Delivering Fairness and Choice

CONFIDENTIAL DRAFT

2017 Long-Term Energy Plan

Minister's Message

[Placeholder]

CONFIDENTIAL DRAFT

Executive Summary

[Placeholder]

CONFIDENTIAL DRAFT

Chapter 1. Ensuring Affordable and Accessible Energy

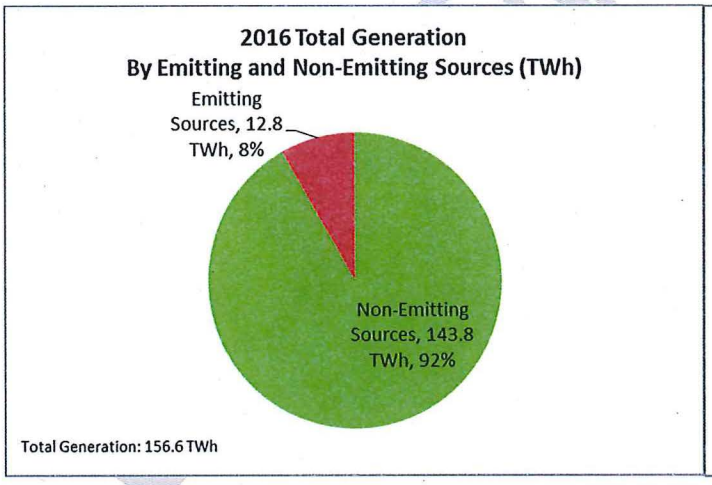
Making Energy Affordable

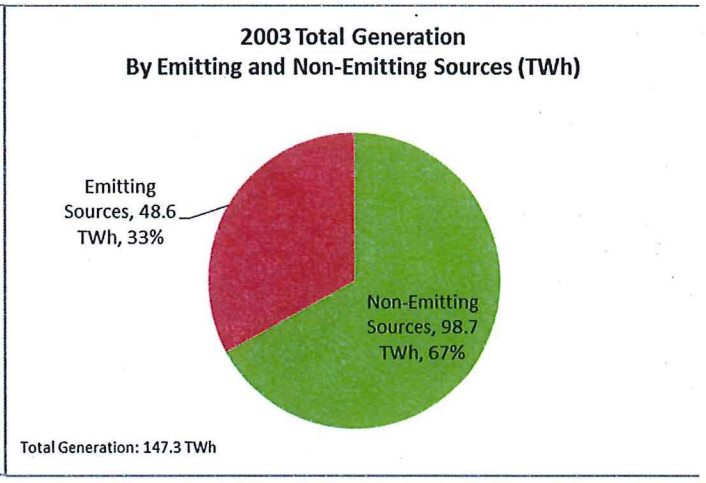
Ontario's electricity system is well positioned to meet any challenges and pursue any opportunities that may occur over the next 20 years. More than $50 billion has been invested in the electricity system since 2003. These investments have provided several benefits, including restoring the reliability of our electricity system.

This is a significant change compared to 2003, when power generated from emitting sources made up one-third of the province's generation mix.

How We've Heard You

- Electricity costs are too high
- High prices hurt industrial competitiveness
- Reduce rates by funding from tax base
  Consider new technologies and methods to manage energy use
- Provide more pricing plans
  Promote both customer and system benefits of conservation
- Delivery charges should be the same province-wide
- Expand access to natural gas





Today, Ontario's electricity sector accounts for two per cent of the province's total GHG emissions. We now have a robust and clean supply of electricity that can be expected to meet Ontario's electricity demand well into the next decade.

The much-needed investments in our electricity system have led to higher electricity prices. As a result, Ontario's Fair Hydro Plan was developed to relieve the cost pressures caused by these

system improvements. The Fair Hydro Plan builds on actions already taken over the past several years that reduced electricity costs for families, farms and businesses, including:

- deferring the construction of two new nuclear reactors at the Darlington Nuclear Generating Station, avoiding an estimated $15 billion in new construction costs;
- driving down the cost of renewable energy generation through annual reviews for Feed-In Tariff (FIT) pricing, revised procurement totals, and the introduction of competitive procurement for large renewable projects, resulting in renewable energy generation costing at least $3 billion less than forecast in the *2013 Long-Term Energy Plan*.
- suspending the second round of the LRP process (LRP II) and the Energy-from-Waste Standard Offer Program, which is expected to save up to $3.8 billion compared to the forecast in the 2013 Long-Term Energy Plan (LTEP 2013);
- renegotiating the Green Energy Investment Agreement with Samsung, reducing contract costs by $3.7 billion;
- reducing Feed-In Tariff (FIT) prices through annual price reviews, saving ratepayers at least $1.9 billion;
- starting the refurbishments at the Bruce Nuclear Generating Station in 2020, instead of 2016, thus helping to save $1.7 billion compared to the forecast in the LTEP 2013; and
- continuing to operate the Pickering Nuclear Generating Station up to 2024, pending regulatory approvals, is estimated to save ratepayers as much as $600 million.

Ontario's Fair Hydro Plan

On June 1, 2017, the *Ontario Fair Hydro Plan Act, 2017* became law, providing additional help for electricity consumers. Ontario's Fair Hydro Plan:

- lowers electricity bills by 25 per cent for a typical residential consumer. As many as half a million small businesses and farms are also benefitting from the reduction;
- expands the Ontario Electricity Support Program (OESP) by increasing the on-bill credits by 50 per cent and making more Ontarians eligible for the program;
- provides enhanced distribution rate protection for residential customers served by local distribution companies (LDCs) with some of the highest rates. This will save eligible customers as much as 40 or 50 per cent on their electricity bills. The enhanced distribution rate protection broadens the support provided under the existing Rural or Remote Rate Protection (RRRP);
- reduces the monthly electricity bills of on-reserve First Nation residential customers of licensed distributors by giving the customers a credit of 100 per cent on the delivery line or service charge of their bill. This provides them with an average monthly benefit of $85;

CONFIDENTIAL DRAFT

- shifts the funding of the OESP and the majority of RRRP from electricity bills to provincial revenues. This will reduce the regulatory charges paid by all Ontario ratepayers;
- adds eligibility for smaller manufacturers and greenhouses with average monthly peak demand greater than 500 kW to the Industrial Conservation Initiative (ICI). This program provides them with a strong incentive to lower their consumption during peak hours and can reduce their bills by one-third , on average;
- includes the 8 per cent rebate introduced that took effect on January 1, 2017, a reduction equal to the provincial portion of the Harmonized Sales Tax (HST); and
- establishes an Affordability Fund to help people who don't qualify for low-income conservation programs make energy efficiency improvements to their homes, in cases where they otherwise couldn't do so without financial assistance.

Additional Details on Ontario's Fair Hydro Plan

Ontario Electricity Support Program

In order to benefit more low-income Ontarians and provide them with additional support, Ontario has expanded the eligibility criteria for the OESP and increased the monthly credits by 50 per cent. This means that:

- *a customer living independently who is earning under $28,000 can now receive $45 per month, up from $30;*
- *a family of four with a combined earning under $48,000 can now receive $40 per month; and*
- *seven or more people living together that earn a total of $39,000 or less can receive $75 per month, up from $50.*

CONFIDENTIAL DRAFT

Secretary of Cabinet, Steve Orsini – Whitney Block

Household Income (After Tax)	Household Size (Number of people living in household						
	1	2	3	4	5	6	7+
< $28,000	$45	$45	$51	$57	$63	$75	$75
$28,001 - $39,000	$40	$40	$45	$51	$57	$63	$75
$39,001 - $48,000	$35	$35	$35	$40	$45	$51	$57
$48,001 - $52,000	$35	$35	$35	$35	$35	$40	$45
Over $52,001	$35	$35	$35	$35	$35	$35	$35

Household Income (After Tax)	Household Size (Number of people living in household) Energy Intensive						
	1	2	3	4	5	6	7+
< $28,000	$68	$68	$75	$83	$90	$113	$113
$28,001 - $39,000	$60	$60	$68	$75	$83	$90	$113
$39,001 - $48,000	$52	$52	$52	$60	$68	$75	$83
$48,000 - $52,000	$52	$52	$52	$52	$52	$60	$68
Over $52, 001	$52	$52	$52	$52	$52	$52	$52

Red cells: new eligibility categories under Ontario's Fair Hydro Plan that came into effect on May 1, 2017.
Orange cells [graphic needs to be fixed]: new eligibility categories to ensure that OESP is available to those deemed financially eligible for social assistance (Ontario Works, Ontario Disability Support Program) but were previously ineligible for OESP.
Purple cells: new eligibility categories to ensure that, if financial eligibility categories for social assistance change in the future, clients will remain eligible for OESP.

Household Income (After Tax)	Household Size (Number of people living in household						
	1	2	3	4	5	6	7+
< $28,000	$45	$45	$51	$57	$63	$75	$75
$28,001 - $39,000	$40	$40	$45	$51	$57	$63	$75
$39,001 - $48,000	$35	$35	$35	$40	$45	$51	$57
$48,001 - $52,000	$35	$35	$35	$35	$35	$40	$45
Over $52,001	$35	$35	$35	$35	$35	$35	$35

Household Income (After Tax)	Household Size (Number of people living in household) Energy Intensive						
	1	2	3	4	5	6	7+
< $28,000	$68	$68	$75	$83	$90	$113	$113
$28,001 - $39,000	$60	$60	$68	$75	$83	$90	$113
$39,001 - $48,000	$52	$52	$52	$60	$68	$75	$83
$48,000 - $52,000	$52	$52	$52	$52	$52	$60	$68
Over $52, 001	$52	$52	$52	$52	$52	$52	$52

Red cells: new eligibility categories under Ontario's Fair Hydro Plan that came into effect on May 1, 2017.
Orange cells [graphic needs to be fixed]: new eligibility categories to ensure that OESP is available to those deemed financially eligible for social assistance (Ontario Works, Ontario Disability Support Program) but were previously ineligible for OESP.
Purple cells: new eligibility categories to ensure that, if financial eligibility categories for social assistance change in the future, clients will remain eligible for OESP.

Secretary of Cabinet, Steve Orsini – Whitney Block

Ontario is also working to improve coordination across provincial programs that provide support to low-income Ontarians. Synchronizing the OESP with other social assistance programs will help get more vulnerable consumers into the program so they can receive the support they need on electricity bills.

Distribution Rate Protection

Rural or Remote Rate Protection provides a subsidy for the distribution rates paid by rural and remote customers who face higher distribution costs compared to less rural areas.

Ontario has expanded this rate protection to provide distribution rate relief to residential customers served by LDCs with some of the highest rates. About 800,000 customers will now benefit from the enhanced distribution rate protection.

LDCs whose customers are benefitting from the enhanced distribution rate protection include: Hydro One (medium- and low-density rate classes), Northern Ontario Wires, Lakeland Power (Parry Sound service territory), Chapleau, Sioux Lookout, InnPower, Atikokan and Algoma. The benefits differ from utility to utility.

On-reserve Credit

The First Nations Delivery Credit benefits up to 21,500 residential customers living on reserve. The costs are being funded by provincial revenues.

The credit provides much needed relief from the high costs of electricity in First Nations on-reserve communities and encourages their socio-economic well-being. This is an important step towards reconciliation and the strengthening of Ontario's relationship with First Nations.

"The elimination of the delivery charge will assist our citizens by reducing energy poverty in our communities. It also represents recognition for the use of the land in the development and expansion of the provincial energy grid," said Ontario Regional Chief Isadore Day. "Poverty, lack of opportunity and choosing to pay for electricity over food is a reality that affects our people. Today's commitment by the Ontario government is commendable and allows a path forward for greater quality of life for First Nations in Ontario." Quote.

Industrial Conservation Initiative

The Industrial Conservation Initiative (ICI) provides large electricity consumers with an incentive to reduce their consumption during peak hours, lowering their electricity costs. This benefits them financially and benefits the electricity system by deferring the need for new peaking generation in the longer term.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

To give more businesses the opportunity to participate in the ICI, Ontario has lowered the threshold for entry and increased the number of companies that can benefit. As of July 1, 2017, all customers with an average monthly peak demand of greater than 1 MW are eligible for the program. In addition, small manufacturing companies and greenhouses with average monthly peak demand greater than 500 kW and less than or equal to 1 MW are also eligible.

Affordability Fund

The Affordability Fund helps those Ontarians not eligible for low-income conservation programs, but displays a need for financial assistance in order to improve the energy efficiency of their homes. The fund is expected to pay for the installation of household improvements such as energy-saving LED light bulbs, power bars, better insulation, and energy efficient window air-conditioners and refrigerators.

The Affordability Fund is administered by an independent trust that distributes funds to the electricity distributors that apply. Distributors are in the best position to provide energy efficiency improvements to consumers in need of assistance. The Province will continue to plan for the integration of conservation and low-carbon technology in the province's energy system.

Refinancing the Global Adjustment to Ensure Intergenerational Fairness

Ontario's Fair Hydro Plan helps consumers by refinancing a portion of Global Adjustment (GA). The GA pays costs associated with contracted generation and conservation and demand management programs in Ontario.

The majority of the province's electricity generators have 20-year contracts, but many facilities are expected to deliver additional benefits by operating beyond the end of those contracts. Similarly, the savings resulting from conservation programs paid for by the Global Adjustment persist for about 15 years. Present-day consumers should not carry a disproportionate amount of the burden of investments that will provide benefits for decades to come. To relieve the burden on today's ratepayers and share costs more fairly with future generations, a portion of the GA is being refinanced to spread the cost of electricity investments over a longer period of time. This refinancing reflects the expected longer lifecycle of the facilities that have been built. The change provides significant and immediate rate relief and will ensure greater fairness.

Existing Help for Families and Individuals

The measures included in Ontario's Fair Hydro Plan build on existing programs that already help Ontario families and individuals pay their electricity bills. This assistance includes:

- the Ontario Energy and Property Tax Credit, for low- to moderate-income individuals;
- low-income Energy Assistance Programs, for emergency situations;

CONFIDENTIAL DRAFT

- the Save on Energy Home Assistance Program, that provides free home energy efficiency assessments and upgrades to low-income consumers; and
- the Northern Ontario Energy Credit, for low- to middle-income families and individuals living in northern Ontario.

To further improve the availability of and support for conservation programs that help low-income customers, the Ministry directed the IESO in August 2017 to centrally design, fund and deliver the Home Assistance Program across all LDC service territories beginning January 2018. It is expected that IESO delivery will result in enhancements and improved access to the program. LDCs may continue to deliver the program if they demonstrate a commitment to serve the sector.

Existing Help for Businesses and Industry

There are a number of measures in place to lower electricity prices for industries, business and commercial operations and institutions. These measures include:

- the Industrial Accelerator Program, which assists eligible companies and their distribution-connected sites, to fast track the capital investment needed for major energy conservation projects; and
- the Save on Energy for Business programs, which provide financial incentives to help distribution-connected businesses reduce their electricity use and manage costs though energy audits, retrofits and process and system improvements.
- the Northern Industrial Electricity Rate Program, provides rate rebates to northern energy intensive industries facing competitiveness concerns due to higher energy costs and assists consumers in developing and implementing energy management plans to manage their usage and reduce costs;

The Province will continue to engage with businesses to explore options that provide support for electricity costs and meet communities' priorities for economic development.

Electricity Price Forecast

[Placeholder for residential and industrial price curves with the impact of OFHP included].

Increasing Consumer Protection

On January 1, 2017, new provisions under the *Energy Consumer Protection Act, 2010,* came into force to protect Ontario consumers from fraudulent claims and high-pressure sales tactics by restricting the door-to-door sale of energy contracts. Additionally, in February 2017, the *Protecting Vulnerable Energy Consumers, Act, 2017* provided the OEB with the authority to

CONFIDENTIAL DRAFT

prohibit disconnections during certain periods of time, like the winter. We will now turn our attention to protecting those consumers who live in condominiums and other multi-unit residential buildings and are served by unit sub-meter providers (USMPs).

USMPs are private companies that meter and send bills directly to the residents of the individual units in multi-unit residential buildings for the electricity they consume. The OEB currently licenses 28 USMPs who provide services to 2,500 buildings with 326,000 individual units metered. The residential customers inherit the pricing arrangements; costs are set by the owner or developer of the building or by the condominium board.

Both the Province and the Ontario Energy Board (OEB) have heard consumers say they would like to know more about how these decisions are made and what they are being asked to pay for. That is why the Province will enable the OEB to enhance its oversight of sub-metering companies and bring in new consumer protection measures.

Enhancing consumer protection and taking a more stringent approach to regulation would give the OEB more insight into how these sub-metering companies determine their costs and set their rates and how they set up their contractual agreements with developers.

Consumers living in condominiums and other multi-unit residential buildings will benefit from having the same protections as LDC customers, including:

- clarity about what goes into the prices they are charged;
- protection from winter disconnections; and
- the ability to appeal unfair practices to the OEB.

The OEB will complete a review of these issues on a priority basis.

Natural Gas Expansion

Ontario wants to expand access to natural gas to give customers greater choice in their energy supply and to aid the economic development of their communities. In order to do this, the Province launched a new $100 million Natural Gas Grant Program in April 2017, administered by the Ministry of Infrastructure. It supports both the expansion of natural gas pipelines and the construction of new infrastructure for liquefied or compressed natural gas. Switching from heating with oil to using natural gas under this program could save the average consumer an estimated $1,100 a year.

A new regulatory framework issued by the OEB in November 2016 gives utilities more flexibility in rate structures, making natural gas expansion more economically feasible for unserved communities. The framework also encourages the use of rate competition when multiple utilities apply to the OEB to serve these communities. Natural gas is one among several

CONFIDENTIAL DRAFT

different energy options that provide greater consumer choice and may help to reduce overall energy costs.

Gasoline Price Review

Northern and remote communities have raised concerns about the high cost of the gasoline. As a result, the Province directed the OEB to review Ontario's retail market for gasoline and diesel fuel.

The Gasoline Price Review will focus on three main topics:

- the extent and causes of variations in retail prices over time and between one region and another in Ontario;
- how pricing and markets in Ontario compare with other jurisdictions; and
- the information available to consumers about pricing and price variations.

The OEB expects to report on its findings later this year. The Province intends to review the OEB's report in detail and consider the information in future decision-making.

Summary

- Ontario's Fair Hydro Plan lowers electricity bills by 25 per cent for a typical residential consumer. As many as half a million small businesses and farms are also benefitting from the reduction. It builds on previous actions that reduced electricity costs for families, farms and businesses.
- Ontario will spread the cost of electricity investments over a longer period of time by refinancing a portion of the Global Adjustment. This will share the costs more fairly with future generations.
- Ontario will enhance consumer protection by providing the Ontario Energy Board with increased regulatory authority over Unit Sub-meter providers (USMPs) to gain better insight into USMP costs and rates, and their contractual agreements with developers.
- Residential and industrial electricity prices are forecast to remain below the level forecast in the *2013 Long-Term Energy Plan* over the outlook period.
- The expansion of the Industrial Conservation Initiative will encourage more businesses to reduce their consumption during peak hours to lower their electricity costs.
- Ontario will continue to support expanded access to natural gas to give customers greater choice and aid in the economic development of their communities.
- Provides enhanced distribution rate protection for residential customers served by LDCs with some of the highest rates. This will save eligible customers as much as 40 or 50 per cent on their electricity bills.
- Reduces the monthly electricity bills of on-reserve First Nation residential customers of licensed distributors.

CONFIDENTIAL DRAFT

Chapter 2. Ensuring a Flexible Energy System

Ontario has made significant progress in rebuilding its electricity system. Of the $50 billion invested in Ontario's electricity system since 2003, over $35 billion has been invested in electricity generation, to ensure we have a clean and reliable supply of electricity for households and businesses. This is in addition to the much-needed upgrades we have made to our transmission and distribution systems. Ontario now has an electricity system that is well-positioned to pursue emerging opportunities and meet future challenges, including the fight against climate change.

How We've Heard You

- First consider costs when deciding on supply
- Use a technology-neutral competitive process to acquire electricity supply
- Optimise use of our existing energy facilities and infrastructure, including nuclear
- Acquire more power from neighboring jurisdictions
- Both support and concerns expressed about nuclear and renewables
- Storage can solve problems

Ontario's electricity system provides us with a firm base on which to take further steps to fight climate change. Currently, the province's fuels sector supplies most of the energy needed for our transportation, heating and manufacturing. Our clean and reliable electricity system is strong enough to allow us to electrify further sectors of the economy, in order to reduce greenhouse gas emissions. The province's existing network of pipelines and retail outlets can also be used to deliver future alternative fuels, such as renewable natural gas (RNG).

The Need for Flexibility

Ontario is moving towards a new market-based approach to ensure the province has the electricity supply it needs to reduce costs and ensure the electricity system has flexibility to meet future challenges. While the current electricity market structure and mechanisms have kept the lights on in Ontario, it is time to adjust them to keep up with the pace of change and our evolving supply mix. This means that Ontario is moving away from relying on long-term contracts to ensure it has a sufficient supply of electricity. The more competitive, market-based approaches that Ontario is moving towards can provide a cost-effective supply of electricity, as well as the flexibility to react quickly to changing needs. System operators in New England, New York and the Pennsylvania-New Jersey-Maryland Interconnection have successfully implemented this sort of approach.

Our current robust supply situation provides us with the ideal conditions to take the necessary time to explore and efficiently implement new approaches to procuring electricity generation and capacity. These approaches will need to have flexibility built into all facets of their design to ensure that Ontario is well positioned to accommodate and benefit form rapidly changing energy technologies.

CONFIDENTIAL DRAFT

Due to the substantial decline in the cost of renewable technologies, particularly wind and solar, over the last decade, renewables are becoming increasingly competitive with conventional energy sources and will continue to play a key role in helping Ontario meet its climate change goals. Changes will need to be made to the market to ensure that system needs, including the need for increased flexibility, are met at the lowest cost to ratepayers.

To meet our long-term needs, the Independent Electricity System Operator (IESO) has begun a Market Renewal initiative to redesign the province's electricity markets. This undertaking is expected to save up to $5.2 billion between 2021 and 2031 and forms a key component of Ontario's plan to bring down the cost of electricity. The IESO is developing a capacity auction that will increasingly, over time, use competition to secure the resources we need, regardless of the technology. This process would be used to secure the incremental capacity required, in addition to already contracted resources, to meet Ontario's forecasted demand and resource adequacy needs. Generators, demand response providers, and importers could all participate in the auction, with the lowest-cost resources winning out.

Market Renewal is expected to ultimately result in a more competitive marketplace that efficiently meets system needs. It can offer flexibility under various demand outlook scenarios, from higher demand scenarios due to increased electrification of our economy to lower demand scenarios as a result of increased behind-the-meter generation. Market Renewal will also help Ontario prepare for the future by creating a framework that can effectively incorporate new and emerging technologies that will, together with cap and trade, help to ensure Ontario's climate change commitments are met.

A reformed electricity market would not only help reduce costs, but it would also increase two-way electricity trade with other jurisdictions. Imports and exports would be able to be scheduled more frequently on interties, which are the transmission lines to other states and provinces. This could allow imports of more lower-cost generation, and provide greater revenue and flexible access to export markets for Ontario generators.

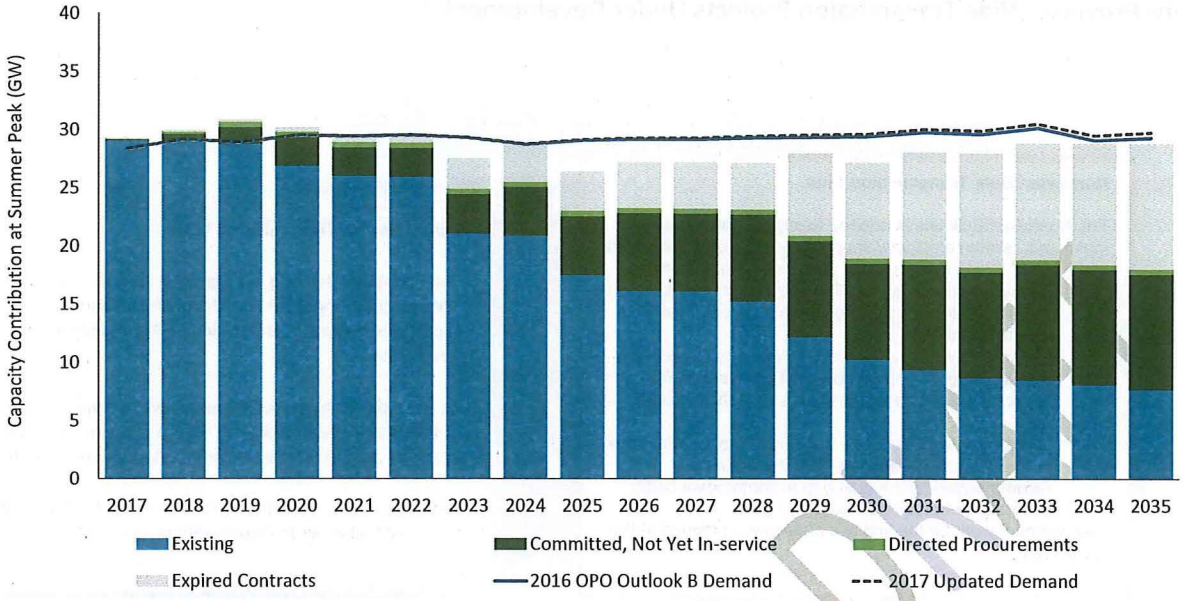
The IESO is working closely with partners in the electricity sector to develop high-level designs and a plan for bringing in the significant changes that will become the foundation of Market Renewal. The plan will set out the specific changes to be implemented and the timelines for completing the work. This will allow the IESO and its partners to address the known challenges of our existing markets while laying a solid foundation for a more competitive and flexible energy market that can meet future needs.

Electricity: Supply and Demand

While there is currently a robust supply of electricity, a shortfall in capacity is expected when existing contracts begin to expire and Pickering reaches its end of life in the early 2020s.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT



This capacity requirement would be met through the IESO's proposed incremental capacity auction. The auction, together with a robust energy market, would allow existing and new clean generation facilities to compete with clean imports, conservation and other demand-side initiatives. The continued growth of embedded wind and solar power is also expected to reduce the need for grid-supplied electricity.

Demand is forecast to be relatively steady over the planning period. In the long-term, the IESO projects an increase in overall demand as electrification of the economy occurs. The potential for electrification exists in nearly every part of society. In particular, there is a great potential for electrification in the transportation sector, where it would be an economical and clean alternative to fossil-fuel powered engines. The IESO's outlook assumes that there will be approximately 2.4 million electric vehicles (EVs) on the road by 2035, up from about 9,000 at the end of 2016.

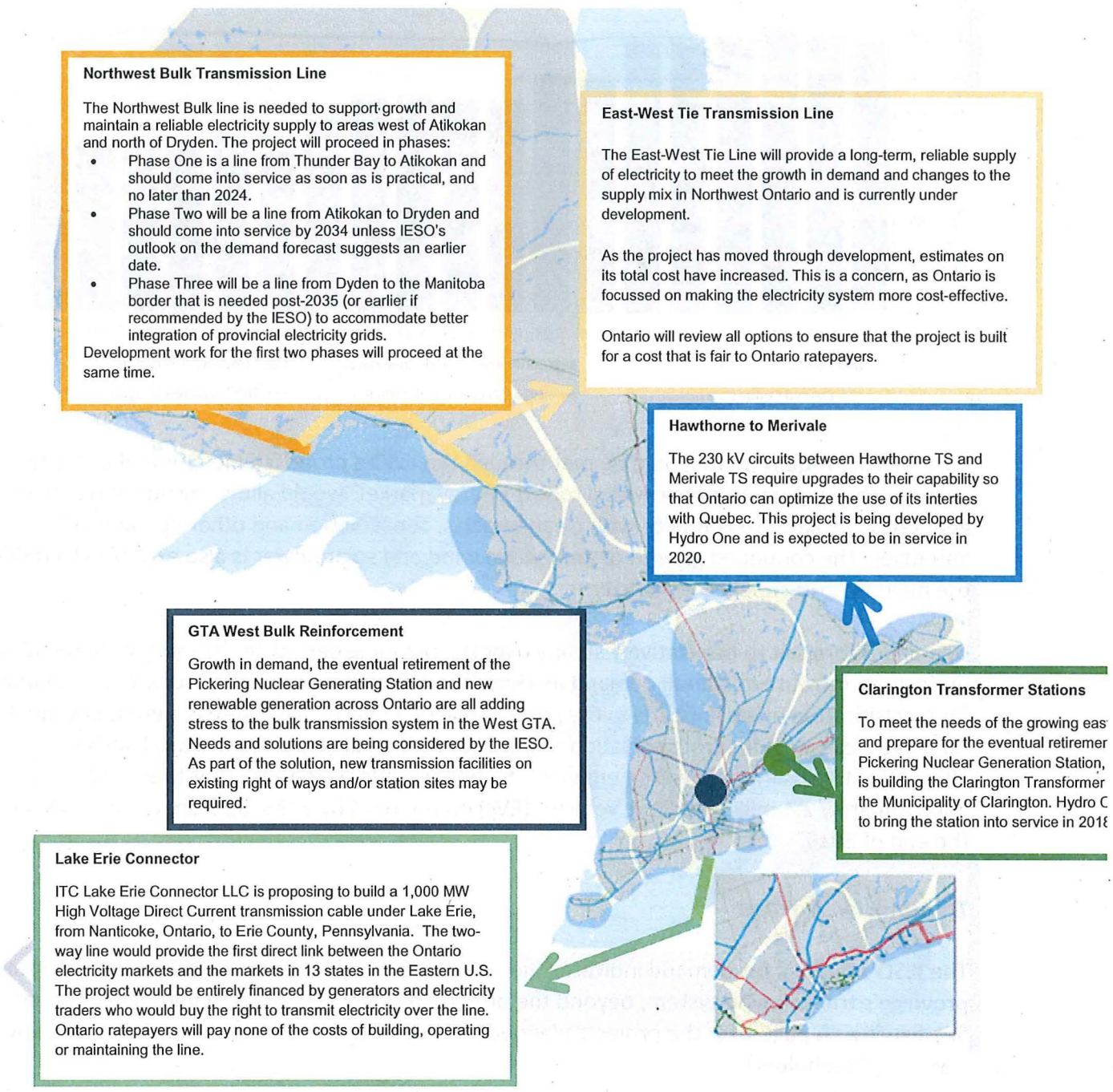
Transmission Forecast

The IESO's outlook for demand indicates there will be no need for any major expansion of the province's transmission system, beyond the projects already planned or under development. See figure x on page x for the projects planned or underway on the high-voltage transmission system. [Placeholder]

The Province will direct the IESO to establish a formal process for planning the future of the integrated province-wide "bulk" system, which includes the high voltage system that is typically 230 kV and 500 kV in Ontario. As part of the process, the IESO will consult with its partners and communities.

Secretary of Cabinet, Steve Orsini – Whitney Block

Major Province-Wide Transmission Projects Under Development

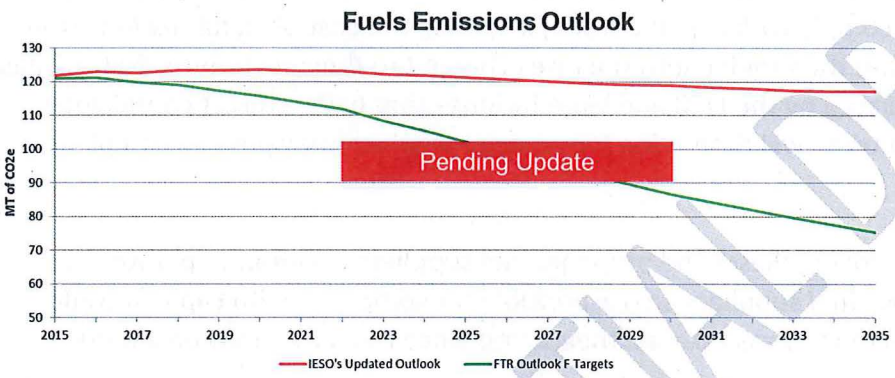


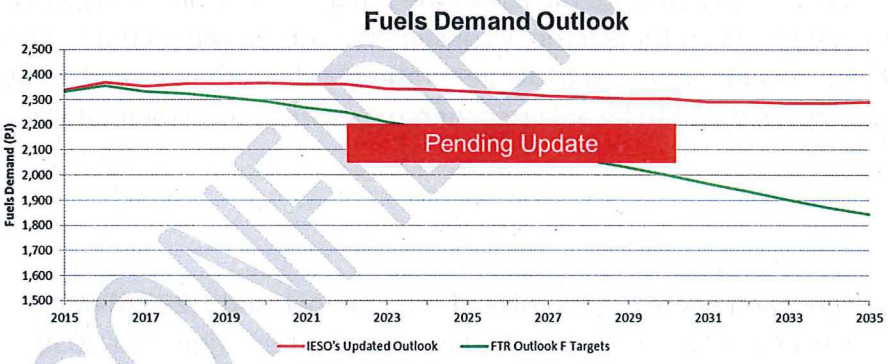
Fuels: Supply and Demand

Secretary of Cabinet, Steve Orsini – Whitney Block

The *2017 Long-Term Energy Plan* is not forecasting any issues with the supply of liquid fuels or natural gas and anticipates the industry will continue to reinvest and maintain its facilities in Ontario. While the existing infrastructure is likely to be sufficient for fossil fuels, new investments in processing and delivery may be required to handle increases in the use of alternative fuels such as ethanol, renewable natural gas, biodiesel and other biofuels.

[Placeholder pending further analysis/modelling] Over the next 20 years, the fuels sector will see a transformation through electrification of vehicles, enhanced conservation and switching to lower-carbon fuels. As a result, both the demand for fuels and emissions from the sector are expected to decline.





[placeholder for chart showing expired capacity over next 20 years]

The Influence of the Carbon Market

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

On January 1, 2017, Ontario implemented a cap and trade program. It will influence the cost of fossil fuels, but also influence how Ontario plans the province's energy supply and achieves cost-effective reductions in greenhouse gas (GHG) emissions.

Fossil-Fuelled generators are now exposed to a carbon cost with respect to the GHG emissions they produce from burning fossil fuels to generate electricity. This carbon cost is expected to form part of their electricity offers into the wholesale market which will increase the relative competitiveness of non-emitting electricity generation and clean energy imports from neighbouring jurisdictions, which are not exposed to this cost.

Cap and trade also increases the price consumers pay for fossil-fuels such as natural gas, gasoline, diesel and propane. The OEB has to approve the costs that regulated natural gas utilities incur when they comply with cap and trade, including the cost of acquiring emission allowances. These costs are then folded into the rates charged to their customers. Natural gas utilities that are not regulated by the OEB and large facilities that have a direct compliance obligation under cap and trade will determine the manner in which they pass on compliance costs.

For other fuels such as gasoline, diesel and propane, fuel suppliers in Ontario operate in a competitive market. These fuel suppliers are responsible for complying with cap and trade regulations and are expected to pass through their compliance costs to retail consumers.

Maximizing Existing Assets

Delivering Fairness and Choice aims to maximize the use of the province's existing energy assets in order to limit any future cost increases for electricity consumers. Ontario can do this because planned the fact that many of the numerous electricity generation facilities that have been built in the last decade and a half are expected to be able to generate power beyond their typical contract life.

Renewable Energy

Contracts for over 4,800 MW of wind energy, 2,100 MW of solar energy, and 1,200 MW of hydroelectric generation will expire between 2026 and 2035, with most expiring after 2030. While wind and solar contracts are for 20 years, and hydroelectric contracts for 40 years, wind turbines and photovoltaic panels are often still able to generate electricity after their contracts expire and we know from experience that hydroelectric facilities can operate for as long as a century. In many cases, new or more efficient technology could be added to upgrade these renewable energy facilities so they could continue operating or increase their output.

Market Renewal will lay the foundation for a more competitive marketplace that will, in the long run, aim to enable future investments in and opportunities to improve the use of these existing and new renewable energy resources, as part of Ontario's support for its climate change goals.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

Natural Gas

Ontario's natural gas generating stations can respond quickly to match changes in demand. These generators can be relied upon to meet our needs during the province's highest demand periods, including hot summer days and cold winter nights. Natural gas can also be used to ensure a reliable power supply when other generators are unavailable or require maintenance. Most of Ontario's natural gas turbines are expected to operate beyond the life of their contracts. This will be important over the coming decade, as additional electricity will be needed to replace the electricity that will not be available during with the ongoing nuclear refurbishments and with the retirement of the Pickering Nuclear Generating Station in 2024. In the early 2020s, it is forecasted that there will no longer be enough contracted and rate regulated facilities to meet reliability requirements.

Many existing generation contracts will expire over the same time frame, predominantly the natural gas generators that came online in the 2006–2014 period. These natural gas facilities are expected to continue to have a role in the province's diverse supply mix over the planning period, and could continue to generate electricity past their contract life by participating in the incremental capacity auctions being considered under Market Renewal.

Refurbishing Nuclear

Refurbishing Ontario's nuclear generating stations is the most cost-effective option for producing the required baseload generation while producing no GHG emissions. Ontario is moving forward with the plans laid out in LTEP 2013 to refurbish a total of 10 nuclear units between 2016 and 2033: four units at Darlington and six units at Bruce.

The Darlington Nuclear Generating Station, in the Municipality of Clarington, is a top-performing nuclear power plant in the world. The Bruce Nuclear Generating Station, in the Municipality of Kincardine, is the largest nuclear facility operating anywhere in the world. Together, Darlington and Bruce provide around 50 per cent of Ontario's electricity needs.

Refurbishing these 10 units will secure over 9,800 MW of affordable, reliable and emission-free generation capacity for the long-term benefit of Ontario. It will also support the 180 companies and 60,000 jobs that make up the province's globally-recognized nuclear supply chain.

Ontario Power Generation (OPG) is taking a phased approach to refurbishing the Darlington Nuclear Generating Station. This approach benefits from the lessons learned during previous refurbishment projects, which highlighted the need for in-depth planning and preparation prior to starting the work.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

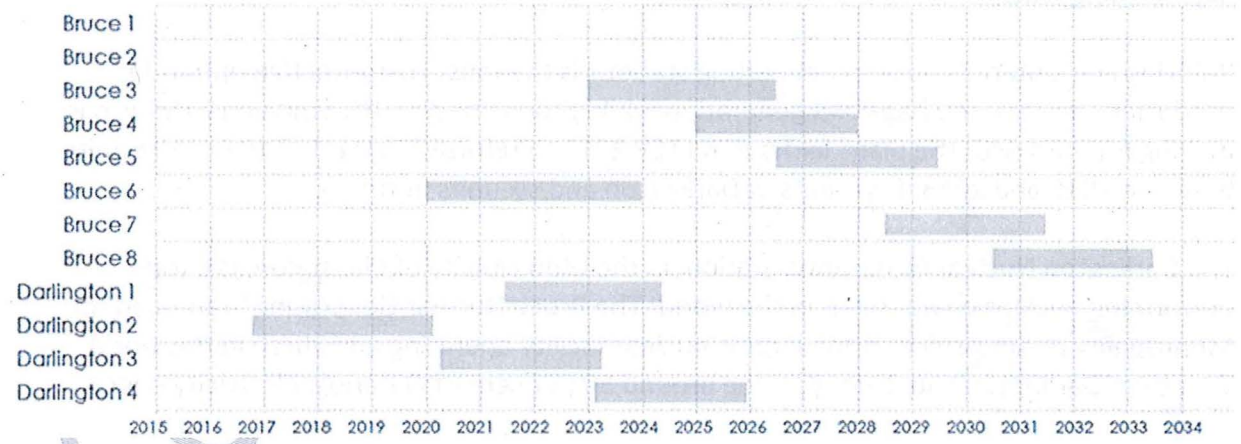
In November 2015, OPG's Board approved a total estimated cost of $12.8 billion for refurbishing all four Darlington units. This includes all spending to-date, interest and inflation and is $1.2 billion lower than OPG's original estimate in 2009.

In January 2016, Ontario gave OPG approval to proceed with refurbishing Unit 2, the first of the Darlington units. On April 13, 2017, OPG announced it had successfully completed the first of four major l segments of the Unit 2 refurbishment and isolated it from the rest of the Darlington plant. OPG has now moved on to next phase of work and is on track to complete the entire project on budget and schedule.

The refurbishment and continued operation of Darlington will contribute a total of $90 billion to Ontario's GDP and increase employment by an average of 14,200 jobs annually.

On December 3, 2015, the IESO updated its contract with Bruce Power for the refurbishment of six nuclear units at the Bruce Nuclear Generating Station. Bruce Power plans to invest approximately $13 billion of its own funds in the project. Ontario was able to further optimize the schedule for refurbishment in order to get the best value out of the existing nuclear units. The new schedule will see construction start in 2020, instead of the previously estimated start date of 2016. The updated agreement saved $1.7 billion for electricity customers, compared to the forecast in LTEP 2013.

Updated Nuclear Refurbishment Schedule



Breakout Box
Bruce Power and OPG Collaboration

OPG and Bruce Power have a long-standing relationship as operators of Ontario's nuclear fleet, sharing best practises and information with one another on a regular basis.

Secretary of Cabinet, Steve Orsini – Whitney Block

Secretary of Cabinet, Steve Orsini – Whitney Block

On November 12, 2015, Bruce Power and OPG signed a Memorandum of Understanding (MOU) – facilitated by the Ministry of Energy – to formalize the collaboration between the two companies on nuclear refurbishment and power plant operation.

The MOU addressed a key objective in LTEP 2013 that the two companies work together to identify efficiencies and innovation that lowers cost for ratepayers, share lessons learned on refurbishments and leverage economies of scale to ensure Ontario's refurbishments remain on time and on budget.

Bruce Power is currently undertaking a number of activities as part of the revised contract, including:

- implementing an asset management program to optimize the life of the Bruce units before and after refurbishment;
- developing a final cost estimate for refurbishing the first unit, Unit 6; and
- executing contracts with suppliers, including BWXT Canada and SNC-Lavalin.

The Bruce refurbishment and long-term operation is expected to annually generate up to $4 billion in economic benefits and increase employment by up to 22,000 jobs.

Bruce Power has begun a Nuclear Economic Development and Innovation Initiative with the County of Bruce to maximize the local economic impact of Bruce Power's $13 billion investment. This program seeks to ensure there are long-term benefits for the counties of Bruce, Grey and Huron by:

- asking suppliers to open offices in Bruce, Grey and Huron counties, and hire local people; and
- giving preference to suppliers who generate jobs and economic benefit in Ontario, and where possible, operate close to the Bruce nuclear site.

This effort will have spin-off economic benefits for the region, such as the construction of new housing and other facilities needed to accommodate the businesses and workers involved in this long-term project.

Breakout Box
ONTARIO COMPANIES WORKING ON NUCLEAR REFURBISHMENT

CAMECO

Cameco is one of the world's largest uranium companies, with facilities in Blind River, Cobourg and Port Hope.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

In May 2017, Cameco agreed to continue supplying uranium to Bruce Power for another 10 years, reducing the cost of electricity to Ontarians by an estimated $200 million over the 10-year period. This stable partnership will also bring long-term economic benefits to the Northumberland Region.

Cameco is also supporting Darlington refurbishment, and in May 2017, delivered a first shipment of more than 200 calandria tubes ahead of schedule and on budget. Calandria tubes are an integral part of the reactor's fuel channels which hold nuclear fuel and coolantplay a critical role in the safe and efficient operation of the reactor.

BWXT

BWXT Canada Ltd, headquartered in Cambridge, Ontario, employs 850 people across the province and is a leader in the design, manufacturing, commissioning and servicing of nuclear power generation equipment.

BWXT played a key role in defueling Darlington's Unit 2 ahead of schedule. The company will also continue to manufacture feeders - tubes delivering coolant to the reactor - to support the Darlington refurbishment program.

In addition, BWXT will supply eight new steam generators for the Bruce refurbishment. The contract is worth about $130 million and will secure more than 100 jobs.

Laker

Laker Energy Products is a leading supplier of nuclear reactor components 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 more than $130 million in contracts to help refurbish the Bruce and Darlington nuclear reactors. The facility will also support Laker's sales to international markets, including existing and new-build projects in Argentina, Romania, China and the UK.

Managing the Risks

One of the principles of LTEP 2013 was the inclusion of potential off-ramps for nuclear refurbishment. Off-ramps ensure that refurbishments are only undertaken if they continue to deliver value for ratepayers.

OPG must get provincial approval before refurbishing each remaining unit at Darlington. Every decision to proceed with refurbishing will depend on:

CONFIDENTIAL DRAFT

- OPG's adherence to the approved costs and schedules from previous refurbishments; and
- whether the project provides ongoing value to ratepayers.

Ontario's contract with the privately-owned Bruce Power also includes strong protection for ratepayers from cost overruns with the refurbishments. For example, Bruce Power is bearing approximately $2 billion in cost overruns that occurred when two of the Bruce units and were refurbished restarted in 2012.

Under its recently updated agreement with the IESO for refurbishing the six remaining Bruce units, Bruce Power will be assuming the full risk of any cost overruns during refurbishment of these units.

Contractual off-ramps allow Ontario to stop work on any Bruce refurbishment if the estimated cost exceeds a pre-defined amount. Refurbishment at Bruce can also be stopped if demand drops or lower-cost resources emerge.

Ontario will proceed with caution and protect ratepayers by strictly controlling the cost and timetable of refurbishments. OPG and Bruce Power will be subject to strict oversight to ensure they complete the refurbishments on time and on budget.

In addition to OPG's oversight of the Darlington refurbishment, Ontario has an independent advisor to ensure, with support from Infrastructure Ontario, that it has continued and effective oversight. All of OPG's expenditures on nuclear refurbishment will also be reviewed by the OEB as part of its rate-setting process.

The Province subjected the updated agreement with Bruce to extensive due diligence, as did the financial and technical advisors who were engaged by the IESO when it negotiated the contract.

The IESO will continue to manage the Bruce contract and conduct an "open book" review of costs. It has full-time representatives on-site and will regularly report back to the Province.

Pickering Nuclear Generating Station

OPG is working on plans to continue to operate the Pickering Nuclear Generating Station until 2024. Two of the units would be shut down in 2022, with the remaining four units shut down in 2024. The continued operation of Pickering will ensure Ontario has a reliable source of emission-free baseload electricity to replace the power that will not be available during the Darlington and initial Bruce refurbishments. It would also reduce reliance on electricity generated from natural gas, saving $600 million for electricity consumers and reducing GHG emissions by at least eight million tonnes.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

Secretary of Cabinet, Steve Orsini – Whitney Block

The Province announced on January 11, 2016 that it had approved OPG's plan to ask the Ontario Energy Board (OEB) and the Canadian Nuclear Safety Commission (CNSC) to approve the continued operation of Pickering until 2024. The OEB will ensure the costs of OPG's plan for continued Pickering operation are prudently incurred while CNSC will ensure the safe operation of Pickering during this period. OPG will still need to get final government approval to proceed with continued operation of Pickering after these regulatory reviews are complete.

Summary

- Market Renewal will refashion Ontario's wholesale electricity markets and will ultimately result in a more competitive marketplace that efficiently meets system needs at the lowest cost, and together with cap and trade, will help to ensure Ontario's climate change commitments are met.
- The *2017 Long-Term Energy Plan* aims to maximize the use of the province's existing energy assets in order to limit any future cost increases for electricity consumers.
- An Incremental Capacity Auction will increase the use of competition to secure the technology-neutral resources we need and will help reduce the cost of procuring resources to meet long-term demand.
- Market Renewal will lay the foundation for Ontario to prepare for the future by creating additional enhancements that can effectively incorporate non-emitting resources and new and emerging technologies.
- Cap and trade will make conventional fuels more expensive and will affect how often fossil-fueled generators will get called on to meet the province's electricity demand. This will help reduce the province's GHG emissions and shift Ontario towards a low-carbon economy.
- Market Renewal will provide future opportunities for existing and new renewable energy resources to provide different services to help meet system needs, benefitting consumers and supporting Ontario's climate change goals.
- The Province will direct the IESO to establish a formal process for planning the future of the integrated province-wide "bulk" system.
- The Northwest Bulk transmission project will proceed in phases. Phase One, a line from Thunder Bay to Atikokan, is to come into service as soon as is practical, with development work on the second phase, a line from Atikokan to Dryden, proceeding at the same time. Phase Three, a line from Dryden to the Manitoba border, may be needed post-2035 to accommodate better integration of provincial electricity grids.
- The Province will review all options to ensure the East-West Tie project is built at a cost that is fair to Ontario ratepayers.
- Ontario will exercise strict oversight of nuclear refurbishments and ensure they are only undertaken if they provide value for ratepayers.

CONFIDENTIAL DRAFT

Secretary of Cabinet, Steve Orsini – Whitney Block

Chapter 3. Innovating to Meet the Future

Modernizing the System

The way we deliver and use electricity is changing.

New technologies allow us to capture, store, and use energy locally and deliver it in new and innovative ways. Clean, distributed energy resources are powering our economy and moving closer to home. New tools and devices are appearing on smartphones and in homes, harnessing the power of data that can give customers greater choice and control over the energy they use. Customers' expectations of their utilities are increasing.

These new technologies present a significant opportunity to make electricity systems run better, reduce costs, and give customers more choice.

How We've Heard You

- Support increased use of electric vehicles (EVs)
- Support and enable options for home energy storage, including EV batteries
- New business models can drive innovation
- Modernize regulations and rate designs
- Customers will decide which technologies best meet their needs
- Government support is needed for R&D
- Distributed generation will transform conventional electricity distribution networks

Innovative Pricing Plans

Together with the Ontario Energy Board, the Province is working on giving consumers more choice in their electricity price plans. The OEB is using pilot projects to test innovative time-of-use price structures, as part of its review of the Regulated Price Plan (RPP). Ontario already offers time-of-use electricity prices to most of its residential and small business electricity customers. Along with smart meters, time-of-use pricing has enabled customers to better manage their costs by reducing or shifting their consumption to off-peak times when electricity is less expensive to produce. Time-of-use pricing also ensures that the price consumers pay for electricity reflects the cost of producing it at peak and off-peak times.

The pilots will test a variety of innovative price structures, including:

- different ratios between on- and off-peak prices;
- different times for on- and off-peak periods;
- prices that increase during critical peaks – the short time periods with extremely high demand; and
- seasonal pricing plans that have a flat rate for spring and fall, and on- and off-peak price periods for summer and winter.

CONFIDENTIAL DRAFT

Some of the pricing pilots will be combined with smart technologies, such as smart thermostats, energy use apps, and electric vehicles, to give customers further ability to manage their electricity use.

The pilots will help guide future OEB decisions on potential new price plans that match a customer's lifestyle and give them more control over their electricity costs.

In addition to these pilot programs, the OEB is also examining changes to the way the Global Adjustment (GA) is charged to mid-sized commercial and industrial consumers, otherwise known as non-RPP Class B consumers. For these consumers, the GA is a fixed charge that is the same regardless of the time that they consume electricity. A GA charge that varies with the time of use could lower prices for all Class B consumers, as well as residential and small business consumers who are on the Regulated Price Plan.

<table>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Customer of Tomorrow</td></tr>
<tr><td rowspan="2">Graphic of a person looking at a Home Energy Management System that shows linkages to their home solar, battery, EV, etc.)

[Placeholder]</td><td><u>Responding to Visibility</u>
Customers have access to real –time data and applications to manage their electricity use.</td><td><u>Participating Consumers</u>
Customers actively manage their electricity use and self-generators trade electricity with the grid.</td></tr>
<tr><td><u>Customer Focused Interaction</u>
Distributors have the tools to meet demands for broader customer-centric services.</td><td><u>Technology Integration</u>
Home energy management systems connect customer generation, electric vehicles, energy storage and more</td></tr>
</table>

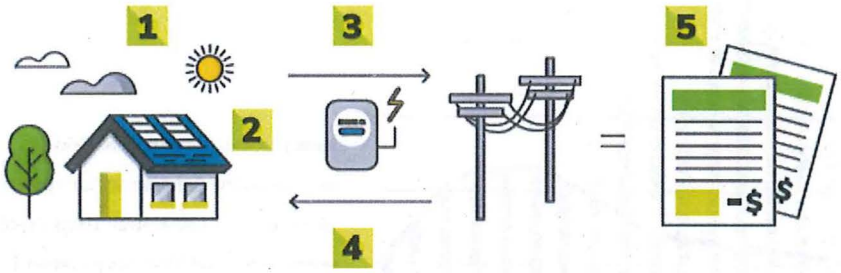
Net Metering

Net metering is a billing arrangement between an electricity distributor (also known as a local distribution company or LDC) and a customer that allows the customer to offset their electricity use with electricity generated by their own renewable energy systems. A net-metered customer is still able to draw power from the local distribution grid when needed. Net-metered customers receive credits on their electricity bill for electricity they send to the grid at times when they generate more electricity than they consume, reducing their total bill charges. The credit can also be carried over for up to 12 months for application on future bills.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

How Net Metering Works



The graphic shows how a typical residential rooftop solar project works under net metering. Other types of renewable energy installations are also allowed to net meter in Ontario.

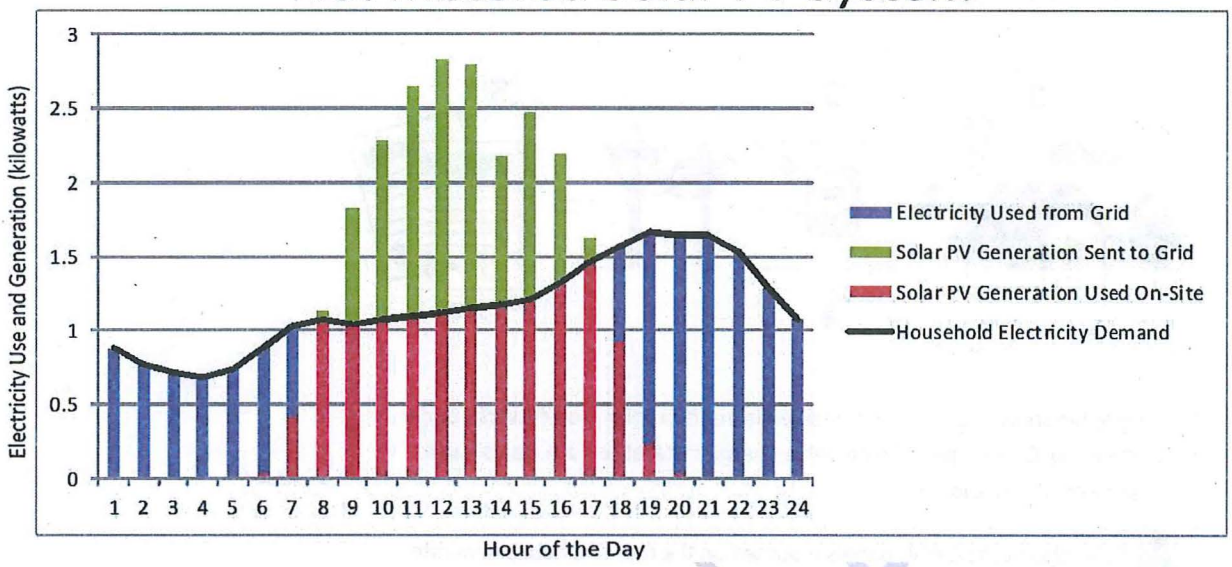
1. Solar photovoltaic (PV) panels mounted on the roof of a house generate electricity.
2. The electricity generated is first used on-site to power the house.
3. Net-metered customers receive credits on their electricity bill when they send any excess electricity to the local grid.
4. Net-metered customers receive a charge on their electricity bill for the electricity they draw from the local grid when their electricity needs cannot be met by the on-site generation.
5. A net-metered customer's monthly electricity bill is calculated based on the difference between the dollar value of any electricity used from the local grid, and the dollar value of electricity sent to the grid from their renewable energy system.

The graph below shows the electricity generated by a typical net-metered residential rooftop solar installation in the summer:

- the purple columns show the electricity used from the local grid;
- the red columns show the electricity generated and used on-site; and
- the green column shows the electricity that is generated and sent back to the local grid.

Secretary of Cabinet, Steve Orsini – Whitney Block

A Typical Summer Day With a Residential Net Metered Solar PV System



Ontario has recently taken significant steps to boost net metering by removing the limit on the size of eligible generation systems and allowing them to be paired with energy storage technologies.

Ontario will be proposing further legislative and regulatory amendments to expand and enhance net metering by allowing third-party providers to own and operate net-metered renewable generation systems and ensuring appropriate consumer protection measures are in place. This would give Ontario electricity consumers new choices for offsetting their electricity use with clean power generated on-site, while also reducing their electricity bills. Net metered renewable energy systems can also help reduce peak demand and delay or even eliminate the need for local utilities to invest in costly grid upgrades.

The Province will also propose changes that would enable the deployment of virtual net metering demonstration projects, and work with the IESO to support these types of demonstration projects. Virtual net metering could allow Ontarians who may not be able to host their own renewable energy system to participate in renewable energy projects sited away from their homes or businesses, and still receive a credit to offset their electricity bill. It could also support the siting of renewable generation where the electricity is most needed and valuable on the distribution grid. The goal of these demonstration projects would be to better understand the impacts of virtual net metering, and ultimately guide future policy decisions on net metering.

CONFIDENTIAL

Secretary of Cabinet, Steve Orsini – Whitney Block

Taken together, these proposed enhancements would provide a platform for future innovation in clean, distributed energy and put the province at the forefront of renewable energy integration in Canada.

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.

Since 2013, the Ministry has made it a priority to understand the value of energy storage for Ontarians. This includes:

- procuring 50 MW of different types of energy storage to test how they can support Ontario's electricity network;
- using the Smart Grid Fund to support several energy storage projects and test the full range of their capabilities on distribution systems; and
- undertaking studies that look at capturing the different values of storage.

eCAMION: A Leader in Energy Storage.

eCAMION is a leading provider for community-based energy storage solutions. eCAMION specializes in the integration of energy storage with advanced grid controls, which interface with a utility's control room. The intelligent controls operate seamlessly with Ontario's smart grid.

eCAMION has tested a number of its solutions through Ontario's Smart Grid Fund, including deployment of energy storage in Sudbury, Ottawa, and Toronto, and a residential microgrid in Woodstock. These projects have demonstrated the ability of eCAMION's solutions to increase reliability and promote customer control.

A March 2016 study by the IESO found that energy storage facilities can provide many of the services that are needed to reliably operate the electricity system in Ontario. The Province also commissioned Essex Energy to study the benefits of storage for distribution grids. The study found that energy storage can provide many benefits for larger consumers, including cost reduction.

The unique aspects of energy storage come into conflict with some of the rules governing the electricity system. The Province intends to change its regulations, and will also look to the IESO and OEB to examine codes and rules that may inhibit the cost-effective development of energy storage that provides value to customers and the electricity system.

Secretary of Cabinet, Steve Orsini – Whitney Block

Electric Vehicles

Ontario's Climate Change Action Plan focused significant attention on low-emission transportation as a way to drive down GHG emissions in the province. This is critical to establishing a green economy and a carbon-free Ontario. The continued adoption of electric vehicles (EVs) 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 strained. As the uptake of EVs continues, pressures on our distribution networks will grow, and utilities will need the tools to manage this change in a cost-effective way.

Utilities have begun to test ways to work with EV owners to minimize these impacts. FleetCarma and Toronto Hydro successfully tested a project that guarantees EV owners a charged vehicle, but allows the utility to control charging to minimize grid impacts. Burlington and Oakville Hydro are testing how to do the same thing with smart chargers by offering the chargers at a reduced cost in exchange for some control of the charging activity.

Ontario wants to provide utilities with more options for integrating EVs into their grids at the lowest cost. The OEB will support this goal by looking at how utilities can invest in technologies such as residential smart chargers that would avoid more costly system upgrades affecting all customers. These types of technologies could also give EV owners more choice by presenting new customer service models. For example, an EV owner could be rewarded for allowing the car to be charged at times when the grid is not constrained. The customer would work with the utility to find the right combination of preferences so both parties can benefit from smart charging.

Ontario will also promote the sharing of information and data on EV usage, and work to harmonize the province's energy, climate change, transportation, and infrastructure policies. While the focus is often on personal EVs, we will broaden that to include other types of mobility, including electrified transit.

CONFIDENTIAL DRAFT

Electric Mobility – Beyond Passenger EVs.

Cars only make up a portion of all transportation – about XX percent in Ontario. The rest is made up of a range of other vehicle types: long-haul transport, trains, buses, dump trucks, and even mining equipment.

Electric mobility captures all of these types of vehicles, and can make a big impact on reducing GHGs. The Climate Change Action Plan includes several initiatives to explore these opportunities, including an electric school bus pilot project*, and a Green Commercial Vehicle Program**. Metrolinx is also investigating the electrification of the GO Transit network***.

More electric mobility means more power from the grid. The Ministry will work with its partners to understand the impacts on the grid and ensure that electricity sector stakeholders can get involved early in the planning process.

Vehicle-Grid Integration

Vehicle-grid integration is a perfect example of what can be done to modernize the grid. It provides more choice for customers while giving utilities the information and tools to optimize their systems.
A car is parked 95% of the time. For EVs, some of that time is dedicated to charging; other times, it sits idle, waiting for its next trip. In the future, the battery of an electric vehicle could deliver electricity to the home in the event of an outage. It could also deliver electricity back to the community, or even to the entire grid. Essentially, the EV becomes a distributed energy resource, one that can help avoid system upgrades and reduce costs for everyone.

The Province will engage with its partners in the energy sector to develop a roadmap for Vehicle-Grid Integration that will look closely at this technology and what it could mean for Ontario.

Grid Modernization

<GRID MODERNIZATION GRAPHIC TO BE INSERTED IN THIS SECTION>

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 to our homes and businesses. Ontario was a world leader in deploying smart meters, which is the foundation for a smart grid. The meters continue to provide a significant amount of data to utilities, allowing them to locate and respond more quickly to power outages, monitor their systems, and better plan for the future; all to the benefit of Ontario's customers

CONFIDENTIAL DR

Now is the time to build on our investments in smart meters and the smart grid to establish a modern grid for Ontarians. 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. A modern grid would be more resilient to the effects of climate change and utilize the real-time visibility they need to respond to problems and even address them before they happen.

A modern grid can also give customers more choice, ranging from flexible pricing models to enabling home energy management systems to realizing the full value of EVs. A modern grid can ensure that distributed resources like solar power, storage, and microgrids can be integrated in the most efficient way possible. Above all, a modern grid can drive down costs for customers.

However, that same independent study found there were several barriers to further grid modernization in Ontario. For example, utilities are challenged by the "diffuse benefits" issue. This is when the costs of technologies such energy storage are borne only by utilities, but the benefits flow to a range of other electricity sector participants. Without a clear framework on how to address diffused benefits, utilities are deterred from exploring solutions that may be more cost-effective and provide greater benefits to the grid. Ontario is committed to overcoming and removing these barriers so that utilities can make the right investments; this is explored in more detail later in the chapter.

Breakout box: EDA's *The Power to Connect – Advancing Customer-Driven Electricity Solutions for Ontario*

The Electricity Distributors Association (EDA) recognizes the need to build a modern grid that is responsive to new technologies, innovation, the power of data, and customer control. They recognize the transformation ahead – moving from a one-way grid to a two-way grid. Distributed energy resources will be at the centre of this transformation, driven by customers who become active in the electricity marketplace, seeking greater control and choice over how they use energy.

For the EDA, creating a platform to enable DER, integrating DER into utility operations, and allowing utility control to optimize the operation of their grids are critical to realizing the full value of grid modernization. The Government looks forward to working with the EDA and other stakeholders in overcoming barriers preventing grid modernization.

Driving Innovation: Enhancing the Smart Grid Fund

The Smart Grid Fund was launched in 2011 to support innovation in Ontario's electricity sector. This includes a broad range of technologies – home energy management, grid automation,

energy storage, microgrids, cyber security, and EV integration. Through the Fund, we have learned a great deal about how these technologies can solve problems on distribution grids, and utilities are using this opportunity to build their understanding of how the smart grid can benefit the system and their customers.

The Smart Grid Fund is also supporting jobs and growth in the province. Ontario businesses have found the support they need to turn demonstrations into commercial successes. A number of SGF recipents and products are gaining traction in foreign markets, including:

- N-Dimension Solutions, a cybersecurity firm with over 100 utility customers in North America;
- Utilismart's distribution monitoring software, which has been installed by over 140 utility customers; and,
- a transformer sensor manufactured in Ontario by Grid 20/20, which has been tested in 11 countries worldwide.

As part of Ontario's grid modernization strategy, now is the right time to build on this success by renewing and enhancing the Smart Grid Fund. An enhanced Smart Grid Fund will focus on ways to encourage a culture of innovation within the electricity sector, explore solutions that integrate many technologies, test new business models, explore the integration of electricity and other energy sources, and generate new ideas for advancing grid modernization.

Modernizing the Grid – Success Stories

Power.House	Alectra Utilities, with support from the IESO's Conservation Fund, launched the POWER.HOUSE pilot in 2015. The innovative residential solar storage program outfitted 20 homes with solar panels, an energy storage device, and digital devices that allowed the homes to communicate with the utility. The pilot allows Alectra to treat the 20 homes as a single, virtual power plant and provide demand response or support when outages occur. This resulted in savings for not only the 20 homeowners, it also helped identify how POWER.HOUSE could even the need for distribution network upgrades, which benefits all customers. Alectra believes POWER.HOUSE could be expanded to include 30,000 homes in York Region alone.
Fleetcarma logo here	**Control for You - FleetCarma** With the support from the Smart Grid Fund, FleetCarma developed a system that lets utilities control when an electric vehicle is charged, helping them protect their local grid infrastructure. FleetCarma's solution also takes the needs of EV owners into account. They can opt-out on a day-to-day basis and set a minimum, guaranteed charge for the morning commute.

CONFIDENTIAL-DRAFT

	FleetCarma is a great example of Ontario exporting its expertise: Building on its success from its Toronto-area Smart Grid Fund project, the company announced in April 2017 that the New York City utility, Con Edison, will be using its system to dampen the impact of EV charging on the grid while collecting critical data on how EVs are used.

Distributed Energy Resources

A distributed energy resource (DER) is a decentralized source of energy that provides electricity services to individual customers, or to the wider system located nearby.

Specific examples of DER include:

- Distributed Generation (DG): electricity generated for self-consumption and/or export to the distribution 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; and
- Demand response: a temporary reduction or shift in demand in response to higher prices or requests from a system operator.

Each distributed energy resource offers its own distinct benefits. However, their best value occurs when utilities use smart communications systems to integrate the technologies across their distribution network.

Renewable Distributed Generation

Renewable generation systems, such as solar photovoltaic (PV) panels, are becoming more widely adopted across the province. When strategically located and combined with smart communications and control systems, renewable distributed generation can provide added value: utilities can defer or avoid costly investments in their local distribution networks; customers can generate and store their own power to lower bills and ensure reliable access to electricity at times when power from the grid is not available.

The Province and the IESO will develop a program to support the deployment of strategically located renewable DG systems, paired with other DERs and smart grid technologies, to demonstrate their value to customers and the grid. The data gathered from these innovative projects will help guide the treatment of renewable DG by regulators and energy markets, and ultimately steer further integration of these resources into Ontario's energy system.

CONFIDENTIAL DRAFT

Barriers to Innovation

Ontario's approach to grid modernization is to create the right environment for utilities to make the best decisions for their systems and their customers. To get there, the province and its partners need to address the barriers to innovation. Many of these barriers are a legacy of the old way of doing things, when power only flowed one way and the technologies were simple and straightforward. However, times have changed.

The Province has taken a number of steps to encourage innovation in a changing energy sector. In 2010, the Province directed the OEB to give guidance to utilities on building smart grid technologies into their systems and put innovation into their business practices. The OEB incorporated these ideas through a new regulatory framework. In 2013, the OEB also established a Smart Grid Advisory Committee to provide it with ongoing assistance in facilitating grid modernization.

Despite these efforts, there has been an unclear and uneven level of investment in grid modernization by Ontario's utilities. Some LDCs – such as Hydro Ottawa and Greater Sudbury Utilities – are implementing plans to build a modern grid and a culture of innovation within their organizations. Nevertheless, the EDA found that half of Ontario LDCs still approach innovation in a gradual or incremental way. It is clear that barriers to innovation still remain. With the rapid development of new technology and increasing customer expectations, the time to address these barriers is now.

To encourage change in the energy sector, the Province will work with utilities and other partners to build a culture of innovation, and look to the IESO and OEB to explore, where cost-appropriate:

- building a stronger culture of innovation in the sector;
- the equitable treatment of energy storage;
- utility participation in residential smart charging;
- the deployment of renewable distributed generation and other distributed energy resources;
- the use of innovative, non-wires solutions that will, among other things, allow utilities to manage their systems better and encourage customer choice;
- a cost-benefit framework that provides clarity on the treatment of investments, including those with localized costs that provide benefits to other electricity system participants (also known as the "diffuse benefits" issue);
- providing clarity on how the OEB will consider applications for new business models and innovative ideas from utilities that are allowed under the *Strengthening Consumer Protection and Electricity System Oversight Act, 2015;*
- the ability of utilities to participate in market opportunities that would ultimately reduce ratepayers' costs associated with capital or other investments; and,

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

- opportunities for utilities to partner with their customers to address system needs both in-front and behind-the-meter.

As part of this effort, the Province will encourage utilities to develop plans that demonstrate how they intend to modernize their grids and their businesses. These modernization plans could be incorporated into a utility's asset management practices and filings to the OEB.

Building on the Success of Renewables

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 have every reason to expect these economic benefits will continue. The renewables sector is forecast to contribute nearly $5.4 billion dollars to Ontario's GDP and create 56,500 jobs between 2017 and 2021. Over $2.5 billion of these expenditures will occur directly in Ontario communities, contributing appreciably to local economic activity.

Many of the companies that participated in Ontario's expansion of renewable energy are now poised to export their expertise and products to foreign markets. This could contribute as much as $1 billion to Ontario's GDP and could add as many as 10,700 jobs between 2017 and 2021. For example, Ontario-based manufacturers of hydroelectric components have been successfully exporting to the United States for years. Many of Ontario's solar manufacturers are also reporting increased export activity to the US, while facing strong global competition. And wind component manufacturers have developed expertise that will help them access nearby American markets that have strong renewable energy targets.

Exporting Ontario's Energy Expertise

Ontario's energy innovators are experts in smart grid, renewables, nuclear and other technologies, and are using the solid base they have established in Ontario to export to other markets in North America and around the world.

CONFIDENTIAL DRAFT

A Northern Ontario Success in Manufacturing
Heliene Canada has been manufacturing solar photovoltaic (PV) panels in Sault Ste. Marie since 2010. The company currently exports over half of its modules to US and other markets.

Heliene's manufacturing facility uses state of the art technologies from around the world, including Japanese robotics, a Spanish lamination process, materialsfrom the United States, and solar cells from Asia.

Heliene collaborates with other industry players and universities, such "ePower" the micro-electronics laboratory of Queens University and 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 support of Ontario energy companies wanting to export their goods, services and expertise, by:

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

Ontario will develop, in consultation with industry and the Federal Government, a pilot program that provides financial support for the demonstration of locally-developed technologies abroad. The pilot will help Ontario energy companies get a foothold with utilities and buyers in global markets, and support Ontario's commitments to help Ontario companies to go global.

"Global economies are demanding clean and low-cost energy solutions and Ontario entrepreneurs are poised to seize that opportunity." – MaRS Cleantech

Nuclear Innovation

Nuclear energy 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 surgery patients around the world.

Ontario is keenly interested in collaborating with the federal government, universities and industry partners to continue its support of the nuclear industry for both energy and non-

CONFIDENTIAL DRAFT

energy applications. Ontario can help create new export opportunities for nuclear innovations, such as:

- Small Modular Reactor (SMR) Technology: This is a new generation of nuclear power reactors that have smaller footprints than conventional reactors and promise economies of scale through mass production. In 2016, Ministry of Energy released a consultant's study on the feasibility of SMRs for remote mining applications in Ontario. Ministry staff continue to monitor SMR technologies and engage with key stakeholders involved in advancing these innovative technologies.
- 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 largescale production of hydrogen. Hydrogen is a low-carbon energy source that could in the future replace gasoline for transportation or natural gas for heating.

Medical Isotopes

Ontario's power reactors can be used to transform chemical elements, such as Cobalt, into new forms or "isotopes" to be harnessed for medical applications such as the diagnosis and treatment of life-threatening diseases. Such Isotopes can also be used to sterilize medical equipment such as hospital gowns, gloves, masks, implantable devices and syringes, as well as some food products.

Cobalt-60 is a key isotope used in these medical applications. Currently, 70% of the world's supply of the medical-grade Cobalt-60 isotope is produced in nuclear reactors at Chalk River, Pickering and Bruce B . The isotope is used for 10 million cancer therapy treatments around the world every year and for medical imaging, equipment sterilization and non-invasive brain surgery.

Recently, Cobalt-60 harvested from the Bruce reactor was used in the Sterile Insect Technique or SIT, to combat the spread of Zika, West Nile and Dengue viruses.

The medical health-sciences company, Nordion, based in Ottawa, is exploring opportunities to expand the production of Cobalt-60 to the Bruce A and Darlington reactors in the future.

Innovative Uses for Ontario's Natural Gas System

Renewable Natural Gas

Renewable natural gas (RNG) is a low-carbon fuel produced by the decomposition of organic materials found in landfills, forestry and agricultural residue, green bin and food and beverage waste, as well as waste from sewage and wastewater treatment plants. Because it comes from organic sources, the use of RNG does not add any additional carbon to the atmosphere. As an

CONFIDENTIAL DRAFT

added benefit, it can replace the use of conventional natural gas in today's stoves and furnaces while still using the existing natural gas distribution system.

RNG can be an innovative Ontario-made source of energy. Some types of RNG like biogas from landfills or agricultural waste are technically feasible today. In the longer term, RNG may be produced by biomass from forestry residue.

RNG IN TRANSPORTATION – PILOT PROGRAM

Ontario's Climate Change Action Plan committed to increase the availability and use of lower-carbon fuel.

The Province is now developing a pilot program that takes methane from agricultural materials or food wastes and uses it for transportation. The program is expected to demonstrate the business models and technology that will allow agricultural and food sectors to produce RNG, and support businesses as they change their vehicles and fueling infrastructure to use RNG.

In May 2017, Ontario issued a discussion paper to gather feedback from businesses, partners and the public to help guide the design of the program.

Power-to-Gas

Electrolysis, also known as power-to-gas, uses electricity to break down water molecules into hydrogen and oxygen. This transforms electrical power into hydrogen gas, a different type of fuel. The hydrogen can be stored or transported in existing natural gas pipelines and used to heat homes and fuel vehicles. The vast storage system that currently exists for natural gas in Ontario can be used for the long-term storage of hydrogen. The gas can even, in a sense, go back to where it came from and be used to generate electricity when and where it is needed.

Power-to-gas could potentially become a new link between the province's electricity system and its natural gas system. The IESO recognizes this, and has already awarded a contract to an Ontario-based manufacturer of electrolysis and fuel cell technology, Hydrogenics, to provide electricity grid services while it makes hydrogen.

Using electricity to create hydrogen is one way to help decarbonise the natural gas supply and the natural gas vehicles that are expected to reach market soon. The potential versatility of this fuel source was acknowledged recently by the Ministry of Transportation, which is undertaking a feasibility study of using hydrogen fuel for GO Transit passenger trains.

CONFIDENTIAL

Summary

Promoting innovation in Ontario's energy sector will help us take advantage of new opportunities in a period of technological transformation. New products, services, and business models will deliver greater choice to all Ontarians. The government intends to capitalize on these opportunities by:

- working with the OEB to provide customers greater choice in their electricity price plans;
- continue enhancing net metering framework to give customers new sources of clean energy and new ways to reduce their electricity bills;
- overcoming barriers to the deployment of cost-effective energy storage;
- enabling utilities to intelligently and cost-effectively integrate EVs into their grids, including smart charging in homes;
- articulating a vision for grid modernization in Ontario, and overcoming barriers so that utilities have more tools to provide efficient, reliable, and cost-effective services to customers, and enable more customer choice;
- building on the success of the Smart Grid Fund by renewing and enhancing the program. This will continue the Province's support of Ontario's innovation sector and help overcome other barriers to grid modernization;
- working with the IESO to strategically deploy renewable distributed generation projects paired with innovative technologies that demonstrate their value to the system and customers;
- funding pilot projects that will support Ontario's innovative energy companies that export to foreign markets;
- collaborating with the federal government, universities and industry to support the province's nuclear sector; and.
- pursuing innovative uses for Ontario's natural gas distribution system.

Chapter 4 – Improving Value and Performance for Consumers

Ontario and its partners are focussing their efforts on improving service to the province's electricity consumers. This requires a continuous search for efficiencies, and maintaining a culture of innovation in the sector. These new technologies and systems can improve value for energy consumers by enabling more intelligent planning and investments. Ontario expects LDCs to rise to the challenge to continue to deliver high-quality service while also

How We've Heard You

- Eliminate Regulatory Barriers
- Encourage consolidation and partnerships
- Expedite approvals for new technologies
- Allow utilities to provide additional services

CONFIDENTIAL DRAFT

finding efficiencies and opportunities to lower costs.

Continued innovation in the electricity sector enables customers to use data and information to make better decisions, creating the additional choice they have in many other parts of their lives. More choice though requires more information, so consumers will expect more openness from energy companies and agencies. Ontario is making this change possible by ensuring the standards and performance of the sector's entities are readily accessible.

The independence of the OEB is a vital feature of Ontario's electricity sector. It gives consumers and sector partners the confidence that decisions are being made in the public interest. Ontario upholds this independence, and expects that the OEB, when delivering on the vision outlined in this *Long-Term Energy Plan*, will set policies in a manner that benefits ratepayers and the sector as a whole.

Modernizing the Utility Business

Ontario's local distribution companies (LDCs) are the main point of contact when customers deal with the electricity system. They provide the services that consumers count on, such as restoring power after outages, maintaining the safety of the system and fielding calls and questions.

In the coming years, utilities will face a number of challenges to how they conduct their business. Disruptive technologies, innovative companies entering the energy space, and changing consumer expectations are all on the horizon. LDCs need to consider how they will continue to provide value to consumers long into the future. Ontario is confident that LDCs will respond to the changing landscape and find opportunities to achieve further efficiencies and savings.

In 2012, the Ontario Distribution Sector Review Panel found that utility consolidation could reduce costs from the distribution sector by $1.2 billion over 10 years.

The Ontario Energy Board (OEB), the independent regulatory tribunal that regulates electricity distribution, must lead, innovate and provide LDCs with incentives to become more cost effective and efficient. The OEB has made improving LDC performance a priority since it refreshed its framework for utility regulation in 2011.

Its *LDC Performance Scorecard* measures whether local distribution companies have improved their performance based on several key measures, such as resolving customer complaints during the first phone call or visit from a customer. It also allows customers to see if the service they receive from their utility meets OEB standards. The OEB is planning to enhance this framework to deliver greater efficiencies and make LDCs more accountable to consumers.

CONFIDENTIAL DRAFT

Ontario will look to the OEB to further strengthen the accountability that both distributors and transmitters need to show to their customers. By focussing on the principles of transparency, responsiveness to customers, efficiency and cost-effectiveness, the OEB will support a future in which:

- utilities have incentives to cut unnecessary costs and make annual improvements to productivity and cost efficiency;
- utilities are constantly striving to improve;
- utilities are held to account when expectations are not met;
- customers get the highest possible value from their electricity services; and
- businesses and other large customers have a timely and predictable process to connect to the grid or modify their existing connections.

The OEB is helping LDCs prepare for the future by encouraging them to undertake pilots of new pricing plans, as part of its ongoing redesign of the Regulated Price Plan (RPP). Utilities such as London Hydro and Alectra are giving participants new pricing structures paired with smart technologies, such as smart thermostats and energy use apps. These pilots will give the OEB the information it needs to design new pricing plans that allow customers to manage their electricity usage and enable LDCs to pursue increased system efficiency (see Chapter 5 for more details).

Enhancing Reliability

Generators, transmitters and distributors in Ontario must abide by internationally-recognized standards and requirements that ensure the reliability of the bulk electricity grid. The IESO enforces these standards in Ontario, working closely with industry participants to ensure they understand and follow the rules.

The Ontario Energy Board also sets standards for reliability and quality of service for transmitters and distributors. Distributors report the frequency and duration of outages in their annual performance scorecard to the OEB. Transmitters also have customer standards, including a process to address areas of poor performance.

Reliability and quality of service are of vital importance to electricity consumers. This is especially true for communities on long, radial lines that can fail more frequently and businesses that are particularly sensitive to electricity outages or fluctuations. The OEB has considered a number of ways to improve reliability over the years and the Province will look to the OEB to examine further cost-effective steps that could be taken to ensure customers are aware of the reliability of their service and their ability to resolve their concerns.

An enhanced framework for the reliability and quality of service of transmitters and distributors could provide customers with increased fairness by:

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

- introducing incentives for improvement and consequences for under-performance to ensure transmitters and distributors are held to account. For example, some other jurisdictions have introduced an on-bill credit for customers when service standards are not met.
- establishing new standards and measurements of reliability that give customers more detailed insights into local reliability, in addition to the current system-wide averages;
- ensuring that utilities report whether they are meeting the standards, in a way that customers find meaningful and easy to understand; and
- setting out clear timelines and steps that utilities must follow when customers report problems with reliability, power quality and other quality of service issues or when utilities do not meet reliability standards.

The Province will direct the OEB to review the standards for reliability and quality of service for transmitters and distributors and recommend options for improving the standards. It will also ask the IESO to review how its' planning and policies can improve customer reliability.

CALL OUT BOX 1:** Examples from Outside Ontario: Compensating Customers for Poor Service

In Michigan, residential customers are eligible for a credit of $25 USD if their utility fails to restore power after 16 hours of outage under normal conditions, after 120 hours under catastrophic conditions and after 7 outages within a 12-month period.

CALL OUT BOX 2**: Examples from Outside Ontario: Compensating Customers for Poor Service

In the United Kingdom, residential customers receive £70-75 after 12 hours of outage in normal weather. Utilities in the U.K. also have a percent of their revenue at risk based on their performance against reliability targets.

***CALL OUT BOX 3**: Raising Awareness of Local Issues ***

The publication of standardized and more detailed criteria for reliability would ensure greater transparency for customers and the regulator. This is particularly relevant for transmitters and large distributors.

The current LDC scorecard requires Ontario distributors to report their system-wide reliability. This means a small distributor, like Whitby Hydro with under 40,000 customers reports the same level of detail as a large distributor like Toronto Hydro with nearly 700,000 customers.

CONFIDENTIAL DRAFT

Because the OEB scorecard has not been implemented for transmitters, the reporting in transmission rate applications varies. Hydro One, a large transmitter with hundreds of customer delivery points reports only its system-wide performance, while a small transmitter like Five Nations Energy Inc., with only 4 delivery points, reports the data for each.

Changing Business Models

To meet the challenges of the future, LDCs may need the tools to adopt more flexible and innovative approaches to service delivery than have been allowed in the past.

****Call Out Box:** More Flexible Regulation

Many LDCs have entered into service agreements to improve customer service and reduce their operating, maintenance and administration (OM&A) costs. Organizations such as GridSmart City, the Coalition of Large Distributors, and Cornerstone Hydro Electricity Concepts are examples of LDCs collaborating to lead the way in these partnerships.

**Call Out Box: GridSmart City Profile

GridSmartCity®
COOPERATIVE
Driving Energy Innovation and Efficiency

GridSmartCity Cooperative is a partnership of thirteen LDCs, created to provide greater value to electricity customers by achieving increased efficiencies of scale and scope within each of their operations. The Partnership has reduced costs by having joint purchasing arrangements for services such as information technology, human resources, and infrastructure procurement.

The Province will look to the Ontario Energy Board to explore ways of facilitating these partnerships where they make economic sense. It will also consult with LDCs on additional ways to realize these savings and provide better customer service. The OEB will also review its own regulatory requirements and processes to ensure that it minimizes inefficiency and does not impose unnecessary burdens on LDCs.

Making Electricity Bills More Understandable

Electricity bills need to be clearer and more understandable. The bill is the main tool through which consumers interact with the electricity system – it impacts how they view both the value they receive from the electricity system and their opportunities to use electricity more efficiently. Both the Province and LDCs have heard that consumers find current invoices to be confusing and inaccessible, and action is underway to address this. For example, Hydro One Inc. is moving ahead with plans to introduce a redesigned electricity bill for its low volume consumers in late 2017. Hydro One's redesigned bill, the product of research and testing into how consumers behave, is expected to increase customers' understanding and comprehension of their electricity charges.

In order to expand this effort across Ontario, the Province will work with the OEB and LDCs to redesign electricity bills to get the information we have heard you want on the bill. This will make bills easier for customers to understand and ensure they get the most useful information out of their bills. Customers expect LDCs to adopt more consumer-friendly billing systems, such as bills that can be viewed and paid on mobile devices.

Improving Customer Choice through Data Accessibility

Ontario is promoting improved data accessibility to help consumers view and understand the information they need to make better decisions about their energy use. Recent initiatives include:

- the Ontario Energy Report, an online portal that provides electricity sector consumers and stakeholders with an up-to-date snapshot of Ontario's energy sector;
- GreenButton is a data standard that gives residential and commercial consumers the ability to access data on their energy and water consumption. Green Button also allows households and businesses to securely and automatically transfer that data to applications of their choice, which can help them manage and conserve energy and water; and
- enhancing the *Meter Data Management and Repository (MDMR)*, Ontario's central repository for smart meter data. The IESO Smart Metering Entity is leading a project that will support much more rigorous analysis of consumption data across the province, with the end goal of making better planning decisions and improving services to customers.

Ontario will continue to improve the ways people can use data to make their decisions. But the effort must also have a broader focus. Ontario's energy sector as a whole must continue to improve its ability to analyze data, using advanced mapping tools and other cutting-edge technologies to further modernize our grid. This is discussed further in Chapter 5.

CONFIDENTIAL DRAFT

These efforts also need to keep the individual in mind. While the digital economy is integral to an efficient government and an affordable energy sector, it has to be built on a firm foundation of personal privacy.

Cyber Security

Cyber security is an emerging field of critical infrastructure (including the electricity system) protection and includes the body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access.

Cyber security standards for the bulk electric system are set through a North American-wide process led by the North American Electric Reliability Organization (NERC). These standards are adopted in Ontario and enforced through the Ontario Energy Board and Independent Electricity System Operator, and transmitters such as Hydro One are required to implement and comply with the standards.

Cyber security at the distribution level is an emerging issue, and is an operational necessity for the distribution sector. It includes both the protection of customer-specific information held by Local Distribution Companies (LDCs) and the protection of distribution-level system operations.

As the organization responsible setting Ontario's electricity legislative and regulatory frameworks, the Ministry is actively working with both the IESO and the OEB to ensure that Cyber security is being implemented and that regulatory oversight is appropriate to mitigate cyber risks and threats.

In the spring of 2017, the OEB has issued a draft framework which will define cyber security guidance and reporting requirements for LDCs. This first phase of this framework will be implemented for yearend 2017, and roll into 2018. The second phase of this initiative will start in the Fall of 2017.

**Call out box for Hydro One Cyber Security

- As the owner and operator of much of Ontario's bulk transmission system assets, Hydro One is required to comply with NERC standards for cyber security and information technology. Meeting the NERC standards requires actions such as investments in upgrading equipment, proper management of IT systems such as installation of security patches, and ensuring procedures for identifying and acting on cyber security threats are in place.

CONFIDENTIAL DRAFT

Right-Sizing

When transmitters and distributors replace aging equipment, they can increase efficiency by "right-sizing" the replacements, ensuring the new investments match forecast demand and requirements. This could mean upgrading pieces of equipment in communities with growing demand, or downgrading or removing the equipment if demand has dropped.

The electricity system needs to reflect a realistic view of the likelihood of growth, including the impact of new technologies and government policies, to ensure new and refurbished infrastructure is built to the right size.

As they exercise their respective responsibilities for planning, the Province will direct the IESO and the OEB to ensure that processes promote a coordinated, streamlined and longer-term approach to the replacement of transmission and distribution assets that are at end of their life, consistent with the "beneficiary pays" principle, where the consumers that benefit from the asset are responsible for the costs.

Preserving Transmission Corridors

The Provincial Policy Statement, 2014 (PPS) states that efficient patterns of land use and development are essential for healthy, liveable and financially-viable communities. The PPS links the planning for land use and energy infrastructure by promoting the planning and protection of transmission corridors and preventing development that could preclude or limit the use of a planned corridor.

The Growth Plan for the Greater Golden Horseshoe (2017) (Growth Plan) builds upon the PPS's foundation. The Growth Plan requires the Province, municipalities and other public agencies to encourage the co-location of linear infrastructure, such as roads and transmission lines when planning for development. The Growth Plan says governments and public agencies should also ensure that existing and planned corridors are protected to meet current and projected needs.

The IESO's regional plan has identified the long-term need for a transmission corridor in the northwest Greater Toronto Area (Figure xx), and may identify a more specific route through future studies. The IESO relied on demand forecasts for the area that were based on population and employment forecasts included in the Growth Plan. This transmission corridor would supply portions of the Regions of Halton, Peel and York.

Given the size of the forecasted growth and the distance from existing transmission lines, alternatives to a new transmission corridor are either not economic or not technically feasible. In addition, the IESO estimates it could result in hundreds of millions of dollars in additional costs to build underground transmission lines later on, if an overhead transmission corridor is not reserved before the area develops.

CONFIDENTIAL DRAFT

[Map of GTA West Corridor will be inserted here TBD]

Transparency for Consumers on Gasoline Pricing

Gasoline prices are a major area of interest for Ontario consumers. There are a number of factors that contribute to the determination of retail gas prices, including crude oil costs, taxes, the gross refining/wholesale margin and the gross retail margin. Families and businesses have requested more information about how gasoline and diesel retail prices are set.

In November 2016, the Ontario Minister of Energy asked the OEB to conduct a review of the gasoline and diesel market including the information available to consumers about pricing and price variations. The OEB expects to report on its findings later this year.

The Ministry of Energy currently monitors the supply and price of gasoline in Ontario (and in other jurisdictions) on an ongoing basis and makes this information publicly available through the quarterly Ontario Energy Report.

Summary

- Ontario will direct the OEB to continue and enhance its efforts to improve the performance of local distribution companies. The OEB will increase utility accountability to consumers, promote efficiencies and cost reductions (including through encouraging partnerships), and ensure regulatory processes are cost-effective and streamlined to accommodate changing utility business models.
- Ontario will work with the OEB and LDCs to redesign the electricity bill to make it more valuable for consumers in understanding and managing their energy costs.
- The Province will direct the OEB to review the standards for reliability and quality of service for transmitters and distributors and recommend options for improving the standards. It will also ask the IESO to review how its planning and policies can improve reliability.
- The Province will look to the IESO and the OEB to promote "right-sizing" of transmission and distribution assets at their end of life.
- A transmission corridor is needed in the northwest Greater Toronto Area and significant cost savings are possible if, land is reserved before the area develops.
- Ontario will provide greater transparency for consumers on gasoline pricing through the OEB's transportation fuels review.

CONFIDENTIAL DRAFT

Secretary of Cabinet, Steve Orsini – Whitney Block

Chapter 5. Strengthening our Commitment to Energy Conservation & Efficiency

Ontario has been building a culture of conservation since 2005 and we can be proud of what has been accomplished. According to the IESO's 2015 study on the province's conservation efforts, businesses are becoming more productive by investing in energy-efficiency upgrades, and residents are choosing to install energy-efficient equipment in their homes, some with the help of Ontario's suite of residential and business conservation and demand management programs. Between 2005 and 2015, the average monthly household consumption for electricity decreased from over 800 kWh to about 750 kWh.

Energy efficiency is becoming more of a part of our everyday lives. Between 2005 and 2015, we conserved 13.5 TWh of electricity. That's equivalent to the electricity used by 1.5 million households in a year, or the amount of electricity that powered the cities of London, Kingston, Ottawa and Peterborough in 2015. During the same time, the conservation programs delivered by natural gas utilities saved XX m3 in natural gas, equivalent to YY.

How We've Heard You

- Reaffirm and enhance commitment to *Conservation First*
- Improve building codes and standards
- Increase awareness of conservation and demand management programs and the value of conservation
- Ensure conservation and demand management programs are in sync with *Climate Change Action Plan* programs
- Expand conservation to other fuels
- Encourage energy efficiency on the distribution system

Since LTEP 2013, the Ministry of Energy, its agencies, and electricity and natural gas distributors have been implementing the province's *Conservation First* policy.

Conservation and energy efficiency require a sustained commitment if they are to achieve persistent savings over the long-term. Ontario is enhancing its *Conservation First* commitment to improve affordability and choice for people, businesses and communities, and to coordinate its conservation programs with Ontario's climate change objectives.

[CALL OUT BOX#1: The Savings from Conservation and Energy Efficiency]

Electricity			
1,013 GWh Of energy savings achieved in 2015 through business conservation programs	4.1 million coupons for energy-efficient products redeemed across the province in 2015	$2 The province has traditionally avoided $2 in added costs to the electricity system every time it invested $1 in energy efficiency	$0.04 per kWh Cost of electricity programs in 2015, which is cheaper than most forms of new supply
Natural Gas			

CONFIDENTIAL DRAFT

Over 1,200 Million cubic metres Of natural gas savings achieved in 2015 through natural gas conservation programs for businesses.	8,000+ Projects completed through home energy audit and retrofit programs in 2015.	tbd	$0.04 per cubic metre Cost of natural gas conservation programs in 2015, which is significantly cheaper than the cost of purchasing natural gas.

Getting More from Conservation

Ontario has a healthy supply of energy, with any added demand for electricity not expected to materialize until the early 2020s. In this context, Ontario will continue to use conservation programs and improved efficiency standards to drive towards a long-term target of 30 TWh of electricity savings in 2032. The Province and its agencies will continue to assess the achievable potential for energy conservation, including by considering initiatives under *Ontario's Climate Change Action Plan*, and explore options to enhance the value of our existing investments in conservation.

Right now, the IESO and the OEB are respectively conducting mid-term reviews of the *Conservation First Framework* and the *Industrial Accelerator Program* for electricity conservation programs, and of the *Demand Side Management Framework* for natural gas programs. The reviews are looking at how the programs are meeting customer needs, program budgets and the distributors' 2020 targets for conservation savings.

The IESO is using the mid-term review to look at how these programs can be better aligned with local and regional electricity planning Ontario's climate change objectives.

Demand Response

Demand response programs reward electricity customers for reducing their electricity use when needed. Demand Response can enhance the reliability of the system, as well as reduce system costs and GHG emissions. An example of Demand Response is a factory temporarily halting a process, and a group of residential consumers reducing their air conditioning when electricity demand is high.

The IESO has successfully transitioned from securing Demand Response through multi-year contracts to an annual competitive auction for Demand Response. The Demand Response auctions held in 2015 and 2016 reduced the cost of obtaining Demand Response by up to 27% when compared to previous contracts. The IESO is now working with industry partners to use

CONFIDENTIAL DRAFT

Demand Response to better respond to times when electricity demand increases or decreases during the day.

LTEP 2013 set a long-term target to use Demand Response to reduce 10% of the province's peak electricity demand by 2025. As Ontario transitions to a technology-neutral capacity auction, the Province will no longer pursue a long-term Demand Response target, and instead work with the IESO to transform the Demand Response auction into a technology-neutral capacity auction, where Demand Response resources can compete directly with traditional generation.

Ensuring a Customer-Centred Approach

The current conservation frameworks encourage electricity and natural gas distributors to collaborate to provide more efficient programs and a streamlined experience for customers. Such partnerships can provide energy consumers with a coordinated, one-window approach to meeting their energy management needs. Currently, 46 electricity distributors are involved in joint conservation plans, and electricity distributors are partnering with natural gas distributors to design and develop programs that cover multiple fuels.

Distributors are being encouraged to develop new and innovative programs for their customers. New pilots and programs include Hydro One's Heat Pump Advantage pilot, Province-Wide Business Refrigeration program (originally developed by Alectra Utilities) , Toronto Hydro's incentive program for Energy Star pool pumps, and Enbridge Gas Distribution's School Energy Competition.

The IESO has supported innovation in program design by launching the first full-scale "pay-for-performance" program in North America in 2016. The *Save on Energy Multi-Distributor Pay-for-Performance Program* rewards businesses for improving their overall energy performance over a number of years. Businesses are paid for each kilowatt hour they conserve, and are given flexibility on how they achieve those savings. Ratepayers benefit as well: participants only have to file a single project application, reducing the administration costs of the program.

CONFIDENTIAL DRAFT

CALLOUT BOX #3: Business Refrigeration Incentive
"This is beneficial to the company and to our environmental footprint. We try to look at our footprint and make it as small as possible."

- *Don Kellett, Owner, Donaleigh's Irish Public House*

Barrie based Donaleigh's Irish Public House installed energy efficient motors on its refrigeration units to reduce annual electricity costs by $2,394. The project was implemented at no cost to the owner, with the Save On Energy Business Refrigeration Incentive Program covering the entire $2,536 costs for material and labour. Powerstream (now Alectra), the local electricity utility, developed a customized "Energy Action Plan" for the restaurant and pub, and helped identify the specific energy saving opportunity.
PLACEHOLDER: Pictures

CALL OUT BOX #4: DSM – Union Gas and Social Housing Haldimand Norfolk Housing Corp

"This methodology has proven to save significant amounts of energy required to heat incoming fresh air. The resulting savings have been instant and the...incentive was able to cut the payback in half."
- *Marc Puype Technical Services Manager, Haldimand Norfolk Housing Corporation*

Installation of variable frequency drives on the heating systems of six rental buildings helped Haldimand Norfolk Housing Corporation save $14,000 in annual cost savings and improve tenant comfort. The project received a $14,500 incentive (50% of total project cost) through Union Gas's Affordable Housing Conservation Program and is helping reduce annual natural gas consumption by 45,000 cubic meter.

Expanding Home Retrofits

As part of its Climate Change Strategy, Ontario has invested $100 million from its Green Investment Fund (GIF) to help eligible homeowners who primarily heat with natural gas, oil, propane or wood. They can improve the energy efficiency of their homes, reduce their energy bills and cut greenhouse gas emissions by participating in enhanced residential audit and retrofit programs offered by Enbridge Gas Distribution and Union Gas.

Launched province-wide on October 31, 2016, the program is expected to enable the auditing and retrofitting of about 37,000 additional homes by 2019, and cumulatively reduce their lifetime greenhouse gas emissions by approximately 1.6 million tonnes.

Ontario further enhanced the home energy audit and retrofit programs in May 2017. Partnering with Enbridge Gas Distribution and Union Gas, the IESO expanded the program to include electrically-heated homes. This 'Whole Home' approach is now providing residential consumers with a coordinated one-window approach to energy efficiency improvements.

Case Study: Energy Efficiency for Your Whole Home

Secretary of Cabinet, Steve Orsini – Whitney Block

Incentives from the *Home Energy Conservation Program* allow families like the O'Hara's to reduce their energy bills, increase their home comfort, and cut greenhouse gas emissions. The O'Hara's upgraded their furnace, hot water heater and windows, improving the efficiency of their more than century-old home. They also added basement insulation, and air sealed their home. The upgrades will reduce the O'Hara's consumption of natural gas by 36 per cent, and cut their greenhouse gas emissions by 1.67 tonnes annually. In addition to retrofitting their home, the O'Hara's installed a Smart Thermostat, which increases their savings by allowing them to reduce home temperatures when they are away.



Providing Choice through Information, Tools & Data

Ontario is leading the way in empowering consumers to choose devices and technologies that can give them greater control over their energy use, and help them find opportunities to lower their energy bills.

Smart Thermostats

Smart thermostats can be an important technology for homeowners looking to reduce the costs of heating and cooling their homes as well as their carbon footprint. Smart thermostats:

- give consumers more information about their energy use;
- enable customers to use a smart phone app to remotely control the temperature of their home or small business; and
- automatically adjust the temperature to respond to changes in a customer's schedule, or to seasonal changes.

To standardize incentives for the purchase of smart thermostats and expand their availability across the province, in August 2017 the Ministry directed the IESO to support the design and delivery of a Province-Wide Smart Thermostat rebate program, in partnership with the Ministry of Environment and Climate Change and Green Ontario Fund.

Energy Benchmarking

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

Secretary of Cabinet, Steve Orsini – Whitney Block

Ontario's energy benchmarking and rating initiatives give people and organizations the tools and information they need to understand the energy performance of their homes and businesses, and compare it with similar buildings. They can use this information to manage their usage and costs, and justify investments in energy efficiency. According to the IESO, 16 electricity distributors have social benchmarking programs in their Conservation and Demand Management Plans (as of July 2017), with four programs currently available to electricity customers. Enbridge Gas Distribution and Union Gas are including social benchmarking in their outreach and education programs to promote participation in their residential audits and retrofits.

Ontario's *Climate Change Action Plan has* committed to expanding another tool, the province's Green Button Initiative. Green Button Download My Data can give households and businesses easy electronic access to data on their energy and water consumption. Green Button Connect My Data lets households and businesses securely and automatically transfer their own data to applications of their choice. Greater access to information through Green Button will increase consumer understanding of their energy and water use and enable consumers to make informed decisions about their energy use, such as reducing or shifting their energy use or completing retrofits to improve the energy efficiency of their home or business. It can also support energy reporting and benchmarking, and create new opportunities for economic development.

Ontario is committed to expanding Green Button province-wide and intends to introduce amending legislation that would, if passed, require electricity and natural gas distributors to implement Green Button Download My Data and Connect My Data. In addition, the Province will collaborate with the province's natural gas and water utilities to adapt the Green Button standard for use by their customers, and to update guidance documents for Green Button's use with electricity data.

CALL OUT BOX #6: Green Button

"Event Assist, using information gathered through the Green Button Initiative, helps Budweiser Gardens better understand hydro usage by the size, type and configuration of each event, this has the capability of changing the way we book events in the future not only for our building but within the industry. Working with the team at London Hydro has shown me what a truly professional organization they are from top to bottom."

- *Gary Turrell, Director of Operations, Budweiser Gardens*

Organizations in Ontario's Broader Public Sector are required to annually report their energy consumption and greenhouse gas emissions to the Ministry of Energy and make that information available to the public. Building on this success, as well as the lessons learned from similar programs in the United States, Ontario has introduced a requirement for Energy and Water Reporting and Benchmarking for large private sector buildings.

Secretary of Cabinet, Steve Orsini – Whitney Block

Starting in 2018, and phased in over three years, owners of large commercial, multi-unit residential and some industrial buildings will be required to annually report their building's use of energy and water and its GHG emissions to the Ministry of Energy. Some of that data will be posted on Ontario's Open Data website every year, so owners can compare the energy and water usage of their buildings with that of similar facilities, and identify where improvements can be made. The first deadline for reporting is July 1, 2018.

Ontario is also exploring how to increase access to corporate financing for energy efficiency projects. The Investor Confidence Project gives financiers the information and tools they need to assess the viability of energy efficiency projects. The Project was established by the Environmental Defense Fund in the United States in 2013. In partnership with the Ministry of Energy, the MaRS Advanced Energy Centre is piloting Investor Confidence Project protocols in Ontario and exploring how they can be adapted for the Canadian market.

Raising the Bar for Energy and Water Efficiency

Ontario continues to play a leading role in improving the energy efficiency of equipment in our homes, offices and factories. Since 2013, the Province has improved or set new energy efficiency standards for over 60 products. The gains in energy efficiency have not only endured, but they helped consumers save on their energy bills. In addition, economies of scale have lowered the cost of the technologies, making them more popular, affordable and more available than ever before.

An amendment to the *Green Energy Act, 2009*, in 2016 now allows the province to regulate water efficiency of products that consume both energy and water. As a result, it is now on a path to achieve more efficient use of water and produce even greater energy savings and reductions in greenhouse gas emissions.

How Enhanced Standards Can Save Water and Energy for Households

- Water efficiency standards for clothes washers are estimated to save **22 billion liters/year** of water in 2032, equivalent to:
  - 9000 Olympic-sized swimming pools
  - The amount of water that flows over Niagara falls in 2.75 hours
- New energy efficiency standards for clothes washers from 2015 are estimated to save **0.60 TWh/yr** of electricity in 2032, equivalent to:
  - The annual electricity consumed by all the private dwellings (residential homes) in the City of Kingston
  - The annual electricity consumed by the City of Stratford

**Note: The below images are not approved and are intended for illustration purposes only*



Ontario will continue to set advanced efficiency standards for products and appliances and work with other provinces and the federal government to harmonize and raise the bar for energy and water efficiency standards.

Efficiency Standards for Drinking Water and Waste- Water Treatment Plants

Ontario is exploring opportunities to set or update energy efficiency standards for key electrical equipment in drinking water and waste water treatment plants. As Ontario's *Climate Change Action Plan* pointed out, this initiative would help reduce one of the largest uses of electricity by municipalities and help them save on their electricity bills.

> *"Municipal water and waste-water services are typically one third to one-half of a municipality's total electrical use, so there is potential for reductions in both costs and emissions."*
>
> CCAP 2016, pg. 83

Expanding the Scope of Conservation

> *In Front of the Meter Conservation (IFMC) technologies are deployed on distribution networks and provide electricity savings and peak reductions to customers behind the meter. Examples include technologies that reduce line losses and optimize voltage levels.*

Ontario is expanding the scope of conservation to ensure that all participants in the energy sector put *Conservation First* and help Ontario reach its greenhouse gas reduction targets.

Ontario and its agencies have taken important steps to put conservation first when planning to meet regional and local electricity and natural gas needs, and are committed to further embedding this policy in planning processes

(see Chapter 8). Through the LTEP consultations and engagements, the Ministry heard specific interest from LDCs and technology vendors in Ontario for encouraging the deployment of In Front of the Meter (IFMC) technologies to meet local needs. Innovative IFMC technologies can cost-effectively reduce line losses and optimize voltage levels on distribution networks, conserving electricity and reducing peak demand.

Several pilots across North America have demonstrated the potential benefits of deploying IFMC technologies, and pilots are underway in Ontario through the Smart Grid Fund and the Conservation Fund. A recent study commissioned by the Ministry of Energy estimated they can be cost-effectively deployed on 30 per cent of Ontario's electricity distribution networks.

The Ministry of Energy and its agencies will encourage distributors to increase the energy efficiency of their networks, by allowing them to count the electricity savings from IFMC measures towards their electricity savings targets under the *Conservation First Framework*. IFMC project costs will continue to be funded through distribution rates, and subject to the

CONFIDENTIAL DRAFT

OEB's cost application and review processes. The OEB will also examine and identify steps for pursuing opportunities for cost-effective modernization of the electricity system, including conservation on the distribution system.

Integrating Conservation and Climate Change Programs

Ontario's *Climate Change Action Plan* emphasized the need to increase the use of low-carbon technology, such as solar panels and heat pumps, in Ontario homes and businesses. Several programs to increase energy choices for Ontarians are being introduced this year, funded by the proceeds from the cap and trade program.

A new agency, the Green Ontario Fund, will help Ontarians move to a low-carbon future by offering them incentives, financing and services to increase the use of technologies that reduce greenhouse gas emissions. The Green Ontario Fund website provides a coordinated "one-window" approach where Ontarians can get help, information and access to its programs, as well as to other conservation and renewable energy programs in Ontario. [Web launch late Aug or early Sept – TBC]

Green Ontario Fund programs are building on the success of the province's existing conservation and energy efficiency programs, and providing a customer-focused approach that gives Ontarians more opportunities to reduce their energy costs and carbon footprint. The IESO will be a delivery partner for certain Green Ontario Fund programs

Ontario will work with its agencies to consider further opportunities to integrate the delivery of all conservation and low-carbon technology programs, for both electricity and fuels.

Behind the meter generation refers to on-site generation projects where the electricity generated is used within a facility. Under the IESO's current program rules, behind the meter generation projects include combined heat and power and waste energy recovery.

Under current conservation programs, behind the meter generation projects using supplied fossil fuels to generate electricity on-site, typically combined heat and power projects, have been eligible for incentives because they can significantly reduce demand on the electricity grid.

To help meet Ontario's climate change goals, these projects will no longer be eligible under the *Conservation First Framework* and the *Industrial Accelerator Program (IAP)*, starting July 1, 2018. The deadline coincides with the end of the mid-term review of both the Framework and IAP.

Because of their environmental benefit, projects that use renewable energy, such as solar thermal water heating or biomass fuel for boilers, will continue to be eligible for funding under the *Conservation First Framework* and the *Industrial Accelerator Program*. Electricity distributors may also offer incentives for energy storage systems that are integrated with a

customer's own renewable energy project. When added to on-site renewable generation, energy storage systems can provide reliability and help customers reduce their demand on the grid when prices are highest. This can help reduce peaks in demand on the local and provincial systems.

Summary

- The transition to a capacity auction will provide an opportunity to expand the use of DR as a system resource, enabling it to compete directly with traditional generation.
- Ontario will continue to set advanced efficiency standards for products and appliances and will explore opportunities to set or update energy efficiency standards for key electrical equipment in drinking water and waste water treatment plants.
- The Province and its agencies will take steps to maximize customer benefits by further encouraging distributors to pursue conservation on their distribution systems.
- Ontario is promoting a coordinated, one-window approach through the Green Ontario Fund for energy consumers to encourage conservation across multiple energy sources and programs.
- Behind the meter generation projects using supplied fossil fuels as a primary fuel source will no longer be eligible for incentives under the *Conservation First* or the *Industrial Accelerator Programs* beginning July 1, 2018. Waste energy recovery projects will continue to be eligible, as will renewable energy projects, including those paired with energy storage systems.
- Ontario is committed to expanding Green Button province-wide and intends to introduce legislation to require electricity and natural gas utilities to implement Green Button Download My Data and Connect My Data.

CONFIDENTIAL DRAFT

Secretary of Cabinet, Steve Orsini – Whitney Block

Ontario is taking a leading role in Canada and abroad in the global fight against climate change. The energy sector will play a central role in assisting the transition to a clean economy. At the same time, we must lessen the damage that climate change can cause, by strengthening our energy infrastructure so that it remains resilient.

Ontario's cap and trade program came into effect on January 1, 2017. The cap and trade program is a flexible, market-based program that sets an annual cap for greenhouse gas (GHG) emissions, with the targets becoming more stringent over time. The cap will drop each year to enable Ontario to meet its GHG reduction targets.

Cap and trade creates a market to provide an incentive to reduce emissions. Large emitters must have enough allowances to cover their emissions. Some companies are currently allocated free allowances in recognition of their exposure to international trade and/or the amount of energy they need to use. Companies that emit more than their allocation can buy additional allowances through government auctions or from other companies that have surplus allowances.

How We've Heard You

- Support increased use of electric vehicles (EV)
- Support options for home storage, including EV batteries
- Microgrids can help resiliency and northern communities
- Customers will decide which technologies work best
- Modernize regulations and rate designs
- Integrate conservation programs with initiatives announced in CCAP
- Government support needed for R&D
- Distributed generation will transform Conventional networks
- Introduce renewable natural gas into Ontario's natural gas supply

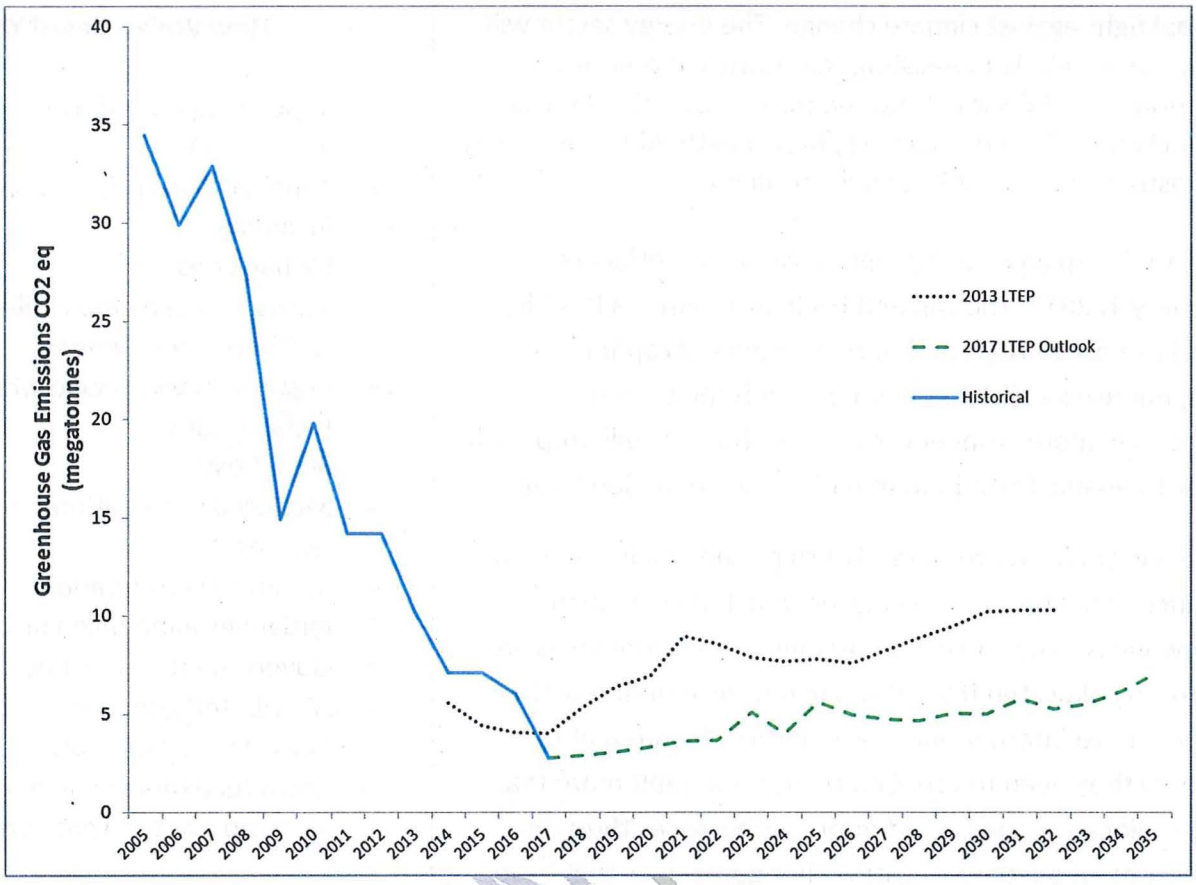
Under the *Climate Change Mitigation and Low-Carbon Economy Act, 2016,* proceeds from Ontario's cap and trade auctions will be used to help Ontarians shift away from higher carbon fuels and reduce their energy consumption in order to reduce the province's GHG emissions. Ontario's *Climate Change Action Plan* (CCAP) is investing up to $8.3 billion over five years to fight climate change, reduce greenhouse gas pollution and transition to a low-carbon economy.

Building on a Clean Electricity System

About 90 per cent of the electricity generated in Ontario in 2016 was greenhouse gas (GHG) emissions-free, coming from sources such as water, nuclear, wind, solar and bio-energy. Our investments in these types of clean generation sources, along with the elimination of coal-fired electricity generation, have significantly reduced GHG emissions in the province. Thanks to these investments, our electricity sector emissions are forecast to be more than 80 per cent below 1990 levels in 2017 and currently account for only about 2 per cent of the province's total GHG emissions. As seen in figure X below, emissions are expected to remain relatively flat over the planning period.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT



These actions have given Ontario an electricity system that is well positioned to help the province move towards a low-carbon economy. Our clean and reliable electricity system gives us the strong base we need to pursue the increased electrification of other sectors of our economy such as the use of more electric vehicles, and the expanded use of renewable natural gas (RNG).

It will also allow us to combine different energy sources into integrated energy systems that provide new services for homeowners and businesses. Natural gas will continue to play a critical role in space and water heating, but we must use it as efficiently as possible and supplement it with the next generation of clean energy technologies, such as ground-source and air-source heat pumps. Funding from the proceeds of Ontario's cap and trade auctions will benefit just these sorts of technologies. By making the best use of our existing energy sources and infrastructure, a more integrated energy system allows Ontario to chart the most effective course for achieving our GHG emissions reduction goals.

Renewable Energy Success

Secretary of Cabinet, Steve Orsini – Whitney Block

Ontario is Canada's leader in wind and solar power. There is more wind and solar capacity in operation here than in any other province or territory. When you add hydroelectric generation and bioenergy into the mix, renewables accounted for 40 per cent of Ontario's electricity supply mix in 2015, up from 26 per cent in 2005. Currently, Ontario has over 18,300 megawatts (MW) of wind, solar, hydroelectric and bioenergy generation capacity in operation or under development.Most recently, the results of the final Feed-in-tariff (FIT) procurement were announced [DATE TBD] and will add XXXMW of clean renewable generation to our supply mix. To reflect decreasing technology costs and ensure value to ratepayers, FIT and microFIT prices have been reduced between 50 and 75 per cent since 2009.

A highlight of Ontario's renewable energy programs has been the success that individuals, schools, places of worship, municipalities, co-operatives and Indigenous communities have had in participating in clean energy projects. From smaller home or farm-sized projects to larger community-scale projects, Ontarians are using renewable energy to meet their community's electricity needs, while reducing their demand on the provincial electricity grid.

Of the 936 successful applications announced in 2016 under the 4th phase of the Feed-in Tariff (FIT) program, 74 per cent had Indigenous, municipal, public sector or community participation.

Over 60 First Nation and Métis communities and groups are participating in over 550 FIT renewable energy projects.

Nearly 25,000 microFIT projects are feeding clean power to the grid.

The Large Renewable Procurement (LRP), launched in 2014, was designed to provide local communities with a stronger voice and additional opportunities to participate in the development of renewable energy projects, while also ensuring value for ratepayers.

Of the 16 projects that received contracts under the first phase of LRP (LRP I) in 2016, more than 80 percent included participation from one or more Indigenous communities, including five projects with more than 50 percent Indigenous participation. In addition, 75 percent of the successful LRP I projects received support from local municipalities and more than 60 percent had support from abutting landowners. LRP I introduced strong competition between developers of large renewable projects, to help drive down price.

Secretary of Cabinet, Steve Orsini – Whitney Block

The Municipality of Chatham-Kent has received significant benefits for hosting a number of wind energy projects. Recent projects include:

South Kent Wind

- $2.5 million to upgrade the Chatham-Kent Municipal Airport plus community benefits totalling $11.5 million over the life of the project. I

North Kent Wind 1

- Community benefit contribution of $4 million, and an estimated $5 million in property taxes over the 20-year life of the contract.

Romney Wind

- Total of $3 million contribution to the municipality over the 20-year life of the contract, and an estimated $1.1millionin additional property tax revenue for Chatham Kent over 20years.

These companies have invested heavily in the social fabric of the community through partnerships with local organizations for sponsorship of community projects such as splash pads. Chatham-Kent is also widely recognized as one of Ontario's leading green energy communities, which has helped spur local economic development.

Ontario's renewable energy policies have made our electricity supply mix cleaner, and are providing real benefits for communities and municipalities. Recognizing this success, the *2017 Long-Term Energy Plan* is focused on outcomes rather than mandating targets and technologies. With a solid foundation of electricity provided by renewable energy, we can now focus on new opportunities for innovation, modernization and exporting our expertise.

Ontario remains committed to an electricity system that includes an essential role for renewable energy generation and supports the goals of the Province's *Climate Change Action Plan* (CCAP).

Wind

Wind turbines capture the movement of air, and convert it to electricity. Wind power has become an important source of clean electricity for Ontario. In 2003 there was only 15 megawatts of installed wind energy capacity in Ontario, compared with 4,800 MW today, which is enough to power approximately 1.4 million homes each year. Today, turbines use state of the art digital controls to adjust their blades and orientation for maximum energy output in response to changing wind conditions.

Solar

Solar photovoltaic (PV) technology converts the sun's rays into electricity. Solar PV systems can help the electricity system to meet Ontario's needs on hot and sunny days, when air conditioning use is highest. Ontario has become a North American leader in the development of solar PV with over 2,300 megawatts online, enough to power about 300,000 homes each year. Advances in solar PV have seen costs decline significantly and improved performance, resulting in more cost-effective solar generation.

Hydroelectric

Ontario has a long and productive history with waterpower systems, which use falling or flowing water to rotate the blades of a turbine. Most of Ontario's renewable energy supply continues to come from hydroelectric facilities, which provided 24 per cent of Ontario's total generation in 2016. Ontario has approximately 8,800 megawatts of installed hydroelectric capacity. Older hydroelectric projects can be re-designed to use new, more efficient turbines, in order to improve performance.

Bioenergy

Bioenergy refers to electricity generated from burning biomass, such as plant or animal by-products and wastes; and biogas and landfill gas, which is methane gas produced from the decomposition of organic matter which is burned in a generator to produce electricity. Ontario has about 500 megawatts of bioenergy generation capacity in operation which converts various forms of organic material, such as agricultural and forestry residues, wood pellets, food waste, organic landfill waste and energy crops into clean electricity.

A Clean Electricity System

Putting a price on carbon will have a significant impact on the operation of the electricity market in Ontario. Cap and trade will encourage a transition from the use of fossil fuel-fired generation to GHG emissions-free electricity generation and clean imports, and will also encourage more efficient natural gas generation. As we move forward with Market Renewal, the cost of carbon will become increasingly important in the economics of electricity generation projects, and ultimately their success in a capacity auction.

CONFIDENTIAL DRAFT

Shifting to Lower Carbon Gasoline and Diesel

Delivering Fairness and Choice recognizes the commitment in the *Climate Change Action Plan* to introduce a Renewable Fuel Standard (RFS) for gasoline. This is an important step towards reducing GHG emissions from the transportation sector. Since it uses the existing fuels infrastructure, this standard is one of the more flexible and cost-effective ways to increase the use of renewable and low-carbon fuels.

The use of renewable and low-carbon transportation fuels can be expanded by:

- increasing the use of renewable liquid fuels by existing vehicles. "Drop-in" fuels such as ethanol can be mixed with gasoline to produce blended fuels and can be used the same way as regular gasoline;
- having existing fuel stations offer higher blends of ethanol and biodiesel;
- making renewable liquid fuels available to more regions of the province;
- adding bio fuels to the crude oil that Ontario refineries process; and
- lowering the carbon intensity of renewable fuels produced by Ontario manufacturers.

There are many different ways to achieve deep reductions in emissions and transform the transportation sector. While current outlooks include increased electrification for light-duty vehicles and adoption of advanced bioenergy in long-haul road freight and aviation, technological innovation remains inherently unpredictable. The technology-neutral approach of the RFS lets the alternatives compete on their merits.

Shifting to Renewable Natural Gas

Natural gas remains a reliable and cleaner option for many Ontarians, and will continue to play an important role in the province's energy supply mix. Homeowners, businesses and industries use natural gas for space heating, domestic hot water, steam and process heat. There were about 3.5 million natural gas customers in Ontario in 2016. Natural gas was also used to generate about 10 percent of Ontario's electricity in 2015.

Ontario is looking at using renewable natural gas to lower the carbon intensity of the natural gas we burn. RNG is a low-carbon fuel produced by the decomposition of organic materials found in landfills, forestry and agricultural residue, green bin and food and beverage waste, as well as waste from sewage and wastewater treatment plants. Because it comes from organic sources, the use of RNG does not add any additional carbon to the atmosphere. As an added benefit, it can replace the use of conventional natural gas in today's stoves and furnaces while still using the existing natural gas distribution system.

Ontario is investing from the cap and trade auctions to help introduce RNG in the province. The province's investment in RNG will reduce GHG emissions and help consumers with the cost of

CONFIDENTIAL DRAFT

shifting to renewable natural gas, as RNG costs more than conventional natural gas. Proceeds from the cap and trade auctions to help introduce RNG in the province. The province's investment in RNG will reduce GHG emissions and help consumers with the cost of shifting to renewable natural gas, as RNG costs more than conventional natural gas.

RNG can be an Ontario-made source of energy. Some types of RNG like biogas from landfills or agricultural waste are technically feasible today. In the longer term, RNG may be produced by biomass from forestry residue.

The Province will continue to work with industry partners and the OEB to introduce a requirement for renewable content for natural gas, fulfilling a commitment of the *Climate Change Action Plan.*

RNG IN TRANSPORTATION – PILOT PROGRAM

Ontario's Climate Change Action Plan committed to increase the availability and use of lower-carbon fuel.

The Province is now developing a pilot program that takes methane from agricultural materials or food wastes and uses it for transportation. The program is expected to demonstrate the business models and technology that will allow agricultural and food sectors to produce RNG, and support businesses as they change their vehicles and fueling infrastructure to use RNG.

In May 2017, Ontario issued a discussion paper to gather feedback from businesses, partners and the public to help guide the design of the program.

Integrated Energy Solutions

Renewable energy technologies can serve as the fuel for innovative integrated clean energy systems, such as the ones profiled below, which provide for other energy needs (such as space heating and cooling) or help to address challenges facing our electricity system (such as the need for additional energy storage).

Power-to-Gas

Electrolysis, also known as power-to-gas, uses surplus electricity to break down water molecules into hydrogen and oxygen. The hydrogen can be stored or transported in existing natural gas pipelines and used to heat homes and fuel vehicles. The vast storage system that currently exists for natural gas in Ontario can be used for the long-term storage of hydrogen.

Power-to-gas could potentially become a new link between the province's electricity system and its natural gas system. The IESO recognizes this, and has already awarded a contract to an

Ontario-based manufacturer of electrolysis and fuel cell technology, Hydrogenics, which will deliver 2 megawatts of storage capacity in the Greater Toronto Area.

Heating and Cooling with Renewable Energy Technologies

Ontario aims to support its goals for reducing greenhouse gas emissions by increasing the use of low-carbon technology (such as solar thermal, as well as air and ground-source heat pumps) to heat and cool Ontario homes and businesses.

This has the potential for a big payoff in the fight against climate change. Space heating accounts for approximately 75 per cent of the demand for fuels energy in Ontario homes, making it an important area to target for reducing GHG emissions.

RNG IN TRANSPORTATION – PILOT PROGRAM

Ontario's Climate Change Action Plan committed to increase the availability and use of lower-carbon fuel.

The Province is now developing a pilot program that takes methane from agricultural materials or food wastes and uses it for transportation. The program is expected to demonstrate the business models and technology that will allow agricultural and food sectors to produce RNG, and support businesses as they change their vehicles and fueling infrastructure to use RNG.

In May 2017, Ontario issued a discussion paper to gather feedback from businesses, partners and the public to help guide the design of the program.

The Province will continue to work with its agencies, including IESO and the Green Ontario Fund (GOF) to encourage the deployment of thermal and alternative technologies for residential, commercial, industrial and institutional buildings, and plan how to integrate them and the delivery of conservation and low-carbon technology programs into the province's energy system.

Solar Air and Hot Water Heating

Solar hot water systems use the energy from the sun to heat 40 to 60 per cent of a building's hot water needs, whether for domestic or commercial use. Solar air systems capture air warmed by the sun and circulate it to heat buildings.

Secretary of Cabinet, Steve Orsini – Whitney Block

Ground Source and Air Source Heating and Cooling

Ground-source heat pumps, also known as geothermal energy systems, use buried pipes to absorb heat from the ground and transfer it to a home or building, reducing heating bill savings by up to 70 percent. With both systems, an energy pump, running on electricity, then "concentrates" the heat, and moves it to where it is needed. The same systems can also be used to provide cooling in the summer; and more advanced air-source systems can even provide domestic water heating.

Beginning July 2017, the Save on Energy Heating and Cooling Program began offering incentives of up to $4,000 across the province to help those in electrically-heated homes and businesses purchase and install air-source heat pumps.

District Heating and Cooling

District energy systems generate and supply heating and cooling, domestic hot water and electricity to blocks or neighborhoods in a community.

District heating and cooling can reduce GHG emissions by using local energy resources, such as biomass , heating and cooling from the earth (known as 'geothermal' energy) and mechanical waste heat (i.e. from industrial operations). Opportunities for district energy are greatest for new residential or commercial developments not served by existing gas pipelines or distribution networks. District energy systems can be more cost-effective than heating and cooling systems for individual buildings, when used in more densely populated areas.

CONFIDENTIAL DRAFT

Enwave Energy Corporation

Toronto-based Enwave Energy Corporation is a fully integrated, sustainable energy services provider with operations in Toronto, Chicago, Houston, Las Vegas, New Orleans, Seattle, Windsor, Los Angeles, Portland, London and Prince Edward Island. In each community, the company operates highly efficient thermal energy plants that distribute steam, hot water and/or chilled water to customer buildings. Customers enjoy multiple benefits including reduced operating costs, lower emissions, and increased reliability.

Enwave's Toronto System
Enwave sells more than 2.5 billion pounds of steam each year to 140 commercial, government, hospital, university, and residential buildings in downtown Toronto representing over 40 million ft^2 of real estate.

Enwave's London System
The London system serves 60 customers with steam (200,000 pounds per hour capacity) and chilled water (4,200 ton capacity) and uses cogeneration (18 MW capacity) to sell electricity to the grid.

Near and Net Zero Carbon Emission Buildings

Ontario's *Climate Change Action Plan* aims to reduce emissions in the building sector by encouraging the building of near net zero and net zero carbon emission homes and buildings. The electricity and natural gas conservation frameworks will continue to support the development and enhancement of high efficiency, low-carbon homes and buildings, and new programs will be offered through the Green Ontario Fund.

Advanced efficiency standards will be set for products and appliances used in new and existing homes and buildings. New high-performance standards for space and water heating equipment could significantly reduce the energy use and greenhouse gas emissions of new and existing homes and buildings and lower consumers' energy costs and environmental footprint

Together with other provinces and the federal government, Ontario is exploring opportunities and strategies to support implementation of these new standards by developing markets for high efficiency products and appliances. For example, markets have to be developed for space heating technologies that are more than 100 per cent efficient, such as air source heat pumps. These deliver as much as three to four units of heat for every unit of electricity used to power the system. This would enable Ontario to move towards achieving one of the goals of its *Climate Change Action Plan*: net zero carbon emissions homes by 2030.

Minimizing energy use is an important part of transitioning to near and net zero energy or carbon emission buildings. Generally, the most cost-effective strategy is to first pursue any opportunities to improve energy efficiency, such as through increased insulation, advanced air

sealing, and high efficiency heating and cooling systems. Once that has been done, some type of on-site renewable energy generation is generally required to achieve net zero energy or carbon emission status. Ontario is taking steps to expand and enhance the province's net metering framework, which would give building owners increased opportunities to integrate renewable energy generation and energy storage technologies.

Reid's Heritage Homes – Guelph

Reid's Heritage Homes built five net zero homes in Guelph in 2016. These homes were the first to meet new net zero home standards set up by the Canadian Home Builders' Association.

Key features include:

- air source heat pumps;
- high efficiency water heaters;
- increased insulation values in exterior walls, attic and basement;
- advanced air sealing to avoid air leakage; and
- right sized mechanicals and energy recovery ventilators
- solar panels

Climate Change Adaptation

Ensuring a Resilient Energy Supply

Ontarians need to have a reliable supply of energy, not just for for our economic prosperity but for our basic health and safety. In order to provide vital energy services to Ontarians, our energy system must remain resilient and able to withstand a changing climate.

The facilities and equipment that currently generate, transmit and distribute energy across the province are potentially threatened by the extended heat waves, high winds, severe rainfall and ice storms that come with climate change. Climate change may also change the flows of rivers, water levels of lakes and their temperatures, with additional possible effects on electricity generation.

To address these concerns, Ontario's energy organizations are taking a number of actions that will ensure the province's energy system is better prepared to meet extreme weather events:

- together with several partner organizations the Independent Electricity System Operator conducted a study of Ontario's transmission system which found it resilient enough to substantially withstand most extreme weather scenarios, but recommended continued monitoring and refinement of climate scenarios.
- more and more local distribution companies are making adaptation and system resilience a priority. Toronto Hydro and the former Horizon Utilities (now Alectra

CONFIDENTIAL

Utilities) have both conducted vulnerability assessments of their systems. A leader in Canada in this regard, Toronto Hydro is addressing climate change vulnerabilities by enhancing its engineering practices and tools, such as its load forecasting model, and installing more resilient equipment on its system. In its last rate application, Toronto Hydro submitted a report on the future impacts of climate change on its grid, and identified extreme weather as a driver for its capital and maintenance expenditures.

- local distribution companies such as Oshawa PUC, Veridian and Whitby Hydro are developing adaptation plans to match the adaptation planning done at the local level by transit, water and communications authorities.

Building on its current activities, Ontario will strengthen the ability of the energy industry to anticipate the effects of climate change and integrate its impacts into operational and infrastructure planning.

The Province and its agencies will facilitate information and knowledge exchange among utilities and other partners to allow them to share best practices and increase their ability to adapt to climate change. Since these activities are best coordinated with other public services, the Province will also encourage utilities to work with municipalities and other public and private infrastructure operators. This knowledge-sharing platform will be a key first step to help inform the following initiatives:

- The Province will support the development of a vulnerability assessment of the energy distribution sector to help utilities develop state-of-the-art strategies to manage risk. This will complement the vulnerability assessment done of the transmission system in 2015.
- As part of its regulatory review, the OEB will provide guidance to utilities on approaches for integrating cost-effective opportunities for climate change adaptation into their planning and operations. The IESO will ensure that climate change adaptation is considered and integrated within the bulk system and regional planning processes.

Box 1: *Examples of Adaptation Initiatives by Local Distribution Companies*

- Building on their distribution system vulnerability assessment, Horizon Utilities, now part of Alectra Utilities, developed a long-term plan for adapting to climate change. The plan considers the risk of flooding when planning infrastructure, and the utility's improved geographic information and outage management system reduces response times.

- Hydro Ottawa focussed its "storm hardening" initiative, completed in 2015, on revising the schedule for removing and trimming overhanging tree branches. As a result, public safety has been increased, the distribution system is less vulnerable to damage from high winds and ice storms, and the company's budget for vegetation management was reduced by $750,000.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

Summary

- Ontario remains committed to an electricity system that includes renewable energy generation and supports the goals of the Province's *Climate Change Action Plan*.
- The proceeds of cap and trade auctions are intended to help Ontarians reduce their energy consumption and shift away from higher carbon fuels in order to reduce the province's GHG emissions.
- Building on its current activities, Ontario will strengthen the ability of the energy industry to anticipate the effects of climate change and integrate its impacts into operational and infrastructure planning.
- The Province and its agencies will build adaptation capacity by convening relevant partners to share knowledge and adaptation expertise, by supporting the development of an energy distribution vulnerability assessment, and by providing guidance to utilities on how to integrate climate change adaptation considerations into business planning and operations.
- Ontario's *Climate Change Action Plan* aims to reduce emissions in the building sector by encouraging the building of near net zero and net zero carbon emission homes and buildings.
- Ontario is expanding and enhancing the province's net metering framework to give building owners increased opportunities to integrate renewable energy generation and energy storage technologies.
- The Province will continue to work with its agencies to support the deployment of low-carbon energy technologies and consider further opportunities to integrate the delivery of conservation and low-carbon technology programs.
- Advanced efficiency standards will be set for products and appliances used in new and existing homes and buildings to reduce their energy use and GHG emissions and enable near and net zero carbon emission homes and buildings.
- Ontario will continue to work with industry partners to introduce renewable natural gas into the province's natural gas supply and expand the use of lower-carbon fuels for transportation.

CONFIDENTIAL DRAFT

Chapter 7. Supporting First Nation and Métis Capacity and Leadership

First Nations and Métis are leaders in Ontario's energy sector, bringing unique perspectives, knowledge and leadership to energy planning, projects and policies. This level of involvement of First Nations and Métis in the energy sector is unprecedented:

- First Nations and Métis are now leading or partnering on over 550 wind, solar, and hydro-electric generation projects across Ontario, accounting for over 2,000 megawatts of clean energy capacity.
- First Nations and Métis lead or are partners with transmission companies on proposed major priority transmission lines.
- Nearly 100 First Nations are participating in the IESO's Aboriginal Community Energy Plan program. These community-led energy plans assess a community's current energy needs and priorities and explore options for conservation and renewable energy.

How We've Heard You

- Need to connect remote communities
- Unreliable electricity service impacts quality of life and hinders community development
- Improve electricity affordability such as through the elimination of the electricity delivery charge on reserve
- Need for funding to assist with implementing Community Energy Plans
- Conservation programming should better meet community needs
- General preference for renewable energy over nuclear
- Desire for First Nation and Métis ownership of and partnerships on projects
- Need for federal funding for connection of remote communities

Ontario takes its duty to consult First Nation and Métis seriously and is committed to ensuring that First Nations and Métis are consulted on any energy activity that could potentially affect their Aboriginal and Treaty rights.

Many First Nations and Métis across Ontario face energy-related challenges: the need for reliable and affordable power, energy-inefficient housing and inadequate infrastructure to name just a few. The causes and solutions to these challenges are rooted in complex historical, jurisdictional, geographic and regulatory contexts, but progress is being made through nation-to-nation interactions.

On August 25, 2015, the First Nations-Ontario Political Accord was signed by the Chiefs of Ontario and the province, creating a formal bilateral relationship framed by the recognition of the treaty relationship. The Political Accord and the Ontario-Métis Nation Framework Agreement signed in 2008 and renewed in 2014, guide Ontario's relationships with First Nations and Métis. Ontario is committed to working together with First Nations and Métis to identify issues and propose actions to take towards reconciliation and healing.

CONFIDENTIAL DRAFT

Secretary of Cabinet, Steve Orsini – Whitney Block

The First Nations-Ontario Political Accord

- Affirms First Nations' inherent right to self-government.
- Commits the parties to work together on issues of mutual interest, such as resource benefits sharing and jurisdictional matters.
- Sets a path for reconciliation.

The Province will continue the direction established in LTEP 2013 and support First Nation and Métis leadership and capacity in Ontario's evolving energy sector. The focus of *Delivering Fairness and Choice* reflects the province's strong energy supply position and responds to the concerns heard through the LTEP engagement process and the ongoing dialogue between the Province, its agencies and First Nation and Métis partners.

Building on the dialogue from the LTEP engagement process, Ontario commits to a more regular and ongoing dialogue with First Nations and Métis. This will include energy awareness and education initiatives, the involvement of youth in the energy conversation, and more regular communication to ensure First Nations and Métis are informed about the Province's progress on its energy commitments and have opportunities to provide insight and feedback.

Addressing Electricity Affordability

Improving electricity affordability is a major priority for Indigenous and non-Indigenous electricity consumers. Ontario is working to address the issue with available programs such as:

- the Ontario Electricity Support Program (includes enhanced credits for First Nations, Métis and Inuit electricity consumers) (more details in Chapter 1);
- Ontario's Fair Hydro Plan (more details in Chapter 1);
- the Low-Income Energy Assistance Program (more details in Chapter 1); and
- the Conservation First Framework (more details in Chapter 4).

A number of remote First Nations rely on diesel generators for power. The fuel is trucked in on winter roads which are becoming increasingly unavailable due to o climate change. This drives up the cost of diesel oil, which has to be flown in instead.

Ontario selected Wataynikaneyap Power to connect 16 remote First Nations to the province's electricity grid. Wataynikaneyap Power is a transmission company owned by 22 First Nations in partnership with FortisOntario.

Grid connection will reduce greenhouse gas emissions and support jobs and economic growth.

Once completed, more than 10,000 people will have a reliable, clean supply of electricity.

Secretary of Cabinet, St

CONFIDENTIAL DRAFT

Ontario recognizes that First Nation electricity consumers living on-reserve face unique challenges with respect to electricity affordability. Customers living on-reserve often pay higher distribution costs than customers in more populated areas because distribution rates are partially based on population density. The problem of higher distribution rates was often compounded by energy inefficient homes on reserves and other challenges that lead to higher levels of energy consumption.

First Nation Delivery Credit

To address these unique energy affordability challenges, First Nation leaders recommended eliminating delivery charges for electricity transmission and distribution when they met at the First Nations-Ontario Energy Table with the Minister of Energy and other energy sector leaders in April 2016.

The Minister committed to taking action and directed the Ontario Energy Board (OEB) to work with First Nations to research options to address energy affordability on reserve, and to report back on findings. Based on the OEB's findings and feedback heard from First Nations, Ontario announced on March 2, 2017 its *Fair Hydro Plan* would provide a credit equal to 100% of the electricity delivery charge on the bills of on-reserve First Nation residential customers. The First Nation Delivery Credit, which was implemented on July 1, 2017, is a demonstration of the Political Accord signed between Premier Wynne and Ontario Regional Chief Day on August 24, 2015, being brought to life.

Connecting Off-Grid First Nation Communities

25 remote First Nation communities in the province's northwest rely on diesel fuel to power their communities. Ontario recognizes the distinct challenges they face, and, because of the high cost of diesel fuel, there is a good economic case to connect as many as 21 of those communities to Ontario's electricity grid.

Connecting these remote First Nations is a priority for Ontario. Communities cannot improve their housing, their water treatment systems or other community infrastructure without having a reliable and adequate supply of electricity.

Connection to Ontario's low-carbon electricity grid will not only improve the quality of life and enable economic development opportunities for these communities, but will also reduce local pollution, greenhouse gas emissions, and the environmental risks associated with transporting and storing diesel fuel.

CONFIDENTIAL DRAFT



For these reasons, Ontario has taken several steps to begin the connection of remote First Nation communities. These include:

Secretary of Cabinet, Steve Orsini – Whitney Block

- selecting Wataynikaneyap Power as the transmitter for connecting most of the remote First Nations (see inset box);
- creating a mechanism for funding a portion of project costs; and
- working to reach a fair cost-sharing agreement with the federal government that ensures the project is fully funded and can proceed to construction.

Ontario also supports the connection of the five remote Matawa communities that are not currently part of the Wataynikaneyap Power project. Further steps will be taken to advance these connections when proposals are brought forward.

Ontario Power Generation and Gull Bay First Nation *[Do not edit]*

Ontario Power Generation (OPG) and Gull Bay First Nation (GBFN) are in the early stages of building an advanced renewable microgrid on the GBFN reserve on the western shore of Lake Nipigon. GBFN has an on-reserve population of 300 people and is one of the four remote First Nation communities that the IESO has determined to be economically unfeasible to connect to the provincial grid at this time.

Ontario is supporting the Gull Bay Diesel Offset Micro Grid project with $2 million in funding from the Smart Grid Fund [TBC: as well as $X from the Northern Ontario Heritage Fund Corporation].

The Gull Bay Diesel Offset Micro Grid project will create a community micro grid by integrating new solar photovoltaic generation, battery energy storage, and a micro grid control system with the existing on-site diesel generators that currently supply the community's entire energy needs. The project will create opportunities for capacity building and employment during the development, construction, and operations phases of the project.

At this time, grid connection is not feasible for four of the 25 remote First Nations in Ontario. So, each of these communities has begun planning and development work to add sustainable technologies that will reduce their reliance on diesel. Projects that reduce diesel reliance could include renewable microgrids, battery storage, and other innovative technologies that meet identified community needs.

Ontario will continue to partner with these communities and other collaborators, and is looking to the federal government to commit its support to these projects. To this end, the Government of Canada has agreed to financially support the early connection of Pkangikum First Nation and Wataynikaneyap Power is moving forward with construction of this connection project in 2017. Ontario and Canada are continuing to negotiate cost-sharing to support the remainder of the Watay project.

Conservation

Conservation on the Coast

Local Distribution Companies (LDCs) owned by Attawapiskat, Kashechewan and Fort Albany First Nations are collaborating to provide conservation programs to their customers under the name, Conservation on the Coast (COTC).

COTC began by conducting annual energy audits in the three First Nation communities in 2013.

By October 2017, 30 homes per community will have had LED bulbs, power bars, low flow aerators and showerheads, hot water pipe wrap, and improved insulation installed, resulting in 20-25% decrease in electricity usage per home. In addition to the energy savings, the occupants report that their homes are more comfortable to live in, they are burning less wood and moisture and mold problems have diminished.

Over 40 First Nations participated in the *Aboriginal Conservation Program* between 2013 and 2015. The program funded energy efficiency upgrades such as new insulation, appliances and lighting for more than 3,000 First Nations households.

First Nation and Métis customers also have access to other energy efficiency and conservation programs through the 2015-2020 Conservation First Framework, such as Save on Energy programs offered by local distribution companies.

While conservation programs are working well in some First Nation and Métis households, participants in the LTEP engagement meetings said the programs needed to be more flexible, and more widely available.

In conjunction with the Mid-Term Review of the *Conservation First Framework* and engagement with the Indigenous communities, the IESO will report to government on options to improve conservation programs and their availability for First Nations and Métis, including the communities served by Independent Power Authorities.

Further, the Green Ontario Fund will be offering new incentives, financing and services to help First Nations and Métis adopt low carbon technologies and reduce their energy use.

Implementing Community Energy Plans

Community energy plans are an important way to understand local energy needs better. They help communities to identify opportunities for energy efficiency and clean energy and develop a plan to meet their community's energy goals. Close to 100 First Nations are developing community energy plans, using funding from the *Aboriginal Community Energy Plan* (ACEP) program. Ontario is committed to continuing this funding.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

But energy plans are just a first step and Ontario recognizes that further support is needed to turn these plans into tangible actions and results. That is why the ACEP program will be expanded to give program participants the support they need to implement the solutions identified in their plans.

The IESO will engage with First Nation and Métis communities and organizations to identify the strengths and weaknesses of the current ACEP program, explore implementation opportunities, and then recommend program changes that can best support the implementation of community energy plans. Funding will come from the $10 million the IESO has dedicated for this and other support programs. Ontario's *Climate Change Action Plan* also identifies opportunities for Indigenous program support.

Supporting Local Opportunities

Building Sector Knowledge and Capacity

The IESO's Education and Capacity Building (ECB) program continues to support the education, training and skills building of First Nations and Métis. The ECB program will continue to support initiatives that help build local business skills, energy literacy, and youth engagement.

Exploring Energy Projects and Partnerships

The IESO's Energy Partnerships Program (EPP) supports First Nation and Métis communities and organizations that want to lead or be partners on renewable energy and transmission projects. Three streams of funding from the EPP help support:

- financial, legal and technical due diligence to partner on major priority transmission lines and renewable energy projects;
- the development of renewable energy projects including costs for regulatory approvals; and
- the Initiatives that reduce the reliance on diesel fuel for the four First Nations that can't be feasibly connected to the transmission grid.

Ontario will engage with First Nations and Métis further to explore how to change these programs to better reflect their needs within the current energy system. This may include a look at how programs can support the integration of small-scale renewable energy projects into the local energy system, and the use of net metering and other innovative solutions that address local or regional energy needs and interests.

CONFIDENTIAL DRAFT

Access to Financing

The development of energy projects requires significant financial and human capital, and barriers to accessing this capital can prevent First Nation and Métis communities and organizations from actively participating in the energy sector. Barriers to more widespread First Nation and Métis participation include:

- lack of capital at reasonable terms;
- high financing costs; and
- a shortage of capacity around financing and building partnerships.

The Aboriginal Loan Guarantee Program has helped First Nations and Métis obtain lower-cost financing to participate in large-scale energy projects. However, Ontario recognizes that barriers to financing remain, particularly for smaller-scale projects. As a result, Ontario will engage with First Nations and Métis to identify gaps in financing, changes that could be made to existing programs, as well as alternative financing models.

[Call-out Box or Side Box] What is the Aboriginal Loan Guarantee Program (ALGP)?

The ALGP supports First Nation and Métis participation in building energy infrastructure. Launched in 2009, the $650 million program guarantees up to 75 percent of a First Nation or Métis corporation's equity in a project. To date, the ALGP has approved nine projects, including the 438MW Lower Mattagami hydro-electric project, the Bruce to Milton transmission reinforcement project, the 28MW Peter Sutherland hydro-electric project, and the 4MW Mother Earth Renewable Energy wind project.

Ontario can apply innovative financing models and build on its strong record of promoting First Nation and Métis participation in energy projects. These types of financing models and social finance tools have been successfully used in the United States, Australia, and elsewhere in Canada to facilitate greater Indigenous economic participation.

Ontario also appreciates the unique social benefits that can result from First Nation and Métis participation in energy projects. Measuring and assessing these benefits could help Ontario take a broader and more inclusive view of outcomes when deciding on energy policies and projects.

The Mother Earth Renewable Energy (MERE) Project

MERE is the first wholly First Nation-owned wind project in Canada. The 4MW project consists of two wind turbines owned by M'Chigeeng First Nation (MFN) that generate enough energy to power the community's 418 homes. The project received a loan guarantee from the Aboriginal Loan Guarantee Program (ALGP) in 2012.

MERE was established under MFN's mandate to build a green economy. The proceeds, averaging $300,000 per year for the first fourteen years, pay for community development programs. The MERE project is an innovative example of how clean energy and the ALGP can be used to create additional financial and socio-economic benefits for communities.

Rainy River First Nations Solar Project

Rainy River First Nations signed a memorandum of understanding with Ontario Solar PV Fields to purchase three solar projects located in the Rainy River community. The cost of the projects was around $154 million, of which $19 million has been guaranteed through the Aboriginal Loan Guarantee Program.

Rainy River First Nations partnered with Clark, Conner and Lunn for the project. The projects' net profits are $1.3 - $2.3 million a year for twenty years, generating around 37 million kilowatt hours of electricity in their first year of operation in 2014. The project generates enough energy to meet the average electricity needs of approximately 3,080 households.

Building on these and other successes across the province, Ontario will take the following actions to increase First Nation and Métis access to financing:

- engage with leaders, organisations, and financing experts to identify financing gaps and barriers to the development of First Nation and Métis participation in energy projects;
- investigate the applicability of innovative financing models to better support First Nation and Métis participation in energy projects; and
- develop methods to better capture the social, environmental, and local benefits of First Nation and Métis participation in energy projects.

Expanding Access to Natural Gas

Natural gas remains a clean, reliable energy option, and it will continue to play a critical role in Ontario's energy mix. We know access to natural gas is an important issue, especially for Ontario's First Nations communities.

To assist with natural gas expansion, the Province launched a new $100 Natural Gas Grant Program in April 2017. Through the program, municipalities and First Nations communities are able to work with natural gas utilities to bring forward proposals to expand access to natural gas. The Natural Gas Grant Program guidelines outline that additional consideration will be given to projects located in northern Ontario or located within First Nation reserves.

Successful applicants under this program will then apply to the OEB for leave-to-construct approval for their expansion projects.

Over the coming years, Ontario looks forward to natural gas expansion projects proceeding and delivering greater consumer choice and economic growth to Ontario's municipalities and First Nations communities.

Summary

- Ontario will improve the availability of conservation programs for First Nations and Métis, including communities served by Independent Power Authorities.
- Ontario will continue to prioritize the connection of remote First Nation communities to the grid and continue to support the four First Nations where transmission connection is not economically feasible.
- The Aboriginal Community Energy Plan program will be expanded to help communities implement their community energy plans and support Ontario's Climate Change Action Plan.
- Ontario will engage with First Nations and Métis to explore options for supporting education and capacity building, the integration of small-scale renewable energy projects, net metering and other innovative solutions that address local or regional energy needs and interests.
- Innovative financing models and support tools will be investigated to lower financing costs of First Nation and Métis-led or partnered projects.
- The province will report back to communities between LTEPs to provide updates on the province's progress and seek ongoing feedback from First Nations and Métis.
- Ontario's Natural Gas Grant Program will support the expansion of natural gas access to First Nation communities.

CONFIDENTIAL DRAFT

Chapter 8. Supporting Regional Solution and Infrastructure

Community and Regional Planning

Secretary of Cabinet, Steve Orsini – Whitney Block

The regional planning process takes into account that different regions and communities may require different solutions to meet their differing energy needs. For example urban regions may experience an increase in demand due to population growth, while more rural or remote regions may be more concerned about the reliability of their energy supply. Industrial activities such as mining and manufacturing have different patterns of energy use than health and social services. Agribusinesses have different needs than commercial centers.

How We've Heard You

- Integrate electricity planning with municipal planning
- Consider impact on economic development
- Improve local reliability
- Innovative technologies and fuels face special barriers in the North
- Programs should meet customer and regional needs

Since 2013 a formalized regional planning process now includes participation from communities to identify their electricity needs and develop cost-effective solutions for meeting them. For some it could mean additional supply from transmission lines, for others it could come from local resources like district energy or conservation, or a combination of both. Over the past three years, the electricity needs of all 21 of Ontario's planning regions have been evaluated, completing the first full cycle of regional planning assessments across the province.

Breakout Box

Agri-business is growing in rural Essex County, near Kingsville and Leamington. The region has the largest concentration of greenhouse vegetable production in North America. Greenhouses, food processing operations and increasing tourism related to the area's growing wineries are increasing the demand for electricity, in particular during the summer months.

At the same time, other needs in the area are triggering infrastructure upgrades that would benefit not just the local agri-business sector, but local generation developers, other customers in the Windsor-Essex region and Ontario ratepayers as a whole.

If the infrastructure upgrades were carried out separately, they would have cost about $100 million. Instead, by looking at the totality of the needs, the recommended solution, which includes a new 13km line and a new transformer station in Leamington, addressed the same needs for $22.5 million less. Collaborative solutions like these are critical to realizing the benefits of the enhanced regional planning.

Regional planning gives communities the opportunity to consider all the cost-effective resources for meeting their regional needs. It promotes the principle of Conservation First by first incorporating conservation targets into the forecasts of net regional electricity demand. Only then are other economical solutions considered, such as new supply, distributed generation, additional local and regional conservation and demand management and investments in transmission and distribution infrastructure.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

In order to further increase diversity in cost-effective solutions, barriers to non-wires solutions, such as conservation, demand response and other distributed energy resources must be reduced.

The OEB is also working to integrate conservation into natural gas infrastructure planning at regional and local levels. The OEB's *2015 to 2020 Demand Side Management (DSM) Framework* says natural gas utilities need to consider conservation as a key principle in their infrastructure planning. As part of the mid-term review of the DSM Framework that is currently underway, natural gas utilities are expected to propose a plan on how to integrate natural gas conservation into their planning for future infrastructure.

Breakout Box

Targeted conservation initiatives can be the most cost-effective solutions for meeting local and regional electricity needs. The Independent Electricity System Operator (IESO) is working with local utilities in Ottawa, Toronto, Barrie-Innisfil and Parry Sound-Muskoka regions to determine whether targeted conservation initiatives can defer costly upgrades to specific local distribution and transmission infrastructure. In the mid-term reviews of the 2015-2020 Conservation First Framework and Industrial Accelerator Program, the IESO is also exploring how to further integrate conservation initiatives into the regional planning process.

Local advisory committees have helped build an understanding in the community about regional electricity issues. These committees give residents an opportunity to provide input and advice improves the implementation and the regional plan. Community engagement is also crucial to linking regional energy plans with community energy planning.

Ontario's Municipal Energy Plan (MEP) program and the IESO's Aboriginal Community Energy Plan (ACEP) program both support the efforts of municipalities and Indigenous communities to assess their energy use and needs, consider the impact of future growth, and foster local economic development. Communities have been encouraged to develop their own energy plans identifying opportunities for conservation and priorities for infrastructure. The resulting community energy plans have helped communities recognize opportunities to conserve energy, improve energy efficiency and reduce GHG emissions. More information on the ACEP program can be found in Chapter 7: Supporting Indigenous Capacity and Leadership. *Ontario's Climate Change Action Plan* has reinforced the importance of community energy plans, and indicated Ontario will continue to support them. *Ontario's Climate Change Action Plan* also includes a Challenge Fund to provide funding for GHG emissions reduction projects proposed by a municipality that has completed a community energy plan and meets the program eligibility criteria.

Now that the first cycle of regional planning has been completed, the Province is directing the IESO to review the regional planning process and report back with options and recommendations that will address the challenges and opportunities that have emerged.

CONFIDENTIAL DRAFT

Breakout Box: Regional and Community Energy Planning by the Numbers:
21 Electricity Regions
16 Integrated Regional Resources Plans (IRRP) completed. An IRRP, led by the IESO, integrates a variety of resource options to address the electricity needs of the region.
8 Regional Infrastructure Plans (RIP) underway or complete. An RIP, led by the transmitter, identifies investments in transmission and/or distribution facilities to meet a region's electricity needs.
11 Active Local Advisory Committees
36 Municipalities have Municipal Energy Plans underway or complete
97 Aboriginal Community Energy Plans underway

Breakout Box:

More information on your region can be found by entering your postal code online at http://www.ieso.ca/en/get-involved/regional-planning

CONFIDENTIAL DRAFT

Map: Differing Regional Needs



North of Dryden and Remote Connection

The construction of a new line to Pickle Lake and the connection of remote First Nation communities currently served by diesel generators are priorities for Ontario. The regional plan for North of Dryden recommended two projects to meet the near-term electricity needs of the region:

- building a new 230 kV transmission line from the Dryden / Ignace area to Pickle Lake
- upgrading the existing transmission lines from Dryden to Ear Falls and from Ear Falls to Red Lake
-

Together, these projects will substantially increase the ability of the subsystems in Pickle Lake and Red Lake to meet demand.

Wataynkaneyap Power is the proponent of the 230-kV transmission line from the Dryden/Ignace area to Pickle Lake and is currently acquiring the necessary approvals. The line is expected to be in service in early 2020.

Ring of Fire

The Ring of Fire represents one of the most significant mineral regions in the province, and includes the largest deposit of chromite ever discovered in North America. Electricity supply for the development of mines and the connection of remote First Nations in the Ring of Fire area was assessed in the North of Dryden regional plan and transmission connection to the Ontario grid was found to be the most economic option.

The preferred approach to electricity supply in the Ring of Fire will depend on decisions related to transportation infrastructure, Indigenous community preferences and the electricity needs of mining companies.

Greenstone Marathon

To build on the regional planning process in Greenstone-Marathon, a working group was established to work collaboratively with local partners on electricity reliability and transmission issues.

The group collected valuable information on the challenges faced in developing transmission projects and ensuring reliability in northern and rural areas of the Province. Hydro One participated in the working group and has recently made investments in transmission equipment that will help response crews locate the cause of outages and restore power more rapidly.

Ottawa Work is underway or complete on five transmission projects to address near-term reliability needs and growth in demand in the Ottawa region.

The projects include upgrading a 115 kV circuit to provide increased supply capability for downtown Ottawa and a new transmission station and transmission line to meet the growing electricity needs of new developments in South Nepean*

A Local Advisory Committee has been established to provide advice on the development of the region's longer-term electricity plan.

York Region

Three transmission projects are underway to address capacity and reliability needs in York Region in the near-term, including a new transformer station in the City of Markham.

Based on current projections, York's sub-region electricity system is expected to reach its capacity to supply growth in the medium to long term. A Local Advisory Committee has been established to provide advice on the region's longer-term electricity plan.

Central Toronto

Increased density, new large transit projects, aging infrastructure and reliability needs are all driving new investments in Toronto's electricity infrastructure.

Electricity conservation is a key component of meeting the city's future needs, with conservation resources expected to offset nearly 40% of the growth until 2036.

Investments in the Runnymede, Horner and Copeland transformer will ensure new customers can be connected, while maintaining reliability in the area.

Two major autotransformer stations and key transmission facilities are expected to reach their capacity to supply growth in Central Toronto's as early as the mid to late 2020s.

A Local Advisory Committee has been established to provide advice on the development of the region's longer-term electricity plan.

Windsor-Essex

Agri-business in the rural portion of Essex County is growing, increasing the demand for electricity. Hydro One is addressing this growth and improving restoration timelines by building a new transmission line, a new transformer station near Leamington, and refurbishing the Kingsville and Keith stations. The projects are expected to be in service by 2018.

Breakout Box

The City of Temiskaming Shores began its Municipal Energy Plan in 2015. Thanks to its MEP, the City has found ways to be more energy efficient. For example, it installed LEDs in 955 street lights, converted to smaller pumps and motors in environmental facilities, and installed more efficient heating systems. The energy efficiency changes the city made have resulted in reductions of 20% in the utility bills for some projects. The MEP ensures that City Council will approve one energy-related project each year. Temiskaming Shores has also increased its public transit service to reduce the number of private vehicles on the road.

Pipelines

Almost all of Ontario's oil and natural gas is delivered from outside the province by interprovincial and international pipelines. These pipelines are under federal jurisdiction and regulated by the National Energy Board (NEB). The 2013 Long-Term Energy Plan set out six principles Ontario will use to evaluate oil and natural gas pipelines, such as TransCanada's Energy East project:

- Pipelines must meet the highest available technical standards for public safety and environmental protection:
- Pipelines must have world-leading contingency planning and emergency response programs:
- Proponents and governments must fulfill their duty to consult obligations with Indigenous communities:
- Local municipalities must be consulted:
- Projects should provide demonstrable economic benefits and opportunities to the people of Ontario, over both the short and long term; and
- Economic and environmental risks and responsibilities, including remediation, should be borne exclusively by the pipeline companies, who must also provide financial assurance demonstrating their capability to respond to leaks and spills.

In November 2014, Ontario and Quebec jointly adopted these six principles for their review of Energy East and added a seventh principle, the need to take into account greenhouse gas (GHG) emissions and the interests of natural gas consumers.

Ontario is committed to public engagement on major pipeline developments. On November 12, 2013, the Minister of Energy asked the OEB to conduct province-wide consultations regarding TransCanada's Energy East proposal. The consultation process focused on four areas of potential impact:

- The impacts on Ontario natural gas consumers in terms of rates, reliability and access to supply, especially those consumers in eastern and northern Ontario;
- The impacts on pipeline safety and the natural environment in Ontario;
- The impacts on First Nations, Metis and local communities; and

CONFIDENTIAL DRAFT

- The short and long term economic impacts of the project in Ontario.

The OEB undertook an extensive consultation and review process. The OEB hired experts in the field of pipelines, environmental reviews and economics to assist in understanding of the project and made these expert reports available for public comment. The OEB visited seven cities and towns along the route in spring 2014 and again in winter 2015; meeting with local residents and First Nations and Métis to get their views on TransCanada's Energy East application. In addition, the OEB received over 10,000 written submissions during its review.

On August 13, 2015 the OEB published its report "Giving a Voice to Ontarians on Energy East". The report provides advice on ensuring an appropriate balance between the economic and environmental risks of the project and the expected benefits for Ontarians. This report will inform Ontario's participation in the NEB's regulatory proceeding on Energy East.

Ontario will continue to participate in regulatory proceedings at the NEB and at intergovernmental forums that discuss the delivery of energy in a safe and environmentally sustainable manner to ensure its strategic interests in pipeline projects are represented. Ontario is also working with the federal government on regulatory initiatives such as NEB modernization to ensure major energy projects are reviewed in a predictable manner that increases public confidence.

Competitive Transmitter Selection

To help ensure least-cost solutions for transmission, the *Energy Statute Law Amendment Act, 2016* enabled the IESO to use competitive processes to select companies or consortia for the construction of new transmission lines in Ontario.

As a first step in implementing the new legislation, Ontario will direct the IESO to develop a competitive selection or procurement process for transmission and identify possible pilot projects. The results of these pilots will be used to develop a procurement process that is clear, cost-effective, efficient and able to respond to changing policy, market and system needs.

Summary:

- The Province will continue to work with its agencies to implement the Conservation First policy in regional and local energy planning processes.
- With the first cycle of regional planning completed, the Province is directing the IESO to review the regional planning process and report back with options and recommendations that will address the challenges and opportunities that have emerged.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT

- *Ontario's Climate Change Action Plan* has reinforced the importance of community energy plans, and indicated Ontario's continued support for them.
- The Province will direct the IESO to develop a competitive selection or procurement process for transmission, and to identify possible pilot projects.

Glossary

Aboriginal Rights – Rights acquired by some Indigenous peoples of Canada though long-standing use and occupancy of the land, and are protected under Section 35 of the *Constitution Act, 1982*.

Baseload Generation – Generation such as nuclear and hydro-electric that provide a more or less constant supply of electricity, every day and every season of the year.

Behind the Meter Generation – Refers to on-site generation projects where the electricity generated is used within a facility. Under the IESO's current program rules, behind the meter generation projects include combined heat and power and waste energy recovery.

Beneficiary Pays – Cost allocation approach based on consumers paying the full cost of the goods that they consume or asset they benefit from. This approach protects ratepayers from paying for infrastructure benefitting only a few customers.

Bioenergy and Bio-diesel – Energy produced from agricultural residues, food by-products, animal manure, waste wood and kitchen waste.

Cap and Trade – A program that puts a "cap" on the amount of greenhouse gases a company can discharge. If it releases more than that, the company can purchase credits from another company whose emissions are below the cap.

Capacity Auction – A competitive market that commits a supplier to provide a specified amount of electricity in the future.

Climate Change Action Plan – A five-year plan, part of Ontario's long-term fight against climate change. The current *Climate Change Action Plan* will be followed by a revised plan in 2020.

Climate Change Mitigation and Low Carbon Economy Act, 2016 – Ontario legislation that established, among other things, the legal framework for Ontario's cap and trade program.

Conservation First and ***Conservation First Framework*** – *Conservation First* is Ontario's policy of making cost-effective conservation the first resource considered when planning the

CONFIDENTIAL DRAFT

province's energy needs. The *Conservation First Framework* sets the rules for conservation and energy efficiency programs offered by Ontario's electricity distributors.

Demand Side Management (DSM) Framework –*Demand Side Management Framework* sets the rules for conservation and energy efficiency programs offered by Ontario's main natural gas distributors.

Demand Response – Price or financial incentives offered to residential and business users to shift or reduce their electricity at times of system need.

Distributed Generation (also known as Embedded Generation) – Electricity generation that is located on the distribution system close to where it is used.

Energy Audit – Determining the changes that can be made in a building to improve its energy efficiency, reduce costs and decrease GHG emissions

Energy Retrofit – Renovating a building in order to decrease its use of energy.

Energy Storage – Equipment or technology that collects energy so it can be used at a later date.

Ethanol – A renewable fuel made from plants such as corn, sugar cane and grasses whose use can reduce greenhouse gases.

Fuels Technical Report **(FTR)** – A report prepared for the Ontario Ministry of Energy that reviews the supply and demand for fossil fuels in Ontario through to 2036.

Green Button – A data standard that gives customers the ability to access and share their utility data in an electronic, standardized and secure way.

Heat Pumps – A device that heats or cools buildings by absorbing heat from one area and transferring it to another.

In Front of the Meter Technologies - Technologies that are deployed on distribution networks and provide electricity savings and peak reductions to customers behind the meter. Examples include technologies that reduce line losses and optimize voltage levels.

Independent Electricity System Operator (IESO) – The provincial agency that manages the province's power system so that Ontarians receive power when and where they need it. It plans and prepares for future electricity needs, and works with its partners to guide conservation efforts.

Indigenous – Another term for Canada's First Nation, Métis and Inuit peoples.

CONFIDENTIAL DRAFT

Kilowatt (kW) – A standard unit of power equal to 1,000 Watts. Ten 100-watt light bulbs operated together require one kW of power.

Megatonnes (Mt) – One million metric tons.

Megawatt – A unit of power equal to 1,000 kilowatts (kW) or one million watts (W).

Megawatt Hour (MWh) – A measure of the energy produced by a generating station over time: a one MW generator, operating for 24 hours, generates 24 MWh of energy.

Microgrid – A local electricity network that in the event of a failure of the larger network, can seal itself off and provide power to local homes and businesses.

National Energy Board – The federal agency that regulates the international and inter-provincial operations of oil and gas pipelines and electricity transmitters.

Net Metering – Allows customers to generate their own electricity and receive bill credits for any surplus electricity sent to the local distribution system.

Net-zero Energy Buildings – Buildings that annually produce at least as much energy as they consume.

Ontario Energy Board (OEB) – The provincial agency that sets the prices for natural gas and electricity in Ontario and regulates the activities of generators, transmitters, distributors, and wholesalers and retailers of electricity and natural gas.

Ontario Planning Outlook **(OPO)** – A technical report that provides a 10-year review (2005-2015) and 20 year outlook (2016-2035) for Ontario's electricity system.

Petajoules – One petajoule is roughly equivalent to the energy produced by one billion cubic feet of natural gas.

Regulated Price Plan – The plan, revised every six months by the OEB, that sets the time-of-use prices for electricity.

Terawatt Hours (TWh) – One billion kilowatts of electricity used for one hour.

Time-Of-Use Prices – Prices that vary according to the cost of producing the electricity.

Vancouver Declaration – An agreement-in-principle by Canada's First Ministers to work toward a national climate change plan and develop of a price on carbon.

Watt (W) – A unit that measures how much electricity is generated or used at any one time.

Secretary of Cabinet, Steve Orsini – Whitney Block

CONFIDENTIAL DRAFT