TAB 7

TREASURY BOARD / MANAGEMENT BOARD OF CABINET
REQUEST ASSESSMENT NOTE

Ministry:	Energy	
Meeting Date:	August 16, 2017	
Agenda Class:	Discussion	
Last reviewed by: Cabinet (July 26, 2017)		**Tracking to:** Cabinet (August 31, 2017)

SUBMISSION TITLE:	Long Term Energy Plan – Smart Grid Fund Renewal

I. DECISION BEFORE THE BOARD

- Approve renewal of the Smart Grid Fund (SGF) program to continue support for electricity grid modernization and funding of up to $60M over five years.
    - A commitment by TB/MBC would allow the Ministry to announce government support for a renewed SGF within the upcoming 2017 LTEP document.

II. RECOMMENDATIONS: (UNDER DEVELOPMENT)

• Approve the Ministry's plan to renew the Smart Grid Fund program	*Approve*
• Direct the Ministry to return through 2018-19 PRRT with multi-year funding amounts including a potential offset strategy	*Direct to return through 2018-19 PRRT*
• Direct the Ministry to return through a future PRRT planning process for its request related to administrative costs of about $1.5M including a potential offset strategy, starting in 2019-20 through to 2021-22 related for external technical advisory services for oversight and reviews from project application to project completion	*Direct to return through a future PRRT planning process*
• Approve the Minister of Energy to make decisions to approve a grant of up to $10M. If a project demonstrates unique or unprecedented opportunity such that it warrants support over the above limit, the request must be approved by Treasury Board	*Approve* *(Consistent with previous SGF)*
• Note the Ministry will be seeking an exemption to the Cash Management Directive, from the Ontario Financing Authority, to enable it to flow up to 20% of approved support upon contract signing for the Smart Grid Fund	*Note seeking cash management exemption. Ontario Financing Authority decision*
• Note the Ministry will continue working with the electricity sector through industry consultations to refine the design and development implementation details in the Fall 2017	*Note, and direct the Ministry to provide an update on refinements, including implementation details through 2018-19 PRRT*

III. FINANCIAL SUMMARY

$ Millions	2017-18	2018-19	2019-20
Initiative cost requested	0.0	20.0	18.0
Initiative cost recommended	0.0	0.0	0.0
Recommended program base	0.0	0.0	0.0
Offset Recommended (Specify Ministry/Program)	0.0	0.0	0.0
Total Fiscal Impact	0.0	20.0	18.0

IV. KEY COMMENTS AND CONSIDERATIONS

The Ministry of Energy continues to work towards finalizing the 2017 Long Term Energy Plan (2017 LTEP). The LTEP document is one of three tools for creating and implementing the Long Term Energy Plan:

1) The LTEP document – Sets out the government's goals for the Energy sector and provides the narrative and rational behind new and ongoing initiatives. Prepared by Energy and approved by Cabinet.

2) Implementation Directives – Articulates outcomes and provides direction to IESO and OEB for LTEP implementation. Directives are high level and provide agencies flexibility to create detailed implementation plans. Prepared by Energy and approved by Cabinet.

3) Implementation Plans – Outlines steps IESO and OEB with take to meet the directives. Plans will identify how agencies will engage with public, Indigenous communities and councils, and key stakeholders. Prepared by IESO, OEB, and approved by the Minister of Energy.

The 2017 LTEP, *Delivering Fairness and Choice*, focuses on the energy consumer, positions the sector for the future and builds off LTEP 2013's success.

The 2017 LTEP focuses on the energy consumer by highlighting initiatives that:

- Reduce energy costs
- Improve the performance and accountability of the sector
- Give consumers more choice in their pricing plans and how they participate in the energy sector

The 2017 LTEP also highlights initiatives that will modernize the energy system and support provincial climate change objectives. The plan builds off important elements of the 2013 LTEP:

- Reaffirming Ontario's commitment to Conservation
- Support the involvement of Indigenous communities in the energy sector
- Recognizing regional priorities

The Ministry is proposing the following goals and objectives for the 2017 LTEP and proposing that these be used as chapters to organize key initiatives in the plan (Appendix D provide details on key initiatives under each):

- Ensuring Affordable and Accessible Energy
- Ensuring a Flexible Energy System
- Improving Value and Performance for Consumers
- Strengthening our Commitment to Energy Conservation & Efficiency
- Innovating to Meet the Future
- Responding to the Challenge of Climate Change
- Supporting Indigenous Capacity and Leadership

- Regional Priorities

Financial Implications:

The majority of initiatives contained in the proposed 2017 LTEP, the Ministry indicates, are either anticipated to be funded from internal allocations, or are already funded by the rate base, with two specific exceptions: the Smart Grid Fund and an International Energy Demonstration Fund pilot.

- The Ministry, through the current submission, is seeking TB/MBC approval for $60M over five years, starting in 2017-18, to renew the Smart Grid Fund.
- The Ministry will report to TB/MBC through the 2018-19 PRRT process to identify any additional cost impacts associated with policy initiatives under the LTEP, including $10 million for the International Energy Demonstration Fund pilot.

TBS staff note that analysis on ratepayer impacts have not been submitted or reviewed for initiatives. Also, the LTEP Outlooks have not been reviewed, nor analysis of the impacts of the initiatives on the Outlooks. The Ministry should provide detailed analysis for the potential fiscal, ratepayer, and LTEP Outlook impacts for each of the policy initiatives.

Smart Grid Fund Renewal (Current Item before TB/MBC):

The Ministry's TB/MBC submission is narrowly focused on renewing the Smart Grid Fund (SGF), and to enable announcing renewed government support for SGF within the 2017 LTEP.

- The Ministry also notes Natural Resources Canada (NRCan) is expected to announce funding for a smart grid program in fall 2017. This funding will support both demonstration and deployment funds. Ministry staff have been told that support from provincial / territorial governments will be considered favourably in applications to their fund.

The Ministry is requesting $60M over five years ending in 2021-22 and no funding in 2017-18, to support SGF and position it as a critical piece for grid modernization policy execution.

Year 1 2017-2018	Year 2 2018-2019	Year 3 2019-2020	Year 4 2020-2021	Year 5 2021-22	TOTAL
$0M	$20M	$18M	$15M	$7M	$60M

The Ministry indicates it will use the previously created Transfer Payment line Smart Grid Fund, and that it has provided a preliminary financial profile (above table) that will likely adjust the funding profile through the 2018-19 PRRT.

- TBS staff note reprofiling the above multi-year breakdown could result in fiscal plan implications if the profile above is provided through the Ministry's preliminary planning allocations and subsequently altered by the Ministry.

Through the 2017 LTEP process, the Ministry indicates it will direct the Ontario Energy Board (OEB) to explore, address, and recommend actions to remove regulatory barriers that inhibit cost-effective grid modernization.

The renewed SGF will focus on addressing non-regulatory barriers to grid modernization. This will build on previous work by focusing on activities that have a greater likelihood of domestic integration outcomes. Program design will be expanded to enable a broader range of projects and investment mechanisms, but targeting those investments to better address specific barriers to innovation and get the best performance and results. Appendix J provides an overview of potential for Smart Grid growth.

- A key difference will be moving from general calls for applications with parameters on types of projects and technologies that will be supported under the previous SGF, to layering different

project calls for applications to address multiple aspects of grid modernization include identified barriers that were gathered from a 2016 survey of SGF recipients and LDC collaborators.

The original Smart Grid Fund was launched in April 2011 and concluded at the end of 2015-16. The Ministry indicates 38 projects received funding totaling about $50M including home energy management, data analytics, grid automation, energy storage, microgrids, electric vehicles and cyber security.

- The projects leveraged approximately $200M in sector investment, resulting in an investment ratio of 1:3.6. Over 780 direct jobs have been created by recipients and their collaborators, which includes 24 local distribution companies and 41 industry and academic collaborators.

Appendix G provides further program descriptions on the renewed Smart Grid Fund. Appendix H provides details on the 38 projects receiving funding under the original Smart Grid Fund.

Risks:

While many initiatives in the electricity sector are not funded through the tax base, most are recovered through the electricity rate base on electricity bills.

- As seen with the recent Fair Hydro Plan, cost pressures on the rate base can lead to an interest in moving ratepayer-funded costs to the tax base, as was done in the case of social programs in the electricity sector.
- The Cabinet Office note from July 26, 2017, regarding the 2017 LTEP, notes the Ministry will continue to monitor the rate impacts of existing and new energy programs and consider such impacts in the context of commitments made under the OFHP and the requirements of the OFHPA.

The Ministry has not identified any medium or high likelihood risks with renewal of the Smart Grid Fund. Of note from the low level risks is public concern with ratepayer impacts of the SGF.

Timelines:

Appendix F contains the Ministry's graphic outlining 2017 LTEP development process and timeline. On July 26, 2017 the Ministry obtained approval to finalize Ontario's next Long-Term Energy Plan.

- ENERGY will return to Cabinet in August 2017 to seek approval of the modelling outlooks to be included in the 2017 LTEP.
- ENERGY will report to Cabinet and table the final LTEP and directives in September/October 2017.

The Ministry indicates the official launch of the renewed SGF would likely occur in 2018.

Name of analyst:	James Strang	**Phone number:**	416-327-2071
Date:	August 15, 2017	**Log number:**	
Branch / Division:	GGPR, PEMD, TBS		

APPENDIX A: PROPOSED MINUTE

Approve the Ministry's plan to renew the Smart Grid Fund (SGF) program beginning in 2017-18, including funding of up to $60,000,000 over five years to position the program as a critical tool supporting electricity grid modernization in Ontario, and to enable announcing renewed government support for the Smart Grid Fund within the upcoming 2017 Long Term Energy Plan.

In this regard,

i) Note:
   a) The renewed Smart Grid Fund will be guided by four strategies:
      - Promoting jobs and economic growth by continuing to demonstrate technologies with observed high-value potential
      - Addressing Local Distribution Company barriers to modernization
      - Helping the smart grid sector in Ontario mature
      - Exploring ways for government to benefit from its investments

   b) The Ministry will continue working with the electricity sector through industry consultations to refine the design and development implementation details in the Fall 2017.

ii) Direct the Ministry:

   a) Through the upcoming 2018-19 Program Review, Renewal and Transformation planning process to:

      1) Request funding of up to $60,000,000 on a multi-year basis, from 2018-19 to 2021-22, with no funding needed in 2017-18.
      2) Identify any refinements made to the renewed Smart Grid Fund program resulting from upcoming stakeholder consultations, including but not limited to changes in eligibility, and outcomes from investigating options to create a direct benefit for government for providing public funding toward smart grid and business development.
      3) Work with Treasury Board Secretariat to provide additional performance measure information including measures and targets for the renewed program.

iii) Direct the Ministry to return through a future PRRT planning process for its request related to administrative costs of about $1.5M including potential offset strategy, starting in 2019-20 through to 2021-22 related for external technical advisory services for oversight and reviews from project application to project completion.

iv) Approve the Minister of Energy to make decisions to approve a grant of up to $10,000,000 as was in place under the previous Smart Grid Fund program. If a project demonstrates unique or unprecedented opportunity such that it warrants support over the above limit, the request must be approved by Treasury Board.

v) Note the Ministry intends to seek an exemption to the Cash Management Directive, administered by the Ontario Financing Authority, to give the Ministry authority to flow up to 20% of approved support upon contract signing for the Smart Grid Fund.

FINANCIAL IMPACTS: CHANGES TO EXPENSE AND REVENUE					TABLE B1
		Fiscal Plan Basis			*Appropriations Basis*
$ Millions		**2017-18**	**2018-19**	**2019-20**	**2017-18**
Initiative cost recommended		0.0000	20.0000	18.0000	
Expense changes:					
Operating item – (reuse) Smart Grid Fund TP	Oper	0.0000	20.0000	18.0000	0.0000
Capital item	Cap	0.0000	0.0000	0.0000	00000
Revenue changes:					
Revenue increase/offset		0.0000	0.0000	0.0000	
Revenue decrease		0.0000	0.0000	0.0000	
Total Fiscal Impact		**0.0000**	**20.0000**	**18.0000**	**0.0000**

APPENDIX C: CABINET MINUTE (JULY 26, 2017)

CABINET AGREED THAT:

1. The Ministry of Energy (ENERGY) prepare for approval a 2017 Long Term Energy Plan (LTEP) that sets out the following goals and objectives:

    A. Ensuring affordable and accessible energy;
    B. Providing a flexible energy system;
    C. Improving value and performance for consumers;
    D. Reaffirming a commitment to conservation;
    E. Preparing for the future and innovation;
    F. Responding to the climate change challenge;
    G. Supporting Indigenous capacity and leadership; and
    H. Responding to regional priorities.

2. ENERGY implement initiatives identified in the LTEP, including:

    A. Ensuring affordable and accessible energy
        i. Enhancing consumer protection by providing the Ontario Energy Board (OEB) with increased regulatory authority over unit sub-meter providers (USMPs).
        ii. Proclaim existing provisions under the *Ontario Energy Board Act, 1998* that would empower the OEB to rate regulate USMPs.
        iii. Directing the OEB to define its process for establishing such a regulatory framework in its implementation plan.
    B. Providing a flexible energy system
        i. Requesting an updated needs assessment for the East-West Tie from the Independent Electricity System Operator (IESO) and retain the option of rescinding or amending the 2016 prioritization Order-in-Council at the time Leave to Construct is filed or at a future date.
        ii. Outlining a three-phased approach to the development of the Northwest Bulk project.
        iii. Directing the IESO to establish a formal process for planning the future of the integrated province-wide “bulk” system.
    C. Improving value and performance for consumers
        i. Detailing the need for a new transmission line through the Northwest Greater Toronto Area and highlight the need to protect the corridor for the line
        ii. Detailing the government’s policy objectives for utility reliability and quality of service and directing the OEB and IESO to review reliability standards.
        iii. Directing the IESO to develop a competitive transmission selection or procurement process and identify potential pilot projects
        iv. Directing the IESO and the OEB to take a coordinated, long-term approach when addressing the need to replace end-of-life assets.
        v. Enhancing the regulation of Local Distribution Companies (LDCs) by directing the OEB to review the regulatory framework to drive efficiency, continuous performance improvement, and accountability to customers.

vi. Improving regulatory efficiency by requiring the OEB to mitigate costs for ratepayers and find efficiencies in the distribution sector
vii. Convening a working group on bill redesign and preparing regulatory amendments to simplify bill presentment in late fall 2017 / winter 2018.

D. Reaffirming a commitment to conservation
   i. Directing the IESO to cease accepting incentive project applications for behind the meter generation projects that use supplied fossil fuels, effective July 1, 2018.
   ii. Encouraging In Front of the Meter Conservation (IFMC) projects by allowing electricity distributors to count the electricity savings from IFMC technology deployments, paid for through distribution rates, towards their electricity savings targets, under the 2015-2020 Conservation First Framework.
   iii. Directing the OEB to examine and identify steps for pursuing opportunities for cost-effective modernization of the electricity system, including energy efficiency measures on the distribution system.
   iv. Preparing amending legislation to mandate Green Button for electricity and natural gas distributors.

E. Preparing for the future and innovation
   i. Directing the OEB to address regulatory and cultural barriers to grid modernization.
   ii. Directing the OEB to examine and identify opportunities for utilities to raise the profile of their modernization / innovation plans.
   iii. Subject to TB/MBC approval, renewing the Smart Grid Fund with an expanded scope and more targeted investments in innovative solutions that support grid modernization.
   iv. Updating market rules and regulations so energy storage can be introduced onto the grid where it makes technological and economic sense.
   v. Working with the Ministry of Environment and Climate Change (MOECC), Ministry of Transportation (MTO), Ministry of Infrastructure (MOI) and other partner ministries, as appropriate, to support the integration of electric mobility onto Ontario's grids, including:

      a) Remove barriers to investing in cost-effective solutions for integrating electric vehicles into the grid, including residential smart charging;
      b) Developing a Vehicle Grid Integration roadmap; and
      c) Working with ministry and stakeholder partners to share information and data on electric mobility.

   vi. Move forward with the implementation of the vision embedded in the OEB's Regulated Price Plan Roadmap.
   vii. Subject to TB/MBC approval, working with the Ministries of International Trade (MIT, Intergovernmental Affairs (MIA), Economic Development and Growth (MEDG) and Research, Innovation and Science (MRIS), develop an International Energy Demonstration Fund (IEDF) that would support Ontario energy companies in undertaking international demonstration projects.
   viii. Expanding and enhancing the net metering framework, including:

a) Enabling third party ownership and, addressing any related consumer protection measures and relevant siting requirements;
b) Allowing virtual net metering demonstration projects; and
c) Working with the IESO to support the deployment of near-term virtual net metering demonstration projects.
d) ENERGY to work with other relevant Ministries, as appropriate, to develop legislation and regulations to support Ontario's enhanced net metering framework.

ix. Working with the IESO to develop a program to support the strategic deployment of innovative renewable distributed generation projects.
x. Working with the IESO to ensure Market Renewal acknowledges the objectives of the Climate Change Action Plan and is designed to reduce greenhouse gas emissions and ratepayer costs.

F. Responding to the climate change challenge
i. Working with utilities and other stakeholders to share best practices and to build capacity
ii. Working with MOECC and partner ministries, support the development of a climate change vulnerability assessment of the distribution system.
iii. Directing the OEB to provide guidance to utilities on approaches for integrating cost-effective opportunities for adaptation into their operations and planning processes.

G. Supporting indigenous capacity and leadership
i. Directing the IESO to prepare a report on options to improve conservation programs for First Nations and Metis, based on an assessment of programs offered under the Conservation First Framework and Demand Side Management Framework, as well as energy support programs.
ii. Directing the IESO to review and propose options to improve Indigenous energy support programs, including supporting energy plan implementation, including small-scale renewables, conservation and other community-scale energy opportunities.
iii. Increasing outreach to Indigenous communities and organizations to better align policy development with local and regional needs, including outreach between LTEPs to provide updates on progress and seek ongoing feedback.

H. Responding to regional priorities
i. Working with MIA, MOI, MEDG and MNDM, explore ways to use federal and provincial infrastructure and economic development funding to support electricity transmission and distribution infrastructure that supports regional economic development.
ii. Directing the IESO to review the regional planning process and report back with options and recommendations to address the challenges and opportunities that have emerged, including:
a) Addressing barriers to cost-effective non-wires solutions;
b) Integrating bulk, regional, distribution system and community energy planning;

c) Streamlining the regional planning process; and
d) Integrating the regional planning process with the need to right-size assets reaching end of life.

iii. Directing the OEB to identify steps to implement changes, as may be appropriate, to improve utility regional planning processes on receipt of IESO's recommendations regarding its review of the regional planning process

3. ENERGY prepare LTEP implementation directives to the IESO and OEB, as necessary, including requiring the IESO and the OEB to submit their implementation plan in a timely manner.

4. ENERGY prepare an amending directive to the OEB to support enhancements to conservation demand management (CDM), including to:
   A. Exclude behind the meter generation using supplied fossil fuels as a primary fuel source from the definition of eligible CDM activities, effective July 1, 2018; and
   B. Annually review and publish verified electricity reductions resulting from distributor in front of the meter conservation projects where the IESO has confirmed that reductions count towards a distributor's CDM Target.

5. ENERGY continue to work with MOECC, IESO, and partner ministries to explore LTEP modelling outlooks that align with Ontario's greenhouse gas reduction targets and report back to Cabinet in summer 2017 with modelling outlooks to be included in the 2017 LTEP.

6. ENERGY report back to Cabinet in September/October 2017 to seek approval of the final 2017 LTEP document and the IESO and OEB directives.

7. ENERGY report back to Treasury Board/Management Board of Cabinet prior to the release of LTEP on the program design, implementation plans, and a funding strategy for the Smart Grid Fund.

8. ENERGY report back to Treasury Board/Management Board of Cabinet through the 2018/19 PRRT process on the program design, implementation plans, and a funding strategy for the International Energy Demonstration Fund pilot.

9. ENERGY report to Legislation and Regulations Committee for necessary approvals in fall 2017.

10. ENERGY work with the Premier's office and Cabinet Office on an integrated communications strategy.

APPENDIX D: BACKGROUND ON LTEP KEY POLICY INITIATIVES

The following overview was prepared by Cabinet Office as part of the July 26, 2017 Cabinet item. The Ministry is proposing to announce a number of ongoing and new programs through the 2017 LTEP document.

The Ministry is proposing the following LTEP chapters to organize the key initiatives (they are LTEP's goals and objectives):

A. Ensuring Affordable and Accessible Energy
B. Ensuring a Flexible Energy System
C. Improving Value and Performance for Consumers
D. Strengthening our Commitment to Energy Conservation & Efficiency
E. Innovating to Meet the Future
F. Responding to the Challenge of Climate Change
G. Supporting Indigenous Capacity and Leadership
H. Responding to Regional Priorities

Key Policy Initiatives

A. Ensuring Affordable and Accessible Energy

Oversight of Unit Sub-Meter Providers

The Ministry plans to enhance the Ontario Energy Board's (OEB) consumer protection authority with regards to consumers serviced by Unit Sub-Meter Providers (USMPs) by proclaiming existing provisions under the *Ontario Energy Board Act, 1998*. Increasing the OEB's regulatory authority over USMPs is expected to ensure that charges to consumers are just and reasonable and provide greater consumer protections.

Profiled Ongoing Initiatives

The Ministry also plans to profile existing initiatives related to the OFHP, including the OEB's ongoing gasoline price review and natural gas expansion to increase customer choice. In addition to the initiatives highlighted under this section, other chapters in the LTEP contain initiatives that are expected to lead to efficiencies and reduce overall system costs, which in turn will result in reduced costs for consumers (e.g., Market Renewal is captured in "Ensuring a Flexible Energy System" and OEB regulatory burden review is captured in "Improving Value and Performance for Consumers").

B. Ensuring a Flexible Energy System

East West Tie

The East West Tie (EWT) is an approximately 400 km, 230 kV proposed transmission line paralleling an existing line between Wawa and Thunder Bay. The proponent, Nextbridge, was selected through a competitive process run by the OEB. Ontario declared the construction of the EWT a priority project in 2016. In May 2017, NextBridge informed the Ministry that the estimated capital costs for the EWT had increased from its initial 2011 estimate of $400 million to $740 million. The Ministry is proposing to request an updated needs assessment from the Independent Electricity System Operator (IESO) for this project following NextBridge making the cost public through their Leave to Construct

Application before the OEB. The Ministry also proposes to emphasize Ontario's focus on making the electricity system more cost-effective in the LTEP document.

Northwest Bulk

The Northwest Bulk (NWB) Project, a reinforcement of the 230 kV system from Thunder Bay to Dryden, was named as a priority project in the 2013 LTEP and Hydro One was designated as the transmitter. The ministry is proposing to outline a phased development approach, including the possibility of a phase from Dryden to the Manitoba border. The language in the LTEP would serve as a signal that Ontario is interested in inter-jurisdictional energy trade if future forecasts indicate the final phase is needed.

Bulk Planning

To address the need for increased transparency and better integrated planning of the bulk system (i.e., 230kV or 500kV transmission line infrastructure), the Ministry is proposing to direct the IESO to establish a new formal planning process that would include consultation with stakeholders and communities.

Profiled Ongoing Initiatives

The Ministry plans to highlight ongoing work related to the IESO's Market Renewal initiative that is intended to modernize and redesign the province's wholesale electricity markets, consider the benefits and impacts of the cap and trade program and alignment with CCAP objectives, and maximize the value of existing generation assets. Market Renewal is expected to deliver a more efficient, competitive and flexible electricity market to meet future system needs at lowest cost. The project is expected to save up to $5.2 billion over a 10-year period, and forms a key component of Ontario's plan to ensure the affordability of electricity in the longer term.

Highlighting the desire to maximize the benefits from existing assets is prudent but will also emphasize the importance of continuing to benefit from the generating assets captured by the Clean Energy Costs (i.e., renewables and some natural gas) under the *Ontario Fair Hydro Plan Act, 2017* (OFHPA). Under the Global Adjustment (GA) refinancing mechanism outlined in the OFHPA, there is a requirement to benefit from these assets for a period beyond their existing contracts. The LTEP will also reaffirm the province's commitment to nuclear refurbishment projects with appropriate oversight and value for money caveats in place.

C. Improving Value and Performance for Consumers

Preserving Transmission Corridors

Through the Northwest Greater Toronto Area Integrated Regional Resource Plan (2015), the IESO identified the need for a new transmission line to supply portions of the Regions of Halton, Peel and York. Demand forecasts were developed by IESO based on population and employment forecasts included in Ontario's Growth Plan for the Greater Golden Horseshoe, 2017. The IESO has identified transmission as the most cost effective and technically feasible option and the Ministry is proposing to highlight the need to protect corridor lands for the new transmission line in the Northwest Greater Toronto Area (GTA) in the LTEP.

Enhancing Reliability

The Ministry is proposing to have the IESO and OEB review the standards for reliability and quality of service for transmitters and distributors and highlight the province's policy objectives for reliability and quality of service in the LTEP. To enhance reliability and customer satisfaction, the Ministry is looking to its agencies to establish new reliability metrics and standards that provide insight into local reliability performance, establish customer service guidelines, increase transparency of performance reporting, and create accountability for improvement through incentives and/or penalties.

Competitive Transmitter Selection

The Ministry is proposing to direct the IESO to develop a competitive selection or procurement process for the transmission sector, and to identify possible pilots for its use. The results of the pilots would then be used to refine the parameters of a more general selection or procurement process. The Ministry indicates that greater competition could reduce costs in the development of new transmission, providing benefits to ratepayers.

Right-Sizing Assets

When transmitters and distributors replace aging equipment, they can increase efficiency by "right-sizing" the replacements (i.e., ensuring the new investments match current and future 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 Ministry is proposing to provide a policy statement through LTEP supporting "right-sizing" transmission and distribution assets at end of life and to have the Minister direct the IESO and the OEB to take a coordinated, long-term approach when addressing the need to replace these assets. To enhance coordination and value for money, there is a need to integrate considerations of asset end of life and right-sizing into electricity planning initiatives such as regional planning and the proposed integrated bulk system planning.

Improved Regulatory Efficiency

The Ministry is also proposing to direct the OEB to strengthen utility accountability and find ways to mitigate costs for consumers. This is intended to create a regulatory environment which better replicates the pressures and incentives of a competitive market, whereby utilities are motivated to be more proactive, innovative, cost effective and less risk averse in the delivery of electricity service which responds to their customers' needs and expectations. Should utilities not meet customers' needs and expectations, there will be the potential for the consumer to receive an on-bill rebate.

Bill Redesign

The Ministry is proposing to undertake a process to review the regulatory framework for electricity bills and redesign the bill. The Ministry would convene a working group of LDCs and relevant stakeholders to provide advice on the redesign process and come forward with regulations to Legislation and Regulations Committee and Cabinet by the end of fall 2017/early 2018 with proposed regulatory amendments.

The Digital Transformation

The Ministry is also proposing to highlight the government's continued commitment to improve the ways that people can use data to make decisions about their energy use (e.g., Ontario Energy Report, Green Button etc.).

D. Strengthening our Commitment to Energy Conservation & Efficiency

Behind the Meter Generation

According to current conservation and demand management (CDM) program rules, behind the meter generation (BMG) projects include Combined Heat and Power (CHP) and Waste Energy Recovery (WER) and are eligible to receive incentives through the Conservation First Framework (CFF) and the Industrial Accelerator Program (IAP). The CHP projects use a fossil fuel, such as natural gas, as an energy source and therefore, while reducing demand on the grid, generally result in a net increase in GHG emissions. The Ministry is proposing to change the program rules to make ineligible any new project that uses supplied fossil fuels as a primary fuel source. To give time for LDCs and stakeholders to adjust, it is proposed that the IESO continue accepting applications for BMG projects that use supplied fossil fuels until June 30, 2018 (changes would come into effect July 1, 2018). This

has the effect of allowing the majority of existing project applications to proceed. Projects using recovered waste energy and renewable energy would continue to be eligible.

In Front of the Meter Conservation

In Front of the Meter Conservation (IFMC) technologies are deployed on the distribution system and provide electricity savings and peak reductions to customers behind the meter. Examples include technologies that reduce line losses and optimize voltage levels. The Ministry is proposing to encourage greater distribution system efficiency by allowing electricity savings from IFMC technology deployments to count towards electricity savings targets under the Conservation First Framework. IFMC technology deployments would be funded through LDC distribution rate applications (approved by OEB). Further, the Ministry is proposing to direct the OEB to examine and identify steps for pursuing opportunities for cost-effective modernization of the electricity system, including energy efficiency measures on the distribution system.

Green Button Standard

Green Button is a data standard that provides households and businesses with access to data on their energy and water consumption and allows for the secure transfer of their own data from utilities to applications of their choice. Greater access to data through Green Button will help consumers make informed decisions about their energy and water use and empower them to improve the energy efficiency of their home or business.

Ontario is a leader in the implementation of Green Button and was the first jurisdiction in Canada to announce its adoption in 2012. Since that time, 11 electricity distributors have implemented Green Button, representing over 60% of smart meter customers in the province. The 2016 Climate Change Action Plan committed to expanding the Green Button program province-wide. The Ministry is proposing to proceed with the development of the legislative and regulatory framework in late 2017/ early 2018 to mandate the implementation of the Green Button standard for electricity and natural gas distributors, and enable voluntary implementation for water distributor utilities. A voluntary framework for water utilities is recommended due to reduced cost effectiveness of the program for this sector. The Ministry intends to work with MOECC to monitor and assess uptake among water utilities, and will provide technical guidance to support water utilities.

Demand Response

2013 LTEP stated that Ontario will aim to use demand response (DR) to meet 10% of peak demand by 2025 (equivalent to ~2,400 MW under 2013 LTEP forecast conditions). This target includes peak reductions from a variety of initiatives, including the Industrial Conservation Initiative (ICI), Time-of-Use (TOU) rates, DR auction and DR pilots. Significant progress towards this target has been made. ENERGY will maintain the 10% for the time being and look at ways in the future to align DR with system needs and prepare for it to be rolled into a general capacity auction including the possible elimination of this target. The IESO is planning to implement a general capacity auction through which DR resources will compete with traditional generation resources and would be procured if cost-competitive with other offers.

Profiled Ongoing Initiatives

The Ministry also plans to highlight ongoing work on energy efficiency standards, enhancing the value of conservation, alignment of conservation programs with Green Ontario Fund programs, smart thermostat incentive programs, home energy audit and retrofit program, and the Investor Confidence Project.

E. Innovating to Meet the Future

Grid Modernization

Ontario has made important investments in grid modernization such as smart meters. Under the proposal, the 2017 LTEP would articulate the government's vision for distribution grid modernization: the creation of an environment that enables a modern, digital grid for Ontarians. The Ministry proposes to direct the OEB to address regulatory and cultural barriers in order to encourage innovation, optimal utility investment, and customer choice. For example, options include:

- Providing clarity to utilities on the treatment of smart grid investments, including addressing the "diffuse benefits" issue (i.e. investments by a utility may benefit other sector participants that do not contribute to the cost of the solution);

- Enabling utilities to make investments in non-traditional technologies, and earn a return on those investments, where they make economic sense, including investments behind-the-meter;

- Allowing utilities to partner on investments, and to participate in market opportunities where there is a clear benefit for customers; and

- Encouraging utilities to create plans that articulate how they intend to cost-effectively modernize their grids and promote innovation within their operations.

Renew Smart Grid Fund

The Ministry is proposing to renew the Smart Grid Fund (SGF) with an additional investment of $60M over 5 years. The SGF has helped many innovators become successful international companies (e.g. FleetCarma, Energate, Varentec). However, evidence suggests there are still barriers to domestic integration of these solutions, and the Ministry recommends that a renewed SGF is an important tool for overcoming barriers to modernization. Under the proposal, the 2017 LTEP would highlight a renewed SGF with an expanded scope and more targeted investments in innovative solutions that support grid modernization. The Ministry will report to TB/MBC in summer 2017 for necessary approvals in advance of the announcement of the renewed SGF.

Energy Storage

The Ministry is proposing to amend the regulatory framework for energy storage to remove unfair market and regulatory barriers (e.g. the "double taxing" issue, which would happen when grid-connected storage providers pay the full costs of Global Adjustment when most of the power consumed to charge the storage system will be later discharged and used by another consumer that will also be charged Global Adjustment). This will enable energy storage to compete against other assets in future service procurements and general capacity auctions envisioned under IESO Market Renewal.

Electric Mobility

Fuel switching, including promotion of electric vehicles, was an important commitment under CCAP to reduce GHG emissions from the transportation sector. However, electrification of vehicles and transit will have an impact on electricity grid demand. The Ministry is proposing that the 2017 LTEP support a deliberate transition to a low-emission transportation economy by authorizing specific actions, including: removing regulatory barriers that inhibit utilities from making economic decisions that support electric vehicle (EV) integration; implementing an overnight charging program that generates critical data for EV policy and program design while meeting CCAP objectives; developing a vehicle-grid integration road map, and facilitating information sharing between government and utilities.

International Energy Demonstration Fund

The Ministry is proposing a pilot International Energy Demonstration Fund which would support Ontario energy companies (e.g., renewables, smart grid etc.) to undertake demonstration projects located in international jurisdictions. The proposal includes funding of $10M and is expected to fund between five and ten high value demonstration projects.

Program rules would be developed to give priority to Ontario-based project costs to maximize provincial benefit. Stakeholders have indicated a policy gap in provincial and federal energy innovation programs as they do not typically consider international projects to be in scope. While there may be associated GHG reductions, they will be minimal due to the demonstration nature of the projects, and if they do occur, the reductions would occur outside of Ontario. As such, the Ministry is not seeking funding from Cap and Trade proceeds at this time.

The program would be designed in collaboration with the Ministry of International Trade (MIT), the Ministry of Economic Development and Growth (MEDG), the Ministry of Intergovernmental Affairs (MIA) and the Ministry of Research Innovation and Science (MRIS) to leverage their expertise in program development, ensure compliance with international trade obligations and utilize Ontario's representatives in foreign markets. The Ministry will report to TB/MBC through the 2018/19 PRRT process for necessary approvals.

Expanding Net Metering

The Ministry is proposing to develop legislative and regulatory amendments that would expand and enhance Ontario's net metering framework, including enabling third-party ownership and related consumer protection measures and allowing for virtual net metering demonstration projects. The Ministry is also proposing to work with the IESO to support the deployment of near-term virtual net metering demonstration projects.

Third-party Ownership and Virtual Net Metering emerged during stakeholder consultations regarding earlier net metering updates as two areas for enhancements to the existing net-metering framework. In addition, there has been increased interest in net metering given the planned wind down of the Feed-in Tariff (FIT) and microFIT procurement programs in 2017. The Ministry advises that the program changes would have a negligible impact on electricity rates. Implementation would require legislative and regulatory changes which would be brought forward for approval in fall 2017.

Smart Renewable Distributed Generation

Renewable distributed generation (DG) and other distributed energy resources (DERs) are becoming widely adopted in Ontario and have the potential to provide added value to customers and utilities. To date, renewable energy facilities have been sited based on the resource availability and connection capacity. Siting these facilities in areas that could provide local or broader system value, and pairing them with other innovative DERs, smart communications and controls, can provide added value to customers and utilities.

For example, on certain areas of the grid, a solar photovoltaic system combined with energy storage and intelligent communications could respond to a utility's need to help reduce load at times of peak electricity demand. The Ministry is proposing to work with the IESO to develop a funding program to support the strategic deployment of these kind of innovative renewable DG projects in order to better understand their benefits and challenges and inform future policy decisions.

Profiled Ongoing Initiatives

The Ministry is also proposing to continue the ongoing work related to exporting Ontario's energy expertise, OEB Regulated Price Plan (RPP) pilot projects to provide greater choice in time of use billing practices for consumers, and promoting and exporting Ontario's nuclear innovation.

F. Responding to the Challenge of Climate Change

Climate Change Adaptation

The Ministry is proposing to support a number of actions related to climate change adaptation through collaboration and dialogue with MOECC, other ministries, agencies, stakeholders, and utilities. The Ministry proposes to direct the OEB and IESO to integrate climate adaptation into their planning processes. Taken together, these initiatives will improve capacity in the distribution sector and inform the development of a province-wide energy distribution vulnerability assessment.

Profiled Ongoing Initiatives

The Ministry proposes to profile ongoing initiatives that have an adaptation co-benefit, such as the remote connections project, shifting to renewable natural gas and lower carbon transportation fuels, supporting a transition to heating and cooling with renewable technologies, district heating and cooling initiatives, and supporting the transition to near and net zero carbon buildings.

G. Supporting Indigenous Capacity and Leadership

Indigenous participants in engagement sessions emphasized the need for enhanced affordability supports and a desire for greater participation in the energy sector. Many First Nations also highlighted the need for program dollars to support the implementation of plans developed under the province's very successful Aboriginal Community Energy Plan (ACEP) program.

Evolve Indigenous Conservation and Support Programs

The Ministry proposes to direct the IESO to, in alignment with the Mid-Term Review of the CFF and IAP, and informed by engagement with Indigenous communities, prepare a report on options to improve conservation programs for First Nations and Métis. The Ministry also proposes to direct the IESO to re-profile an existing $10M/year rate based funding envelope to focus on Indigenous energy programming and to report on options to evolve programming to better align with community needs and interests, which will include activities related to the implementation of community energy plans.

Outreach to Indigenous Communities

The Ministry proposes to increase outreach to Indigenous communities and organizations to better align policy development with local and regional needs. This includes outreach to Indigenous communities between LTEPs to update on progress and to seek ongoing feedback. This action is a direct result of feedback from Indigenous communities and groups indicating a desire for ongoing engagement with the Ministry on energy issues.

Profiled Ongoing Initiatives

The Ministry is proposing to profile ongoing initiatives related to electricity affordability for Indigenous communities (e.g., First Nations Delivery Credit, Ontario Electricity Support Program expansion), the connection of remote communities to the provincial grid as well as the province's work to explore innovative solutions for the communities that are uneconomic to connect to the grid. In addition, the Ministry proposes to highlight plans to enhance engagement with Indigenous communities and further investigate innovative financing models and support tools that may help lower financing costs and stimulate more capital in the financing of Indigenous energy projects.

H. Regional Priorities

Regional Economic Development

The Ministry proposes to indicate in the 2017 LTEP that it will explore ways to use federal and provincial infrastructure and economic development funding to support electricity transmission and

distribution infrastructure that supports regional economic development, and respond to regional disparities in electricity infrastructure that were highlighted during engagement with stakeholders and communities. Reasonable certainty with respect to availability of a funding source or program is necessary as such a statement would raise stakeholder expectations.

Regional Planning Review

The Ministry is proposing to direct the IESO to review the regional planning process and report back with options and recommendations to address challenges and opportunities. This review would include integrating regional planning with the new bulk system planning process proposed in this submission, as well as with community energy planning. It would also include addressing barriers to non-wires solutions, such as demand response and distributed energy, in regional planning, and ensuring assets are right-sized at end of life, as articulated earlier in this submission.

Since 2013, an enhanced regional planning process has brought communities together to identify their electricity needs and develop cost-effective solutions to meet them. Over the past three years, the electricity needs of all 21 of Ontario's electricity planning regions have been evaluated, marking the completion of a full cycle of regional planning assessments, which presents a good opportunity to review the planning process.

APPENDIX E: BACKGROUND ON IESO and OEB Directives

As part of the July 26, 2017 Cabinet minute, the Ministry direction to prepare implementation directives to the IESO and OES, as necessary, including requiring the IESO and the OEB to submit their implementation plan in a timely manner (See Appendix C).

The following was part of the Cabinet Office briefing note for the July 26, 2017 LTEP item.

The directives are intended to be high-level, allowing the agencies to determine the specific initiatives to meet LTEP objectives and would be released simultaneously with the release of the LTEP document. The directives will be in support of the following policy objectives, which are consistent with the policy initiatives outlined above.

IESO Directive:

- *Support Indigenous Capacity and Leadership*
  - Report on options to improve conservation programs for First Nations and Métis.
  - Evolve support programs offered to Indigenous communities and organizations to better align with community needs and interests.
- *Encourage an Innovative Sector*
  - Assess system impacts of increased net metering and identify opportunities to enhance local and system value of distributed energy resources under net metering framework.
  - Develop a program that supports the strategic deployment of renewable distributed generation projects.
  - Work with OEB to identify barriers to entry for storage facilities and identify appropriate mitigation strategies.
- *Deliver a Flexible and Efficient System*
  - Develop a formal bulk system planning process that considers a coordinated approach to replacing transmission assets at end of life.
  - Develop a competitive transmitter selection or procurement process and identify specific pilot projects to be used.
  - Review the regional electricity planning process and report back with options to address challenges and opportunities.
  - Review the technical criteria used to assess customer reliability for the purposes of identifying and evaluating the need for and effectiveness of local area enhancements.

OEB Directive:

- *Delivering Efficiency and Value*
  - Examine opportunities to strengthen utility accountability and reporting related to service issues, including reliability.
  - Examine cost effectiveness of modernizing and removing barriers in Ontario's electricity sector, including in front of the meter conservation and non-wires solutions (e.g. conservation and demand response, distributed generation).
  - On receipt of recommendations from the IESO, identify steps to implement changes to improve utility regional planning processes.
  - Identify steps for encouraging a coordinated approach to replacing transmission and distribution assets at end of life.
- *Ensuring Affordable and Accessible Energy*
  - Examine tools to mitigate costs for ratepayers.
  - Protect consumers in the natural gas sector.

- Reduce costs and find efficiencies in the distribution sector.
- Strengthen consumer protection related to unit sub-meter providers.

- *Enhancing Commitment to Energy Conservation and Efficiency*
  - Move forward with regulated price plan roadmap and consider pricing structures that give consumers control and the ability to respond to pricing signals.
  - Enhance energy literacy.
- *Responding to Climate Change Challenge*
  - Provide guidance to utilities on approaches for integrating cost effective opportunities for climate change adaptation.
- *Encouraging an Innovative Sector*
  - Work with utilities to encourage a culture of innovation in the distribution sector and provide opportunities for utilities to raise the profile of their modernization and innovation plans.

In addition, some of the proposed policy initiatives under the LTEP require amendments to previous directives to the OEB. Prior to the release of the LTEP, the Minister of Energy will issue an amending directive to the OEB to support enhancements to Conservation Demand Management (CDM):

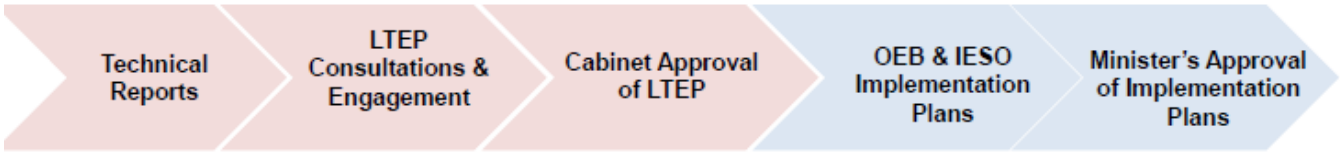
- Annually review and publish Distributor CDM programs and measures used by a Distributor to maximize the efficiency of its new or existing distribution system infrastructure where the resulting electricity reductions are counted towards the target allocated to the Distributor.
- CDM shall be considered to exclude behind the meter customer generation that uses fossil fuels purchased from or otherwise supplied by a third party as a primary fuel source.
- CDM shall continue to be inclusive of behind the meter generation, where the generation of electricity is primarily from renewable energy sources or primarily from heat or fuel that is a waste by-product of a facility.

The Minister will request that the IESO and OEB submit implementation plans for Minister's approval in a timely manner.

APPENDIX F: LTEP DEVELOPMENT PROCESS & TIMELINE

The following graphics, provided by Energy, outline the 2017 LTEP development process and timeline. LTEP development is on-going.

- After the 2013 LTEP, the Ministry of Energy took time to reflect on its energy planning process. It determined that the process used for developing the 2010 & 2013 LTEP's should be enshrined in legislation.
- These changes were made through the *Energy Statute Law Amendment Act, 2016* which was passed in June 2016 and came into force on July 1, 2016.
- The 2017 LTEP follows this planning process:

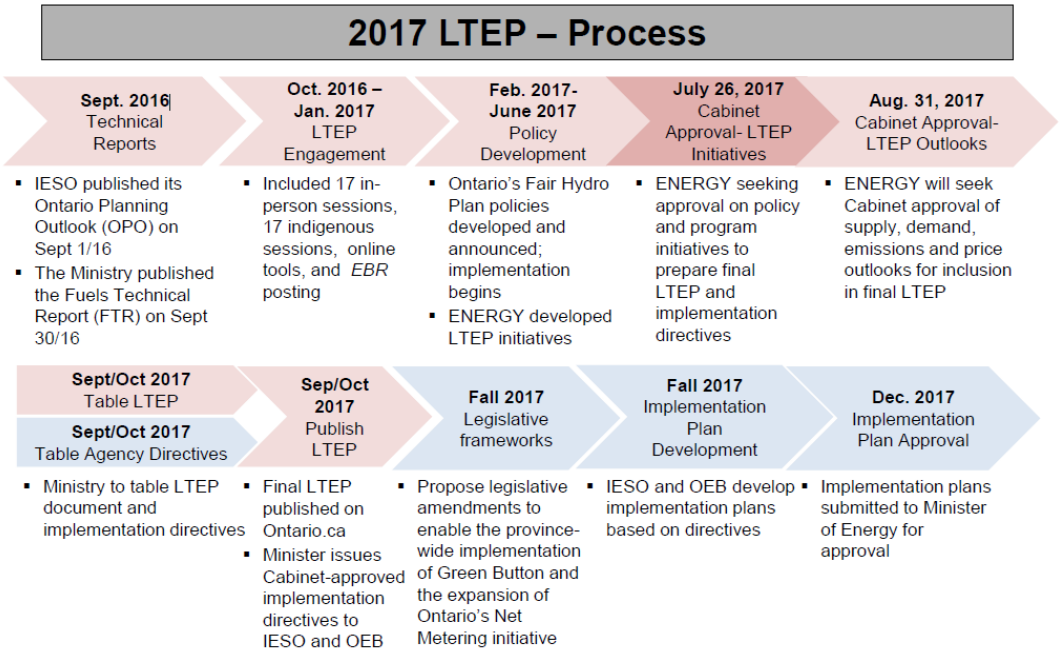


2017 LTEP Development

- LTEP process began with IESO technical report.
- ENERGY led LTEP development, engagement, and consultations.
- ENERGY is seeking Cabinet approval on the LTEP and implementation directives.

Implementation

- IESO and OEB will develop plans for implementing LTEP objectives.
- Plans submitted to Minister of Energy for approval.



APPENDIX G: PROGRAM DETAILS – SMART GRID FUND RENEWAL

The Ministry is seeking approval of its plan to renew the previous Smart Grid Fund, along with refinements to the program to continue to provide financial support for innovative smart grid technologies, with the aim of modernizing the electricity grid, encouraging the commercialization of made-in-Ontario smart grid solutions, generate economic growth, and to overcome barrier to domestic take up (See Appendix I for details on domestic take up barriers and Ministry intended response):

- SGF renewal enables announcing renewed government support for SGF within the 2017 Long Term Energy Plan (LTEP).
- The Ministry also notes Natural Resources Canada (NRCan) is expected to announce funding for a smart grid program in fall 2017. This funding will support both demonstration and deployment funds. Ministry staff have been told that support from provincial / territorial governments will be considered favourably in applications to NRCan fund.

The original SGF, that ran from 2011-12 through to 2015-16 used non-repayable grants to support a diverse portfolio of 38 projects including home energy management, data analytics, grid automation, energy storage, microgrids, electric vehicles and cyber security. These 38 projects leveraged approximately $200 million in sector investment, resulting in an investment ratio of 1:3.6. About 780 direct jobs have been created by recipients and their collaborators, which includes 24 local distribution companies and 41 industry and academic collaborators. (Appendix H provides a list of projects).

Historical SGF Spending

($ millions)	Budget	Spent (Public Accounts)
2010-11	12.5	-
2011-12	12.5	1.8
2012-13	12.5	12.0
2013-14	12.5	8.0
2014-15	12.5	10.3
2015-16	12.5	21.8
Total	75.0	53.9

Renewed Smart Grid Fund – Overview

The renewed SGF would continue to provide support for testing new technologies, advancing commercialization, and de-risking the sector. It will continue to employ the same due diligence process as the previous Smart Grid Fund for screening eligibility, reviewing project applications, contracting and performing project oversight. Payments will be on a per-milestone basis.

Costs eligible for support within a renewed SGF would align with those from the previous program, including labour (excluding overhead) and capital. Ineligible costs would continue to include travel, marketing and ongoing operational business costs such as general administrative staff, accounting and legal services. Direct project costs would remain eligible.

The Ministry proposes that the program be enhanced to broaden the scope of eligible investment activities and take a more targeted approach to addressing barriers to grid modernization and commercialization of smart grid technologies.

A renewed SGF will be guided by four strategies:

1) Promoting hobs and economic growth by continuing to demonstrate technologies with observed High-value potential
    - Through a renewed SGF, targeted calls for demonstration projects reflecting emerging best practices, and high-value opportunities to advance grid modernization, informed by Ministry's learnings from previous SGF and broader industry assessments.
2) Addressing Local Distribution Company (LDC) barriers to modernization
    - The Ministry would like to see utilities develop implementable grid modernization plans replicated across the sector (currently being done by a few innovative utilities), and would dedicate a portion of SGF to supporting LDCs to collaborate on drafting modernization plans.
    - A second component of this strategy is to enable utilities to de-risk the implementation of modernization plans by funding deployments. Deployments would support the acquisition and deployment of commercially proven solutions that are still considered risky due to immature technology business cases, and a regulatory process that continues to encourage traditional investments.
3) Helping the smart grid sector in Ontario mature
    - A renewed SGF would create opportunities to provide targeted support for smart grid companies in Ontario to refine their business cases and seek opportunities to form collaborations and partnerships in order to provide turnkey smart grid solutions to LDCs and other clients.
4) Exploring ways for government to benefit from its investments in sector growth.
    - The renewed SGF would continue to explore options to create a direct benefit for government for providing public funding toward smart grid and business development.
        i. Looking beyond the traditional non-repayable grant model to develop options to use innovative funding tools to generate benefit from the technologies that were able to achieve market-success.

           By providing funding through the SGF, the Ministry assumes some of the inherent risks that companies face as they develop innovative technologies. By assuming some of that risk, there is a case to consider potential options for earning a return on successful investments.

        ii. The Ministry will finalize design for the equity options in the fall 2017 Program Review, Renewal and Transformation (PRRT) process and TB report-back, if needed. Engagement with the Ministry of Finance, Ontario Financial Authority and the Ministry of Economic Development and Growth/Ministry of Research, Innovation and Science are ongoing to develop an appropriate pathway for incorporating the benefits for Ontarians. Stakeholder engagement is planned for 2017-18 and would explore equity options in more detail.

Project Characteristics and Eligibility

The Ministry indicates that under the renewed program there will be a narrowing of scope for recipient eligibility, and that this will be vetted through the fall 2017 stakeholder sessions.

Project Type	Demonstration	Deployment
Description	Pilots to test innovative technologies in collaboration with LDCs or led by LDCs.	Installation and integration of new technologies/ technology systems across the grid or to address a specific issue on some part of the grid.
Eligible Recipients	Companies, LDCs	LDCs
Collaborators	Companies, LDCs, universities, non-profits, municipalities	Companies, LDCs, universities, non-profits, municipalities

Commented [RCZ1]: Corrected from a previous draft - "targeted" column removed

Performance Measures

The ministry has provided some initial performance measures that will capture the immediate outputs of the program and some initial outcomes, including jobs created. The ministry is encouraged to continue developing the performance measurement framework, with a focus on outcome-based measures.

Outcome	Description
Addressing Barriers to Grid Modernization	Development of modernization plans, deployment, and other initiatives that will address barriers to grid modernization in Ontario and continue to reduce risk and uncertainty in electricity sector investments.
Advancing Ontario's Innovation Economy	Create jobs and economic development opportunities for Ontario vendors seeking to commercialize and export smart energy technologies.
Positioning Ontario at the Forefront of Smart Grid	Support the demonstration of the innovative utility business models, emerging smart grid technologies, and other initiatives that both respond to changes in the sector and have the potential for generating value for Ontario's utilities and ratepayers

Commented [RCZ2]: Corrected from a previous draft

APPENDIX H: SMART GRID FUND PROJECT SUMMARIES

	Recipient	Project Description	Primary Smart Grid Objective	Direct Jobs	Total Project Cost (SGF Contribution)
1.	**dTechs**	Installing 225 high resolution wireless sensors on the medium voltage supply in Oakville to help the utility detect issues on their grid, making the system more efficient and reliable	Power System Flexibility	9.00	$758,237 ($233,794)
2.	**Energate** *Project Complete*	Placing hundreds of smart energy management in-home displays to demonstrate their integration with advanced metering infrastructure and to test their ability to help grid operators manage the system	Customer Control	39.00	$7,828,315 ($2,872,775)
3.	**Essex Energy** *Project Complete*	Construction of a software system that will integrate data sources from a variety of technologies (including existing smart meters) to monitor the state of the distribution system and alert operators to system problems.	Adaptive Infrastructure	22.00	$1,946,970 ($687,519)
4.	**General Electric Canada** *Project Complete*	Building a facility for research and development in substation and distribution automation, transmission protection and control	Power System Flexibility	271.00	$37,018,800 ($5,288,400)
5.	**IBM** *Project Complete*	Creating a research collaboration centre that will use and analyze smart meter data. The project will leverage this data to identify ways to improve conservation and shift usage away from peak times.	Power System Flexibility	48.00	$43,172,530 ($1,465,663)
6.	**N-Dimension** *Project Complete*	Demonstration of cyber security capabilities for smart meter collector systems, providing monitoring and control capability over a smart meter network to ensure data is secure.	Adaptive Infrastruc-ture	14.50	$1,625,487 ($753,487)
7.	**Prolucid** *Project Complete*	Developing, testing and gathering data in real time to give local distribution companies more automated control over managing their systems by pinpointing outages and finding fault responses.	Power System Flexibility	13.50	$3,016,880 ($887,820)
8.	**Canadian Solar**	The Test Centre will provide testing and validation services for new microgrid system components and controls to achieve high energy penetration of renewable energy (RE) resources within a microgrid system.	Power System Flexibility	27.00	$6,484,912 ($2,934,000)
9.	**eCamion - Smart Energy**	This project showcases the interoperability of smart energy storage and various integrated technologies within 3 LDCs highlighting 3 distinct buildings and customer types and uses for each building.	Power System Flexibility	28.00	$6,967,768 ($3,339,634)
10.	**eCamion – Wood-stock**	This project showcases a flexible microgrid with grid connection. It creates a microcosm of a microgrid within a specific zone in the distribution system, including 14 customers who are all individually tied into a hub.	Power System Flexibility	10.00	$737,364 ($309,317)

Recipient	Project Description	Primary Smart Grid Objective	Direct Jobs	Total Project Cost (SGF Contribution)
11. **Energate** *Project Complete*	The project will deploy Energate's Consumer Connected Demand Response (CCDR) solution to support the introduction of opt-in dynamic pricing programs (e.g., variable peak pricing (VPP) & critical peak pricing (CPP)) to some PowerStream (Alectra) customers.	Customer Control	13.75	$3,249,242 ($1,349,320)
12. **Fleet-Carma** *Project Complete*	This project facilitates the integration of Plug-in Electric Vehicles (PEVs) into the Smart Grid, including PEV charging data collection effort, providing visibility into the grid impacts of PEV charging loads and driver behaviour, and a smart charging demonstration wherein charging loads are optimized according to grid capacity and user preferences.	Adaptive Infrastruc-ture	8.00	$819,274 ($339,637)
13. **Grid 20/20** *Project Complete*	GRID20/20 will demonstrate its OptaNODE™ device, which attaches to distribution transformers and provides essential Distribution Transformer Monitoring (DTM), increasing grid visibility, providing improved outage notification and theft detection.	Power System Flexibility	16.00	$3,456,760 ($1,657,370)
14. **McMaster University**	This project evaluates participants' behavioural response to various electricity pricing plans and various levels of customer-specific instantaneous load data, disaggregated by the household's electricity-using equipment and appliances.	Customer Control	19.50	$2,872,931 ($1,357,966)
15. **Opus One**	The project demonstrates a distributed energy management and storage network (DEMSN) on Hydro One's distribution system for the purpose of monitoring, protecting, controlling, and optimizing a distribution feeder with integrated distributed generation (DG) resources.	Power System Flexibility	10.00	$1,340,792 ($492,535)
16. **Panasonic**	The project demonstrates a 'grid-tied' microgrid. The microgrid will operate without impacting the grid power quality during grid-tied mode, and provide load/price forecasting ability to optimize its economical operation with peak-shaving features that will save energy costs for the UOIT campus.	Power System Flexibility	15.00	$8,407,000 ($3,829,000)
17. **Rogers**	The purpose of the project is to control energy consuming devices within the home. Rogers Conservation & Energy Management (RCEM) is an energy management and home automation system that delivers energy savings and convenience to its users by leveraging the Rogers Smart Home platform.	Customer Control	9.00	$5,310,478 ($2,403,489)

	Recipient	Project Description	Primary Smart Grid Objective	Direct Jobs	Total Project Cost (SGF Contribution)
18.	**Ryerson University - CUE**	Development and demonstration of a pole mounted energy storage system ("PMESS") on Toronto Hydro's grid. The pole mounted storage system will communicate with residential smart meters to identify load patterns of homes and residential EVs.	Power System Flexibility	4.00	$1,219,726 ($609,850)
19.	**Tech Mahindra**	This project is designed to tie a link between customer behaviour and the load on electric grid due to charging of electric vehicles (EVs). A customized analytics solution will be developed during this project to assess the consumer behaviour of EV owners, including charging patterns.	Adaptive Infrastructure	19.00	$3,060,328 ($1,391,250)
20.	**University of Ottawa**	The objective of this project is to develop innovative solutions to support a scalable, reliable, clean and secure Electric Vehicle (EV) ecosystem. The core solutions are (i) a mobile application providing users with charging strategies, (ii) a secure payment application for public/remote EV charging, (iii) a secure Vehicle to Home/Building (V2H/B) labratory demonstration, and (iv) an en route re-charging assistant.	Adaptive Infrastructure	25.00	$3,090,800 ($768,350)
21.	**Varentec** *Project Complete*	This Project will demonstrate the ability of the Edge of Network Grid Optimization (ENGO) distributed Volt/VAR control solution to establish a flatter voltage profile along an entire feeder line.	Power System Flexibility	4.00	$950,245 ($366,500)
22.	**Alectra**	Alectra will pilot the Maintenance Intelligent Line Electric System (MILES) on a subset of its feeder assets. The solution uses location techniques to identify voltage drops, allowing utilities to identify the cause and location of momentary outages in feeder areas. This project will confirm whether the solution will provide reliable results in an urban setting containing significant underground sections.	Power System Flexibility	1.70	$356,000 ($148,000)
23.	**ARDA**	The DC Microgrid project includes integration of distributed energy sources (Solar PV and Gas generator), energy storage, uninterruptable DC and AC loads, along with an AC-grid interconnection. The Microgrid controls enable the DC Microgrid to be operated both in grid-connected mode and as grid-independent system, thus maximizing energy security.	Power System Flexibility	7.40	1,124,988 ($290,000)
24.	**Burman**	The objective of the Loss Reduction Pilot at Chapleau is to test equipment and methodologies to reduce energy losses in the electrical distribution system. The Loss Reduction Pilot will install new equipment in locations strategically determined by Burman to deliver the maximum reduction in the losses experienced by Chapleau PUC in the Pilot site.	Power System Flexibility	0.30	$144,410 ($61,705)

Recipient	Project Description	Primary Smart Grid Objective	Direct Jobs	Total Project Cost (SGF Contribution)
25. **Green Power Labs**	This project will establish a technical standard in supervisory predictive grid control of PV power plants and enabling high penetration of DER in the Ontario electricity grid.	Power System Flexibility	4.00	$1,396,240 ($679,640)
26. **Hydro Ottawa**	Hydro Ottawa Limited proposes to develop a new transactive energy system. The solution allows utilities and consumers to better manage supply and demand of electricity. The solution will use communications hardware and software, and energy management algorithms to allow the grid to exchange demand/supply information with homes.	Power System Flexibility	12.00	$2,172,100) ($481,000)
27. **Kinectrics**	This project involves constructing and outfitting the lab with equipment that will provide 20 MVA of continuous power at variable voltages and frequencies. The purpose of the lab is to allow utilities, equipment manufacturers, and standards organizations to test, develop, and certify new smart grid and renewable energy equipment and systems.	Power System Flexibility	7.00	$6,116,861 ($2,000,000)
28. **Opus One**	This project demonstrates an integrated community microgrid on a distribution energy service platform, with advanced transformer monitoring and predictive analytics, coordinated with distribution operations and incorporating microgrid-assisted feeder automation capabilities.	Power System Flexibility	7.00	$2,942,000 ($1,096,000)
29. **RES**	RES Canada Inc. proposes to develop an automated grid-level storage system. The solution will consist of a containerised 2 MW lithium ion battery, AC/DC power conversion system, a battery management system and a pad mount transformer. The length of the project is approximately one and a half years.	Power System Flexibility	13.00	$8,577,040 ($1,905,000)
30. **Solantro**	This project will demonstrate a small smart microgrid (termed nanogrid) on residential properties. The nanogrid will comprise photovoltaic (PV) generation and battery storage, capable of both islanded and grid tied operation and provide utility grid control and monitoring services.	Power System Flexibility	16.00	$2,937,521 ($1,199,565)
31. **SPARQ**	The project will dynamically control distributed energy resources and provide economic benefits to a large subset of electricity customers within a target community with small-scale solar PV installations.	Adaptive Infrastruc-ture	18.50	$3,522,242 ($1,504,026)
32. **Survalent**	The goal of this project is to develop and evaluate an integrated Distribution Management System (DMS) to Oakville's Hydro existing SCADA and Outage Management System (OMS) to provide a fully integrated Advanced Distribution Management System.	Power System Flexibility	6.00	$307,500 ($151,500)

	Recipient	Project Description	Primary Smart Grid Objective	Direct Jobs	Total Project Cost (SGF Contribution)
33.	**Utilismart**	Utilismart proposes to develop a data platform that integrates disparate data from multiple third party systems in a common form so that utility applications can interoperate to optimize distribution assets/resources in near real-time.	Power System Flexibility	10.00	$2,051,900 ($982,450)
34.	**Opower Inc.** *Project Complete*	Opower teamed up with Hydro Ottawa to deliver a Behavioural Demand Response (BDR) pilot (Pilot) to demonstrate that Ontario LDCs can effectively reduce peak load through customer engagement and behavioural science.	Power System Flexibility	4.75	$1,060,000 ($570,000)
35.	**Team Ontario Smart Home** *Project Complete*	Team Ontario was a collaboration of students competed in the U.S. Department of Energy Solar Decathalon 2013, where they showcased ECHO, and ECological HOme built for today's prospective young, homeowner.	Power System Flexibility	10.00	$1,558,186 ($79,253)
36.	**MaRS Discovery District- Green Button** *Project Complete*	The Green Button pilot was initiated in 2014 offering residential and commercial customers a choice of four applications to easily access their electricity data and better manage their usage.	Power System Flexibility	25.00	$2,219,900 ($625,000)
37.	**Ryerson University Smart Grid Lab** *Project Complete*	Ryerson developed a smart grid laboratory which can host an infrastructure similar to a small Advanced Distribution System. The collaborative laboratory provides facility for testing and demonstrating smart grid concepts and products on a utility scale for Ontario institutions.	Power System Flexibility	6.00	$1,071,468 ($571,468)
38.	**Advanced Energy Centre (AEC)**	The Advanced Energy Centre (AEC) is a public-private partnership founded in 2014, within the MaRS Discovery District, the Ontario Ministry of Energy is one of the founding partners.	Power System Flexibility	7.00	$7,361,190 ($5,496,140)

APPENDIX I: BARRIERS TO DOMESTIC UPTAKE

The Ministry indicates results from LTEP consultations, independent studies, and the SGF survey suggest that there are a number of barriers to grid modernization.

Commented [RCZ3]: These barriers go beyond developing a business case

BARRIER	DESCRIPTION
Regulatory Barriers	
Diffuse Benefits	LDCs lack an incentive to invest in smart grid investments since they bear all of the cost, while much of the benefit accrue to other sector participants – generation, transmission, and the end user.
OEB Treatment of Smart Grid Investments	The OEB treats and evaluates smart grid technology no differently than traditional assets. This approach fails to recognize the unique characteristics of these technologies
Uncertainty around OEB approval processes	LDCs have expressed their concern that they do not have the certainty of the OEB's expectations for lengthy and expensive applications for smart grid solutions.
Bias towards capital	The LDC business model – particularly their regulated returns – encourage a bias towards traditional, capital intensive spending
Non-Regulatory Barriers	
Cultural	Supporting the development of innovative business practices; encouraging changes to long-standing operating practices.
Labour	Supporting initiatives that familiarize LDC staff with grid modernizing technologies, and knowledge transfer between workers
Information sharing	Exploring avenues to facilitate discussion on the future of grid modernization in Ontario
Planning	Supporting the establishment of long-term grid modernization plans, or supporting customer segmentation studies
The evolving customer	There is general consensus that customers generally want to become more involved in the electricity sector, and demand more from their utilities. Some will become prosumers – both consumers and producers of electricity. Little is known however about the Ontario-specific customer's expectations are evolving
Sector maturity	Working with vendors articulate business cases and their value propositions to Ontario's LDCs
Limited access to financing and growth capital for vendors	Difficulty securing financing at critical stages in technology and business development
Limited data to make informed decisions about investing in smart grid.	Working with vendors to articulate business cases and their value propositions to Ontario's LDCs; providing support for deployments.
LDC Financial Constraints	LDCs can be financially constrained, as under their current ownership structure, existing shareholders may be unable to contribute additional capital or reinvest more of the utility's earnings – limiting a willingness to take risks on demonstrations or deployments

APPENDIX J: INNOVATION SUPPORT PROGRAMS IN THE PROVINCE

The Ministry of Economic Development and Growth (MEDG) and the Ministry of Research, Innovation and Science (MRIS) share a mandate to create an innovation-economy in the Province and support job creation and economic growth. The table below shows innovation support programs in the Province.

Energy indicates the renewed SGF is the only government program exclusively targeted towards commercial development and domestic uptake of smart grid technologies. This sector is expected to experience significant and sustained growth over the coming decades; a renewed SGF positions Ontario to provide direct support and expertise to this specific economic sector and benefit from economic growth and associated job creation. Appendix K provides an overview of projected growth associated with Smart Grid.

Ontario has committed to a province-wide rollout of Green Button, and uptake and integration of EVs in Ontario.

Program	Funded by	Focus Areas
Innovation Demonstration Fund (IDF)	MEDG (program sunset)	• Innovation • Commercialization of new technologies • Job growth
Regional Development Funds in Southwestern, Eastern, Northern, and Rural in Ontario	MEDG	• Encourage innovation, collaboration and cluster development • Job growth • Attract private sector investment • Based on geographic area
Jobs and Prosperity Fund (MEDG)	MEDG	• Enhance innovation • Create jobs • *Streams*: Economy, Food and Beverage Growth, Forestry Growth and Strategic Partnerships
Investment Accelerator Fund (MaRS)	MEDG/MRIS	• Test and develop new technology in the early stages • *Streams:* Information Technology, health and cleantech
Ontario Scale-Up Vouchers Program (MaRS)	MEDG/MRIS	• To support the growth of high-potential, technology-driven small- and medium-sized enterprises (SMEs) in the province
Small Business Innovation Challenge (Ontario Centre for Excellence – OCE)	MEDG/MRIS	• To support the growth of high-potential, technology-driven SMEs in the province
TargetGHG (OCE)	MOECC through the Climate Change Action Plan	• Reduce greenhouse gas emissions • Increase energy efficiency • Support cleantech innovation • Drive job creation and economic development
Conservation Fund (Independent Electricity System Operator - IESO)	IESO	• To develop or pilot innovative conservation technologies, practices, research and programs

APPENDIX K: PROJECTED GROWTH ASSOCIATED WITH SMART GRID

The Ministry has provided an overview of projected Smart Grid growth.

Technology	Expected Growth
Smart grid (general)	• The global smart grid market is projected to grow at a compound annual growth rate of 29.5% between now and 2025[1].
Smart Buildings/Internet-of-Things	• Market value projected to increase to $36 billion in 2020, growing at a compound annual rate of 30%. • By 2020, 20.8 billion consumer items are expected to be connected to the Internet[2]
Smart Home Data Analytics	• Worldwide revenue is expected to increase from $1.3 billion in 2017 to $11.0 billion in 2026[3].
Smart Grid Analytics and Software	• Global market for smart grid IT and analytics for software and services is expected to grow from approximately $12.8 billion in 2017 to more than $21.4 billion in 2026[4].
Energy Storage	• By 2022, the capacity of installed energy storage in the United States is expected to be 12 times greater than that in 2016. • By 2022, the market is expected to be worth ten times its 2016 value[5].
Electric Vehicles	• In 2016, Ontario had the highest year-over-year growth of EV uptake in Canada: 67% increase in annual sales[6].
Cybersecurity	• Global smart grid cybersecurity spending is expected to grow from $1.8 billion in 2017 to nearly $3.2 billion in 2026[7].

[1] Accuray Research LLP, https://www.reportlinker.com/p04772878/Global-Smart-Grid-Technology-Market-Analysis-Trends-Industry-Forecast-to.html
[2] Advanced Energy Centre, Tech Trends Quarterly, July 2017.
[3] Advanced Energy Centre, Tech Trends Quarterly, July 2017.
[4] Navigant, "Global Market for Smart Grid IT and Analytics for Software and Services is Expected to Exceed $21.4 Billion in 2026" https://www.navigantresearch.com/newsroom/global-market-for-smart-grid-it-and-analytics-for-software-and-services-is-expected-to-exceed-21-4-billion-in-2026
[5] GreenTechMedia. "US Energy Storage Market Experiences Largest Quarter Ever" https://www.greentechmedia.com/articles/read/us-energy-storage-market-experiences-largest-quarter-ever
[6] Fleetcarma. Electric Vehicle Sales In Canada: 2016 Final Update. http://www.fleetcarma.com/ev-sales-canada-2016-final/
[7] Navigant, Cybersecurity for the Digital Utility, Q3 2017. https://www.navigantresearch.com/research/cybersecurity-for-the-digital-utility