
Business Plan 2019–2021

Independent Electricity System Operator

SEPTEMBER 4, 2018



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Letter from the President & CEO and Chairman of the Board

The Independent Electricity System Operator (IESO)'s proposed 2019-2021 Business Plan provides context on the priorities we're focusing on to enhance the reliability and efficiency of the province's power grid, deliver a more efficient market, plan for the future, and ensure power is available to and affordable for all Ontarians.

With rapid change continuing to be the hallmark of the electricity sector, defining our future success depends on our ability not just to achieve these objectives, but to do so in the most cost-effective manner possible. In keeping with this focus on providing value for every dollar spent, the IESO is committed to delivering on its core responsibilities, while making the investments today that will result in significant benefits for both market participants and consumers over the longer term. Our market renewal program (MRP), which aims to meet system and participant needs at lowest cost, is a perfect example.

At its core, market renewal is about improving how electricity is scheduled and dispatched, and how we acquire resources, to reduce overall system costs. In 2019, with the finalization of the high-level designs for each of the MRP's four initiatives, we'll mark a major milestone on the road to implementation of a stable, robust market that will help us manage future change more effectively.

The plan also outlines how our investments in cybersecurity, innovation, long-term planning and engagement will help position Ontario as both a leader in grid reliability and performance and an important voice on issues shaping the broader electricity sector.

Our commitment to sound financial management, even as we make the significant investments required to deliver on these initiatives, means we are holding our revenue requirement for 2019 at the same levels as 2018 and 2017. For 2019, the IESO's proposed core operating expenses are \$190.8 million, which will be funded by usage fee revenues. Capital projects in 2019 to facilitate the delivery of core business functions are expected to be \$17.3 million, with a further \$38 million allocated to fund the next stage of the MRP.

We look forward to working with you, as we deliver on our mandate, while ensuring that respect for ratepayers and an unswerving focus on reliability and efficiency continues to guide everything we do.



Peter Gregg
President and Chief Executive Officer



Tim O'Neill
Chairman of the Board



Executive Summary

Maintaining the reliability of Ontario's bulk electricity system is at the core of the IESO's mandate and what the IESO will remain focused on over the 2019-21 Business Planning period. In doing so, the IESO will need to effectively manage new and emerging threats, such as cybersecurity, and facilitate the reliable integration of new, more decentralized electricity resources. As always, we will continue this work in ways that recognize the negative impact of electricity cost increases on Ontario ratepayers.

As such, the IESO is proposing to hold its revenue requirement for 2019 at 2017 levels, the second consecutive year that we will not seek any increase. In doing so, we will explore opportunities to reduce our costs without compromising our commitment to reliability.

While the IESO's revenue requirements account for only one per cent of the average residential bill, our unique position at the centre of the province's electricity market, provides us with an opportunity to identify and generate significant efficiencies across the sector. A big part of our efforts over the next few years is aimed at reducing future electricity costs for customers.

The IESO's market renewal program is designed to not only make today's electricity market more efficient, but to create more than \$3 billion in savings for customers over a 10-year period with the potential to reach as high as \$5.2 billion.

The Business Plan provides more details on the IESO's proposed initiatives over the next three years and our commitment to hold our 2019 revenue requirement flat.



Introduction

The Independent Electricity System Operator (IESO) is a not-for-profit corporation responsible for ensuring the reliability and efficiency of the province's power grid, today and into the future. This includes operating the grid 24 hours a day, 365 days a year, administering Ontario's electricity markets, and conducting comprehensive long-term planning and procurement to ensure power is available when Ontarians need it. As a trusted source of data, the IESO supplies the information and reports that sector participants, communities and policy-makers count on to better inform their decision-making.

How we keep the lights on across Ontario is changing. The traditional one-way, top-down model is being replaced by a much more decentralized and dynamic electricity system – and the IESO is at the forefront of this transformation, informing public policy and collaborating with stakeholders to turn today's challenges into tomorrow's opportunities.

Today, we're helping more stakeholders participate in meaningful ways, by giving more businesses, communities and residents a voice in how we meet the evolving demands of our sector. We're shaping how emerging technologies and a changing supply mix will create opportunities for new and existing market participants. We're improving our planning process to better address the growing complexities of operating the system and enable more informed decision-making and investments. Central to this work is our continuing focus on building a more innovative, competitive market – one that addresses inefficiencies, lowers costs, and helps ensure the province is prepared to meet future electricity needs, even as the sector continues to evolve.

Doing more with less: delivering value at the lowest cost

With its broad-reaching responsibilities, the IESO is uniquely positioned to recommend and implement changes that reflect our respect for ratepayers and attention to operating efficiency, while achieving significant cost savings across the sector. We have kept our core revenue requirements at the same levels since 2011, representing about 0.1 cent/KWh for the average residential consumer in Ontario. An increase to our fees and combined revenue requirement occurred with the launch of the Market Renewal Program (MRP) in 2017, a multi-year initiative representing the most significant suite of reforms since the market was designed in the late 1990s. As the MRP moves from design to implementation in the early 2020s, the yearly projected savings to ratepayers as a result of the efficiency gains will exceed the total current operating costs of the IESO.

Organizational focus

This is a pivotal time for the electricity sector. To capitalize on the changes that are underway, the IESO is evaluating all aspects of its business, with a view to making incremental investments now that are expected to reap major dividends down the road.

This includes having the right people in the right place focusing on the right objectives. Through our diverse and highly skilled Board of Directors and employee base, the IESO will continue to deliver value to Ontarians for years to come.

The IESO's broad mandate includes long-term planning, market and system operations and oversight, research into innovative solutions, stakeholder engagement and alignment of energy efficiency with system needs. To better position the organization to deliver on its mandate, in 2018 the IESO completed a corporate realignment aimed at building a stronger, more cohesive organization focused on a common purpose.

In addition to their core responsibilities, each of the six members of the executive leadership team reporting to the CEO will be accountable for achieving specific strategic objectives and performance measures that reflect the growing focus on building a strong foundation to support the ongoing evolution of the sector. These range from developing an enterprise-level data integration strategy, and positioning the IESO as a thought leader in cybersecurity, to implementing major process improvements and enabling innovation across the organization.

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 deliver on core responsibilities, as well as the investments required now to enable longer-term benefits for both the sector and consumers. These additional activities include:

- Advancing the Market Renewal Program to deliver a competitive and efficient market, which, over a 10-year period, is expected to achieve an average of \$3.4 billion in savings (see pages 8 and 11)
- Creating an innovation roadmap to enhance system reliability and drive down costs for an ever-changing sector in collaboration with industry partners (see page 9)
- Enhancing our cybersecurity program to address the increasing complexity and growing threat of cyberattacks (see page 7)
- Developing and implementing the plan to enable approved third parties to access data from the Smart Metering Entity (SME)'s meter data management repository (MDM/R) (see page 10)
- Introducing more transparency into our planning processes by providing updated information to the market and regularly engaging with stakeholders to enable them to make more informed decisions and investments (see pages 6-7)
- Implementing changes to better align energy-efficiency programs with system and consumer needs and transition to the market in the future (see page 10)

Even with the significant investments that are required to deliver on these and other initiatives that will result in long-term benefits for Ontario's energy sector, the IESO intends to hold its revenue requirement for 2019 at the levels approved for 2018 and 2017. This commitment to sound fiscal management means that the IESO will continue to provide real benefits to consumers, stakeholders and market participants, while meeting the challenges associated with maintaining the same revenue requirement for the third consecutive year. These include managing the cost increases resulting from collective agreement escalations and our ongoing focus on system reliability, as well as substantial investments in cybersecurity to support the change in our license requirements, and in the Market Renewal Program.

For 2019, the IESO's proposed core operating expenses are \$190.8 million, which will be funded by usage fees.

In 2019, the IESO is planning a capital envelope of \$17.3 million to facilitate the delivery of corporate priorities associated with its core business. An investment of \$38 million in capital costs is required to fund the next stage of the Market Renewal Program. Further details on the overall capital program are included in Appendix 3.

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

Additional initiatives funded from other sources include efforts 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).

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

The IESO has also established corporate performance measures, which assess progress toward the achievement of its mandate and strategic objectives. In 2019, the business will continue to align these measures with the priorities for each of the IESO's five areas of focus: Reliability and Resilience; Corporate Agility and Effectiveness; Sector Leader – Purposeful Engagement; Innovation; and Cost Efficiency. More information on the IESO's Corporate Performance Management Program for the planning period is found in Appendix 1.



Enhancing System Reliability and Resilience

To meet reliability needs effectively, we are updating our planning processes to align with market renewal initiatives and timelines and to reflect future market design.

Continuing to power Ontario's businesses, homes and communities reliably – and recover in the event of a disruption – starts with standards. Under Ontario's reliability framework, the IESO complies with the standards established by the North American Electric Reliability Corporation and Northeast Power Coordinating Council's criteria, and enforces them through market rules. The IESO is actively involved in the ongoing development of the standards and criteria of each of these bodies, and supports their efforts to create a reliable electrical grid throughout North America.

Improving the IESO's planning processes

Adhering to the sector's most stringent compliance requirements depends on maintaining a robust and coordinated planning process. While the IESO balances the supply of and demand for electricity on a second-by-second basis, ensuring reliability in the longer term is more complex – and takes into account factors that affect the supply-demand balance, current and longer-term resource requirements, as well as economic trends and sector uncertainties.

Historical energy consumption patterns are changing. In the last decade, changes in the economy, savings from energy efficiency and demand management, embedded generation and the expanded Industrial Conservation Initiative have more than offset any increases resulting from population growth and economic expansion.

Reliability standards, based on projected demand, drive the total amount of electricity generation capacity to meet the system's needs, but significant changes to the supply mix are on the horizon. These include the schedule for retiring or refurbishing existing nuclear facilities, and the expiration of contracts with current generating stations, all of which call for heightened market intelligence to manage risks and inform future outlooks on system adequacy.

With new capacity expected to be required as early as 2023, the introduction of an incremental capacity auction – a key part of the work currently being undertaken by the IESO's Market Renewal Program – will be core to meeting future needs. When the market is redesigned, improved price signals will provide a clearer picture of what and where services are needed, and help drive decisions that ensure reliability.

Broadening the adequacy outlook

With the capacity to deliver energy when and where it's most needed, new technologies like energy storage are poised to play a larger role in enhancing the reliability and resilience of the IESO-controlled grid.

During phase one of the IESO's energy storage procurement, seven of 11 participating facilities joined the electricity market, with the remaining four expected to be connected by the end of 2018. While providing ancillary services to the grid, phase one facilities are expected to yield valuable learnings in areas ranging from the mitigation of surplus baseload generation, to the capabilities of fully dispatchable energy storage facilities in the wholesale market.

Our planning processes will be focusing on transparently outlining different system needs, including energy, capacity and ancillary services to support our market mechanisms to meet needs in a cost-effective

manner. In addition, the IESO has to forecast the growth of distributed energy resources with a view to ensuring we can integrate them into the operation of the system.

As part of our commitment to transparency, starting in 2019 the IESO will supplement existing planning publications with an annual planning outlook. Designed to broaden understanding of resource adequacy over a 20-year planning horizon, this document will outline system needs that help enable stakeholders to make informed decisions and investments.

Addressing regional planning needs

Ensuring reliability is also a priority at the regional level. Introduced in 2013, the existing regional planning process is currently being reviewed to ensure it integrates effectively with other planning initiatives, and considers both transmission facility end-of-life and cost-effective alternatives to transmission and distribution infrastructure to meet regional needs.

The review will explore how the existing planning process considers cost-effective alternatives to transmission and distribution infrastructure solutions, such as energy efficiency and demand management and distributed energy resources, as well as possible linkages to current and future electricity markets. In 2019, following the release of an interim report to summarize key findings, the IESO will produce a final report outlining recommendations and identifying supporting legislation that may be required to implement them.

As part of the IESO's planning process, at least once every five years, each of our 21 regions undergoes a rigorous reliability evaluation that includes a needs and scoping assessment, followed by community and stakeholder engagement. These assessments may result in an integrated regional resource plan (IRRP) that outlines specific priorities and actions for the near, medium and long term. In 2019, our focus will be on ensuring IRRPs for the Windsor-Essex, Toronto, GTA North, Burlington-Nanticoke and Greater Ottawa regions, are on track for completion within prescribed timelines.

Investing in cybersecurity to protect the grid

While regular reliability assessments and effective planning are fundamental to reliability, ensuring we can continue to provide Ontarians with the electricity they depend on every day requires us to protect the province's grid from cyberattacks.

That's why the IESO takes a continuous-improvement approach to protecting its data by constantly enhancing our critical information systems, and ensuring cybersecurity risk management is being addressed and integrated at every level and in every business unit.

Expanding and collaborating on cyber defence has been key to our reliability planning. However, our efforts to play a leadership role in the sector have grown since the IESO established the Ontario electricity sector's first executive briefing on cybersecurity in 2015.

Today, as well as bringing together our sector counterparts and the world's leading cybersecurity policy experts to identify emerging trends and collaborate on best practices to address them, we are the first system operator in North America to have accountability for providing cybersecurity-related services to the broader electricity sector. To that end, the IESO is currently working with the federal and provincial governments, including regulators, to contribute to the development of strategies and policies that focus on the reliability, security and privacy of Ontario's interconnected power system.

In addition to facilitating a central collaboration hub for cybersecurity best practices, in December 2018, the IESO is set to launch of a security operations centre – a major milestone in the evolution of the organization's cybersecurity program. The centre will provide new real-time cybersecurity situational awareness capabilities and the 24/7 cybersecurity monitoring required to improve incident detection and response to the threats that face our electricity infrastructure and the organizations that operate it.



Meeting Tomorrow's Needs Cost Effectively

A combination of open, competitive markets and prices that signal where and when services have the greatest value will drive down costs, while setting a strong foundation for innovative approaches to meet system needs

Executing with excellence is the foundation of the IESO's success, whether building consumer and sector confidence in our operations and planning, or exploring how innovation can cost effectively meet changing demands on the grid. Finding efficiencies in the way we do business and delivering reliability at the lowest cost is an enterprise-wide priority. It's also the driving force behind the IESO's Market Renewal Program (MRP) which, over a 10-year period, is expected to deliver an average of \$3.4 billion in efficiency savings, most of which will flow to Ontario's consumers.

Driving efficiencies through market renewal key to cost savings

Market renewal is a collaborative effort to lay the foundation for a made-in-Ontario electricity market of the future. In resolving long-standing market design issues, the MRP will improve the way electricity resources are acquired and scheduled to deliver power to consumers at the lowest cost. In the longer term, the program will prepare us to manage change and benefit from innovation in a rapidly evolving industry, while building on the unique, positive attributes of the existing system.

To achieve these outcomes, the MRP will:

- Replace the current two-schedule market with a **single schedule market** that will address current misalignments between price and dispatch, and eliminate the resulting settlement complexities that have prevented other improvements, including the day-ahead market, from being implemented
- Reduce the cost of scheduling and dispatching resources to meet demand as it changes from the day-ahead market to real time through the **enhanced real-time unit commitment** project
- Introduce a **day-ahead market** that will provide greater operational certainty to the IESO and greater financial certainty to market participants, which lowers the cost of producing electricity and ensures we commit only the resources required to meet system needs
- Improve the way Ontario acquires the resources to meet longer-term supply needs by implementing an **incremental capacity auction** that will drive down costs by enabling all resources to compete to supply what the system needs

Engaging with stakeholders in preparation for the high-level design (HLD) documents was the primary focus in 2018. Market renewal will result in the largest changes to the electricity market since its opening in 2002, and will continue to require broad sector participation to inform the final design. In 2018, the release of HLD recommendations for all three initiatives in the energy work stream – single schedule market, day-ahead market and the enhanced real-time unit commitment – will mark a significant milestone on the road to full implementation. The draft HLD document for the incremental capacity auction will follow in 2019.

In advance of the launch of the incremental capacity auction – one of the core initiatives of the Market Renewal Program – the IESO continues to meet system needs through the ongoing management of generation and storage contracts. As of December 31, 2017, generation contracts, which include natural gas, wind, solar, hydroelectric, biomass and nuclear, range in size from microFIT contracts of less than 10 kilowatts to the Bruce Power nuclear contract, which secures 6,300 MW of supply.

As of December 31, 2017, the IESO was managing more than 31,200 contracts that account for more than 27,650 MW of generation. These include contracts for approximately 26,800 microFIT projects (representing 234 MW) and 4,130 Feed-in-Tariff or FIT projects (representing 4,800 MW). The majority of those contracts are in operation with over 1,310 projects (or 2,780 MW) under development. Renewable energy projects account for 43 per cent of contracted capacity (50 per cent wind, 21 per cent hydro, 25 per cent solar, 4 per cent bioenergy), with natural gas at 34 per cent. In July 2018, the IESO began terminating 751 contracts for electricity generation projects in the early stage of development, a move that is estimated to save ratepayers about \$790 million without any adverse impact on the reliability of Ontario's electricity system.

Roadmap set to build innovation into the way we do business

To help drive the evolution and cost-effectiveness of the province's electricity sector, the IESO is also working on an innovation roadmap and associated work plan, which are expected to be finalized in 2019. With the energy sector continuing to transform, the IESO's investment in innovation will contribute to the assessment of potential future scenarios for the electricity and broader energy sector in the province, and help identify potential roles for other organizations.

After exploring opportunities and establishing priorities in consultation with the industry, the IESO will create a multi-year plan to address shared goals for research and development to support grid modernization. The plan will include work streams that support future-state goals in the near, medium and longer term, and address improvement opportunities in a variety of areas, including technology, policy, interoperability and operational integration. Once complete, the roadmap will coordinate IESO and sector efforts to exploit new avenues for funding and risk-sharing, leverage the best practices implemented in other jurisdictions, and use the resulting insights to broaden the market and increase competition.

Expanding opportunities for newer technologies to compete is central to the IESO's innovation and efficiency agenda. Because energy storage can deliver multiple capabilities – both as a load and a generator – supporting further integration of these resources into the electricity system is essential to sector innovation and modernization. To that end, in April 2018 the IESO established an Energy Storage Advisory Group to address obstacles that restrict the ability of energy storage facilities to compete with other resources.

The IESO's focus on paving the way for storage resources to play a larger role in IESO-administered markets also aligns with policy goals south of the border, where the U.S. Federal Energy Regulatory Commission has issued new requirements to level the playing field. Under Order 841, released earlier

this year, U.S. system operators must establish participation models and market rules that recognize the physical and operational characteristics of electric storage resources. In the absence of similar requirements in Ontario, the IESO is committed to proactively tackling the barriers within its control to take advantage of resources that are often less expensive and easier to deploy and that provide a faster and more accurate response to market signals.

Third-party access to smart meter data: providing value for clients and ratepayers

Leveraging the full value of the data collected and managed by the Smart Metering Entity (SME)'s meter data management repository (MDM/R) will also be critical to promoting innovation and driving down system costs. With almost five million smart meters installed in homes and small businesses across the province, giving authorized third parties access to de-identified data is expected to create value in areas ranging from system planning and policy development to the creation of products and services that support the potential of big data.

Since completing extensive collaboration involving local distribution companies, gas utilities, the Ontario Energy Board (OEB), Ministry of Energy, Electricity Distributors Association, the province's Information and Privacy Commissioner and an external privacy consultant, the IESO (as the SME for Ontario) has been focused on developing a comprehensive third-party access implementation plan that helps create new value, while adhering to confidentiality and privacy requirements.

To be delivered to the OEB by the end of 2018, the plan will outline the proposed tools, processes and procedures that will enable the SME to accept and process data requests, as well as a monetization model that will be beneficial for both data clients and ratepayers. After undergoing a rigorous screening process, clients are expected to use the data to inform research and development, technology, training and continuous service improvement. Any surplus funds – above and beyond those levied for cost recovery – will be credited to ratepayers.

Better aligning energy efficiency and demand management with system and customer needs

Energy-efficiency and demand-management programs are demonstrating that they can be an effective and competitive resource to help meet system needs. From 2015 through to mid-June 2018, the IESO and local distribution companies have helped Ontario's residential and business consumers reduce electricity consumption by 5.4 TWh.

Distribution-connected consumers saved 4.8 TWh and transmission-connected consumers 0.6 TWh respectively. Overall, energy-efficiency program costs came in at just under 2 cents/KWh, considerably less than the threshold of less than 4 cents/KWh. At the same time, the IESO will continue to look for ways to reduce the costs associated with such programs.

With the understanding that energy efficiency is a resource that can reduce demand and benefit ratepayers, the IESO is working more closely with planners to ensure that such programs are maximizing system value, that future targets are aligned with system need, and with a renewed focus on being more customer-centric. Any changes in programs will also need to ensure a focus on ratepayer value and reflect the shift to a more competitive, less prescriptive performance model that pays for verified energy savings achieved, regardless of source.

Over time, with the implementation of the IESO's Market Renewal Program and building on experience to date, we will continue to explore how energy efficiency may one day participate in incremental capacity auctions, where it can compete with other resources to meet system needs at lowest cost.



Leading Through Engagement

Working with diverse stakeholders – from policy-makers, regulators and academic institutions, to market participants and local, regional and provincial planning groups – we leverage our independence and position as a trusted resource to inform decision-making.

Engagement has been part of our DNA – and our business model – since the IESO’s inception in 1999. The transformation of the electricity system and resulting changes to the way Ontarians produce and consume energy is requiring us to engage with more stakeholders, more often and on more issues. As a result, we are broadening our relationships to better inform decision-making and sector innovation and refining our processes to ensure participants understand how we are using their feedback. As part of its commitment to be a leader in grid reliability and system performance, the IESO is also continuing to participate in and drive broader discussion of issues affecting sector participants – both in Ontario and beyond our borders.

Transforming the market

Given the high-stakes nature of the IESO’s market renewal activities, which will fundamentally transform the foundation of Ontario’s \$17-billion annual electricity market, a comprehensive engagement strategy for the Market Renewal Program (MRP) has been a priority from day one. Stakeholders – including suppliers, consumers, emerging technologies, demand-side resources and others – are providing valuable feedback on design options and improving our decision-making.

To date, the IESO has held over 50 market renewal stakeholder engagement and Market Renewal Working Group meetings and discussed more than 170 decisions within 19 design elements. With the release in 2018 and 2019 of high-level designs (HLDs) for each of the energy and capacity initiatives, engagements with stakeholders will shift into high gear. The goal: to ensure stakeholders have an opportunity to provide meaningful input into HLDs and on the detailed-design phase of the project in preparation for full implementation.

Expanding relationships to inform and be informed on sector needs

Better aligning First Nations and Métis energy support programs with community needs and interests is an ongoing goal – and engagement is at the heart of the IESO’s efforts to help these two groups build capacity for their communities.

To supplement regular engagement activities, the IESO held its first Indigenous Community Energy Symposium in October 2017. Learnings from that session – and from First Nations and Métis conferences planned for October and November 2018 – will be used to evolve existing programs aimed at helping these communities move toward a more secure energy future.

Enabling informed decision-making is also the catalyst behind activities to support a number of outcomes for delivery in 2019. These include engagements on:

- Reforms to the regional planning process, including an assessment of the effectiveness of existing engagement channels, and obstacles to the implementation of cost-effective alternatives to transmission and distribution infrastructure solutions
- The removal of barriers to the integration of storage resources into the wholesale electricity market – with a focus on those within the IESO’s control
- The creation of a competitive transmission procurement and selection process, including timelines, qualification requirements and bid evaluation criteria
- A review of the governance and decision-making structure to incorporate considerations arising from market renewal initiatives, and more broadly IESO processes and oversight on market rules and manuals, as well as the dispute resolution process
- An implementation plan that provides approved third parties with access to de-identified meter data available in the province’s Meter Data Management/Repository (MDM/R)
- The technical criteria used to assess customer reliability and supply security in order to identify and evaluate options for local area enhancements

An authoritative source of information, an independent voice

As a not-for-profit corporation with an independent Board of Directors, the IESO has no financial stake in the industry, ensuring its independence both financially and as a contributor to ongoing dialogue and evolution of the system. This makes the IESO well positioned to drive the transformation of high-profile programs – including the redesign of the electricity market, cybersecurity and innovation – throughout the province’s electricity sector.

The IESO is also a trusted source of data. We provide near-term forecasts on reliability through our *18-Month Outlook*, release planning reports on the province’s 21 electrical regions, and forecast needs all the way out to 20 years. We make available up-to-the-minute and projected information on supply, demand and price, and produce weekly reports on system adequacy and other aspects of Ontario’s electricity sector – all of which help market participants, associations and governments inform their own planning.

The IESO’s unique vantage point on the power system and its role as an authoritative source of information is also critical to enhancing its reputation as a sector leader. In addition to establishing the Energy Transformation Network of Ontario (originally the Smart Grid Forum), the IESO belongs to the ISO/RTO Council, working with other members to build a smarter and more efficient grid to serve the North American power market and its consumers. Our executive leadership team is regularly invited to share its perspectives and best practices with industry leaders and regulators – for example, the IESO’s CEO was invited to speak at the U.S. Federal Energy Regulatory Commission’s annual technical conference on reliability in 2018.



Financial Overview

The Business Plan provides an overview of the resources required to maintain the high levels of performance necessary for the IESO to deliver on its core electricity system responsibilities, as well as to execute key programs, including innovation, cybersecurity and market renewal initiatives. The IESO intends to hold its revenue requirement for 2019 at 2018 approved budget levels. Funding levels for the balance of the planning period will be in line with inflation, one of Canada's key economic indicators. Further, the organization continues work to identify potential operating efficiencies within the planning period.

Funded by IESO usage fees, the revenue requirement for 2019 is \$190.8 million, which is at the same level as 2018 and 2017.

The organization has successfully met the challenge of incorporating significant investments that are required to deliver on its mandate with long-term benefits for Ontario's energy sector, while efficiently managing the related cost pressures to continue to operate at the same level of funding since 2017.

A key focus for the IESO will continue to be cybersecurity. Over the past two years the IESO has invested substantially in its cybersecurity technology. Recently, the IESO has expanded its accountability to include providing cybersecurity-related services to the broader electricity sector. The current business plan includes resources to establish best practices in cybersecurity operations, including implementation of a 24/7 security operations centre.

Increases in compensation and benefits costs are a key expense component that is closely managed. Annual compensation escalations due to collective agreements represent a key cost driver in the current business plan that is partially mitigated by other cost efficiencies resulting from an ongoing focus on internal infrastructure enhancements.

As part of its mandate, the IESO operates several programs that are funded from other sources and are not included in this business plan: the smart metering entity, market rule enforcement and education, and energy-efficiency programs.

For 2019, the IESO anticipates an average headcount of 717 to deliver its core electricity system responsibilities while continuing the implementation of its strategic initiatives. The Market Renewal Program will require an average headcount of 125 as the program advances to the detailed design stage. This brings the total average headcount requirement for the IESO to 842 in 2019.

Detailed Financials

The following table outlines 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)

(\$ Millions)	2018 Budget	2018 Forecast	2019 Budget	2020 Budget	2021 Budget
Revenue					
IESO Usage Fee	190.8	187.9	190.8	194.9	199.0
Total Revenue	190.8	187.9	190.8	194.9	199.0
Expenses					
Compensation & Benefits	110.3	111.8	113.4	116.2	119.5
Professional & Consulting Fees	16.9	15.2	15.7	16.3	16.2
Operating & Administration	36.6	36.3	37.5	38.3	41.9
Operating Expenses	163.8	163.3	166.6	170.8	177.6
Amortization	17.7	19.1	18.4	19.0	20.2
Net Interest	(3.4)	(5.4)	(5.9)	(7.1)	(8.4)
Total Core Operations	178.1	177.0	179.1	182.7	189.4
Market Renewal	12.7	14.9	11.7	12.2	9.6
Total Expenses	190.8	191.9	190.8	194.9	199.0
Operating Surplus/(Deficit)	-	(4.0)	-	-	-
Accumulated Operating Surplus	6.0	2.0	6.0	6.0	6.0

The forecasted operating deficit for 2018 is expected to reverse upon approval of the IESO's 2018 usage fee rates and ongoing expense management in the second half of the year. As a result, management expects 2018 total revenues and expenses to be in line with the budget.

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 began its capital implementation stage in late 2018, and will continue its efforts well into 2021. 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)	2018 Budget	2018 Forecast	2019 Budget	2020 Budget	2021 Budget
Core Operations Initiatives	22.6	15.4	17.3	20.3	17.9
Market Renewal	4.0	1.2	38.0	43.3	40.8
Total Capital Envelope	26.6	16.6	55.3	63.6	58.7

Staffing

Total average FTEs are expected to increase in the 2019–2021 planning period due to temporary resourcing required to support the Market Renewal Program and additional resources in core operations to support the IESO’s planning, corporate and information technology services and cybersecurity initiatives. The additional resources will gradually be filled in latter 2018 and continue into 2019. Additional resources in core operations are offset by the allocation of resources to market rule enforcement, market education and energy-efficiency programs, which do not impact this business plan.

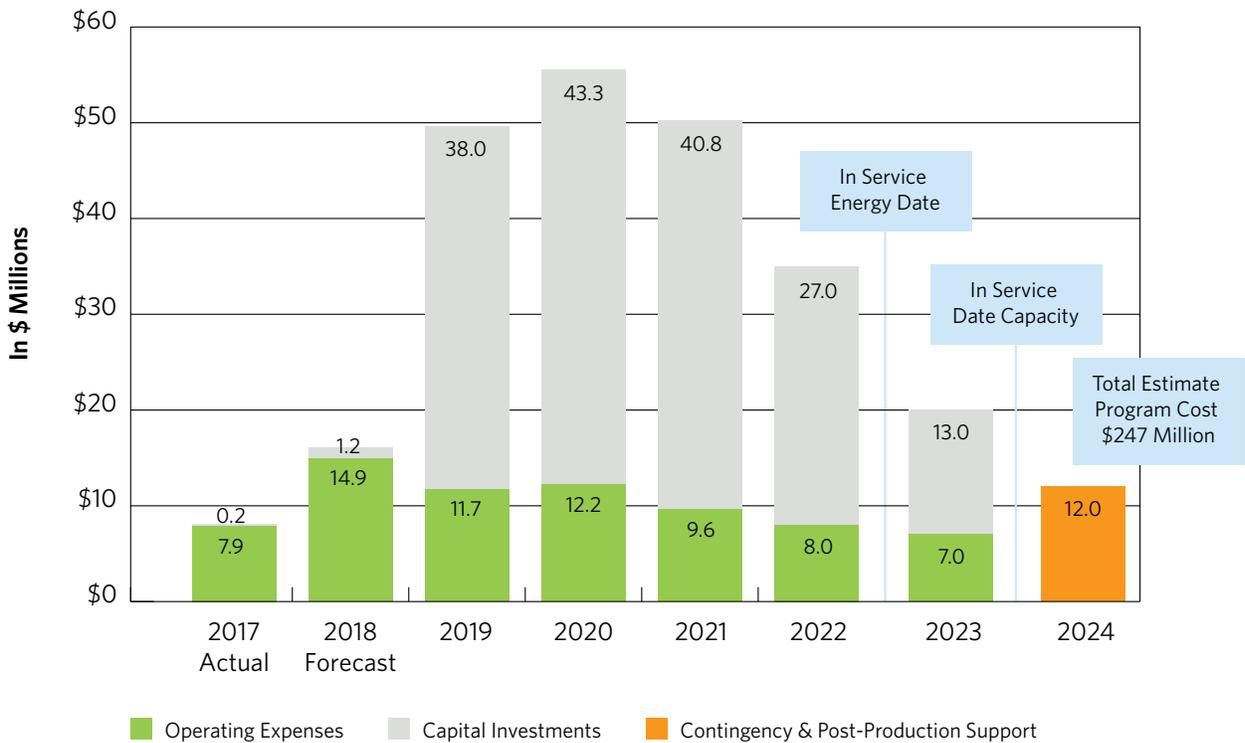
Full Time Equivalentents	2018 Budget Avg FTEs	2018 Forecast Avg FTEs	2018 Forecast Dec 31st Headcount	2019 Budget Avg FTEs	2020 Budget Avg FTEs	2021 Budget Avg FTEs
Core Operations	688	664	722	717	716	716
Market Renewal	43	61	86	125	125	125
Total FTEs	731	725	808	842	841	841

**2018 forecast average FTEs reflect 2018 vacancies, while forecast Dec 31, 2018 headcount reflects anticipated hires later in 2018. 2019 FTEs are budgeted on an annual average basis.*

Market Renewal Program Financials

In 2019, the Market Renewal Program will be entering the detailed design phase for both the energy and capacity work streams of the program, which are classified as capital spending. The timing of this milestone is slightly later than projected in the 2018 plan due to challenges in adding resources to the program. The current total program budget is estimated at \$247 million, with further budget refinement expected upon completion of the business case at the end of 2019. The increased total budget estimate is due to the addition of work to enable participation in future markets, as well as legal and consulting support for the development of market rules and additional resources.

Projected Market Renewal Costing



(Note: Budget estimates are used for 2022-2024 and will be further refined at the completion of the Business Case)

The projected 2018 operating costs for market renewal are \$14.9 million, compared to a budget of \$12.7 million. Resourcing for the program continues to be a challenge and has resulted in later completion of high-level design for the capacity work stream. The focus on high-level design in 2018 has resulted in a shift to more operating costs in the near term instead of the planned capital work late in the year. Timelines have now been revised with the high-level design for the energy work stream completed in late 2018 and the capacity work stream in 2019. The 2018 projected capital costs for market renewal are \$1.2 million, compared to a budget of \$4.0 million.

The total cost for the program from its inception to the end of 2018 is \$22.8 million in operating expenses and \$1.4 million in capital expenses.

In 2019, market renewal costs will be predominantly classified as capital expenses, as the program plans to start the detailed designs related to the energy and capacity work streams. The capital budget for the program in 2019 is \$38.0 million. Operating expenses to support the program include the completion of high-level designs for the capacity work stream, work to enable participation in future markets, market rule amendments and program governance and administration. The operating budget for the program in 2019 is \$11.7 million.

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

Appendix 1: CPM – 2019 Measures and Targets

To support the effective execution of the IESO’s strategy and, in particular, the priority initiatives laid out in this plan, the IESO’s corporate performance management (CPM) program provides an important level of oversight for the organization and its stakeholders and helps to ensure accountability.

Measures and annual targets are developed collaboratively, with input from the Stakeholder Advisory Committee, and communicate key, strategic areas of action for the organization to continuously evaluate and focus its efforts, and drive performance accordingly. The CPM program was the focus of significant internal and external stakeholder consultations in 2018 to enhance its value and relevance for the business and the public.

The measures and targets for 2019 have been defined as part of an overall CPM framework to align with the IESO’s strategic themes of *Reliability and Resiliency, Corporate Agility and Effectiveness, Sector Leader – Purposeful Engagement, Innovation, and Cost Efficiency*. The 2019 targets were developed to be outcome-oriented, while seeking to meet the SMART criteria (*specific, measurable, achievable, relevant and timely*) of measurement balanced by:

- Quantitative vs. qualitative
- Activity-based aspects that support a longer term strategic outcome
- Developmental vs. mission critical
- Strategic vs. operational
- Current vs. future oriented
- Within the IESO’s influence vs. outside its control

IESO Corporate Performance Management: 2019 Measures and Targets

Themes	Strategic Outcomes	Performance Priorities	Corporate Measures	Annual Corporate Targets
Reliability and Resiliency	An integrated electricity system that is reliable, resilient and secure in a period of accelerating change	<ul style="list-style-type: none"> ▪ Enhance grid reliability and resiliency for Ontario through: <ul style="list-style-type: none"> - Proactive response to system events - Training and simulation exercises - Active communication - Advocacy to evolve NERC/NPCC compliance and enforcement ▪ Establish cybersecurity leadership in the sector and improve system resiliency with a focus on: <ul style="list-style-type: none"> - Situational awareness - Collaboration - Information exchange - Cyber defense 	<ol style="list-style-type: none"> 1. Electricity System Reliability 2. Electricity System Resiliency 	<ol style="list-style-type: none"> 1.1 Zero violations of NERC high risk factor reliability requirements within the IESO’s control 1.2 Integrated Regional Resource Plans for the Windsor-Essex, Toronto, GTA North, Burlington-Nanticoke and Greater Ottawa regions are completed or on track to be completed within the timelines prescribed by the OEB’s regional planning process 2.1 Achievement of 2019 cybersecurity milestones

Themes	Strategic Outcomes	Performance Priorities	Corporate Measures	Annual Corporate Targets
Corporate Agility and Effectiveness	A talented, diverse and empowered workforce that has the flexibility to respond to internal and external customer needs	<ul style="list-style-type: none"> ▪ Galvanize the organization around a shared IESO identity that empowers and engages employees by: <ul style="list-style-type: none"> - Breaking down silos - Fostering a positive IESOne culture - Enhancing leadership capabilities ▪ Execute an effective and scalable governance structure for project oversight to enable more timely delivery of the project portfolio ▪ Use IESO resources effectively and efficiently to meet the needs of customers today and in the future 	3. Employee Engagement 4. Project Management 5. Financial Management	3.1 Achievement of the sub-indices of the engagement survey scores related to collaboration, an inclusive culture and enhanced leadership capabilities 4.1 Implement an effective and scalable governance structure for project delivery by end of Q2 2019 and 90% of all high-ranked projects advance into the initiation phase within three months of ranking 5.1 2019 priorities are achieved within +/- 5% of the IESO's approved budget
Sector Leader - Purposeful Engagement	A long-term energy perspective for IESO initiatives that delivers independent and informed energy policy advice	<ul style="list-style-type: none"> ▪ Engage stakeholders in a targeted and purposeful manner to contribute to the development of effective energy policy ▪ Be a thought leader in energy policy and market development 	6. Stakeholder Engagement 7. Electricity System Planning	6.1 2% improvement in satisfaction with the stakeholder engagement process is reported, compared to the 2018 customer satisfaction survey result 7.1 Complete bulk electricity system report by end of Q3 and publish to inform investment and long-term energy plans in Ontario

Themes	Strategic Outcomes	Performance Priorities	Corporate Measures	Annual Corporate Targets
Innovation	Integration of acquired sector innovation expertise into our operations, planning and advice	<ul style="list-style-type: none"> Identify, understand and remove barriers to emerging technologies, new business models and increased competition in the electricity sector in support of cost-efficiencies and enhanced reliability for the electricity system 	8. Innovation	8.1 Implementation of the emerging technology, research and development plan for electricity sector innovation for work streams, including distributed energy resources, storage and data access, resource efficiency (e.g., automation, artificial intelligence) and achieve milestones identified for 2019
Cost Efficiency	Best cost resource acquisition to efficiently manage IESO-administered markets in an evolving sector	<ul style="list-style-type: none"> Improve the way electricity is priced, scheduled and procured, including renewing the market to generate a projected net present benefit value of \$3-5 billion Achieve 2020 energy-efficiency targets while leading province-wide efforts Maximize and broaden the use and value of smart meter data products 	9. Renewal 10. Resource Acquisition 11. Data Availability	<p>9.1 Market Renewal Program (MRP) cost performance index (CPI) and schedule performance index (SPI) year-end accumulated averages are each above 0.9</p> <p>9.2 Develop the MRP business case by end of 2019 that considers the following high-level designs:</p> <ul style="list-style-type: none"> Single schedule market Day-ahead market Enhanced real-time unit commitment Incremental capacity auction <p>10.1 The 2015-2020 conservation energy savings target is contracted within 4 cents/kWh</p> <p>11.1 Develop an integrated enterprise level data strategy by end of 2019</p>

Appendix 2: Key 2019 Risks

The IESO's established enterprise risk management (ERM) framework is in place to identify, assess and manage risks that the IESO faces in achieving the organization's strategic objectives as demonstrated through the effective execution of its 2019 - 2021 Business Plan.

In 2018, the IESO reassessed its ERM program to ensure stronger alignment with the strategic and business plan in order to support decision-making in key areas within the business, as well as ensure continuous monitoring of its operating environment for early identification of emerging risks.

The IESO formally assesses risks to the business annually and has identified seven key risks in relation to the areas of strategic focus. Mitigation plans have been defined and are in place for the 2019 key risks. The IESO's Executive Leadership Team and senior management representatives from each of the organization's business units are leveraged for their subject matter expertise to support the effective assessment of risks and to report on the execution of mitigation plans.

Focus Areas	Key Risks
Reliability and Resiliency	The breadth and pace of change of Ontario's evolving energy sector challenges the IESO's ability to maintain grid reliability and efficiently integrate new entrants and technologies into the operation of the grid and markets
Reliability and Resiliency	A significant cybersecurity event occurs that disrupts the operation of the IESO - including reliable grid operations and efficient market operations - for extended periods of time
Reliability and Resiliency	Failure of critical Control Room tools challenges our ability to effectively manage grid reliability and market operations
Cost Efficiency	The Market Renewal Program is adversely affected by system dependencies, and/or a lack of resources with market design and implementation expertise
Corporate Agility and Effectiveness	Current workforce capabilities, capacity and allocation do not support the IESO's ability to effectively execute its mission, strategy and expanding responsibilities
Sector Leader - Purposeful Engagement	Insufficient support from key stakeholders and communities impedes the IESO's ability to effectively pursue key initiatives
Sector Leader - Purposeful Engagement	Change in provincial energy policy impacts IESO initiatives and programs, government directives and sector structure

Appendix 3: IESO Capital Spending

Summary of 2019 – 2021 Capital Spending

Change Initiatives/Projects (\$ Millions)	2019 Plan	2020 Plan	2021 Plan
Operations Readiness Initiatives (ORI Program)	0.3		
Wallboard Refresh	2.0		
Infrastructure Refresh	2.6	3.0	3.0
Replacement of the Settlement Systems	1.5	3.0	6.0
FIT & microFIT Tool Redevelopment and Integration Project	0.2		
Aspen Refresh Project	0.2		
IESO Simulator Project – Phase 2	0.3		
Wide Area View	0.5	2.5	0.5
PMU Phase 3	1.0	2.5	0.5
Oracle 12c Technical Refresh	1.4		
Tier1 Storage Refresh project	0.1	1.0	
SCADA/EMS Replacement		3.5	6.0
Control Room Upgrade	1.5		
IT Service Management (ITSM)	0.2	0.5	0.3
Dispatch Data Management System (DDMS) Refresh	0.7	1.5	1.0
Access Switches		1.0	
Capital (\$1 million & above)	12.5	18.5	17.3
Other Initiatives / Projects (Less than \$1 million)	4.8	1.8	0.6
Total w/o Market Renewal Program	17.3	20.3	17.9
Market Renewal Program (MRP)	38.0	43.3	40.8
Total Capital including MRP	55.3	63.6	58.7

2019–2021 Capital Plan Details

Project Name	Project Description
ORI Program	A holistic review of all the processes and tools in Operations in order to sustain the level of services to meet reliability standards with the efficient use of resources.
Wallboard Refresh	This project will replace control room wallboards that have reached end of life at both the Clarkson and Backup Operating Centres.
Infrastructure Refresh	This includes a number of miscellaneous building services, software license renewals and procurement of hardware.
Replacement of the Settlement Systems	Given the age of the systems, the evolution of the market since 2002, expected market redesign through the Market Renewal Program and the changing scope of IESO settlements arising from the merger of predecessor organizations, the current settlement systems are being replaced to ensure they can meet current and future business needs.
FIT & microFIT Tool Redevelopment and Integration Project	The FIT and microFIT Tool Redevelopment and Integration Project will integrate the contract management functions of both the FIT and microFIT programs.
Aspen Refresh Project	As the IESO's corporate files server, Aspen is the repository for much of IESO's business information. As part of this project, the underlying hardware and software for Aspen will be replaced, and the data migrated to the new files server.
Access Switches	Replace existing network access switches.
IESO Simulator Project - Phase 2	The IESO Simulator Project - Phase 2 will allow us to fully integrate Energy Management System (EMS) security applications into the simulation environment, improving our ability to simulate more realistic power system conditions.
Wide Area View	<p>This project will achieve improved situational awareness and maintain compliance with NERC IRO standards by:</p> <ol style="list-style-type: none"> 1) Expanding the IESO's power system detailed network model to include neighbouring RC areas; 2) Enabling appropriate contingency monitoring in areas outside of Ontario that impact operating limits within the province; 3) Providing control room operators with timely information and instructions to respond to monitored external events.
PMU Integration - Phase 3	This project will provide time based power system information (PMU data) from the Ontario grid and neighbouring jurisdictions to the IESO, address reputational risks and possible regulatory requirements, allow enhanced offline analysis tools, facilitate demonstration of compliance with a number of NERC reliability standards, and allow expansion to real-time deployment in the control room after further consideration.

Project Name	Project Description
Tier 1 Storage Refresh Project	Replacement of the IESO's existing Tier 1 storage platform, which provides the substantial disk storage required by many of the critical applications and databases used at IESO, with a new platform.
Oracle 12c Technical Refresh	The Oracle Real Application Cluster (RAC) 11g database service supports a number of the IESO's mission critical applications. This project will move our database service to a supported Oracle platform, in response to Oracle's decision to end premier support for the current in-use version.
SCADA/EMS Replacement	This project will review our energy management and data acquisition requirements to establish a platform that provides the control room and back office staff with the tools necessary to monitor and manage power system reliability.
Dispatch Data Management System (DDMS) Refresh	This project will move the Dispatch Data Management System (DDMS) to a vendor-supported hardware and software platform and introduce a number of upgrades to address reliability and performance concerns and enhance functionality of the current DDMS.
IT Service Management (ITSM)	This program that will be responsible for two key organizational deliverables: <ol style="list-style-type: none"> 1. Reviewing, updating and enhancing the processes and tools used for IT Service Management (ITSM) 2. Enhancing and consolidating the IESO Helpdesk functions.
Control Room Upgrade	This project will replace a number of end-of-life assets – specifically monitors, desks, lighting, wallboard and carpeting – within the IESO Clarkson control room to improve efficiency and enable the human performance improvements identified as part of the Operations Readiness Initiative (ORI).

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