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2016 ANNUAL REPORT

# Reliability in a Changing Sector

# Vision: Powering a Reliable and Sustainable Energy Future for Ontario

*Reliability* - it is at the heart of everything the Independent Electricity System Operator (IESO) does, from managing the flow of electricity across Ontario in real time, to planning and procuring for the province's emerging and future energy needs, and leading a culture of conservation.

The IESO has a broad mandate and uses its unique position in the power system to ensure reliability now and in the future.

With this mandate, the IESO has a unique opportunity to engage with a broad cross-section of Ontarians. As it works to shape a more sustainable and reliable electricity system, the IESO strives to be a trusted source of transparent, accessible and timely electricity sector data and information. The IESO values the diversity of its stakeholders and the communities with which it engages, as they assist the organization in making informed decisions. To support its efforts, the IESO applies engagement principles to its wide-ranging initiatives to ensure stakeholders and communities have the opportunity to provide input on matters that impact them.

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## IESO Strategic Plan 2016-2020

In 2016, the IESO released a five-year corporate strategy centred on its vision, mission and corporate values. The IESO 2016-2020 Strategic Plan describes some of the opportunities and challenges the organization anticipates in the coming years. It considers a range of environmental factors that are expected to affect the organization, including climate change, emerging technologies, operability challenges, consumer engagement and cybersecurity, among others.

The strategic plan provides a roadmap for the IESO's activities over the next five years. It will help set the priorities for the organization and inform the development of the IESO's annual business plans.

This annual report, *Reliability in a Changing Sector*, includes a look at some of the core initiatives that the IESO undertook in 2016, as well as a look forward to the coming year and beyond and is structured around three overarching strategic goals:

- **Deliver superior reliability performance in a changing environment**
- **Drive to a more efficient and sustainable marketplace**
- **Be recognized as a trusted advisor, informed by engagement.**

The IESO's fourth strategic goal, **to invest in our people and processes to meet the needs of the sector**, is intended to ensure that the IESO is well-equipped to fulfil its mandate. Realizing this goal is key in meeting the IESO's first three strategic goals.

# 2016: Ontario's Electricity Sector at a Glance

**36,070 MW**

Installed generation capacity

**23,213 MW**

Highest recorded 2016 peak demand, on September 7

**4.9 million**

Customers served

**137 TWh**

Total demand

**21,858 GWh**

Total exports

**7,995 GWh**

Total imports

**\$17 billion**

Financial transactions settled by the IESO wholesale market\*

**684,000 MWh**

Net energy savings from conservation programs delivered by local distribution companies (LDCs) and the IESO

**1.66¢/kWh**

Weighted wholesale price of electricity (Hourly Ontario Energy Price)

**9.65¢/kWh**

Average global adjustment Class B rate

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\*Includes a combination of commodity charges (Hourly Ontario Energy Price and Global Adjustment), wholesale market service charges, wholesale transmission charges and other associated charges.

# Letter from the President & CEO and Chair



**Bruce B. Campbell**  
President and  
Chief Executive Officer



**Tim O'Neill**  
Chairman of the Board

**During 2016, we continued to see accelerated change and transformation across all reaches of the electricity sector. From microgrids to the continued adoption of new energy technologies, our system is evolving in a way that is enabling more customers and stakeholders to play a more active role in the production, management, delivery and use of electricity. For the IESO, 2016 further underscored the organization's ability to adapt to a changing energy landscape and the important role it will play in the ongoing evolution of the sector.**

The IESO's 2016 Annual Report outlines the strategic objectives and achievements of the IESO, together with its industry partners. It also describes how we will continue to provide superior reliability in a changing environment, create a culture of conservation in Ontario and renew our electricity markets, all while working with our stakeholders and communities.

Establishing the IESO 2016-2020 Strategic Plan was an important milestone in the evolution of the IESO, one that both defines the organization's goals and strategic objectives and establishes a framework for how the IESO will evolve to meet the growing energy needs of Ontarians. For the IESO, providing public value is a core priority in our rapidly evolving sector.

The IESO is the steward of a system that supports all Ontarians. In this year's report, we outline active initiatives and engagements, but equally important, we identify how you can get engaged. The next chapter of Ontario's electricity sector is already being written, and it's one in which many customers and stakeholders are playing an increasingly key role.

To navigate this transition over the coming years, our decision-making relies on the guidance and collective views of customers, large and small, commercial and residential, communities and stakeholders, as well as our industry partners.

Strengthening the future framework of Ontario's energy system will also be enabled through robust planning and implementation. In September 2016, the IESO published the *Ontario Planning Outlook*, a 20-year outlook for Ontario's electricity sector. Looking forward, the IESO will be developing an implementation plan to support the upcoming Long-Term Energy Plan and completing a mid-term review of the Conservation First Framework. This work is aimed at better preparing the IESO, and the sector generally, for the future challenges and opportunities ahead.

Through the market renewal program, the IESO is proposing to redesign Ontario's wholesale electricity markets to provide greater transparency, promote competition and deliver more efficient outcomes. This project will engage a wide range of stakeholders, external resources and business units across the IESO.

Supporting transformation also means ensuring that we are investing in our people and processes to meet the needs of the sector. Succession planning and continued capability building will assist us in becoming a more agile and resilient organization.

The coming year also brings additional change to the structure of the organization, with the transition to a new President and Chief Executive Officer, who will lead the IESO's efforts to achieve its mandate and strategic objectives for the balance of this year and beyond.

We would like to thank and acknowledge the hard work of our employees. In 2016 we launched a large number of initiatives, supported policy development, undertook province-wide engagement efforts and worked closely with communities and consumers. We extend our congratulations and our thanks to IESO employees for their efforts over a very busy year. We would also like to recognize the significant contributions of Kim Warren, our former Vice-President, Market and System Operations, and Chief Operating Officer, who retired in December.

We look forward to helping Ontario effectively address the opportunities and challenges facing our electricity system going forward.

**Bruce B. Campbell**  
President and  
Chief Executive Officer

**Tim O'Neill**  
Chairman of the Board

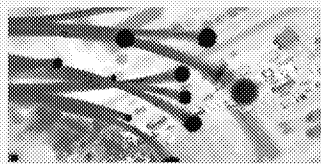
# 2016 Timeline

## January

IESO/Bruce Power amended supply and refurbishment agreement takes effect

## February

IESO hosts executive conference to address cybersecurity



## March

**16 contracts** representing 455 MW of renewable energy projects announced under the Large Renewable Procurement I

## April

Launch of province-wide Save on Energy Spring Coupon Event



Launch of interactive residential energy-efficiency tool, [kilowattway.ca](http://kilowattway.ca)

Stakeholder engagement for market renewal program begins

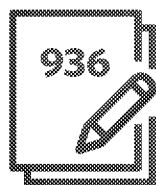
## May

IESO and Ryerson Centre for Urban Energy release discussion papers on the future of energy consumption, sustainability and integrated utility delivery models



**IESO receives ENERGY STAR Canada award** for encouraging energy conservation through consumer incentive programs and promotional campaigns

## June



IESO announces **936 contract offers** for 241 MW under the Feed-in Tariff Program, version 4



Launch of Save on Energy awareness campaign, **Power What's Next**

## July

IESO/LDC Working Group issue 2016 conservation *Achievable Potential Study*

## August

IESO and New York Independent System Operator (NYISO) reach agreement that enables **Ontario generators to offer capacity into future NYISO installed capacity auctions**

## September

Release of IESO's electricity system technical report, the *Ontario Planning Outlook*



**23,213 MW**

September 7, 2016

Reliable management of grid through extreme weather and highest peak day

## October

Launch of province-wide Save on Energy Fall Coupon Event

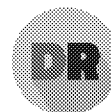
## November

**\$100,000 +**

Amount raised by IESO's workplace campaign for United Way

IESO hosts second executive conference on cybersecurity

## December



Second annual demand response auction results in **prices 12 to 17 percent lower than 2015**

**New electricity trade agreement with Quebec** takes effect, which will help to limit greenhouse gas emissions in Ontario



## Delivering Superior Reliability Performance in a Changing Environment

While operating the power system has always been a balancing act, maintaining that balance in an era of accelerated change across the sector presents new challenges in a number of areas.

Ontario relies on a diverse range of energy resources, both in terms of the generation portfolio itself, but also through the strategic use of conservation and energy efficiency, demand response, clean energy imports and emerging technologies such as storage.

With increases in variable generation and distributed energy resources, as well as nuclear refurbishment outages over the planning horizon and changing customer demand patterns, Ontario's system is becoming increasingly complex to operate on a day-to-day basis.

So what does all of this mean? In part, it means the way the IESO plans and operates the electricity system requires a greater level of agility than ever before. It also means an increased focus on collaboration. This includes collaboration with local distribution companies (LDCs) and other electricity sector partners to establish new pathways to reliability. It also calls for engaging in dialogues with the IESO's system operator counterparts in other jurisdictions to share best practices and leverage the new tools and techniques at its disposal to plan for and adapt to future sector evolutions.

### Addressing Long-Term Energy Needs

In June 2016, the *Energy Statute Amendment Act* received Royal Assent in the provincial legislature. Among its amendments, the Act replaced the Integrated Power System Plan framework and put in place a requirement for the IESO to develop an electricity system technical report. In its role as long-term planner for Ontario's electricity system, the IESO produced a report on September 1, 2016, called the *Ontario Planning Outlook (OPO)*. The report provides a 10-year review (2005-2015) and a 20-year outlook (2016-2035) for Ontario's electricity system. With four different demand outlooks, the OPO considers a range for annual electricity demand over the next 20 years, from as high as 197 terawatt-hours (TWh) to as low as 133 TWh. This technical report also helped to guide the consultations for the province's next Long-Term Energy Plan (LTEP), which is expected to be published in 2017.

Under the *Energy Statute Amendment Act*, the IESO is also now responsible for an implementation plan following the release of the province's LTEP, which will be a priority for the IESO in 2017. The organization will also continue to provide, on an ongoing basis, information on evolving needs and trends in the electricity sector to government, stakeholders and communities.

## Responding to Changing Grid Conditions

### Addressing Emerging and Near-Term Reliability Needs

All across North America, system operators are addressing new challenges as their supply mixes evolve. Some of the adjustments include integrating variable forms of generation, as well as gaining more visibility into electricity systems at the bulk and distribution levels.

In 2016, the IESO completed an operability assessment, which looked at the continuum of complex and interrelated factors at play in Ontario's power system. It focused on changes that are expected on the system in the next few years and addressed the potential operating challenges they represent.

Among the findings, the report identified that the continued growth and integration of variable generation will have a considerable effect on the operability of the system in the next three to five years. This is mainly due to the variability of certain fuel sources, for example, wind or sunlight, which make them less predictable than conventional forms of generation. This results in greater forecast uncertainty from a system operation perspective.

The findings of the *2016 IESO Operability Assessment* led to the formation of a stakeholder engagement focused on enabling system flexibility. In 2017, the IESO will continue its work to maintain and improve the operability of the power system through transparent mechanisms in three key areas:

|                      | Need                                                                                                                                                                                      | Why                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | What the IESO is doing                                                                                                                                                                                                                                                                                                 |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Regulation | Additional frequency regulation capability, or the ability to balance total system supply with total system load, on a second-by-second basis.                                            | To correct for short-term changes in electricity use that alter the supply and demand balance. Some of these changes include increases in variable generation as well as non-traditional demand patterns.                                                                                                                                                                                                                                                                                                                                                         | The IESO is seeking to expand the depth of the regulation services market in Ontario. The IESO issued a draft Request for Proposal (RFP) for regulation services for comment in late 2016, with a final RFP scheduled to be released in spring 2017.                                                                   |
| Voltage Control      | Reactive control devices, which are designed to ensure stable levels of electric power voltage by maintaining voltage levels within pre-determined ranges set by equipment manufacturers. | To better manage voltage levels affecting the bulk power system as a result of the transformation of the province's supply mix, transmission infrastructure, and as increased quantities of supply resources are connected to the distribution system. Studies are underway to determine where the greatest needs exist, including the Greater Toronto Area and eastern Ontario.                                                                                                                                                                                  | In 2017, the IESO will collaborate on an implementation plan with transmitters and seek input from the IESO's Stakeholder Advisory Committee.                                                                                                                                                                          |
| Flexibility          | Increased flexibility from supply resources to be able to address supply and demand imbalances that arise within an hour.                                                                 | To maintain a balance of supply and demand, increased resource flexibility is needed to respond to short-term supply and demand imbalances. Forecast accuracy improves significantly as it gets closer to real-time. As a result, any inaccuracies in supply or demand forecasts will become evident close to real-time when it's sometimes too late to schedule less flexible resources. Solutions considered will need to be cost-effective and competitive, transparent and technology-neutral, allowing for the use of new technology and/or existing assets. | The IESO has initiated a stakeholder engagement to determine potential solutions that can enable and achieve flexibility to meet the evolving needs of the system. This could include getting more flexibility out of existing resources and/or enhancing market mechanisms through the IESO's market renewal program. |

These efforts to improve operability will build on previous efforts such as the Renewable Integration Initiative, which brought in centralized forecasting of wind and solar generation and the capability to dispatch transmission-

connected variable generators. There is also a growing array of emerging technologies that can be leveraged to address these operability issues, discussed on pages 6 and 7.

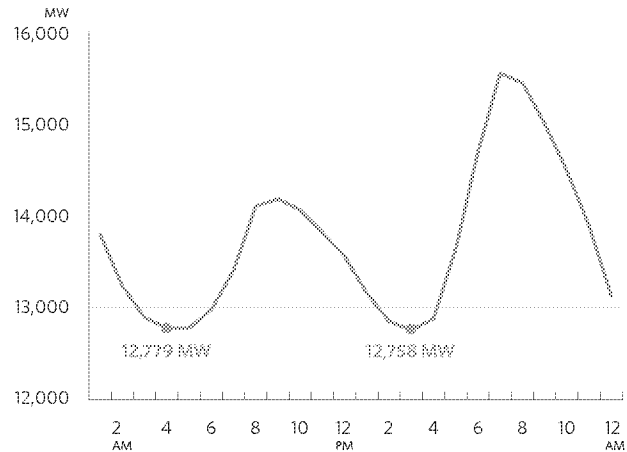
## Ontario Demand – February 18, 2017

*Below is an example that illustrates how Ontario's transforming electricity system is impacting grid operations and presenting new challenges to system operators.*

On Saturday, February 18, 2017, which fell on the Family Day weekend, the confluence of unseasonably warm temperatures and bright sunshine resulted in what's called a "duck curve" load pattern, a distinctive shape (resembling the profile of duck) in which demand falls significantly in the middle of the day.

On February 18, this pattern occurred as a result of already low daytime grid demands being further reduced to overnight lows, due to solar resources embedded in the distribution system generating at full, or close to full, capacity. As the evening approached, solar generation output declined, temperatures fell, lights came on, and grid demand climbed sharply and required other resources to ramp-up to meet the increased system demand. While not yet a common occurrence, the duck curve scenario demonstrates both the challenges associated with

forecasting demand for power from the grid due to embedded variable resources and the need to have sufficient flexible resources online to meet these ramping events.



### Grid-LDC Coordination Initiative

The IESO and LDCs are taking collaborative steps to enhance reliability and efficiency to get a more integrated picture of how emerging technologies and distributed generation might impact the operation of the province-wide power system. The Grid-LDC Coordination initiative is working to refine a framework for data sharing between the IESO and all LDCs, to assist in real time with managing the system more effectively.

This initiative explored the feasibility of residential solar and energy storage technologies using PowerStream's (now Alectra's) POWER.HOUSE project, a "virtual power plant" in Vaughan and soon in Northern Ontario through a partnership with Thunder Bay Hydro. Next the initiative will look at how to enhance reliability and efficiency through coordination of IESO- and LDC-controlled resources. These projects will help gain insights into how upcoming changes at both the grid and distribution levels can impact system operations and identify practical ways to leverage these opportunities.

In addition, in late 2016, Veridian announced the deployment of a residential microgrid involving homebuilders – managed and operated by Veridian's 24/7 System Control Centre and controlled by Opus One's GridOS® Microgrid Energy Management System – which may provide another opportunity to better understand and inform data sharing and real-time system coordination between LDCs and the IESO.

### Harnessing the Potential of Storage

Energy storage is another tool the IESO is exploring to assist with providing resource flexibility to help mitigate the effects of variable output. Energy storage facilities have the potential to provide a range of services to support reliability, including regulation, voltage control, operating reserve and flexibility – provided that they are the right type of facility and in the right location. The variety of benefits associated with storage can include:

- **Smoothing out fluctuations** of variable generation resources, bringing added stability to the electricity system
- **Easing points of congestion** in transmission and distribution networks
- **Helping move clean energy** to peak demand periods
- **Providing reliability** services that support voltage and frequency on the system.

The IESO is already using storage technologies as a source of frequency regulation, with two projects in operation: NRStor Inc., in partnership with Temporal Power, is providing two megawatts of regulation using flywheel technologies, and Renewable Energy Systems Canada Inc. delivers Ontario's first battery regulation service with four megawatts of capability.

To further support and understand the integration of storage into the electricity system, in 2015 the IESO completed a two-phase energy storage procurement, securing approximately 50 MW in total. Soon, energy storage assets procured under Phase I will begin providing ancillary services to Ontario's electricity system in various locations across the province. Although it's still early days for these projects, as the first of these facilities is expected to come into operation in 2017, together they will build up the IESO's direct experience with the various technologies. The IESO looks forward to working with all of the project proponents to confirm and capture the value of storage.

## Growing Role of Interconnections to Strengthen Reliability

Participating in an interconnected power system enables the IESO to respond and assist in maintaining the reliable operation of the entire North American grid, and enables Ontario to receive and benefit from similar assistance from its interconnected reliability partners. Ontario currently has interconnections with five of its neighbours: Quebec, Manitoba, Minnesota, Michigan and New York. These interconnections facilitate the economic import and export of electricity and provide operational and planning flexibility that enhance the reliability and cost-effectiveness of Ontario's electricity system.

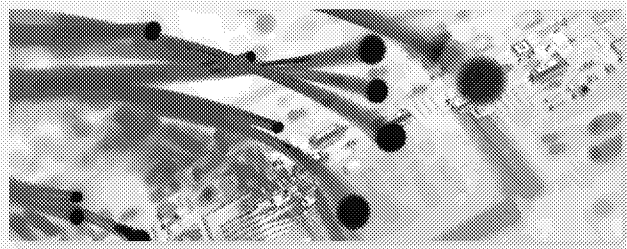
The IESO is working on enhancing the use of its interties to better meet system needs.

The provincial government recently concluded two electricity trade agreements with Quebec. The most recent agreement provides for Ontario to import 2.3 TWh of energy from Quebec in addition to regular wholesale energy trading. These imports will displace dispatchable Ontario-based gas-fired generation with lower-cost and lower greenhouse gas-emitting energy from the Quebec grid. The agreement provides value by displacing higher-emission gas generation and makes use of existing intertie and transmission system capability.

In 2016, the IESO enabled capacity exports, with one Ontario facility participating in and clearing the New York Independent System Operator's (NYISO) auction. In August 2016, a Memorandum of Understanding was signed between the IESO and NYISO, designed to support specific projects on a transitional basis to gain experience and learn lessons for a long-term solution, including the implementation of an incremental capacity auction in Ontario. Joint processes with the NYISO are being established to coordinate operations. Development of the information technology functions to support related control room operations were also initiated in 2016.

In addition to capacity exports, the IESO is also considering moving to 15-minute intertie scheduling as part of the market renewal program (see page 8). This has now become a regulatory standard in the United States. In 2013, the IESO released a study paper concluding that more frequent intertie scheduling would provide system benefits and increase market efficiency by lowering the overall system costs of meeting demand. This will also enable Ontario to schedule resources and meet its adequacy requirements in a more cost-effective manner in the future.

## Cybersecurity



Maintaining system reliability involves keeping Ontario's critical electricity infrastructure secure. As has been widely reported, Ukraine recently experienced a confirmed instance of a cyber-attack causing a blackout. Governments and industry in Canada are working together to develop coordinated cybersecurity strategies and to form organizations specifically focused on cyber defence.

Cybersecurity is a material part of the IESO's business, particularly when one considers the breadth of data the IESO collects on a given day – more than 20,000 data points every three seconds – to support the reliable flow of electricity across the province and its borders. The IESO has put into place robust cybersecurity and cyber incident response programs to mitigate threats to critical business operations.

The IESO is also responsible for the application and enforcement of North American Electricity Reliability Corporation (NERC) cybersecurity standards for critical electricity infrastructure connected to the bulk electricity system in Ontario.

Beyond its regulated requirements, the IESO has also been working closely with market participants and stakeholders to deepen the sector's understanding of cyber risks. These efforts include increasing information sharing between the sector and government partners, exchanging information on respective approaches to mitigating the effects of cyber-attacks, creating a stronger incident response capability and enhancing the awareness of cybersecurity at the executive and board levels of organizations. The IESO held two cybersecurity conferences and hosted two executive/board level cybersecurity briefings in 2016. These forums were attended by electricity industry leaders and cybersecurity experts from around the world and included productive, forward-looking dialogue on matters related to best practices, policy framework, government support and other key areas of cybersecurity. Further meetings are being planned, including an executive briefing scheduled for late 2017. The IESO will continue to invest in advanced technologies and more robust cybersecurity technologies as part of its ongoing cyber threat mitigation efforts.



# Driving to a More Efficient and Sustainable Marketplace: Market Renewal

The IESO, together with stakeholders, have begun a market renewal program to improve the efficiency and performance of the wholesale electricity market. It will enhance the way energy is scheduled and priced, evolve how resources are acquired and drive greater system flexibility.

Nearly 15 years ago, on May 1, 2002, Ontario's electricity market opened for the first time. It marked a major milestone for Ontario's electricity system – the process to match supply and demand would now be based on competition, where electricity would be bought and sold on a spot market at competitive prices. The IESO maintains the wholesale electricity market and directs the operation of Ontario's bulk power system. The market was designed to efficiently dispatch Ontario's supply mix resources, which, at market opening, consisted of mainly coal, nuclear and hydroelectric.

Since then, Ontario's system has seen a significant resource transformation. In a relatively short period, the province experienced a substantial net growth in electricity supply and a material transition to a cleaner energy system. Over six gigawatts (GW) of installed coal-fired capacity was shut down and replaced with more than 14 GW of renewable, natural gas-fired, nuclear and demand response resources. Combined, this new supply mix has changed the dynamics of Ontario's electricity system.

Over the last decade, inefficiencies with the current market were identified through the work of the Electricity Market Forum, the Market Surveillance Panel, IESO studies and stakeholder input. The IESO made a series of enhancements to adapt its market design to the changes in the supply mix.

While the IESO has maintained reliability throughout these changes and adopted new approaches to increase flexibility and resiliency into the provincial power grid, it has also become evident that the current market design needs more foundational changes.

## Where Are We Now?

The IESO has identified the need to evolve Ontario's electricity market to address known inefficiencies and lay the foundation for a more dynamic marketplace in the future. As noted in last year's *Ontario Planning Outlook*, the province is in a stable supply situation that is expected to continue until the beginning of the next decade, making this an opportune time to consider and implement needed market design changes.

To advance these efforts, the IESO and stakeholders are examining the benefits and costs of evolving and improving the market. Market renewal, as the program is called, will be a major undertaking both for the IESO and for Ontario's electricity sector, and it represents the most significant enhancement of Ontario's market since it first opened in 2002.

## Market Renewal Principles



In 2016, when the IESO launched a stakeholder engagement for market renewal, it appointed members for a working group representing a broad cross-section of market participants and stakeholders to help guide the market renewal process.

Comprised of experienced individuals representing generators, traders, consumers and emerging technologies, the working group is a key stakeholder forum for this project.

The IESO also engaged an economic consulting firm, the Brattle Group, to develop a benefits case for the market renewal program, supported by input from the working group and stakeholders. The analysis draws on previous Ontario studies and the experience of other jurisdictions that have gone through similar market redesign processes. The final benefits case is expected to be posted on the IESO website in April 2017.

Early findings show potential for cost savings, with a baseline estimate of \$3.4 billion (net present value) over a 10-year period from 2021-2030. These savings represent a net efficiency benefit, meaning the total commodity cost of electricity (i.e., energy, global adjustment and uplifts) is reduced by that amount. The majority of savings are expected to flow to consumers, while the rest would flow to other market participants. Costs for the project are estimated to fall in the range of \$200 million to \$300 million. While these are only initial findings, the numbers demonstrate that the range of reasonably expected benefits far outweighs the likely costs of the project (see sidebar on page 10).

## Benefits of Transitioning to More Efficient Market-Based Platforms

Market renewal is expected to provide value for Ontario's rate-payers by putting downward pressure on costs while fostering an open and competitive marketplace with broad participation. Effective markets provide clear signals for the value of needed services, and they enable all resources – whether new or existing – to compete to meet those needs. Effective markets, where prices accurately reflect underlying system conditions, also enable individual resources and consumers to make informed decisions, capturing innovation and better managing costs and risks.

Proposed changes to the market include:

- moving from scheduling and dispatching primarily in real time to a financially binding day-ahead market that will provide the IESO and market participants more certainty
  - A day-ahead market will require replacing the current two-schedule system (where prices are determined under one schedule and energy is dispatched under another) with a more efficient single-schedule market.
- introducing an incremental capacity auction where all resources will compete on a level playing field, resulting in lower costs and potentially avoiding or deferring the need to build new resources
- delivering greater flexibility from existing assets and from interties
- other operability enhancements as identified by the IESO and its stakeholders.

## The Evolution of Capacity Procurement

### COMPETITIVE PROCUREMENTS

Ontario has used many different procurement mechanisms: competitive RFPs, standard offer programs and bilateral negotiations. Broad and open competitive RFPs have yielded the best value for consumers.

### DEMAND RESPONSE AUCTION

The demand response auction has been a first step in testing out an auction platform. It provides an annual mechanism for resources to compete transparently. It has attracted a number of new entrants and innovative approaches.

### CAPACITY AUCTION

A capacity auction will provide a stable and enduring platform where existing assets and new entrants can compete on a regular basis for incremental capacity needs. Transparent price signals will lead to improved investment decisions.

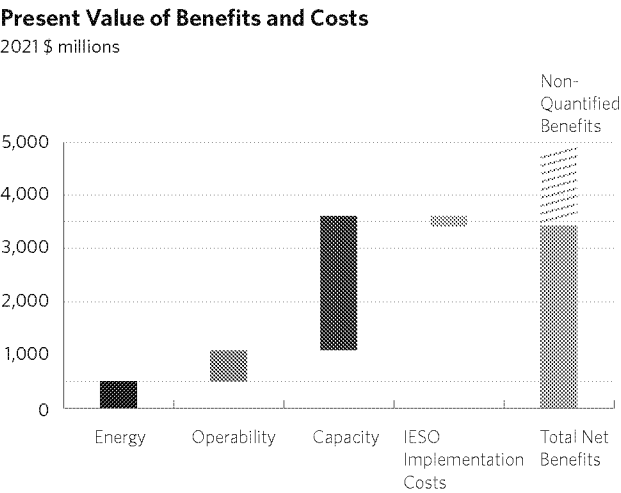
The energy and operability initiatives under market renewal are designed to address inefficiencies with the current market design and improve the way the IESO schedules energy. Market renewal also proposes to introduce an incremental capacity auction that would allow non-traditional resources (such as demand response, distributed energy resources, upgrades to existing assets, and imports) to compete with existing assets. A capacity auction would function similarly to Ontario’s existing demand response auction (see next page) but would include broader participation. This mechanism has been used in a number of North American markets, as well as globally, to cost-effectively meet the capacity needs of modern electricity systems.

The IESO benefits from almost 15 years of experience with Ontario’s electricity market and can also draw upon decades of best practices in other jurisdictions. The IESO will work with stakeholders to reset Ontario’s market in a way that both addresses existing challenges and unlocks future possibilities.

A work plan for market renewal will be developed in 2017 through engagement with stakeholders. It will identify specific market design changes for implementation over the coming years and identify target timelines for completing design and implementation work.

### The Case for Market Renewal

This graph is from the March 2017 draft report, *A Benefits Case Assessment of the Market Renewal Project*, prepared for the IESO by the Brattle Group. It includes the estimated benefits and costs of market renewal for the period of 2021–2030, based on present value of quantified benefits from the three work streams: energy, operability and capacity. The report estimates that market renewal will produce benefits with a present value of approximately \$510 million from energy market reforms, \$580 million from operability reforms and \$2.53 billion from capacity auction reforms. Realized benefits will likely be greater if the existing contracted resources are more responsive to market prices than assumed in the analysis and considering that the value of many benefits has not been quantified. As shown, the estimated benefits are offset by \$200 million in estimated IESO implementation costs.



| Work Streams | Primary Objective                                                                  | Initiatives                                                                                                                                    |
|--------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Energy       | Reduce cost and gain efficiency scheduling energy to meet provincial demand        | <ul style="list-style-type: none"> <li>Single-schedule system</li> <li>Day-ahead market</li> <li>Enhanced real-time unit commitment</li> </ul> |
| Operability  | Increase flexibility to reliably and cost-effectively integrate variable resources | <ul style="list-style-type: none"> <li>More frequent intertie scheduling</li> <li>Investigate other opportunities</li> </ul>                   |
| Capacity     | Reduce cost of procuring resources to meet long-term demand                        | <ul style="list-style-type: none"> <li>Capacity trade</li> <li>Incremental capacity auction</li> </ul>                                         |

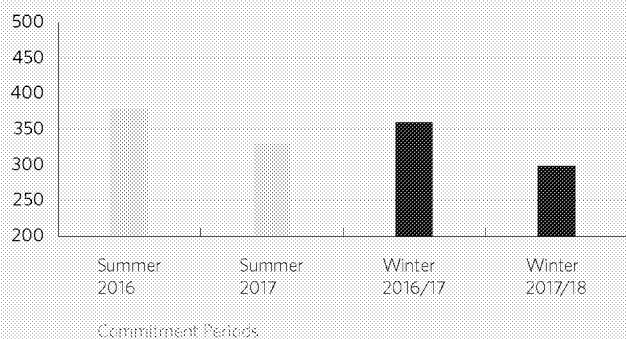
# Demand Response Auction

For a number of years, the IESO has been exploring what types of flexible, responsive mechanisms could be introduced to complement the existing market structure. The IESO's annual demand response (DR) auction is part of those ongoing efforts and has helped to expand Ontario's DR capabilities and transition to a more cost-effective, market-based platform for this resource. DR has been introduced into the market where it can be called upon like other resources to meet provincial needs and can reduce the need to build costly generating facilities by reducing electricity usage during the hours of highest demand, typically on hot summer days. The first DR auction, conducted in December 2015, contributed 391.5 MW during the 2016 summer season and 403.7 MW for the 2016-17 winter season.

The outcome of the second annual DR auction was announced in December 2016 and resulted in both increased participation as well as prices for demand response capacity that were 12 to 17 percent lower than those achieved in 2015. The amount of DR procured through the auction increased by 16 percent in the summer to 455.2 MW and 18 percent in the winter to 477.5 MW compared to the previous year. The next DR auction will be held in December 2017, for delivery of DR capacity between May 2018 and April 2019. The successful DR providers will be integrated into the electricity market along with generators and will help provide capacity to ensure the province's energy needs are met during peak hours. Lessons learned from the DR auction will be applied to the design of an incremental capacity auction.

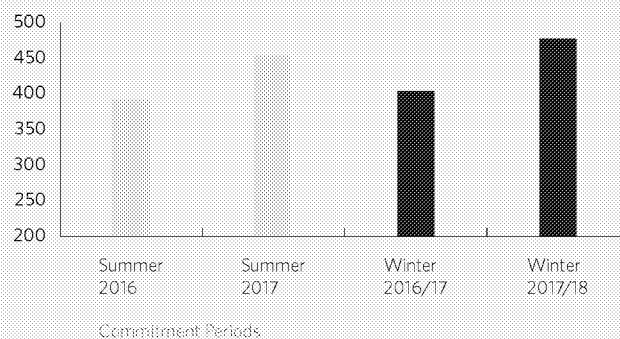
## DR Auction Results – Clearing Prices

Price \$/MW-day



## DR Auction Results – Cleared Quantities

MW



## Engagement Plans for 2017

The market renewal project has a broad reach and will address the way the IESO schedules energy, procures capacity and meets operability needs in the province. The IESO recognizes that these proposed changes will impact market participants and contract counterparties. The IESO will work collaboratively to understand and address the impacts, as required. At the same time, the market renewal program is not a traditional stakeholder engagement, as it encompasses various work streams and will require engagement on various levels, including:

- education for the broader sector
- strategic discussions to focus on policy and key issues
- design discussions to determine, together with stakeholders, the optimal approach for Ontario
- technical dialogues with subject matter experts
- development of market rules and manuals.

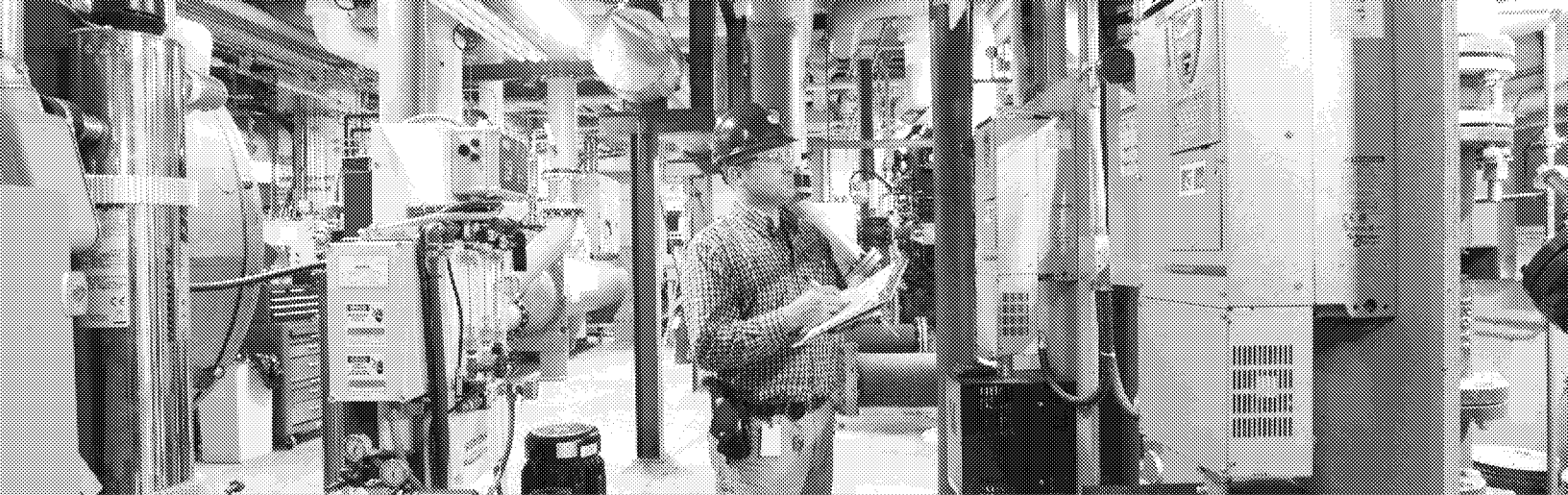
The project will also require an enduring stakeholder commitment over a number of years.

To undertake this work, the IESO will use existing and newly created stakeholder engagement forums to seek input from both the traditional, sector-focused stakeholders and the broader stakeholder community. For example, the IESO will:

- Use existing stakeholder forums including the IESO Stakeholder Advisory Committee (SAC) and the Technical Panel.
- Institute a CEO's Executive Roundtable to ensure awareness and discussion on high-level issues related to the project.
- As the project progresses, engage the broader stakeholder community to ensure they are informed and able to provide input into the decision-making process.

The Market Renewal Working Group has been established to provide expertise and advice to support the development and implementation of market renewal initiatives.

Transparency will be a key component in the stakeholder engagement process. All materials that have been presented and provided to the IESO Market Renewal Working Group are available on the market renewal section of the IESO's website. The IESO encourages all interested parties, or their representatives, to participate in this engagement.



## Driving to a More Efficient and Sustainable Marketplace: Conservation and Energy Efficiency

Energy conservation in Ontario has gone through a considerable evolution, and its contribution will continue to grow as Ontario's system becomes more dynamic and interconnected.

Today, energy efficiency and conservation are playing increasingly important roles in the energy landscape, both at the system level to meet electricity needs and also as an effective tool for consumers of all sizes to help reduce their own energy costs. From optimizing energy-efficient products to supporting certified energy manager training, conservation programs are helping Ontario businesses and residential customers better understand what energy-efficient options are available for them. In turn, these programs are contributing to better quality and more efficient homes, improving day-to-day operations in businesses and enabling a more reliable and sustainable system for future generations.

In 2016, the IESO continued its role in the advancement of a conservation culture in Ontario, working with local distribution companies (LDCs) and others to connect end-use customers to energy-efficient solutions. The past year saw continued progress against the province's six-year (2015-2020) Conservation First Framework (CFF), designed to provide LDCs with greater flexibility to design and deliver conservation programs that meet local community needs, strengthen regional collaboration and benefit both customers and the provincial grid.

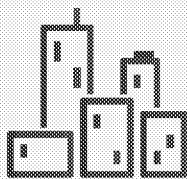
Approved conservation and demand management (CDM) plans are now in place for all LDCs in the province, which in total account for the achievement of the seven terawatt-hour (TWh) CFF target. An additional 1.7 TWh of energy savings are to be achieved through the Industrial Accelerator Program, which has been designed to help transmission-connected customers achieve energy savings. At the same time, efforts continue to ensure programs are delivered in a cost-effective manner by applying rigorous third-party evaluation, measurement and verification of program results, which are made publicly available on the IESO's website.

With the introduction of the province's *Climate Change Action Plan*, the IESO and the province are exploring the potential to build on the existing suite of conservation programs to support and coordinate with the implementation and delivery of the plan's low-carbon objectives.

# Conservation for the Long Term

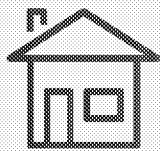
## Investing in Conservation

Ontario is a recognized leader in its commitment to conservation and energy efficiency; it is the cleanest and most cost-effective resource available. For every dollar invested in energy-efficiency programs, Ontarians have saved two dollars in avoided energy costs.



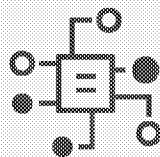
### Sustainable Communities

Conservation investments are being made in existing homes and businesses in Ontario.



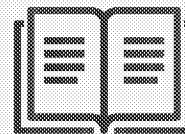
### Homes

Ontario is a leader in setting energy-efficiency standards and supporting energy initiatives.



### Innovation

The IESO's Conservation Fund is supporting new and innovative electricity conservation initiatives.



### Knowledge

Training initiatives help drive participation in energy-efficiency programs.

## Progress in Conservation

Conservation and energy efficiency is the first resource considered in planning Ontario's electricity system. The IESO, local distribution companies and other partners deliver programs across Ontario that result in measurable and verifiable savings toward the province's conservation targets. A lot has been achieved since 2006.

### 2006-2010

Customer incentives available for reducing energy use



Programs delivered for under 4¢/kWh



2015-2016 energy savings achieved equivalent to powering 213,694 homes for one year

### 2011-2015

Coordinated province-wide effort to deliver conservation

### 2015-2020

Conservation First approach to ensuring reliability



9.5 million coupons redeemed across the province



13 TWh of energy saved over 10 years

## 2020 Energy-Savings Targets:

Conservation First Framework

**7 TWh**

Industrial Accelerator Program

**1.7 TWh**

# Conservation First Framework: By the Numbers

Consumers throughout the province continue to take advantage of the range of energy conservation tools, resources and incentives tailored to Ontario homes and businesses through the Save on Energy programs delivered with LDCs. These include incentives for lighting upgrades, purchasing energy-efficient products and replacing inefficient equipment. Businesses of all sizes are also accessing program funding that is helping to improve production efficiency, upgrade equipment and train their staff in energy management, which in turn is resulting in improved productivity, better work environments and lower operating costs.

**In the first two years of the Conservation First Framework, these results have been achieved:**

## Residential

**451 GWh**  
of energy savings\*

**17.8 million**  
energy-efficiency  
products purchased

**4,100**  
energy-efficient homes  
built through the  
New Home Construction  
Program

**224,000**  
installations through  
the Heating and  
Cooling Program

## Business

**1,463 GWh**  
of energy savings\*

**450**  
projects completed  
through the Energy  
Managers Program

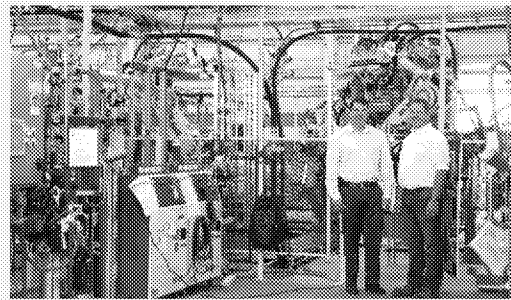
**20,600**  
projects completed  
through the Small  
Business Lighting  
Program

**19,700**  
projects taken on  
through the Retrofit  
Program

\*Energy savings achieved are persisting to 2020.

Preliminary unverified results indicate that LDCs had collectively achieved 27 percent of the provincial CFF target, or 1.92 TWh of the seven TWh target in 2015-2016. These savings represent enough electricity to power a city about the size of Guelph for a year. In addition, the Industrial Accelerator Program has achieved 0.20 TWh of the 1.7 TWh target in 2015-2016, or 12 percent of the 2020 target. This number will increase as additional projects currently under contract are expected to be implemented over the coming period.

## Energy Efficiency in Action



**Valiant TMS**, a Windsor-based company that designs and manufactures welding, assembly and material handling systems for the automotive and aerospace industry, upgraded its lighting, compressors, and heating and cooling systems, resulting in savings of four million kilowatt-hours annually, which represents 25 percent of its annual energy consumption.

The **Thunder Bay Regional Health Sciences Centre**, a 375-bed acute care hospital, emergency centre and research facility, lowered its electricity consumption by 22 percent thanks to Save on Energy incentives. Its energy-efficiency upgrades resulted in \$660,000 in annual cost savings, which could be reinvested into patient and family care services.

More information on these projects, along with other testimonials and case studies, is available at [saveonenergy.ca](http://saveonenergy.ca).

## Getting to 2020 and Beyond

### Conservation First Framework Mid-Term Review

In late 2016, the IESO launched a public engagement process to seek feedback from stakeholders to inform the mid-term review of both the 2015–2020 Conservation First Framework and the Industrial Accelerator Program. The mid-term review will focus on a range of key issues, including the allocation of budgets and targets among LDCs, lessons learned regarding LDC funding models, customer needs and satisfaction, conservation integration with regional planning and alignment with Ontario's *Climate Change Action Plan*.

This review will examine opportunities for achieving conservation objectives to 2020 and beyond, as well as consider using innovative new programs that did not exist prior to the framework and that were developed through pilot programs funded by the IESO.

Input from stakeholders and communities through public engagement meetings will be a key component leading up to and throughout the review. Comprehensive, open engagement that aligns with the IESO's Engagement Principles will help ensure that all LDCs, customers, channel partners and other interested parties have meaningful opportunities to provide feedback on the framework's success and challenges.

A Mid-Term Review Advisory Group, comprised of a variety of stakeholder representatives, has been assembled to tackle more detailed discussions.

Conservation and energy efficiency require a sustained commitment to achieve persistent savings over the long term, and the mid-term review will be an important marker in setting the next phase of conservation in the province. In early 2018, a final report will be submitted to the Minister of Energy and published on the IESO's website. For more information on this stakeholder initiative, please visit the IESO's Conservation Framework Mid-Term Review webpage or email [engagement@ieso.ca](mailto:engagement@ieso.ca).

## Driving Innovation in Conservation, Energy Efficiency and Demand Management

In addition to the energy-efficiency programs delivered through the LDCs, the IESO is committed to encouraging new, innovative solutions and technologies that will help Ontario meet its conservation targets.

The IESO's Conservation Fund helps transform the market by supporting innovative energy-saving pilots and bringing ground-breaking new processes, technologies and policies to market. In 2016, the Conservation Fund committed \$9.5 million to five initiatives. Project examples include:

- LDC achievable potential studies for their service territories
- enhancing CanmetENERGY's RETScreen energy-efficiency software, which provides project feasibility and energy performance analysis
- supporting an energy conservation study on commercial freezer temperature modification
- implementing a smart electric vehicle charging pilot for workplaces.

The LDC Innovation Fund is helping utilities explore new technologies that can contribute to a modern and efficient grid. The fund supports program design and testing of new initiatives, providing LDCs the opportunity to market test the delivery mechanisms and savings potential of new innovative program offerings before including them in their CDM plan and budget. These pilots are also assessed for their potential to be developed into local, regional or province-wide programs. Results of pilot programs are shared with other LDCs and the public so that the LDC community can collaborate and take away key learnings for their own projects.

### Achievable Potential Study

In June 2016, the IESO completed an Achievable Potential Study to assess electricity conservation potential in Ontario. Supported by input from a working group comprised of 12 LDCs and expert industry observers, the study considered the potential for energy-efficiency programs and behind-the-meter generation projects. It concluded that, within the current assumptions, approximately 7.4 TWh of conservation can be achieved by LDCs by 2020. It also found that in the longer term, about 19.5 TWh can be achieved from distribution- and transmission-connected customers by 2035, assuming the same administrative costs and incentive levels. The Achievable Potential Study will be used to inform the Conservation Framework Mid-Term Review (see above) and will be a useful tool in informing program development as well as regional and long-term energy planning.



Photo: Innergex Renewable Energy Inc.

## Engaging Stakeholders, Communities and Consumers

Responding to change in a rapidly evolving sector has become a constant part of the IESO's work. As Ontario's electricity system becomes more interconnected and regionally focused, the IESO's traditional forms of engagement will continue to expand as new generators, customers, Indigenous peoples and communities become more actively involved in the sector.

With this evolving landscape, the IESO's ability to achieve its goals will be dependent on the valuable input it receives.

The IESO's Engagement Principles provide an effective framework for ensuring stakeholders and communities have the opportunity to provide input on matters that impact them. Input was considered in the development of the principles, and both the IESO and the public have come to rely on these to guide open, transparent and meaningful opportunities for input. The Engagement Principles also provide a foundation for the IESO's engagement with Indigenous communities.

The IESO will continue to provide broad engagement channels and processes to ensure that its initiatives are guided by collective engagement. This was re-affirmed in the IESO 2016-2020 Strategic Plan: **Seeking out and responding to input from communities, customers and stakeholders to inform IESO's decision-making** has been adopted as one of the organization's strategic objectives.

At the same time, to be effective and meaningful, engagement must also go through a process of continuous improvement and measurement. The IESO will continue to undertake stakeholder and community interviews and/or surveys, which will indicate the level of satisfaction with the engagement process and whether the IESO has demonstrated appropriate consideration of input in decisions.

The Stakeholder Advisory Committee (SAC) has an important role in providing the IESO with input and feedback on proposed decisions or changes that affect all communities and stakeholders. Through input from the SAC, stakeholder priorities are considered in the development of the organization's core corporate planning documents, including the IESO's latest business plan. The IESO has established corporate performance measures (CPMs) for its key initiatives across the organization, designed to assess progress toward the achievement of its core mandate and strategic objectives. These targets have been developed to be specific, measurable, achievable, relevant and time-bound. They also reflect input received from the SAC to make the CPMs both outcome-oriented and externally focused.

Going forward, the IESO will continue to evolve its engagement processes and procedures, as well as their application, to meet the needs of its expanding stakeholder and community base.

## Engaging Communities and Consumers

Technology developments are continuing to change the landscape of the traditional bulk power system, creating a larger role for the consumer within the broader system and offering a wider range of possibility for meeting their energy needs. Customers are becoming increasingly engaged and involved in managing their energy consumption through things such as:

- smart home technologies and innovative software applications
- community microgrids
- distributed energy resources
- electric vehicles
- storage technologies
- heat pumps
- residential demand management resources
- energy audits and retrofits.

At the same time, communities are becoming more focused on how to meet their energy needs through the development of community energy plans. As part of this, municipalities and Indigenous communities are working with their local utilities, community members and key stakeholders to establish an energy vision and develop plans to achieve this vision.

The result is that consumers and communities are taking an increasingly active role in how their energy needs are being met, and they are exploring local resources that can also meet regional reliability needs. This could take the form of non-wires supply options, such as conservation and distributed energy resources, as well as other innovative solutions. In its role to support this progress, the IESO will continue to expand its outreach efforts to include a broader vision of community engagement.

### Identifying Regional Energy Needs

All of these activities contribute to the development of regional electricity plans across the province, plans that are designed to ensure a reliable supply of electricity over the next 20 years. These regional electricity plans ensure that community-based solutions, which are technically viable, economic and consistent with the values of the local community, are accounted for in the plans needed to meet capacity and reliability needs in a local area.

Meetings with municipalities and communities, as well as feedback received from the 11 Local Advisory Committees (LACs) across the province, contribute a local voice and help identify local priorities in the development of regional plans. LACs are comprised of municipal, First Nation, Métis, environmental, business, sustainability and community representatives and are an effective model for the IESO to engage communities in the regional planning process. All LAC meetings are open to the public.

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### Local Advisory Committees have been formed in the following areas as part of the IESO's regional planning process:

|                                                                                 |                                                                           |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| <b>Greenstone-Marathon</b><br>Sub-region of Northwest<br>Ontario (community)    | <b>Parry Sound/Muskoka</b><br>Sub-region of South<br>Georgian Bay/Muskoka |
| <b>Greenstone-Marathon</b><br>Sub-region of Northwest<br>Ontario (First Nation) | <b>Barrie/Innisfil</b><br>Sub-region of South<br>Georgian Bay/Muskoka     |
| <b>West of Thunder Bay</b><br>Sub-region of Northwest<br>Ontario (community)    | <b>York Region</b><br>Sub-region of GTA North                             |
| <b>West of Thunder Bay</b><br>Sub-region of Northwest<br>Ontario (First Nation) | <b>Toronto</b>                                                            |
|                                                                                 | <b>GTA East</b>                                                           |
|                                                                                 | <b>Ottawa</b>                                                             |
| <b>Thunder Bay</b><br>Sub-region of Northwest<br>Ontario                        |                                                                           |

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All 21 planning regions in the province have had the first five-year cycle of the regional planning process completed; this means that their needs have been examined and, where required, Integrated Regional Resource Plans have been developed. In the first round of regional planning, 16 plans were completed and are posted on the IESO website. Moving forward, the IESO will continue to work collaboratively with all communities to help best address their energy priorities and system needs and to ensure that the implementation of recommendations from completed plans is supported.

# Indigenous Engagement

From First Nation-led transmission companies that are working to connect remote communities, to providing substantive input at Local Advisory Committees, to equity partners in over 1,000 MW of renewable projects, Indigenous communities are important partners in supporting Ontario's sustainable energy future.

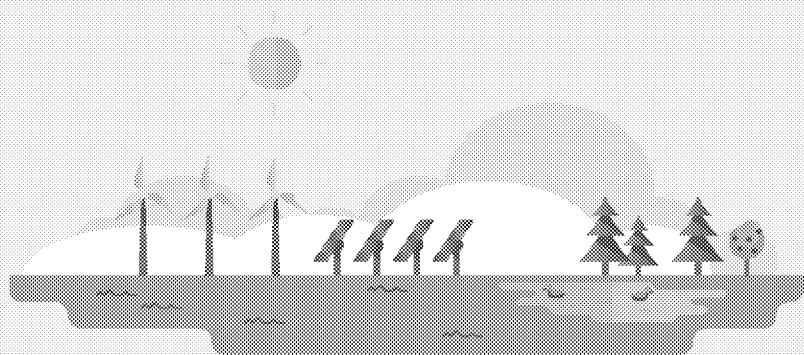
To assist with capacity building, the IESO works to ensure all Indigenous communities are aware of funding programs, upcoming procurements and electricity planning, have the opportunity to provide input and feedback, and that all feedback is considered in the development of programs and procurements.

In 2016, the IESO continued to receive advice and guidance on the development of programs and initiatives through the Aboriginal Energy Working Group, comprised of First Nation and Métis community members who reside across the province and are active in Ontario's electricity industry. Representatives from the IESO also spoke at 13 Indigenous conferences or community meetings, attended 13 additional conferences and assemblies and met with communities on more than 70 occasions.

Also in 2016, the IESO supported the Ministry of Energy in engaging Indigenous communities from across Ontario to provide input to the next Long-Term Energy Plan (LTEP). This included a customized series of regional Indigenous sessions, structured around an LTEP Indigenous engagement workbook. These sessions were part of the ongoing dialogues with Indigenous communities on everything from energy policy development to program delivery.

In 2016, the two-year capacity agreements with the Chiefs of Ontario and the Métis Nation of Ontario for the funding of an Energy Analyst position came to an end. Both of these agreements have been renewed for two additional years based on feedback from the organizations on the benefits of this position and the continued need to have a dedicated resource able to focus on energy issues.

Throughout 2016, the IESO continued efforts to reduce the dependence on diesel in all remote communities. This work included continuing to support the implementation of the Remote Communities Connection Plan. This plan informed an Order-in-Council from the provincial government in 2016, confirming the need to connect these 21 remote communities. The IESO has continued to support the current project to connect 16 of the communities through various regulatory



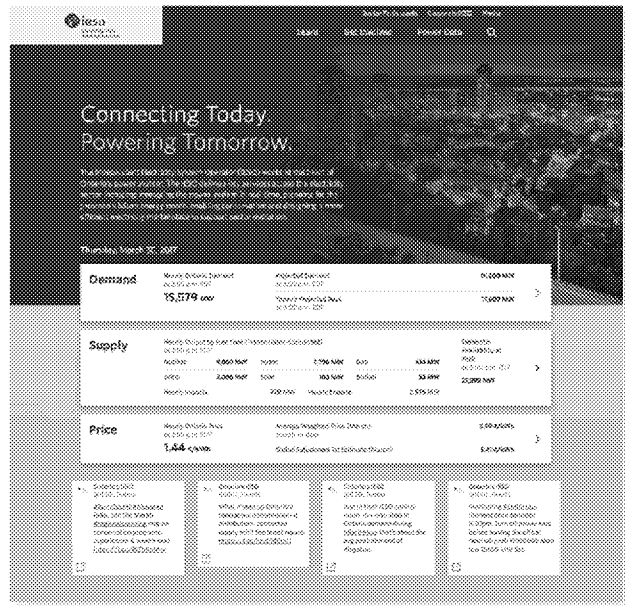
processes and assessments. Work has also continued to build capacity in the communities as they prepare for connection, and the IESO has supported discussions with the federal government on project funding.

The IESO has also established an energy working group with the Matawa communities, which include the remaining five remote communities that are economic to connect to the bulk electricity system. Additionally, in 2016 the IESO launched the Energy Partnerships Program, which will support both the connection of remote communities as well as the effort to reduce reliance on diesel in the four remote communities that are not currently economic to connect.

In 2017 and beyond, the IESO will continue to engage First Nation and Métis communities through one-on-one, face-to-face meetings, customized engagement plans, working groups, capacity-building initiatives, social media and participating at various Indigenous events. Customized engagement will ensure that communities have the opportunity to participate in relevant electricity matters, including regional planning, new marketplace mechanisms, procurements, funds and conservation initiatives. In addition, the IESO will work to ensure that programs are established with considered input from communities and that any identified barriers are removed.

## Expanding the Tools of Engagement

In 2017, the IESO is launching initiatives to engage Ontarians in some new and different ways.



### IESO's New Corporate Website

The IESO's recently launched new corporate website was designed to better reflect all parts of the IESO's expanding mandate. With more than one million interactions each year, the site will continue to provide timely, trusted and vital sector data to market participants, stakeholders, communities and members of the public.

It has also been designed to be more accessible, engaging and with a more intuitive navigation. By taking a more customer-centric approach to design and content development, the IESO's website will further enable customers to make well-informed energy decisions, explore new content areas and gain further insights into the workings of Ontario's electricity sector. The redesign of the IESO's website has been a collaborative project and has included input from external users as well as representatives from across all of the IESO's service groups to ensure it meets a wide range of needs.

### Energy Show at the Ontario Science Centre

The IESO and the Ontario Science Centre have embarked on a five-year partnership to help bring energy knowledge and understanding to all Ontarians. Under this agreement, the IESO is the lead supporter of the **Energy Show**, as well as a supporter of the Centre's two energy-related school programs. Building upon the Science Centre's iconic electricity demonstration, the Energy Show is a family-friendly 30-minute presentation that delves deeper into the principles and concepts of energy. Through interactive and animated investigation, experimentation and collaboration, guests of all ages learn about the different sources of renewable and non-renewable energy and are encouraged to think about the way they use energy in their daily lives.

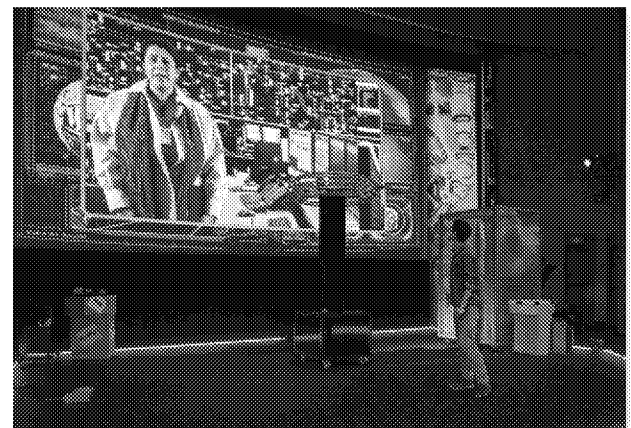
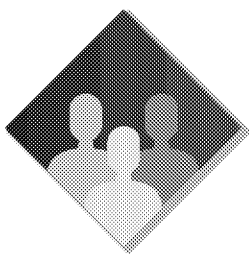


Photo: Ontario Science Centre



### Province-Wide Summit and Regional Forums

The IESO will host a Stakeholder Summit in Toronto and four Regional Forums in 2017 to be held across the province. These events will explore the future direction of the electricity sector, while also engaging communities in local issues that matter most to them. More information about these events, when it is available, can be found on [ieso.ca](http://ieso.ca) in the Engagement Initiatives section.



# Executive Leadership Team, Board of Directors and Advisory Committees to the Board

The IESO is a not-for-profit corporate entity established in the *Electricity Act, 1998*, and is led by an Executive Leadership Team responsible for implementing the strategic direction and initiatives for the organization.

The IESO is governed by an independent Board of Directors that oversees its business and affairs. The Stakeholder Advisory Committee is a forum for appointed stakeholder representatives to provide advice and recommendations to the IESO's Board of Directors and Leadership Team. The Technical Panel proposes and reviews amendments to the Market Rules, and, as requested, advises the Board of Directors on specific technical issues relating to the operation of the IESO-administered markets.

As of December 31, 2016

## Executive Leadership Team

**Bruce Campbell**  
President and  
Chief Executive Officer

**JoAnne Butler**  
Vice-President, Market and  
Resource Development

**Leonard Kula**  
Vice-President, Market and  
System Operations, and Chief  
Operating Officer

**Michael Lyle**  
Vice-President, Planning,  
Legal, Indigenous Relations  
and Regulatory Affairs

**Kimberly Marshall**  
Vice-President, Corporate  
Services, and Chief Financial  
Officer

**Doug Thomas**  
Vice-President, Information  
and Technology Services, and  
Chief Information Officer

**Terry Young**  
Vice-President, Conservation  
and Corporate Relations

## Board of Directors

**Tim O'Neill**  
Chairman of the Board  
*Retired from BMO Financial Group,  
where he served as Executive  
Vice-President and Chief  
Economist; President of O'Neill  
Strategic Economics*

**Bruce Campbell**  
President and Chief Executive  
Officer, Independent Electricity  
System Operator

**Cynthia Chaplin**

Director

*Former Vice-Chair of the Ontario Energy Board***Murray Elston**

Director

*Former Chair of the Electricity Distribution Panel; former President of the Canadian Nuclear Association; former Ontario Minister of Health***Susanna Han**

Director

*Chief Financial Officer, LiUNA Local 183***Ronald L. Jamieson**

Director and Chair, Audit Committee

*Retired from BMO Financial Group, where he was Senior Vice-President, Aboriginal Banking; Director, Nuclear Waste Management Organization and Denendeh Investments Inc.; Member, Order of Canada; Appointee, Order of Ontario***Margaret Kelch**

Director and Chair, Human Resources and Governance Committee

*Director of the Board, DST Engineering Group, Chair of the Human Resources and Governance Committee; Former Board member Nature Conservancy of Canada, Chair of the Conservation Committee; Former Board member Electrical Safety Authority, Chair of the Regulatory and Human Resources and Governance Committees; Former Board member Guelph Hydro; other various board assignments***Bruce Lourie**

Director

*President of Ivey Foundation; Director of Canadians for Clean Prosperity, Clean Economy Fund, Philanthropic Foundations Canada and Advisory Board of Ecofiscal Commission***William Museler**

Director

*Former President and Chief Executive Officer of the New York Independent System Operator***Deborah S. Whale**

Director

*Vice-President, Clovermead Farms Inc.; Past Vice-President, Ontario Farm Products Marketing Commission; Vice-President, Grand River Raceway; Livestock Research and Innovation Corporation, Emerging and Critical Issues Committee***Carole Workman**

Director

*Former Chair of the Ottawa Hospital Board of Directors; Board member of Allstate Insurance of Canada; former Director of Hydro Ottawa and several other organizations*

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**Stakeholder Advisory Committee****Brian Bentz (Chair)**

President and Chief Executive Officer, PowerStream

*Representing: Distributors & Transmitters***Steve Baker**

President, Union Gas Limited

*Representing: Related Businesses/ Services***John Beaucage**

Principal, Counsel Public Affairs Inc.

*Representing: Ontario Communities***Darlene Bradley**

Director, Technical Services, Hydro One Networks Inc.

*Representing: Distributors & Transmitters***Jack Burkom**

Senior Vice-President, Commercial Development, Brookfield Energy Marketing Inc.

*Representing: Related Businesses/ Services***David Butters**

President and Chief Executive Officer, Association of Power Producers of Ontario

*Representing: Generators***Jared Donald**President, Synergist Energy  
*Representing: Generators***Julie Girvan**Consumers Council of Canada  
*Representing: Consumers***Valerie Helbronner**

Partner, Torys LLP – Infrastructure and Energy Practice

*Representing: Generators***Geoff Lupton**

Director, Energy, Fleet &amp; Traffic, City of Hamilton

*Representing: Ontario Communities***Rob Mace**

President and Chief Executive Officer, Thunder Bay Hydro Electricity Distribution Inc.

*Representing: Distributors & Transmitters***Mark Passi**

Manager, Energy, Glencore

*Representing: Consumers***Mark Schembri**

Vice President, Supermarket Systems &amp; Store Maintenance, Loblaw Properties Limited

*Representing: Consumers***James Scongack**

Vice President, Corporate Affairs, Bruce Power

*Representing: Generators***Ersilia Serafini (Vice-Chair)**

President, Summerhill

*Representing: Ontario Communities***Paul Shervill**

Vice President, Strategic Initiatives, Rodan Energy

*Representing: Related Businesses/ Services***Todd Wilcox**

Chief Operating Officer, North Bay Hydro

*Representing: Distributors & Transmitters***Terry Young**

Vice-President, Conservation &amp; Corporate Relations, Independent Electricity System Operator

*Representing: IESO*

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**Technical Panel****Chuck Farmer (Chair)**

Director, Stakeholder &amp; Public Affairs, Independent Electricity System Operator

**Shelly Cunningham**

Senior Vice-President, Engineering Services, PowerStream Inc.

*Representing: Distributors***David Dent**Manager, Strategic and Power Markets, Union Gas Limited  
*Representing: Natural Gas***Barbara Ellard**Director, Markets, Independent Electricity System Operator  
*Representing: IESO***Paul Huebener**Managing Director, DIF Management  
*Representing: Financial Industry***Brian Kelly**

Manager, Indigenous Relations, Eastern Canada, TransCanada Energy Ltd.

*Representing: Generators***Robert Lake***Representing: Residential Consumers***Martin Longlade***Representing: Industrial Consumers***Luis Marti**

Director, Reliability Studies, Strategy and Compliance, Hydro One Networks

*Representing: Transmitters***Peter Rowles***Representing: Commercial Consumers***Bill Wilbur**

Director, Generation and Revenue Planning, Ontario Power Generation

*Representing: Generators***Julien Wu**

Manager, Regulatory Affairs, Quebec-Ontario, Brookfield Energy Marketing

*Representing: Wholesalers***Ontario Energy Board Liaison****David Brown**

Senior Policy Advisor, Wholesale Power Policy, Regulatory Policy Development, Ontario Energy Board

**Technical Panel Secretariat****Susan Harrison****John Rattray**

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2016 ANNUAL REPORT

# Financial Statements

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# Management Report

## Management's Responsibility for Financial Reporting

The accompanying financial statements of the Independent Electricity System Operator are the responsibility of management and have been prepared in accordance with Canadian public sector accounting standards. The significant accounting policies followed by the Independent Electricity System Operator are described in the Summary of Significant Accounting Policies contained in Note 2 in the financial statements. The preparation of financial statements necessarily involves the use of estimates based on management's judgement, particularly when transactions affecting the current accounting period cannot be finalized with certainty until future periods. The financial statements have been prepared within reasonable limits of materiality and in light of information available up to March 22, 2017.

Management maintained a system of internal controls designed to provide reasonable assurance that the assets were safeguarded and that reliable information was available on a timely basis. The system included formal policies and procedures and an organizational structure that provided for the appropriate delegation of authority and segregation of responsibilities.

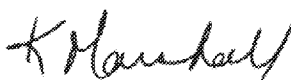
These financial statements have been examined by KPMG LLP, a firm of independent external auditors appointed by the Board of Directors. The external auditors' responsibility is to express their opinion on whether the financial statements are fairly presented in accordance with generally accepted accounting principles in Canada. The Auditors' Report, which follows, outlines the scope of their examination and their opinion.

INDEPENDENT ELECTRICITY SYSTEM OPERATOR

On behalf of management,



**Bruce Campbell**  
President and Chief Executive Officer  
Toronto, Canada  
March 22, 2017



**Kimberly Marshall**  
Vice President, Corporate Services  
and Chief Financial Officer  
Toronto, Canada  
March 22, 2017

# Independent Auditors' Report

## To the Board of Directors of the Independent Electricity System Operator (IESO)

We have audited the accompanying financial statements of IESO, which comprise the statement of financial position as at December 31, 2016, the statements of operations and accumulated deficit, remeasurement gains and losses, change in net debt and cash flows for the year then ended, and notes, comprising a summary of significant accounting policies and other explanatory information.

## Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian public sector accounting standards, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

## Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on our judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

## Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of IESO as at December 31, 2016, and its results of operations and the changes in its net debt and its cash flows for the year then ended in accordance with Canadian public sector accounting standards.



**Chartered Professional Accountants, Licensed Public Accountants**

March 22, 2017  
Waterloo, Canada

# Statement of Financial Position

As at (in thousands of Canadian dollars)

December 31, 2016

December 31, 2015

|                                                                            |                  | (restated Note 3) |
|----------------------------------------------------------------------------|------------------|-------------------|
|                                                                            | \$               | \$                |
| <b>FINANCIAL ASSETS</b>                                                    |                  |                   |
| Cash and cash equivalents                                                  | 33,005           | 14,715            |
| Accounts receivable                                                        | 31,103           | 33,199            |
| Regulated assets (Note 3)                                                  | 65,064           | 88,202            |
| Long-term investments (Note 4)                                             | 40,355           | 37,318            |
| Market accounts – assets (Note 3)                                          | 1,636,201        | 1,443,121         |
| <b>TOTAL FINANCIAL ASSETS</b>                                              | <b>1,805,728</b> | <b>1,616,555</b>  |
| <b>LIABILITIES</b>                                                         |                  |                   |
| Accounts payable and accrued liabilities (Note 5)                          | 38,963           | 48,868            |
| Accrued interest on debt                                                   | 315              | 315               |
| Rebates due to market participants (Note 6)                                | 12,551           | 9,595             |
| Debt (Note 7)                                                              | 90,000           | 90,000            |
| Accrued pension liability (Note 8)                                         | 34,620           | 36,062            |
| Accrued liability for employee future benefits other than pension (Note 8) | 90,251           | 84,501            |
| Market accounts – liabilities (Note 3)                                     | 1,636,201        | 1,443,121         |
| <b>TOTAL LIABILITIES</b>                                                   | <b>1,902,901</b> | <b>1,712,462</b>  |
| <b>NET DEBT</b>                                                            | <b>(97,173)</b>  | <b>(95,907)</b>   |
| <b>NON-FINANCIAL ASSETS</b>                                                |                  |                   |
| Net tangible capital assets (Note 9)                                       | 105,047          | 103,716           |
| Prepaid expenses                                                           | 6,614            | 6,197             |
| <b>TOTAL NON-FINANCIAL ASSETS</b>                                          | <b>111,661</b>   | <b>109,913</b>    |
| <b>ACCUMULATED SURPLUS</b>                                                 |                  |                   |
| Accumulated surplus from operations (Note 6)                               | 6,582            | 6,348             |
| Accumulated remeasurement gains                                            | 7,906            | 7,658             |
| <b>ACCUMULATED SURPLUS</b>                                                 | <b>14,488</b>    | <b>14,006</b>     |

On behalf of the Board:



**Tim O'Neill**  
Chair  
Toronto, Canada



**Carole Workman**  
Director  
Toronto, Canada

# Statement of Operations and Accumulated Surplus

| For the year ended December 31 (in thousands of Canadian dollars)            | 2016             | 2016             | 2015                        |
|------------------------------------------------------------------------------|------------------|------------------|-----------------------------|
|                                                                              | Budget           | Actual           | Actual<br>(restated Note 3) |
|                                                                              | \$               | \$               | \$                          |
| <b>IESO CORE OPERATIONS</b>                                                  |                  |                  |                             |
| System fees                                                                  | 177,219          | 185,531          | 186,187                     |
| Other revenue (Note 10)                                                      | 1,000            | 2,531            | 5,377                       |
| Interest and investment income                                               | -                | 2,157            | 1,430                       |
| <b>Core operation revenues</b>                                               | <b>178,219</b>   | <b>190,219</b>   | <b>192,994</b>              |
| Compensation and benefits                                                    | (106,361)        | (105,570)        | (104,994)                   |
| Professional and consulting                                                  | (20,118)         | (16,844)         | (21,461)                    |
| Operating and administration                                                 | (33,502)         | (34,336)         | (35,005)                    |
| <b>Core operating expenses</b>                                               | <b>(159,981)</b> | <b>(156,750)</b> | <b>(161,460)</b>            |
| Amortization                                                                 | (17,500)         | (19,577)         | (17,933)                    |
| Interest                                                                     | (738)            | (1,341)          | (1,610)                     |
| <b>Core expenses</b>                                                         | <b>(178,219)</b> | <b>(177,668)</b> | <b>(181,003)</b>            |
| <b>Core operations annual surplus before rebates</b>                         | <b>-</b>         | <b>12,551</b>    | <b>11,991</b>               |
| Rebates due to market participants                                           | -                | (12,551)         | (9,595)                     |
| <b>Core operations annual surplus</b>                                        | <b>-</b>         | <b>-</b>         | <b>2,396</b>                |
| <b>MARKET SANCTIONS AND PAYMENT ADJUSTMENTS</b>                              |                  |                  |                             |
| <b>Market sanctions and payment adjustments</b>                              | <b>4,341</b>     | <b>3,889</b>     | <b>6,021</b>                |
| Compensation and benefits                                                    | (2,981)          | (2,180)          | (3,094)                     |
| Professional and consulting                                                  | (1,515)          | (770)            | (1,351)                     |
| Operating and administration                                                 | (150)            | (705)            | (114)                       |
| <b>Customer education and market enforcement expenses</b>                    | <b>(4,646)</b>   | <b>(3,655)</b>   | <b>(4,559)</b>              |
| <b>Market sanctions and payment adjustments<br/>annual surplus/(deficit)</b> | <b>(305)</b>     | <b>234</b>       | <b>1,462</b>                |
| <b>SMART METERING ENTITY</b>                                                 |                  |                  |                             |
| <b>Smart metering charge</b>                                                 | <b>32,244</b>    | <b>27,426</b>    | <b>26,185</b>               |
| Compensation and benefits                                                    | (3,567)          | (2,661)          | (2,607)                     |
| Professional and consulting                                                  | (18,763)         | (14,659)         | (14,902)                    |
| Operating and administration                                                 | (2,364)          | (5,705)          | (4,200)                     |
| <b>Smart metering operating expenses</b>                                     | <b>(24,694)</b>  | <b>(23,025)</b>  | <b>(21,709)</b>             |
| Amortization                                                                 | (4,491)          | (3,861)          | (3,524)                     |
| Interest                                                                     | (3,059)          | (540)            | (952)                       |
| <b>Smart metering expenses</b>                                               | <b>(32,244)</b>  | <b>(27,426)</b>  | <b>(26,185)</b>             |
| <b>Smart metering entity annual surplus</b>                                  | <b>-</b>         | <b>-</b>         | <b>-</b>                    |
| <b>ANNUAL SURPLUS/(DEFICIT)</b>                                              | <b>(305)</b>     | <b>234</b>       | <b>3,858</b>                |
| <b>ACCUMULATED SURPLUS FROM OPERATIONS,<br/>BEGINNING OF PERIOD</b>          | <b>6,348</b>     | <b>6,348</b>     | <b>2,490</b>                |
| <b>ACCUMULATED SURPLUS FROM OPERATIONS,<br/>END OF PERIOD</b>                | <b>6,043</b>     | <b>6,582</b>     | <b>6,348</b>                |

# Statement of Remeasurement Gains and Losses

| For the year ended December 31 (in thousands of Canadian dollars) | 2016         | 2015                        |
|-------------------------------------------------------------------|--------------|-----------------------------|
|                                                                   | Actual       | Actual<br>(restated Note 3) |
|                                                                   | \$           | \$                          |
| <b>ACCUMULATED REMEASUREMENT GAINS, BEGINNING OF PERIOD</b>       | <b>7,658</b> | <b>6,362</b>                |
| <b>UNREALIZED GAINS ATTRIBUTABLE TO:</b>                          |              |                             |
| Foreign exchange – other                                          | 477          | 515                         |
| Portfolio investments (Note 4)                                    | 286          | 1,372                       |
| <b>AMOUNTS RECLASSIFIED TO THE STATEMENT OF OPERATIONS:</b>       |              |                             |
| Foreign exchange – other                                          | (515)        | (591)                       |
| <b>NET REMEASUREMENT GAINS FOR THE PERIOD</b>                     | <b>248</b>   | <b>1,296</b>                |
| <b>ACCUMULATED REMEASUREMENT GAINS, END OF PERIOD</b>             | <b>7,906</b> | <b>7,658</b>                |

# Statement of Change in Net Debt

| For the year ended December 31 (in thousands of Canadian dollars) | 2016             | 2016            | 2015                        |
|-------------------------------------------------------------------|------------------|-----------------|-----------------------------|
|                                                                   | Budget           | Actual          | Actual<br>(restated Note 3) |
|                                                                   | \$               | \$              | \$                          |
| <b>ANNUAL SURPLUS/(DEFICIT)</b>                                   | <b>(305)</b>     | <b>234</b>      | <b>3,858</b>                |
| <b>CHANGE IN NON-FINANCIAL ASSETS</b>                             |                  |                 |                             |
| Acquisition of tangible capital assets                            | (30,706)         | (24,769)        | (25,624)                    |
| Amortization of tangible capital assets                           | 21,991           | 23,438          | 21,457                      |
| Change in prepaid expenses                                        | -                | (417)           | (27)                        |
| <b>TOTAL CHANGE IN NON-FINANCIAL ASSETS</b>                       | <b>(8,715)</b>   | <b>(1,748)</b>  | <b>(4,194)</b>              |
| <b>NET REMEASUREMENT GAINS FOR THE PERIOD</b>                     | <b>-</b>         | <b>248</b>      | <b>1,296</b>                |
| <b>CHANGE IN NET DEBT</b>                                         | <b>(9,020)</b>   | <b>(1,266)</b>  | <b>960</b>                  |
| <b>NET DEBT, BEGINNING OF PERIOD</b>                              | <b>(95,907)</b>  | <b>(95,907)</b> | <b>(96,867)</b>             |
| <b>NET DEBT, END OF PERIOD</b>                                    | <b>(104,927)</b> | <b>(97,173)</b> | <b>(95,907)</b>             |

# Statement of Cash Flows

For the year ended December 31 (in thousands of Canadian dollars)

|                                                         | 2016            | 2015              |
|---------------------------------------------------------|-----------------|-------------------|
|                                                         |                 | (restated Note 3) |
|                                                         | \$              | \$                |
| <b>OPERATING TRANSACTIONS</b>                           |                 |                   |
| Change in accumulated surplus:                          |                 |                   |
| Annual surplus                                          | 234             | 3,858             |
|                                                         | 234             | 3,858             |
| Changes in non-cash items:                              |                 |                   |
| Amortization                                            | 23,438          | 21,457            |
| Pension expense                                         | 11,610          | 11,970            |
| Other employee future benefits expense                  | 8,127           | 6,901             |
|                                                         | 43,175          | 40,328            |
| Changes in non-cash balances related to operations:     |                 |                   |
| Change in accounts payable and accrued liabilities      | (7,495)         | (775)             |
| Change in accounts receivable                           | 2,096           | (10,145)          |
| Change in rebates due to market participants            | 2,956           | 9,595             |
| Change in regulated assets                              | 23,138          | 23,942            |
| Change in prepaid expenses                              | (417)           | (27)              |
|                                                         | 20,278          | 22,590            |
| Other:                                                  |                 |                   |
| Contribution to pension fund                            | (13,052)        | (12,851)          |
| Payment of employee future benefits                     | (2,377)         | (2,314)           |
|                                                         | (15,429)        | (15,165)          |
| <b>Cash provided by operating transactions</b>          | <b>48,258</b>   | <b>51,611</b>     |
| <b>CAPITAL TRANSACTIONS</b>                             |                 |                   |
| Acquisition of tangible capital assets                  | (24,769)        | (25,624)          |
| Change in accounts payable and accrued liabilities      | (2,410)         | (1,569)           |
| <b>Cash applied to capital transactions</b>             | <b>(27,179)</b> | <b>(27,193)</b>   |
| <b>INVESTING TRANSACTIONS</b>                           |                 |                   |
| Purchase of long-term investments                       | (2,751)         | (1,967)           |
| <b>Cash applied to investing transactions</b>           | <b>(2,751)</b>  | <b>(1,967)</b>    |
| <b>FINANCING TRANSACTIONS</b>                           |                 |                   |
| Debt repayment                                          | –               | (39,000)          |
| <b>Cash applied to financing transactions</b>           | <b>–</b>        | <b>(39,000)</b>   |
| <b>INCREASE/(DECREASE) IN CASH AND CASH EQUIVALENTS</b> | <b>18,328</b>   | <b>(16,549)</b>   |
| <b>CASH AND CASH EQUIVALENTS – BEGINNING OF PERIOD</b>  | <b>14,715</b>   | <b>31,340</b>     |
| Unrealized foreign exchange losses for the period       | (38)            | (76)              |
| <b>CASH AND CASH EQUIVALENTS – END OF PERIOD</b>        | <b>33,005</b>   | <b>14,715</b>     |

# Notes to Financial Statements

## 1. NATURE OF OPERATIONS

a) The Independent Electricity System Operator (IESO) is a not-for-profit, non-taxable, corporation established pursuant to Part II of the *Electricity Act, 1998*. The predecessor Independent Electricity System Operator and the Ontario Power Authority (OPA) were amalgamated by statute effective on January 1, 2015, and continued as the Independent Electricity System Operator. As set out in the *Electricity Act, 1998*, the IESO operates pursuant to a licence granted by the Ontario Energy Board (OEB). The amalgamation was effected pursuant to Bill 14, *Building Opportunity and Securing Our Future Act (Budget Measures), 2014*, which received Royal Assent on July 24, 2014. Schedule 7 of the Bill amended the *Electricity Act, 1998*, by amalgamating the two predecessor corporations and by continuing them as the Independent Electricity System Operator. The transitional provision, dealing with corporate matters, provides, among other things, that the predecessor IESO and OPA cease to exist as entities separate from the amalgamated IESO and all their rights, properties and assets become the rights, properties and assets of the amalgamated IESO, as do all outstanding debts, liabilities and obligations of the predecessor IESO and OPA. Schedule 7 of Bill 14 came into force on January 1, 2015. The objects of the IESO as contained in the *Electricity Act, 1998*, and Ontario Regulation 288/14 are as follows:

- to exercise the powers and perform the duties assigned to it under this Act, the regulations, directions, the market rules and its licence;
- to enter into agreements with transmitters to give it authority to direct the operation of their transmission systems;
- to direct the operation and maintain the reliability of the IESO-controlled grid to promote the purposes of this Act;
- to participate in the development by any standards authority of criteria and standards relating to the reliability of the integrated power system;
- to establish and enforce criteria and standards relating to the reliability of the integrated power system;
- to work with the responsible authorities outside of Ontario to co-ordinate the IESO's activities with the activities of those authorities;
- to operate the IESO-administered markets to promote the purposes of this Act;
- to engage in activities related to contracting for the procurement of electricity supply, electricity capacity and conservation resources;
- to engage in activities related to settlements, payments under a contract entered into under the authority of this Act and payments provided for under this Act or the *Ontario Energy Board Act, 1998*;
- to engage in activities in support of the goal of ensuring adequate, reliable and secure electricity supply and resources in Ontario;
- to forecast electricity demand and the adequacy and reliability of electricity resources for Ontario for the short term, medium term and long term;
- to conduct independent planning for electricity generation, demand management, conservation and transmission;
- to engage in activities to facilitate the diversification of sources of electricity supply by promoting the use of cleaner energy sources and technologies, including alternative energy sources and renewable energy sources;
- to engage in activities in support of system-wide goals for the amount of electricity to be produced from different energy sources;
- to engage in activities that facilitate load management;
- to engage in activities that promote electricity conservation and the efficient use of electricity;
- to assist the Board by facilitating stability in rates for certain types of consumers;
- to collect and make public information relating to the short-term, medium-term and long-term electricity needs of Ontario and the adequacy and reliability of the integrated power system to meet those needs; and
- to engage in such other objects as may be prescribed by the regulations.

**b)** The IESO was designated the Smart Metering Entity (SME) by Ontario Regulation 393/07 under the *Electricity Act, 1998*, on March 28, 2007. The regulation came into effect on July 26, 2007.

The objects of the Smart Metering Entity, as contained in the *Electricity Act, 1998*, are as follows:

- to plan and implement and, on an ongoing basis, oversee, administer and deliver any part of the smart metering initiative as required by regulation under this or any Act or directive made pursuant to sections 28.3 or 28.4 of the *Ontario Energy Board Act, 1998*, and, if so authorized, to have the exclusive authority to conduct these activities;
- to collect and manage and to facilitate the collection and management of information and data and to store the information and data related to the metering of consumers' consumption or use of electricity in Ontario, including data collected from distributors and, if so authorized, to have the exclusive authority to collect, manage and store the data;
- to establish, to own or lease and to operate one or more databases to facilitate collecting, managing, storing and retrieving smart metering data;
- to provide and promote non-discriminatory access, on appropriate terms and subject to any conditions in its licence relating to the protection of privacy, by distributors, retailers and other persons,
  - i. to the information and data referred to above, and
  - ii. to the telecommunication system that permits the Smart Metering Entity to transfer data about the consumption or use of electricity to and from its databases, including access to its telecommunication equipment, systems and technology and associated equipment, systems and technologies;
- to own or to lease and to operate equipment, systems and technology, including telecommunication equipment, systems and technology that permit the Smart Metering Entity to transfer data about the consumption or use of electricity to and from its databases, including owning, leasing or operating such equipment, systems and technology and associated equipment, systems and technologies, directly or indirectly, including through one or more subsidiaries, if the Smart Metering Entity is a corporation;
- to engage in such competitive procurement activities as are necessary to fulfill its objects or business activities;
- to procure, as and when necessary, meters, metering equipment, systems and technology and any associated equipment, systems and technologies on behalf of distributors, as an agent or otherwise, directly or indirectly, including through one or more subsidiaries, if the Smart Metering Entity is a corporation;
- to recover, through just and reasonable rates, the costs and an appropriate return approved by the Ontario Energy Board associated with the conduct of its activities; and
- to undertake any other objects that are prescribed by associated regulation.

**c)** The IESO is required to submit its proposed expenditures, revenue requirements and fees for the coming year to the OEB for review and approval. The submission may be made only with the approval or deemed approval of the IESO business plan by the Minister of Energy (Minister).

## 2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

### a) Basis of financial statement preparation

The accompanying financial statements have been prepared on a going concern basis and in accordance with Canadian public sector accounting standards (PSAB) and reflect the following significant accounting policies.

### b) Revenue recognition

System fees earned by the IESO are based on approved rates for each megawatt of electricity withdrawn from the IESO-controlled grid (including scheduled exports) and embedded generation. System fees are recognized as revenue at the time the electricity is withdrawn. Rebates are recognized in the year in which the regulatory deferral account, before such rebates, exceeds regulated limits.

For 2015, the system fee for the then newly amalgamated IESO was comprised of the combined rate calculations of the respective pre-amalgamation entities. Specifically, the former IESO rate base was calculated on electricity withdrawn from the IESO-controlled grid (including scheduled exports and embedded generation), whereas the former OPA rate base only considered Ontario electricity consumers. The OEB approved the continued use of this combined rate calculation for 2016 in an interim order issued on December 22, 2015.

These financial statements do not include the revenue and expenses of the financial transactions of market participants within the IESO-administered markets (IAM).

Other revenue represents amounts that accrue to the IESO relating to investment income on funds passing through market settlement accounts, as well as application fees. Such revenue is recognized as it is earned.

Interest and investment income represents realized interest income and investment gains or losses on cash, cash equivalents, short-term investments and long-term investments.

Market sanctions represent funds received to offset payments disbursed related to penalties, damages, fines and payment adjustments arising from resolved settlement disputes.

### c) Financial instruments

The IESO records cash and cash equivalents, investment portfolio and foreign currency exchange forward contracts at fair value. The cumulative change in fair value of these financial instruments is recorded in accumulated surplus as remeasurement gains and losses and is included in the value of the respective financial instrument shown in the statement of financial position and the statement of remeasurement gains and losses. Upon disposition of the financial instruments, the cumulative remeasurement gains and losses are reclassified to the statement of operations and all other gains and losses associated with the disposition of the financial instrument are recorded in the statement of operations. Transaction costs are charged to operations as incurred.

Cash and cash equivalents comprise cash, term deposits and other short-term, highly rated investments with original maturity dates of less than 90 days.

The IESO records accounts receivable, accounts payable and debt at amortized cost.

### d) Regulated assets and liabilities

As a rate-regulated entity, the IESO, in appropriate circumstances establishes regulated assets or liabilities and thereby defers the impact on the statement of operations of certain expenses or revenues because they are probable to be collected or refunded to market participants through future billings. The IESO has applied guidance from United States Generally Accepted Accounting Principles (US GAAP) Topic 980, *Regulated Operations*, in this policy.

#### e) Market accounts – assets and liabilities

The IESO records the market accounts assets, liabilities and amounts due to and from market participants held on behalf of the IESO-administered markets in its statements of financial position. The IESO-administered markets is a balancing system, and as such, the net position of market accounts will settle to a \$nil balance in accordance with market rules.

#### f) Tangible capital assets

Tangible capital assets are recorded at cost, which includes all amounts directly attributable to the acquisition, construction, development or betterment of the asset. The IESO capitalizes applicable interest as part of the cost of tangible capital assets.

#### g) Assets under construction

Assets under construction generally relates to the costs of physical facilities, hardware and software, and includes costs paid to vendors, internal and external labour, consultants and interest related to funds borrowed to finance the project. Costs relating to assets under construction are transferred to tangible capital assets when the asset under construction is deemed to be ready for use.

#### h) Amortization

The capital cost of tangible capital assets in service is amortized on a straight-line basis over their estimated service lives.

The estimated service lives in years, from the date the assets were acquired, are:

| Class                            | Estimated Average Service Life 2016 | Estimated Average Service Life 2015 |
|----------------------------------|-------------------------------------|-------------------------------------|
| Facilities                       | 37                                  | 37                                  |
| Market systems and applications  | 4 to 12                             | 4 to 12                             |
| Infrastructure and other assets  | 4 to 10                             | 4 to 7                              |
| Meter data management/repository | 10                                  | 10                                  |

Gains and losses on sales or premature retirements of tangible capital assets are charged to operations.

The estimated service lives of tangible capital assets are subject to periodic review. The effects of changes in the estimated lives are amortized on a prospective basis. The most recent review was completed in fiscal 2016.

#### i) Pension, other post-employment benefits and compensated absences

The IESO's post-employment benefit programs include pension, group life insurance, health care, long-term disability and workers' compensation benefits.

The IESO accrues obligations under pension and other post-employment benefit (OPEB) plans and the related costs, net of plan assets. Pension and OPEB expenses and obligations are determined annually by independent actuaries using the projected benefit method and management's best estimate of expected return on plan assets, salary escalation, retirement ages of employees, mortality and expected health-care costs. The discount rate used to value liabilities is based on the expected rate of return on plan assets as at the measurement date of September 30.

The expected return on plan assets is based on management's long-term best estimate using a market-related value of plan assets. The market-related value of plan assets is determined using the average value of assets over three years as at the measurement date of September 30.

Pension and OPEB expenses are recorded during the year in which employees render services. Pension and OPEB expenses consist of current service costs, interest expense on liabilities, expected return on plan assets and the cost of plan amendments in the period. Actuarial gains/(losses) arise from, among other things, the difference between the actual rate of return on plan assets for a period and the expected long-term rate of return on plan assets for that period or from changes in actuarial assumptions used to determine the accrued benefit obligations. Actuarial gains/(losses) are amortized over the expected average remaining service life of the employees covered by the plan.

The expected average remaining service life of employees covered by the pension plans is 15 years (2015 – 15 years) and OPEB plan is 16.2 years (2015 – 14.7 years).

The IESO sick pay benefits accumulate but do not vest. The IESO accrues sick pay benefits based on the expectation of future utilization and records the accrual within accounts payable and accrued liabilities.

#### **j) Foreign currency exchange**

Transactions denominated in foreign currencies are translated into Canadian dollars at the rate of exchange prevailing on the date of the transaction. Items on the statement of financial position denominated in foreign currency are translated to Canadian dollars at the rate of exchange as of the financial statements date. The cumulative unrealized foreign currency exchange gains and losses of items continuing to be recognized on the statement of financial position are recorded in accumulated deficit as remeasurement gains and losses and shown in the statement of financial position and the statement of remeasurement gains and losses. Upon settlement of the item denominated in a foreign currency, the cumulative remeasurement gains and losses are reclassified to the statement of operations, and all other gains and losses associated with the disposition of the financial instrument are recorded in the statement of operations.

#### **k) Use of estimates**

The preparation of the financial statements in conformity with Canadian public sector accounting standards requires management to make estimates and assumptions that affect the reported amounts of revenues, expenses, assets and liabilities and the disclosure of contingent assets and liabilities as at the date of the financial statements. The IESO's accounts that involve a greater degree of uncertainty include the carrying values of tangible capital assets, accrued pension liability and accrual for employee future benefits other than pensions. Actual results could differ from those estimates.

### 3. NEW ACCOUNTING POLICIES

As of January 1, 2016, the IESO changed its accounting policy regarding the recognition of assets and liabilities subject to rate regulation. The change was made to better reflect the economic substance of certain types of expenses that may not be directly recovered through the normal revenue requirement model. This change has been applied retroactively and has increased amounts previously unrecorded for regulatory assets and decreased amounts previously reported for accumulated deficit.

The IESO recognizes two regulated assets: 1) unrecovered smart metering expenses and 2) unrecovered PSAB transition items.

The smart metering expenses result from the IESO's role as the Smart Metering Entity. As such, the IESO funds its SME operating costs and capital investment in the meter data management/repository (MDM/R) through fees from users of smart meters in Ontario. The OEB approves the Smart Metering Entity charge and the charge is intended to cover the costs of developing and operating the MDM/R.

The unrecovered PSAB transition items result from the IESO's adoption of Canadian public sector accounting standards effective January 1, 2011. The adoption of PSAB was accounted for by retroactive application with restatement of prior periods subject to the requirements in Section PS 2125, *First-time Adoption by Government Organizations*. The corresponding change to pension and other post-employment benefits resulted in previously unrecognized actuarial losses and past service costs of \$80,617 thousand at the date of transition.

#### Regulated assets consist of the following:

| As of December 31 (in thousands of Canadian dollars) | 2016          | 2015          |
|------------------------------------------------------|---------------|---------------|
|                                                      | \$            | \$            |
| Unrecovered smart metering expenses                  | 21,623        | 40,849        |
| Unrecovered PSAB transition items                    | 43,441        | 47,353        |
| <b>Closing balance</b>                               | <b>65,064</b> | <b>88,202</b> |

In addition, as of January 1, 2016, the IESO changed its accounting policy regarding the recognition of market accounts assets and liabilities on the statement of financial position. The change was made to better reflect the assets and liabilities and amounts due to and from market participants held by the IESO on behalf of the IAM at year end. This change has been applied retroactively and has increased amounts previously unrecorded for market accounts assets and liabilities. There is no impact to the accumulated deficit or revenues and expenses as the IESO is not party to these transactions as per the market rules.

#### Components of the market accounts are as follows:

| As of December 31 (in thousands of Canadian dollars) | 2016        | 2015        |
|------------------------------------------------------|-------------|-------------|
|                                                      | \$          | \$          |
| Cash, restricted for market activities               | 244,755     | 271,574     |
| Amounts due from market participants                 | 1,391,260   | 1,171,389   |
| Interest receivable                                  | 186         | 158         |
| Revolving line of credit                             | (150,501)   | (12,739)    |
| HST receivable                                       | 25,531      | 20,247      |
| Amounts due to market participants                   | (1,392,643) | (1,380,086) |
| Other liabilities                                    | (118,588)   | (70,543)    |
| <b>Closing balance</b>                               | <b>-</b>    | <b>-</b>    |

## Comparative figures

A detailed reconciliation of the IESO's restated statement of financial position as at December 31, 2015, as follows:

| As of (in thousands of Canadian dollars)                          | December 31, 2015   | December 31, 2015 | December 31, 2015   |
|-------------------------------------------------------------------|---------------------|-------------------|---------------------|
|                                                                   | (as reported)<br>\$ | adjustments<br>\$ | (as restated)<br>\$ |
| <b>FINANCIAL ASSETS</b>                                           |                     |                   |                     |
| Cash and cash equivalents                                         | 14,715              | -                 | 14,715              |
| Accounts receivable                                               | 33,199              | -                 | 33,199              |
| Long-term investments                                             | 37,318              | -                 | 37,318              |
| Regulated assets                                                  | -                   | 88,202            | 88,202              |
| Market accounts – assets                                          | -                   | 1,443,121         | 1,443,121           |
| <b>TOTAL FINANCIAL ASSETS</b>                                     | <b>85,232</b>       | <b>1,531,323</b>  | <b>1,616,555</b>    |
| <b>LIABILITIES</b>                                                |                     |                   |                     |
| Accounts payable and accrued liabilities                          | 48,868              | -                 | 48,868              |
| Accrued interest on debt                                          | 315                 | -                 | 315                 |
| Rebates due to market participants                                | 9,595               | -                 | 9,595               |
| Debt                                                              | 90,000              | -                 | 90,000              |
| Accrued pension liability                                         | 36,062              | -                 | 36,062              |
| Accrued liability for employee future benefits other than pension | 84,501              | -                 | 84,501              |
| Market accounts – liabilities                                     | -                   | 1,443,121         | 1,443,121           |
| <b>TOTAL LIABILITIES</b>                                          | <b>269,341</b>      | <b>1,443,121</b>  | <b>1,712,462</b>    |
| <b>NET DEBT</b>                                                   | <b>(184,109)</b>    | <b>88,202</b>     | <b>(95,907)</b>     |
| <b>NON-FINANCIAL ASSETS</b>                                       |                     |                   |                     |
| Net tangible capital assets                                       | 103,716             | -                 | 103,716             |
| Prepaid expenses                                                  | 6,197               | -                 | 6,197               |
| <b>TOTAL NON-FINANCIAL ASSETS</b>                                 | <b>109,913</b>      | <b>-</b>          | <b>109,913</b>      |
| <b>ACCUMULATED SURPLUS/(DEFICIT)</b>                              |                     |                   |                     |
| Accumulated surplus/(deficit) from operations                     | (81,854)            | 88,202            | 6,348               |
| Accumulated remeasurement gains                                   | 7,658               | -                 | 7,658               |
| <b>ACCUMULATED SURPLUS/(DEFICIT)</b>                              | <b>(74,196)</b>     | <b>88,202</b>     | <b>14,006</b>       |

A detailed reconciliation of the IESO's restated statement of operations for the year ended December 31, 2015, is as follows:

| For the year ended (in thousands of Canadian dollars)                     | December 31, 2015 | December 31, 2015 | December 31, 2015 |
|---------------------------------------------------------------------------|-------------------|-------------------|-------------------|
|                                                                           | (as reported)     | adjustments       | (as restated)     |
|                                                                           | \$                | \$                | \$                |
| <b>IESO CORE OPERATIONS</b>                                               |                   |                   |                   |
| System fees                                                               | 190,099           | (3,912)           | 186,187           |
| Other revenue                                                             | 5,377             | -                 | 5,377             |
| Interest and investment income                                            | 1,430             | -                 | 1,430             |
| <b>Core operations revenues</b>                                           | <b>196,906</b>    | <b>(3,912)</b>    | <b>192,994</b>    |
| Compensation and benefits                                                 | (104,994)         | -                 | (104,994)         |
| Professional and consulting                                               | (21,461)          | -                 | (21,461)          |
| Operating and administration                                              | (35,005)          | -                 | (35,005)          |
| <b>Core operating expenses</b>                                            | <b>(161,460)</b>  | <b>-</b>          | <b>(161,460)</b>  |
| Amortization                                                              | (17,933)          | -                 | (17,933)          |
| Interest                                                                  | (1,610)           | -                 | (1,610)           |
| <b>Core expenses</b>                                                      | <b>(181,003)</b>  | <b>-</b>          | <b>(181,003)</b>  |
| <b>Core operations annual surplus before rebates</b>                      | <b>15,903</b>     | <b>(3,912)</b>    | <b>11,991</b>     |
| Rebates due to market participants                                        | (9,595)           | -                 | (9,595)           |
| <b>Core operations annual surplus</b>                                     | <b>6,308</b>      | <b>(3,912)</b>    | <b>2,396</b>      |
| <b>MARKET SANCTIONS AND PAYMENT ADJUSTMENTS</b>                           |                   |                   |                   |
| <b>Market sanctions and payment adjustment</b>                            | <b>6,021</b>      | <b>-</b>          | <b>6,021</b>      |
| Compensation and benefits                                                 | (3,094)           | -                 | (3,094)           |
| Professional and consulting                                               | (1,351)           | -                 | (1,351)           |
| Operating and administrative                                              | (114)             | -                 | (114)             |
| <b>Customer education and market enforcement expenses</b>                 | <b>(4,559)</b>    | <b>-</b>          | <b>(4,559)</b>    |
| <b>Market sanctions and payment adjustments annual surplus</b>            | <b>1,462</b>      | <b>-</b>          | <b>1,462</b>      |
| <b>SMART METERING ENTITY</b>                                              |                   |                   |                   |
| <b>Smart metering charge</b>                                              | <b>46,215</b>     | <b>(20,030)</b>   | <b>26,185</b>     |
| Compensation and benefits                                                 | (2,607)           | -                 | (2,607)           |
| Professional and consulting                                               | (14,902)          | -                 | (14,902)          |
| Operating and administration                                              | (4,200)           | -                 | (4,200)           |
| <b>Smart metering operating expenses</b>                                  | <b>(21,709)</b>   | <b>-</b>          | <b>(21,709)</b>   |
| Amortization                                                              | (3,524)           | -                 | (3,524)           |
| Interest                                                                  | (952)             | -                 | (952)             |
| <b>Smart metering expenses</b>                                            | <b>(26,185)</b>   | <b>-</b>          | <b>(26,185)</b>   |
| <b>Smart metering entity annual surplus</b>                               | <b>20,030</b>     | <b>(20,030)</b>   | <b>-</b>          |
| <b>ANNUAL SURPLUS</b>                                                     | <b>27,800</b>     | <b>(23,942)</b>   | <b>3,858</b>      |
| <b>ACCUMULATED SURPLUS/(DEFICIT) FROM OPERATIONS, BEGINNING OF PERIOD</b> | <b>(109,654)</b>  | <b>112,144</b>    | <b>2,490</b>      |
| <b>ACCUMULATED SURPLUS/(DEFICIT) FROM OPERATIONS, END OF PERIOD</b>       | <b>(81,854)</b>   | <b>88,202</b>     | <b>6,348</b>      |

## 4. LONG-TERM INVESTMENTS

Long-term investments in a balanced portfolio of pooled funds are valued by the pooled funds manager based on published price quotations and amount to \$39,972 thousand (2015 – \$37,019 thousand). As at December 31, the market value allocation of these long-term investments was 62.3% equity securities and 37.7% debt securities (2015 – 56.0% and 44.0% respectively).

### Balanced portfolio of pooled funds

| As at December 31 (in thousands of Canadian dollars) | 2016          | 2015          |
|------------------------------------------------------|---------------|---------------|
|                                                      | \$            | \$            |
| Opening balance                                      | 37,019        | 33,758        |
| Net purchase of investments                          | 2,667         | 1,889         |
| Change in fair value                                 | 286           | 1,372         |
| <b>Closing balance</b>                               | <b>39,972</b> | <b>37,019</b> |

In addition to the balanced portfolio of pooled funds, the IESO has a long-term deposit with Canada Revenue Agency in the amount of \$383 thousand (2015 – \$299 thousand) pertaining to the Retirement Compensation Arrangements Trust (Note 7).

## 5. ACCOUNTS PAYABLE AND ACCRUED LIABILITIES

| As at December 31 (in thousands of Canadian dollars) | 2016          | 2015          |
|------------------------------------------------------|---------------|---------------|
|                                                      | \$            | \$            |
| Relating to operations                               | 35,630        | 43,125        |
| Relating to tangible capital assets                  | 3,333         | 5,743         |
| <b>Closing balance</b>                               | <b>38,963</b> | <b>48,868</b> |

## 6. REBATES DUE TO MARKET PARTICIPANTS AND ACCUMULATED SURPLUS

In 2016, the IESO recognized \$12,551 thousand in rebates due to market participants of system fees (2015 – \$9,595). As at December 31, 2016, rebates due to market participants were \$22,146 thousand, with the 2015 portion of \$9,595 thousand rebated in January 2017.

The IESO's approved regulatory deferral account balance has been historically maintained at a maximum of \$10.0 million. The 2016 approved regulatory deferral account balance at \$10.0 million was approved by the OEB on December 1, 2016.

Prior to 2014, unrealized gains and losses from portfolio investments and foreign exchange were included in the balance of the regulatory deferral account (life-to-date total \$4,144 thousand). As of January 1, 2014, only realized gains and losses are included in this balance.

As at December 31, the components of the accumulated surplus were as follows:

### Accumulated Surplus

| As at December 31 (in thousands of Canadian dollars)     | 2016          | 2015          |
|----------------------------------------------------------|---------------|---------------|
|                                                          | \$            | \$            |
| Regulatory deferral account (a)                          | 10,000        | 10,000        |
| Accumulated market sanctions and payment adjustments (b) | 726           | 492           |
| Remeasurement gains                                      | 3,762         | 3,514         |
| <b>Accumulated surplus – end of year</b>                 | <b>14,488</b> | <b>14,006</b> |

### a) Regulatory Deferral Account

| As at December 31 (in thousands of Canadian dollars) | 2016          | 2015          |
|------------------------------------------------------|---------------|---------------|
|                                                      | \$            | \$            |
| Accumulated surplus – beginning of year              | 10,000        | 7,604         |
| Revenues (before rebates due to market participants) | 190,219       | 192,994       |
| Rebates due to market participants                   | (12,551)      | (9,595)       |
| Core operation expenses                              | (177,668)     | (181,003)     |
| <b>Accumulated surplus – end of year</b>             | <b>10,000</b> | <b>10,000</b> |

### b) Accumulated Market Sanctions and Payment Adjustments

| As at December 31 (in thousands of Canadian dollars) | 2016       | 2015       |
|------------------------------------------------------|------------|------------|
|                                                      | \$         | \$         |
| Accumulated surplus/(deficit) – beginning of year    | 492        | (970)      |
| Market sanctions and payment adjustments             | 3,889      | 6,021      |
| Customer education and market enforcement expenses   | (3,655)    | (4,559)    |
| <b>Accumulated surplus – end of year</b>             | <b>726</b> | <b>492</b> |

## 7. DEBT

### **Note payable to Ontario Electricity Financial Corporation (OEFC)**

In April 2014, the IESO entered into a three-year note payable with the OEFC. The note payable is unsecured, bears interest at a fixed rate of 2.046% per annum and is repayable in full on April 30, 2017. Interest accrues daily and is payable in arrears semi-annually in April and October of each year. As at December 31, 2016, the note payable to the OEFC was \$90.0 million (December 31, 2015 – \$90.0 million).

For the year ended December 31, 2016, the interest expense on the note payable was \$1,841 thousand (2015 – \$1,841 thousand).

### **Credit facility**

The IESO has an unsecured credit facility agreement with the OEFC, which will make available to the IESO an amount up to \$95.0 million. Advances are payable at a variable interest rate equal to the Province of Ontario's cost of borrowing for a 30-day term plus 0.50% per annum, with draws, repayments and interest payments due monthly. The credit facility expires April 30, 2017. As at December 31, 2016, no amount was drawn on the credit facility (December 31, 2015 – \$nil).

For the year ended December 31, 2016, the interest expense on the credit facility was \$nil (2015 – \$279 thousand).

### **Retirement Compensation Arrangements Trust**

In July 2013, the IESO established a Retirement Compensation Arrangements (RCA) Trust to provide security for the IESO's obligations under the terms of the supplemental employee retirement plan for its employees. As at December 31, 2016, the IESO has provided the RCA trustee with a bank letter of credit of \$30,466 thousand (2015 – \$28,408 thousand) the trustee can draw on if the IESO is in default under the terms of this plan.

## 8. POST-EMPLOYMENT BENEFIT PLANS

The IESO provides pension and other employee post-employment benefits, comprising group life insurance, long-term disability and group medical and dental plans, for the benefit of current and retired employees.

### Pension plans

The IESO provides a contributory defined benefit, indexed, registered pension plan. In addition to the funded, registered pension plan, the IESO provides certain non-registered defined benefit pensions through an unfunded, indexed, non-registered plan.

### Other employee future benefits

The group life insurance, long-term disability and group medical and dental benefits are provided through unfunded, non-registered defined benefit plans.

### Summary of accrued benefit obligations and plan assets

| (in thousands of Canadian dollars)                                         | 2016<br>Pension Benefits | 2015<br>Pension Benefits | 2016<br>Other Benefits | 2015<br>Other Benefits |
|----------------------------------------------------------------------------|--------------------------|--------------------------|------------------------|------------------------|
|                                                                            | \$                       | \$                       | \$                     | \$                     |
| Accrued benefit obligation                                                 | 507,724                  | 482,994                  | 91,014                 | 83,455                 |
| Fair value of plan assets                                                  | 523,756                  | 475,714                  | -                      | -                      |
| Funded status as of measurement date                                       | 16,032                   | (7,280)                  | (91,014)               | (83,455)               |
| Employer contribution/other benefits payments after measurement date       | 2,416                    | 427                      | 588                    | 582                    |
| Unrecognized actuarial (gain)/loss                                         | (53,068)                 | (29,209)                 | 175                    | (1,628)                |
| <b>Accrued liability recognized in the statement of financial position</b> | <b>(34,620)</b>          | <b>(36,062)</b>          | <b>(90,251)</b>        | <b>(84,501)</b>        |

### Registered pension plan assets

As at the measurement date of September 30, the proportion of the fair value of registered pension plan assets held in each asset class was as follows:

|                                    | 2016          | 2015          |
|------------------------------------|---------------|---------------|
| Canadian equity securities         | 20.2%         | 19.9%         |
| Foreign equity securities          | 39.9%         | 41.8%         |
| Canadian debt securities           | 39.8%         | 39.0%         |
| Cash equivalents                   | 0.4%          | 0.6%          |
| Forward foreign exchange contracts | (0.3%)        | (1.3%)        |
|                                    | <b>100.0%</b> | <b>100.0%</b> |

Principal assumptions used to calculate benefit obligations at the end of the year are determined at that time and are as follows:

|                                        | 2016<br>Pension Benefits | 2015<br>Pension Benefits | 2016<br>Other Benefits | 2015<br>Other Benefits |
|----------------------------------------|--------------------------|--------------------------|------------------------|------------------------|
| Discount rate at the end of the period | 5.75%                    | 6.00%                    | 5.75%                  | 6.00%                  |
| Rate of compensation increase          | 3.50%                    | 3.75%                    | 3.50%                  | 3.75%                  |
| Rate of indexing                       | 2.00%                    | 2.25%                    | 2.00%                  | 2.25%                  |

The assumed prescription drug inflation was 8.00% for 2016, grading down to an ultimate rate 4.50% per year in 2030. Dental costs are assumed to increase by 4.00% per year.

Benefit costs and plan contributions for pension and other plans are summarized as follows:

| (in thousands of Canadian dollars) | 2016<br>Pension Benefits | 2015<br>Pension Benefits | 2016<br>Other Benefits | 2015<br>Other Benefits |
|------------------------------------|--------------------------|--------------------------|------------------------|------------------------|
|                                    | \$                       | \$                       | \$                     | \$                     |
| Current service cost (employer)    | 11,117                   | 10,547                   | 3,107                  | 2,857                  |
| Interest cost                      | 29,292                   | 28,143                   | 5,120                  | 4,797                  |
| Expected return on plan assets     | (27,626)                 | (26,053)                 | -                      | -                      |
| Amortization of net actuarial loss | (1,173)                  | (667)                    | (100)                  | (753)                  |
| <b>Benefit cost</b>                | <b>11,610</b>            | <b>11,970</b>            | <b>8,127</b>           | <b>6,901</b>           |

| (in thousands of Canadian dollars)           | 2016<br>Pension Benefits | 2015<br>Pension Benefits | 2016<br>Other Benefits | 2015<br>Other Benefits |
|----------------------------------------------|--------------------------|--------------------------|------------------------|------------------------|
|                                              | \$                       | \$                       | \$                     | \$                     |
| Employer contribution/other benefit payments | 13,052                   | 12,851                   | 2,377                  | 2,314                  |
| Plan participants' contributions             | 5,811                    | 5,162                    | -                      | -                      |
| Benefits paid                                | 23,317                   | 21,155                   | 2,377                  | 2,314                  |

The most recent actuarial valuation of the registered pension plan for funding purposes was at January 1, 2014, and the next required valuation is to be effective January 1, 2017.

Principal assumptions used to calculate benefit costs for the year are determined at the beginning of the period and are as follows:

|                                              | 2016<br>Pension Benefits | 2015<br>Pension Benefits | 2016<br>Other Benefits | 2015<br>Other Benefits |
|----------------------------------------------|--------------------------|--------------------------|------------------------|------------------------|
| Discount rate at the beginning of the period | 6.00%                    | 6.15%                    | 6.00%                  | 6.15%                  |
| Rate of compensation increase                | 3.75%                    | 3.75%                    | 3.75%                  | 3.75%                  |
| Rate of indexing                             | 2.25%                    | 2.25%                    | 2.25%                  | 2.25%                  |

## 9. TANGIBLE CAPITAL ASSETS

Net tangible capital assets consist of the following:

### Tangible Capital Assets

| (in thousands of Canadian dollars) | As at<br>December 31, 2015 | Additions     | Disposals | As at<br>December 31, 2016 |
|------------------------------------|----------------------------|---------------|-----------|----------------------------|
|                                    | \$                         | \$            | \$        | \$                         |
| Facilities                         | 52,281                     | 3,692         | -         | 55,973                     |
| Market systems and applications    | 278,458                    | 28,535        | -         | 306,993                    |
| Infrastructure and other assets    | 60,180                     | 3,175         | -         | 63,355                     |
| Meter data management/repository   | 35,900                     | 1,011         | -         | 36,911                     |
| <b>Total cost</b>                  | <b>426,819</b>             | <b>36,413</b> | <b>-</b>  | <b>463,232</b>             |

### Accumulated Amortization

| (in thousands of Canadian dollars)    | As at<br>December 31, 2015 | Amortization<br>Expense | Disposals | As at<br>December 31, 2016 |
|---------------------------------------|----------------------------|-------------------------|-----------|----------------------------|
|                                       | \$                         | \$                      | \$        | \$                         |
| Facilities                            | (22,604)                   | (1,697)                 | -         | (24,301)                   |
| Market systems and applications       | (251,210)                  | (12,336)                | -         | (263,546)                  |
| Infrastructure and other assets       | (47,228)                   | (5,544)                 | -         | (52,772)                   |
| Meter data management/repository      | (25,329)                   | (3,861)                 | -         | (29,190)                   |
| <b>Total accumulated amortization</b> | <b>(346,371)</b>           | <b>(23,438)</b>         | <b>-</b>  | <b>(369,809)</b>           |

### Net Book Value

| (in thousands of Canadian dollars) | As at<br>December 31, 2015 | As at<br>December 31, 2016 |
|------------------------------------|----------------------------|----------------------------|
|                                    | \$                         | \$                         |
| Facilities                         | 29,677                     | 31,672                     |
| Market systems and applications    | 27,248                     | 43,447                     |
| Infrastructure and other assets    | 12,952                     | 10,583                     |
| Meter data management/repository   | 10,571                     | 7,721                      |
| <b>Total net book value</b>        | <b>80,448</b>              | <b>93,423</b>              |
| Assets under construction          | 23,268                     | 11,624                     |
| <b>Net tangible capital assets</b> | <b>103,716</b>             | <b>105,047</b>             |

In 2016, there were no adjustments to management's estimates of remaining asset service lives (2015 - decrease of \$653 thousand).

Interest capitalized to assets under construction during 2016 was \$260 thousand (2015 - \$263 thousand).

## 10. OTHER REVENUE

In its administration of the IESO-administered markets, the IESO directs the investment of market funds in highly rated, short-term investments throughout the settlement cycle. The IESO is entitled to receive the investment interest and investment gains, net of investment losses earned on funds passing through the real-time market settlement accounts. The IESO is not entitled to the principal on real-time market investments.

The IESO recognized investment income earned in the market settlement accounts of \$2,508 thousand in 2016 (2015 – \$3,212 thousand).

## 11. RELATED PARTY TRANSACTIONS

The Province of Ontario is a related party as it is the controlling entity of the IESO. The OEFC, OEB, Hydro One and Ontario Power Generation Inc. (OPG) are related parties of the IESO, through the common control of the Province of Ontario. Transactions between these parties and the IESO were as follows:

The IESO holds a note payable and an unsecured credit facility agreement with the OEFC (Note 7). Interest payments made by the IESO in 2016 for the note payable were \$1,841 thousand (2015 – \$1,841 thousand) and for the credit facility were \$nil (2015 – \$328 thousand). As of December 31, 2016, the IESO had an accrued interest payable balance with the OEFC of \$315 thousand (2015 – \$315 thousand).

Under the *Ontario Energy Board Act, 1998*, the IESO incurs registration and license fees. The total of the transactions with the OEB was \$1,747 thousand in 2016 (2015 – \$1,671 thousand).

The IESO performed connection and bulk electric system exception assessments for Hydro One in 2016. In 2016, the IESO invoiced Hydro One \$610 thousand (2015 – \$310 thousand).

The IESO procures short circuit studies and protection impact assessments as part of connection assessments, approvals and meter services on IESO-owned interconnected revenue meters from Hydro One. Additionally, the IESO paid Hydro One for the removal of the microwave tower at the Clarkson location. In 2016, the IESO incurred costs of \$188 thousand (2015 – \$525 thousand) for these services. As of December 31, 2016, the IESO had a net payable balance with Hydro One of \$4 thousand (2015 – \$149 thousand).

The IESO performed connection assessment and approvals for OPG, administered telecommunication services to market participants to connect to the real-time market systems and provides market-related training courses. In 2016, OPG was invoiced \$124 thousand (2015 – \$137 thousand). As of December 31, 2016, the IESO had a net receivable balance with OPG of \$5 thousand (2015 – \$4 thousand).

## 12. FINANCIAL RISK MANAGEMENT

The IESO is exposed to financial risks in the normal course of its business operations, including market risks resulting from volatilities in equity, debt and foreign currency exchange markets, as well as credit risk and liquidity risk. The nature of the financial risks and the IESO's strategy for managing these risks have not changed significantly from the prior year.

### a) Market Risk

Market risk refers to the risk that the fair value or future cash flows of a financial instrument will fluctuate to cause changes in market prices. The IESO is primarily exposed to three types of market risk: currency risk, interest rate risk and equity risk. The IESO monitors its exposure to market risk fluctuations and may use financial instruments to manage these risks as it considers appropriate. The IESO does not use derivative instruments for trading or speculative purposes.

#### i) Currency Risk

The IESO conducts certain transactions in U.S. dollars, primarily related to vendors' payments, and maintains a U.S. dollar-denominated bank account. From time to time, the IESO may utilize forward purchase contracts to purchase U.S. dollars for delivery at a specified date in the future at a fixed exchange rate. In addition, the IESO utilizes U.S. dollar spot rate purchases in order to satisfy any current accounts. As at December 31, 2016, the IESO did not have any outstanding forward purchase contracts.

#### ii) Interest Rate Risk

The IESO is exposed to movements or changes in interest rates primarily through its short-term variable rate credit facility, cash equivalents' securities and long-term investments. Long-term investments include investments in a pooled Canadian bond fund. The potential impact to the securities' value had the prevailing interest rates changed by 25 basis points, assuming a parallel shift in the yield curve with all other variables held constant, is estimated at \$0.6 million as at December 31, 2016 (2015 – \$0.6 million).

#### iii) Equity Risk

The IESO is exposed to changes in equity prices through its long-term investments. Long-term investments include investments in pooled equity funds. A 30% change in the valuation of equities as at December 31, 2016, would have resulted in a change for the year of approximately \$7.5 million (2015 – \$6.8 million). The fair values of all financial instruments measured at fair value are derived from quoted prices (unadjusted) in active markets for identical assets.

### b) Credit Risk

Credit risk refers to the risk that one party to a financial instrument may cause a financial loss for the other party by failing to meet its obligations under the terms of the financial instrument. The IESO is exposed directly to credit risk related to cash equivalents' securities and accounts receivable, and indirectly through its exposure to the long-term investments in a Canadian bond pooled fund. The IESO manages credit risk associated with cash equivalents' securities through an approved management policy that limits investments to primarily investment-grade investments with counterparty-specific limits. The accounts receivable balance as at December 31, 2016, included no material items past due and substantially all of the balance was collected within 30 days from December 31, 2016. The long-term Canadian bond pooled fund is comprised of primarily investment-grade securities.

### c) Liquidity Risk

Liquidity risk refers to the risk that the IESO will encounter financial difficulty in meeting obligations associated with its financial liabilities when due. The IESO manages liquidity risk by forecasting cash flows to identify cash flows and financing requirements. Cash flows from operations, short-term investments, long-term investments and maintaining appropriate credit facilities help to reduce liquidity risk. The IESO's long-term investments are normally able to be redeemed within three business days; however, the investment manager of the pooled funds has the authority to require a redemption in-kind rather than cash and has the ability to suspend redemptions if deemed necessary.

## 13. COMMITMENTS

### Operating commitments

The obligations of the IESO with respect to non-cancellable operating leases over the next four years are as follows:

As at December 31 (thousands of Canadian dollars)

|      | \$    |
|------|-------|
| 2017 | 5,489 |
| 2018 | 5,004 |
| 2019 | 3,919 |
| 2020 | 3,195 |

## 14. CONTINGENCIES

The IESO is subject to various claims, legal actions and investigations that arise in the normal course of business. While the final outcome of such matters cannot be predicted with certainty, management believes that the resolution of such claims, actions and investigations will not have a material impact on the IESO's financial position or results of operations.

## 15. COMPARATIVE FIGURES

Certain comparative figures have been reclassified to conform with the financial statement presentation adopted in 2016.

# Executive Compensation at the IESO

## Program Objectives

The IESO compensation program for executives was designed to attract, retain and motivate the calibre of executives required to support the achievement of the IESO's statutory mandate, business objectives and corporate vision. Accordingly, the compensation philosophy and programs were built on the following objectives:

- to focus executives on meeting the IESO's business objectives
- to attract and retain qualified and talented staff needed to carry out the IESO's mandate
- to have the flexibility to reward results and demonstrated competencies
- to have compensation levels that are appropriate and defensible to stakeholders and customers.

The philosophy underlying these objectives is that total compensation for executives should be adequate enough to attract and retain the skills and competencies necessary to carry out the IESO's mandate.

## Program Governance

The IESO Board establishes the compensation objectives for the following year's program. They delegate the responsibility to thoroughly review the compensation objectives, policies and programs to the Human Resources and Governance Committee (HRGC) of the Board, which make recommendations to the full Board for approval.

The Board is comprised of 10 independent, external Board members, appointed by the Minister of Energy, with broad experience in the electricity industry and public sector organizations, and the President and Chief Executive Officer of the IESO. Their experience includes many years of dealing with human resource matters including the setting and implementation of compensation policies and programs.

In carrying out their mandate, the Board members have access to management's analysis and recommendations as well as those of expert consultants in the compensation field. These programs are reviewed annually with regard to business needs, program objectives and design, industry compensation trends, internal compensation relativities and external market relativities.

The Board also assesses risks associated with the establishment and implementation of compensation policies and programs. Annually the Board presides over and approves the IESO's business plan. An important component of this process is consideration of, and the implementation of, mitigating actions associated with enterprise risk management. This latter overarching process includes the assessment of all significant risks to the IESO, including risks associated with its compensation policies and programs.

In addition to the formal governance and oversight structure in place for compensation matters, the IESO discloses compensation levels annually for staff earning \$100,000 or more as part of its public sector salary disclosure. For the IESO, a further level of public review and assurance is provided through a statutorily required annual review of the IESO's expenditures, revenue requirements and fees. Information related to compensation matters, including executive/management compensation and market relativities, is subject to the Ontario Energy Board review. A range of small and large consumers, assisted by their legal and professional advisors, are represented in these public proceedings.

## Market Comparisons

The IESO reviews the competitiveness of the executive compensation levels in relation to a peer group of Canadian organizations and general industry companies every other year at a minimum. The objective is to compare IESO executive compensation levels to those in the marketplace particularly in relation to the median of the market.

Prior to the amalgamation of the IESO with the OPA, the Ministry of Energy had retained the Hay Group, a global management consulting firm, to evaluate and market price the CEO position for the new organization. Following Mr. Campbell's appointment to the CEO position on January 1, 2015, the decision was made to adopt a similar approach to evaluate and market price all other executive roles using the Hay point system.

As part of this process, the comparator group was redefined consistent with the recommendations of the Agency Review Panel (the Arnett report) and is comprised of 13 public sector and 11 private sector organizations, with the comparator data weighted on a 50/50 public/private sector basis. The comparator group represents a range of industries, core business activities and roles that are similar to IESO: electricity, energy, asset management, financial services, infrastructure procurement, engineering and large-scale, complex IT functions. The list of organizations can be viewed in the 2015 Annual Report.

The Broader Public Sector Executive Compensation Framework regulation (O. Reg 304/16) came into force in 2016 for implementation in 2017. The IESO's executive compensation program will be reviewed in accordance with this regulation and made available on the IESO's website by September 2017.

The job evaluation was independently conducted by the Hay Group using its point system and the following executive positions were covered by this review:

- President & CEO
- VP Corporate Services & CFO
- VP Market & Resource Development
- VP Market & System Operations & COO
- VP Conservation & Corporate Relations
- VP Information and Technology Services and CIO
- VP Planning, Law & Aboriginal Relations.

The Hay Group evaluated the Vice-President positions based on the job documents and additional information gathered from the CEO. Based on the evaluation points, a new salary structure was developed. The executive positions were then mapped into the new structure based upon their evaluated points.

Using the market information from the above peer group, the mid-point of the range of points for each executive salary grade was determined as the market price point for comparison purposes.

The mid-points of the new salary ranges were defined as the total direct cash compensation (annual base salaries plus annual short-term and long-term target incentive awards) of the hybrid market's price point at the 50th percentile for each salary grade.

The minimums and maximums of each salary range were calculated using typical salary range spreads at executive levels. In accordance with the *Broader Public Sector Accountability Act* (2010), executive compensation rates have remained the same in 2016 and will be reviewed against the Executive Compensation Framework regulation in 2017.

## Program Description

The IESO program includes fixed and variable compensation, core and flex benefit plans, and pension provisions. IESO Human Resources staff participate in and review results from various compensation surveys and monitor economic trends, such as inflation and unemployment rates, which impact on compensation, as well as internal compensation relativities. Based on this data and the IESO business priorities, Human Resources staff develop recommendations on compensation programs. External specialized compensation, benefit and pension consultants are utilized to ensure accurate, representative market compensation data is obtained, that current industry compensation trends are being utilized, as well as provide insight and recommended adjustments to current programs.

## Program Description – Fixed Compensation

Within the IESO salary ranges, individuals are assessed relative to an established competency model. This model consists of behavioural competencies such as strategic agility, building effective teams, command skills, sizing up people, political savvy and managing vision and purpose. Assessments are based upon demonstrated competency. Each individual is awarded a fixed compensation level within his or her band based upon his or her assessed competency.

## **Program Description – Variable Compensation**

In order to promote a results orientation in the executive team, the variable pay plan forms part of the total compensation of executives. The IESO Board annually establishes a robust set of performance measures, which are evaluated each year.

The IESO Board assesses the corporate performance results and the CEO's individual performance results. Under the plan, having assessed the results against target, the Board has the ability to use some discretion in determining the final performance rating – however in the past, apart from one occasion, the Board has relied upon the directly assessed results to award variable compensation.

The variable compensation award for the CEO and Vice-Presidents is capped at 10% of fixed compensation. The plan provides for awards below the capped amount depending on the performance results achieved. The 2016 annual award was paid on December 30, 2016.

## **Program Description – Group Benefits**

The group benefit plan provides a core level of health and dental benefits, life insurance, disability coverage and vacation, which can be adjusted by individual executives through a flexible component within the plan. The flexible element provides executives the option of adjusting their benefits to meet their individual/family needs, including vacation above core amounts, levels of life insurance, health coverage and other components.

## **Program Description – Pension Plan**

A defined benefit pension plan provides annual retirement income calculated as 2% of pensionable earnings during the highest paid 60 consecutive months of service multiplied by years of service (36 months for the pension earned prior to January 1, 2017, by the former IESO executives), to a maximum of 35 years. The pension formula is integrated with the Canada Pension Plan (CPP) to provide a level income stream before and after age 65, when the IESO pension is reduced to reflect benefits from CPP. The plan also has early retirement provisions as well as commuted value, pension deferral and reciprocal transfer options.

The plan provides a maximum benefit of 70% of highest paid, pre-retirement pensionable earnings. As the Canadian Revenue Agency limits the amount of pension payable from a registered plan, the IESO has a secured supplemental employee retirement plan to provide required pension income to meet the commitments of the plan above that payable from the registered plan.

The plan also provides several options including member's life only or joint and survivor pensions, as well as pre-retirement death benefits to provide benefits to surviving spouses or beneficiaries.

## **Performance Measures & Impact on Compensation**

The IESO annually establishes corporate performance measures relating to its business priorities during the business planning process. These are approved, monitored and assessed by the IESO Board of Directors each year. Individual performance measures supporting one or more corporate performance measures are also developed for each executive. As outlined above, the corporate results achieved each year impact on each executive's variable pay.

For 2016, the Board assessed the corporate results and determined that the IESO met all expectations. In addition to the corporate measures, each executive also had an individual set of measures and targets for the year, which aligned with the corporate performance objectives and IESO's business priorities, and these were similarly assessed. The Board assessed the results of the CEO's performance and the CEO assessed the performance of the Vice-Presidents, which were also reviewed with the Board.

## Other Considerations

Compensation decisions may at times be impacted by market factors – such as the recruitment of an executive with specialized skills/competencies or possessing unique talents within the industry. To this end, individual incumbent arrangements are sometimes established relating to terms of employment and the possibility of future termination.

The VP Market & Systems Operations and COO retired in December 2016 and was replaced by an internal senior-level employee after a thorough internal and external search was completed.

## Compensation Restraints

The IESO executive compensation has been significantly impacted by the compensation restraint legislation in Ontario since 2010. The *Broader Public Sector Accountability Act* (BPSAA) imposes a general freeze on designated executives' salary, variable pay, benefits and perquisites subject to very limited exceptions.

Following the amalgamation of the two former organizations (IESO and OPA) on January 1, 2015, the total 2015 variable performance pay amount awarded to all employees and office holders became the cap for total variable performance pay to be paid out in future years as long as the BPSAA remains in effect. The total variable compensation paid in 2016 was within this maximum.

## Executive Compensation Structure Alignment

With the appointment on January 1, 2015, of Mr. Campbell as the CEO of the merged organization, the IESO aligned the compensation plan for its Vice-Presidents with the structure established for the new CEO. Accordingly, in both cases, the variable pay component was capped at 10% of fixed compensation with no deferral. There were no salary adjustments for executives in 2016. .

The figures reported as 2016 "Salary Paid" in the 2016 Public Sector Salary Disclosure for the executives include the 2016 earned variable compensation that was paid on December 30, 2016.

## Executive Compensation Statement

The table below details the annual compensation for the year ended December 30, 2016, for the executives listed.

### 2016 Summary Compensation Table

| Name & Position                           | Base Salary | Variable Pay <sup>1</sup> | Other Annual Compensation <sup>2</sup> | Total Cash Compensation <sup>3</sup> |
|-------------------------------------------|-------------|---------------------------|----------------------------------------|--------------------------------------|
| <b>Bruce Campbell</b>                     |             |                           |                                        |                                      |
| President & CEO                           | \$536,364   | \$53,636                  | \$32,527                               | \$622,527                            |
| <b>Kimberly Marshall</b>                  |             |                           |                                        |                                      |
| VP Corporate Services & CFO               | \$268,460   | \$13,423                  | \$5,305                                | \$287,188                            |
| <b>JoAnne Butler</b>                      |             |                           |                                        |                                      |
| VP Market & Resource Development          | \$339,968   | \$30,600                  | \$1,037                                | \$371,605                            |
| <b>Kim Warren</b> (retired Dec. 31, 2016) |             |                           |                                        |                                      |
| VP Market & System Operations & COO       | \$319,228   | \$30,330                  | \$15,893                               | \$365,451                            |
| <b>Terence Young</b>                      |             |                           |                                        |                                      |
| VP Conservation & Corporate Relations     | \$307,037   | \$29,170                  | \$22,065                               | \$358,272                            |

1. 2016 earned variable compensation was paid in December 2016

2. Represents remaining flex credits paid out at year end as taxable income

3. These amounts will be reported as "Salary Paid" under the Annual Public Sector Salary Disclosure



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