Business Plan 2018–2020

Independent Electricity System Operator

DECEMBER 18, 2017

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Contents

Introduction

The Independent Electricity System Operator (IESO) is responsible for maintaining a reliable and efficient province-wide power system, today and into the future. This includes directing the flow of electricity across the province's transmission system, planning for the province's future energy needs and acquiring resources needed to maintain reliability.

Another part of the IESO's core mandate involves the development and implementation of effective policy that reflects the needs of Ontario and its consumers, while continuing to foster innovation. The IESO is a trusted source of transparent, accessible and timely information, providing independent advice to government and industry. It also stimulates innovation within the energy sector with a core focus on reliability, resiliency and market-based solutions that can benefit Ontario. As Ontario's electricity sector continues to evolve, the IESO will enable innovative ideas that help open up new opportunities for consumers and stakeholders, drive down costs, and lead to a more efficient and effective electricity grid.

Changing environment for business planning

The environment in which the IESO is planning its activities for the 2018–2020 business planning period is quickly evolving. Some of these changes include rapid technological advancement, increasing consumer engagement, growth in both renewable and distributed energy resources, and climate change policies. This evolving environment is changing the dynamics of today's electricity system and how the IESO plans to meet the future needs of Ontarians. These changes are creating new operating challenges in managing the bulk power system, but they are also creating new opportunities for consumers, communities and sector participants to get more actively involved.

With respect to energy demand, forecasts indicate it is expected to increase in 2018 as a result of projected stronger economic growth in the industrial sector. Ontario's peak demand is expected to remain relatively flat. Conservation savings, growing embedded generation output and the Industrial Conservation Initiative have offset increased demand from population growth and economic expansion. This trend is expected to continue over the business planning period. However, given the uncertainty in any demand forecast, the IESO's planning considers a range of outlooks for electricity demand in Ontario, from below current levels to significantly higher demands driven by different levels of electrification.

The IESO is also leading fundamental changes to Ontario's electricity landscape, including a Market Renewal Program that will address current inefficiencies, put downward pressure on costs for consumers and stakeholders, and design a market that can better meet future needs. The IESO is also developing an Implementation Plan associated with initiatives in the Ministry of Energy's 2017 Long-Term Energy Plan (LTEP).

Market Renewal is about improving the way electricity is priced, scheduled and procured in order to meet Ontario's current and future energy needs reliably, transparently, efficiently and at the lowest cost.

In the face of this change, delivering reliability now and in the future remains a priority for the IESO. In addition, the IESO recognizes that stakeholder and community engagement is critical to the success of its initiatives. The IESO values the diversity of its stakeholders and the communities with which it engages, as they assist the organization in making informed decisions. To support its efforts, the IESO applies engagement principles to its wide-ranging initiatives to ensure stakeholders and communities have the opportunity to provide input on matters that impact them. The principles help ensure inclusiveness, sincerity, respect and fairness in its engagements.

Organizational focus

In early 2017, the IESO's Board of Directors appointed Peter Gregg as the IESO's new President and Chief Executive Officer. Under Mr. Gregg's leadership, the IESO will fulfill its broad mandate in Ontario's electricity sector, with a focus on two of its most important responsibilities: ensuring a reliable and efficient province-wide power system today and into the future, and informing and implementing policy while fostering innovation.

Ensuring a reliable and efficient power system includes coordinated reliability, leveraging expertise and utilizing changing technologies and becoming a leader in cybersecurity for the electricity sector. The IESO will prioritize the least-cost procurement of energy and resources in the interests of ratepayers, and enhance the use of a range of market tools to acquire system needs and to make decisions in the context of the government's broader policy goals.

Informing policy development and implementation includes enhancing the IESO's trusted advisor status by being more proactive, forward looking and broader in scope, and engaging stakeholders in a more targeted and purposeful manner. The IESO anticipates that the change the electricity sector is undergoing will continue to accelerate. Innovation will play a key role in helping to navigate through that change, and the IESO will play a key role in enabling it.

Another focus will be on the efficient and cost-effective delivery of corporate services within the organization. This includes building a customer service mindset into the IESO's work with internal customers and adopting an enterprise-wide view in support of the IESO's business. The IESO will re-engineer business processes where needed to address inefficiencies, consolidate and enhance project management capabilities and re-examine its approach to risk.

The expected outcomes of these efforts are:

- sustained reliability and resiliency for Ontario
- the cost-effective acquisition of the right mix of energy
- customer-focused internal support and greater productivity with higher efficiencies.

It is within this context that the IESO has planned its business activities and initiatives for the 2018–2020 period.

Summary of priority initiatives and resource requirements

The IESO's Business Plan provides an overview of the organization's priority initiatives and associated resourcing requirements needed to maintain the high level of performance required to deliver its core electricity system responsibilities as well as to deliver on additional initiatives that the IESO is undertaking. These additional initiatives include:

- progressing the Market Renewal Program (see page 5)
- developing the IESO Implementation Plan for initiatives in the 2017 Long-Term Energy Plan, as well as the implementation of these initiatives (see page 7).

The work associated with these initiatives leverages the most efficient deployment of IESO's current resources and requires additional resources in some areas.

Other priorities for the IESO for this business planning period include:

- a focus on cybersecurity (see page 9)
- completing the Conservation First Framework (CFF) Mid-Term Review (see page 10).

Even with these additional initiatives, the IESO intends to hold its revenue requirement for 2018 at 2017 approved budget levels. This means the organization will continue its efforts to find efficiencies and opportunities for expense reductions. Challenges are presented in managing the budget in 2018 and beyond as increases in compensation and benefits begin to outpace opportunities to reduce costs.

Even with its additional initiatives, the IESO intends to hold its revenue requirement for 2018 at 2017 approved budget levels.

For 2018, the IESO's proposed core operating expenses are $190.8 million. The IESO expects these expenses to be funded by usage fee revenues.

In 2018, the IESO is planning a capital envelope of $22.6 million to facilitate the delivery of corporate priorities associated with its core business. An investment of $4.0 million in capital costs is required for the next stage of the Market Renewal Program. Further details on the overall capital program are included in Appendix 3.

For 2018, the IESO anticipates an average headcount of 688 full-time equivalents (FTEs) for core operations, including implementation of LTEP initiatives and an incremental headcount of 43 FTEs, for a total of 731 FTEs. The incremental headcount will be required for the Market Renewal Program.

More detailed information about the IESO's proposed budgets for the planning period is available in the Financial Overview section (see page 13).

The IESO is also undertaking additional initiatives that will not impact its core operating resource requirements, as these initiatives are funded from other sources.

The IESO is providing support for the Ontario Climate Change Solutions Deployment Corporation as a service provider; costs for this work are being charged back to the Ministry of the Environment and Climate Change (see page 11). The IESO is supporting the effort to enhance the value of smart meter data; the Smart Meter Entity fees and revenues are the subject of a separate revenue requirement submission to the Ontario Energy Board (OEB) (see page 12).

The IESO is also working to design and deliver province-wide distributor CDM programs in support of achieving Conservation First Framework targets, to be funded from CFF budgets.

The IESO has established corporate performance measures (CPMs) for its key initiatives across the organization, which assess progress toward the achievement of its core mandate and strategic objectives. The targets for 2018 have evolved to be more specific, measureable, achievable, relevant and time-bound. The IESO continually strives to achieve higher outcome levels. In 2018, the business will further align performance measures to provide enhanced focus on organizational efforts within the context of its strategic direction, associated key risks and mitigation plans in support of the IESO's mandate to meet the changing needs of the business and wider electricity sector. More information on the IESO's CPMs for the planning period is found in Appendix 1.

The IESO has also assessed its key areas of risk in relation to strategic areas of focus, developed mitigation plans to support the organization to deliver on its mandate and put in place a robust risk framework to continue to identify and manage risk, which includes monitoring and reporting. More information on the IESO's key risks and how they will be addressed during the planning period is available in Appendix 2.

Market Renewal

Market Renewal is a collaborative effort by the IESO and industry stakeholders to make fundamental and substantive changes to the design of the Ontario electricity market.

The changes are much needed and long-awaited. Since the market opened in 2002, the market's design has changed only to address incremental and pressing needs. While these measured modifications were being made, the electricity sector was experiencing significant changes: coal was eliminated from Ontario's supply mix, distributed energy resources increased, new technologies emerged, consumers became more engaged and renewables were integrated into the market.

Ontario is now in a stable supply situation that is expected to continue into the 2020s, making this an opportune time to consider and implement needed market design changes that would realize significant benefits for the province. Market Renewal is an investment in the future.

The Market Renewal work that the IESO and industry stakeholders have begun will create a marketplace with lower costs, more opportunities, reduced waste and more certainty for market participants. It will help ensure the province is prepared to meet its future electricity needs, even as the sector and technology continue to evolve.

The successful implementation of the Market Renewal initiatives will provide the IESO with the flexibility to manage unexpected short-term changes in the system, such as those caused by variable generation. It will improve the way that Ontario acquires electricity to meet medium- and long-term needs, as well hour-to-hour and minute-to-minute time frames, meeting consumers' need for a reliable source of energy.

The benefits from Market Renewal are likely to grow over time as Ontario's electricity sector continues to decarbonize, as contracts expire, and as the sector becomes more distributed in nature.

More efficiently and effectively acquiring and dispatching electricity will save consumers and sector participants money. An independent study commissioned by the IESO and published in April 2017 showed the benefits of Market Renewal. The analysis found that starting in the early 2020s, the proposed Market Renewal initiatives could result in an estimated benefit of up to $5.2 billion over 10 years, the majority of which will be realized by consumers.

Significant progress has been achieved to date. Stakeholders are integral to the market renewal process because their perspective on the new design is critical. Those focused on the single schedule market and the incremental capacity auction streams are on track to make high-level design decisions by mid-2018. Additional stakeholder engagement has begun on the day-ahead market and the enhanced real-time unit commitment initiatives. Stakeholder engagement efforts on capacity

exports and enabling system flexibility were added to the Market Renewal Program as well; near-term solutions for these work streams are expected in early 2018.

The Market Renewal Working Group has created a subcommittee to answer some core questions about the role of non-emitting resources in the new electricity marketplace. The Non-emitting Resources Subcommittee is focussing on:

- removing any barriers to market participation by non-emitting resource generators
- implications to the market of a high penetration of low- or zero-cost resources
- exploring incentive mechanisms for non-emitting resources.

A report from the subcommittee is expected in 2018.

The Market Renewal Working Group has also been exploring issues of governance as they relate to stakeholder involvement in the proposed new market structures and stakeholders' need for confidence in the process. Results of a scan of dispute resolution processes and how demand curves are established in other jurisdictions are expected in early 2018.

Implementation Plan for Long-Term Energy Plan Initiatives

The Ministry of Energy released its 2017 Long-Term Energy Plan (LTEP) on October 26. Since the passing of Bill 135, the *Energy Statute Law Amendment Act, 2016*, upon receiving a directive on the initiatives included in the LTEP, the IESO will be responsible for the development of an Implementation Plan containing an outline of the steps the IESO intends to take to meet the requirements set out in the directive.

The IESO informed the development of the Long-Term Energy Plan in 2016 with the development of a technical report, the Ontario Planning Outlook (OPO), which included assessments on the adequacy and reliability of electricity resources for capacity, reliability, market and system operations, transmission and distribution. The LTEP forecasts were based on IESO data but also include inputs determined by the Ministry of Energy to reflect government policy. The LTEP concludes that Ontario is well-positioned to meet provincial needs until the mid-2020s, consistent with the findings of the OPO.

The LTEP references nine initiatives the IESO is directed to undertake. To accomplish them, the IESO is engaging stakeholders, communities, and First Nations and Métis from the beginning to ensure that initiatives are developed collectively by all affected parties. This includes engagement on the development of the Implementation Plan to seek input on the overall approach (e.g., will the proposed activities effectively respond to the directive or are other activities required). In addition, separate engagement initiatives will be launched post-Implementation Plan to develop and deliver on each initiative. The IESO will also coordinate with the OEB on the Implementation Plan as well as on implementation of the directive items.

The LTEP initiatives will be implemented within the context of other IESO priorities, including engaging stakeholders in a targeted and purposeful manner, the conservation mid-term review, market renewal, sustained reliability and enabling innovation.

Following are the nine directed initiatives that the IESO will be responsible to deliver:

- The IESO will review and propose options to improve energy support programs to First Nations and Métis, with the objective of better aligning programs with community needs and interests.
- The IESO will prepare a report on options to improve conservation programs, and access to programs, for First Nations and Métis. The report timing will be aligned with the Mid-Term Review of the Conservation First Framework.
- The IESO will develop a program for innovative renewable distributed generation projects to demonstrate enhanced system integration and deployment potential, including projects demonstrating virtual net metering models that would inform potential future net metering policy updates.

- In coordination with the OEB, the IESO will review market rules, industry codes and regulations to identify potential obstacles to fair competition for energy storage with other technologies in the delivery of services, and where appropriate, propose mitigation strategies.
- The IESO will identify options for pilot projects that evaluate the electricity system benefits, costs and GHG emission reductions of using electricity to create hydrogen.
- The IESO will develop a formal integrated bulk system planning process that ensures solutions are identified transparently as needs materialize. The process shall also include a coordinated, cost-effective, long-term approach to replacing transmission assets at end-of-life.
- The IESO will develop a competitive transmitter selection or transmission procurement process that is transparent, efficient and able to respond to changing policy, market and system needs.
- The IESO will review and report on the regional planning process, taking into account lessons learned, and provide options and recommendations.
- The IESO will review and report on technical criteria used to assess customer reliability in order to identify and evaluate options for local area enhancements.

Cybersecurity

A key focus for the IESO will continue to be cybersecurity. These threats continue to exploit the increased complexity and connectivity of critical infrastructure systems on which Ontario depends. As information sharing systems are challenged by more frequent and often more creative and sophisticated attacks, the need for robust and integrated cybersecurity management becomes vital.

Today, the IESO's role as a reliability coordinator goes beyond the flow of electrons. In an increasingly interconnected, distributed and widespread sector, maintaining the safe and sustainable operation of the power grid extends to being best-in-class in cybersecurity. The IESO complies with all cybersecurity standards set forth by the North American Electric Reliability Corporation and, in 2016, began operating under an even more robust security governance framework, based on the National Institute of Standards and Technology Framework for Improving Critical Infrastructure Cybersecurity. This framework is considered absolute best practice on cybersecurity across all industries.

The IESO operates under a framework that is considered absolute best practice on cybersecurity across all industries.

In addition to enforcing North American standards and rigorous internal practices, the IESO has taken a leadership role in cross-sector cybersecurity awareness through industry capacity building sessions, the promotion of leading security standards and best practices, and collaboration with organizations and experts in cyber- and IT security policy from across North America. For example, the IESO regularly hosts an executive cybersecurity briefing that is attended by industry executives and cybersecurity experts representing a broad cross-section of industries in both the private and public sectors, as well as multiple levels of governments.

The IESO also works to inform policy and regulation, which includes working with the OEB to ensure there is appropriate regulatory oversight to mitigate cybersecurity risks and threats at the distribution level for Ontario's local distribution companies (LDCs). The IESO has been supporting the development of the OEB's proposed regulatory framework for cybersecurity.

The IESO also works toward additional information exchange throughout Ontario's energy sector and for broadening its cybersecurity framework model to other sectors to reflect the interconnected nature of cybersecurity management.

Conservation Mid-Term Review

Costs are lower today because of the conservation efforts of the last 10 years, which have helped avoid investments in more expensive electricity infrastructure and new generation. Over the business planning period, the IESO will continue to oversee the implementation of the Conservation First Framework. Covering the period from 2015 to 2020, the framework aims to achieve 7 terawatt-hours (TWh) of electricity savings through programs and initiatives offered to all customer segments. The framework also includes delivering 1.7 TWh of energy savings through the Industrial Accelerator Program, which has been designed to help transmission-connected customers achieve energy savings.

Based on preliminary unverified results, as of Q3 2017, LDCs have collectively achieved 49 percent of the 2020 provincial Conservation First Framework target, or 3.44 TWh of the 7 TWh target. Additionally, the Industrial Accelerator Program has achieved 0.28 TWh of the 1.7 TWh target, or about 17% percent of the 2020 target. This number is expected to increase as more projects are verified and implemented.

A mid-term review began in 2016 and is expected to be completed in 2018. The focus of the review is the cost-effective delivery of both LDC and transmission-connected customer conservation programs, and assurance that LDC and directly connected customer program progress is in line to achieve the 2020 energy-savings targets. It is specifically looking at how conservation and energy-efficiency programs are meeting customer needs, distributor budgets and targets for conservation savings, and coordination with the province's climate change objectives, including Green Ontario Fund programs. The IESO is also using the mid-term review to identify how conservation programs can better meet the needs of local and regional electricity planning. Multiple feedback opportunities have been built into the review process to ensure the views of stakeholders are heard.

In conjunction with this review, the IESO will give the province options for improving conservation programs and their availability for First Nations and Métis people, including the 10 communities served by unlicensed LDCs in northwestern Ontario known as the Independent Power Authorities.

Specifically, it will deliver a report, including recommendations, on energy conservation initiatives designed to align with the specific needs and challenges of Ontario's First Nation and Métis communities, and provide options for improved access to these programs. The report will be informed by an analysis of community energy plans funded through the IESO's Aboriginal Community Energy Plan program, and by extensive engagement with First Nation and Métis communities province-wide. Included will be an assessment of existing programs offered under the Conservation First Framework and the Demand Side Management Framework for natural gas distributors, as well as strategies for supporting energy education and capacity building, the integration of small-scale renewable energy projects, net metering and other solutions. The report will form the basis for new programs that are expected to launch in 2018.

Work with Ministry of Environment and Climate Change

The IESO is collaborating as a service provider with the Ministry of Environment and Climate Change (MoECC) to support the Green Ontario Fund, by assisting with the design and operation of a website, the management of a call center and the design and delivery of programs. The IESO has valuable experience in delivering electricity conservation programs to customers of all types and is helping develop greenhouse gas savings programs that will complement and build on the success of its existing conservation and energy-efficiency programs.

Programs are intended to focus on reducing greenhouse gas emissions associated with energy usage and energy sources from Ontario residences and businesses. Leveraging the IESO's experience in designing and implementing customer-focused conservation programs will result in efficiencies for the province.

A call centre and website serve as a one-window approach for Ontarians seeking information and access to all related programs in the province that reduce or support greenhouse gas reductions and promote energy conservation. This includes Save on Energy and gas utility programs.

All funding for Green Ontario Fund programs, with the exception of the province-wide Smart Thermostat Rebate Program, will be recovered through the Greenhouse Gas Reduction Account. Funding for the Smart Thermostat Rebate Program will be jointly funded from the Conservation First Framework budget and GreenON.

The incremental resource requirement in support of MoECC will be in line with the expanding scope of this work; efforts are already underway to design and implement other Green Ontario Fund programs that will help reduce greenhouse gas emissions while building on the province's existing suite of conservation and energy-efficiency programs.

Enhancing the Value of Smart Meter Data

The almost five million smart meters installed across the province have enabled the collection of vast amounts of data that can be leveraged to create innovative products and services. The IESO, as the Smart Metering Entity (SME) for Ontario, is responsible for the implementation, integration and operation of the Meter Data Management/ Repository (MDM/R), the data repository that processes, stores and protects the electricity consumption data of residential and small business customers used for consumer billing by Ontario's LDCs.

The IESO has begun to work with stakeholders to define the rules for how third-parties can gain access to that data while protecting privacy and confidentiality. A Data Strategy Advisory Council has been established with representatives of various sectors across the province to provide expert advice and to help design the Third-Party Access Implementation Plan.

While it's difficult to predict all innovative uses for the data at this time, the IESO expects third-parties to seek access to the MDM/R data set for a range of purposes; these may include the design, development and implementation of conservation and demand response programs; electricity system planning; policy development; academic research; outage management; predictive billing; and development of new products and services that support the potential of big data. In this way, the full value of this data may be leveraged for years to come.

The IESO expects the Third-Party Access Implementation Plan to be complete in 2018. This includes the processes, procedures and tools to enable the SME to accept and process third-party data requests.

While the work of the SME is reflected in a separate rate case from the IESO's core business, these efforts have sector-wide implications, including for the future development of conservation programs.

Financial Overview

The IESO's Business Plan provides an overview of resourcing requirements to maintain high levels of performance required to deliver its core electricity system responsibilities as well as to execute key initiatives, including implementation of initiatives in the Long-Term Energy Plan, cybersecurity leadership and continued progress of the Market Renewal Program. The IESO intends to hold its revenue requirement for 2018 at 2017 approved budget levels. The organization continues work to identify potential operating efficiencies within the planning period.

The revenue requirement for 2018 is $190.8 million, which is at the same level as 2017. The revenue requirement will be funded by the IESO usage fees, with no further registration fee revenue expected in 2018.

The Long-Term Energy Plan was released by the Ministry of Energy on October 26, 2017. The IESO will be responsible for the development of an Implementation Plan to be completed by January 31, 2018. To deliver on the initiatives in the Implementation Plan, the IESO will require a combination of its core as well as incremental resources over the course of the business plan.

A key focus for the IESO will continue to be cybersecurity. Over the past two years the IESO has made significant investment in its cybersecurity technology. The current business plan includes resources to implement a Security Operations Centre for 24-hour monitoring of cybersecurity threats and for the addition of advanced malware protection software.

Increases in compensation and benefits costs are a key expense component that is closely managed. Annual compensation escalations due to collective agreements and expected estimates of annual pension and post-retirement benefits are putting upward pressure on the current business plan. This is partially mitigated by increased staff pension contributions resulting from pension plan redesign.

Within the IESO's mandate, it operates several programs that are funded from other sources and are not included in this business plan; the smart metering entity, market rule enforcement, conservation programs related to the Conservation First Framework and the Green Ontario Fund.

The proposed 2018 budgeted expenses include the IESO's core and strategic activities, including Market Renewal and LTEP implementation, but no allowance has been made for other policy initiatives.

For 2018, the IESO anticipates an average headcount of 688 to deliver its core electricity system responsibilities, begin implementation of the initiatives in the Long-Term Energy Plan and cybersecurity initiatives. The Market Renewal Program will require an additional average headcount of 43, bringing the total headcount requirement for the IESO to 731 in 2018.

Detailed Financials

The following table outlines the operating revenues and expenses over the business planning period.

Pro Forma Statement of Operations
For the Year Ended December 31
(in Millions of Canadian Dollars)

Budget ($ Millions)	2017	2018	2019	2020
Revenue				
IESO Usage Fee	190.8	190.8	190.8	189.6
Registration Fees	0.6	–	–	–
Total Revenue	**191.4**	**190.8**	**190.8**	**189.6**
Expenses				
Compensation & Benefits	109.2	110.3	117.1	118.7
Professional & Consulting Fees	17.8	16.9	17.6	17.9
Operating & Administration	35.5	36.6	37.1	37.3
Operating Expenses	**162.5**	**163.8**	**171.8**	**173.9**
Amortization	18.3	17.7	17.4	16.9
Net Interest	(1.4)	(3.4)	(5.3)	(6.7)
Total Core Operations	**179.4**	**178.1**	**183.9**	**184.1**
Market Renewal	12.0	12.7	6.9	5.5
Total Expenses	**191.4**	**190.8**	**190.8**	**189.6**
Operating Surplus/(Deficit)	–	–	–	–
Accumulated Operating Surplus	10.0	10.0	10.0	10.0

Capital

The IESO regularly prioritizes capital initiatives. The business planning process establishes an appropriate capital envelope for core operating initiatives with commitments approved individually on an ongoing basis. This practice is consistent with prior years. The Market Renewal Program will begin its capital implementation stage at the end of 2018. The table below provides a summary of the total capital spending required in this plan. Project details and associated descriptions are included within Appendix 3.

Capital ($ Millions)	2017	2018	2019	2020
Core Operations Initiatives	25.0	22.6	24.1	17.5
Market Renewal	–	4.0	34.0	48.0
Total Capital Envelope	**25.0**	**26.6**	**58.1**	**65.5**

Staffing

Total average FTEs are expected to increase in the 2018–2020 planning period due to temporary resourcing required to support the Market Renewal Program. Additional resources in core operations to support the LTEP implementation and cybersecurity initiatives have been offset by the reclassification of resources to market rule enforcement, conservation programs related to the Conservation First Framework and the Green Ontario Fund, which do not impact this business plan.

Full Time Equivalents	2017	2018	2019	2020
Core Operations	687	688	695	692
Market Renewal	25	43	86	92
Total FTEs	**712**	**731**	**781**	**784**

Market Renewal Program Financials

The Market Renewal Program is progressing on track with current total program budget estimated at $200 million, with further budget refinement expected with the completion of the Business Case at the end of 2018.

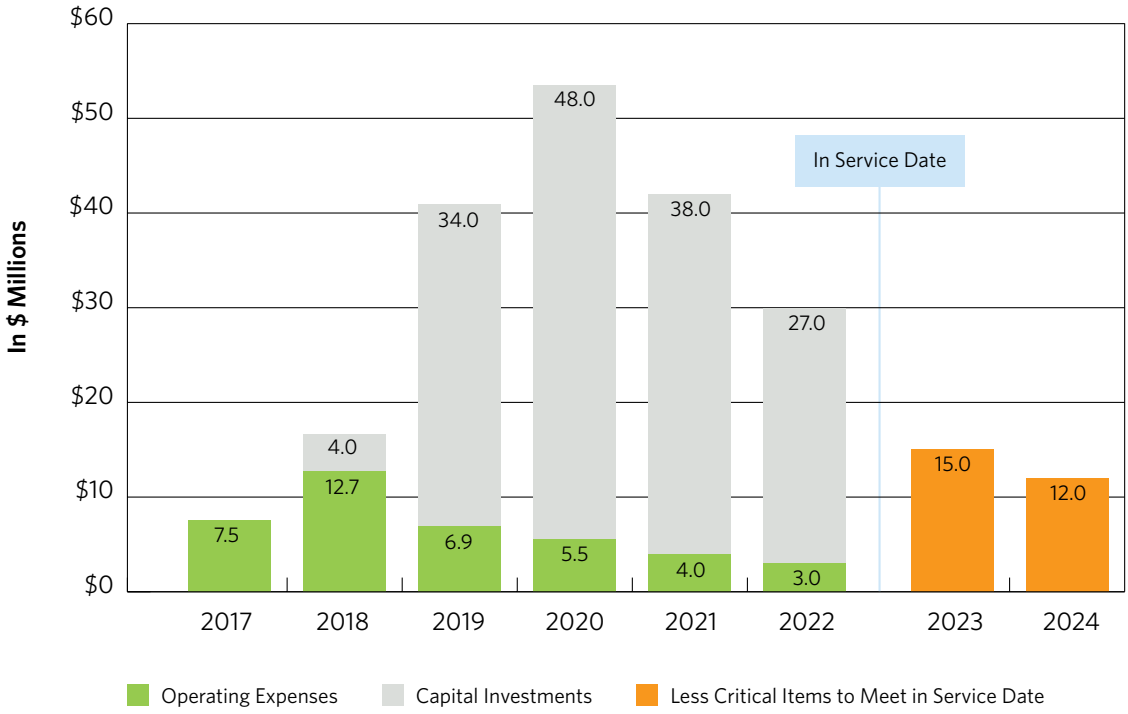
The projected spending related to Market Renewal in 2017 is $7.5 million, compared to a budget of $12.0 million. Spending in 2017, consistent with projections developed in Q3, is expected to be lower than planned due to slower ramp up of internal program resources and budgeted contingency amounts not required.

In 2018, Market Renewal costs continue to be predominantly classified as operating expenses, as the program plans to complete the high-level designs related to energy and capacity while balancing emerging operability challenges. The operating budget for the program in 2018 is $12.7 million.

In late 2018, Market Renewal is expected to start the implementation phase of the program, at which time many costs will be classified as capital. The capital budget for the program in 2018 is $4.0 million.

The program will draw support from additional internal and external resources as well as from other IESO corporate support functions.

Projected Market Renewal Costing



Green Ontario Fund

In early 2017, the IESO was directed by the Ministry of Energy to collaborate with the Ministry of Environment and Climate Change (MoECC) to support the Green Ontario Fund by assisting with the design and operation of a website, the management of a call center, and the design and delivery of programs that will help reduce greenhouse gas emissions while building on the province's existing suite of conservation and energy-efficiency programs. All funding for Green Ontario Fund programs, with the exception of the province-wide Smart Thermostat Rebate Program, will be recovered through the Greenhouse Gas Reduction Account. Funding for the Smart Thermostat Rebate Program will be jointly funded from the Conservation First Framework budget and GreenON.

Since the August 30, 2017, launch of GreenON.ca, the IESO has been actively negotiating contracts with three vendors to undertake the installation of smart thermostats and the supporting expert energy advice program for residential customers. Collectively, these contracts are valued at up to $55 million.

Since late April, the IESO has undertaken a significant amount of work focused on website development and marketing, provision of a contact centre and client relations management services, program design and project management. Given the IESO's continued and expanded scope of work with the MoECC, a dedicated project team has been established for the Green Ontario Fund, a team that continues to grow.

As of October 31, 2017, the IESO has spent $1.3 million of the $3.4 million budget, which includes IESO and third-party costs that have been incurred and invoiced to the MoECC. Projected costs to the end of 2017 are under $2 million.

Furthermore, approximately 72 percent of the total budget has already been committed.

The IESO remains uniquely positioned to effectively deliver on the design and implementation of Green Ontario Fund programming and integration with existing energy conservation programs delivered through the Conservation First Framework.

Appendix 1: Corporate Performance Measures (CPMs)

The IESO's work is focused on achieving the outcomes of this Business Plan. The 12 corporate performance measures (CPMs) defined for 2018 are intended to help drive organizational performance towards the achievement of key initiatives within the focus areas of energy utilization, resource acquisition as well as policy, business innovation and engagement and finally, corporate resources.

The 2018 CPMs consider input from the IESO's Stakeholder Advisory Committee, representing the voices of the sector as well as IESO subject matter experts. The CPMs were developed to be results and outcome-oriented, externally focused while seeking to meet the SMART criteria (specific, measureable, achievable, relevant and timely) of measurement.

Focus Areas	Corporate Performance Measure	2018 Corporate Performance Target
Energy Utilization	1. Ontario's electricity service is reliable.	• 100% compliance to North American Electricity Reliability Corporation high violation risk factor standard requirements (including audit requirements).
	2. Robust cybersecurity leadership and practices are demonstrated across the sector.	• By end of 2018, the IESO establishes itself as a cybersecurity thought leader in Ontario and North America by expanding the executive Cybersecurity briefings to more fully engage industry executives, work with the OEB to meet the needs of the Cybersecurity Framework by formally expanding the scope of the Cybersecurity Forum and develop a relevant metrics model to share with industry and establish a common mode of measuring security effectiveness.
	3. Conservation is an effective resource to produce efficiencies in the electricity system, drive industry innovation and support the achievement of climate change policy goals.	• Cost-effective delivery of conservation programs undertaken within 4 cents/kWh. LDC and direct-connect customer program progress is in line with achieving the 2020 energy savings target of 8.7 TWh, with 66% (5.7 TWh) of 8.7 TWh target forecasted to be contracted by the end of 2018.
Resource Acquisition	4. The electricity market evolves, enabling the province to have the appropriate sources of electricity at a more competitive market price.	• Draft, high-level designs are complete for the Market Renewal Program (MRP) energy and capacity work streams by the end of 2018.
	5. Broader participation in the electricity market is enabled by enhancing and expanding the value of Smart Meter Data.	• By end of 2018, the Third-Party Access Implementation Plan will be completed.

Policy, Business Innovation and Engagement	6. Public confidence is enhanced by the IESO's excellence in implementing the effective execution of policy.	• 2017 LTEP Implementation is tracking on schedule based on the Minister-approved Implementation Plan.
	7. Enhanced reliability and efficiency through co-ordination of resources with sector partners is fostered.	• The mid-term review (MTR) of the Conservation First Framework and Industrial Accelerator Program is completed no later than June 1, 2018, with the IESO implementing any outcomes of the MTR starting in Q3.

	8. Energy system innovation advances future grid modernization and supports interoperability.	• By Q4, the IESO will develop an Innovation Roadmap that engages a broad range of industry partners and customers to drive innovation across all aspects of IESO business. The Roadmap will indicate how the IESO will aim to do the following with respect to innovation:
		  • foster or try to initiate
		  • facilitate and collaborate
		  • adapt.

	9. Stakeholders and communities are confident with the engagement process for making informed decisions.	• A 2% improvement in satisfaction with the stakeholder engagement process is achieved from the 2017 customer satisfaction survey baseline of 67%.
Corporate Support	10. IESO resources are utilized effectively and efficiently.	• 2018 priorities are achieved within the IESO's approved budget.
	11. Employees are engaged towards delivering the IESO's mandate.	• A 4% increase in employee engagement is achieved from the baseline of 71% set in 2016.
	12. IESO effectively executes enterprise-wide change to enable a consistent, focused and common purpose for the business.	• By the end of 2018, IESO's organizational realignment is progressing on track and key milestones identified for 2018 are met, including the establishment of the new enterprise change mandate by end of Q1 to centralize and enhance IESO project delivery capability.

Appendix 2: Key 2018 Risks

The IESO's established enterprise risk management (ERM) framework is in place to identify and mitigate risks that the IESO faces in achieving the organization's strategic objectives as demonstrated through the effective execution of its 2018–2020 Business Plan.

The IESO assesses risks to the business semi-annually and has identified six key risks in relation to the areas of strategic focus. Mitigation plans have been defined and are in place for the 2018 key risks. The IESO's Corporate Risk Team, representing members from each of the organization's business units, is leveraged for their subject matter expertise to support the effective assessment of risks and to report on the execution of mitigation plans. Reporting of key risks is provided to IESO's Board of Directors quarterly to monitor and report on the progress of mitigation plans.

In 2018, the IESO will look to re-define and reassess risk for further alignment with its focus areas and direction of the IESO, in order to support these key areas of focus within the business, as well as to continuously scan its operating environment for early identification of emerging risks.

Focus Areas	Key Risks
Energy Utilization	A significant cybersecurity event occurs that disrupts the operation of the IESO for extended periods of time.
Resource Acquisition Policy, Business Innovation and Engagement	Stakeholder actions and a lack of attainable capabilities have an adverse effect on the Market Renewal Program.
Energy Utilization	The breadth and pace of change of Ontario's evolving energy environment challenges the IESO's ability to maintain grid reliability and efficiently integrate new entrants and technologies into the operation of the grid.
Corporate Resources	Lower than desired employee engagement impedes the efficient and effective execution of initiatives and priorities.
Corporate Resources	Current workforce capacity and allocation does not support the IESO's ability to effectively execute its new mission, strategy and expanding mandate.
Energy Utilization	Failure of critical control room tools challenges the IESO's ability to effectively manage grid reliability and market operations.

Appendix 3: IESO Capital Spending

Summary of 2018–2020 Capital Spending

Change Initiatives/Projects ($ Millions)	2018 Plan	2019 Plan	2020 Plan
Operations Readiness Initiatives	1.8	–	–
Wallboard Refresh	1.5	–	–
Unified Communications	3.0	2.0	–
Enterprise Cyber Security Management Refresh (Advanced Malware)	1.0	–	–
Infrastructure Refresh (building services, software licenses & computer hardware)	2.5	2.5	2.5
CRS Replacement & Migration	2.0	2.0	–
On-Line Limit Derivation (OLLD) Roll-out To Real-time Operations	1.0	1.0	–
Financial Systems Upgrade	1.0	0.5	–
FIT, microFIT and other upgrades	1.0	1.5	–
Aspen Refresh	1.0	0.2	–
IESO Portal	1.0	0.5	–
IESO Simulator Project – Phase 2	1.1	0.2	–
Meter Data Management (Upgrade)	0.5	1.0	–
Wide Area View Phase 2	0.2	0.2	3.0
PMU Integration Phase 2	–	–	3.0
Oracle Archetype Expansion, Oracle batch and Oracle Exadata Refresh	–	1.5	–
Tier 1 Storage Refresh	–	2.0	–
ETP Refresh	–	1.0	–
SCADA/EMS Replacement	–	5.0	5.0
Control Room Refresh	1.0	–	–
IT Service	–	–	1.0
Capital ($1M & above)	**19.6**	**21.1**	**14.5**
Other Capital Initiatives/Projects	3.0	3.0	3.0
Core Operations Capital	**22.6**	**24.1**	**17.5**
Market Renewal	4.0	34.0	48.0
Total Capital including Market Renewal	**26.6**	**58.1**	**65.5**

2018–2020 Capital Plan Details

Project	Description
Operations Readiness Initiatives	A holistic review of all the processes and tools in Market and System Operations with the intent to sustain the level of services to meet reliability standards with the efficient use of resources.
Wallboard Refresh	This project proposes to replace all wallboard projector components in the control room with a unified vendor solution that can be managed efficiently by the IESO and reduce costs associated with wallboard display changes. Wallboard projectors have exceeded their intended supported service life and must therefore be refreshed to sustain the wallboard service.
Unified Communications	The IESO currently has limited video-conferencing capabilities for interactive communication for its employees situated at its multiple locations. This project will research, analyze, select and implement improved video- and audio-conferencing facilities for use within and between the IESO's three staffed locations, Clarkson, Adelaide and UMR. Consideration will be given to meeting room-to-meeting-room, laptop-to meeting-room, and laptop-to-laptop conferencing. These new facilities will enhance meeting communication (audio and video) between sites and result in travel-related savings.
Market Information System (MIS) Refresh	The MIS, which calculates the market clearing price for settlement purposes, is used by the IESO to meet its primary obligations to determine dispatch schedules in both real-time and pre-dispatch timeframes, while satisfying operating reserve requirements and respecting transmission and security limits. This project will update both the application and underlying infrastructure to support future years while taking advantage of improvements in the most recent product.
Enterprise Cybersecurity Management Refresh	This project will include enhancements to cybersecurity analytical capabilities, procurement of new technology to address advanced malware and sourcing of additional cybersecurity intelligence. This project also includes a refresh of cybersecurity technologies.
Infrastructure refresh (building services, software licenses & computer hardware)	To procure racks and enclosures to expand the IESO's blade server rack and enclosure infrastructure to support the requirements of emerging projects. This project also includes miscellaneous building services and software license renewals.
CRS Replacement & Migration	The existing settlements system is an internally developed calculation engine of charge types to settle the electricity market. The IESO plans to review and replace this system with a standard software application.

Project	Description
On-Line Limit Derivation (OLLD) Roll-out To Real-time Operations	As the power system continues to evolve, the capabilities of Operations staff, process and tools must also evolve to ensure the IESO can meet the needs of system, now and into the future, both efficiently and reliably. The enhanced working environment developed through the Operations Readiness Initiative (ORI) Program will continue to build flexible and sustainable skills, tools and processes to support further evolution of IESO operations. By reducing manual effort and increasing productivity, the IESO will be better able to manage new operational challenges of tomorrow. The OLLD Roll-out to Real-time Operations is one of several interrelated projects that form part of the ORI Program and contributes to the achievement of the program objectives. This project will deploy the DSA Tools (a power system analysis software suite) into the control room and examine the need to staff the control room with competencies of a power system analyst and modelling data analyst. As a result of changing the operating security limit support in the control room, the process and content of the SCO's will be reviewed to seek out efficiencies and suitability of on- and off-shift staff needing operating instructions. This project is expected to result in a reduction of approximately five minutes of effort per hour (0.5 FTE) for existing control room staff.
Implementing GTL Obligations under proposed IDC Changes	The Interchange Distribution Calculator (IDC) is being changed in 2018 to require Generation to Load (GTL) relief during Transmission Loading Relief (TLR) procedures, and the IESO's current method of manually constraining generation to meet TLR obligations will no longer be sufficient. This puts the IESO at a higher risk of being non-compliant with NERC Interconnection Reliability Operations and Coordination (IRO) Standards. In order to comply with the GTL relief obligations under the IDC changes, a different methodology will need to be developed to ensure the IESO can demonstrate its compliance with the IRO standards.
Financial Systems Upgrade	Payroll process and tools upgrade and separation of corporate and market financial transactions.
FIT, microFIT and other upgrades	A replacement/re-platforming of the existing FIT and microFIT systems based on program requirements and business needs and an upgrade to the existing CRM platform to the latest version of the Microsoft Dynamics CRM platform.
Aspen Refresh	Netapp NAS Storage System was deployed under 2012 Aspen Refresh Project with five years of fixed support costs. Storage vendors usually charge a premium price for renewing support after five years. This refresh project will upgrade the Netapp storage system with minimum five years of vendor support.
IESO Portal	Upgrade existing and enable new business capabilities through the IESO portal to enable the delivery of efficient services to IESO staff and external customers. An enhanced and more reliable portal will provide new IT enterprise tools that will enable the IESO to improve its business efficiency, provide more sophisticated yet user-friendly screens, and permit IT to deliver services such as online forms and collaboration features in a more flexible and timely manner.
IESO Simulator Project – Phase 2	The IESO simulator is an essential part of the control room operator's training to ensure the IESO delivers superior reliability performance in a changing environment. The new IESO Simulator Project – Phase 2 initiative will address outstanding items to include custom EMS security applications and allow IESO to fully integrate the EMS security applications into the simulation environment.
Meter Data Management (Upgrade)	The revenue metering and meter data management system (MDMS) application is required to store, transform and deliver the revenue meter information. This project is to refresh MDMS application and supporting hardware to sustain required services.

Project	Description
Wide Area View Phase 2	To meet industry best practices and to maintain compliance with evolving NERC Interconnection Reliability Operations (IRO) standards and audit expectations, the IESO must improve its awareness of critical elements in adjacent Reliability Coordinator (RC) areas. Improved monitoring will include power flows, voltages and equipment status within MISO in phase 1. This project seeks to complete the following to achieve improved situational awareness and maintain compliance with NERC IRO standards: 1. Expand the IESO's power system detailed network model to include the neighbouring RC areas 2. Conduct a wide-area view study to identify and monitor critical elements impacting the IESO-controlled grid that reside in neighbouring RC areas 3. Enable the appropriate contingency monitoring in these external areas to ensure that the IESO monitors elements outside of Ontario that impact operating limits within Ontario 4. Provide control room operators with timely information and instructions to respond to monitored external events.
PMU Integration Phase 2	The electricity industry has embraced the move towards the incorporation of Phasor Measurement Unit (PMU) telemetry into its real-time, power system modelling and post-event analysis practices. In leading the industry, NERC has identified PMUs as an emerging need in the industry to support more these advanced operations activities. PMUs calculate the phase angle that is fundamentally linked to power transfer and system topology. The phase angle will change drastically for major topology changes; hence, phase angle difference is a key indicator of changing system topology and switching events. Having phase angle and related information in real time will greatly improve the IESO's situational awareness with access to new PMUs in Ontario and existing PMUs beyond Ontario's borders in NYISO, PJM, MISO and ISO-NE. This project, in support of the IESO's 2016-2020 Strategic Plan, will integrate PMU information into the IESO's power system monitoring and analysis systems. Objectives are to develop capabilities for efficient operation of the power system and to demonstrate compliance with a number of real-time monitoring-related NERC standards. For post-event review, there is a requirement for PMU information to support NERC MOD-033-1 compliance when it comes into effect (July 1, 2019).
Oracle Archetype Expansion, Oracle batch and Oracle Exadata Refresh	Upgrade Oracle 11 g to Oracle 12 C.
Tier 1 Storage Refresh	This project proposes to procure Tier 1 storage and the fiber channel SAN infrastructure for the IESO's critical applications to meet the IESO needs for the next four years. It includes the purchase and installation of additional storage and fibre channel ports at each of Clarkson and Backup Operations Centre site and migration of all servers.
Enterprise Threat Prevention Refresh	The IESO uses HP's Tipping Point solution to detect and block network-borne malicious code and cyber-attacks. This project proposes to refresh the software and hardware applications to ensure that the organization continues to be protected from threats and risks that may impact its business operations.
SCADA/EMS Replacement	The primary goal of the project is to transition daily power system operations to a robust and modern EMS platform that is expected to be effective until 2020. The project also provides the opportunity to take advantage of enhancements incorporated within VENTYX's most recent product offering.

Project	Description
Control Room Refresh	The control room layout, which remains largely unchanged since the control centre was commissioned in 1990, was not designed to meet the needs of today's operations. Since the early 1990s, there have been significant changes in power system and market operations that necessitate a revisit of the IESO's control room design. The control room upgrade project will address a number of issues related to layout, effective interaction and situational awareness to enable efficient and reliable market and system operations now and into the future.
IT Service (HP Service Manager)	This project is to refresh an existing HP Service Center tool to improve customer service.
Market Renewal	Market Renewal involves initiatives to evolve the wholesale energy market and introduce capacity auctions to competitively and efficiently procure resources, while continuing to meet emerging operability challenges. Market Renewal is expected to provide value for Ontario's ratepayers by putting downward pressure on costs while fostering an open and competitive marketplace with broad participation. Market Renewal will include: • a single-schedule market • a financially binding Day-ahead Market • enhanced real-time unit commitment • a capacity auction including the import and export of capacity • more frequent intertie scheduling • other operability enhancements as identified by the IESO and its stakeholders.

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