

Business Plan 2017-2019

Independent Electricity
System Operator

February 1, 2017

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Introduction

The Independent Electricity System Operator (IESO) operates within a complex and changing energy sector environment. Its broad mandate includes real-time operations of Ontario's bulk power system, province-wide and regional planning, conservation, resource development and contract management. Changes occurring in many different areas can be expected to affect its operations in both the near and long terms. These changes include an evolving supply mix, with nuclear units coming offline for refurbishment, continued increases in renewable energy connected to both the transmission and distribution systems, as well as expected increases in conservation and demand response.

At the system level, electricity demand is expected to decline slightly or remain relatively flat over the business planning period as growth in demand from economic expansion and population growth will be mostly offset by conservation. However, since demand depends on many factors and there is 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.

In addition to the underlying supply and demand factors, emerging technologies, an increasing role for consumers, climate change actions, potential electrification, including of transportation, and evolving stakeholder expectations will also impact the IESO's operations over the business planning period and beyond.

To prepare for the electricity sector of tomorrow, the IESO is working with stakeholders to pursue fundamental and enduring changes to Ontario's electricity market that will address known inefficiencies and put downward pressure on electricity costs. These foundational changes will provide opportunities for all participants in Ontario's electricity market, with increased competition, flexibility and transparency resulting in material efficiency gains for the entire electricity sector, including customers and suppliers. This work includes evolving the wholesale electricity market and adopting new procurement practices through the introduction of an incremental capacity auction to competitively and efficiently acquire resources to meet reliability and adequacy requirements. The Market Renewal project will require efforts from business units across the IESO, external resources and input from a wide range of stakeholders.

Context for Market Renewal

The current electricity market was designed in the late 1990s and introduced in 2002, when the electricity landscape looked very different from today. The elimination of coal, integration of

renewables, increase in distributed resources, and growing role of demand-side resources has dramatically changed the dynamics of Ontario's electricity system. Inefficiencies with the current market have been identified over the years through the work of the Market Surveillance Panel, the Electricity Market Forum, IESO studies, and stakeholder input.

While the IESO and its stakeholders have worked together over the last decade to incrementally improve different aspects of the market, it is apparent that more foundational market changes are necessary to meet the very different circumstances of today and tomorrow's electricity marketplace. Maintaining the status quo would lock in current inefficiencies and gaming opportunities of our current design, drive higher than necessary costs, and limit the ability of the market to integrate new, emerging technologies reliably and cost effectively. Ontario is now in a stable supply situation that is expected to continue into the mid-2020s, making this an opportune time to consider and implement needed market design changes that would realize significant benefits for the province.

Operating the grid effectively has become more complex as the sector has transitioned from a model of centralized, conventional generation to an increasingly diverse, clean supply mix. However, the current market design is premised on scheduling and dispatching much of the energy in real-time providing very little flexibility should system conditions deviate from forecasts. Improving the dispatch and commitment of resources is expected to result in material benefits by using our assets in a more efficient manner, supporting reliable and more efficient operations as more renewables and decentralized resources are added to the grid.

Just as the energy and operability initiatives under Market Renewal are designed to address inefficiencies with our current market design, introducing an incremental capacity market would allow non-traditional resources (such as demand response, distributed energy resources including in LDCs, upgrades to existing assets, and imports) to compete on a level playing field with existing assets, resulting in lower cost solutions and potentially avoiding or deferring the need for costly new build. Capacity markets also result in greater transparency and certainty, providing participants with greater certainty to plan their business. At the same time, annual auctions provide greater flexibility in meeting system needs and help avoid the cost and risk of locking in resources for extensive periods when they might not be required.

To meet these objectives, the project scope will include improvements to the way the IESO schedules energy, procures supply resources, and manages variability - in particular:

- 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; and
- Other operability enhancements as identified by the IESO and its stakeholders.

Many of these changes will result in increased opportunities for both consumers and generators by introducing stable competitive mechanisms to meet a variety of system needs. These market structures are well-proven in other electricity markets and Ontario will be able to benefit from the best practices that have emerged in those markets over the past two decades. However, there is significant work ahead for the IESO and its stakeholders to design a market that best meets Ontario's needs.

It is within this context that the IESO has planned its business activities and initiatives for the 2017-2019 period.

The IESO's Business Plan provides an overview of the organization's near-term activities and associated resourcing requirements needed in two areas: to maintain the high level of performance required to deliver its core electricity system responsibilities; and in parallel to execute the Market Renewal project. The additional work associated with Market Renewal will require a temporary increase in resources for the duration of the project, with the objective that at the conclusion of the project, Market Renewal would not have a significant impact on the staffing level of the underlying business.

The IESO anticipates a four per cent increase is required in its usage fees to support the Market Renewal work. For 2017, the organization's proposed expenses of \$191.4 million are expected to be funded by usage fee revenues of \$190.8 million and registration fees of \$0.6 million.

In 2017, the IESO is planning a capital envelope of \$25 million to facilitate the delivery of corporate priorities associated with its current core business. Further details are included in Appendix 4.

Addressing Future Uncertainty

Ontario's transition off coal to a more renewable, yet more variable supply mix, combined with the increasing implementation of embedded resources in the distribution system, has brought about increasing complexity in directing the reliable operation of the provincial power system. Addressing that ongoing transition and complexity, responding effectively to government policy initiatives, continued technology change and increasing cyber security risks will require

ongoing reassessment of the IESO's current resource complement, particularly in the following areas:

(i) *Technology, Industry Change and Electrification*

Technology developments will continue to change the landscape of the traditional bulk power system with communities and customers taking more control of meeting their energy needs. Our planning efforts are expected to grow as a result. We are now seeing a need for an increased focus on regional planning, leading or supporting efforts to help communities consider non-wires supply options such as conservation and distributed energy resources. At the same time, the IESO will need to develop new policies and processes with provincial and municipal governments to procure transmission rights of way and facilities where they provide the best solution for local needs. The increasing amount of resources being embedded in the distribution system will also lead to increased coordination efforts with LDCs, a transformation that will need to be carefully managed to ensure that reliability of the bulk power system and the local area system is not compromised.

The publication of the IESO's 2016 Ontario Planning Outlook also marks a significant role for the IESO going forward. This technical report is the first step in a process that will move through a Ministry-led consultation phase, and development by the Ministry of a new Long-Term Energy Plan, with IESO support anticipated for both phases. Following plan approval, it is anticipated that the IESO may be required to develop an implementation plan, and upon its approval, proceed with implementation. The draw on IESO resources is expected to be significant throughout this process, particularly given the focus on increased electrification in meeting climate change objectives.

(ii) *Cyber Security and Maintaining Reliable Operations*

Cyber security is one of the fastest changing areas in the electricity sector with an ever-increasing number and complexity of tools being deployed (preventative, detective, and analytical). A mature cyber security posture requires not only measures aimed at preventing an attack, but the ability to respond to an event when it occurs. If cyber security risks continue to grow as forecast, additional resources will be needed to sufficiently mitigate these risks. Although not as critical as cyber security, we can also expect ongoing mandated upgrading of physical security levels. The industry's work in further defining mandatory standards for essential reliability services to maintain reliable interconnected grid operations is also an area that may require future investments in resources.

(iii) Changing Demographics

Challenges and risks are expected to occur at a time when the IESO could see significant changes in its work force. Over the next five years, 27 per cent of the IESO managerial staff and 12 per cent of the senior professional level staff will be eligible for retirement with unreduced pensions. Well over half of these staff are in Information and Technology Services and Market and System Operations. Recruiting, developing and retaining skilled staff will be an ongoing priority for adapting to future uncertainties.

(iv) Provincial Government Initiatives

Provincial government initiatives such as the new cap-and-trade program and the Climate Change Action Plan (CCAP) are already impacting the IESO's current scope of work.

Cap-and-trade is now requiring the IESO to assess the impact on and negotiate amendments to a number of its major procurement contracts. At the same time, the cap-and-trade initiative is requiring new business processes to be developed and put in place to address increased monitoring of emissions, manage transactions involving carbon costs, and develop and manage, on an ongoing basis, new and complex settlement arrangements including rebate processes for various customer rate classes.

The IESO already plays a lead role in the province-wide implementation of the government's conservation first policies, including management of the local distribution company (LDC)-delivered Conservation First Framework (CFF) and the Industrial Accelerator Program for transmission-connected customers. Recent directives aimed at improving the effectiveness of the CFF will result in increased responsibility for the IESO. And it is reasonable to expect that as the six-year conservation framework approaches its midpoint in 2018, there will be additional enhancements including the need to engage a broader range of customers in energy efficiency. Given the potential overlap with initiatives contemplated under the CCAP, there may also be opportunity for the IESO to help address the need for coordination between the energy efficiency programs offered under the conservation framework and the CCAP programs implemented across the province.

Market Renewal

As noted earlier, the IESO is working with stakeholders on the development of a Market Renewal project. This includes evolving the wholesale energy market and introducing capacity auctions to competitively and efficiently procure resources, while continuing to meet emerging

operability challenges. The project will foster increased transparency, flexibility and competition in the electricity marketplace with opportunities for broader participation from both suppliers and consumers, providing significant value for Ontario's ratepayers and better addressing the ongoing changes across the sector.

Throughout 2016, the IESO has worked closely with its stakeholders to (1) discuss the appropriate scope for the project and (2) develop a benefits case that assesses the potential range of outcomes from the identified scope.

The scope for the project will include improvements to the way we schedule energy, procure supply resources, and manage variability. In particular, the project 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; and
- Other operability enhancements as identified by the IESO and its stakeholders.

The IESO has been working with stakeholders for over a year to lay the foundation for this evolution of Ontario's electricity market, and has more recently been supporting this effort with the development of a benefits case. The benefits case will examine the potential scale of these benefits and the associated costs. The analysis draws on past Ontario studies and the experience of other jurisdictions that have gone through similar market redesign processes. The benefits case is expected to be complete by the end of Q1 2017.

Early findings show potential for cost savings that are expected to be realized by both consumers and suppliers, with a baseline estimate of \$3.7 billion (net present value) over a ten year period from 2021-2030. These savings represent a net efficiency benefit, meaning the total commodity cost of electricity (ie. energy, Global Adjustment and uplifts) is reduced by that amount. The majority of savings are expected to flow to consumers, while the rest would flow to other market participants. Costs for the project are estimated to fall in the range of \$150 - \$200 million. While these are only initial findings and are expected to change as the IESO works with stakeholders in Q1 2017 to finalize the analysis, the numbers demonstrate that the range of reasonably expected benefits far outweighs the likely costs of the project.

Cost savings are achieved through the better utilization of existing assets, greater competition among resources, a reduced need to build new resources, and a more flexible procurement process that will better reflect system needs. Over half of the expected benefits are attributable

to lower capacity costs from the introduction of a capacity auction while the remainder comes from lower production costs through the energy and operability work streams. The exact timing and magnitude of cost savings will largely depend on the timing of Market Renewal initiatives.

The IESO will continue its work with stakeholders to work through key design elements for the various elements of the project, as well as a more detailed project plan for the overall program.

Enhancing the Value of Smart Meter Data

Smart meters 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), is leading efforts to expand the types of data it collects through its Meter Data Management and Repository (MDM/R) and to facilitate third party access to fully capture the value of this data. The MDM/R currently provides a common platform for processing, storing and managing all smart meter data in the province.

The Ontario Energy Board renewed the SME's license on November 24, 2016 for a five-year period and established the scope of information flowing into the MDM/R. The IESO is now moving to define the rules for how third parties can gain access to that data while protecting privacy and confidentiality. Although the work of the SME is reflected in a separate rate case from the IESO's core business, these efforts contribute to the IESO's overall theme of providing public value and have sector-wide implications, including for the future development of conservation programs.

Stakeholder Input

Engagement remains a priority for the IESO; seeking out and responding to input from communities, customers and stakeholders to inform IESO's decision-making is one of the organization's strategic objectives. The Stakeholder Advisory Committee (SAC) has an important role to provide the IESO with input and feedback on proposed decisions or changes that affect all stakeholders. Stakeholder and community interviews and/or surveys will indicate the level of satisfaction with the engagement process and whether the IESO has demonstrated appropriate consideration of stakeholder input in decisions.

Through input from the SAC, stakeholder priorities have been considered in the development of the business plan. These include a focus on transparency and data, conservation, gas-electric coordination, cap-and-trade, costs, education, Market Renewal, planning, stakeholder engagement, corporate vision and reliability.

The IESO has established corporate performance measures (CPMs) for its key initiatives across the organization, which assesses progress toward the achievement of its core mandate and strategic objectives. The targets for 2017 have been developed to be specific, measurable, achievable, relevant and time-bound. They also reflect input received from the SAC to make the CPMs both outcome-oriented and externally focused. 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, developed mitigation plans 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 dealt with during the planning period is available in Appendix 2.

Strategic Plan

Business activities and initiatives will be guided by the IESO's Strategic Plan for the 2016-2020 period. The Strategic Plan was released in mid-2016 and will inform the development of annual business plans and enable a clear focus on priorities, success drivers and measures. Establishing the organization's corporate strategy is an important milestone in the evolution of the IESO, and the strategy will help focus attention and effort on achieving our vision: powering a reliable and sustainable energy future for Ontario. The Strategic Plan is organized around the IESO's strategic themes and is guided by its corporate vision, mission and values. A summary of the IESO's goals and objectives from the Strategic Plan can be found in Appendix 3.

Financial Overview

The IESO's Business Plan outlines the resourcing requirements needed to deliver corporate priorities including the Market Renewal project. The IESO proposes an increase of four percent in usage fees to support this emerging priority. For 2017, the organization's proposed expenses of \$191.4 million are expected to be funded by usage fee revenues of \$190.8 million and registration fees of \$0.6 million.

The 2017 proposed operating expenses are \$9.3 million above the 2016 budget expenses as per the 2016-2018 Business Plan. The higher operating expenses are primarily due to the impact of Market Renewal and higher pension and other post-employment expenses.

Market Renewal (as described on page 6 and 7) will result in fundamental changes to Ontario's electricity market that will require efforts from business units across the IESO. The project will require incremental temporary resources to support the design of various Market Renewal initiatives, to create new business processes and IT systems, to conduct ongoing stakeholder engagement, and to address impacts on other IESO functions such as contract management and legal.

Pension and other post-employment expense increases in the planning period are due to a lower discount rate, which increases future liabilities, and reduced asset valuations resulting in a higher funding requirement. The higher expenses are partially offset by increases in the management group pension contributions and pension benefit changes, which take effect in 2017.

Further increases in 2017 operating expenses include the impact of foreign exchange rates and higher than anticipated fees for the OEB. Operating expenses also reflect increases in computer services contracts, and amortization expenses that will increase due to a number of significant systems being put into service.

The proposed 2017 budget includes the IESO's core and strategic activities, including Market Renewal, but no allowance has been made for other policy initiatives.

For 2017, the IESO anticipates an average headcount of 687 for core operations and an incremental 25 headcount, for a total of 712. The incremental resources will be required to deliver the IESO's core business and Market Renewal.

The IESO has made changes, including revisions to management pension and compensation, as well as the negotiated contracts with its unions, in order to manage the IESO's overall costs in the longer term. Expense increases in each year include annual compensation escalations according to current collective agreements and expected estimates of annual pension and post-retirement expenses.

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)	2016	2017	2018	2019
Revenues	182.1	191.4	196.1	189.4
Expenses				
Operating Expenses	163.9	162.4	164.0	167.4
Amortization	17.5	18.4	19.6	19.0
Net Interest	0.7	(1.4)	(1.5)	(3.0)
Total Core Operations	182.1	179.4	182.1	183.4
Market Renewal	-	12.0	14.0	6.0
Total Expenses	182.1	191.4	196.1	189.4
Operating Surplus/(Deficit)	-	-	-	-
Accumulated Operating Surplus	10.0	10.0	10.0	10.0

A further breakdown by expenditure category is provided in the table below.

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Budget (\$ Millions)	2016	2017	2018	2019
Core Operating Expenses				
Compensation & Benefits	110.3	109.2	110.7	113.8
Professional & Consulting Fees	20.1	17.8	17.7	17.7
Operating & Administration	33.5	35.4	35.6	35.9
Amortization	17.5	18.4	19.6	19.0
Net Interest	0.7	(1.4)	(1.5)	(3.0)
Total Core Operations	182.1	179.4	182.1	183.4
Total Market Renewal Expenses	0.0	12.0	14.0	6.0
Total Expenses	182.1	191.4	196.1	189.4

The IESO regularly prioritizes capital initiatives. The business planning process establishes an appropriate capital envelope with commitments approved individually on an ongoing basis. This practice is consistent with prior years. The table below provides a summary of the capital envelope. Project details and associated descriptions are included within Appendix 4.

Capital (\$ Millions)	2016	2017	2018	2019
Core Operations Initiatives	28.4	25.0	25.0	23.2
Market Renewal	-	-	20.0	40.0
Total Capital Envelope	28.4	25.0	45.0	63.2

Total average FTEs are expected to increase in the 2017-2019 planning period due to temporary resourcing required in support of Market Renewal. A reduction of one percent in the core operations staffing budget is anticipated to occur over the planning period as merger synergies are maintained and other efficiencies are realized.

Staffing Budget (Average)	2016	2017	2018	2019
Core FTEs	688	687	685	681
Incremental FTEs	-	25	75	75
Total FTEs	688	712	760	756

The Market Renewal project will utilize a variety of resourcing approaches to most effectively manage project delivery timelines, cost, and to mitigate risk. Resourcing approaches will include competitive contracting with suppliers, as well as seconding key internal IESO resources for different durations based on the specific skills needed as the project moves through the various phases (e.g. design, implementation, testing, etc.) until the project is complete. The incremental FTEs will be required to deliver the IESO's core business and Market Renewal.

Functional Areas

Operations

The IESO's Market and System Operations business unit manages real-time operations, balances supply and demand for electricity, directs the flow of electricity across transmission lines, and connects generators that produce power, transmitters that send power across the province, local utilities that deliver it to people's homes and businesses, and directly connected industrial companies.

During the 2017-2019 business planning period, Market and System Operations will be working to maintain and improve the operability of the power system through transparent mechanisms in three key areas:

- **Regulation** – The IESO is seeking to expand the depth of the regulation service market in Ontario. A Request for Information was issued in mid-2016, and a subsequent Request for Proposals is expected to be issued in early 2017.
- **Voltage control** – Studies and recommendations on the need and location of voltage control devices to address issues in the Greater Toronto Area and eastern Ontario are underway and are expected to be completed in 2017. The IESO will also collaborate on an implementation plan with transmitters.
- **Flexibility** – A need has been identified for up to 300 megawatts (MW) of flexible resources by the end of 2017 and up to an additional 700 MW by the end of 2018. The IESO is working with stakeholders to assess how this need could be met by existing generation assets, as well as from loads, demand response and new emerging technologies.

This business unit will also implement the situational awareness initiative, enhancing the IESO's modelling capability and providing the control room with more visibility and better post-event analysis. In support of the IESO's 2016–2020 Strategic Plan, another project is

underway that will enable a better two-way exchange of information for enhanced decision-making through coordination with LDCs.

Market and System Operations will also continue the Operations Readiness Initiatives over the planning period. This will provide an operational framework to enable the IESO to adapt to the evolving environment while maintaining the same level of performance and risk tolerance associated with managing the reliability of the grid. It will involve knowledge transfer, enhanced processes, improved work platforms and the continuation of operational training and development.

Planning

The IESO's Planning group, responsible for long-term and regional electricity planning for the province, is now operating under the recently proclaimed *Energy Statute Amendment Act*, which has replaced the Integrated Power System Plan framework. The IESO is now responsible for the development of a technical report, which it completed in 2016. The IESO is also now responsible for an implementation plan following the release of the LTEP in 2017. The Planning group also provides, on an ongoing basis, information on evolving trends in the electricity sector to the government, stakeholders and communities.

Regional planning remains a priority for the IESO. For the 2017-2019 business planning period, the IESO is committed to continuing to provide an opportunity to all First Nations communities and Métis councils to be engaged in regional planning and Local Advisory Committees where they are set up. Engagements with communities, municipal governments and stakeholders will adhere to IESO core stakeholder principles of creating transparency, engaging early and often, and bringing communities to the table to enhance the success of regional plans. Incremental conservation and distributed generation opportunities will continue to be considered in regional plans. In addition, the IESO's Planning group will ensure that the implementation of recommendations from completed plans is supported.

The Planning group will also participate in engagement activities with remote communities to support the implementation plan to connect remote communities as well as support potential transmitters and priority transmission projects at the OEB.

Market and Resource Development

The Market and Resource Development business unit, in addition to leading the analysis in support of the development of the Market Renewal project, will continue to pursue other select market-based projects, such as enhancing the demand response auction and supporting capacity exports. In addition, Market and Resource Development is responsible for the ongoing

management of generation contracts, which include natural gas, wind, solar, hydroelectric, biomass and nuclear, and range in size from microFIT contracts that are less than 10 kilowatts to the Bruce Power Nuclear contract, which secures 6,300 MW of supply. In addition to generation contracts, Market and Resource Development also manages storage contracts as part of pilot program procurements. As of December 31, 2016, the IESO was managing more than 27,350 contracts that account for more than 27,350 MW of generation. These include contracts for approximately 24,500 microFIT projects (representing 216 MW) and 3,950 Feed-in Tariff or FIT projects (representing 4,750 MW). The majority of those contracts are in operation with 1,050 projects (or 3,281 MW) under development. Renewable energy projects account for 43 percent of contracted capacity (52 percent wind, 21 percent hydro, 23 percent solar, 4 percent bioenergy), with natural gas at 34 percent and nuclear at 23 percent. This business unit is also responsible for the settlement of transmission-connected generator contracts.

Other initiatives that will be undertaken during this period include evolving the design of the demand response auction to increase available demand-side resources, including enabling the participation of residential customers, in conjunction with and as well as continuing work on capacity auction mechanisms in Market Renewal by further engaging stakeholders. This business unit will also continue to clarify the impact on the IESO's resources and contracts of the new cap-and-trade policy and Climate Change Action Plan. In addition, Market and Resource Development will continue to monitor developments of distributed energy resources in other jurisdictions, in coordination with other business units, as the IESO works to foster an open and competitive electricity marketplace with broad participation. At the same time, under recent changes to the *Electricity Act*, the IESO was given a new accountability for transmission procurement.

Information and Technology Services

The Information and Technology Services business unit meets the ongoing and daily needs of the IESO and its customers, including 24x7 support to help maintain the reliable operation of the IESO-controlled grid and the IESO-administered markets.

Through the IESO Cyber Security Forum, this business unit will continue to promote cyber security best practices by sharing information, hosting conferences and collaborating with participants to help manage cyber risk, including supporting standards being developed by the OEB.

During the 2017-2019 business planning period, Information and Technology Services will collaborate with other IESO business units (e.g., Conservation and Corporate Relations, Market

and System Operations, and Corporate Services) on a number of projects to support the evolving needs of both stakeholders and the IESO. Examples include a consolidated corporate website, continued implementation of the Conservation and Demand Management Information System (CDM-IS) to support the Conservation First Framework, support of the Operations Readiness Initiatives, and the replacement of the Market Information System and Commercial Reconciliation (or settlement) system.

In addition, Information and Technology Services will also implement a variety of prioritized projects to mitigate the rapidly evolving cyber security landscape and to ensure the underlying infrastructure remains current. Examples of projects include Enterprise Cyber Security Management Refresh, Tier 1 Storage Refresh and Oracle Archetype Expansion.

Conservation

Over the 2017-2019 business planning period, the IESO's Conservation group will continue to oversee the implementation of the provincial government's 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.

A mid-term review began in 2016 and will continue through 2017. The focus of the review will be cost-effective delivery of both LDC and transmission-connected customer conservation programs, and assurance that LDC and directly connected customer program progress are in line to achieve the 2020 energy-savings targets. The review will also consider the deployment of innovative new programs that did not exist prior to the framework and that were developed through pilot programs funded by the IESO.

Based on preliminary unverified results, as of Q3 2016, LDCs have collectively achieved 23 percent of the 2020 provincial Conservation First Framework target, or 1.63 TWh of the 7 TWh target. Additionally, the Industrial Accelerator Program has achieved 0.171 TWh of the 1.7 TWh target, or 10 percent of the 2020 target. This number is expected to increase as more projects are verified and implemented.

The group will continue to administer both a \$70 million LDC Innovation Fund and a \$9.5 million Conservation Fund, to provide funding for research and development into new, innovative technologies, energy management practices and programs.

The Conservation group will also focus on the transparency and reliability of cost-effective conservation activities during this planning period. This will be achieved through accurate and transparent reporting of conservation efforts to all stakeholders according to committed timelines. In addition, rigorous counterparty compliance and evaluation, measurement and verification will continue to be completed by independent third parties. Reporting will include monthly progress reports to LDCs, quarterly conservation progress reports and annual verified results reports posted on the IESO website by July 1 of each year.

Market Assessment and Compliance

Compliance with the market rules is key to the operation of an efficient and reliable electricity market and system. The Market Assessment and Compliance business unit is responsible for monitoring compliance with the market rules by market participants, as well as compliance by the IESO. This is achieved through a variety of activities including prevention through education and interpretation, monitoring for and investigation of possible violations, along with enforcement actions in cases of determined violations, where appropriate.

For the 2017-2019 business planning period, this business unit will continue to identify market rules where breaches would have the most significant impact on either the market or reliability and take appropriate enforcement actions in response to alleged violations. It also plans to conduct audits to better detect reliability standards violations and assess risk areas to guide enforcement activities.

Market Assessment and Compliance will also continue to provide market rule interpretations upon request and in 2017 expects to finalize a formal market rule interpretation process. This will include completing performance measures and preparing process guidelines and templates to provide interpretations that offer greater clarity on the meaning, application and implementation of the market rules.

Enabling Services

Various IESO business units provide services to enable the overall organization to achieve its core mandate and strategic goals and objectives. These services include communications and stakeholder relations, settlements, finance, human resources, internal audit, First Nations and Métis relations, legal and regulatory affairs.

For the business planning period, the stakeholder and public affairs group will continue to solicit and respond to input from stakeholders, government and communities on all major

initiatives, using consistent stakeholder engagement principles and processes (e.g., Stakeholder Advisory Committee, Technical Panel, Local Advisory Committees). This group will also continue to communicate regularly with employees, respond to customer and media inquiries, and participate in customer outreach. A near-term deliverable is the launch of a new and consolidated corporate website in mid-2017.

Projects for 2017 to achieve greater efficiency and cost-effectiveness among the settlements and finance groups are to replace the Commercial Reconciliation system, review payroll processes and tools and continue to evolve and enhance the business planning, corporate performance measures and enterprise risk management processes. The human resources group will implement a talent management system that includes enhanced recruitment and selection capabilities, a suite of comprehensive learning and development programs, organizational development services, and reward and recognition plans. In addition, this group will continue to administer the annual employee engagement survey, and design and facilitate processes for action planning at the organizational, business unit and group levels. Human resources will have a significant role in supporting the Market Renewal project, particularly in regard to labour relations and staffing.

The IESO's Internal Audit group provides independent, objective insight and assurance on governance, risk management, and controls to management and the Board of Directors. The IESO Internal Audit function works collaboratively and respectfully with the business units in order to provide value and contribute to the overall success of the organization.

The First Nation and Métis relations group works to ensure all Indigenous communities are aware of the IESO's funding programs, upcoming procurements and electricity planning and that they have an opportunity to provide input and feedback. The First Nation and Métis relations group is also committed to continuing to be a trusted and accessible resource in the electricity sector and to building capacity in Indigenous communities across Ontario.

The IESO's law group provides timely and responsive legal services, leveraging internal counsel knowledge of the organization to enhance value. Over the business planning period, the law group will continue to partner with business units to deliver major initiatives, including developing a market rule legal framework to help evolve the Ontario market through Market Renewal, and leverage lessons and experience from the Conservation First Framework mid-term review. It will also continue to direct and manage the processing of Freedom of Information requests and other document disclosure obligations. This group is also responsible for ensuring that the IESO Board of Directors is well supported and works with other parts of

the organization to ensure that high standards of governance for the organization are maintained.

The organization's regulatory affairs group leads the IESO's interactions with sector regulators-- the OEB, the National Energy Board, the North American Electric Reliability Corporation and the Federal Energy Regulatory Commission --- working to obtain desired outcomes in regulatory filings and in the positive evolution of the sector. Over the business planning period, the regulatory group will continue to lead the IESO's participation in and monitoring of key regulatory proceedings and policy development processes in Ontario and other jurisdictions. The regulatory group will also direct the IESO's annual revenue requirement submission with the OEB.

Appendix 1: Corporate Performance Measures (CPMs)

The IESO's work is focused on achieving the outcomes of the 2017-2019 Business Plan. Corporate performance measures (CPMs) are established annually to help translate the strategic goals, objectives and business plan into action so the IESO can continue providing public value, respecting and valuing our stakeholders and building corporate resilience.

The 2017 CPMs consider input from the IESO's Stakeholder Advisory Committee, representing the voices of the sector, as well as working collaboratively with the subject matter experts of the IESO itself. The CPMs were developed to be results and outcome-oriented, externally focused, measureable, specific and achievable.

The 10 CPMs defined below provide a gauge on key focus areas for the IESO in 2017. These CPMs look to sustaining the IESO's excellence in operating the grid, promoting cyber security across the sector, exploring Market Renewal to support future price efficiencies, operability, transparency and innovation, as well as striving towards improved price impacts by fostering broader market participation, transparent execution of competitive procurements and cost-effective delivery of LDC conservation programs.

CPM	2017 Target
1. The IESO executes its strategic plan	Overall progress to achievement of the 2016-2020 strategic plan
Strategic Goal: Deliver superior reliability performance in a changing environment	
2. Ontario's electricity service is reliable	100% compliance to North American Electricity Reliability Corporation high violation risk factor reliability standard requirements (including audit requirements) is self-certified by the IESO, demonstrating ability to sustain the reliability of the power system
3. The provincial power system is well planned	Implementation of key recommendations in regional and bulk system power plans is on track according to their suggested timelines¹ to meet the Ontario resource and transmission assessment criteria and support the planning and management of the provincial power system, whereby: • 100% of the 44 key recommendations for 2017 are progressing on track for the 15 Integrated Regional Resource Plans • 100% of the five priority and key transmission projects in Northwest Ontario from provincial plan(s) (2013 Long Term Energy Plan) are progressing on track, along with associated milestones with timelines in 2017

¹ Subject to change to reflect more current information

CPM	2017 Target
4. Operations are well co-ordinated with LDC partners	One major LDC is actively engaged in two-way communication by end of 2017, including sharing of operational data to support coordinated and consistent operation decision making; discussion underway with additional two LDCs
5. Cybersecurity leadership is demonstrated across the sector	Cybersecurity excellence is promoted by: • The objectives contained in the 2016 – 2017 cybersecurity forum work plan are accomplished • Supporting the OEB objectives for completion of standards development by the end of 2017 • Increasing the IESO's internal cybersecurity capabilities by implementing an advanced malware technology solution that is designed to improve our capability to detect and deter new and complex cyber-attacks and completing cybersecurity process enhancements by Q1 2017
Strategic Goal: Drive to a more efficient and sustainable marketplace	
6. The electricity market is efficiently delivered	The IESO continues to focus on price efficient outcomes via: • Design and development of a renewed market structure project built on stakeholder input that lays the foundation for improved price efficiencies, operability, transparency and innovation includes: ◦ A robust, well stakeholdered cost/ benefit analysis completed by end of Q1, 2017 ◦ Well attended, at a minimum quarterly meetings (including information sessions) with stakeholders to discuss, review and educate stakeholders on high level market design elements ◦ A detailed project plan developed by the end of Q3 which defines project scope (detailed design work to be undertaken), schedule and cost (including internal/external resourcing requirements) ◦ A project level risk assessment and Key Performance Indicators completed by end of Q3 • Directed procurements (FIT and microFIT) are completed through transparent, consistent and efficient processes with posted standard contract, rules and prices. The processes are validated by a Fairness Commissioner to be executed with consistency and integrity. The costs are at or below the government's cost projections included in the 2013 LTEP • Cost-effective delivery of LDC 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 50% (3.5 TWh) of 7 TWh Conservation First target forecasted to be achieved and 46% (0.78 TWh) of

CPM	2017 Target
	the 1.7 TWh Industrial Accelerator Program (IAP) target contracted by the end of 2017
7. The marketplace for electricity is innovative and competitive	Broader, competitive and more innovative sector participation is enabled by end of 2017 through: • Formal mid-term review of Conservation First Framework and Industrial Accelerator Program has been initiated by June 1, 2017 and on track to be completed no later than June 1, 2018 • At least \$50M (3%) of the Conservation First Framework Conservation and Demand Management Plan budget committed to full deployment of innovative new programs • The demand response (DR) auction enables the participation of a broad range of participants, including residential DR by the end of 2017, and meets the objectives of the DR working group • The SME will enhance the value of electricity data by expanding the type of access to smart meter data received by the IESO's systems
Strategic Goal: Be recognized as a trusted advisor, informed by engagement	
8. Stakeholders and communities are confident with the engagement process for making informed decisions	2% improvement in satisfaction with the engagement process is achieved from the 2016 customer satisfaction survey baseline of 65%; demonstrating continuous improvement in the IESO's consideration of stakeholder input in its decisions
Strategic Goal: Invest in our people and processes to meet the needs of the sector	
9. IESO employees are engaged	A two point increase in employee engagement is achieved from the baseline of 71% set in 2016 and all business units successfully implement their action plans resulting from the survey.
10. IESO resources are utilized effectively and	Expanded operational capacity is realized by: • All priorities in 2017 are being achieved within the IESO's approved budget

CPM	2017 Target
efficiently	• 80% of priority change initiatives progressing according to their approved business case, on time and budget and completed projects meeting all of their defined business objectives • 100% of the Operations Readiness Initiatives (ORI) progressing according to their approved business case, meeting all of their defined business objectives to achieve a headcount reduction of six FTEs by end of 2018

Appendix 2: Key 2017 Risks

The IESO's established risk framework is in place to identify and mitigate risks that the IESO faces in achieving the organization's strategic goals and objectives as well as in the effective execution of the 2017-2019 Business Plan.

The IESO assesses risks to the business at least annually and has identified nine key risks in the areas of reliable operation of the grid, stakeholder engagement and corporate resilience including workforce capacity and engagement.

Risks that continue to be key into 2017 pertain to the breadth and pace of change in Ontario's evolving energy environment, cyber security and the effective prevention of market rule and reliability standard violations. The risk of insufficient support from key stakeholders has shifted in focus and relates more to supporting specific key 2017 initiatives, including Market Renewal, as opposed to the IESO's broader stakeholder engagement efforts. New key risks in 2017 include resourcing constraints, employee engagement, complexities with regard to the management of procurement contracts, conservation funding and grid operability limitations.

Mitigation plans have been defined and are in place for each of the 2017 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 execution of the mitigation plans. Reporting of key risks is provided to the Audit Committee of IESO's Board of Directors quarterly to monitor and report on the progress of mitigation plans.

Risks related to Market Renewal will continue to evolve over the lifecycle of the project and will include stakeholder, resourcing, integration and implementation risks. In 2017, Market Renewal will be impacted by stakeholder and resourcing risk. To manage stakeholder risk, an effective stakeholder process will be executed to complete the Market Renewal cost/ benefit analysis and the IESO will provide ongoing sessions to discuss, review and inform stakeholders on high level market design elements to ensure stakeholder feedback is incorporated in order to obtain the required stakeholder support. From a resourcing perspective, Market Renewal will face challenges securing appropriate subject matter experts, effectively backfilling resources to minimize the impact to other aspects of the business, and obtaining resources within the timelines required. The IESO will establish processes to competitively secure external resources and second key internal resources in order to manage internal and external resourcing requirements while minimizing the overall impact to permanent headcount and other IESO initiatives.

Beyond 2017, the IESO anticipates increased integration and implementation risk as well as continued stakeholder risk. Integration risk will require organization-wide changes including

adopting and adapting new processes, systems and tools into the existing framework. Implementation risk includes managing project scope, costs and schedules.

The IESO will monitor Market Renewal risks on a continuous basis, performing risk assessments during the various phases of the project as required and developing a risk register to track risks and related mitigation plans that will be reported to the Audit Committee of the IESO Board of Directors.

The key risks for 2017 are as follows:

1	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
2	Grid requirements for regulation, voltage control and flexibility lead to challenges in maintaining grid reliability and achieving efficient market operations
3	A significant cyber security event occurs that disrupts the operation of the IESO
4	Current workforce capacity and allocation does not support the IESO's ability to effectively execute its mission, strategy and expanding responsibilities
5	Market rule and reliability standard violations significantly impact markets and reliability
6	The volume, complexity, length and financial materiality of contracts under IESO's management exposes the organization to contract compliance and litigation risks that could erode public confidence in the IESO and in the sector
7	Insufficient support from key stakeholders impedes the IESO's ability to effectively pursue key initiatives
8	Failure of critical Control Room tools challenges the IESO's ability to effectively manage grid reliability and market operations
9	Lower than desired employee engagement impedes the efficient and effective execution of initiatives and priorities

Appendix 3: Strategic Plan Framework

The Strategic Plan is organized around the IESO's strategic themes and is guided by its corporate vision, mission and values. Below is a summary of the IESO's strategic goals and objectives:

Themes (What we do)	Providing public value		Respecting and valuing our communities, customers and stakeholders	Building corporate resilience
Goals (What we want to achieve in the next five years)	Deliver superior reliability performance in a changing environment	Drive to a more efficient and sustainable marketplace	Be recognized as a trusted advisor, informed by engagement	Invest in our people and processes to meet the needs of the sector
Strategic Objectives (How we will achieve our goals)	• Plan and manage the power system so Ontarians have power when and where they need it. • Enhance reliability and efficiency through coordination of IESO- and LDC-controlled resources. • Promote robust cyber security practices across the sector.	• Evolve the IESO markets to increase market efficiency and value for consumers. • Foster an open and competitive electricity marketplace with broad participation.	• Enhance public confidence in the IESO and the sector to facilitate informed customer choice. • Work effectively with government to support policy development and IESO's excellence in implementation. • Seek out and respond to input from communities, customers and stakeholders to inform IESO decisions.	• Strengthen the development and engagement of our employees. • Attract and retain the best talent. • Be a focused and flexible organization positioned to support the ongoing transformation of our industry.

The full plan document can be found at http://www.ieso.ca/Documents/corp/IESO-Strategic-Plan_2016-2020.pdf.

Appendix 4: IESO Capital Spending

Summary of 2017 – 2019 Capital Spending

Change Initiatives/Projects (\$ Millions)	2017 Plan	2018 Plan	2019 Plan
Identity Access Management	2.1		
Operations Readiness Initiatives	2.5	3.0	
Market Information System (MIS) Refresh	2.0	1.7	
Infrastructure Refresh (building services, software licenses & computer hardware)	2.5	2.5	2.3
Enterprise Cyber Security Management Refresh	2.0		
Conservation Demand Management Information System (CDM IS)	1.0	0.4	1.0
Corporate Website including consolidation and enhancement to Save-on-Energy	1.5	1.0	1.5
CRS Replacement & Migration	1.0	2.0	2.0
Financial Systems Upgrade	1.0	1.5	1.0
MACD Enforcement Support Tool and related projects	1.0	0.5	1.0
FIT, microFIT and other upgrades	1.0	0.7	0.4
Oracle Archetype Expansion and Oracle batch	1.0	1.0	
Wallboard Refresh	1.0		
System Logging and Analysis Upgrade Qradar		2.0	
Tier 1 Storage Refresh			2.0
ETP Refresh			1.0
Capital (\$1M & above)	19.6	16.3	12.2
Other Capital Initiatives/Projects	5.4	8.7	11.0
Core Operations Capital	25.0	25.0	23.2
Market Renewal	-	20.0	40.0
Total Capital including Market Renewal	25.0	45.0	63.2

Capital Change Initiatives/Project Descriptions

2017 – 2019 Capital Plan Details

Change Initiatives/Projects	Descriptions
Identity Access Management	The Identity Access Management (IAM) project will implement an IAM solution for both Bulk Electricity System (BES) cyber and non-BES cyber assets. This will reduce the risk of non-compliance by substantially reducing the amount of manual intervention in addition to reducing the effort required to generate and validate access reports for future critical infrastructure protection (CIP) audits. This will also improve the efficiency of onboarding, off-boarding and cross-boarding processes from the user's perspective.
Operations Readiness Initiatives	This includes 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.
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.
Infrastructure Refresh (building services, software licenses & computer hardware)	To procure Racks and Enclosures to expand the IESO's blade server rack and enclosure infrastructure, which will facilitate the requirements of emerging projects. This project also includes miscellaneous building services and software license renewals.
Enterprise Cyber Security Management Refresh	This project will include enhancements to cyber security analytical capabilities, procurement of new technology to address advanced malware, and sourcing of additional cybersecurity intelligence. This project also includes a refresh of cyber security technologies.
Conservation Demand Management Information System (CDM IS)	Supports the delivery of reliable, cost-effective conservation (7 TWh through the Conservation First Framework and 1.7 TWh through the Industrial Accelerator Program), while meeting the IESO's fiduciary and contract management accountabilities through a solid contracting infrastructure, rigorous program reporting, strong evaluation, measurement and verification and counterparty compliance programs, and enabling technology platforms.
Corporate Website including consolidation and enhancement to Save on Energy	Corporate website upgrade to help proactively manage the IESO's reputation through its communications to and relationships with stakeholders, customers, employees and others to position the organization as a leader in the electricity sector.
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.
Financial Systems Upgrade	Payroll process and tools upgrade and Separation of Corporate and Market Financial Transactions

Capital Change Initiatives/Project Descriptions Continued

2017 – 2019 Capital Plan Details

Change Initiative/Projects	Descriptions
MACD Enforcement Support Tool and related projects	Implement an enhanced, IT-supported information solution to help MACD effectively and reliably conduct its enforcement activities in Ontario and mitigate the risks to the IESO's regulatory obligations in the next 18- 24 months.
FIT, microFIT and other upgrades	A replacement/replatforming of the existing FIT and microFIT system based on program requirements and business needs and an upgrade the existing CRM platform.
Oracle Archetype Expansion and Oracle batch	The Oracle Exadata appliance is the IESO's enterprise Oracle database server. This project will add both disk and CPU capacity to support additional applications and further database growth of existing applications.
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.
System Logging and Analysis Upgrade (Qradar)	Qradar is a security information and event management system that is used to collect and store all security logs in a centralized location for analysis and correlation. This project will refresh Qradar with the latest software and hardware appliances to ensure the IESO is effectively able to monitor for the latest security threats.
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 IESO needs for the next 4 years. It includes the purchase and installation of additional Storage and Fibre Channel ports at the Clarkson and Backup Operations Centre (BOC) sites and migration of all servers.
Enterprise Threat Prevention (ETP) 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 appliances to ensure that we continue to protect the organization from threats and risks that may impact our business operation.
Market Renewal	The Market Renewal project will evolve the wholesale energy market and introducing capacity auctions to competitively and efficiently procure resources, while continuing to meet emerging operability challenges. The Market Renewal initiatives 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; and • Other operability enhancements as identified by the IESO and its stakeholders

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