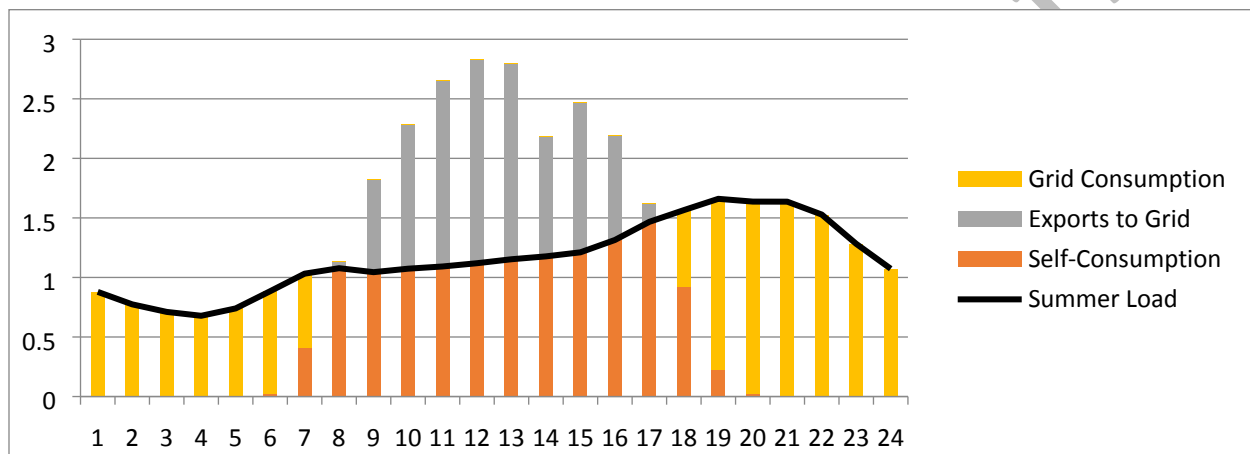
Net metering lets customers use electricity generated from their own renewable energy equipment, while still able to draw power from their local distribution network when needed. A net-metered customer will get credits on their bill for the electricity they send back to their local distributor. The fixed portions of the consumer's bill that support the costs of maintaining the grid will continue to be paid, but net metering can offset up to 100 per cent of the volume-based charges.



A net-metered residential customer will typically self-consume 30 to 40% of their annual generation onsite. A typical net-metered commercial or industrial customer may self-generate 75 to 100% of their annual consumption.<sup>2</sup> Net metering allows a customer to size a renewable generation system to meet their annual electricity needs.

The graph below shows the activity of a net-metered residential customer in the summer. The red columns show the portion of electricity the customer consumes that is self-generated.

**Hourly Summer Electricity Demand Consumption and Generation Yield for an Average Ontario Household with a 3.5 kW Solar PV System**



The province is examining the possibility of expanding the opportunities for utilities and industry to participate in net metering by allowing third parties to own and operate net metered facilities while ensuring there are strong consumer protections. Ontario is also examining more flexible net metering models, such as virtual and community net metering.

<sup>2</sup> based on International Energy Association 2014 and 2016 Residential and Commercial Renewable Energy Prosumers reports

## POWER.HOUSE

In 2015, Alectra Utilities – with support from the IESO’s Conservation Fund – launched a pilot of POWER.HOUSE, an innovative residential solar storage program. Twenty homes were outfitted with solar panels, an energy storage device, and digital devices that allowed the home and Alectra to communicate with each other.

Alectra could treat the 20 homes as a single, virtual power plant to provide services for the local and provincial grid. The homes provided enough energy together to make the case for delaying upgrades to the local distribution network by several years. This resulted in savings for all Alectra’s customers. Alectra believes that 30,000 homes in York Region alone could participate in an expanded POWER.HOUSE pilot in the future.

## ***Distributed Energy Resources***

A Distributed Energy Resource (DER) is a decentralized energy resource that provides electricity services to individual customers, or to the wider system close to where it is located.

Specific examples of DER include:

- Distributed Generation: electricity generated on site for self-consumption or export to the grid.
- Energy storage: energy stored for use close to where it is needed.
- Microgrid: a mini-network that can operate independently when it is disconnected from the main electricity grid.
- Demand Response: a temporary reduction or shift in demand in response to prices and requests from a system operator.

Many renewable energy technologies can be deployed as distributed generation. Ontario will provide short-term funding to support the development of innovative, renewable distributed generation projects that can demonstrate their benefits to the grid. LDCs and the IESO will use the data gathered by this program to identify priority areas where distributed generation can address a specific system need.

Many jurisdictions are finding it challenging to quantify the benefits of DERs. The Ministry will work with the OEB on removing market and regulatory barriers to the deployment of distributed energy resources.

## ***Energy Storage***

Energy storage is a game-changing technology. Sometimes, it acts like a home or business, consuming electricity from the grid. At other times, it acts like a power plant, sending electricity

out when needed. An independent study commissioned by the Ministry on the value of storage showed there are significant opportunities for using storage on-site, at factories, industrial facilities, and in large commercial facilities. The government will encourage utilities to develop new and innovative relationships with customers so the full benefits of energy storage can be realized.

The government is also taking steps to overcome the regulatory barriers that limit the development of energy storage. We will work with both the OEB and IESO to review the market fees paid by energy storage facilities that prevent them from enjoying a level playing field with other technologies. The government will also ensure that energy storage facilities pay their fair share to support the grid.

### ***Electric Mobility***

To curb climate change, Ontario is moving forward to increase the use of low-emission transportation. This is critical to establishing a green economy and a carbon-free Ontario.

The continued adoption of electric vehicles (EV) will have an impact on our distribution networks. If enough electric vehicles in a neighborhood charge at the same time, important parts of the distribution system can be damaged. As the EV market continues to grow, our distribution networks will need to be upgraded to ease the pressure.

The province's utilities need the ability to partner with Ontarians as they install vehicle chargers in their homes and businesses to understand charging patterns. This will help utilities understand where and when electricity is needed, so they can plan their systems in the most cost-effective manner, while maintaining reliability.

To increase the use of electric vehicles, the Government will work with its agencies and partners to:

- remove barriers for utilities investing in residential smart charging infrastructure;
- promote information sharing so utilities can avoid costly grid problems before they happen;
- harmonize the government's energy, climate change, transportation, and infrastructure policies; and
- develop a roadmap for Vehicle-Grid Integration.

### ***Vehicle-Grid Integration***

Vehicle-grid integration means that electric vehicles can be managed by local utilities to provide services or reduce pressure on Ontario's grids.

The first step in vehicle-grid integration is to encourage smart charging by homeowners. With smart charging, utilities will be able to adjust the charging of an electric vehicle so that it does not coincide with other demands for electricity. This means charging during off-peak periods, when there is less stress on the system. In the future, it may also mean charging during sunny and windy periods when Ontario has abundant emissions-free generation through sources of wind and solar power. Customers would still wake up to a fully charged vehicle, but the need for costly network upgrades would be reduced.

Smart charging is just the start of vehicle-grid integration. In the future, the battery of an electric vehicle could deliver electricity to the home in the event of an outage. It could also serve as a DER and deliver electricity back to the community.

The government will engage with energy sector partners to develop a Vehicle-Grid Integration roadmap that encourages the integration of electric vehicles within local distribution networks and ensures that vehicle owners can access all the potential benefits of their investments.

### ***Building on the Renewables Revolution***

The tremendous growth of Ontario's clean tech and renewable energy sectors has attracted billions of dollars in investment to Ontario and led to the creation of thousands of new jobs. Ontarians can expect these economic benefits to continue. The renewables sector is expected to contribute nearly \$5.5 billion dollars to Ontario's GDP between 2017 and 2021.

Ontario's renewable energy policies have helped build a domestic industry, significantly greened our electricity supply mix, and provided real benefits for communities and municipalities. Recognizing this success, the 2017 LTEP is focused on outcomes instead of mandating targets and technologies. With a solid foundation of renewable energy online, we can focus on new opportunities for innovation, modernization and exporting our expertise.

But make no mistake. Ontario remains committed to an electricity system that includes renewable energy generation and supports the Province's *Climate Change Action Plan*.

### **Exporting Ontario's Energy Expertise**

"As climate action picks up speed and the costs of renewables continue to fall, the prospects for the future of the clean energy industry are very strong. The question is, will Ontario take advantage or be left behind?" – Renewable Energy Alliance of Ontario

The firms that participated in Ontario's expansion of renewable energy are now poised to export their expertise and products to foreign markets. Ontario's energy innovators – those with expertise in smart grid, renewables, nuclear and other technologies – are using the solid base they established in Ontario to export to other jurisdictions and parts of the world.

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#### *Canadian Solar, a Global Success Story*

Headquartered in Ontario, Canadian Solar Inc. is one of the world's largest solar power companies, with subsidiaries in 24 countries on 6 continents, and over 8,900 employees.

Canadian Solar began producing solar photovoltaic (PV) panels in Guelph in 2010. In 2014, the company began manufacturing solar PV modules and medium voltage power stations at its plant in London, Ontario.

The company has invested more than \$800 million Canadian in research and development. Canadian Solar operates three state-of-the-art research centres for PV cells, modules and systems, one of them in Guelph.

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#### *A Northern Ontario Success in Manufacturing Renewable Energy*

Heliene Canada has been manufacturing solar photovoltaic (PV) panels in Sault Ste. Marie since 2010. Heliene currently exports over half of its modules to US markets.

Heliene's assembly line relies on Japanese robotics, a Spanish lamination machine, glass from the United States and solar cells from Thailand. As of December 2015, the company employed 36 people using 8 robots over 3 shifts to produce solar panels 24 hours a day.

Heliene Canada collaborates with other industry players and universities, such as the Rotman School of Business at the University of Toronto, to create a link between academic research and industrial applications.

Ontario continues to be committed to the dynamic and innovative business climate that made this possible. The Ministry will expand its role in supporting Ontario energy companies that want to export their goods, services and expertise, by:

- working with other provincial and federal government partners, industry associations and companies to develop and support trade initiatives that strengthen international relationships and create new business opportunities
- developing market intelligence that determines which foreign markets hold the most promise for Ontario's energy goods and services
- participating in energy-related trade missions abroad
- promoting Ontario's technical expertise at appropriate international forums

The Ministry, in collaboration with partner ministries, will also develop a program that supports the demonstration of made-in-Ontario technologies abroad. In designing this program, the Ministry will seek to collaborate with the federal government, which announced several investments in the cleantech sector in the 2017 budget.



*“Ontario can lead globally on development of clean and low-cost remote energy systems ... Emerging global economies, including India, are demanding these solutions and Canadian entrepreneurs are poised to seize that opportunity.” – MaRS Cleantech*

*FleetCarma is an Ontario company that provides electric vehicle products and services,.*

*With the support of the Ministry’s Smart Grid Fund, FleetCarma developed a solution to control EV charging. This solution gives utilities the ability to control when an electric vehicle is charged, helping utilities protect local grid infrastructure. FleetCarma’s solution accomplishes this while taking the needs of EV owners into account.*

*After participating in several ministry trade programs, FleetCarma announced In April 2017 that the New York City utility, Con Edison, will be using their system exclusively to run an off-peak charging program for electric vehicles.*

**Callout Box:** *Laker Energy Products is a leading supplier of nuclear-class pipes and fittings for the CANDU nuclear power industry. The Ontario company is building on this success to export its precision-tooled products around the world.*

*Laker recently purchased a new 65,000 sq. ft. facility to handle the more than \$85 million in contracts it has helping refurbish the Bruce and Darlington nuclear reactors. The facility will also support Laker’s service to international markets, including existing and new-build projects in Argentina, Romania, China and the UK*

*From our own backyard, Laker has become a world leader in the provision of fully integrated, high-precision machining, assembly and testing of CANDU-related products.*

## **Nuclear Innovation**

Nuclear energy doesn’t only power our homes. It has enabled Canada to be a world leader in nuclear research and nuclear medicine, saving lives and bringing peace of mind to countless numbers of cancer and heart patients around the world. *Include stats or call-out box on Cobalt-60/Nordion – number of treatments, etc.*

Ontario is keenly interested in collaborating with the federal government, universities and industry partners to continue the support the nuclear industry for both energy and non-energy applications. Ontario can help create new export opportunities for our “home-grown” nuclear innovations, such as:

- Small Modular Reactor (SMR) Technology: SMRs are a new generation of nuclear power reactors that have smaller footprints than conventional reactors and promise economies of scale through mass production.
- Nuclear Fuel Research: Technological innovations could lead to the reprocessing or recycling of used nuclear fuel or the use of thorium to power nuclear reactors.
- Hydrogen: Ontario's nuclear technology could be used for the large-scale production of hydrogen. Hydrogen is a low-carbon energy source that could in the future replace gasoline for transportation or natural gas for heating.
- Isotopes: Isotopes are as used in space exploration, supplying heat and power for Mars Rovers. Research is underway into expanding Ontario's role in the production and use of isotopes.