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# Business Plan 2020-2022

Independent Electricity System Operator

DECEMBER 9, 2020



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# Letter from the Interim President & CEO

Over the past few years, our efforts to maintain a cost-effective and reliable electricity system have been shaped, in part, by electricity sector transformation – more resources, new business models, emerging technology, and demands for more choice in how we produce and consume electricity.

In 2020, the emergence of COVID-19 added another layer of complexity to operating the grid, reminding us how factors outside the sector can have a significant impact on Ontario's electricity system. As the province continues to recover in the months and years ahead, ensuring Ontario residents and businesses receive reliable and affordable electricity will be especially important. It is within this context that the IESO presents its 2020-2022 Business Plan.

This plan lays out how we will deliver on our core strategic priorities, sets out the initiatives and investments that are integral to achieving them, articulates the risks that inform our decision-making and establishes the performance measures that will demonstrate our success.

Looking ahead, Ontario's electricity system is well-positioned for the future, with enough existing and available resources to meet electricity demand until the mid-2020s. Over the course of the planning period, enhancements to our bulk and regional planning processes, planning and reliability tools, and cybersecurity sector services will play an important role in ensuring cost-effective and risk-adjusted grid reliability in real-time and longer term.

To help ensure electricity is affordable, enabling greater competition in our electricity markets will continue to be a priority. In Q3 2020, we began engaging with stakeholders on the development of a strategy for the competitive acquisition of resources to meet short-, medium- and long-term electricity system capacity needs, recognizing that not all resources can participate in our annual capacity auction. To further competition, we will build on a previous scoping and assessment exercise to enable the participation of several resource types such as storage, hybrid facilities, demand response and distributed energy resources and intertie transactions to deliver capacity into the real-time energy market.

With greater uncertainty and ongoing sector transformation, the IESO is continuing to make innovation a priority by leading or supporting initiatives that can increase the reliability or cost-effectiveness of the electricity system. This will include addressing calls for greater community choice and alternatives to traditional transmission infrastructure by testing whether using distributed energy resources can help meet fast-growing needs and drive down costs in the province's York Region. Another priority is Windsor Essex, where electricity demand is expected to double over the next five years as a result of the expected growth in the greenhouse industry. Working with greenhouse growers and others, the IESO is supporting a number of initiatives that will help improve capacity in the area.

Whether ensuring reliability or enabling competition to reduce costs, working with stakeholders and communities across the province will become even more important to helping us meet the challenges associated with ongoing disruption. Bringing together these different perspectives helps lead to better outcomes. Recognizing this, in 2020 we introduced a new framework to make it easier for stakeholders to engage with us. Over the course of this planning cycle, we will use our early experiences to evolve this new streamlined approach to stakeholder engagement.

In preparing for the future, our recent experiences with COVID-19 and working from home underline the need to sharpen our focus on reducing our own costs, and on developing a flexible workforce strategy. Positioning the IESO to meet the challenges ahead involves developing a more cohesive and inclusive culture, and a more agile and engaged workforce – and building new capabilities that will drive performance, now and in the years ahead. The latter includes harnessing the value of internal data to improve fact-based decision-making for both the IESO and our market participants and stakeholders.

The 2020-2022 Business Plan sets out the IESO revenue requirement and capital spending needed to maintain our critical responsibilities over the three-year period. The move to a three-year cycle, which is consistent with the practice of other regulated entities in the Ontario electricity sector, will reduce costs associated with an annual filing. Updates to this plan will be submitted on an annual basis to account for required deviations from established program parameters, timelines or funding envelopes.

With our commitment to delivering value through organizational efficiencies and by investing in priority projects, the IESO maintained flat revenue requirement levels from 2017-2019. In early 2020, in response to the emergence of COVID-19, the IESO reduced its revenue requirement inclusive of one-time pandemic-related expenses. The IESO proposes a return to pre-COVID-19 funding levels for 2021 and a 1.4% increase in funding over the three years when compared to 2019.

Funding for capital projects to facilitate the delivery of the tools, technology and programs that are required to achieve our strategic objectives, including cybersecurity enhancements and the multi-year Market Renewal – Energy project, will be \$51.5 million in 2020, \$77.2 million in 2021 and \$67.6 million in 2022.

As the province continues to recover from the effects of the pandemic, the IESO remains committed to ensuring Ontarians benefit from a reliable, affordable and sustainable electricity system.

A handwritten signature in black ink, appearing to read 'Terry Young', with a stylized flourish at the end.

**Terry Young**  
Interim President and Chief Executive Officer



## About the IESO

Every minute of every day, the Independent Electricity System Operator ensures the reliability and efficiency of the province's electricity system, providing Ontarians with the power they need when they need it – and at the lowest cost.

We do this by balancing supply and demand for electricity on a second-by-second basis, governing Ontario's electricity markets to ensure fair and open access to the grid, and preparing for the future by undertaking comprehensive and transparent planning. Given the scope of our mandate and the far-reaching implications of our decisions, engagement to inform – and be informed – remains central to everything we do. It's why we are committed to sharing our expertise, data and insights and why consulting with stakeholders – whether market participants, municipalities, or policy-makers – is so fundamental both to advancing our work and influencing the evolution of the energy sector.

The IESO is guided by the following core strategies:

- Ensure cost-effective reliability
- Enable competition
- Advance sector leadership
- Drive business transformation
- Prepare for the sector of the future



## At a Glance: Priority Initiatives

The 2020-2022 Business Plan will help support the following priority initiatives, among others.

- **Driving business transformation** across the enterprise by investing in initiatives that will increase organizational agility and performance, and prepare the IESO – and our people – to meet the challenges associated with ongoing disruption in the electricity sector. This work will be guided by a three-year HR strategic roadmap and include continued support for the development of people leaders, and a culture built on shared values.
- **Establishing a resource adequacy framework** that, in developing competitive mechanisms to meet future capacity needs in the short, medium and long term, will better balance ratepayer and supplier risks, improve planning certainty, and drive down costs. An engagement was launched in Q3 2020 and will continue into 2021.
- **Enabling resources** to participate more fully in the IESO-administered markets. This will help ensure that resources like energy storage and distributed energy resources are able to compete to deliver power system reliability services in a cost-efficient manner. In addition to ongoing efforts, a work plan will be released in Q1 2021 and lead to subsequent stakeholder engagements.
- **Upgrading or replacing the information systems** that we rely on to help ensure grid reliability and performance, as well as administer the more than \$18 billion marketplace and meet changing settlement requirements. This includes a five-year project to replace the IESO's settlement system, with the first two phases slated for completion in 2022.
- **Planning for the future** to enhance transparency and help market participants make more informed decisions, while **evolving our bulk and regional planning processes** to increase effectiveness and accommodate ongoing change.
- **Building a data excellence program** that will increase our data and analytics maturity level and help us deliver new operational efficiencies and insights. This includes implementation of a data management and analytics framework that is underway and expected to continue into 2022.
- **Maintaining strong cyber security partnerships** with industry leaders, including through the IESO's cyber security situational awareness and information-sharing service. As part of our multifaceted approach to tackling cyber security, we will also continue to **enhance threat detection and response** by investing in advanced technology to elevate our security posture.



# Financial Overview

The 2020-2022 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 responsibilities, as well as to execute key strategies, including ensuring cost-effective system reliability, enabling competition, driving business transformation, advancing sector leadership and preparing for the future of the sector. The IESO has maintained flat revenue requirement levels from 2017-2019 through prudent investments in its priorities, while focusing on process enhancements, leveraging organizational efficiencies and closely managing cost pressures.

In early 2020, in response to the emergence of COVID-19, the IESO revisited its business plan in light of evolving system needs and reduced its revenue requirement to \$189.6 million. The Business Plan includes a total revenue requirement of \$191.8 million and \$193.7 million in 2021 and 2022, representing a 1.4% increase from 2019 to 2022.

In 2020, the IESO managed COVID-19-related impacts, including one-time expenses as pandemic plans were executed to ensure the safety of staff working on-site to support grid operations and the reliability of the electricity system. The IESO took steps to prioritize new projects and initiatives to manage costs, while continuing to deliver on important system enhancements within the Market Renewal – Energy project (MRP) and other multi-year projects.

Cost drivers in 2021 include the impact of deferring 2020 projects, and work to enable a more competitive electricity marketplace and market rule and manual amendments; these will mostly be offset through judicious management of resources, process efficiencies and re-engineering how the IESO delivers on its core mandate. Cost increases in 2022 resulting from higher pension liabilities, and continuation of market-related projects, will be partially offset by savings as the IESO reconfigures its overall footprint, and seeks further operating efficiencies within the 2020-2022 planning period.

The IESO remains committed to enabling a more competitive electricity marketplace, through the delivery of the capacity auction in 2020, working with its stakeholders to develop a competitive resource acquisition strategy for short-, medium- and long-term capacity needs and by enabling more resources to participate. Internally, the IESO will drive business transformation by implementing a workplace strategy aimed at enhancing its culture and people practices to accelerate performance, and by establishing a technology and data roadmap to enable better analytics, achieve new efficiencies and deliver value to the sector.

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 2020, the IESO anticipates an average of 779 full-time employees to deliver on core electricity system responsibilities, as well as to support the Market Renewal – Energy project. After rigorous review, staffing levels will remain relatively flat over the planning period, with a few strategic positions added to support key initiatives.

## 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)                          | 2019<br>Actual | 2020<br>Budget | 2021<br>Budget | 2022<br>Budget |
|----------------------------------------|----------------|----------------|----------------|----------------|
| <b>Revenue</b>                         |                |                |                |                |
| IESO Usage Fee                         | 191.0          | 189.6          | 191.8          | 193.7          |
| <b>Total Revenue</b>                   | 191.0          | 189.6          | 191.8          | 193.7          |
| <b>Expenses</b>                        |                |                |                |                |
| Compensation & Benefits                | 117.5          | 122.4          | 122.6          | 126.8          |
| Professional & Consulting Fees         | 15.4           | 13.3           | 12.9           | 12.9           |
| Operating & Administration             | 35.7           | 34.5           | 36.0           | 34.2           |
| Capacity Market Design                 | -              | 0.9            | -              | -              |
| <b>Operating Expenses</b>              | 168.6          | 171.1          | 171.5          | 173.9          |
| Amortization                           | 19.1           | 19.7           | 19.2           | 19.1           |
| Net Interest                           | (9.0)          | (3.3)          | (2.5)          | (3.5)          |
| <b>Total Core Operations</b>           | 178.7          | 187.5          | 188.2          | 189.5          |
| <b>Market Renewal - Energy</b>         | 3.1            | 2.1            | 3.6            | 4.2            |
| <b>Market Renewal - Capacity (ICA)</b> | 5.5            | -              | -              | -              |
| <b>Total Expenses</b>                  | 187.3          | 189.6          | 191.8          | 193.7          |
| <b>Operating Surplus/(Deficit)</b>     | 3.7            | -              | -              | -              |

## 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 capital implementation stage of the Market Renewal – Energy project (MRP), which began in 2018, will continue through the planning period.

The 2020 capital focus is directed toward refresh projects to replace or upgrade aging systems and infrastructure, including carryover of in-flight projects from 2019. The increase in capital funding in 2021 will support projects – such as Wide Area Visualization Environment, Market Analysis and Simulation Toolset, and Data Warehouse – to ensure system reliability and enable a more competitive electricity marketplace.

The Market Renewal – Energy project business case was approved in 2019, and the table below includes the forecasted spend for 2020 and business case budgets for 2021 and 2022, as well as a summary of the total capital spending required in this plan. Project details and associated descriptions are included in Appendix 3.

| <b>Capital (\$ Millions)</b>  | <b>2019<br/>Actual</b> | <b>2020<br/>Budget</b> | <b>2021<br/>Budget</b> | <b>2022<br/>Budget</b> |
|-------------------------------|------------------------|------------------------|------------------------|------------------------|
| Core Operations Initiatives   | 20.6                   | 25.6                   | 32.6                   | 30.0                   |
| Market Renewal – Energy       | 10.3                   | 25.9                   | 44.6                   | 37.6                   |
| <b>Total Capital Envelope</b> | <b>30.9</b>            | <b>51.5</b>            | <b>77.2</b>            | <b>67.6</b>            |

## Staffing

In 2020, 709 full time positions support the IESO's core initiatives. Staffing levels in 2021 and 2022 (713 and 716 employees respectively) are required to support new initiatives to enable resources, and the reallocation of previously externally funded staff back to core operations. In 2020, 70 employees will be required to enable Market Renewal – Energy market design and implementation; this number will increase slightly in 2021 and 2022 to support market rule amendments and documentation work.

The 2019 decision to cease the incremental capacity auction (ICA) work under the Market Renewal Program resulted in no further related hires, with existing staff being redeployed to capacity market design, the MRP energy work stream and the IESO's core operations.

### Average FTEs

| <b>Full Time Equivalents (FTEs)</b> | <b>2019<br/>Actual</b> | <b>2020<br/>Budget</b> | <b>2021<br/>Budget</b> | <b>2022<br/>Budget</b> |
|-------------------------------------|------------------------|------------------------|------------------------|------------------------|
| Core Operations                     | 689                    | 709                    | 713                    | 716                    |
| Market Renewal – Energy             | 49                     | 70                     | 81                     | 81                     |
| Market Renewal – Capacity (ICA)     | 31                     | -                      | -                      | -                      |
| <b>Total FTEs</b>                   | <b>769</b>             | <b>779</b>             | <b>794</b>             | <b>797</b>             |

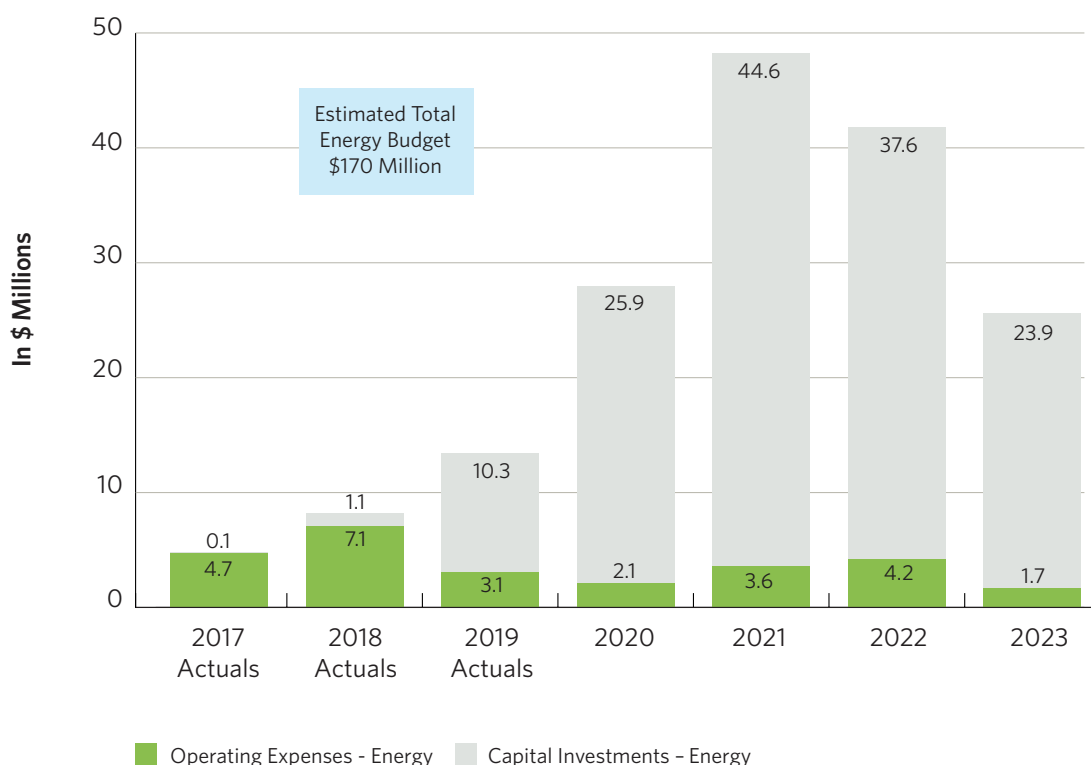
# Market Renewal Financials

Market Renewal will continue with the delivery of the energy work stream during this business planning period. The current cost estimate, which includes the delivery of the energy work stream, and the cost of the capacity work stream up until the end of 2019, is approximately \$192 million.

## Market Renewal – Energy Business Case Approval

The business case for the Market Renewal – Energy work stream was approved by the IESO Board on October 23, 2019. The estimated cost to deliver the project, including contingency, ranges from \$151 million to \$194 million. The business plan financials reflect the mid-range number of \$170 million.

## Market Renewal – Energy Business Case Financials



## Market Renewal – Energy Funding Update

Market Renewal will continue the detailed design and implementation phases of the energy work stream, which are classified as capital spending. This work will proceed with broad support across the organization and will include a significant complement of IT resources to support implementation of the energy deliverables, while managing the inter-related nature of other significant IESO initiatives. Market Renewal activities funded through operating costs include market rule amendments and related stakeholder activities, change management planning and coordination, and updates to internal and external manuals.

### Market Renewal Financial Summary

| (\$ Millions)                             | 2019<br>Actual | 2020<br>Budget | 2021<br>Budget | 2022<br>Budget |
|-------------------------------------------|----------------|----------------|----------------|----------------|
| <b>Market Renewal Program – Operating</b> |                |                |                |                |
| Market Renewal – Energy                   | 3.1            | 2.1            | 3.6            | 4.2            |
| Market Renewal – Capacity (ICA)           | 5.5            | –              | –              | –              |
| <b>Total Operating Expenses</b>           | <b>8.6</b>     | <b>2.1</b>     | <b>3.6</b>     | <b>4.2</b>     |
| <b>Total Capital Expenses</b>             | <b>10.3</b>    | <b>25.9</b>    | <b>44.6</b>    | <b>37.6</b>    |

The annual Market Renewal – Energy project costs from 2020-2022 are consistent with the business case, with some adjustments in timing and dollars between years.



## Appendix 1: IESO Performance Management – Measures and Targets

In tandem with its updated strategic plan, the IESO developed a five-year strategic measures and targets monitoring framework to ensure ongoing alignment to the priorities of the organization. This approach is transitional for the organization and represents an advancement in the maturity of the IESO's Performance Management. The measures are intended to support monitoring of performance toward the five-year strategic objectives. Going forward, the IESO will track annual performance against targets, as well as continually assess the measures to ensure they drive performance and track progress against strategic objectives.

This approach provides for an expanded view of measuring and monitoring performance not just within the IESO but on a broader sector scale, in the context of supporting advice to the market and in our stakeholder engagements. This change is expected to have significant advantages for aligning behaviours and driving actions for desirable long-term performance outcomes. The framework guides our efforts to ensure that the measurements and targets developed are relevant to the business context and aligned with the IESO's strategic objectives.

| Five-Year Strategic Objectives             | Metrics                                                                                            | Five-Year Targets                                                                                                                                                            | What the Measure Means                                                                                                                                                                                                                                                                                                                                                                                                                | Link to Strategic Objective                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Culture & Workforce Transformation         | <b>1. Employee Engagement</b><br>Commitment to the execution of enterprise priorities              | <ul style="list-style-type: none"> <li>4% annual increase from baseline as established by previous employee survey</li> </ul>                                                | <ul style="list-style-type: none"> <li>The IESO's workforce is increasingly committed to the goals of the organization, as demonstrated by improved annual survey results from the baseline.</li> </ul>                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>The five-year strategic objective is to align culture, mindset, skills and capabilities to deliver on strategy. Having a highly engaged workforce will be a critical differentiator in achieving this objective.</li> </ul>                                                                                                |
|                                            | <b>2. Organizational Agility</b><br>Openness to Change                                             | <ul style="list-style-type: none"> <li>65% positive employee feedback on the Openness to Change scale on employee survey</li> </ul>                                          | <ul style="list-style-type: none"> <li>Employees are aware of the rationale for change and view it positively. Survey results will confirm if overall employee feedback is above target on the measurement scale.</li> </ul>                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>Openness to change is a core value of the organization and is seen as critical to responding to and achieving culture and workforce transformation.</li> </ul>                                                                                                                                                             |
|                                            | <b>3. Operational Efficiency</b><br>Percentage of Strategic Initiatives that are completed on time | <ul style="list-style-type: none"> <li>90% of Strategic Initiatives are completed within timelines established by the Integrated Project Plan and Project Charter</li> </ul> | <ul style="list-style-type: none"> <li>Demonstrates a commitment and accountability to cost efficiency, and signals that we are using our workforce effectively in pursuit of objectives.</li> </ul>                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>To be able to deliver on strategy, we need to demonstrate that Strategic Initiatives are completed on time.</li> </ul>                                                                                                                                                                                                     |
| Stakeholder Trust                          | <b>4. Stakeholder Satisfaction</b><br>Engagement process                                           | <ul style="list-style-type: none"> <li>By 2023, 84% of stakeholders indicate the IESO's engagement meets or exceeds their expectations</li> </ul>                            | <ul style="list-style-type: none"> <li>The IESO effectively educates and involves stakeholders in its activities and decisions.</li> <li>Positive responses indicate stakeholders' experience with the IESO's engagement process is building long-term trust.</li> </ul>                                                                                                                                                              | <ul style="list-style-type: none"> <li>This measure links to enhancing stakeholders' trust in the IESO to operate in the best interests of Ontario.</li> </ul>                                                                                                                                                                                                    |
| Affordability, Reliability, Sustainability | <b>5. Cost-Effectiveness</b><br>Forecast accuracy                                                  | <ul style="list-style-type: none"> <li>Annual forecast error within +/- 2.5% (actual vs. forecast)</li> </ul>                                                                | <ul style="list-style-type: none"> <li>As load forecasting affects resource commitment, load forecast accuracy impacts commitment costs. The more accurate a forecasting load, the greater the likelihood the IESO can commit sufficient resources in a cost-effective manner that avoids over-commitment of resources, inefficient commitment of short lead time resources, and under-utilization of available resources.</li> </ul> | <ul style="list-style-type: none"> <li>Having accurate short-term forecasts and performing consistently within a range shows how the IESO is promoting reliability by effectively planning loads and driving affordability through effective resource utilization.</li> <li>Optimizes balance to ensure best overall electricity outcomes for Ontario.</li> </ul> |

| Five-Year Strategic Objectives             | Metrics                                                                                                                            | Five-Year Targets                                                                                                                                                | What the Measure Means                                                                                                                                                                                                                                                                                                         | Link to Strategic Objective                                                                                                  |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Affordability, Reliability, Sustainability | <b>6. Cost-Effectiveness</b><br>Resource balance: energy curtailments to total production                                          | <ul style="list-style-type: none"> <li>10% outcome improvement to "right size" the system</li> </ul>                                                             | <ul style="list-style-type: none"> <li>This measure is intended to drive performance toward "right sizing" the system and achieving resource adequacy goals by effectively meeting energy and ancillary services needs.</li> </ul>                                                                                             | <ul style="list-style-type: none"> <li>Optimizes balance to ensure best overall electricity outcomes for Ontario.</li> </ul> |
|                                            | <b>7. Cost-Effectiveness</b><br>Resource balance: annual energy/operating reserve shortage frequency                               |                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                |                                                                                                                              |
|                                            | <b>8. Reliability</b><br>Number of forced outages to resources above 250 MW and the length of time they are out                    | <ul style="list-style-type: none"> <li>Below 9.2% (the figure that represents two standard deviations from the five-year historical baseline average)</li> </ul> | <ul style="list-style-type: none"> <li>Measures bulk transmission system performance beyond four hours in duration.</li> <li>The performance of the thermal resource fleet as calculated by the probability that a generating unit will not be available when required due to forced outages and forced de-ratings.</li> </ul> |                                                                                                                              |
|                                            | <b>9. Reliability</b><br>Number of extended forced outages to transmission facilities above 230 kV and length of time they are out | <ul style="list-style-type: none"> <li>Below 334 total annualized outages</li> </ul>                                                                             | <ul style="list-style-type: none"> <li>Measures bulk transmission system performance based on forced outages and extensions to outages over four hours in duration to significant transmission elements (below 334 which is the five-year historical high).</li> </ul>                                                         |                                                                                                                              |
|                                            | <b>10. Market Efficiency</b><br>Market cost/revenue transparency index                                                             | <ul style="list-style-type: none"> <li>Improve index by 1% by 2024</li> </ul>                                                                                    | <ul style="list-style-type: none"> <li>Represents the proportion of revenues received by suppliers (or payments from consumers) for electricity in the wholesale market to the total costs of supplying the electricity. Performance improves as market revenues increase and non-market uplifts shrink.</li> </ul>            |                                                                                                                              |

## Appendix 2: Enterprise Risk Management

The IESO's established enterprise risk management (ERM) program supports the identification, assessment and mitigation of risks that the organization faces in achieving its strategic objectives. This business plan has aligned priorities and resources across key areas of the IESO to support informed decision-making in the consideration and mitigation of the strategic risks identified below.

| Risk Event Description                                                                                                                                       | Strategic Objectives                       |                                      |                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------|-------------------|
|                                                                                                                                                              | Affordability, reliability, sustainability | Culture and workforce transformation | Stakeholder trust |
| The IESO develops tools/mechanisms to acquire resources, but the design and integration of the tools do not effectively balance ratepayer and supplier risk. | X                                          |                                      | X                 |
| Supply and demand are significantly mismatched over the longer term.                                                                                         | X                                          |                                      | X                 |
| Conditions for market power, such as a further increase in the concentration of generation ownership, are enhanced.                                          | X                                          |                                      | X                 |
| Operating in a constrained environment defers and delays advancement of key initiatives to innovate the business and electricity sector.                     | X                                          | X                                    | X                 |
| Users of the IESO's information technology systems are subject to cyberattacks.                                                                              | X                                          | X                                    | X                 |
| The IESO's information systems are subject to intentional and unintentional exfiltration of sensitive data.                                                  | X                                          | X                                    | X                 |
| The IESO's ability to facilitate cybersecurity situational awareness and information exchange across Ontario's electricity sector is diminished.             | X                                          |                                      | X                 |
| A regulatory decision is invoked that is contrary to the delivery of enhanced competitive mechanisms.                                                        | X                                          |                                      | X                 |
| Non-electricity sector entrants cause significant disruption in energy market dynamics.                                                                      | X                                          |                                      |                   |
| Availability of human capital with required skills is inconsistent with the IESO's need for talent in hard-to-fill roles.                                    | X                                          | X                                    |                   |
| The IESO is unable to retain critical staff or transition employees into emerging roles.                                                                     | X                                          | X                                    |                   |
| An extreme weather event significantly damages generation or transmission assets.                                                                            | X                                          |                                      |                   |

## Appendix 3: Capital Spending

### Summary for 2020-2022 capital spending

| Change Initiatives/Projects (\$ Millions)                        | 2020 Plan   | 2021 Plan   | 2022 Plan   |
|------------------------------------------------------------------|-------------|-------------|-------------|
| Centralized Alarm Management System Replacement                  |             | 2.5         | 1.1         |
| Replacement of the Settlement Systems                            | 8.4         | 8.8         | 10.9        |
| SCADA/Energy Management System (EMS) Upgrade                     | 5.7         | 5.6         | 0.6         |
| Corporate PBX Phone System Refresh                               | 1.2         |             |             |
| Data Excellence Program                                          | 0.5         | 1.3         | 1.8         |
| Dispatch Data Management Systems Refresh                         | 1.5         | 0.1         |             |
| Capacity Auction                                                 | 1.7         | 0.1         |             |
| External Identity Management (Portal)                            | 1.1         | 0.3         |             |
| Wide Area Visualization Environment (WAVE) - Phase 2             | 0.5         | 1.2         | 0.4         |
| Enabling Resources to Deliver on Capacity/Participate in Markets |             | 0.5         | 2.4         |
| Addressing Market Surveillance Panel (MSP) Recommendations       |             | 1.8         | 1.6         |
| Data Warehouse                                                   |             | 0.5         | 1.0         |
| Dynamic Limits in Real-Time                                      |             | 1.1         | 1.2         |
| New Capacity/Resource Acquisition Initiatives                    |             | 1.0         | 2.0         |
| Network Performance Monitoring and Diagnostic                    |             |             | 2.5         |
| <b>Capital (\$1 million &amp; above)</b>                         | <b>20.6</b> | <b>24.8</b> | <b>25.5</b> |
| <b>Other Initiatives/Projects (Less than \$1 million)</b>        | <b>5.0</b>  | <b>7.8</b>  | <b>4.5</b>  |
| <b>Total Without Market Renewal - Energy project</b>             | <b>25.6</b> | <b>32.6</b> | <b>30.0</b> |
| <b>Market Renewal Program - Energy project</b>                   | <b>25.9</b> | <b>44.6</b> | <b>37.6</b> |
| <b>Total Including Market Renewal - Energy project</b>           | <b>51.5</b> | <b>77.2</b> | <b>67.6</b> |

## 2020-2022 Capital Budget Details

| Project                                                                                          | Description                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Centralized Alarm Management System (CAMS) Replacement</b>                                    | The CAMS project will ensure IESO operators can continue to manage alarms and events that are important indicators of change by implementing a solution to software that will no longer be supported by the vendor.                                                                                                                                   |
| <b>Replacement of the Settlement Systems</b>                                                     | In replacing settlement systems that have been in operation since market opening in 2002, this project will address market re-design needs associated with implementation of the Market Renewal Program and enable the system to meet current and future business needs.                                                                              |
| <b>Supervisory Control and Data Acquisition (SCADA) / Energy Management System (EMS) Upgrade</b> | This project will upgrade the SCADA/EMS, the primary system operators use to monitor and manage the IESO-controlled grid. The resulting improvements will enable custom applications to run on the latest version of the vendor's software and improve the ability of energy storage resources to become integrated suppliers of regulation services. |
| <b>Corporate PBX Phone System Refresh</b>                                                        | This refresh project will replace and consolidate the existing Avaya PBX system with a new phone system featuring enhanced mobility capabilities.                                                                                                                                                                                                     |
| <b>Data Excellence Program</b>                                                                   | To help harness the full value of IESO data, this program will establish a data management and analytics framework that will support IESO business needs, and enhance third-party access to data and information.                                                                                                                                     |
| <b>Dispatch Data Management Systems (DDMS) Refresh</b>                                           | This project will move the 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.                                                                                                                                |
| <b>Capacity Auction</b>                                                                          | As the mechanism for procuring capacity in the short term (see New Capacity/Resource Acquisition Initiatives), the IESO's capacity auction, which launched in December 2020, will evolve over time, delivering more efficient and cost-effective outcomes through improved processes and expanded participation.                                      |
| <b>External Identity Management (Portal)</b>                                                     | The IESO external portal is used as an entry point for participants to multiple market-facing applications and collaboration communities. This project will replace the existing portal, which is at end of life, and enable the delivery of efficient services to IESO staff and external customers.                                                 |
| <b>Wide Area Visualization Environment (WAVE) - Phase 2</b>                                      | This project will improve situational awareness and maintain ongoing compliance with NERC IRO standards by expanding modelling to neighbouring power systems (NYISO, PJM and Hydro Quebec), improving the IESO's ability to monitor and respond to real-time conditions that may affect the IESO-controlled grid.                                     |
| <b>Enabling Resources to Deliver on Capacity/Participate in Markets</b>                          | The IESO will increase the number of resource types that can participate in the IESO markets to deliver energy, capacity and ancillary services. Increasing supply options will lower the total cost of meeting system needs.                                                                                                                         |
| <b>Addressing Market Surveillance Panel (MSP) Recommendations</b>                                | This project is proposed as a portfolio of initiatives to develop, evolve and address inefficiencies in the electricity market in response to observations by the MSP and other stakeholders.                                                                                                                                                         |
| <b>Data Warehouse</b>                                                                            | In use since market opening, the IESO's current market data warehouse has limited data utilization/reporting/management functionality. This project will implement an updated data warehouse strategy and supporting applications, enabling the IESO to effectively manage and leverage the data it collects.                                         |
| <b>Dynamic Limits in Real-Time (DLRT)</b>                                                        | In enabling the continuous assessment of real-time grid conditions, the DLRT Project will significantly improve the utilization of Ontario's transmission system, resulting in market and system operations efficiencies, and increased system security and resiliency.                                                                               |

| Project                                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>New Capacity/Resource Acquisition Initiatives</b>        | As part of its commitment to transition to the long-term use of competitive mechanisms to meet Ontario's resource adequacy needs, the IESO is working with stakeholders to develop a resource adequacy framework with mechanisms to procure capacity in three distinct time frames (short, medium and long term). In addition to facilitating competition, this work aims to better balance supplier, ratepayer and IESO risks, reduce costs, and provide business planning certainty. |
| <b>Network Performance Monitoring and Diagnostic (NPMD)</b> | The IESO's Core and Data Centre networks provide the backbone of the IESO's network infrastructure connecting all systems and locations in a robust and reliable high performance network. The NPMD solution will provide the capabilities to monitor network devices, analyze network packets for enhance visibility, reducing troubleshooting effort and time to resolution and predictive failure analysis.                                                                         |

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