OEB STAFF INTERROGATORY 1

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

Staff IR #1

INTERROGATORY

Reference: Exhibit A-2-1. Pg. 1 of 2

Preamble:

In the IESO's September 4, 2018 letter to the Minister, the IESO indicates:

> "Our Commitment to sound financial management, even as we make significant investments to deliver market renewal, cybersecurity and other priorities, means we are not seeking an increase to our revenue requirement for 2019".

And

Reference: Exhibit A-2-2. Pg. 6 of 7, Exhibit A-2-2 page 16 and 17, Exhibit B-3-1, Attachment 3 – Appendix 2-JC OM&A Programs

Preamble:

In its business, plan the IESO states: "The IESO intends to hold its revenue requirement for 2019 at the levels approved for 2018 and 2017".

Questions:

a) Please discuss how the IESO is able to hold its budget to 2017 and 2018 levels given that its Operating, Capital expenditure and full time staffing levels are increasing for both Core Operations and the MRP as provided in the detailed financial tables on pages 16 and 17 of Exhibit A-2-2.
b) What program activities have been cancelled/modified/reduced or replaced to make room for the new and expanded activities in 2019 in terms of operations, capital and staffing?

c) Please quantify the financial and staffing impacts of these changes.

d) A flow chart has been provided as Attachment 1 that provides a model of the OEB's understanding of the inputs that go into calculating the IESO Revenue Requirement. Please confirm whether the flow chart is accurate or modify the flow chart as necessary. In addition, please confirm that the total IESO OM&A costs are comprised of only the departments identified in Appendix 2-JC OM&A Programs and that no changes are planned to these departments in 2019.

RESPONSE

a) The IESO has maintained its 2019 revenue requirement in line with prior years through risk-informed prioritization of initiatives and effective allocation of its resources. The IESO has continued to focus on the efficient use of resources across the organization to work more effectively within budgets that have absorbed collective bargaining agreement impacts and that support priority initiatives. The operating budget increases to support IESO's core operations have been partially offset by the implementation of recommendations from the Cost Allocation Study (BDR Report) and reduced operating costs for the Market Renewal Program as the program starts its capitalization phase.

The table below provides the year-over-year changes in the operating budget, comparing 2018 and 2019.

Operating Budget (In $ Millions)	2018 Budget	2019 Budget	Year-over-year budget changes
Revenues	**190.8**	**190.8**	**-**
Costs			
Operating Costs	163.8	166.6	2.8
Amortization	17.7	18.4	0.7
Net Interest	(3.4)	(5.9)	(2.5)
Market Renewal Program	**12.7**	**11.7**	**(1.0)**
Total Costs	**190.8**	**190.8**	**-**

The capital envelope has increased in 2019 in order to support the detailed design and implementation phases of the Market Renewal Program. The capital envelope for core operations projects was reduced to be more in line with historical spending trends. The total capital increase has no impact on the current revenue requirement and will be funded by the IESO's line of credit.

Capital Budget	2018	2019	Year-over-year budget

(In $ Millions)	Budget	Budget	changes
Core Operations	22.6	17.3	(5.3)
Market Renewal	4.0	38.0	34.0
Total Capital Envelope	**26.6**	**55.3**	**28.7**

Staffing increases are in line with the operating and capital budgets. Core Operations increased headcount is to support various IESO initiatives, while the MRP headcount increases are to support the capital phase of the program.

Staffing	2018 Budget	2019 Budget	Year-over-year budget changes
Core Operations	688	717	29
Market Renewal	43	125	82
Total Capital Envelope	**731**	**842**	**111**

b) The IESO was directed by the Minister of Energy, Northern Development and Mines to discontinue the 2015-2020 Conservation First Framework and establish a scaled down Interim Framework for the balance of 2019 and 2020, delivered centrally by IESO with continued funding from electricity rates. This is a coordinated effort between the IESO and the ministry and has no resourcing impact in 2019.

c) There is no incremental impact to this change.

d) The flow chart appears to represent the process flow accurately, if "Procurement Revenue" means the revenue from registration and market participation fees. The IESO confirms that total IESO OM&A costs are comprised of the departments identified in Appendix 2-JC OM&A.

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OEB STAFF INTERROGATORY 2

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

Staff IR #2

INTERROGATORY

Reference: Exhibit B-3-1, Attachment 3 – Appendix 2-JC OM&A Programs

Preamble

OEB staff is seeking additional information in questions a) thru d) to explain how and where the PSAB transition items are included in the 2019 revenue requirement. OEB staff is also seeking additional information that demonstrates that the interest on the cumulative difference between cash and accrued pension and OPEB expenses is being appropriately allocated to the 2019 revenue requirement.

Questions:

a) Please confirm that the amount of recovery for PSAB transition items included in the IESO's revenue requirement remains at $3.912 million for 2019.
b) Please indicate the line item in Appendix 2-JC (OM&A Programs) that the PSAB transition recovery amounts are included in.
c) Please confirm that the 2019 interest income shown in Appendix 2-JC ($5.9 million for 2019) includes calculated interest on the cumulative difference between the amounts collected under the cash basis versus amounts collected under the accrual basis for pension and other post-employment benefit costs.
d) Please provide the supporting calculation for the amount referred to in part c).

RESPONSE

a) The amount of recovery for PSAB transition items remains at $3.912 million in 2019 and is included in the IESO's revenue requirement.

b) The PSAB transition recovery amounts are included in line "Corporate Adjustments – General".

c) Yes, the 2019 interest income includes calculated interest on the cumulative difference between the amounts collected under the cash basis versus amounts collected under the accrual basis for pension and other post-employment benefit costs.

d) The net interest budget item is calculated as follows:

Net Interest Expense (In $ millions)	**2019 Budget**
Interest OEFC/Credit Facility	2.1
Capitalized Interest	(0.9)
Financing Charges	0.3
Investment Income (Mkt + Corp)	(5.9)
SERP Income	(1.5)
Total	(5.9)

OEB STAFF INTERROGATORY 3

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

Staff-3

INTERROGATORY

Reference: Exhibit B-3-1, Attachment 3 – Appendix 2-JC OM&A Programs

Preamble:

Under the heading Corporate Adjustments within Appendix 2-JC OM&A Programs the categories of General, Amortization and Interest are significant components of the overall budget and thus more detail is required to understand their impact.

Questions:

a) Please provide a more detailed breakdown of the $18.4 million in amortization proposed in the 2019 budget and provide the supporting calculations for how this figure was derived.
b) Please provide a more detailed breakdown of the $5.9 million in interest income proposed in the 2019 budget and provide the supporting calculations for how this figure was derived.
c) Please explain what the $2.8 million proposed in the 2019 budget under General represents.
d) Please confirm that there are no amounts included in the 2019 revenue requirement, or the December 31, 2018 accumulated deficit of the IESO that relate to the Ontario Fair Hydro Plan. If this is not the case, please indicate the nature of these costs, where they are included in Exhibit B-3-1 Appendix 2-JC, and provide justification for their inclusion.

RESPONSE

a) The table below provides a more detailed breakdown of the $18.4 million in amortization proposed in the 2019 budget and provides the supporting materials for how this figure was calculated:

Description	Amounts	Calculation Notes
Ongoing Amortization	$18.2M	This amount represents the projected December 2018 amortization expense carried forward into 2019
Less: Assets Fully Amortized	($1.4M)	This amount represents the assets that will fully amortize in 2019
Add: Assets in Service	$1.6M	This amount represents the forecasted amortization of assets put into service in 2019
Total	**$18.4M**	

b) The table below provides a more detailed breakdown of the $5.9 million in interest income proposed in the 2019 budget and provides the supporting materials for how this figure was calculated:

Description	Amounts	Calculation Notes
Interest OEFC/Credit Facility	$2.1M	This amount represents the forecasted amount of interest incurred on our credit facility which is used to fund capital projects.
Capitalized Interest	($0.9M)	This amount represents the amount of interest that will be capitalized over the course of the year.
Financing Charges	$0.3M	This amount represents the forecasted financing charges related to our credit facilities and investment management fees.
Investment Income	($5.9M)	This amount represents the forecasted market and corporate interest income.
SERP Income	($1.5M)	This amount represents the forecasted realized income earned on reinvested distributions on our SERP assets.
Total	**($5.9M)**	

c) The table below provides a more detailed breakdown of the $2.8 million proposed in the 2019 budget under Corporate Adjustment – General:

Description	**Amounts**
PSAB Recovery Amount	$3.9M
Component of Cost Allocation Recovery	($0.7M)
Impact of 4 FTE reduction	($0.4M)
Total	**$2.8M**

d) There are no amounts related to the Ontario Fair Hydro Plan in the 2019 revenue requirement or the 2018 accumulated deficit.

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OEB STAFF INTERROGATORY 4

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

Staff-4

INTERROGATORY

Reference: Exhibit A-3-1 – Audited Financial Statements, Note 3 – Restatement of Corresponding Figures, Note 6 – Rebates Due to Market Participants and Accumulated Deficit

And

Reference: Exhibit B-3-1 Pages 2-4 of 6 – Accounting Policy Change

Preamble:

With respect to changes in its accounting policy, the IESO states the following under Note 3 c) in its 2018 Financial Statements:

> The discount rate used to value the IESO's supplemental employee retirement and other post-employment benefit plans' liabilities previously was based on the expected rate of return on plan assets as at the measurement date. As of January 1, 2018, the discount rate utilized to value these unfunded liabilities is based on the IESO's estimated cost of borrowing as at the measurement date. The impact for this change is an increase of $31,314 thousand in the deficit balance reported to accumulated deficit as at December 31, 2017.

OEB staff notes that, after retroactively recording the accounting policy change, the IESO's December 31, 2018 Accumulated Deficit includes a $4.73 million deficit for the Regulatory Deferral Account and a $52.482 million deficit for the PSAB Transition Items.

In Exhibit B-3-1, the IESO further states:

> In this submission, the IESO has requested to raise its operating reserve to $10 million. The IESO is not proposing to increase its revenue requirement for fiscal 2019 to recover its current operating deficit position. The IESO plans to address the deficit funding gap in future rate filings with the OEB.

Questions:

a) Please prepare a table identical to the one in Note 6 d) PSAB Transition Item – Accumulated Deficit, in the 2018 Financial Statements. However, please apply the previous accounting policies (discount rate based on expected rate of return of plan assets as at the measurement date) to these figures.
b) Please elaborate on the IESO's plans to address the deficit-funding gap as a result of the change in accounting policy. Specifically, in what manner does the IESO intend to recover this shortfall, over what time period, etc.
c) Please provide rationale for why the funding gap is not being addressed in this current application.
d) Please provide an analysis to show what the impact would be on the 2019 revenue requirement, as well as the 2019 Usage Fees, if the cumulative impacts of the accounting policy change were amortized and collected on the same basis as the amounts that are currently being amortized in the PSAB Transition Items accumulated deficit account (based on estimated average remaining service life of employees).

RESPONSE

a)

PSAB Transition Item – Accumulated Deficit

As at December 31 (in thousands of Canadian dollars)	2018	2017
	$	$
Accumulated deficit – beginning of year	(39,529)	(43,441)
Recovery of PSAB transition items	3,912	3,912
Accumulated deficit – end of year	(35,617)	(39,529)

b) The IESO is in the process of developing an appropriate strategy to address the funding gap as a result of the change in accounting policy.

c) The funding gap identified is material and addressing the funding gap in the current application could potentially create a revenue requirement that would be a material departure from the IESO's approved Business Plan 2019-2021. The funding gap, and its impact on ratepayers, will be addressed in a future IESO business plan, with the required approvals, prior to seeking the funding for its recovery.

d) Amortizing the remaining balance of the impacts from the accounting policy change on the same basis as the amounts that are currently being amortized in the PSAB Transition

Items accumulated deficit account would result in an increase of $1,787 thousand to the 2019 revenue requirement. Estimated impact to the 2019 usage fee is illustrated in the table below.

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Increased in liabilities due to Accounting change	31,314										
Prior year pension expenses adjustments (Y2017)	(13,449)										
Remaining balance to be amoritzed	17,865	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787

		Domestic	Exports
2019 Net Revenue Requirement	$ 190.803		
Energy Volume (TWh)		140.000	18.700
Usage Fees (EB-2019-0002, B-1-1, Page 4)		1.227	1.013
2019 Revised Net Revenue Requirement	$ 192.590		
Revised 2019 usage fee		1.239	1.022

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OEB STAFF INTERROGATORY 5

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

Staff IR #5

INTERROGATORY

Reference: Exhibit A-2-2. Pg. 9 of 27

Preamble:

At Exhibit A-2-2. Pg. 9 of 27, the IESO states: "As part of our commitment to transparency, starting in 2019 the IESO will supplement existing planning publications with an annual planning outlook."

Questions:

a) Has the IESO initiated development of the annual planning outlook?
b) If applicable, what is the IESO's anticipated timing for the release of the outlook report?
c) Please provide an overview of the information that will be provided in annual planning outlook report.
d) How are the findings provided in the annual planning outlook expected to influence the work and budgets of the IESO in future years?

RESPONSE

a) Yes, the IESO has initiated development of the annual planning outlook.[1]

b) The IESO anticipates to release its annual planning outlook in September 2019.

c) The 2019 annual planning outlook will include:

[1] Further information can be found on the IESO's Planning Outlook engagement webpage: http://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Planning-Outlook

- Demand Forecast
- Global Resource Adequacy:
  - o Reserve Margin Requirement
  - o Sensitivity Analyses or Scenarios for Reserve Margin Calculations
  - o Capacity required to maintain adequacy
- Transmission Adequacy:
  - o Ongoing Studies, Plans and Initiatives
- Planned Outcomes (emissions, marginal cost forecasts)
- Methodology Document
- Excel Data Table

d) The findings provided in the annual planning outlook form part of the IESO's core activities and are expected to be managed within existing and future budgets. One of the main purposes of the annual planning outlook is to provide information to the market on system needs and help inform investment decisions. Such needs will inform future IESO market acquisitions, such as those made through the Incremental Capacity Auction.

OEB STAFF INTERROGATORY 6

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

OEB Staff #6

INTERROGATORY

Preamble: Exhibit A-2-1. Pg. 1 of 2

Preamble:

In the Honourable Greg Rickford's letter dated December 11, 2018 to the IESO, the Minister states:

> I expect future Market Renewal resourcing beyond 2019 will be further reassessed in future business plans and in the IESO's proposed expenditure and revenue requirements submitted to the Ontario Energy Board. I hope that the IESO will continue to focus on operating efficiency and ensuring maximum value for ratepayers.

Questions:

a) Please describe the steps the IESO has been and plans to take in implementing cost efficiencies and opportunities for expense reductions.

RESPONSE

a) The IESO regularly reviews its priorities and ongoing expenditures, and assesses and mitigates risks to ensure that resources are allocated efficiently within the approved budget.

In 2018, core operating expenses were in line with budget, which included absorbing collective bargaining agreement impacts. This was managed through the efficient allocation of resources, including staffing levels, professional consulting expenses and timing of capital projects.

In 2019, the IESO is able to maintain a flat revenue requirement, please see the response to OEB Interrogatory 1 a), at Exhibit I, Tab 1.1, Schedule 1.01 for further details.

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OEB STAFF INTERROGATORY 7

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

Staff IR #7

INTERROGATORY

Reference: Exhibit B-1-1. Pg. 2 of 8

Preamble:

At Exhibit B-1-1, Pg. 2, the IESO states:

> "In furtherance of its commitment in the Package Settlement, the IESO is investigating the potential for a multi-year revenue requirement submission to assist with meeting the timing prescribed in section 25(1) of the Act".

Questions:

a) Please explain what is meant by the statement "the IESO is investigating the potential for a multi-year revenue requirement submission".
b) Please confirm that in this application the IESO is not seeking OEB approval to submit a multi-year application in the future.
c) How does the IESO envision that a multi-year approval would work?

RESPONSE

a) The IESO is examining whether a multi-year submission for approval to the OEB would comply with the requirements of the Electricity Act and the feasibility of such a submission.

b) The IESO is not seeking in this application OEB approval to submit a multi-year application in the future.

c) Please see a) above.

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ENERGY PROBE INTERROGATORY 2

Issue 1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

INTERROGATORY

EP-2

Reference: Government Press Release and Save Energy Website

Preamble: The CFF and IAP programs were discontinued on March 21, 2018

a) Will there be any additional conservation staffing and OM&A costs in 2019? What are these costs?

b) Will the cost consequences be incremental and covered in the 2019 Budget or covered by the uplift charges?

c) Please summarize the conservation initiatives in the March 2019 Federal Budget and discuss the relevance to Ontario and IESO 2019-20 programs.

RESPONSE

a) There will be no implications for IESO's staffing levels and/or operation costs related to the IESO's revenue requirement related to Conservation Demand Management.

b) There will be no implications for IESO's staffing levels and/or operation costs related to the IESO's revenue requirement related to Conservation Demand Management.

c) The IESO suite of conservation programs contain rules on a program by program basis which outline how incentives from other programs are treated within the incentive model of the program. Details can be found with the program rules for each program, if applicable.[1]

[1] A summary of the conservation initiatives contained in the Federal Budget can be found here: https://www.budget.gc.ca/2019/docs/plan/chap-02-en.html#Reducing-Energy-Costs-Through-Greater-Energy-Efficiency

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ENERGY PROBE INTERROGATORY 3

Issue 1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

INTERROGATORY

EP-3

Reference: Minister's Directive - FIT and LRP

Preamble: On July 5, 2018, the Minister of Energy, Northern Development and Mines released a directive requiring the IESO to take cancellation action on certain projects procured through the Feed-in-Tariff and Large Renewable Procurement initiatives.

Are there any costs in 2019 related to this directive? If the answer is yes, please provide the amounts with explanations.

RESPONSE

There are no costs related to this directive in the IESO's Fiscal Year 2019 net revenue requirement.

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ENERGY PROBE INTERROGATORY 4

Issue 1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

INTERROGATORY

EP -4

Reference: Exhibit A, Tab 2, Schedule 2, Page 12 and page 22 (SME)

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

a) Why is the plan not in evidence? Please file the plan.

b) Who are the clients?

c) What are the capital and operating costs and revenues, annual and total?

d) Please provide the cost/benefit business case.

RESPONSE

a), b), c) and d)

While the IESO is designated as the Smart Metering Entity (SME) the *Electricity Act, 1998* and *Ontario Energy Board Act, 1998* set out that the SME requires OEB approval of any fees it charges. On December 4, 2018 the SME filed an application to charge market prices for Third Party Access to smart meter data held by the SME, OEB file No. EB-2018-0316, which is currently in the Argument phase[1].

[1] The complete record is available on the OEB's website at: http://www.rds.oeb.ca/HPECMWebDrawer/Record?q=CaseNumber=eb-2018-0316&sortBy=recRegisteredOn-&pageSize=400

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ENERGY PROBE INTERROGATORY 5

Issue 1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

INTERROGATORY

EP-5

Reference: Exhibit A, Tab 2, Schedule1, Page 1, and Business Plan

a) Please update the steps the IESO has taken and initiatives in 2018 in identifying cost efficiencies and opportunities for expense reductions.

i. Please identify the status of each identified efficiency opportunity. Classify each opportunity as either implemented or in process.

ii. If available, please quantify the financial cost savings and expense reduction opportunities identified through this process.

iii. Identify human resource activities e.g. in staffing levels, corporate re-organizations and compensation.

b) Are the cost savings achieved through these efficiency opportunities included in the IESO's 2019 Revenue Requirement? Please provide a summary

RESPONSE

a) Please see the response to OEB Interrogatory 6 a), at Exhibit I, Tab 1.1, Schedule 1.06.

i. Please see the response to OEB Interrogatory 6 a).

ii. Please see the response to OEB Interrogatory 6 a).

iii. To better position the organization to deliver on its mandate, in 2018 the IESO completed a corporate realignment aimed at building a stronger, more cohesive organization focused on a common purpose. In addition to their core responsibilities, each of the six members of the executive leadership team reporting to the CEO is accountable for achieving specific strategic objectives and performance measures that reflect the growing focus on building a strong foundation to support the ongoing evolution of the sector. These range from developing an enterprise-level

data integration strategy, and positioning the IESO as a thought leader in cybersecurity, to implementing major process improvements and enabling innovation across the organization.

b) Please see the response to OEB Interrogatory 6 a).

ENERGY PROBE INTERROGATORY 6

Issue 1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

INTERROGATORY

EP-6

Reference: Exhibit B, Tab 1, Schedule 1, page 7

Preamble: IESO lists a number of risks to its forecasts, which include the "potential impacts of fulfilling new directives from the Minister and managing the work associated with new contracts, whether for new supply, conservation or the import and export of power."

a) Has IESO undertaken the management of any new contracts related to conservation or new supply? If so, please summarize and provide the costs of that work?

b) Can IESO update the budget for the nine items in the LTEP that it was directed to undertake? If so, please provide that budget or any estimates related to LTEP directives.

RESPONSE

a) The only new supply contracts IESO is managing in 2019 is an additional 35 microFIT contracts. There is not expected to be any additional costs for that work as they will be managed with existing resources already assigned to the current fleet of over 30,000 microFIT contracts.

As a result of the March 21, 2019 directive from the Minister on CDM, the IESO will be undertaking open competitive procurements for service providers to meet the new program delivery requirements of the Interim Framework outlined in the directive. The total cost of these procurements is currently under development as the IESO prepares to submit the 2019-2020 interim framework CDM Plan to the Ministry by end of April 2019.

b) Individual project budgets have not been created for the LTEP initiatives.

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PWU INTERROGATORY 1

1.1-PWU-1

Issue 1.1: Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

INTERROGATORY

Ref: Cover letter to IESO's updated evidence, March 28, 2019

In its 2019 Revenue Requirement Submission, the IESO requested to raise its operating reserve to $10 million. The IESO is not proposing to increase its revenue requirement for fiscal 2019 to recover its current operating deficit position. Rather, the IESO plans to address this deficit funding gap in future rate filings with the OEB.

a) Please explain IESO rationale for IESO's decision not to recover its current operating deficit in the current revenue requirement application.

RESPONSE

a) Please see the response to OEB Staff Interrogatory 4 c), at Exhibit I, Tab 1.1, Schedule 1.04.

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SEC INTERROGATORY 1

1.1-SEC-1

INTERROGATORY

With respect to the IESO budgeting process:

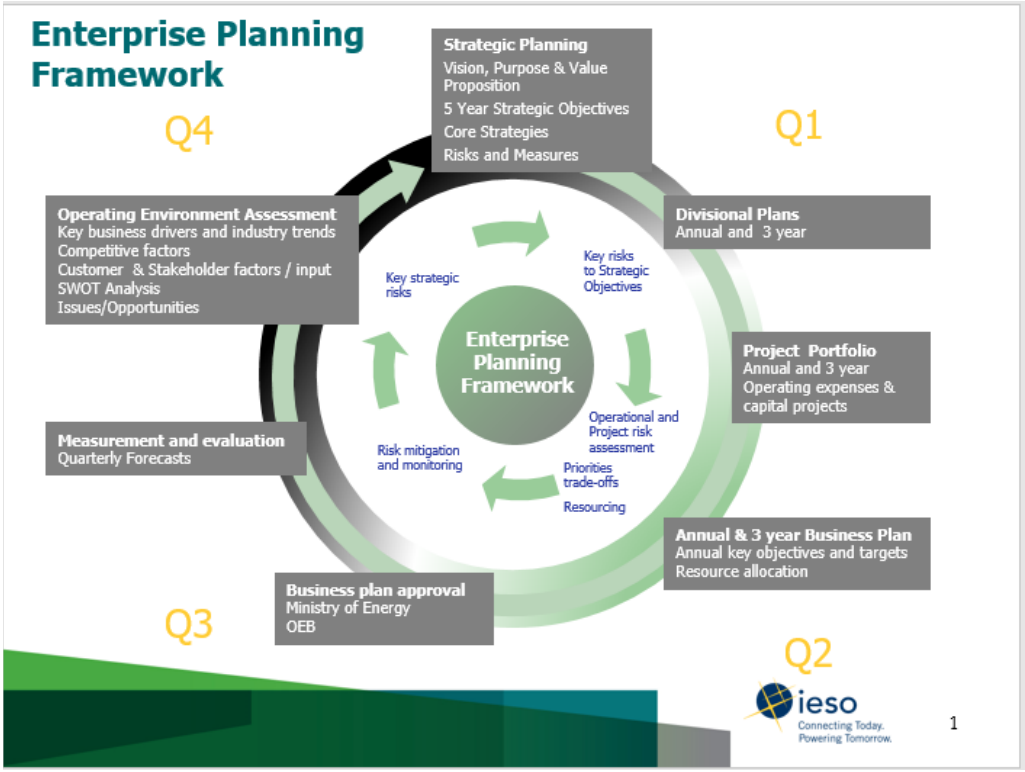
a. Please provide a step-by-step explanation of how the IESO created its 2019 budget.

b. For internal purposes, how does the IESO report on its spending against its budget through the year? Please provide a copy of the 3 most recent versions of such documents.

c. Please provide a copy of all documents that were provided to the Board of Directors in approving the underlying budgets contained in the Business Plan and this Application.

RESPONSE

a. Please see the diagram below:



b. As a part of monthly and quarterly management reporting, the IESO provides summaries of actual expenditures versus budget[1].

c. All materials provided to the Board of Directors in approving the underlying budgets contained in the Business Plan and this Application are provided as attachments to this response as follows:

Attachment 1 – August 28, 2018, Agenda Item Summary, 2019 - 2021 Business Plan

Attachment 2 – September 4, 2018, IESO Audit Committee – Draft - 2019 -2021 Business Plan

Attachment 3 – August 28, 2018, IESO Audit Committee – 2019 -2021 Business Plan Presentation

Attachment 4 – August 29, 2018, Resolution of the IESO Board of Directors – Approval of 2019 – 2021 Business Plan and and the included 2019 Corporate Performance Management Measures and Targets

[1] The IESO's quarterly financial statements can be found at the following link: http://www.ieso.ca/Corporate-IESO/Corporate-Accountability/Financial-Reporting

Agenda Item Summary

Date of Meeting:	August 28, 2018
Presenter:	Barb Anderson
Agenda Item:	2019 – 2021 Business Plan
Purpose of item:[1]	Recommendation
Strategic Theme:	Corporate Agility and Effectiveness
Executive Summary[2]**:**	The IESO is planning its 2019 - 2021 activities in a rapidly evolving environment and mandate which includes long-term planning, market and system operations and oversight, exploration of innovative solutions, stakeholder engagement and alignment of conservation with system needs. The 2019 - 2021 Business Plan is intended to proactively respond to and plan for this changing environment while prudently managing costs to the public. **The IESO's 2019 revenue requirement of $190.8 million remains at 2018 and 2017 approved budget levels.** Key areas of focus include: Continuing the progress of Market Renewal, leadership and investment in cybersecurity, conducting integrated planning while seeking innovative solutions that enhance reliability, broadening engagement and leveraging the IESO's role as a trusted information source to drive collaboration and inform decision-making, implementing conservation changes to better align with system and consumer needs, and enhancing the value of smart meter data.
Significant Issues, Risks and Opportunities:[3]	None

[1] State the purpose of the agenda item: a) Education for a strategic issue, b) soliciting Feedback, or c) a Decision/Recommendation item.

[2] Provide concise summary of issue, identifying why the item is important to the Board, with distilled analysis, and Management's recommendation.

[3] Provide concise description of significant issues, risks and opportunities.

Materials[4]**:** 2019 – 2021 Business Plan draft narrative document

Business Plan Presentation (PowerPoint slides)

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4 Materials (memo, slides, and reports) are to be concise, providing brief analysis of salient points, risks/opportunities, and Management's recommendations. If detailed report/ background information is necessary, it should be provided in an appendix with specific direction to key sections.

Business Plan 2019-2021

Independent Electricity System Operator

September 4th, 2018

ieso
Connecting Today.
Powering Tomorrow.

Introduction

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

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

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

Doing more with less: delivering value at the lowest cost

With its broad-reaching responsibilities, the IESO is uniquely positioned to recommend and implement changes that reflect our respect for ratepayers and attention to operating efficiency, while achieving significant cost savings across the sector. As a not-for-profit corporation we have kept our core revenue requirements at the same levels since 2011, representing about 1 cent/KWh for the average residential consumer in Ontario. An increase to our fees and combined revenue requirement occurred with the launch of the Market Renewal Program (MRP) in 2017, a multi-year initiative representing the most significant suite of reforms since the market was designed in the late 1990s. As the MRP moves from design to implementation in the

early 2020s, the yearly projected savings to ratepayers as a result of the efficiency gains will exceed the total current operating costs of the IESO.

Organizational focus

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

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

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

As part of that initiative, three new vice presidents joined the organization. Barbara Anderson, Chief Financial Officer and VP, Corporate Services; Alex Foord, Chief Information Officer and VP, Information and Technology Services; and Marcia Mendes-d'Abreu, VP, Human Resources.

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

Summary of priority initiatives and resource requirements

The IESO's Business Plan provides an overview of the organization's priority initiatives and associated resourcing requirements needed to deliver on core responsibilities, as well as the investments required now to enable longer-term benefits for both the sector and consumers. These additional activities include:

- Advancing the Market Renewal Program to deliver a competitive and efficient market, which, over a 10-year period, is expected to achieve savings of between $2.2 and $5.2 billion (see pages 7, 8 and 11)

- Creating an innovation roadmap to enhance system reliability and drive down costs for an ever-changing sector in collaboration with industry partners (see page 9)
- Enhancing our cybersecurity program to address the increasing complexity and growing threat of cyberattacks (see pages 6-7)
- Building the infrastructure required to enable approved third parties to access data from the Smart Metering Entity (SME)'s meter data management repository (MDM/R) (see page 10)
- Introducing more comprehensive planning processes and engaging with market participants early on to involve them in meeting system needs effectively (see pages 4-6)
- Implementing conservation changes to better align with system and consumer needs and transition to the market in the future (see page 10)

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

For 2019, the IESO's proposed core operating expenses are $190.8 million. The IESO expects these expenses to be funded by usage fee revenues.

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

For 2019, the IESO anticipates an average headcount of 851 full-time equivalents (FTEs) for market renewal and core operations, including planning, corporate and information technology support services and cybersecurity initiatives.

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

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

effort to enhance the value of smart meter data through a third-party access implementation plan; the Smart Meter Entity fees and revenues are the subject of a separate revenue requirement submission to the Ontario Energy Board.

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

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

Enhancing system reliability and resilience

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

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

Improving the IESO's planning processes

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

Historical energy consumption patterns are changing. In the last decade, conservation savings, embedded generation and the expanded industrial conservation initiative have more than offset any increases resulting from population growth and economic expansion.

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

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

Broadening the adequacy outlook

With the capacity to deliver energy when and where it's most needed, new technologies like energy storage are poised to play a larger role in enhancing the reliability and resilience of the IESO-controlled grid. As part of the first phase of the IESO's energy storage procurement, seven of 11 participating facilities have now joined the electricity market, with the remaining four expected to be connected by the end of 2018. While providing ancillary services to the grid, phase one facilities are expected to yield valuable learnings in areas ranging from the mitigation of surplus baseload generation, to the capabilities of fully dispatchable energy storage facilities in the wholesale market.

The IESO is also working on new planning processes that can effectively outline the needs and weigh the value of market-based procurements against the potential for longer-term investments in capital-intensive resources, like transmission assets. These will need to take into account the growth of distributed energy resources – expected to double in North America in just four years – and how we capture their value, as well as the resulting implications for the reliability of Ontario's bulk electricity system.

As part of our commitment to transparency, starting in 2019 the IESO will supplement existing planning publications with an annual planning outlook. Designed to broaden understanding of resource adequacy over a 10-year planning horizon, this document will be used to engage stakeholders in creating solutions, and support our efforts to develop a market with the flexibility to adjust to changing supply and demand dynamics.

Addressing regional planning needs

Ensuring reliability is also a priority at the regional level. Introduced in 2013, the existing regional planning process is currently being reviewed to ensure it integrates effectively with other planning initiatives, and considers both transmission facility end-of-life and cost-effective alternatives to transmission and distribution infrastructure to meet regional needs. The review will explore how the existing planning process considers cost-effective alternatives to transmission and distribution infrastructure solutions, such as conservation and distributed energy resources, as well as possible linkages to the Market Renewal Program. In 2019, following the release of an interim report to summarize key findings, the IESO will produce a final report outlining recommendations and identifying supporting legislation that may be required to implement them.

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

Investing in cybersecurity to protect the grid

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

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

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

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

contribute to the development of strategies and policies that focus on the reliability, security and privacy of Ontario's interconnected power system.

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

Meeting tomorrow's needs cost-effectively

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

Executing with excellence is the foundation of the IESO's success, whether building consumer and sector confidence in our operations and planning, or designing a market that creates value for them. Finding efficiencies in the way we do business and delivering reliability at the lowest cost is an enterprise-wide priority. It's also the driving force behind the IESO's Market Renewal Program (MRP) which, over a 10-year period, is expected to deliver between $2.2 and $5.2 billion in efficiency savings, most of which will flow to Ontario's consumers.

Driving efficiencies through market renewal key to cost savings

A collaborative effort to lay the foundation for a made-in-Ontario electricity market, the MRP will create value for consumers and suppliers, and prepare us to manage change and benefit from the innovation in a rapidly evolving industry, while building on the positive attributes of the existing system.

Market renewal will provide transparent price signals for the products and services the system needs, improve how electricity is scheduled and dispatched to help reduce overall system costs. It will also enable the system to respond to short-term changes in supply and demand, and establish a level playing field for all resources to compete to supply what the system needs.

To achieve the latter goal, the IESO will be introducing an incremental capacity auction (ICA), which will be responsible for the majority of the savings associated with market renewal. While we are benefitting from the lessons learned in jurisdictions that have already implemented

successful ICAs, our own experience with the demand-response auction already points to the potential benefits of an auction mechanism in driving down costs and opening the door to innovative solutions. In the three years since the auction was introduced, the number of participants has doubled while the clearing price has dropped 16.6 per cent.

Once the MRP has been implemented, demand-response providers can continue to compete through the annual ICA, which will enable the IESO to adjust to changing demand, while attracting the low-cost, non-traditional capacity resources that are unlikely to be identified in the absence of a competitive auction.

To unlock the value of the ICA and day-ahead market (DAM) – two of the four initiatives that comprise the MRP – the IESO is adopting the single-schedule market (SSM) model already in use in all other North American markets. This move will address the misalignments between price and dispatch resulting from maintaining a separate schedule for each, and eliminate the resulting settlement complexities that have prevented other improvements, including the DAM, from being implemented.

Closely linked to the single-schedule market, the DAM and enhanced real-time commitment (ERUC) will reduce costs by improving how resources are scheduled and introducing a financially binding day-ahead commitment to provide greater production and operational certainty. Simply, in driving down risk, financial certainty encourages more resources to participate, giving the IESO more operational certainty as real-time approaches, and paving the way for the efficiencies that lead to lower costs for consumers.

Stakeholder engagement on design decisions in preparation for the drafting of high-level design (HLD) documents was the primary focus in 2018. The renewal of the electricity market is the largest change to the market since its opening in 2002, and will continue to require broad sector participation to inform the final design and decision-making. Next year, with the release of the HLD documents for all four initiatives – the single-schedule market, day-ahead market, ERUC and the ICA – the MRP will mark a significant milestone on the road to full implementation.

Sidebar: Meeting system needs effectively

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

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

Roadmap set to build innovation into the way we do business

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

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

Sidebar: Addressing barriers to fair competition part of encouraging sector innovation

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

The IESO's focus on paving the way for storage resources to play a larger role in IESO-administered markets also aligns with policy goals south of the border, where the U.S. Federal Energy Regulatory Commission has issued new requirements to level the playing field. Under Order 841, released earlier this year, U.S. system operators must establish participation models and market rules that recognize the physical and operational characteristics of electric storage

resources. In the absence of similar requirements in Ontario, the IESO is committed to proactively tackling the barriers within its control to take advantage of resources that are often less expensive and easier to deploy and that provide a faster and more accurate response to market signals.

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

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

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

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

Better aligning conservation with system and customer needs

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

Distribution-connected consumers saved 4.8 TWh and transmission connected consumers 0.6 TWh respectively. Overall, conservation program costs came in at just under 3 cents/kilowatt-hour, considerably less than the target threshold of less than 4 cents/kilowatt-hour.

With the understanding that conservation is a resource that can reduce demands and benefit ratepayers, the IESO is working more closely with planners to ensure that conservation programs are maximizing system value, that future targets are aligned with system need, and

with a renewed focus on being more customer-centric. Any changes in programs will also need to ensure a focus on rate payer value and reflect the shift to a more competitive, less prescriptive performance model that pays for verified energy savings achieved, regardless of source.

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

Leading through engagement

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

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

Transforming the market

Given the high-stakes nature of the IESO's market renewal activities, which will fundamentally transform the foundation of Ontario's $17-billion annual electricity market, a comprehensive engagement strategy for the Market Renewal Program (MRP) has been a priority from day one. Stakeholders – including suppliers, consumers, emerging technologies, demand-side resources and others – helped shape preliminary decisions, providing input into the scope and set of initiatives to be included under the MRP, and the assessment of expected future benefits.

To date, the IESO has held over 50 market renewal stakeholder engagement and Market Renewal Working Group meetings and discussed more than 170 decisions within 19 design

elements. With the release in 2018 and 2019 of high-level designs (HLDs) for each of the energy and capacity initiatives, engagements with stakeholders will shift into high gear, with educational sessions on the implications of the design for various participants and continuing opportunities for feedback. The goal: to ensure stakeholders have an opportunity to provide meaningful input into HLDs and on the detailed-design phase of the project in preparation for full implementation.

Expanding relationships to inform and be informed on sector needs

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

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

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

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

An authoritative source of information, an independent voice

As a not-for-profit corporation with an independent Board of Directors, the IESO has no financial stake in the industry, ensuring its independence both financially and as a contributor to ongoing dialogue and evolution of the system. This makes the IESO well positioned to drive

the transformation of high-profile programs – including the redesign of the electricity market, cybersecurity and innovation – throughout the province's electricity sector.

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

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

Financial Overview

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

The revenue requirement for 2019 is $190.8 million, which is at the same level as 2018 and 2017. The revenue requirement will be funded by the IESO usage fees.

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

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

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

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

For 2019, the IESO anticipates an average headcount of 726 to deliver its core electricity system responsibilities while continuing the implementation of its strategic initiatives. The Market

Renewal Program will require an average headcount of 125 as the program advances to the detailed design stage. This brings the total headcount requirement for the IESO to 851 in 2019.

Detailed Financials

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

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

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

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

Capital

The IESO regularly prioritizes capital initiatives. The business planning process establishes an appropriate capital envelope for core operating initiatives with commitments approved individually on an ongoing basis. This practice is consistent with prior years. The Market Renewal Program began its capital implementation stage in late 2018, and will continue its efforts well into 2021. The table below provides a summary of the total capital spending required in this plan. Project details and associated descriptions are included within Appendix 3.

Capital ($ Millions)	2018 Budget	2018 Forecast	2019 Budget	2020 Budget	2021 Budget
Core Operations Initiatives	22.6	15.4	17.3	20.3	17.9
Market Renewal	4.0	1.2	38.0	43.3	40.8
Total Capital Envelope	**26.6**	**16.6**	**55.3**	**63.6**	**58.7**

Staffing

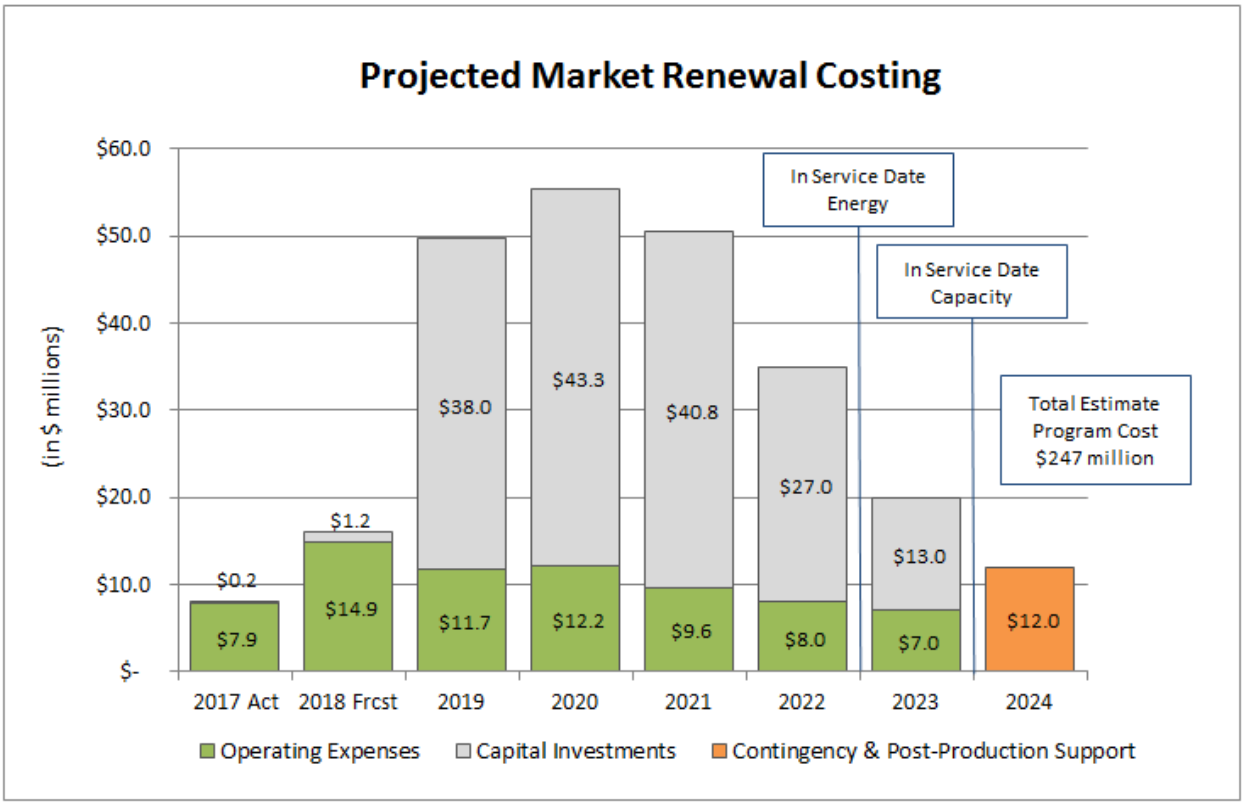
Total average FTEs are expected to increase in the 2019–2021 planning period due to temporary resourcing required to support the Market Renewal Program and additional resources in core operations to support the IESO's planning, corporate and information technology support services and cybersecurity initiatives.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

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

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

Market Renewal Program Financials

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



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

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

The 2018 projected capital costs for market renewal are $1.2 million, compared to a budget of $4.0 million.

The total cost for the program at the end of 2018 is $22.4 million in operating expenses and $1.4 million in capital expenses.

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

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

Green Ontario Fund

In 2017 the IESO entered into two agreements with the Ministry of Environment and Climate Change to support the design and delivery of programs that help homeowners and businesses reduce energy use and greenhouse gas emissions. All funding for Green Ontario Fund programs, with the exception of the province-wide Smart Thermostat Rebate Program, is recovered through the Greenhouse Gas Reduction Account. Funding for the Smart Thermostat Rebate Program is jointly funded from the Conservation First Framework budget and GreenON.

The provincial government announced the closure of the GreenON programs delivered by the IESO in mid-2018. The IESO is now implementing a wind-up plan in accordance with the terms of the agreements.

Appendix 1: Corporate Performance Management (CPM) – 2019 Measures and Targets

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

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

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

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

IESO Corporate Performance Management: 2019 Measures and Targets

Themes	Reliability and Resiliency	Corporate Agility and Effectiveness	Sector Leader – Purposeful Engagement	Innovation	Cost Efficiency
Strategic Outcomes	An integrated electricity system that is reliable, resilient and secure in a period of accelerating change	A talented, diverse and empowered workforce that has the flexibility to respond to internal and external customer needs	A long-term energy perspective for IESO initiatives that delivers independent and informed energy policy advice	Integration of acquired sector innovation expertise into our operations, planning and advice	Best cost resource acquisition to efficiently manage IESO-administered markets in an evolving sector
Performance Priorities	• Enhance grid reliability and resiliency for Ontario through: ○ Proactive response to system events ○ Training and simulation exercises ○ Active communication ○ Advocacy to evolve NERC/NPCC compliance and enforcement • Establish cybersecurity leadership in the sector and improve system resiliency with a focus on: ○ Situational awareness ○ Collaboration ○ Information exchange ○ Cyber defense	• Galvanize the organization around a shared IESO identity that empowers and engages employees by: ○ Breaking down silos ○ Fostering a positive IES*One* culture ○ Enhancing leadership capabilities • Execute an effective and scalable governance structure for project oversight to enable more timely delivery of the project portfolio • IESO resources are used effectively and efficiently to meet the needs of customers today and in the future	• Engage stakeholders in a targeted and purposeful manner to contribute to the development of effective energy policy • Be a thought leader in energy policy and market development	• Identify, understand and remove barriers to emerging technologies, new business models and increased competition in the electricity sector in support of cost-efficiencies and enhanced reliability for the electricity system	• Improve the way electricity is priced, scheduled and procured, including renewing the market to generate a projected net present value of $3-5 billion • Achieve the 2020 Conservation First Framework (CFF) targets while leading provincial conservation and energy efficiency efforts • Maximize and broaden the use and value of smart meter data products
Corporate Measures	**1.** Electricity System Reliability **2.** Electricity System Resiliency	**3.** Employee Engagement **4.** Project Management **5.** Financial Management	**6.** Stakeholder Engagement **7.** Electricity System Planning	**8.** Innovation	**9.** Market Renewal **10.** Resource Acquisition **11.** Data Availability

Annual Corporate Targets	**1.1** Zero violations of NERC high risk factor reliability requirements within the IESO's control **1.2** Integrated Regional Resource Plans for the Windsor-Essex, Toronto, GTA North, Burlington-Nanticoke and Greater Ottawa regions are completed or on track to be completed within the timelines prescribed by the OEB's regional planning process **2.1** Achievement of 2019 cybersecurity milestones	**3.1** Achievement of the sub-indices of the engagement survey scores related to collaboration, an inclusive culture and enhanced leadership capabilities **4.1** Implement an effective and scalable governance structure for project delivery by end of Q2 2019 and 90% of all high-ranked projects advance into the initiation phase within three months of ranking **5.1** 2019 priorities are achieved within +/- 5% of the IESO's approved budget	**6.1** 2% improvement in satisfaction with the stakeholder engagement process is reported, compared to the 2018 customer satisfaction survey result **7.1** Complete bulk electricity system report by end of Q3 and publish to inform investment and long-term energy plans in Ontario	**8.1** Implementation of the emerging technology, research and development plan for electricity sector innovation for work streams, including distributed energy resources, storage and data access, resource efficiency (e.g. ,automation, artificial intelligence) and achieve milestones identified for 2019	**9.1** Market Renewal Program (MRP) cost performance index (CPI) and schedule performance index (SPI) year-end accumulated averages are each above 0.9 **9.2** Develop the MRP business case by end of 2019 that considers the following high-level designs: ○ Single schedule market ○ Day-ahead market ○ Enhanced real-time unit commitment ○ Incremental capacity auction **10.1** The 2015-2020 conservation energy savings target is contracted within 4 cents/kWh **11.1** Develop an integrated enterprise level data strategy by end of 2019

Appendix 2: Key 2019 Risks

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

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

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

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

Appendix 3: IESO Capital Spending

Summary of 2019 – 2021 Capital Spending

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

2019 – 2021 Capital Plan Details

Project	Description
ORI Program	A holistic review of all the processes and tools in Market and System Operations with the intent to sustain the level of services to meet reliability standards with the efficient use of resources.
Wallboard Refresh	The Wallboard Refresh project is required to replace the control room wallboards at both the Clarkson and Backup Operating Centres. The Clarkson wallboard is well past its end-of-life and the BOC wallboard will be out of support by the end of 2018. The QA wallboard will be refreshed for IT support of the two control rooms.
Infrastructure Refresh	This budget includes miscellaneous building services, software license renewals and procurement of hardware.
Replacement of the Settlement Systems	Given the age of the systems, the evolution of the market since 2002, expected market redesign from the Market Renewal Program and the changing scope of IESO settlements arising from the merger of the former IESO and former OPA, the current settlements systems are due for replacement to ensure our systems can meet our current and future business needs.
FIT & microFIT Tool Redevelopment and Integration Project	The FIT and microFIT Tool Redevelopment and Integration Project will integrate the procurement and contract management functions of both the FIT and microFIT programs, creating a single comprehensive and secure system that allows for accurate and efficient data management across programs and business units.
Aspen Refresh Project	Aspen is the IESO's corporate fileserver. Much of the IESO's business information resides on Aspen. As part of this project, the underlying hardware and software for Aspen will be replaced. Data that resides on existing Aspen fileserver will be copied to the new Aspen fileserver as part of the project.
Access Switches	To replace existing network access switches.

Project	Description
IESO Simulator Project – Phase 2	The IESO Simulator is an essential part of the Control Room Operator's training to ensure we deliver superior reliability performance in a changing environment. As outlined in the original business case for the Operations Training Simulator, maintaining reliability of Ontario's electricity system continues to be our primary focus. One of the risks we face is that staff with little experience may not have either the capability or the confidence to respond appropriately when a significant contingency occurs or when we need to execute a material system restoration. As a result, operators need to gain the necessary experience through a more effective training experience supported by a power system simulator. Since the introduction of the Operations Training Simulator in 2014, our operators have benefitted significantly from being able to respond to both routine and extreme system events in a safe environment. With the simulator, in one week we can expose a team of control room operators to a variety of training scenarios that they might not see in five years on-shift. The initial delivery of the IESO Simulator Project in December 2014 did not include the IESO's custom EMS security applications. During the closure of this project, it was agreed that these security applications would be delivered as part of the EMS replacement project. The EMS replacement project, which was completed in 2016, upgraded the existing IESO Simulator to the latest EMS platform (NM6.4) and introduced the EMS security applications. Although the security applications are part of the latest Simulator delivery, we are unable to use them to provide a sufficiently realistic training experience for IESO Control Room operators and achieve the objectives stated in the original business case. The new IESO Simulator Project – Phase 2 initiative will address the outstanding items above and allow us to fully integrate the EMS security applications into the simulation environment.

Project	Description
Wide Area View	In order to meet industry best practices and to maintain compliance with evolving NERC Interconnection Reliability Operations (IRO) standards and audit expectations, the IESO must improve its awareness of critical elements in adjacent Reliability Coordinator (RC) areas. Improved monitoring will include power flows, voltages and equipment status within MISO, NYISO, PJM and TransEnergie. This project will allow the IESO to achieve improved situational awareness and maintain compliance with NERC IRO standards by: 1) Expanding the IESO's power system detailed network model to include the neighbouring RC areas; 2) Conducting a wide area view study to identify and monitor critical elements impacting the IESO-controlled grid that reside in neighbouring RC areas; 3) Enabling appropriate contingency monitoring in these external areas to ensure that we monitor elements outside of Ontario that impact operating limits within the province; and 4) Providing control room operators with timely information and instructions to respond to monitored external events.
PMU Integration	This project, in support of the IESO's 2016-2020 Strategic Plan, will integrate PMU information into the IESO's power system monitoring and analysis systems. In turn, we will develop capabilities for efficient operation of the power system and to demonstrate compliance with a number of real-time monitoring-related NERC standards. For post-event review, we will require PMU information to support NERC MOD-033-1 compliance when it comes into effect (July 1, 2019).
Tier1 Storage Refresh project	The Tier 1 storage platform provides the massive amounts of disk storage required by many of the critical applications and databases used at the IESO, as well as the disaster recovery capability for these applications and databases. As part of this project, the existing Tier 1 storage platform will be replaced with a new disk storage platform, and data residing on existing Tier 1 storage will be copied to the new platform.

Project	Description
Oracle 12c Technical Refresh	The Oracle Real Application Cluster (RAC) 11g database service supports a number of the IESO's mission critical applications, such as Central Forecast System (CFS), ETL Repository, Metrix IDR, Energy Market Interface (EMI), Customer Data Management System (CDMS), RMS, Surveillance Data Repository, Day Ahead Optimization System (DAOS), and the Market Information System (MIS). Oracle has announced that premier support has already ended for Oracle 11g software – the IESO will need to move our database service to Oracle 12c to maintain vendor premier support. We will be maintaining the Oracle 11g cluster for applications that are not supported on the Oracle 12c platform. This aligns with the IESO strategy to provide 2 database revisions, and provides the flexibility to update the application based on business needs and timelines.
SCADA/EMS Replacement	This project will review our energy management and data acquisition requirements to establish a modern platform that provides the control room and back office staff with the tools necessary to monitor and manage power system reliability.
Dispatch Data Management System (DDMS) Refresh	The Dispatch Data Management System (DDMS) is a suite of tools used by IESO staff to interact with the Dispatch Schedule Optimizer and Day Ahead Commitment computation engines. Equipment thermal limits, system constraints, operating reserve and other inputs can be entered via DDMS to shape energy and reserve market schedules. Once computed, dispatch instructions and interchange schedules (imports/exports) are managed using DDMS tools. This project will look to update infrastructure components used by DDMS. At project completion, DDMS will be deployed on vendor-supported hardware and software. In addition to upgrading the system we will be making improvements to the solution design to address reliability and performance concerns, as well as implementing functional improvements.

Project	Description
IT Service Management (ITSM)	This program that will be responsible for two key organizational deliverables: 1. Reviewing, updating and enhancing the processes and tools used for IT Service Management (ITSM) 2. Enhancing and consolidating the IESO Helpdesk functions.
Control Room Upgrade	This project is part of the Operation Readiness Initiative (ORI) Program. The program business objective is to provide an operational framework that allows M&SO to adapt to the evolving environment, while maintaining the same level of performance and risk tolerance associated with managing the reliability of the grid. Through productivity improvements, ORI will allow M&SO to reduce the total number of budgeted M&SO staff by six full-time equivalents (FTEs) for the work that we do now and repurpose an additional six FTEs within M&SO by December 31, 2018. This project, which contributes to the reduction of FTEs for the ORI Program, is one of four initiatives within the Human Performance Improvements stream of ORI which, as a group, will contribute approximately 10 minutes of savings per hour in the Control Room. The Control Room Upgrade will improve the physical layout and furnishings within the Control Room to align with the changes resulting from the other ORI projects impacting the Control Room. Time savings will be realized through improved displays and summaries to find information more quickly and facilitate information exchange.

Market Renewal Program (MRP)	The Market Renewal Program (MRP), the most significant suite of reforms since the market opened in 2002, will address known efficiency issues and prepare us to meet future challenges. It will enhance the way we schedule and price energy, acquire capacity resources and deliver greater flexibility. The project scope includes improvements to the way the IESO schedules and prices energy, procures supply resources and delivers greater flexibility from existing assets and from our interties. The changes proposed to the market include: • moving from a two-schedule system (where prices are determined under one schedule and energy is dispatched under another) to a more efficient, single-schedule market; • moving from scheduling and dispatching primarily in real time to a financially binding day-ahead market that will provide the IESO and market participants with more certainty; • introducing a 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; and • delivering greater flexibility from existing assets and from our interties

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IESO 2019 - 2021 Business Plan

IESO Audit Committee of the Board of Directors

August 28th, 2018

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Business Plan: Key Priorities

- Advancing Market Renewal to deliver a more competitive and efficient market to improve the way electricity is priced, scheduled and acquired
- Preparing for the future by conducting integrated planning while seeking innovative solutions that enhance reliability and help lower costs
- Investing in cybersecurity to protect the grid through leadership in cybersecurity best practices for the sector
- Broadening engagement and leveraging the IESO's role as a trusted information source to drive collaboration and inform decision-making
- Implementing conservation changes to better align the system and consumer needs and transition to the market of the future

Business Plan Highlights

- 2019 revenue requirement remains flat to 2018 and 2017 levels
- Investments in cybersecurity, IT process enhancements and Market Renewal are offset by other organizational efficiencies
- Prudent prioritization of incremental resources is applied to closely manage staffing cost pressures
- In 2019, portions of Market Renewal begin to move to capitalized work to support detailed design
- IESO's core capital plan of $17.3 million is focused primarily on in-flight and refresh projects
- Market Renewal capital costs are $38.0 million

Key assumptions:

2019 Cost Pressures

- Increased staffing costs including incremental resource requirements and impact of collective agreements necessitate prudent management of incremental hires

- Continuing cybersecurity enhancements including the OEB direction to IESO

- Ongoing focus on strategic priorities to enhance grid reliability and resiliency, effectively allocate resources in support of corporate agility, demonstrate leadership in purposeful engagement, innovation and cost efficiency

Key assumptions - continued:

Market Renewal budget of $11.7M vs $l2.7M in 2018

- Detailed costing for each work stream, including timing of capital phases
- Reduced MRP contingency
- Risk of cost over-runs if Capacity work stream is delayed

IT service levels and project delivery impacts

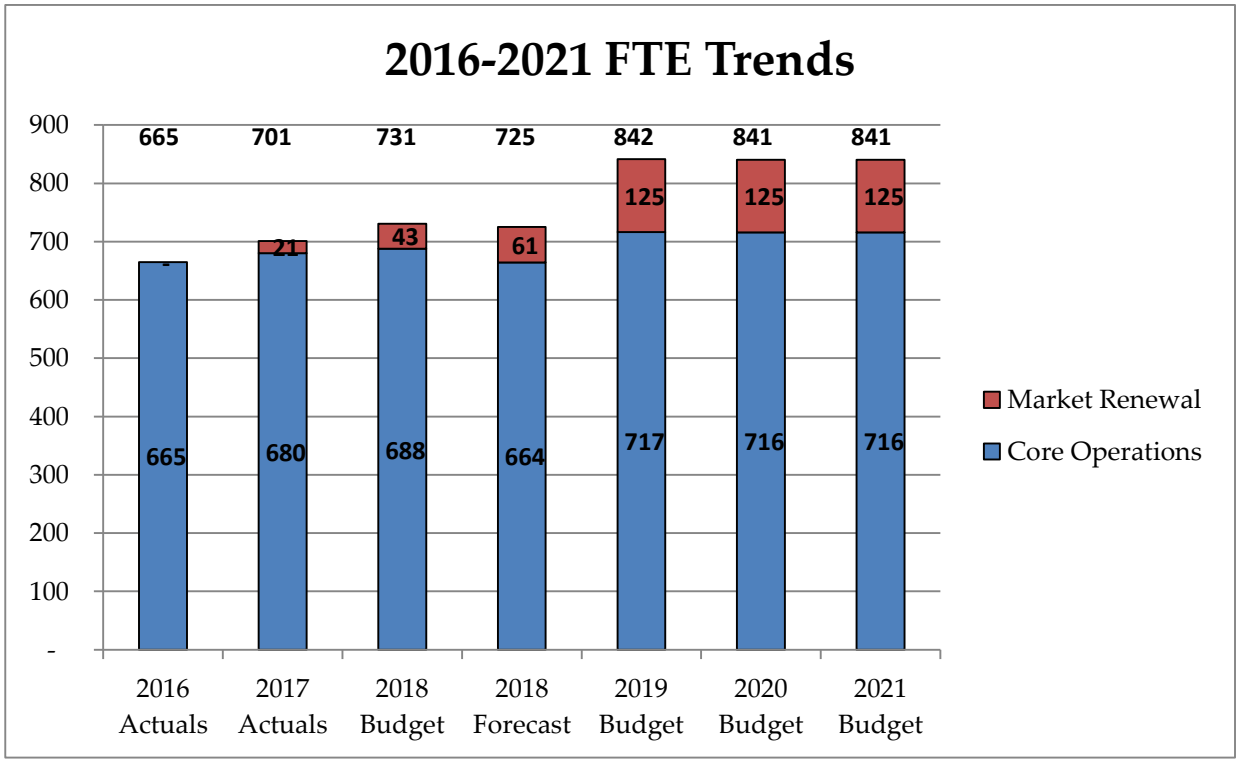
- Helpdesk and service improvements implementation will be slower, utilizing existing resources
- Operating costs related to capital projects are limited, resulting in slower ramp up time and project delivery

Outer years - 2020 and 2021 assumptions:

Overall spending levels will be in line with CPI/Inflation rates of 2.1%

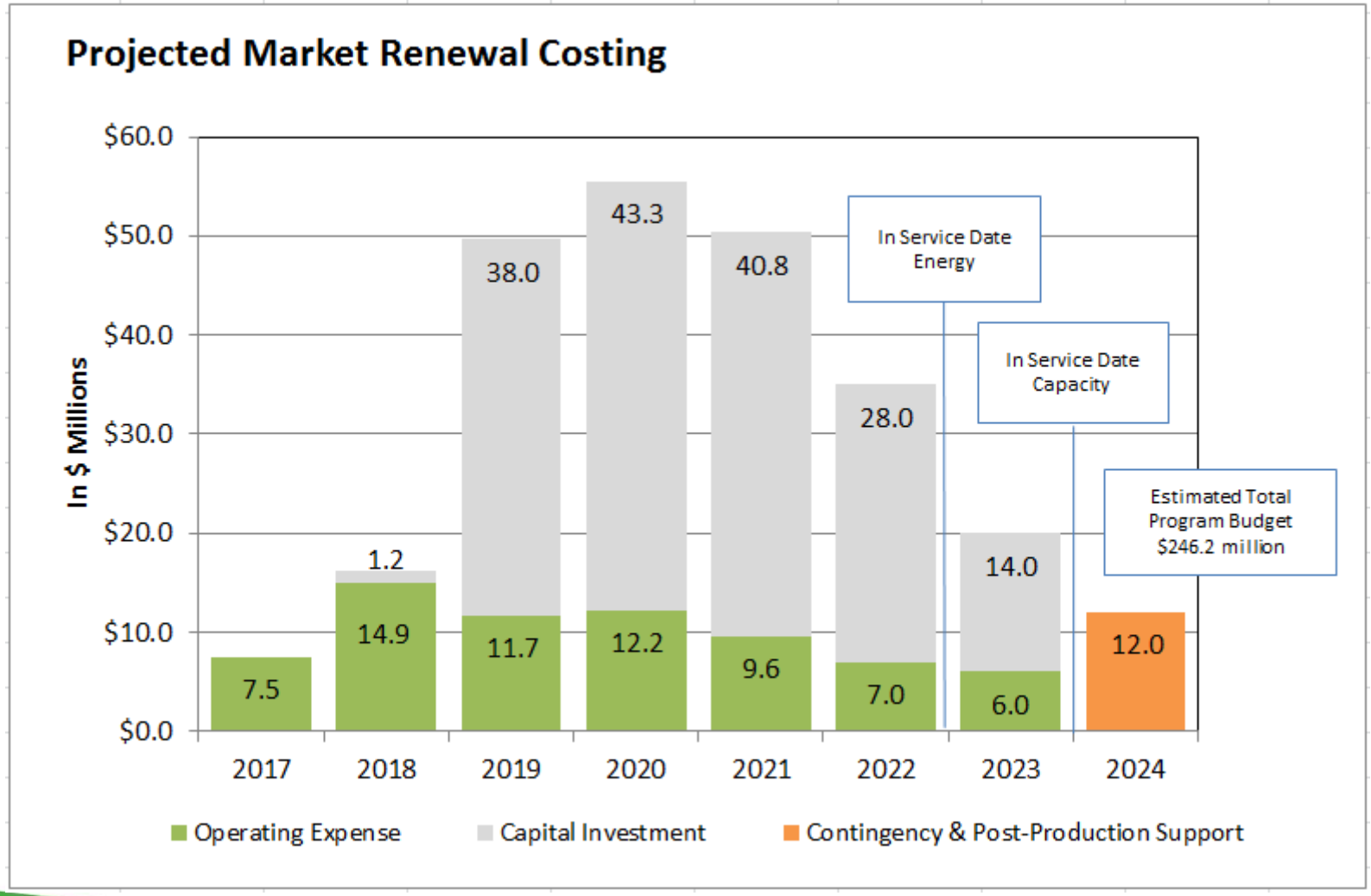
- Collective agreements' escalation impacts are included
- Amortization expense continues to increase with assets going into service
- Some 2019 external cost recoveries are not sustained
- Market Renewal costs are predominantly capitalized, partially mitigating overall operating budget pressures
- Offsetting efficiencies will be required

Staffing Trends



- Core Operations staffing has gradually been increasing to support core initiatives like cybersecurity, IT process enhancements, planning and internal infrastructure support
- MRP staffing increases further in 2019 to support the detailed designs related to the energy and capacity work streams, development of new market rules and market rule amendments

Market Renewal Project Financials



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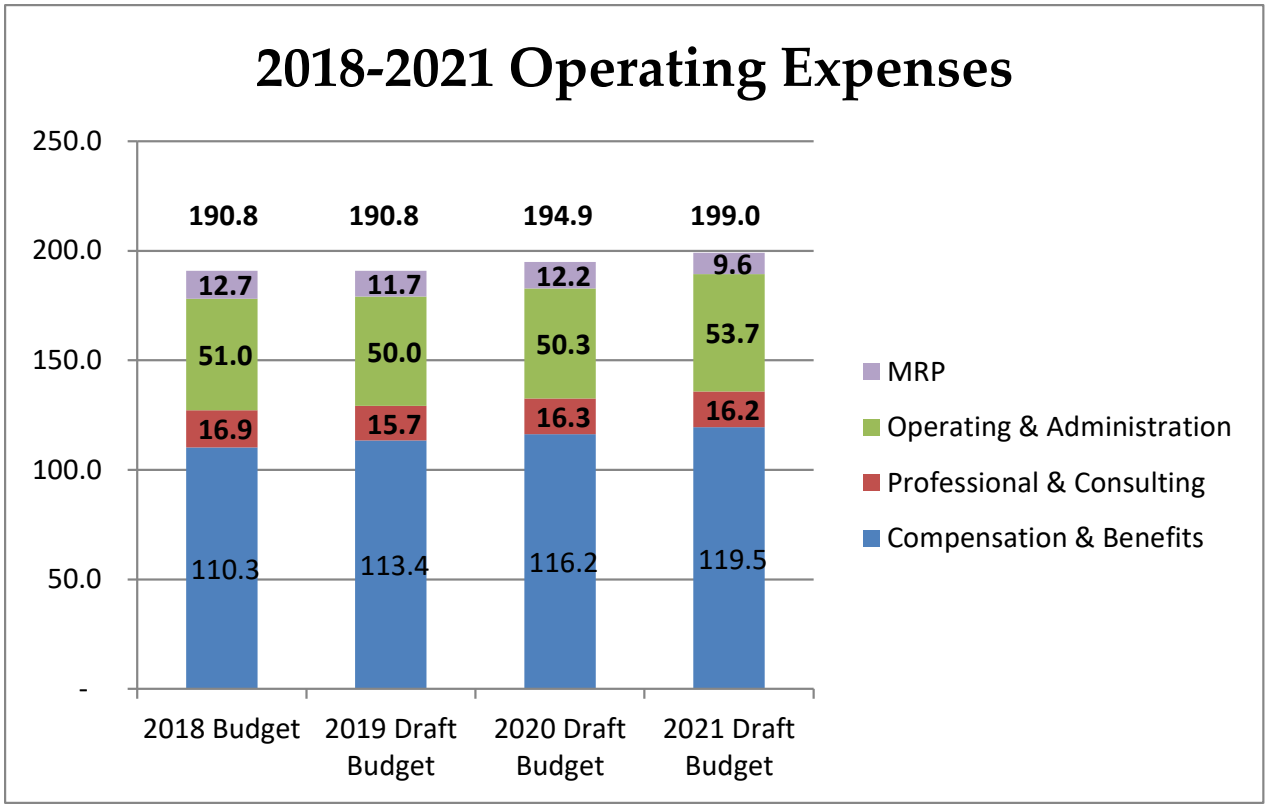
Financial Trends

(in millions $)	2015 Budget	2016 Budget	2017 Budget	2018 Budget	2019 Budget	2020 Budget	2021 Budget
Revenue							
Usage Fees	$181.2	$181.1	$190.8	$190.8	$190.8	$194.9	$199.0
Registration Fees	2.0	1.0	0.6	-	-	-	-
Other	1.9	-	-	-	-	-	-
Revenue	$185.1	$182.1	$191.4	$190.8	$190.8	$194.9	$199.0
Operating Expenses	$184.6	$182.1	$191.4	$190.8	$190.8	$194.9	$199.0
Surplus/(Deficit)	$0.5	-	-	-	-	-	-
Usage Fee (per TWh)	$1.24						
Usage Fee Domestic (per TWh)		$1.1636	$1.2187	$1.2402	$1.2566	$1.2820	$1.3085
Usage Fee Exports (per TWh)		$0.9603	$0.9872	$1.0115	$0.8748	$0.8888	$0.8843

- Impact of Market Renewal on IESO's fees begins in 2017
- 2019 revenue is maintained at 2018 and 2017 levels
- 2020 and 2021 revenue increases are below CPI/inflation rates
- Variability in usage fee is also impacted by demand forecasts, with 2019 usage fees projected to increase by 1%

Financial Trends continued…



- Annual funding requirements increase by an average of 1.4% over the planning period, below CPI forecasts of 2.1%

2019 - 2021 Capital Projects

Capital ($ Millions)	2018 Budget	2019 Budget	2020 Budget	2021 Budget
Core Operations Initiatives	22.6	17.3	20.3	17.9
Market Renewal	4.0	38.0	43.3	40.8
Total Capital Envelope	**26.6**	**55.3**	**63.6**	**58.7**

- The business planning process establishes an appropriate capital envelope for core operating initiatives with commitments approved individually on an ongoing basis.
- Historical trends in capital spending were considered in establishing the 2019 capital envelope.
- The core capital budget of $17.3 million is focused primarily on in-flight and refresh projects, with an additional $39 million required for MRP
- MRP detailed design is expected to begin in 2019 and implementation and testing in 2020

Corporate Performance Management

CPM program underwent significant internal and external consultations to enhance its value and relevance and:

- Align measures and annual targets to the IESO's overall strategic and business plans
- Better communicate strategic business areas
- Enhance CPM governance and oversight
- Provide a means to continuously evaluate and focus corporate performance
- Achieve a diverse set of measures and targets

Reliability and Resiliency	Cost Efficiency
Strategic Outcome: An integrated electricity system that is reliable, resilient and secure in a period of accelerating change	**Strategic Outcome:** Best cost resource acquisition to efficiently manage IESO-administered markets in an evolving sector
Measures: Electricity System Reliability Electricity System Resiliency	**Measures:** Market Renewal Resource Acquisition Data Availability
2019 Targets: Zero violations of NERC high risk factor reliability requirements within the IESO's control Integrated Regional Resource Plans for the Windsor-Essex, Toronto, GTA North, Burlington-Nanticoke and Greater Ottawa regions are completed or on track to be completed within the timelines prescribed by the OEB's regional planning process. Achievement of 2019 cybersecurity milestones	**2019 Targets:** Market Renewal Program (MRP) cost performance index (CPI) and schedule performance index (SPI) year-end accumulated averages are above each 0.9 Develop the MRP business case by end of 2019 that considers the following high level designs: o Single schedule market o Day ahead market o Enhanced real-time unit commitment o Incremental capacity auction The 2015-2020 conservation energy savings target is contracted within 4 cents/kWh Develop an integrated enterprise level data strategy by end of 2019

Corporate Agility and Effectiveness	Sector Leader – Purposeful Engagement	Innovation
Strategic Outcome: A talented, diverse and empowered workforce that is flexible to respond to internal and external customer needs	**Strategic Outcome:** A long-term energy perspective for IESO initiatives that delivers independent and informed energy policy advice	**Strategic Outcome:** Integration of acquired sector innovation expertise into our operations, planning and advice
Measures: Employee Engagement Project Management Financial Management	**Measures:** Stakeholder Engagement Electricity System Planning	**Measures:** Innovation
2019 Targets: Achievement of the sub-indices of the engagement survey scores related to collaboration, an inclusive IESOne culture and enhanced leadership capabilities Implement an effective and scalable governance structure for project delivery by end of Q2 2019 and 90% of all high ranked projects advance into the initiation phase 2019 priorities are achieved within +/- 5% of the IESO's approved budget	**2019 Targets:** 2% improvement in satisfaction with the stakeholder engagement process is reported, compared to the 2018 customer satisfaction survey result Complete bulk electricity system report by end of Q3 and publish to inform investment and long term energy plans in Ontario	**2019 Targets:** Implement the emerging technology, research and development plan for electricity sector innovation for work streams including distribute energy resources, storage and data access, resource efficiency (e.g. automation, artificial intelligence) and achieve milestones identified for 2019

ERM Risk Assessment & Key Risks

- IESO has an established enterprise risk management (ERM) framework in place to identify, assess, manage and report on key risks impacting the achievement of strategic and key business objectives.
- Enterprise risks are formally assessed annually. The Executive Leadership Team determines key risks based on assessment input from the business.
- IESO's Board of Directors receive quarterly updates on the status of mitigation plans in place to mitigate key risks.

ERM Risk Assessment & Key Risks

IESO key risks are as follows:

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

Resolution of the Board of Directors
Independent Electricity System Operator

August 29th, 2018

In Respect of Approval of the 2019 – 2021 Business Plan and the included 2019 Corporate Performance Management Measures and Targets

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BE IT RESOLVED THAT the 2019 – 2021 Business Plan and the Corporate Performance Management Measures and Targets for fiscal 2019 as recommended by the Audit Committee, presented and discussed at this meeting of the Board, be approved.

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SEC INTERROGATORY 2

1.1-SEC-2

INTERROGATORY

[Ex. B-3-1] Please revise Appendices 2-AA, 2-JB, 2-JC and 2-JK for 2018 actuals.

RESPONSE

For Appendix 2-AA please see the response to AMPCO Interrogatory 18, at Exhibit I, Tab 1.4, Schedule 13.18.

Appendix 2-JB
Cost Drivers Table

(in thousands)	2018 Latest Estimate	2018 Actual	2019 Budget
Previous Year Actual	**183,297**	**183,297**	**193,044**
Compensation & Benefits	3,264	7,959	(5,380)
Professional & Consulting Fees	1,247	1,058	1,991
Operating & Administration	1,632	1,795	1,835
Amortization	621	1,412	(1,215)
Interest	(865)	(2,477)	528
Total Actual/Application Year Budget	**189,196**	**193,044**	**190,803**

Appendix 2-JC
Operating Tables Table

(in $ millions)		2018 Latest Estimate	2018 Actual	2018 Budget	2019 Budget
CEO		**7.9**	**7.9**	**7.7**	**7.7**
	CEO Office	6.5	6.5	6.0	6.3
	Internal Audit	1.4	1.4	1.6	1.5
Planning, Acquisition and Operations		**40.8**	**40.7**	**46.2**	**44.2**
	VP Office	1.2	1.3	1.8	0.7
	Power System Assessments	14.1	13.6	14.9	15.1
	Resource Planning	4.3	4.4	4.3	4.8
	Transmission Planning	3.6	3.6	4.2	4.9
	Market Operations	14.7	15.1	16.1	15.7
	Markets & Procurement	2.8	2.8	5.0	3.0
Policy, Engagement and Innovation		**20.6**	**21.0**	**22.1**	**24.5**
	VP Office	1.0	0.8	0.5	0.8
	Energy Efficiency	4.7	4.6	4.1	4.4
	Alliances and Marketing	2.9	2.9	2.9	3.4
	Corporate & Indigenous Relations	6.9	7.4	8.0	8.4
	Policy Innovation	2.9	2.9	3.9	4.7
	Regulatory Affairs	2.2	2.3	2.8	2.8
Information and Technology Services		**39.9**	**40.2**	**39.7**	**41.8**
	VP Office	1.3	1.1	1.1	0.6
	Organizational Governance Support	1.6	1.7	1.3	1.9
	Information Security	3.5	3.5	3.9	5.5
	Business Solutions	16.0	16.0	15.3	16.7
	Technology Services	17.5	17.9	18.1	17.2
Legal Resources and Corporate Governance		**15.4**	**16.3**	**15.3**	**14.1**
	VP Office	1.1	1.1	1.1	1.3
	General Counsel	5.9	6.5	5.3	5.0
	Board	0.7	0.7	0.7	0.7
	Contract Management	7.8	7.9	8.2	7.0
Corporate Services		**24.8**	**24.9**	**23.8**	**24.4**
	VP Office	0.9	1.0	0.4	0.5
	Finance & Treasury	3.5	3.4	3.5	3.7
	Procurement	1.5	1.5	1.6	1.5
	Financial Planning and Analysis	1.6	1.6	1.5	1.5
	Settlements	5.2	5.3	5.4	5.4
	Enterprise Change	3.7	3.6	2.7	2.8
	Facilities	8.4	8.5	8.7	9.0
Human Resources		**5.1**	**5.1**	**5.1**	**5.0**
Market Assessment and Compliance Division		**1.6**	**1.6**	**1.9**	**2.0**
Market Renewal		**15.0**	**14.9**	**12.7**	**11.7**
Corporate Adjustments		**18.1**	**20.4**	**16.3**	**15.3**
	General	4.1	7.2	2.0	2.8
	Amortization	18.8	19.6	17.7	18.4
	Interest	(4.8)	(6.4)	(3.4)	(5.9)
Total		**189.2**	**193.0**	**190.8**	**190.8**

Appendix 2-K
Employee Costs

	2017 Actual	2018 Latest Estimate	2018 Budget	2019 Budget	2019 Actual March 31
Number of Employees (FTEs)					
Executive	7	7	6	7	7
Management	107	118	118	132	119
Non-Management Regular	534	529	575	633	534
Non-Management Temporary	53	63	32	71	84
Total	701	716	731	842	744
All figures below are in $ millions					
Total Salary and Wages					
Executive and Board	3.2	3.4	2.9	3.4	0.7
Management	14.9	17.7	18.6	17.4	4.0
Non-Management Regular	62.0	59.6	63.0	63.8	15.7
Non-Management Temporary	6.2	8.1	4.0	5.2	2.1
Total	86.3	88.9	88.5	89.8	22.5
Total Benefits					
Executive	0.9	0.9	0.7	0.9	0.2
Management	5.9	6.1	6.1	5.8	1.5
Non-Management Regular	24.5	22.5	21.9	21.8	6.0
Non-Management Temporary	1.0	1.0	0.5	0.7	0.4
Total	32.3	30.6	29.2	29.1	8.1
Total Compensation (Salary, Wages & Benefits)					
Executive and Board	4.1	4.3	3.6	4.2	0.9
Management	20.8	23.8	24.7	23.2	5.5
Non-Management Regular	86.5	82.2	84.9	85.7	21.7
Non-Management Temporary	7.2	9.1	4.5	5.8	2.5
Total	118.6	119.5	117.7	118.9	30.6

Note: The values for Executive and Board & Non-Management Regular within the Total Salary and Wages in 2018 Budget have been corrected from the original application filing. The correction has not changed the total.

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SEC INTERROGATORY 3

1.1-SEC-3

INTERROGATORY

Please provide details of all productivity and efficiency measures the IESO undertook in 2018 and plans to undertake in 2019.

RESPONSE

Please see the response to OEB Interrogatory 6 a), at Exhibit I, Tab 1.1, Schedule 1.06

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SEC INTERROGATORY 4

1.1-SEC-4

INTERROGATORY

With respect to the 2018 Corporate Performance Measures:

a. Please provide a copy of the 2018 Corporate Performance Measures and targets.

b. Please provide the actual results of each Corporate Performance Measure.

RESPONSE

a. 2018 Corporate Performance Measures and targets are provided below:

CPM	Description	2018 CPM Target
1) Reliable electricity service is sustained in a changing environment.	Reliability risks are assessed within a violation risk factor (VRF) matrix. VRFs indicate the potential reliability impact of violating a standard requirement. Each requirement is assigned a violation risk factor from the following three levels – high, medium, or low; this CPM being concerned with the high VRFs. A high VRF, if violated, could directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures; or, a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures, or could hinder restoration to a normal condition. Given that the IESO is the sole entity in Ontario accountable to NERC (North American Electricity Reliability Corporation) and NPCC (Northeast Power Coordinating Council) reliability standards and criteria, the IESO must be able to demonstrate continuous compliance as it is subject to a rigorous compliance framework: • Numerous compliance assessments throughout the year (spot checks, self-certifications) • Mandatory on-site comprehensive audit every 3 years due to the importance of its functional roles on the bulk power system • All potential violations, regardless of severity, must be identified, reported and addressed (self-reports) • All confirmed violations are subject to possible financial penalties	100% compliance to NERC high violation risk factor (VRF) standard requirements is achieved. Compliance to the High VRF standard includes all the following 14 categories: • Resource and Demand Balancing • Communications • Critical Infrastructure Protection • Emergency Preparedness and Operations • Facilities Design, Connections, and Maintenance • Interchange Scheduling and Coordination • Interconnection Reliability Operations and Coordination • Modeling, Data, and Analysis • Nuclear • Personnel Performance, Training, and Qualifications • Protection and Control • Transmission Operations • Transmission Planning • Voltage and Reactive

CPM	Description	2018 CPM Target
	and corrective action plans.	
2) The IESO is a recognized cybersecurity leader in the energy sector.	IESO's cybersecurity program is a strategic contributor to the sector's ability to protect the bulk electricity system reliability and in addressing threats to critical business operations. To meet the requirements of the established objective, the IESO needs to develop best in class cybersecurity systems, policies and capabilities such as the new 24/7 Security Operations Center (SOC) and to implement a "cybersecurity by design" culture at the enterprise level for all procured, or in-house developed technical solutions. Externally, the IESO also needs to establish a leading role within the electricity sector, through broad sector collaboration and an information sharing program as per OEB's cybersecurity framework (as per March 12th response to the letter from the OEB.)	By the end of 2018: • A cybersecurity maturity level of 3.5/5, as defined by recognized industry standards, achieves an increase of approximately 25% over the 2016 baseline; and • Implement all requirements of the OEB's information sharing program and support LDCs compliance with OEB's Cybersecurity Framework (such as self-certification reports).
3) Conservation and energy efficiency programs are available to all customers in Ontario to support the achievement of the 2020 Conservation First Framework (CFF) targets.	The 2015-2020 CFF and the Industrial Accelerator Program maps out Ontario's energy conservation goals over a six-year period, emphasizing a coordinated effort within all stages of energy planning, as well as more effective teamwork among sector partners, particularly with local distribution companies (LDCs). The goal of the conservation efforts is a total reduction of 8.7 TWh of electricity consumption in Ontario by December 31, 2020 to be achieved through conservation projects with transmission-connected customers, and from conservation programs delivered by LDCs to residential and business customers across the province. Each year, annualized targets are set to ensure that the IESO and the sector is making progress towards the achievement of the overall CFF goal.	By the end of 2018: • 66% (5.7 TWh) of the combined 2015-2020 energy savings target of 8.7 TWh for Conservation First Framework (CFF) and Industrial Accelerator Program is contracted in a cost-effective manner within 4 cents/kWh.
4) The electricity market evolves to enable the province to have the appropriate sources of electricity at a more competitive market price.	Market Renewal is about improving the way electricity is priced, scheduled and procured to meet Ontario's current and future energy needs reliably, transparently, efficiently and at the lowest cost. Key Market Renewal initiatives are identified below: **Single Schedule Market** The IESO is working with stakeholders to design and develop a single schedule market (SSM) to replace the existing two schedule system. This initiative is a key foundational element of the IESO's Market Renewal program. **Day Ahead Market** The IESO is working with stakeholders to design and develop a financially-binding Day-Ahead Market. A Day-Ahead Market will provide market participants with price certainty ahead of real-time, increase operational certainty for both market participants and the	High-level designs are complete and published for stakeholder review (but not formally approved) for the Market Renewal Program (MRP) projects including: • Single schedule market – end of Q3 2018 • Day ahead market – end of Q4 2018 • Enhanced real-time unit commitment – end of Q4 2018 • Incremental capacity auction – end of Q2 2019

CPM	Description	2018 CPM Target
	IESO, and reduce out of market payments. **Enhanced Real-time Unit Commitment** The IESO is working with stakeholders to design and develop an Enhanced Real-Time Unit Commitment (ERUC) program. An Enhanced Real-Time Unit Commitment Program will improve the efficiency of unit commitments in the intra-day timeframe by considering all resource costs in commitment decisions. An ERUC will also improve commitment decisions overall by optimizing over multiple hours rather than solving for each hour independently. **Incremental Capacity Auction** The IESO is working with stakeholders to design and develop an Incremental Capacity Auction (ICA). The ICA initiative will develop an enduring market-based mechanism that will secure incremental capacity to help ensure Ontario's reliability needs are met cost effectively. Developing an ICA is a key element of the IESO's Market Renewal program. Enhanced Real-Time Unit Commitment, together with a Day-Ahead Market and a Single Schedule Market collectively will improve the dispatch, commitment and pricing of resources in the energy market.	
5) Enhance the value of the smart meter data by enabling various third parties to leverage the consumption data in the meter data management repository (MDM/R) in a privacy compliant manner.	The IESO, as the Smart Metering Entity (SME) of Ontario, is responsible for maintaining and operating the province's smart meter data repository that processes, stores and protects electricity consumption data used for consumer billing by Ontario's local distribution companies. The IESO is working on enhancing the value of the data in the provincial MDM/R and set a path for third party access to this data for a range of purposes including: o Design, development and implementation of conservation and demand response programs o Electricity system planning o Academic research o Predictive billing o Outage management o Development of new products and services that support the potential of big data o Others	By the end of 2018, the Smart Meter Entity will have established the processes and policies to enable MDM/R data products to be available publicly or by third-party request, as per the process approved by the OEB and in compliance with the Information and Privacy Commissioner's (IPC) requirements.
6) Execution of government policy by the IESO towards the achievement of long term planning and	The IESO has a key role informing and implementing policy. The IESO is responsible for issuing a technical report to inform the Government of Ontario's Long-Term Energy Plan (LTEP) and provide an execution plan to outline the steps it will take to implement LTEP policy initiatives.	By the end of 2018: • 100% of the 10 key initiatives from the 2017 Long-Term Energy Plan are progressing on time and budget, as evidenced by meeting associated milestones and timelines in 2018.

CPM	Description	2018 CPM Target
reliability goals.		Key initiatives and timelines include: o First Nation and Metis Energy Support Programs – Q1 2018 o First Nation and Metis Conservation Programs – Q1 2018 o Renewable Distributed Generation Demonstration Projects – Q4 2018 o Energy Storage – Q3 2018 o Power-to-Gas Pilot Projects – Q4 2018 o Bulk System Planning Process (develop high level issues/straw case proposal for discussion with stakeholders) – Q4 2018 o Regional Planning Process (complete review of the existing process and complete a jurisdictional scan) – Q4 2018 o Transmission Assets End-of-Life – Q4 2018 o Transmission Procurement Process (develop high level issues/straw case proposal for discussion with stakeholders) – Q4 2018 o Customer Reliability (complete need assessment for changes to IESO reliability standards) – Q3 2018
7) The Ontario energy sector is innovative with the IESO's active support to enable reliable, efficient and clean technologies and foster a competitive and inclusive	The Innovation Roadmap will encompass an IESO-wide innovation strategy and work plan. Based on input from across the IESO, external stakeholders and interested parties, the strategy will set out a vision for innovation within the electricity and broader energy sector, and IESO's role and key objectives with regards to grid modernization and broader innovation in support of our mandate. The multi-year work plan will outline the specific actions that IESO will take in pursuit of the vision and objectives including a research agenda that will set out specific initiatives to be undertaken to generate necessary learnings, test out new ways of doing business and guide IESO's innovation investments	By the end of 2018, an Innovation Roadmap is developed and approved, informed by engaging a broad range of industry partners and stakeholders to support an environment that enables sector transformation. The Roadmap will encompass an IESO-wide innovation strategy and work plan that is endorsed by the IESO board in Q4 2018.

CPM	Description	2018 CPM Target
network for emerging resources.	(e.g. projects funded through the Conservation Fund, Renewable Distributed Energy Integration Fund).	
8) Stakeholders and communities are confident with the engagement process for making informed decisions.	On an annual basis, the IESO conducts customer and stakeholder surveys to help determine the level of stakeholder satisfaction with the IESO's engagement process. The annual survey is designed to gauge customer's perspectives on the IESO's management of the stakeholder engagement process.	A 2% improvement in satisfaction with the stakeholder engagement process is achieved from the 2017 customer satisfaction survey baseline of 67% that also establishes the new benchmark to measure progress in future years.
9) The IESO holds its revenue requirement at approved budget levels.	The IESO intends to hold its revenue requirement for 2018 at 2017 approved budget levels and continues to work to identify potential operating efficiencies within the planning period. The resourcing requirements to maintain high levels of performance required by the IESO includes delivering its core electricity system requirements as well as executing key initiatives such as Long-Term Energy plan implementation, cybersecurity leadership and continued progress of the Market Renewal Program.	2018 priorities are achieved within the IESO's approved budget of $190.8 million.
10) Employees are engaged towards achievement of the IESO's business priorities.	An engaged workforce is necessary to meet the needs of the sector in the future. Better engagement is intended to lead to better productivity whereby, a more engaged workforce will feel a connection and alignment to the IESO's overall purpose and an inherent belief that the work undertaken is important. Each year, the IESO reaches out to its staff for feedback via an in-depth engagement survey or smaller 'pulse' surveys to pinpoint areas of improvement for the organization. The survey is conducted by an independent third party and the results inform an overall employee engagement action plan.	By the end of 2018, a 4-point increase in employee engagement is achieved from the baseline of 71% set in 2016.

b. Corporate performance results for each measure are provided below:

Overall, the IESO 'met expectations' regarding its overall performance against the 2018 CPM targets. The rationale for this overall recommendation is based on all targets being achieved with the exceptions noted below.

While the target result in red below relating to, *"A 2% improvement in satisfaction with the stakeholder engagement process is achieved from the 2017 customer satisfaction survey baseline of 67% that also establishes the new benchmark to measure progress in future years"* did not meet

expectations, the score for stakeholder satisfaction achieved a stable result of 67/100; the same score as 2017.

This satisfaction score demonstrates that stakeholders continue to believe that the IESO provides for effective change in the sector and considers the broader sector complexities and uncertainties.

CPM Measure	2018 CPM Target	Result
1) Reliable electricity service is sustained in a changing environment.	100% compliance to NERC high violation risk factor (VRF) standard requirements is achieved. Compliance to the High VRF standard includes all the following 14 categories: • Resource and Demand Balancing • Communications • Critical Infrastructure Protection • Emergency Preparedness and Operations • Facilities Design, Connections, and Maintenance • Interchange Scheduling and Coordination • Interconnection Reliability Operations and Coordination • Modeling, Data, and Analysis • Nuclear • Personnel Performance, Training, and Qualifications • Protection and Control • Transmission Operations • Transmission Planning • Voltage and Reactive	
2) The IESO is a recognized cybersecurity leader in the energy sector.	By the end of 2018: • A cybersecurity maturity level of 3.5/5, as defined by recognized industry standards, achieves an increase of approximately 25% over the 2016 baseline; and • Implement all requirements of the OEB's information sharing program and support LDCs compliance with OEB's Cybersecurity Framework (such as self-certification reports).	
3) Conservation and energy efficiency programs are available to all customers in Ontario to support the achievement of the 2020 Conservation First Framework (CFF) targets.	By the end of 2018: • 66% (5.7 TWh) of the combined 2015-2020 energy savings target of 8.7 TWh for Conservation First Framework (CFF) and Industrial Accelerator Program is contracted in a cost-effective manner within 4 cents/kWh.	
4) The electricity market evolves to enable the province to have the appropriate sources of electricity at a more competitive market price.	High-level designs are complete and published for stakeholder review (but not formally approved) for the Market Renewal Program (MRP) projects including: • Single schedule market – end of Q3 2018 • Day ahead market – end of Q4 2018 • Enhanced real-time unit commitment – end of Q4 2018 • Incremental capacity auction – end of Q2 2019	
5) Enhance the value of	By the end of 2018, the Smart Metering Entity will have established the processes and policies	

CPM Measure	2018 CPM Target	Result
the smart meter data by enabling various third parties to leverage the consumption data in the meter data management repository (MDM/R) in a privacy compliant manner.	to enable MDM/R data products to be available publicly or by third-party request, as per the process approved by the OEB and in compliance with the Information and Privacy Commissioner's (IPC) requirements.	
6) Execution of government policy by the IESO towards the achievement of long term planning and reliability goals.	By the end of 2018: • 100% of the 10 key initiatives from the 2017 Long-Term Energy Plan are progressing on time and budget, as evidenced by meeting associated milestones and timelines in 2018. Key initiatives and timelines include: o First Nation and Metis Energy Support Programs – Q1 2018 o First Nation and Metis Conservation Programs – Q1 2018 o Renewable Distributed Generation Demonstration Projects – Q4 2018 o Energy Storage – Q3 2018 o Power-to-Gas Pilot Projects – Q4 2018 o Bulk System Planning Process (develop high level issues/straw case proposal for discussion with stakeholders) – Q4 2018 o Regional Planning Process (complete review of the existing process and complete a jurisdictional scan) – Q4 2018 o Transmission Assets End-of-Life – Q4 2018 o Transmission Procurement Process (develop high level issues/straw case proposal for discussion with stakeholders) – Q4 2018 o Customer Reliability (complete need assessment for changes to IESO reliability standards) – Q3 2018	
7) The Ontario energy sector is innovative with the IESO's active support to enable reliable, efficient and clean technologies and foster a competitive and inclusive network for emerging resources.	By the end of 2018, an Innovation Roadmap is developed and approved, informed by engaging a broad range of industry partners and stakeholders to support an environment that enables sector transformation. The Roadmap will encompass an IESO-wide innovation work plan that is endorsed by the IESO board in Q4 2018.	
8) Stakeholders and communities are confident with the engagement process for making informed decisions.	A 2% improvement in satisfaction with the stakeholder engagement process is achieved from the 2017 customer satisfaction survey baseline of 67% that also establishes the new benchmark to measure progress in future years.	

CPM Measure	2018 CPM Target	Result
9) The IESO holds its revenue requirement at approved budget levels.	2018 priorities are achieved within the IESO's approved budget of $190.8 million.	
10) Employees are engaged towards achievement of the IESO's business priorities.	By the end of 2018, a 4-point increase in employee engagement is achieved from the baseline of 71% set in 2016.	

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SEC INTERROGATORY 5

1.1-SEC-5

INTERROGATORY

Please provide a summary of all internal audit reports issued in the past year, their recommendations and the status of the implementation of those recommendations.

RESPONSE

Internal Audit provides independent and objective services on risk management, controls and governance processes to management and the Audit Committee of the Board of Directors. The IESO Internal Audit function is committed to being a high value, cost-effective contributor to the overall business success of the IESO. Annually, the Internal Audit group develops a three-year Audit Services Plan.

The Audit Services Plan typically includes audits covering process control, information technology and policy compliance. The following provides a listing of the internal audits completed in 2018 by audit type, a summary of key themes and recommendations, and the current status of management's remediation activities

Process Control

The objectives of a process control review are to confirm that the IESO's controls are designed appropriately for the task, as well as to verify that they are operating as designed. These reviews may confirm that the organizational or program processes are aligned with leading industry practices.

The Information Technology audits completed are:

- Nuclear Refurbishment Contract Management Process
- Stakeholder Engagement
- Regional Planning
- DSO/DACE (external)
- Ontario Reliability Compliance Program
- Evolve Market & Market Rules
- Corporate Procurement

The following is a summary of key themes documented by Internal Audit to address identified findings:

- Ensure clarity of roles and responsibilities of business units in stakeholder engagement
- Increase clarity and transparency of the LAC process in regional planning
- Improve access to data
- Increase coordination between MACD and rest of IESO on ORCP
- Increase transparency of IESO Board's role in market rule oversight
- Improve transparency around plans for future market rule changes
- Ensure that the market rules group is prepared and able to manage potential influx of rule changes arising from market renewal
- Clarify roles and responsibilities related to contract management
- Ensure procurement directive is clearly understood by staff

Information Technology

The objective of an IT review is to confirm that IESO's IT system control and processes are designed appropriately for the purpose, as well as to verify that these controls are operating as intended. These reviews often confirm that the controls and practices are aligned with leading industry practices. IT and end user computing tool reviews are often included within process audits.

The Information Technology audits completed are:

- Cloud Computing: Services Provider Management

The following is a summary of key themes documented by Internal Audit to address identified findings:

- Ensure access management occurs in a timely and accurate manner
- Ensure ongoing monitoring of security posture of service providers
- Standardise treatment of IT service providers (SAAS, PAAS and IAAS)

Policy Compliance & Governance

The objective of policy compliance reviews is to confirm that the organization is in compliance with documented and approved corporate or government policies. A secondary objective of these reviews is to identify any existing gaps in the policy and procedure (e.g. a new government administrative directive, such as the Travel, Meal, Hospitality and Expenses Directive) that should be updated by the IESO.

The Policy Compliance audits completed between are:

- Treasury Board Directive compliance
- Internal Audit Quality Assurance Review
- Corporate Performance Metrics review
- Market Renewal Program Governance

The following is a summary of key recommendations documented by Internal Audit to address identified findings:

- Clear documentation of roles and responsibilities within projects
- Ensure approval authority is clear within projects

Management Response and Action Plans

Management has fully participated in the internal audit process, has accepted recommendations presented by Internal Audit and implemented necessary action plans.

As of March 2019 there were fifty-five (55) open action items related to the following completed audits:

- Resolve dispute (2014)
- Business Continuity Management Review (2016)
- Market Rules Enforcement Process Review (2016)
- Entity-Level Control Framework (2017)
- Resolve IT Incident and Resolve IT Problem (2017)
- Conservation Plan and Program Approval Process (2017)
- Stakeholder Engagement (2017)
- Regional Planning (2017)
- Cloud computing (2017)
- Ontario Reliability Compliance Program (2018)
- Evolve Market and Market Rule Amendment (2018)
- Corporate Procurement (2018)

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SEC INTERROGATORY 6

1.1-SEC-6

INTERROGATORY

Since the filing of the Application, the Minister has issued a number of directives to the IESO related to CDM.

a. Please provide a copy of all directives received by the IESO.

b. Please provide details regarding the impact of the directives on the 2019 IESO's operations and budget.

c. With respect to part (b), please explain how the costs related to the additional responsibilities given to the IESO related to CDM programs will be funded.

RESPONSE

a. Directives received by the IESO related to CDM are provided as Attachments 1 and 2 to this response (Conservation First Framework (CFF) and Industrial Accelerator Program (IAP) wind-down, and Interim Framework, respectively).

b. Please see the response to OSEA Interrogatory 2 part (d) ii, at Exhibit I, Tab 5.1, Schedule 5.02.

c. As per the March 21, 2019 directives from the Ministry of Energy, Northern Development and Mines, the costs associated from the wind-down of the CFF and IAP, and the operation of the Interim Framework will continue to be recovered from the Global Adjustment Mechanism.

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Ontario

Executive Council of Ontario
Order in Council

On the recommendation of the undersigned, the Lieutenant Governor of Ontario, by and with the advice and concurrence of the Executive Council of Ontario, orders that:

Conseil exécutif de l'Ontario
Décret

Sur la recommandation de la personne soussignée, le lieutenant-gouverneur de l'Ontario, sur l'avis et avec le consentement du Conseil exécutif de l'Ontario, décrète ce qui suit :

WHEREAS the Minister of Energy, Northern Development and Mines (Minister) is committed to ensuring that Ontario has an affordable and reliable electricity system, while continuing to find efficiencies in the electricity sector;

AND WHEREAS it is desirable that the Minister bring forward an initiative designed to refocus current conservation and demand management efforts on the most cost-effective programs and delivery models;

AND WHEREAS the Minister may, with the approval of the Lieutenant Governor in Council, issue directives under subsections 25.32(5) and (11) of the *Electricity Act, 1998* that require the Independent Electricity System Operator to undertake any initiative or activity that relates to measures related to the conservation of electricity or the management of electricity demand and may amend or revoke directions previously issued for that purpose;

NOW THEREFORE the Directive attached hereto is approved.

ATTENDU QUE le ministre de l'Énergie, du Développement du Nord et des Mines (le « ministre ») est résolu à faire en sorte que l'Ontario dispose d'un réseau d'électricité abordable et fiable, tout en continuant à réaliser des économies dans le secteur de l'électricité ;

ATTENDU QU'il est souhaitable que le ministre présente une initiative visant à recentrer les efforts actuels de conservation de l'énergie et de gestion de la demande sur les programmes et les modèles de prestation qui sont les plus rentables au regard des résultats ;

ATTENDU QUE le ministre peut, sous réserve de l'approbation du lieutenant-gouverneur en conseil peut, en vertu des paragraphes 25.32 (5) et (11) de la *Loi de 1998 sur l'électricité*, donner des directives qui obligent la Société indépendante d'exploitation du réseau d'électricité à entreprendre toute initiative ou activité liée aux mesures concernant la conservation de l'électricité ou la gestion de

la demande d'électricité, et que le ministre peut modifier ou annuler des directives antérieures qui ont été données à cette fin ;

PAR CONSÉQUENT, la directive ci-jointe est approuvée.

Recommended: Minister of Energy, Northern Development and Mines
Recommandé par : Le ministre de l'Énergie, du Développement du Nord et des Mines

Concurred: Chair of Cabinet
Appuyé par : Le président | la présidente du Conseil des ministres

Approved and Ordered: MAR 2 0 2019
Approuvé et décrété le :

Alexandre ACOD.

Administrator of the Government
L'administratrice du gouvernement

MINISTER'S DIRECTIVE

TO: THE INDEPENDENT ELECTRICITY SYSTEM OPERATOR

I, Greg Rickford, Minister of Energy, Northern Development and Mines hereby direct the Independent Electricity System Operator (IESO) pursuant to subsections 25.32(5) and (11) of the *Electricity Act, 1998* (Act) in regard to two previously established electricity conservation and demand management (CDM) procurement initiatives, the 2015-2020 Conservation First Framework (CFF) and the Industrial Accelerator Program (IAP), which were undertaken by the IESO in accordance with one or more directions previously issued, as follows:

Background

Our government is committed to ensuring that Ontario has an affordable and reliable electricity system, while continuing to find efficiencies in the electricity sector.

To date, electricity CDM programs in Ontario have resulted in significant electricity savings and given consumers choices on how to reduce their electricity costs. However, consumers now are much more aware of their conservation options and the range of affordable products, services and technology.

The IESO's recent system planning assessment, which includes ongoing benefits from energy efficiency, indicates that Ontario has sufficient options to satisfy electricity demand needs for the near term.

It is therefore appropriate to re-evaluate the current CDM programs and to refocus efforts on the most cost-effective initiatives and discontinue programs and delivery models that are less effective in driving cost efficiencies and meeting system needs.

In addition to this Directive, I intend to issue a directive to the Ontario Energy Board (OEB) to provide the OEB with the authority to amend or remove licence conditions for local distribution companies (LDCs) that relate to CDM. I also intend to issue a companion directive to the IESO directing it to offer a suite of centrally-delivered electricity CDM Programs.

Directive

Therefore, in accordance with the authority I have pursuant to subsections 25.35(5) and (11) of the Act, I hereby direct the IESO in respect of the CFF and IAP procurement initiatives, as follows:

1. To take all steps necessary to immediately discontinue the CFF;

2. To take all steps necessary to immediately discontinue the IAP;

3. To take all other steps which are necessary in order to facilitate the full and complete implementation of this Directive, as soon as is practicable;

4. To use all commercially reasonable efforts to minimize costs associated with the CFF and IAP procurement initiatives, including costs associated with the immediate discontinuance of such procurement initiatives;

5. To complete by September 30, 2019, an achievable potential study for electricity efficiency in Ontario, to inform electricity efficiency planning and programs. The achievable potential study should, as far as is appropriate and reasonable having regard to the respective characteristics of the electricity and natural gas sectors, be coordinated with the natural gas efficiency achievable potential study referred to in the directive to the Ontario Energy Board dated March 26, 2014; and

6. To report quarterly to the Ministry on all costs and activities related to the discontinuance of the CFF and IAP procurement initiatives.

Consequential Amendments

1. The direction entitled "2015-2020 Conservation First Framework" that was issued to the Ontario Power Authority on March 31, 2014 is hereby revoked.

2. The direction entitled "Industrial Accelerator Program" that was issued to the Ontario Power Authority on July 25, 2014 is hereby revoked.

3. The direction entitled "Amending March 31, 2014 Direction Regarding 2015-2020 Conservation First Framework" that was issued to the Ontario Power Authority on October 23, 2014 is hereby revoked.

4. Section 2 and the corresponding paragraphs under the Background heading of the direction entitled "Upgrades to Existing Renewable Projects, Conservation First Framework and Support Programs" that was issued to the IESO on June 10, 2016 is hereby revoked.

5. Sections 3, 4 and the corresponding paragraphs under the Background heading of the direction entitled "Non-Utility Generators (NUGs) under Contract with the Ontario Electricity Financial Corporation (OEFC), Feed-in Tariff (FIT) Procurements, 2015-2020 Conservation First Framework, and Delivery of Programs under the Conservation First

Framework and the Industrial Accelerator Program" that was issued to the IESO on December 16, 2016 are hereby revoked.

6. The direction entitled "2015-2020 Conservation First Framework and Partnering with Green Ontario Fund; Delivery of Conservation and Demand Management Programs Targeted to the Low-Income Customer Segment" that was issued to the IESO on August 4, 2017 is hereby revoked.

7. Section 1 and the corresponding paragraphs under the Background heading of the direction entitled "Amendments to Ministerial Directions Arising from the Long-Term Energy Plan 2017" that was issued to the IESO on October 26, 2017 is hereby revoked.

8. The direction entitled "Reallocation of Targets from the Industrial Accelerator Program to the 2015-2020 Conservation First Framework and Delivery of Programs Targeted to On-Reserve First Nations Communities" that was issued to the IESO on February 8, 2018 is hereby revoked.

General

For greater clarity, all other terms of any previous direction or directive remain in full force and effect.

This Directive takes effect on the date it is issued.

DIRECTIVE DU MINISTRE

DESTINATAIRE : LA SOCIÉTÉ INDÉPENDANTE D'EXPLOITATION DU RÉSEAU D'ÉLECTRICITÉ

Je soussigné, Greg Rickford, ministre de l'Énergie, du Développement du Nord et des Mines, enjoint par les présentes à la Société indépendante d'exploitation du réseau d'électricité (SIERE), en vertu des paragraphes 25.32 (5) et (11) de la *Loi de 1998 sur l'électricité* (la « Loi »), de prendre les mesures qui suivent à l'égard de deux initiatives déjà établies de conservation de l'énergie et de gestion de la demande, c'est-à-dire le Cadre stratégique de priorité à la conservation de l'énergie 2015-2020 et le Programme d'accélération pour le secteur industriel, initiatives qui avaient été entreprises par la SIERE conformément à une ou plusieurs directives données auparavant :

Contexte

Notre gouvernement est déterminé à faire en sorte que l'Ontario dispose d'un réseau d'électricité abordable et fiable, tout en continuant de trouver des solutions efficaces dans le secteur de l'électricité.

Jusqu'à présent, les programmes de conservation d'énergie et de gestion de la demande d'électricité en Ontario ont permis de réaliser d'importantes économies d'électricité et d'offrir aux consommateurs des choix sur la façon de réduire leurs frais d'électricité. Toutefois, aujourd'hui, les consommateurs sont beaucoup plus conscients de leurs options de conservation d'énergie et plus au courant de la gamme de produits, de services et de technologies qui sont abordables.

L'évaluation récente de la planification du réseau de la SIERE, qui comprend les avantages continus de l'efficacité énergétique, indique que l'Ontario dispose de suffisamment d'options pour répondre à la demande d'électricité à court terme.

Il convient donc de réévaluer les programmes actuels de conservation d'énergie et de gestion de la demande d'électricité, de recentrer les efforts sur les initiatives les plus rentables et d'abandonner les programmes et les modèles de fourniture d'énergie qui sont moins efficaces afin de réaliser des économies et répondre aux besoins du système.

En plus de la présente directive, j'ai l'intention de donner une directive à la Commission de l'énergie de l'Ontario (CEO) pour que celle-ci ait le pouvoir de modifier ou de supprimer les conditions de permis des sociétés locales de distribution (les distributeurs locaux) qui ont trait à la conservation d'énergie et à la gestion de la demande d'électricité. J'ai également l'intention de donner à la SIERE une directive complémentaire lui enjoignant d'offrir une série

de programmes centralisés de conservation d'énergie et de gestion de la demande d'électricité.

Directive

Par conséquent, en vertu des pouvoirs que me confèrent les paragraphes 25.35 (5) et (11) de la Loi, j'ordonne par la présente à la SIERE, à l'égard du Cadre stratégique de priorité à la conservation de l'énergie et du Programme d'accélération pour le secteur industriel, ce qui suit :

1. Prendre toutes les mesures nécessaires pour mettre fin immédiatement au Cadre stratégique de priorité à la conservation de l'énergie ;

2. Prendre toutes les mesures nécessaires pour mettre fin immédiatement au Programme d'accélération pour le secteur industriel ;

3. Prendre toutes les autres mesures nécessaires pour que la mise en œuvre intégrale et complète de la présente directive se fasse dès que possible ;

4. Déployer tous les efforts raisonnables sur le plan commercial pour réduire au minimum les coûts associés aux initiatives d'approvisionnement dans le Cadre stratégique de priorité à la conservation de l'énergie et dans le Programme d'accélération pour le secteur industriel, y compris les coûts associés à la cessation immédiate de ces initiatives d'approvisionnement ;

5. Terminer, d'ici au 30 septembre 2019, une étude sur le potentiel d'efficacité réalisable de l'utilisation de l'électricité en Ontario afin de guider la planification et les programmes d'efficacité énergétique. L'étude du potentiel réalisable devrait, dans la mesure appropriée et raisonnable (compte tenu des caractéristiques respectives des secteurs de l'électricité et du gaz naturel), être coordonnée avec l'étude du potentiel réalisable d'efficacité du gaz naturel mentionnée dans la directive donnée à la Commission de l'énergie de l'Ontario et datée du 26 mars 2014 ;

6. Remettre un rapport trimestriel au ministère sur tous les coûts et toutes les activités liés à l'abandon des initiatives d'approvisionnement dans le Cadre stratégique de priorité à la conservation de l'énergie et dans le Programme d'accélération pour le secteur industriel.

Les modifications corrélatives

1. La directive intitulée « 2015-2020 Conservation First Framework » (en anglais seulement - Cadre stratégique de priorité à la conservation de l'énergie 2015-2020) qui a été donnée à l'Office de l'électricité de l'Ontario le 31 mars 2014 est par les présentes révoquée.

2. La directive intitulée « Programme d'accélération pour le secteur industriel » qui a été donnée à l'Office de l'électricité de l'Ontario le 25 juillet 2014 est par les présentes révoquée.

3. La directive intitulée « Amending March 31, 2014 Direction Regarding 2015-2020 Conservation First Framework » (en anglais seulement - Modification de la directive du 31 mars 2014 concernant le Cadre stratégique de priorité à la conservation de l'énergie 2015-2020) qui a été donnée à l'Office de l'électricité de l'Ontario le 23 octobre 2014 est par les présentes révoquée.

4. La deuxième section et les paragraphes correspondants sous la rubrique « Background » (Contexte) de la directive intitulée « Upgrades to Existing Renewable Projects, Conservation First Framework and Support Programs » (en anglais seulement - Mises à niveau des projets d'énergie renouvelable existants, du Cadre stratégique de priorité à la conservation de l'énergie et des Programmes de soutien) qui a été donnée à la SIERE le 10 juin 2016 sont par les présentes abrogés.

5. Les troisième et quatrième sections et les paragraphes correspondants sous la rubrique « Background » (Contexte) de la directive intitulée « Non-Utility Generators (NUGs) under Contract with the Ontario Electricity Financial Corporation (OEFC), Feed-in Tariff (FIT) Procurements, 2015-2020 Conservation First Framework, and Delivery of Programs under the Conservation First Framework and the Industrial Accelerator Program » (en anglais seulement - Producteurs privés d'électricité qui ont une entente avec la Société financière de l'industrie de l'électricité de l'Ontario (SFIÉO), Approvisionnements au titre du programme de tarifs de rachat garantis (TRG), Cadre stratégique de priorité à la conservation de l'énergie 2015-2020 et Prestation de programmes en vertu du Cadre stratégique de priorité à la conservation de l'énergie et du Programme d'accélération pour le secteur industriel) donnée à la SIERE le 16 décembre 2016 sont par les présentes abrogés.

6. La directive intitulée « 2015-2020 Conservation First Framework and Partnering with Green Ontario Fund; Delivery of Conservation and Demand Management Programs Targeted to the Low-Income Customer Segment » (en anglais seulement - Cadre stratégique de priorité à la conservation de l'énergie 2015-2020 et partenariat avec le

Fonds pour un Ontario vert ; Prestation de programmes de conservation et de gestion de la demande axés sur le segment de la clientèle à faible revenu) qui a été donnée à la SIERE le 4 août 2017 est par les présentes révoquée.

7. La première section et les paragraphes correspondants sous la rubrique « Contexte » de la directive intitulée « Modifications des directives ministérielles découlant du Plan énergétique à long terme de 2017 » qui a été donnée à la SIERE le 26 octobre 2017 sont par les présentes abrogés.

8. La directive intitulée « Reallocation of Targets from the Industrial Accelerator Program to 2015-2020 Conservation First Framework and Deliver of Programs Targeted to On-Reserve First Nations Communities » (en anglais seulement - Réaffectation des cibles du Programme d'accélération pour le secteur industriel au Cadre stratégique de priorité à la conservation de l'énergie 2015-2020 et prestation de programmes destinés aux collectivités des Premières Nations vivant dans les réserves) qui a été donnée à la SIERE le 8 février 2018 est révoquée.

Disposition générale

Aux fins de précision, toutes les autres dispositions de toute directive antérieure demeurent en vigueur.

La présente directive entre en vigueur à la date de sa publication.

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Ontario

Executive Council of Ontario
Order in Council

On the recommendation of the undersigned, the Lieutenant Governor of Ontario, by and with the advice and concurrence of the Executive Council of Ontario, orders that:

Conseil exécutif de l'Ontario
Décret

Sur la recommandation de la personne soussignée, le lieutenant-gouverneur de l'Ontario, sur l'avis et avec le consentement du Conseil exécutif de l'Ontario, décrète ce qui suit :

WHEREAS the Minister of Energy, Northern Development and Mines (Minister) is committed to ensuring that Ontario has an affordable and reliable electricity system, while continuing to find efficiencies in the electricity sector;

AND WHEREAS it is desirable that the Independent Electricity System Operator (IESO) establish an interim electricity conservation and demand management (CDM) framework aimed at offering a suite of CDM programs centrally-delivered by the IESO;

AND WHEREAS the Minister may, with the approval of the Lieutenant Governor in Council, issue directives under subsection 25.32(5) of the *Electricity Act, 1998* that require the IESO to undertake any initiative or activity that relates to measures related to the conservation of electricity or the management of electricity demand;

NOW THEREFORE the Directive attached hereto is approved.

- - - - - - -

ATTENDU que le ministre de l'Énergie, du Développement du Nord et des Mines (le « ministre ») est résolu à faire en sorte que l'Ontario dispose d'un réseau électrique abordable et fiable tout en continuant de dégager des occasions de réaliser des gains en efficacité dans le secteur de l'électricité;

ATTENDU qu'il est souhaitable que la Société indépendante d'exploitation du réseau d'électricité (SIERE) établisse un cadre provisoire de conservation et de gestion de la demande (CGD) afin de proposer des programmes de CGD dont la mise en œuvre sera centralisée;

ATTENDU que le ministre peut, avec l'approbation du lieutenant-gouverneur en conseil, en vertu du paragraphe 25.32 (5) de la *Loi de 1998 sur l'électricité*, donner des directives exigeant que la SIERE lance des initiatives ou des activités portant sur des mesures de conservation de l'électricité ou de gestion de la demande en électricité;

PAR CONSÉQUENT, la directive ci-jointe est approuvée.

Recommended: Minister of Energy, Northern Development and Mines
Recommandé par : Le ministre de l'Énergie, du Développement du Nord et des Mines

Concurred: Chair of Cabinet
Appuyé par : Le président | la présidente du Conseil des ministres

Approved and Ordered: MAR 2 0 2019
Approuvé et décrété le :

Administrator of the Government
L'administratrice du gouvernement

MINISTER'S DIRECTIVE

TO: THE INDEPENDENT ELECTRICITY SYSTEM OPERATOR

I, Greg Rickford, Minister of Energy, Northern Development and Mines hereby direct the Independent Electricity System Operator (IESO) pursuant to subsection 25.32(5) of the *Electricity Act, 1998* (Act) in regard to electricity conservation and demand management (CDM) procurement initiatives, as follows:

BACKGROUND

Our government is committed to ensuring that Ontario has an affordable and reliable electricity system, while continuing to find efficiencies in the electricity sector.

As our government continues to explore cost-effective electricity CDM initiatives designed to meet Ontario's needs in the future, an interim framework will be established, ending on December 31, 2020, aimed at offering a suite of electricity CDM programs centrally-delivered through the IESO (IESO CDM Programs). In addition, there will be an opportunity for Local Distribution Companies (LDCs) to apply for limited funding from the IESO for cost-effective local programs (LDC CDM Programs).

While we shift from an LDC-led delivery approach to a central IESO-led approach in the interest of cost efficiency, the overall customer experience will be of paramount importance. We are committed to ensuring that there is a smooth transition between the two approaches and that there continues to be cost-effective CDM opportunities.

In addition to this Directive, I intend to issue a directive to the Ontario Energy Board (OEB) to provide the OEB with the authority to amend or remove licence conditions for LDCs related to CDM. I also intend to issue a companion directive to the IESO to discontinue the 2015-2020 Conservation First Framework (CFF) and the Industrial Accelerator Program.

DIRECTIVE

Therefore, in accordance with the authority I have pursuant to subsection 25.32(5) of the Act, I hereby direct the IESO to design, coordinate, deliver, and/or fund the delivery of electricity CDM programs, as appropriate, according to the following principles and requirements.

A. Principles

1. The IESO shall be directly responsible to deliver the IESO CDM Programs, utilizing procurement contracts in connection with those programs as required.
2. Electricity consumers connected to the IESO-controlled grid, and those connected to a distribution system will be eligible for the IESO CDM Programs. The IESO shall target the IESO CDM Programs to the following consumer segments:

- commercial, institutional and industrial consumers;
- low-income residential consumers; and
- on-reserve First Nation communities, including communities that are or are soon to be connected to the IESO's controlled grid.

3. The IESO shall implement the IESO CDM Programs targeting commercial, institutional and industrial consumers that demonstrate positive cost benefit benchmarks when considered jointly as a portfolio in accordance with the IESO's cost-effectiveness guidelines. For clarity, on-reserve First Nations and low-income programs will not be required to meet cost benefit benchmarks.
4. For commercial, institutional and industrial consumers, the IESO should prioritize the IESO CDM Programs which yield high reductions in electricity usage (e.g. Gigawatt hours) and peak demand reductions (e.g. Megawatts) in a cost-effective manner.
5. To the degree reasonably practicable, the IESO will coordinate the delivery of the IESO CDM Programs with entities delivering natural gas Demand Side Management.
6. The IESO shall make limited funds available for LDCs to apply to design and deliver cost-effective LDC CDM Programs that are not duplicative of the IESO CDM Programs. Eligible LDC CDM Programs may target residential, on-reserve First Nations, low income, commercial, institutional and industrial consumers. LDC CDM Programs targeting residential, commercial, institutional and industrial consumers shall demonstrate positive cost benefit benchmarks independently in accordance with the IESO's cost-effectiveness guidelines. For clarity, LDC CDM Programs targeting on-reserve First Nations communities and low-income consumers will not be required to meet cost benefit benchmarks.

B. Definition of CDM

1. For the purposes of the IESO CDM Programs and LDC CDM Programs, the IESO shall consider CDM to be inclusive of activities aimed at reducing electricity consumption and/or decreasing demand from the electricity grid. Examples of CDM include energy efficiency replacements whereby similar output is achieved with less electricity input and small scale (i.e., <10MW) behind the meter customer generation.

2. However, for the purposes of the IESO CDM Programs and LDC CDM Programs the IESO shall consider CDM to exclude those measures promoted through a different program or initiative undertaken by the Government of Ontario or the IESO, and behind the meter customer generation that uses fossil fuels purchased from or otherwise supplied by a third party as a primary fuel source.

C. Term and Limits of Funding

1. The IESO shall make the IESO CDM Programs available from April 1, 2019, or as soon as possible thereafter, to December 31, 2020 (Term) and no consumer applications to the IESO under the IESO CDM Programs or LDC applications to the IESO for LDC CDM Programs will be accepted or approved after the end of the Term.
2. The IESO shall not exceed a total budget of $353 million for the Term, which includes $27 million for any approved LDC CDM Programs as well as the $28M in central services costs and payments as described in section C.3.
3. The IESO will limit its central services costs and payments, which shall be inclusive of costs and payments for marketing, Evaluation, Measure and Verification (EM&V), compliance, capacity building and customer support, to $28 million for the Term.

D. Design and Delivery

1. Within 1 month of the issuance of this Directive, the IESO will deliver to the Ministry of Energy, Northern Development and Mines (Ministry) a CDM plan (Plan) for the Term, including details of the IESO CDM Programs that will be delivered, the estimated costs and expected results, and estimates of the budget for the LDC CDM Programs. The expected savings of electricity and the expected demand reductions will constitute the targets for the Term, which will respectively be known as the "electricity target" and "demand reduction target" (CDM Targets).
2. The IESO shall evaluate any electricity and demand savings achieved by the IESO CDM Programs and LDC CDM Programs based on the IESO's EM&V protocols in such frequency as the IESO considers appropriate.

E. Reporting

1. The IESO will report to the Ministry:
    a. Quarterly, by each IESO CDM Program and in aggregate: participation, electricity and demand savings, as well as forecasted participation, electricity and demand savings throughout the life of the IESO CDM Programs.
    b. Quarterly, financial reporting for payments disbursed and costs committed in the previous quarter and forecasted disbursements and commitments in throughout the life of the IESO CDM Programs.
    c. As required, lessons learned, upcoming issues, recommended program changes and proposed timelines for any changes.
    d. As required, any other information, as may be required by the Ministry.
2. The IESO shall continue to produce and publish annual reports detailing the overall progress of the IESO CDM Programs, LDC CDM Programs and annual incremental savings expected from provincial building codes and product standards.

F. Low-Income and on-reserve First Nations.

1. The IESO shall continue to fund and deliver the existing province-wide program, called the Home Assistance Program, targeted to low-income residential consumers on similar terms and in a similar manner as had been previously provided for under the CFF.
2. The IESO shall make best efforts to fund and deliver two local programs targeting on-reserve First Nations communities, where such programs are modeled, delivered and implemented on similar terms and in a similar manner as had been provided for under the First Nations Conservation Program and the Conservation on the Coast CDM Program.
3. The IESO shall design, fund and deliver an electricity conservation pilot program targeted at residential consumers and small businesses in on-reserve First Nations communities that are, or are soon to be, connected to the IESO-controlled grid.
4. Despite IESO CDM Programs and LDC CDM Programs targeting on-reserve First Nations and low-income consumers not being required to meet cost benefit benchmarks, the IESO shall nevertheless ensure that these programs are designed and delivered in as cost-effective a manner as is reasonably possible.

DIRECTIVE DU MINISTRE

DESTINATAIRE : LA SOCIÉTÉ INDÉPENDANTE D'EXPLOITATION DU RÉSEAU D'ÉLECTRICITÉ

Par la présente, je soussigné, Greg Rickford, ministre de l'Énergie, du Développement du Nord et des Mines, ordonne par la présente ce qui suit à la Société indépendante d'exploitation du réseau d'électricité (SIERE), en vertu du paragraphe 25.32 (5) de la *Loi de 1998 sur l'électricité* (la « Loi »), en ce qui concerne les initiatives d'acquisition en matière de conservation et de gestion de la demande (CGD) d'électricité :

CONTEXTE

Notre gouvernement est résolu à faire en sorte que l'Ontario ait un réseau d'électricité abordable et fiable tout en recherchant de nouveaux moyens de faire des gains d'efficacité dans le secteur de l'électricité.

Pendant que notre gouvernement continue d'étudier des initiatives de CGD d'électricité rentables conçues pour répondre aux besoins de l'Ontario dans l'avenir, il établira un cadre provisoire qui prendra fin le 31 décembre 2020 afin de proposer des programmes de CGD d'électricité mis en œuvre de manière centralisée par l'intermédiaire de la SIERE (les « programmes de CGD de la SIERE »). En outre, les sociétés de distribution locales (SDL) auront la possibilité de demander un modeste financement de la SIERE pour la prestation de programmes locaux rentables (les « programmes de CGD des SDL »).

Pendant que, dans un souci de rentabilité, nous passons de la prestation par les SDL à la prestation centralisée par la SIERE, l'expérience des consommateurs dans l'ensemble sera de la plus haute importance. Nous tenons à ce que la transition entre les deux se fasse en douceur et à ce qu'il y ait encore des possibilités de CGD rentables.

En plus de la présente directive, j'ai l'intention de donner à la Commission de l'énergie de l'Ontario (CEO) une directive qui lui donnera le pouvoir de modifier les conditions de délivrance de permis aux SDL ou de révoquer leur permis en ce qui concerne la CGD. J'ai également l'intention de donner une directive complémentaire enjoignant à la SIERE de mettre fin au Cadre stratégique de priorité à la conservation de l'énergie de 2015 à 2020 et au Programme d'accélération pour le secteur industriel.

DIRECTIVE

C'est pourquoi, par le pouvoir que me confère le paragraphe 25.32 (5) de la Loi, j'ordonne par la présente à la SIERE de concevoir, de coordonner, d'assurer ou de financer la prestation des programmes de CGD d'électricité, selon les besoins, en se conformant aux exigences et aux principes suivants.

A. Principes

1. La SIERE aura la responsabilité directe de mettre en œuvre les programmes de CGD de la SIERE au moyen de contrats d'acquisition en lien avec ces programmes, selon les nécessités.
2. Les consommateurs d'électricité reliés au réseau contrôlé par la SIERE et ceux reliés à un système de distribution seront admissibles aux programmes de CGD de la SIERE. Dans la mise en œuvre de ces programmes, la SIERE ciblera les segments de clientèle suivants :
    - les consommateurs commerciaux, institutionnels et industriels;
    - les consommateurs résidentiels ayant un faible revenu;
    - les populations des Premières Nations vivant dans les réserves, y compris celles qui sont reliées au réseau contrôlé par la SIERE ou qui le seront bientôt.
3. La SIERE mettra en œuvre les programmes de CGD qui ciblent les consommateurs commerciaux, institutionnels et industriels et qui démontrent un rendement coûts-profits positif lorsqu'ils sont pris conjointement en tant que portefeuille, conformément aux lignes directrices de la SIERE en matière de rentabilité. Par souci de clarté, les programmes qui ciblent les Premières Nations vivant dans les réserves et les consommateurs ayant un faible revenu n'ont pas à répondre aux exigences en matière de rendement coûts-profits.
4. En ce qui concerne les consommateurs commerciaux, institutionnels et industriels, la SIERE devrait accorder la priorité à ses programmes de CGD qui permettent de grosses réductions de la consommation d'électricité (p. ex. gigawattheures) et des réductions de la demande de pointe (p. ex. mégawatts) d'une manière rentable.
5. Dans la mesure où cela est réalisable, la SIERE coordonnera la prestation de ses programmes de CGD avec le concours de sociétés offrant des moyens d'effacement de consommation de gaz naturel.
6. La SIERE mettra un modeste financement à la disposition des SLD, qui s'en serviront pour concevoir et mettre en œuvre des programmes de CGD rentables qui ne doublonnent pas avec les siens. Les programmes de CGD de SLD admissibles peuvent cibler les consommateurs résidentiels, les populations des Premières Nations vivant dans des réserves, les consommateurs ayant un faible revenu, les consommateurs commerciaux, institutionnels et industriels. Les programmes de CGD des SLD ciblant les consommateurs résidentiels, commerciaux, institutionnels et industriels démontreront un rendement coûts-profits positif indépendamment, conformément aux lignes directrices de la SIERE en matière de rentabilité. Par souci de clarté, les programmes de CGD des SLD qui ciblent les populations des Premières Nations vivant dans les réserves et les consommateurs ayant un faible revenu n'ont pas à répondre aux exigences en matière de rendement coûts-profits.

B. Définition de conservation et gestion de la demande (CGD)

1. Aux fins des programmes de CGD de la SIERE et des SLD, la SIERE considérera que la CGD inclut les activités visant à faire baisser la consommation d'électricité ou la demande d'électricité. Entre autres activités de CGD, citons par exemple le recours aux remplacements favorisant un bon rendement énergétique, qui permettent d'obtenir une production semblable avec une consommation d'électricité moindre, et la génération d'électricité à petite échelle (c,-à-d. <10 MW) par les consommateurs.

2. Toutefois, aux fins des programmes de CGD de la SIERE et des SLD, la SIERE considérera que la CGD exclut les mesures soutenues grâce à une initiative ou un progamme différents lancés par le gouvernement de l'Ontario ou par elle-même et la génération d'électricité à petite échelle par les consommateurs à partir de combustibles fossiles achetés d'un tiers ou fournis par un tiers comme principale source d'énergie.

C. Période et limites du financement

1. La SIERE permettra l'accès à ses programmes de CGD du 1er avril 2019, ou dès que possible après cette date, jusqu'au 31 décembre 2020 (période). Aucune demande de consommateurs à la SIERE au titre des programmes de CGD de la SIERE ni aucune demande de SLD à la SIERE au titre des programmes de CGD des SLD ne seront acceptées ou approuvées après la conclusion de cette période.
2. La SIERE ne dépassera pas le budget total de 353 millions $ pour la période, qui comprend 27 millions $ pour les programmes de CGD des SLD approuvés et 28 millions $ pour les couts et paiements relatifs aux services centraux, comme le prévoit l'article C.3.
3. La SIERE limitera à 28 millions $ pour la période ses coûts et paiements relatifs aux services centraux, qui comprendront les coûts et paiements relatifs au marketing, à l'évaluation, à la mesure et à la vérification, à la conformité, au renforcement des capacités et à l'aide aux consommateurs.

D. Conception et prestation

1. Dans le mois suivant l'émission de la présente directive, la SIERE présentera au ministère de l'Énergie, du Développement du Nord et des Mines (le « ministère ») un plan de CGD (le « plan ») pour la période comprenant en détails les programmes de CGD de la SIERE qui seront mis en œuvre, l'estimation de leurs coûts, les résultats attendus et le budget prévu pour les programmes de CGD des SDL. Les économies d'électricité et les réductions de la demande attendues constitueront les objectifs pour la période et seront appelés respectivement « objectif d'économie d'électricité » et « objectif de réduction de la demande » (objectifs de CGD).
2. La SIERE évaluera toute économie d'électricité et toute réduction de la demande réalisées grâce à ses programmes de CGD et ceux des SLD en se fondant sur ses

protocoles d'évaluation, de mesure et de vérification et aussi souvent qu'elle le juge utile.

E. Reddition de comptes

1. La SIERE fera rapport au ministère :
   a. chaque trimestre, pour tous ses programmes de CGD, individuellement et dans leur ensemble, sur la participation, sur les économies d'électricité, sur les réductions de la demande et sur les prévisions de participation, d'économies d'électricité et de réductions de la demande pour toute la durée de ces programmes;
   b. chaque trimestre, sur les paiements et les coûts engagés au trimestre précédent et sur les prévisions de paiements et d'engagements pour toute la durée de ses programmes de CGD;
   c. selon les nécessités, sur les leçons apprises, les enjeux à venir, les modifications de programmes recommandées et les calendriers de modification proposés;
   d. selon les nécessités, de tout autre renseignement exigé du ministère.
2. La SIERE continuera de produire et de rendre publics des rapports annuels présentant en détails l'état d'avancement général de ses programmes de CGD, de ceux des SLD et des économies supplémentaires annuelles attendues des codes du bâtiment et des normes relatives aux produits de la province.

F. Consommateurs ayant un faible revenu et Premières Nations vivant dans les réserves

1. La SIERE continuera de financer et de mettre en œuvre le programme provincial existant appelé Programme des services à domicile, qui cible les consommateurs résidentiels ayant un faible revenu, selon des conditions et d'une manière semblables à ce qui se faisait sous le Cadre stratégique de priorité à la conservation de l'énergie.
2. La SIERE fera de son mieux pour financer et mettre en œuvre deux programmes locaux ciblant les populations des Premières Nations vivant dans les réserves, où de tels programmes seront conçus, offerts et mis en œuvre selon des conditions et d'une manière semblables à ce qui se faisait avec le Programme de conservation destiné aux Premières Nations et le Conservation on the Coast CDM Program.
3. La SIERE concevra, financera et mettra en œuvre un programme pilote de conservation de l'électricité ciblant les consommateurs résidentiels et les petites entreprises des Premières Nations vivant dans les réserves qui sont reliées au réseau qu'elle contrôle ou qui le seront bientôt.

4. S'il n'est pas nécessaire que les programmes de CGD de la SIERE et des SLD ciblant les Premières Nations vivant dans les réserves et les consommateurs ayant un faible revenu n'aient pas à répondre à des exigences de rendement coûts-profits, la SIERE veillera néanmoins à ce que ces programmes soient conçus et mis en œuvre de manière aussi rentable que possible.

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SEC INTERROGATORY 7

1.1-SEC-7

INTERROGATORY

EB-2015-0275, S-1-1, p.16-17] The approved EB-2015-0275 Settlement Proposal states:

The Board stated its expectations regarding stakeholder consultation in the EB-2013-0326 Decision and Order. Intervenors are concerned that, aside from the IESO's Stakeholder Advisory Committee, there are few, if any, consumer or consumer group participation in the IESO's working groups and stakeholder engagement initiatives. The IESO's current Stakeholder Engagement Principles include the principle of inclusive and adequate representation which includes consumers and consumer groups. To address intervenors' concern, the IESO commits to the implementation of the principle of inclusive and adequate representation, including from consumers and consumer groups, in all of its stakeholder engagement activities and working groups.

a. Please explain how the IESO has implemented this principle in 2018 and further plans to implement this principle in 2019.

b. Please detail how the IESO has and plans to further its engagement with both low and medium[1] volume customers and/or groups representing low and medium volume customers.

c. For each stakeholder engagement that is currently underway or is expected to take place in 2019, please explain how the IESO is or plans to seek the views of customers and/or groups representing customers.

RESPONSE

a. To address the principle of inclusive and adequate representation, the IESO uses a variety of approaches to appeal to our broad stakeholder base, including low and medium volume consumers. This includes a mix of web-based discussions and in-person discussions.

b. In the IESO report on Governance and Decision Making, it was recommended that the IESO fund low-volume consumer participation and representation in IESO engagements. The IESO has committed to conduct research by the end of Q4 to understand different practices across other jurisdictions and at the OEB, to inform the potential adoption of funding for

[1] General service customers not eligible for Class A

low volume consumer representation. The IESO report on Governance and Decision Making is provided as Attachment 1 to this response.

c. For each engagement that is currently underway or planned for 2019, the IESO will continue to offer broad based opportunities for engagement that are open to all interested stakeholders and communities. In addition, the Stakeholder Advisory Committee is updated on the status of active engagements and the Consumers Council of Canada is an active member representing the consumer constituency.

IESO Report & Recommendations

RE Consultations with the Advisory Group on Market Rule Governance & Decision-Making Processes

November 23, 2018

Michael Lyle, Terry Young and Jessica Savage

ieso
Connecting Today.
Powering Tomorrow.

1.0 Introduction

1.1 BACKGROUND

The recommendations described in this Report are informed by successive stakeholder engagements, originating with the Market Renewal Working Group (MRWG), expanding to the Stakeholder Advisory Group (SAC), Technical Panel and open public consultations, and concluding with the Board-appointed Advisory Group on market rule governance and decision-making processes.

The MRWG first identified market rule governance and decision-making processes as a concern, in light of the scope of market evolution contemplated by the Market Renewal Program and the concern that these reforms would result in more risk-taking by market participants. Consultations with the MRWG led to the classification of stakeholder issues into three categories: (1) market rule processes, (2) market manual processes, and (3) dispute resolution processes.

Recognizing that changes to processes for amending and administering the market rules would have implications beyond the scope of the Market Renewal Program, the IESO engaged external facilitator Karla Reesor of MovingForward Ltd., and conducted consultations sessions in August with the MRWG, the Stakeholder Advisory Committee, the Technical Panel, and an open public forum. The IESO also requested stakeholders to submit nominations for a Board-appointed Advisory Group to consider the issues and feedback more closely.

At its August meeting, the Board appointed a nine member Advisory Group from the list of nominees and approved the Terms of Reference. The Advisory Group met three times from September to November 2018, and reviewed and commented on a draft of this Report.

This Report details the recommendations of IESO management, following the conclusion of the Advisory Group consultation. The non-IESO members of the Advisory Group generally endorse the recommendations, and will have the opportunity to directly communicate any independent feedback at the December meeting of the IESO Board.

1.2 SCOPE

The scope of the Advisory Group mandate is set out in the Terms of Reference, attached as Appendix A to this Report.

By design, the Advisory Group mandate reflects the scope of the August engagement sessions, signifying the next step in an iterative consultation on market rule governance and decision-making processes. The Advisory Group was informed by feedback from the preceding stakeholder consultations, with the objective of finding alignment on potential options for procedural enhancements. The processes identified as in scope are as follows:

- market rule amendment process – stakeholdering and decision-making processes to amend the market rules;
- market manual amendment process – stakeholdering and decision-making processes to amend the market manuals, including the distinction between a market manual and a market rule; and
- dispute resolution process – processes and remedies for market participant redress.

The IESO confirmed the scope of recommendations to the IESO Board would be limited to processes within the IESO's decision-making authority and would not consider any delegation of authority to stakeholders or otherwise. This limitation served to exclude stakeholder requests for changes to procedural rights falling within the jurisdiction of the Ontario Energy Board (OEB), i.e. market rule processes involving the exercise of OEB decision-making authority (such as appeal rights). As the limitation was specific to the recommendations, the IESO agreed to submit stakeholder feedback on changes to OEB regulatory oversight to the Board, on the understanding that there was no expectation the Board would respond to the feedback. This feedback is included in the Board presentation slide deck, supporting this Report. Stakeholders were encouraged to submit comments on procedural rights within the OEB's jurisdiction to the OEB Modernization Panel.[1]

1.4 RECOMMENDATIONS

The recommendations reflect three forms of procedural enhancements, namely, transparency, inclusiveness and remedies. Recommendations for enhanced transparency include publicly posting market rule amendment proposal submissions to the Board, written reasons for Board decisions on market rule amendments, and introducing greater clarity to the distinction between a market rule and market manual. Recommendations for inclusiveness include enhanced stakeholder consultation for market rule amendment proposals and market manual changes, introducing a stakeholder Markets Committee, funding low volume consumer representation, and stakeholder consultation on recruitment for Technical Panel and Dispute Resolution Panel members. Finally, recommendations for enhanced market participant remedies include broadened mediation/arbitrator selection rights for market participants and a commitment to exploring new opportunities for market participant redress in the Market Renewal design engagements. The recommendations are set out in Section 3 of this Report.

2.0 Advisory Group Consultations

This Section 2, Advisory Group Consultations, was drafted by the external facilitator retained by IESO, Karla Reesor of MovingForward Ltd., and is included to demonstrate the objective analysis of the facilitator on the Advisory Group process. Karla was selected as the facilitator following a Request for Qualifications process, based in part on her previous facilitation work with the Alberta Electricity System Operator and the National Energy Board.

2.1 ADVISORY GROUP MEMBERS

The Advisory Group is comprised of the following IESO and stakeholder representatives:

- Colin Anderson, AMPCO

[1] The Ontario Ministry of Energy, Northern Development and Mines, established the OEB Modernizaion Review Panel to provide recommendations on how the OEB's governance and operations can deliver better outcomes for consumers. Refer to Ontario Energy Board website: https://www.ontario.ca/page/consultation-modernizing-ontario-energy-board-oeb

- David Butters, APPrO
- Jason Chee-Aloy, Power Advisory
- Brandy Giannetta, CanWEA
- Sarah Griffiths, EnerNOC
- Margaret Kuntz, TransCanada
- Michael Lyle, IESO
- Alex Palimaka, Bluewater Power
- Jessica Savage, IESO

There was a high level of engagement and participation by all Advisory Group members.

2.2 MEETING SCHEDULE, AGENDA & REFERENCE MATERIALS

The group met on September 17, October 11 and November 2. A proposed agenda and meeting materials were provided in advance of each meeting. Discussions progressed through the following topics:

- a review of the feedback and synthesis of the concerns received from stakeholders in the August meetings, and from letters of comment received by the IESO;
- identification of possible options to address the concerns; and
- review and refinement of IESO staff recommendations to the IESO Board.

Meeting agendas and materials are accessible on the IESO's website:

http://www.ieso.ca/Sector-Participants/Engagement-Initiatives/Engagements/IESO-Governance-and-Decision-Making

2.3 STAKEHOLDER FEEDBACK

The following table summarizes the stakeholder feedback and concerns shared in the August facilitated discussions and in letters to the IESO, as synthesized by the Advisory Group:

Market Rule Amendments
Key Concern: Transparency • Stakeholders request greater transparency around the market rule decision-making process of the Technical Panel and the IESO Board of Directors • New mechanisms should be explored to provide stakeholders with greater visibility into the Technical Panel and Board's consideration of market rule amendments **Key Concern: Inclusiveness and Consistency** • Stakeholders request greater opportunity to participate in and provide direct input to the market rule amendment process, recognizing that market participants will take on more market risk as the markets evolve • Consistent processes for stakeholder involvement are needed to provide certainty to market participants • Enhancements could include changes in the composition of the Technical Panel to better

reflect market participants and a new stakeholder forum to provide strategic advice on markets **Key Concern: Expertise of Technical Panel** • Stakeholders seek a higher level of confidence in the demonstrated technical skills and market rules expertise of Technical Panel members, both in terms of the ability to perform existing duties and the ability to manage the demanding timelines and large volume of market rules related to the Market Renewal Program • Revisions to competencies for demonstrated technical skills and market rules expertise in the Technical Panel *Terms of Reference* could be considered
Market Manual Amendments
Key Concern: Transparency, Inclusiveness and Consistency • Stakeholders request greater transparency and opportunities to participate in the market manual process, and that opportunities to participate be applied consistently • Stakeholders also request consistency in the information that is included in market rules versus market manuals • Enhancements could include new guidelines to indicate when and how stakeholder involvement will be triggered for market manuals, and guidelines on content for market rules and market manuals
Dispute Resolution Process
Key Concern: Expertise of Dispute Resolution Panel • Stakeholders seek a higher level of confidence in the electricity markets knowledge and expertise of Dispute Resolution (DR) Panel members • Competencies for electricity markets knowledge and experience could be enhanced, and open nominations for DR Panel members could be initiated for qualified candidates within or outside of Ontario **Key Concern: New Mechanisms and Remedies** • Stakeholders request greater opportunity to challenge certain IESO decisions or in-market actions by adopting new procedural mechanisms in the market design, intended to redress market participants taking on more market risk • As part of current market design engagements, new procedural mechanisms could be explored for market participant challenges and redress that align with the specific risk

Members of the Advisory Group expressed their appreciation to the IESO for initiating the engagement on this important topic, and for responding to their request to provide an independent, third-party facilitator. The facilitator observed that members were focused on making proactive change to address evolving market conditions, and to understanding and addressing the interests of all stakeholders. In addition, each participant demonstrated a commitment to collaboration and openness to new approaches, and all members were engaged in the discussions.

The members of the group also appreciated the invitation to participate in a presentation to the IESO Board of Directors, and as opportunities arise, look forward to continued involvement in the implementation of the recommendations.

Prepared by: *Karla Reesor*
Moving Forward Ltd.

3.0 Recommendations

As informed by stakeholder feedback, IESO management makes the following recommendations to the Board for enhancements to governance and decision-making processes:

Recommendations for Enhanced Transparency

1. Publicly post all market rule amendment proposal materials for submission to the IESO Board prior to the meeting, subject to limited exceptions. Such limited exceptions may include redactions for legal privilege, commercial sensitivity, or security, to protect sensitive information. Materials will include a summary of stakeholder feedback from the stakeholder engagement and the Technical Panel, with links to individual stakeholder feedback posted to the IESO website, in addition to the following documents, listed in table of content format for each Board submission:

    a. Agenda Item Summary
    b. IESO Staff Presentation Materials
    c. Market Rule Amendment Proposal form
    d. Memo to Board of Directors from Technical Panel Chair
    e. Technical Panel Materials
        i. Memo to Technical Panel from IESO staff
        ii. Market Rule Amendment Proposal form
        iii. Stakeholder feedback
    f. Stakeholder feedback summary, stakeholder engagement and Technical Panel
    g. Consumer Impact Assessment
    h. Draft Board Resolution

2. Publicly post written reasons for the IESO Board's decision in respect of a market rule amendment proposal, with the authorizing Board Resolution. The reasons would be in template form that:

    a. confirms whether any conflict of interest was declared, and if so, that the Board member was recused;
    b. acknowledges the stakeholder consultation and feedback record, particularly where there is a lack of consensus or clear dissent;
    c. acknowledges the Technical Panel process and vote, particularly where there is a lack of consensus or clear dissent at the stakeholder level informing the vote, or where the Technical Panel vote is not unanimous; and
    d. either approves or rejects the market rule amendment proposal, providing a rationale for the decision.

3. Publicly post all stakeholder feedback on draft market manual amendments, and the IESO's response to the feedback.

4. Publicly post historical market manual *baselines* to the IESO website, on a reasonable efforts basis. Going forward, update the publicly accessible chronology of market manual amendments with each *baseline*.

5. Introduce guidelines that clarify the distinction between market rule content and market manual content. Guidelines should be broad and flexible, but involve a clear assessment, where the primary distinction would be that: (a) rules of conduct that materially affect rights or obligations, (b) rules that materially affect money or property, or (c) rules enforceable by penalties.

Recommendations for Enhanced Inclusiveness

6. Where market manual changes are required to support a market rule amendment, determine whether draft market manual content should be provided to stakeholders for review as part of the engagement process (along with the draft market rule amendment language as described in #7 below). The IESO's determination would apply a new review threshold, informed by *timing/reliability* and *materiality/economic impact* considerations. The IESO would consult stakeholders market manual content they want to review at the same time as the market rule amendment proposal, which would include identifying the considerations that would inform the IESO's assessment of whether the threshold is met.

7. For each market rule amendment proposal, consult stakeholders and request feedback on the draft market rules as part of the engagement phase. Following the engagement, a summary of stakeholder feedback would be submitted to the Technical Panel and the IESO Board, to inform their respective reviews of the market rule amendment proposal. The record of stakeholder feedback would indicate whether there is consensus or dissent.

8. Review and potentially revise Technical Panel composition and process to avoid duplication with stakeholder review of the market rule amendment proposal and draft market manual content in a preceding engagement.

9. Introduce a new stakeholder Markets Committee that would be expected to contribute to the overall success of market initiatives by providing advice, guidance, and support for the development of electricity markets in Ontario. The proposed Terms of Reference for the Markets Committee are attached as an Appendix to these recommendations (draft pending stakeholder consultation on proposed Terms of Reference, not for Board approval at this time).

10. Fund low volume-consumer representation and participation in stakeholder engagements. Consult the Markets Committee on the recruitment of low volume consumer representatives. Low volume

consumer representation would be specific to *Regulated Price Plan* consumers, as defined by the OEB.

11. Consult the Markets Committee on the recruitment of new Technical Panel members, including the knowledge and expertise informing the desired candidate profile.

12. Consult the Markets Committee on the recruitment of new Dispute Resolution Panel members, including the knowledge and expertise informing the desired candidate profile.

Recommendations for Enhancements to Market Participant Remedies

13. Amend the dispute resolution provision in the market rules to provide the market participant/ applicant (in a dispute), with selection and veto rights as concerns the appointment of a mediator, arbitrator or panel of arbitrators from the list of Dispute Resolution Panel members (to the extent this right does not already exist).
14. Continue to be receptive to introducing new mechanisms for market participant redress in the market design. The market renewal design engagements are currently exploring new mechanisms as part of the High Level Design process and will continue to identify and refine potential new mechanisms in the Detailed Design process.

4.0 Conclusion

The conclusion of the Advisory Group process marks the end of a longer stakeholder dialogue and there is general consensus and stakeholder support for the recommendations set out in this Report. Throughout the consultation, all Advisory Group members were engaged, considerate of the input and sometimes conflicting positions of fellow Advisory Group members, and committed to finding solutions that benefitted the collective. The IESO thanks all participants for their contributions over the course of the governance and decision-making engagements.

Subject to the Board's approval of the recommendations set out in this Report, the IESO will begin implementing the procedural enhancements.

Appendices

A. Terms of Reference, Advisory Group on Market Rules Governance & Decision-Making Processes

SEC INTERROGATORY 8

1.1-SEC-8

INTERROGATORY

Please provide a copy of the IESO's organizational chart and explain any material changes that have occurred since the filing of its previous application (EB-2018-0143).

RESPONSE

Please see the response to OEB Staff Interrogatory 9, at Exhibit I, Tab 1.3, Schedule 1.09.

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APPrO INTERROGATORY 1

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

APPRO INTERROGATORY 1

Reference: Exhibit A-2-2 p 8

Preamble: Under the heading "Broadening the adequacy outlook" the Business Plan states "Our planning process will be focusing on transparently outlining different system needs" and further states "As part of our commitment to transparency, starting in 2019 the IESO will supplement existing planning publications with an annual planning outlook. Designed to broaden understanding of resource adequacy over a 20-year planning horizon, this document will outline system needs that help enable stakeholders to make informed decisions and investments."

Questions: Please elaborate on the above. Specifically:

a) How will the new annual planning outlook impact the IESO's revenue requirement (will more resources be required)?

b) How will the new annual planning outlook to be provided differ from what the IESO currently provides?

c) Aside from the new annual planning outlook, how does and how will IESO planning process focus on transparently outlining different system needs?

RESPONSE

a) The annual planning outlook is part of the IESO's core activities and is expected to be managed within existing budgets.

b) The annual planning outlook will build in more transparency into planning processes by providing updated information to the market at regular intervals to enable more informed decisions. The development of the outlook will include more public touchpoints and regular engagement with stakeholders to enable them to make more informed decisions and investments. It will be informed by the development of the Bulk Planning Process[1] and coordinated with the development of the IESO's Incremental

[1] Further information can be found on the IESO's bulk system planning engagement webpage: http://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Formalizing-the-Integrated-Bulk-System-Planning-Process

Capacity Auction. The report will be produced annually and will provide more details on planning data and methodologies, so as to enable stakeholders to assess risks and opportunities when making asset management or investment decisions, using their own assumptions and methods.

c) Please see response to (b) above.

APPrO INTERROGATORY 2

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

APPRO INTERROGATORY 2

Reference: Exhibit A-2-2 p 10

Preamble: The IESO's Business Plan states at p 10, "finding efficiencies in the way we do business and delivering reliability at the lowest cost is an enterprise-wide priority"

Questions: Please provide examples (aside from the Market Renewal Program ("MRP")) of how in 2018 or 2019 the IESO has found efficiencies in the way it does business and delivers reliability at the lowest cost. Please explain how the revenue requirement for 2019 has been lowered by these examples.

RESPONSE

Please see the response to OEB Staff Interrogatory 6, at Exhibit I, Tab 1.1, Schedule 1.06.

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APPrO INTERROGATORY 3

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

APPRO INTERROGATORY 3

Reference: Exhibit A-2-2 p 15

Preamble: The IESO's Business Plan states at p 15:

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

Questions: The IESO's revenue requirement was raised in 2017 as a result of the MRP. Therefore, aside from MRP investments (for which there was an increase in revenue requirement), please provide examples of the significant investments made in 2018 and expected in 2019 that have been incorporated by the IESO while continuing to operate at the same level of funding.

RESPONSE

Examples of initiatives started in 2018 and expected in 2019 include:

- Creating an innovation roadmap to enhance system reliability and drive down costs for an ever-changing sector in collaboration with industry partners.
- Enhancing our cybersecurity program to address the increasing complexity and growing threat of cyberattacks.

The IESO takes a continuous-improvement approach to protecting its data by constantly enhancing our critical information systems, and ensuring cybersecurity risk management is being addressed and integrated at every level and in every business unit. In addition to facilitating a central collaboration hub for cybersecurity best practices, in December 2018, the IESO is set to launch of a security operations centre – a major milestone in the evolution of the organization's cybersecurity program.

- Introducing more transparency into our planning processes by providing updated information to the market and regularly engaging with stakeholders to enable them to make more informed decisions and investments

- Implementing changes to better align energy-efficiency programs with system and consumer needs and transition to the market in the future

This commitment to sound fiscal management means that the IESO will continue to provide real benefits to consumers, stakeholders and market participants, while meeting the challenges associated with maintaining the same revenue requirement for the third consecutive year. These include managing the cost increases resulting from collective agreement escalations and our ongoing focus on system reliability, as well as substantial investments in cybersecurity to support the change in our license requirements, and in the Market Renewal Program.

EDA INTERROGATORY 3

Issue 1.1

INTERROGATORY

EDA interrogatory 3

Reference: A-2-2 p9

Preamble: The IESO recently assumed responsibility for supporting the development of cyber security issues, awareness and preparedness.

Question

Please quantify the proposed level of spending on all cyber activities in 2019 and describe the activities that this spending supports; please state all assumptions

RESPONSE

The IESO information security annual operating budget is roughly $5.5 million. This budget covers operational costs including contracts, computer services and software support. The activities of the information security team include governance, threat and risk management, security architecture, security technology, access management and our sector situational awareness and information sharing and collaboration efforts. This current budget also supports the delivery of the IESO sector cybersecurity services.

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AMPCO INTERROGATORY 1

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-1

INTERROGATORY

Ref: Exhibit A-2-2 Page 16

Please add 2017 and 2018 actuals to the Detailed Financials Table.

RESPONSE

Please see the table below:

For the Year Ended December 31
(in Millions of Canadian Dollars)

($ Millions)	2017 Actual	2018 Budget	2018 Forecast	2018 Actual	2019 Budget	2020 Budget	2021 Budget
Revenue							
IESO Usage Fee	178.4	190.8	187.9	194.3	190.8	194.9	199.0
Total Revenue	178.4	190.8	187.9	194.3	190.8	194.9	199.0
Expenses							
Compensation & Benefits	110.7	110.3	111.8	114.8	113.4	116.2	119.5
Professional & Consulting Fees	15.0	16.9	15.2	14.4	15.7	16.3	16.2
Operating & Administration	34.5	36.6	36.3	35.8	37.5	38.3	41.9
Operating Expenses	160.2	163.8	163.3	165.0	166.6	170.8	177.6
Amortization	18.2	17.7	19.1	19.6	18.4	19.0	20.2
Net Interest	(4.0)	(3.4)	(5.4)	(6.4)	(5.9)	(7.1)	(8.4)
Total Core Operations	174.5	178.1	177.0	178.2	179.1	182.7	189.4
Market Renewal	7.9	12.7	14.9	14.9	11.7	12.2	9.6
Total Expenses	182.4	190.8	191.9	193.0	190.8	194.9	199.0
Operating Surplus/(Deficit)	(4.0)	-	(4.0)	1.30	-	-	-
Accumulated Operating Surplus	(6.0)	6.0	2.0	(4.7)	6.0	6.0	6.0

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AMPCO INTERROGATORY 2

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-2

INTERROGATORY

Ref: A-2-2 Page 21 Appendix 1

Preamble: At Appendix 1, the IESO provides its Corporate Performance Management: 2019 Measures and Targets.

With respect to Corporate Agility and Effectiveness, please provide the priorities and corresponding budgets that are to be evaluated under the Annual Corporate Target: 2019 priorities are achieved within +/- 5% of the IESO's approved budget.

RESPONSE

The IESO's Business Plan summarizes the organization's priority initiatives, associated resourcing requirements, investments required and is the basis for evaluating the +/- 5% within approved budget. These priorities include:

- Advancing the Market Renewal Program,
- Creating an innovation roadmap,
- Enhancing our cybersecurity program,
- Developing and implementing the plan to enable approved third parties to access data from the Smart Metering Entity (SME)'s meter data management repository (MDM/R),
- Introducing more transparency into our planning processes, and
- Implementing changes to better align energy-efficiency programs with system and consumer needs and transition to the market in the future.

For the IESO's budgets please see the response to AMPCO Interrogatory 18 and SEC Interrogatory 2, at Exhibit I, Tab 1.4, Schedule 13.18 and at Exhibit I, Tab 1.1, Schedule 10.02, respectively.

AMPCO INTERROGATORY 3

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-3

INTERROGATORY

Ref: A-2-2 Page 22 Appendix 1

Preamble: Page 22: Under Cost Efficiency the IESO indicates it will develop an enterprise-level data integration strategy by the end of 2019.

a) Please explain the need and objective of this strategy including more details on the current state of data integration and the expected outcomes.

b) Please provide the 2019 budget and milestones for the enterprise-level data integration strategy.

RESPONSE

a) The IESO's data strategy involves treating data as a valuable asset and creating opportunities for meaningful ratepayer and organizational value creation from the vast quantity of information that we have in the IESO's data repositories. This involves employing a business-centric approach to enhance IESO's data management capabilities by extracting value through a broad range of enterprise wide applications.

b) The 2019 budget has not been finalized. Initial analysis has allowed the IESO map the high level scope of the Data Strategy program under three major themes as follows: Good Data Governance, Model Enterprise Architecture and a Sustainable Data Excellence Operational Model. A number of initiatives under each of these themes have been identified for implementation over the 2020 – 2022 business planning period. The remaining of 2019 will be focused on establishing the internal enterprise-wide program governance, defining the implementation plan and establishing the high level business requirements for the upcoming identified program initiatives.

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AMPCO INTERROGATORY 4

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-4

INTERROGATORY

Ref: Exhibit A-2-2 Page 23

Preamble: The IESO indicates a change in provincial energy policy that impacts IESO initiatives and programs, government directives and sector structure is a key risk in 2019.

Please identify and explain how changes in provincial energy policy in 2018 and to date in 2019 have impacted IESO initiatives, programs and budgets in 2019, 2020 and 2021.

RESPONSE

Since a new government was elected in June 2018, the IESO has received the following directives:

- Wind Down of pre-Notice to Proceed Feed-in Tariff and pre-Key Development Milestones Large Renewable Procurement Contracts,
- Discontinuation of the Conservation First Framework, and
- Interim Framework for the delivery of Energy Efficiency Programs.

These directives have resulted in fewer generation contracts to manage and changes to how we deliver conservation programs across Ontario[1].

The change in Conservation policy resulting from the Minister's March 21, 2019 directive will not impact the 2019 net revenue requirement for the IESO.

[1] A full list of government directives to the IESO can be found at: http://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives

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AMPCO INTERROGATORY 5

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-5

INTERROGATORY

Ref: Exhibit A-2-3 Page 1

Please provide the Memorandum of Understanding referred to in the December 11, 2018 letter.

RESPONSE

Please see the Memorandum of Understanding filed as Attachment 1 to BOMA Interrogatory 10, at Exhibit I, Tab 0, Schedule 2.10.

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AMPCO INTERROGATORY 6

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-6

INTERROGATORY

Ref: Exhibit B-1-1 Page 5

Please explain how the IESO will be supporting the close of the Green Ontario Fund and provide a breakdown of costs including labour.

RESPONSE

Please see the response to BOMA Interrogatory 11 b), at Exhibit I, Tab 0, Schedule 2.11.

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AMPCO INTERROGATORY 7

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-7

INTERROGATORY

Ref: A-2-2, Page 11

Preamble: The IESO indicates that to help drive the evolution and cost-effectiveness of the province's electricity sector, the IESO is also working on an innovation roadmap and associated work plan, which are expected to be finalized in 2019.

a) Please provide a detailed description of the innovation roadmap work and provide the key innovation milestones for 2019.

b) Please provide the approved business case for this work. If a business case does not exist, please explain.

c) Please indicate when this initiative was approved by the IESO's Board of Directors.

d) Please provide the materials provided to the IESO's Board of Directors regarding this initiative.

e) Please provide the IESO's capital and operating investment levels in 2019, 2020 and 2021 related to innovation.

f) Please provide a detailed breakdown of the budget and schedule related to innovation work in 2019.

g) Please discuss if the IESO's innovation work has been formalized as a project or program.

h) Does the IESO have a separate cost centre for innovation?

i) Please provide the number of existing FTEs and new FTEs in 2019 allocated to innovation and the corresponding costs.

RESPONSE

a) The Innovation Roadmap is a way of capturing, communicating, prioritizing and reporting on the work the IESO does that is focused on:

- Enabling or removing barriers to the deployment of innovative solutions to improve affordability and/or reliability in Ontario's electricity markets; and
- Understanding, evaluating and preparing for the potential electricity market and reliability impacts of emerging technologies, business models, changing consumer behaviours/preferences and other challenges and opportunities that are likely to have a significant impact on the IESO's ability to carry out its mandate on a go-forward basis.

In May 2019, the IESO will publish the final version of the Innovation Roadmap and 2019-2021 Work Plan which will include a detailed list of innovation-related activities that will be undertaken or supported by the IESO. A preliminary list of initiatives to be included in the Innovation Roadmap Work Plan was provided in a presentation to the IESO's Stakeholder Advisory Committee (SAC) on February 14, 2019, filed as Attachment 1 to this response. The IESO made a number of revisions to the 2019-2021 work plan to reflect the feedback provided by SAC, including:

SAC Feedback	Changes Made to Final Version of Innovation Roadmap Work Plan to Address SAC Feedback
1. Demonstrate how each project within the work plan contributes to the overall objective of affordability/reliability	IESO will include a description of how each activity contributes directly/indirectly to improved affordability and reliability
2. Provide more detail about the cost and resource requirements associated with the projects	IESO will provide a high-level summary of tools available to implement road map (e.g. Grid Innovation Fund, capital budget).
3. Provide greater clarity with respect to decision making on work plan projects	IESO to provide a conceptual framework that describes decision-making criteria/ gates for determining if/when a demonstration project is undertaken or a capital project is initiated.

4. The plan is very ambitious	Several projects have been deferred to later years of the work plan and others have been removed (e.g. Inventory of DERs, white paper on implications of the Internet of Things for the electricity sector)

b) and g) The Innovation Roadmap is not a distinct project. It is a means of communicating all of the work that the IESO is undertaking related to innovation in various parts of the organization. As a result, there is not a business case for the Innovation Roadmap. There are/would be business cases for any current/future capital projects and any projects funded through the Grid Innovation Fund (GIF). Given that GIF business cases are developed by the Fund recipients and often contain proprietary information, they are treated as commercially confidential documents.

c) The IESO Board provided support for the development of an Innovation Roadmap that "engages a broad range of industry partners and customers to drive innovation across all aspects of IESO business" in 2017. The development of an Innovation Roadmap was included as a Corporate Performance Measure in the IESO's 2018-2020 Business Plan which was published on December 18, 2017. The IESO Board endorsed the Roadmap at their December 2018 meeting.

d) The IESO has provided the December 2018 and June 2018 Innovation Roadmap presentations made to the IESO Board of Directors as Attachments 2 and 3 respectively, to this response.

e) f) and i) There are three sources of funding for activities within the Innovation Roadmap work plan.

1) GIF

- The GIF is funded through the global adjustment with an annual budget of up to $9.5 million and requires matching funding of at least 25-50% from Fund recipients;
- Per its MOU with the Ministry of Energy, the IESO administers GIF in accordance with the Transfer Payment Accountability Directive (TPAD) which includes requirements for financial accountability, prudent spending and annual reporting on expenditures/value for money to the Government; and

- A complete list of project investments by the GIF and its predecessor funds is filed as Attachment 4 to this response[1].

2) IESO's Operating & Maintenance (O&M) Budget

- The white papers/research and maintenance projects outlined in the roadmap work plan are captured in existing line items within Exhibit B-3-1 Appendix 2-JC[2] of the IESO's 2019 Revenue Requirement Submission; associated costs are tracked and monitored per the IESO's internal financial tracking procedures; and
- Any external support for white papers/research will be competitively procured.

3) Capital

- The Innovation Roadmap work plan includes in-progress and planned capital projects necessary to update tools and systems to remove barriers to the fair competition of resources (e.g. energy storage) within IESO-administered markets;
- The IESO has a rigorous process for prioritizing, allocating and tracking budget for capital projects that places highest priority on projects necessary to maintain system reliability and market efficiency; and
- The IESO has one capital project on the Innovation Roadmap underway in 2019: Demand Response Enhancements has a budget of $17,000 in the 2019 capital envelope.

Given that there are existing requirements for the IESO to validate and track expenditures on activities set out within the Roadmap work plan (e.g. TPAD requirements for GIF) and that the Roadmap is a means of communicating work that the IESO is undertaking in various parts of the organization with existing internal procedures for tracking/validating expenditures, the IESO will not provide a breakdown of the costs and headcount of each individual activity within the work plan as this would be a very labour intensive effort.

h) The IESO does not have a separate cost centre for the initiatives recorded within the Innovation Roadmap and associated work plan.

i) Please see the response to e), f), i), and h) above.

[1] The list is also available on the IESO's website at: http://www.ieso.ca/Get-Involved/Funding-Programs/Grid-Innovation-Fund/Projects-Funded

[2] An updated version of Appendix 2-JC is available in the response to SEC Interrogatory 2, at Exhibit I, Tab 1.1, Schedule 10.02.

IESO's Approach to Amending Market Participant Contracts in Response to the Market Renewal Program

Prepared for the IESO Stakeholder Advisory Committee (SAC)

April 24, 2019

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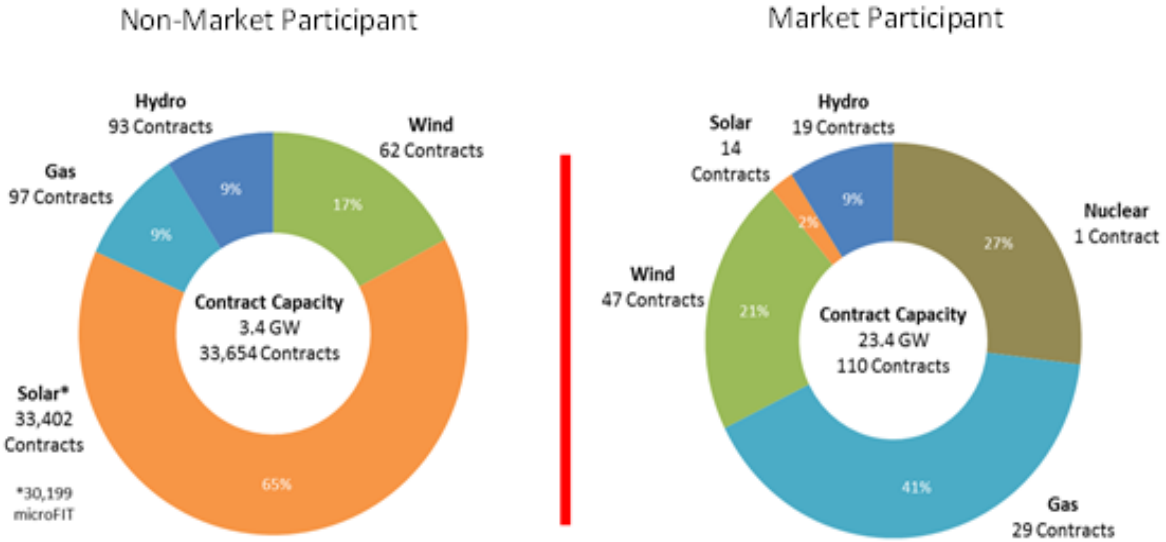
Purpose

- To provide SAC with an overview of IESO's publication on *Approach to Amending Market Participant Contracts in Response to the Market Renewal Program* released on April 12, 2019
- The publication outlines IESO's objective and high-level principles that will guide discussions with affected contract counterparties, as well as high level contractual implications and suggested strategies to address them
- The publication can be found on the IESO website, click here

Background – IESO Electricity Contracts

- The IESO is the contract counterparty to over 33,000 electricity supply contracts, of which 110 are for facilities that are registered to participate in the IESO-Administered Markets (Market Participant (MP) contracts)[1]
  - These 110 MP contracts are the ones that will be primarily impacted by the MRP
  - Distribution connected facilities with IESO contracts (except microFIT) may be impacted by changes to the OEB's Retail Settlement Code
  - microFIT contracts are not expected to be impacted by MRP



[1] As of February 15, 2019

Contracts – Common Elements

- Fundamental commonalities of IESO electricity supply contracts include:

Financial Hedge

- Contracts provide a hedge against a market price through a strike price or fixed monthly payment

Operationally Impartial

- Contracts generally do not dictate how a facility is to be operated in the market

Contemplate Market Evolution

- Transition to Locational Market Pricing (LMP) and a Day-Ahead Market (DAM) are contemplated in many MP Contracts

- These commonalities help provide a common starting point for all parties

Objective – MP Contracts and the MRP

To ensure that the contractual implications arising from the MRP are addressed within a timeline that is appropriately aligned with the MRP and in a manner that is consistent with the existing terms in the affected contracts

Making any necessary contract amendments as a result of changes to energy pricing, as well as commitment and dispatch mechanisms that are part of the energy stream of the MRP

Providing contractual certainty for contract counterparties interested in participating in the Incremental Capacity Auction (ICA)

Principles

- The primary principal to be employed by the IESO is to proceed on the basis of the existing provisions in the relevant contracts

- IESO's focus is on making principled amendments based on the provisions of the applicable contract and not on achieving a particular commercial outcome

- It is not an objective of the IESO to extract financial value from contracts by way of the MRP

Key Considerations

- There are 3 considerations that apply to the primary principal:

1 **Treat Similar Contracts in a Similar Manner**

- IESO intends to make the same contractual amendments to contracts belonging to the same class of contract, subject to any contract-specific considerations that may apply

2 **Contract Incentives Should be Aligned with Market Incentives**

- IESO contracts should not impede efficient market operations
- Under the MRP, contracts should maintain incentive to respond to market signals

3 **Timely Resolution of Amendments**

- All parties would benefit from clarity of contract-market interaction by the date of the MRP implementation

Implications on Contracts

- Implications from the *energy stream* arise mainly from the introduction of a Day-Ahead Market (DAM) and a Single Schedule Market (SSM) with locational marginal pricing, as they impact the mechanics used for MP contract settlement

- Implications from the *capacity stream*, specifically the Incremental Capacity Auction (ICA) will be driven by end-of term transition issues and by the need for contractual clarity in respect of the participation of incremental capacity from existing contracted generating assets in the ICA

- A detailed summary of anticipated contract changes can be found in Appendix A.

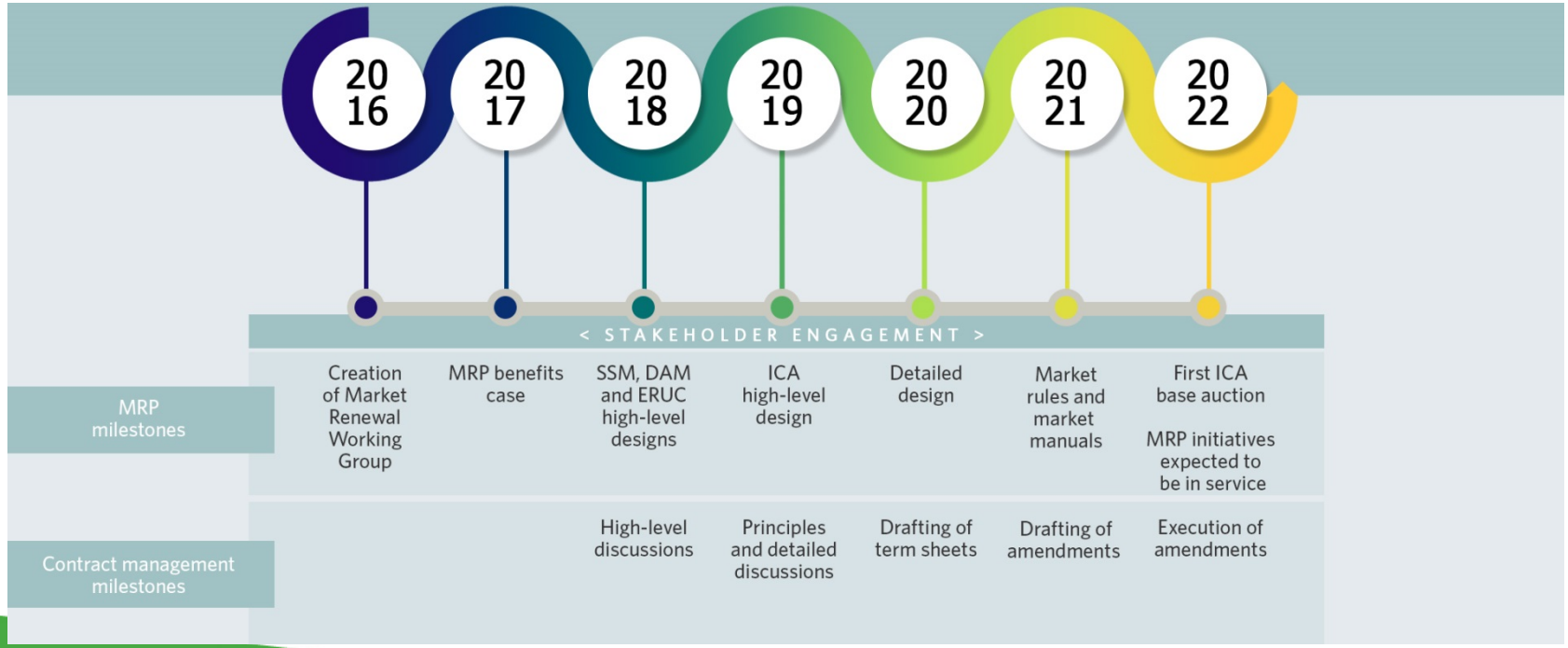
Engagement

- IESO will continue to address contract implications from the MRP as a separate initiative that is distinct from energy and capacity design stakeholder engagement activities
  - It will however, be closely aligned and coordinated

- In order to achieve the overall objective, the IESO will implement mechanisms to advance contractual discussions, including:
  - Dedicated contract management MRP webspace
  - Dedicated email for contract counterparties/stakeholders to provide feedback
  - Webinars/meetings will be conducted for all stakeholders
  - Smaller meetings will be held on an as-needed basis
  - Updates will be provided to the Markets Development Advisory Group, Stakeholder Advisory Committee, etc.

Timing and Next Steps

- IESO is aiming to align the timing of its contract amendments with the go-live date of the MRP
- IESO foresees its process being broken down into several phases which includes development of principles, development and finalization of terms sheets and drafting of amending agreement



APPENDIX A

Anticipated Contract Changes– Energy

Element	CES and Similar Contracts (ACES[2], CES[3], CHP[4], PGC[5])	Power Purchase Agreements (FIT[6], RES[7], LRP[8])
Single Schedule Market	Change HOEP to the applicable locational marginal price, as specified in the contracts.	
Day-Ahead Market	Amend settlement to settle contracts and calculate imputed net revenues based on the DAM	Amend settlement to offset differences between day ahead and real-time forecasted scheduled/delivered quantities. Payment for energy continues to be based on real-time production and includes the same real-time foregone energy provisions as in the existing contracts, as applicable.

[2]Accelerated Clean Energy Supply
[3]Clean Energy Supply
[4]Combined Heat and Power
[5]Peaking Generation Contract

[6]Feed-In Tariff
[3]Renewable Energy Supply
[4]Large Renewable Procurement

Anticipated Contract Changes – Capacity

Element	CES and Similar Contracts	Power Purchase Agreements (PPA)
Contract Capacity/Merchant Capacity Differentiation	Define calculation of incremental installed capacity that is above contract capacity, while Qualified Capacity to be determined in accordance with ICA rules.	
Energy Compensation	Not applicable; settlement is based on deemed parameters utilizing contract capacity.	Separate metering of energy from existing and ICA capacity may be required. Possibility of proportionate allocation of commonly metered energy based on actual and verified capacity additions made for ICA participation.
Energy Must-Offer Obligations	Where energy must-offer obligations exist, modify the obligations to not conflict with any ICA energy must-offer obligations where obligations apply to all capacity.	No contractual energy must-offer obligations currently exist and are not expected in the future.
Capacity Check Test	Capacity check test protocols to be changed to account for capacity (ICAP) committed to the ICA.	Not applicable. PPAs typically do not have contractual capacity check test obligation.
Metering Plans	Metering plans to be changed to align with any changes to capacity check test protocols.	Metering plans to be changed to align with any changes to calculation of energy output.

Anticipated Contract Changes – Capacity Cont'd

Element	CES and Similar Contracts	Power Purchase Agreements (PPA)
Force Majeure	Consistent with contract provisions, the impact of any force majeure event would be attributed to merchant capacity (including the ICA capacity) before providing any relief to contract capacity.	Generally not required given the interaction of Force Majeure with PPA requirements during the operating term.
Outages	Consistent with contract provisions, the impact of any outage would be attributed to merchant capacity (including the ICA capacity) before providing any relief to contract capacity.	Generally not applicable, as PPAs do not have provisions related to outages.
End of Term Obligations	Allow a supplier option for limited reduction of contract term so that the final date of the term aligns with the start of an obligation period under the ICA.	
Contract Facility Amendments	IESO will grant approvals of contract facility amendments for the purposes of creating additional capacity for the ICA (subject to satisfactory metering or proportioning of energy) if agreement can be reached on other contractual amendments related to the ICA.	

For discussion: IESO Innovation Roadmap – preparing for electricity sector evolution and increasing value for ratepayers

Presentation to IESO Board of Directors

December 5, 2018

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Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 2 of 21

Why was the innovation roadmap developed?

- Establishment of priorities for innovation activities – learning, capability building, enabling the innovation of others (in IESO-administered markets) – for improved electricity system cost-effectiveness and reliability
- Roadmap sets a framework and focus for sector evolution that will enable IESO to leverage its recognized leadership position within the sector to guide this evolution
  - Priorities provide an opportunity for coordination of IESO efforts with necessary regulatory and policy changes to support modernization/innovation for cost-effectiveness and reliability
- Development of an innovation roadmap is a 2018 IESO corporate performance measure (CPM)

Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 3 of 21

Purpose of roadmap: cost-effectiveness and reliability of Ontario's electricity system

Understand potential change, challenge and opportunities facing IESO and electricity sector through 2030 in order to ensure a **cost-effective** and **reliable** electricity system into the future per IESO's mandate

- ***Dialogue***: facilitate an internal and external dialogue on the evolution of Ontario's electricity and broader energy sector as it relates to IESO's mandate
- ***Situational analysis***: assess existing and emerging challenges and opportunities facing IESO and the broader electricity sector
- ***Prioritization:*** Identify and prioritize key areas of focus for learning, capability building and enabling the innovation of others to address the existing and emerging challenges
- ***Action:*** be supported by a multi-year work plan to focus and coordinate IESO and sector efforts

Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 4 of 21

How does IESO define **innovation**?

- Novel solutions to important challenges relevant to the work of the IESO, for which existing solutions are inadequate or inefficient
  - Solutions such as emerging technologies, new business models, practices, regulatory and policy constructs, and etc.
  - Emerging technologies, business models and etc. may be both solutions to existing problems and create new challenges in and of themselves (e.g. distributed energy resource proliferation)
  - Use of existing solutions in novel ways
- In practice: innovation is the process of developing and implementing new methods, ideas and/or products OR using existing methods, ideas, and/or products/services in new ways

IESO's objective and role in electricity sector innovation

IESO will leverage its recognized leadership within the electricity sector to guide and enable sector evolution to achieve improved cost-effectiveness and reliability through the following:

1. Monitor and be aware of activities of others with regards to innovation **(be prepared)**
2. **Enable the innovation** of others in support of electricity system reliability and cost-effectiveness where such actions are within IESO's purview including IESO-administered markets (IAM), operations, systems, standards, norms and practices
3. Look at IESO internally and how we can do things more efficiently and effectively
4. Leverage IESO's **unique vantage point** within the sector (central, not-for-profit) to **encourage a more efficient and effective** sector in service of the people of Ontario

What stakeholders said IESO's role in enabling innovation should be:

- *Leadership – with regards to markets, creating sector standards, thought leadership (funding/guiding research)*
- *Information sharing – providing access to data and a platform for sharing data amongst stakeholders*
- *Improving IESO operations – forecasting, operational efficiency, be technology agnostic*
- *Send clear info. to market – define products/services; publish requirements; send signals so others can address problems*

Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 6 of 21

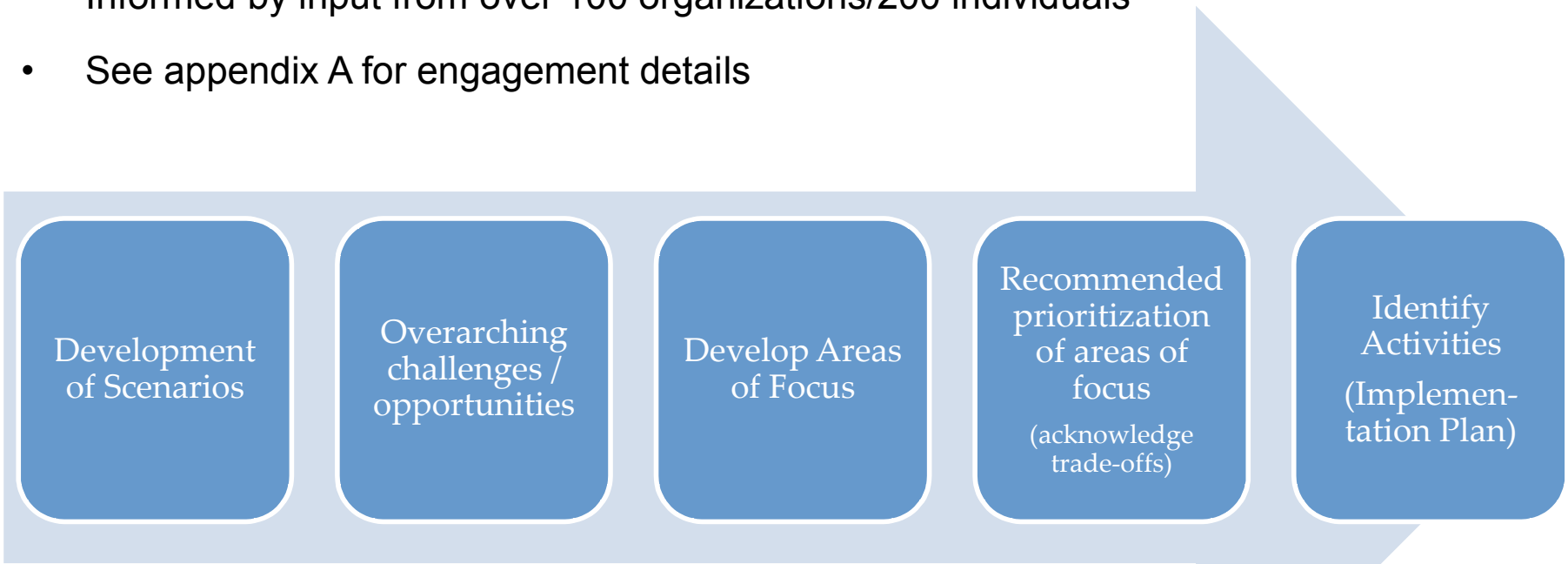
Linkage to IESO strategic and business planning processes and Market Renewal Project (MRP)

- The Roadmap will be a key input to IESO's strategic plan and will help identify specific priorities – e.g. opportunities, challenges, initiatives and capital projects to support the specific areas of focus identified for innovation
- Consideration of whether/how projects support the areas of focus for innovation will be an input to the prioritization of capital projects which forms part of the annual business planning process
- The outcome of the prioritization process will identify if /when these innovation initiatives can be undertaken considering the other needs of the organization and resource availability
- Inclusion of these priority areas of focus and initiatives in the business planning process will help ensure coordination across business units within IESO
- MRP will enable the innovation of others; by sending prices signals that reflect real-time system conditions, MRP will stimulate innovative responses by loads and electricity product and service providers

Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 7 of 21

Method for roadmap development

- Informed by input from over 100 organizations/200 individuals
- See appendix A for engagement details



To help determine key challenges/opportunities facing electricity sector; how system needs to evolve in next 5, 10, 20 yrs; informed by a jurisdictional scan

The scenarios provide the "lens" to identify challenges/opportunities to address (i.e. what are our future system needs to maintain reliability; what roles/responsibilities are evolving within the sector). Areas of focus are informed by challenges/opportunities

IESO will identify activities it will undertake to learn, build capability, enable innovation of others (informed by jurisdictional scan)

Aug/Sept 2018 | Aug/Sept 2018 | Oct. 2018 | Nov. '18 | Dec '18/Jan '19

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Scenario distillation: evolution of Ontario's electricity sector – envisioning how Ontario's electricity sector may evolve by 2030

By the early 2030s, Ontario's electricity sector will likely include many more decentralized elements (e.g. smaller scale resources, platforms to enable peer-to-peer buying and selling). Due to the planned decommissioning of certain large-scale generation assets reaching end-of-life in the mid-2020s, (e.g. Pickering Generation Station), a greater number of smaller scale resources (transmission-connected and distribution-connected) will likely contribute to meeting electricity resource requirements through participation in IESO-Administered Markets (IAM). Distributed Energy Resources (DERs) are also likely to provide services to customers behind-the-meter (BTM) and serve as alternatives to traditional transmission or distribution infrastructure expansions to meet local electricity needs as part of distribution system plans or markets established to meet those local needs. Transmission-connected resources will continue to serve the bulk of Ontario's electricity needs and will – along with other resources – be able to provide new products and services required to maintain reliability. Energy storage, solar photovoltaic (PV) and combined heat and power (CHP) may increase due to declining installed costs, increased ability to monetize the full range of services these technologies can provide, and the ability of these technologies to be scaled to meet local and customer needs and be developed within a short timeframe. With technology neutral systems and market platforms, all resources technically capable of providing needed electricity products and services should be able to compete to do so in Ontario.

Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 9 of 21

Areas of focus for IESO's innovation efforts

- Potential challenges and opportunities identified through the scenarios were grouped into potential areas of focus to guide IESO's innovation efforts over the next 3-5 years

- Areas of focus were first prioritized internally by IESO based on vantage point and accountability for core mandate
  - impact on IESO's ability to maintain system reliability
  - impact on IESO's ability to maintain a cost-effective system
  - likelihood of impacts within the area of focus materializing
  - expected time or speed of onset of potential impacts of the area of focus

- Stakeholder input was then used to calibrate areas of focus
  - helped to ensure area of focus related to data access includes electricity system supply and demand information to inform investment decisions by consumers, potential electricity product and service providers and others in Ontario

Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 10 of 21

Organization of areas of focus

Highest priority areas for resource allocation and engagement by IESO:	Require IESO resources and attention given the potential magnitude and immediacy of the impacts on IESO's ability to carry out its core mandate
Important areas core to IESO's mandate:	Important and necessary to address; less urgent and immediate than first category
Areas for monitoring or to support the action of others:	Important; can be handled with less active approach by IESO (e.g. by observing the work of another organization in the area)
Foundational to support innovation:	IESO's efforts to support and enable electricity sector evolution depend on the strength of our workforce and our ability to shape the policy and regulatory frameworks that impact our work

Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 11 of 21

Areas of focus for IESO's innovation efforts: recommended prioritization*

	Area of Focus Name	Timeline for onset of potential impacts related to area of focus
		2019 | 2022 | 2025 | 2028
Highest Priority Areas for Resource Allocation and Engagement	Unlock value of new and existing resources	
	Leadership with respect to emerging cyber security risks	
	Increase transparency and visibility of resources operating on the distribution system	
	New capability to collect, store, share, analyze and use data	
Important Areas Core to IESO Mandate	New methods for ongoing operation of an electricity grid with more intermittent supply resources and increasingly variable loads	
	Inform new distribution system operations and business models to support bulk market efficiency and reliability	
Monitor or Support Action of Others	Prepare for increase in customer-led and LDC-led DER deployment	
	Prepare for changing consumer choice	
	Alternative approaches to provide system resiliency	

IESO's work in each area of focus is enabled by:

- Human resource readiness within IESO to meet innovation needs
- Leadership with respect to policy and regulatory changes needed to enable innovation in support of market/cost efficiency and reliability (see appendix C for more information)

*See Appendix A for stakeholder ranking of areas of focus and Appendix B for descriptions of each area of focus

Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 12 of 21

Implementation tools: taking action on the roadmap

- IESO has a number of tools or vehicles to generate learnings, capability building and enable the innovation of others in support of improved electricity system cost outcomes and reliability for the people of Ontario
- IESO will aggressively pursue external partnerships and funding sources in support of roadmap implementation

Tool	Applicability to enable innovation
Market rules	• Govern participation in IESO markets; can be revised to enable new solutions (existing or new technologies) to compete to provide products and services needed to maintain reliability
IESO Capital budget	• Subject to an appropriate business case, can be used to update systems and tools to enable new market participants and increased coordination between IESO and distributors
IESO operating and maintenance budget	• Opportunities to improve the efficiency and effectiveness of systems as they're maintained
Data and expertise	• By engaging with others and sharing data and expertise, IESO and stakeholders can learn and understand new solutions, challenges and opportunities together
Conservation Fund	• Leverage investments of private sector, non-profit, utilities and others to understand emerging technologies, business models, products and services in the Ontario context and how they might impact IESO's ability to carry out its mandate
Energy Support Programs	• Support innovation for positive energy outcomes in Indigenous communities

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Implementation plan: conceptual draft for illustrative purposes

- IESO will develop an implementation plan that will outline key initiatives that IESO will undertake over the next three years to address the areas of focus
  - Including capital projects (e.g. enabling new resource participation in IESO-administered markets); demonstration projects; white/research papers; policy reviews; engagement initiatives; and etc.
- Will include initiatives that are being led by various parts of the IESO
- For lower priority areas of focus, plan will outline initiatives that may be led by others (with IESO as an observer)
- Will help coordinate IESO internally; can help inform regulatory/policy priorities

Illustrative example of implementation plan elements

Area of Focus within the Roadmap	**Initiatives/Projects**		
	Learn	Capability Building	Enable Innovation of Others
Unlock value of new and existing resources	• Fast frequency regulation experiments • Energy Storage Advisory Group • Ryerson Transactive Energy Fellowships	• Evolution of planning processes • Standardized DER test cases • York Non-wires alternatives pilot	• Market Renewal Project (MRP) • Expansion of resources available for Operating Reserve (OR) • Demand Response updates • Storage in DSO/AGC • *Enabling energy efficiency in IESO-administered Markets (IAMs)* • *Mutually beneficial contract amendments* • *Aggregation of resources <1MW into IAMS*

Legend: Initiatives in progress; Planned; *Proposed*

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Filed: April 30, 2019, EB-2019-0002, Exhibit I, Tab 1.1, Schedule 13.07 AMPCO 7, Attachment 2, Page 14 of 21

Next steps

Dec./Jan.	Develop innovation implementation plan • Will include projects with funding committed in 2019 capital budget amongst other initiatives • Initiatives communicated externally
Jan. '19	Roadmap document published on IESO website
Jan. '19	Develop a partnerships plan to support roadmap developed • E.g. opportunities to work with other levels of government, academia, other system operators • Partnerships for funding, other resources, learning opportunities
Ongoing	• Annual review of roadmap and measurement of progress against implementation

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Appendix A. Stakeholder engagement to inform roadmap – engagement process

- Over 100 organizations/200 individuals engaged (Aug-Nov. 2018)
- Three sessions with IESO Stakeholder Advisory Committee (SAC)
- Three focus group sessions
  - Industry, Academia, Government, Associations, Energy Transformation Network of Ontario (ETNO) Corporate Partners Committee
- Energy Transformation Network of Ontario (ETNO)
- Public webinar
- IESO staff (two all-staff webinars)

Types of questions posed to stakeholders:

1. What do you see as the biggest capability and knowledge gaps in preparing for change in the electricity sector?
2. What innovation is happening/on the horizon for Ontario, including that from other sectors, which may impact the electricity sector?
3. What are the current barriers for innovation in the electric sector?
4. What are the external factors that IESO needs to consider as part of the roadmap?
5. What is IESO's role in removing barriers and enabling innovation in the electricity sector?
6. What innovation activities should IESO prioritize? Why?
7. With whom should IESO engage to implement innovation?

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Appendix A. Stakeholder engagement to inform roadmap – key input

Draft scenarios

- Need to better reflect the future role of Transmission-connected (Tx resources)
- Considerable focus on **evolution of customer needs**, Dx sector, DERs
- Need for economic analysis (how likely is DER uptake based on cost forecasts? Benefits of DERs vs. Tx resources? Existing system costs)
- Need to understand economics of consumer behaviour/choice

IESO's role in innovation

- Leadership: IESO as **neutral** 3rd party; on markets; determine/fund research; create standards; thought leadership
- **Information sharing** across sector
- Define products/services, create fair playing field and **let market innovate**
- **Fair market access as 1st principle** (technology neutrality
- Look at total cost (customers, society)
- Forecasting
- Co-ordinating with OEB

Capability/knowledge gaps

- Better understand customer behaviour (e.g. rate of technology adoption)
- Lack of communication across sector
- How to unlock value of DERs
- Understand value/potential of new technologies

Innovation on horizon

- Decarbonizing transportation
- Storage
- DERs; smaller supply resources
- New business models
- AI to optimize grid operations

Opportunities

- IESO communicate standards, norms, practices for reliability (what's required; what's practiced)
- Better way to **allocate fixed asset costs**

Barriers to innovation

- Lack of data/info. sharing
- Utility **monopolies; s**ector favours existing actors
- Potential for **stranded assets (high fixed costs)**; cost transfer to remaining customers
- No standardization (e.g. LDC connection requirements vary)
- Appropriate price signal
- Regulations

How to prioritize efforts

- Measures to reduce customer and system costs; **affordability**
- Value creation: reliable, affordable, sustainable
- Number of potential market participants enabled by a change
- **Data access**
- Need to make business case

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Appendix A. Stakeholder engagement to inform roadmap – prioritization of areas of focus

Areas of Focus	ETNO CPC	Assoc-iations / Academic	Industry Group	Overall External Rank
Unlock value of new and existing resources	2	2	2	**1**
Leadership with respect to emerging cyber security risks	6	7	7	**8**
Increase transparency and visibility or resources operating on the distribution system	3	4	7	**7**
New methods for operating a more dynamic electricity grid	3	12*	5	**6**
Leadership with respect to policy and regulatory changes in regards to IESO's core mandate	3	4	4	**4**
Human resource readiness to meet innovation needs	10	7	12*	**12***
Understanding of new distribution system operations and business models	6	7	**1**	**3**
New capability to collect, store, share, analyze and use data	1	3	2	**2**
Prepare for increase in customer-led and LDC-led DER deployment	8	4	7	**8**
Prepare for changing consumer choice	8	**1**	6	**5**
Alternative approaches to provide system resiliency	10	7	11	**10**

Note: rank of 12 possible because of "other" option in focus groups

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Appendix B. Description of areas of focus: highest priority areas for resource allocation and engagement

Area of Focus Name	Description
Unlock value of new and existing resources	Enable increased competition through new solutions within IAMs and other competitive markets where there are currently limits to the ability of new and existing resources to provide cost-effective grid services. Opportunities such as: addressing technical, procedural challenges that currently prevent resources from participating in energy, capacity and ancillary service markets; exploring new participation models for DERs within IAMs and researching methods for existing resources to provide new services (e.g. leveraging inverter-based resources for inertia)
Leadership with respect to emerging cyber security risks	Provide leadership and coordinate with electricity sector partners to prepare for emerging cyber security risks. This work may include understanding the changing nature of threats from the increasing integration of consumer-level devices, establishing standards for their integration (with input from LDCs and others) while leveraging the IESO's insight into the cyber-security requirements of the North American Electric Reliability Council.
Increase transparency and visibility of resources operating on the distribution system	In coordination with LDCs and others stakeholders (e.g. aggregators) IESO will explore/develop new methods and platforms to obtain appropriate levels of visibility of the distribution system with respect DER operations. IESO will engage with others to determine appropriate level of visibility, e.g. static resource information such as location, nameplate capacity and capability, and improving transparency of BTM resources. May include greater visibility of individual resources operating within DER aggregations.
New capability to collect, store, share, analyze and use data	Build new capability to leverage electricity data to deliver a more efficient energy system. This capability includes creating useful information through combining datasets, sharing data and information and developing appropriate standardization of data sets that are predictable, accessible and useful to IESO and others in the electricity and broader energy sector.

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Appendix B. description of areas of focus: important areas core to IESO mandate

Area of Focus Name	Description
New methods for ongoing operation of an electricity grid with more intermittent supply resources and increasingly variable loads	Working with market participants and the broader electricity sector, the IESO will investigate and advance new methods for operating a grid with increased intermittent resources, DERs and variable loads. This work may include engaging with electricity suppliers, large load customers or resource aggregators to learn about options for flexibility products and services.
Inform new distribution system operations and business models to support bulk market efficiency and reliability	IESO will engage with the electricity sector and others to develop a shared understanding of options for the development of new distribution system operation and business models to ensure value for ratepayers through market efficiency and competition as well as reliable electricity supply. This engagement may include exploring new concepts such as DSOs/IDSOs, load serving entities (LSEs), and future interoperability requirements and opportunities.

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Appendix B. description of areas of focus: areas to monitor or support action of others

Area of Focus Name	Description
Prepare for increase in customer-led and LDC-led DER deployment	IESO will prepare for an increase of DERs which may not directly participate in the IAMs. For example, the IESO will consider effects with respect to supply and resource planning, stranded assets and reducing load on the electricity system.
Prepare for changing consumer choice	With respect to matters impacting IESO markets or operations, the IESO will prepare for changes resulting from evolving consumer choice. This may include different models for consumers to secure electricity supply such as community choice aggregation, bi-lateral contracting or peer-to-peer transactions.
Alternative approaches to provide system resiliency	The IESO will design alternative approaches to providing grid-level resiliency. These approaches may include learning about the capability of the distribution system to provide local resiliency. For example, leveraging microgrids, power electronics and energy storage for the provision of resiliency services.

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Appendix C. Human resource readiness and leadership in policy/regulatory evolution: foundational elements essential to IESO's innovation efforts in any area of focus

Human resource readiness to meet innovation needs

IESO will continue to ensure human resources readiness to ensure its ability to prepare for major, disruptive change within the electricity sector. This preparation may include hiring employees with an innovation mindset as well as developing enhanced capability to train and redeploy employees throughout their careers in a time of increasingly complex and fast change.

Leadership with respect to policy and regulatory changes needed to enable innovation in support of market/cost efficiency and reliability

Within the context of IESO's core mandate, IESO will provide leadership with respect to policy and regulatory changes impacting the electricity sector. An example may include coordinating with the Ontario Energy Board (OEB) to synchronize efforts to address market, operation and regulatory barriers to enable new resources to compete to provide needed electricity products and services in Ontario markets. It may also include ensuring that any policy or regulatory initiatives related to potential changes to the role of distributors considers the efficiency of IAMs and interoperability issues with IESO as applicable

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IESO Innovation: A Roadmap for Electricity Sector Modernization

Information Item for IESO Board of Directors

June 13, 2018

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Purpose and Overview of Discussion

- Provide an update to the Board on development of IESO Innovation Roadmap per the 2018 Corporate Performance Measure (CPM)
- Establish shared understanding of the key elements required of a successful innovation program:
  - organizational commitment to delivery on a set of innovation goals and priorities
  - commitment of resources
  - willingness to take risk on innovation projects that is greater than risk generally taken for core IESO business
  - strong partnerships for resources, learning, risk sharing
  - identification and address of barriers to private-sector/other innovation that are within IESO control
- Outline engagement approach for Innovation roadmap development

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IESO Innovation: Electricity Sector Modernization

Innovation is needed to improve energy outcomes

- Innovation to improve **reliability, adequacy, cost, sustainability**
- **Decentralization**, **digitization**, **decarbonization** and **democratization** are triggering the transformation of energy systems around the world

Innovation investment (time, people, resources) enables the leadership role demanded and required of IESO in grid modernization

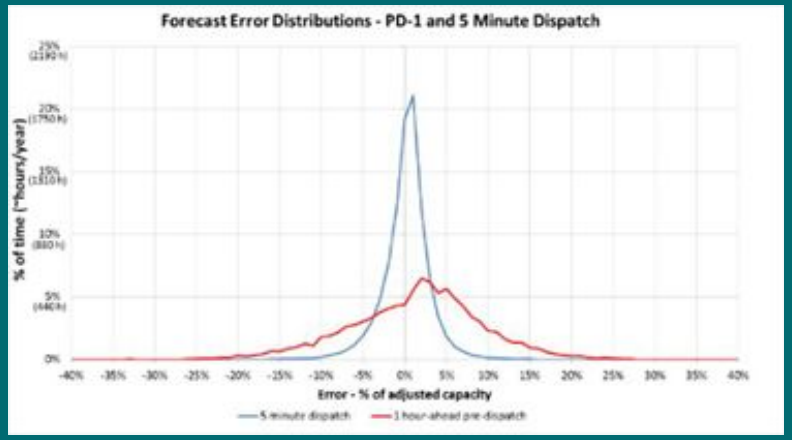
- Support adequacy, security, operability, affordability and sustainability needs
- Stakeholders/others have called on IESO to take a leadership role in innovation given the IESO's central and non-commercial role in the electricity sector
  - 2017 Buildability Report on the future of the Conservation Fund
  - 2018 LTEP includes a leadership role for IESO in innovation
  - 2018 IESO CPM
  - 2018-2022 IESO Strategic Plan

An innovation roadmap will guide IESO and industry efforts

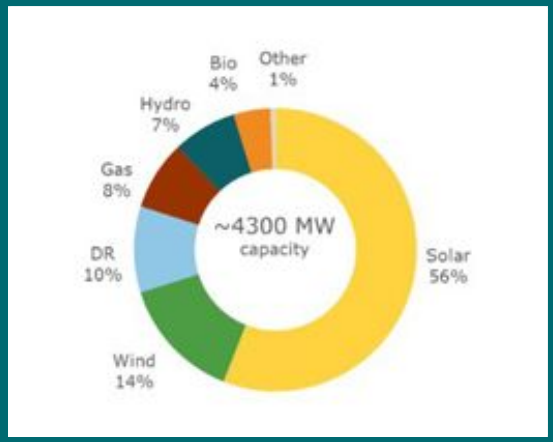
- Coordinate/focus IESO and sector efforts on shared priorities (challenges/opportunities) and desired outcomes to support grid modernization
- Resolve fragmentation of efforts; establish IESO and sector leadership
- Other jurisdictions have similar innovation strategies/plans
  - E.g. UK National Grid, Hydro Quebec (see Appendix A)

A Leadership Role in Innovation Now, Will Enable the IESO to Lead in Electricity Sector Modernization

Managing Uncertainty

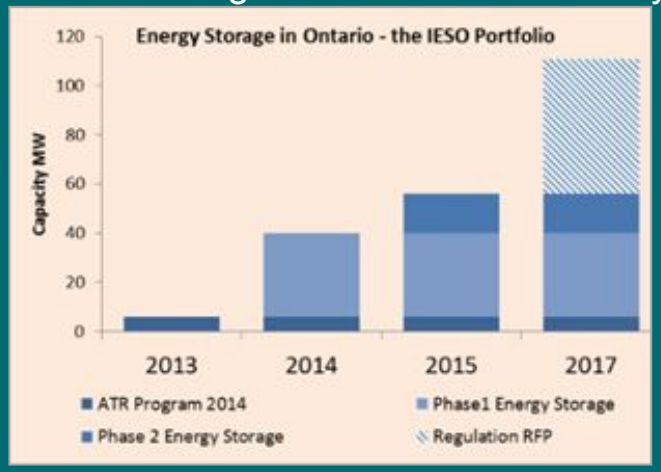


DER Growth



Empowered Consumers and Market Entrants are Creating New Business Models

Growing Bulk System Storage Portfolio and Unknown but Growing Levels in Distribution System



IESO Needs to Invest in Innovation; Modernization of Ontario's Energy Sector is not "business as usual"

- Innovation success requires long-term resource commitment and integration within IESO's broader strategic, business and project planning processes
  - Dedicate resource(s) across IESO to support/enable innovation (including removal of barriers within IESO's control to innovation by others)
  - Annual departmental innovation performance metrics
  - Support and encourage innovation internally (e.g. "intrapreneurialism" award)

- Innovation investment risk is generally greater than risk taken by core business and is necessary to learn/improve
  - UK National Grid System Operator (UKSO) states that they expect between **25-50%** of their innovation projects and investment to fail
  - Failures offer learning opportunities/avoid larger bad investments

- IESO must seek to lever partnerships for potential funding, learning opportunities, shared risk
  - Seek other funding (e.g. federal government, foundations, private)
  - Lever IESO innovation funds (Conservation Fund, Renewable Distributed Generation Integration Fund, Energy Support Programs)
  - Establish source of funding for innovation projects to improve how IESO does business
  - Support removal of barriers to private-sector investment

Figure 1. UKSO Innovation Fund Investment Risk Profile Compared to Private Investors

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IESO Innovation Roadmap

- The development of the roadmap will:
  - Establish a definition of innovation within IESO and broader electricity sector
  - Facilitate an internal and external dialogue of potential future **scenarios** for the electricity and broader energy sector in Ontario including **roles** of various organizations in those scenarios and how emerging social, economic, political and environmental trends and issues may impact future state(s)
- The roadmap itself will:
  - Set innovation **priorities**
  - Create a multi-year work plan to **focus** and **coordinate** IESO and sector efforts around a **shared set of goals** for research and development including related emerging technologies, consumer trends, business models/practices, and policy alternatives in support of electricity system/grid modernization
  - Establish a plan to identify, assess, prioritize and address opportunities and barriers to innovation within the IESO and throughout the electricity sector
  - Identify/align multiple work streams towards a shared set of innovation goals
  - Include annual performance/success metrics to track progress

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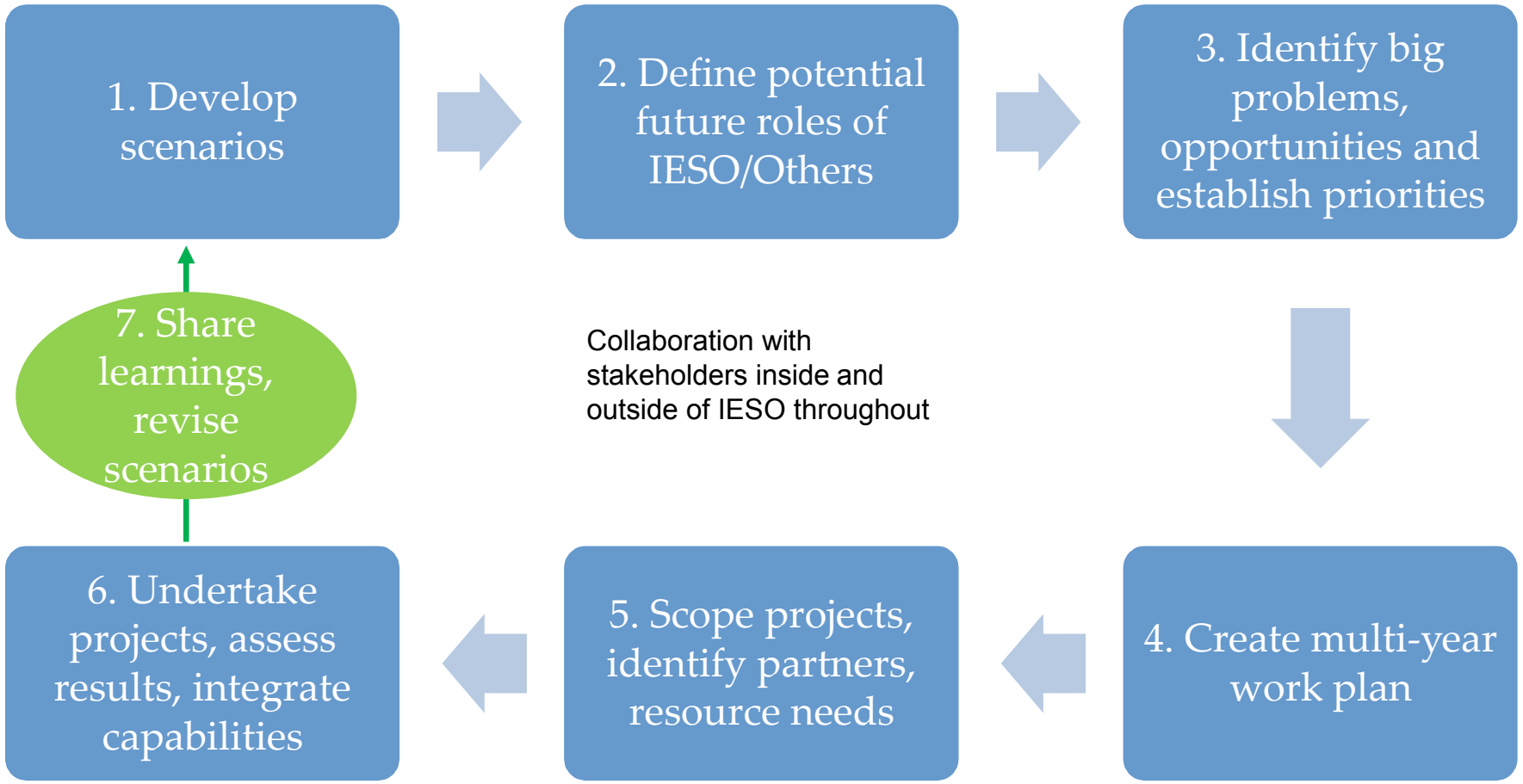
Approach to Development and Implementation of Innovation Roadmap

Determine likeliness/desirability of each scenario from multiple perspectives



Develop research questions, problem statements; each department sets innovation performance metrics

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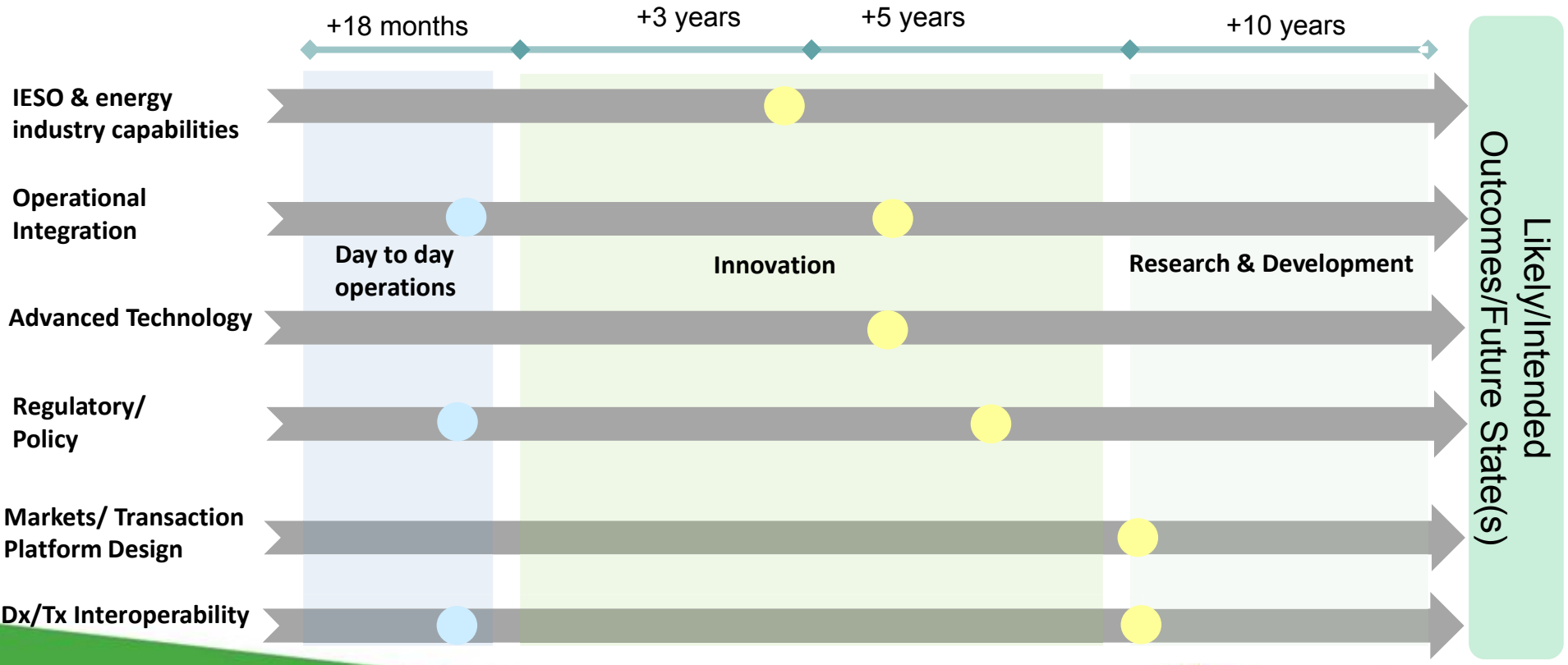
Innovation Roadmap & Work Plan Concept

- Work streams for different areas of IESO business
- All work streams coordinated within roadmap and focused on supporting intended future state and role of IESO/others
- Priorities supported across work streams (e.g. DER, storage, data access)
- Outputs: Innovation roadmap/workplan; partnerships plan; communications plan



Innovation: Engagement and Partnership Throughout the Process

1. Develop scenarios	• IESO, Energy Transformation Network of Ontario (ENTO), IESO Stakeholder Advisory Committee (SAC)
2. Define potential future roles of IESO/Others	• IESO, ETNO, SAC
3. Identify big problems/ opportunities and establish priorities	• IESO, SAC, other stakeholders/parties
4. Create multi-year work plan	• IESO, SAC, other stakeholders/parties
5. Scope projects, identify partners, resource needs	• IESO, SAC, other stakeholders/parties
6. Undertake projects, assess results, integrate capabilities	• IESO, Project Partners

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Next Steps & Timelines

- Select vendor to support roadmap development (June 2018)
- Create internal advisory group (senior management) to guide roadmap development
- Initiate and work plan development (July – Oct. 2018)
- Engage IESO Stakeholder Advisory Committee (SAC) and others in roadmap development (August/September 2018)
- Review roadmap/workplan with IESO Board (December 2018)

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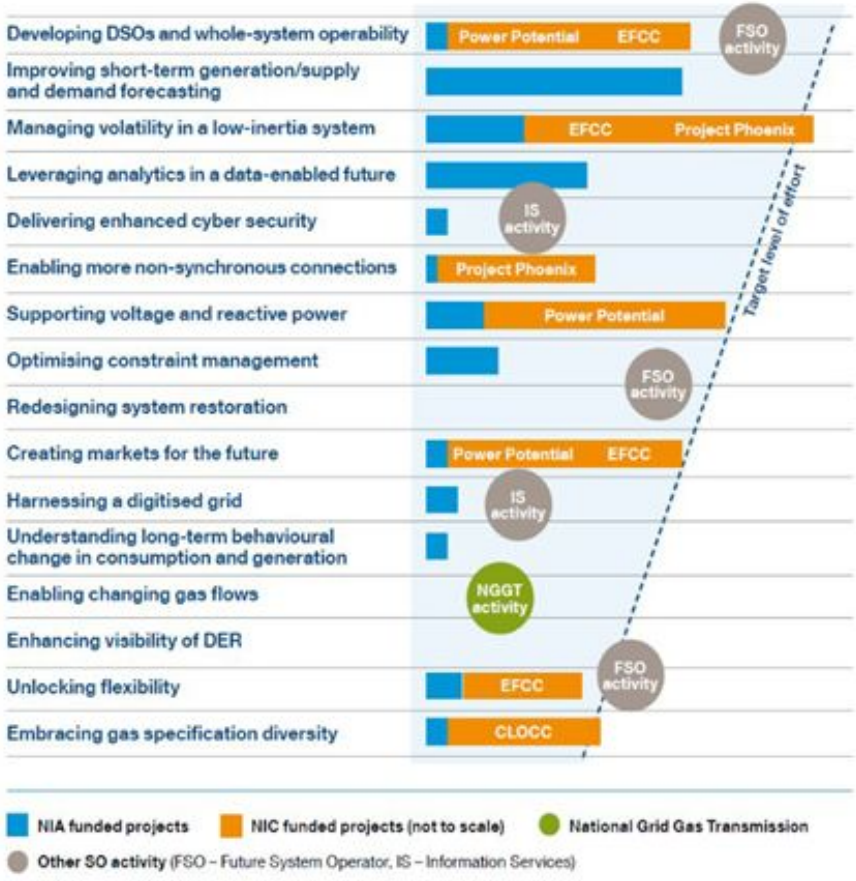
Appendix A: Example System Operator Approach to Innovation: UK National Grid System Operator ("UKSO") Innovation Strategy

- First UKSO innovation strategy created in 2018
- UKSO takes various forms of involvement in innovation projects:
  1. Direct funding – primary sources:
     - OFGEM's Network Innovation Allowance (NIA) - $10 million/yr; for earlier-stage R&D/demonstration
     - OFGEM's Network Innovation Competition (NIC) - ~ $34 million/yr annual competition open Network Licensees; larger-scale projects
  2. Provide time, expertise, data, offering problems for third parties to solve
  3. Support 3rd parties' bids for grant funding (include commitments to offer time, data, expertise)
- Note: IESO is currently participating in learning partnership with UKSO set up by Natural Resources Canada (NRCan)

UKSO Innovation Priorities and associated investment and effort levels



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IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
City of Toronto	Waterfront Neigbourhood Centre Deep Energy Retrofit	This deep energy retrofit will demonstrate a commercial-scale lake-based geothermal system. The demonstration will produce valuable quantitative and qualitative information on the technology, and deep energy retrofits more broadly, to inform future deployments.	Commercial & Institutional	$ 500,000	$ 1,161,300	2018	Active
Opus One Solutions	Transactive Energy Network	This project, in colloboration with three Local Distribution Companies, will develop and demonstrate the ability to generate locational price signals at the distribution system level to faciliate the economically efficient integration of energy storage, microgrids, smart EV supply equipment, and other resources into the electicity system while protecting local grid reliability.	Various	$ 1,000,000	$ 5,050,000	2018	Active
NRStor	Local Distributed Energy Resource (DER) Integration and Rental Program Pilot	This pilot will demonstrate a rental model for deploying behind-the-meter energy storage in an electrically constrained urban neighbhourhood. The project will explore how this model can make energy storage affordable for homeowners while providing valuable services to the local and provincial bulk electricity system.	Residential	$ 475,000	$ 1,090,590	2018	Active
Opus One Solutions	Smart Energy Community Microgrid Project	This project is a unique approach to residential community development. The entire project considers developing a community from the transmission station down to the individual homes, providing feeder visibility to the Local Distribution Company to monitor the feeder and optimize microgrid resources, including energy storage and EV supply equipment, according to real-time conditions to provide grid benefits. The project will generate valuable learnings for electricity network planners and operators, municipal planners, and developers, on the value of microgrids.	Residential	$ 500,000	$ 3,141,000	2018	Active
Innovia	Pile-Integrated Geo-Exchange System	The objective of this demonstration project is to compare the heating and cooling performance of helical steel geo-exchange piles versus conventional High Density Polyethylene (HDPE) ground loops in geothermal systems in a real-world setting in Ontario and to develop the local engineering and construction expertise for further implementations. Helical steel geo-exchange piles may offer significant installation cost, installation time, durability, and other benefits compared to conventional HDPE ground loops.	Commercial & Institutional	$ 375,000	$ 576,261	2018	Active
Goldcorp	Distributed Underground Air Compressors Demonstration	This project will seek to verify that small distributed air compressors can meet compressed air needs in mines using less than 50% of the energy compared to a conventional central surface compressor plant with associated underground distribution. The project will produce learnings on the business case and safe implemention of this novel approach.	Industrial	$ 500,000	$ 1,517,462	2018	Active
Ryerson University	IESO Distinguished Research Fellows	The Centre for Urban Energy (CUE) at Ryerson University will establish two research fellowships focusing on Energy Storage and Transactive Energy respectively to advance IESO and industry knowledge in these fields.	Institutional	$ 721,550	TBD	2017	Active
UPPlift: Toronto	Urban Living Futures	This project will pilot an alternative model for the IESO Conservation Fund to support CDM innovation providing additional non-financial support to projects and engaging private investment, while producing a round of field demonstrations of emerging technologies selected with input from the IESO.	Commercial & Institutional	$ 499,375	$ 816,425	2017	Active
Canadian Urban Institute	Improving Electrcity Conservation in Small-Medium Municipal Water Distribution Systems across Ontario	As water and wastewater treatment and delivery becomes the single largest energy use for Ontario municipalities, this project will provide small-medium municipalities with a tool to enhance visibility into energy consumption in water distributions systems and identify energy efficiency and peak demand reduction opportunities.	Institutional	$ 470,108	$ 627,696	2017	Active
Enersion	Low-Cost Adsorption Chiller	This project will demonstrate a new technology with the potential to significiantly reduce the costs of waste heat-to-cooling adsorption cooling.	Commercial & Institutional	$ 348,100	$ 614,900	2017	Active
York University	Impacts of Adopting Full Battery-Based Electric Transit Bus Systems on Ontario Electricity Grid	York University will develop modelling, simulation and optimization tools to study the integration of battery electric transit and school buses within existing electricity infrastructure and provide recommendations for local electric utilities and bus fleet owners/operators.	Commercial & Institutional	$ 100,000	$ 200,000	2017	Active

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
EnerQuality Corporation	ENERGY STAR Multi-Family Buildings Pilot Program	With industry input, EnerQuality will design, develop and pilot a third party energy efficient certification program for mid/high-rise residential building new construction projects in Ontario leveraging the brand power of the ENERGY STAR label.	Multi-Unit Residential	$ 437,800	$ 778,500	2017	Active
RWDI	COMPASS: A Benchmarking Tool for Energy Models	This project will create a streamlined energy benchmarking and reporting tool for new construction projects at the design stage. By providing benchmarking analytics and data points aligned with electricity CDM and natural gas DSM program requirements, this tool will increase the energy literacy of the design and construction community and reduce soft costs of program participation to ultimately reduce electricity consumption and greenhouse gas emissions.	Commercial & Institutional	$ 461,091	$ 636,320	2017	Active
North Bay Hydro Services	North Bay Community Energy Park	This project will establish a microgrid and district energy system serving a number of North Bay community facilities. North Bay Hydro Services and its partners will perform a series of tests exploring the capabilities of the microgrid and its electricity CDM, greenhouse gas reduction, and resiliency benefits.	Commercial & Institutional	$ 1,000,000	$ 2,074,221	2017	Active
The Atmospheric Fund	Pumping Energy Savings Phase II: Demonstration and Scale-up Strategy	This project will evaluate the performance of heat pumps within the context of deep energy retrofits and develop best practice metrics to advance their adoption across the electrically-heated multi-unit residential building (EMURB) sector in Ontario. The strategies taken to transform the market for heat pumps will include: increasing market confidence; verifying performance in real-world environments; identifying and showcasing financing options; and developing a scale-up strategy that identifies and addresses the remaining market barriers.	Multi-Unit Residential	$ 500,000	$ 1,632,700	2017	Active
Alectra Utilities	Smart Electric Vehicle Charging Pilot for Workplaces	Throughe demonstrations at different buildings, this project will investigate how smart charging systems at workplaces can minimize the customer and utility impacts of transportation electrification.	Commercial & Institutional	$ 933,300	$ 2,706,022	2016	Active
Multiple Local Distribution Companies (LDCs)	Local Achievable Potential Studies Allocation	IESO will make available funding for LDC-lead Local Achievable Potential Studies for specific areas with identified capacity needs. The plans will assess the feasibility and costs of using CDM and other Distributed Energy Resources as Non-Wires Alternatives to defer or negate the need for additional investment in transmission and distribution system infrastructure. Study findings will inform the Integrated Regional Resource Planning process.	Various	$ 1,000,000	$ 1,000,000	2016	Active
National Research Council (NRC)	High Performance Buildings Program Recommitment	Through resource-efficient collaboration with critical and high profile stakeholders representing commercial building owners and operators, technology vendors, utilities and governments, the NRC-managed program will define, scope and execute collaborative demonstration and validation projects. These industry-driven projects will establish the value of retrofit solutions to potential early adopters for building owners and managers, provide the technical and market insight that participating companies and organizations need to support commercialization for vendors and service providers, and provide program design and delivery information for utilities and governments.	Commercial & Institutional	$ 2,000,000	$ 17,997,461	2016	Active
Brickworks Communications	Freezer Temperature Modification	The goal of this experimental research project is to measure the energy savings benefit, and assess any impacts on food quality, associated with a 3 degree Celsius increase in the standard temperature set-point in commercial freezers. A successful outcome from this project will show significant electricity savings ~10% with no concerns related to food quality, allowing regulators to adjust the required set-point generating significant electricity and customer financial savings. This project may lead to opportunities in residential refrigeration as well.	Commercial & Institutional	$ 166,450	$ 253,900	2016	Complete
CanmetENERGY	Enhancing RETScreen Expert to Further Meet the Needs of Ontario Energy Professionals	Building on the initial success of the RETScreen Expert tool, this project will add new building and project archetypes requested by Ontario energy professionals. Additionally enhancements will support data import using the Green Button standard and integration with the popular Portfolio Manager benchmarking tool. Cumulatively these enhancements will reduce the time and expense required by Ontario's business and institutions to identify energy efficiency opportunities, track project savings, and report on energy performance.	Industrial, Commercial & Institutional	$ 400,000	$ 911,000	2016	Active
SensorSuite	Development and Demonstration of Intelligent MURB Energy Management System	This project will demonstrate an energy management system for Multi-Unit Residential Buildings that leverages in-suite sensors, big data, machine learning algorithms, and IESO demand/price data to proactively manage building load while maintaining occupant comfort.	Multi-Unit Residential	$ 498,250	$ 1,195,400	2015	Active

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Ontario Clean Water Agency	Pay-for-Performance Pilot Initiative	This pilot will extend the IESO's testing of the pay-for-performance model as a potential approach to Conservation and Demand Management program delivery under the Conservation First Framework. Complementing the customer-level pay-for-performance pilots currently underway in the commercial retail and office sectors, this pilot will assess the application of the model at the program delivery agent-level to determine if it offers a more cost-effective, lower-risk means of effectively reaching challenging Industrial, Commercial & Institutional subsectors compared to traditional approaches.	Institutional	$ 1,000,000	$ 5,860,000	2015	Active
Alectra Utilities	Evolution of Advantage Power Pricing	This project will extend and expand Alectra's Smart Grid Fund-supported dynamic pricing pilot with price-responsive home technology to produce the financial, energy, and implementation data necessary to inform decisions about the introduction of dynamic pricing as a voluntary, all-year, alternative to the TOU rate structure for residential customers.	Residential	$ 999,000	$ 1,999,558	2015	Complete
Alectra Utilities	Residential Solar Storage Pilot	This project will install 20 residential solar storage units in the Alectra service area to evaluate their benefits to customers, the distribution system and the provincial grid. Public reports on conservation outcomes, electricity system benefits and LDC business models will be produced and shared publicly with all Ontario LDCs.	Residential	$ 500,000	$ 1,393,605	2015	Complete
Electrale Innovation Ltd.	Hydraulic Air Compressor (HAC) Demonstrator Project	A 30-metre high Hydraulic Air Compressor (HAC) Demonstrator rig will be installed in a former elevator shaft at Science North's earth sciences centre, Dynamic Earth. The project will measure and verify electricity savings of new HAC technology primarily for deep mining applications, and will provide opportunities for large industrial mining customers to learn more about the technology, which may lead to increased uptake and eligible projects through the Industrial Accelerator Program.	Industrial	$ 499,000	$ 2,555,367	2015	Complete
BEworks Inc.	Bills that Save: Nudging Energy Conservation and Demand Shifting Through Effective Communication of Time Use Pricing	Building on an Ontario Energy Board-commissioned project comparing the effectiveness of different LDC bills in communicating energy consumption and Time-of-Use (TOU) pricing information, this project will create a primer on best practices for bill design and conduct a field trial testing if optimized billing designs can cost effectively increase the desired customer response to TOU pricing.	Residential	$ 450,000	$ 600,000	2015	Active
Toronto Water	Advancing Energy Efficient Water Services in Toronto	This project will assess Toronto's water distribution network with the objective of developing a model to enable the use of pressure management strategies and price signals to improve the operational efficiency of Toronto's water system. Results and best practices will be shared with municipalities across Ontario to assist them in implementing a similar approach to energy conservation.	Institutional	$ 100,000	$ 148,000	2015	Complete
Hydro Ottawa	Conservation Voltage Regulation Leveraging AMI Data	This demonstration project will determine if Conservation Voltage Regulation (CVR) tools leveraging data from utility smart meter networks can deliver precise voltage regulation that produces quantifiable electricity savings for customers.	Various	$ 305,681	$ 312,231	2014	Active
Toronto Atmospheric Fund	Pumping Energy Savings	In collaboration with utilities, public and private building owners/manager, and other stakeholders, TAF will characterize Ontario's electrically-heated Multi-Unit Residential Building stock and develop tools and resources to support conversion to air- and ground-source heat pumps.	Multi-Unit Residential	$ 260,700	$ 388,300	2014	Complete
D+R International	Home Appliance Market Lift	D+R International will pilot a new mid-stream program approach designed to mitigate free-ridership issues that have challenged traditional efficient appliance incentive programs, while leveraging retailer expertise in product promotion.	Residential	$ 498,688	$ 666,088	2014	Complete

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Evergreen CityWorks	Tower Renewal Showcase Project	As part of a broader, three-phased Tower Renewal initiative, this Phase 1 project works with tower owners to develop scalable financing models using three MURB sites as case studies.	Multi-Unit Residential	$ 150,000	$ 340,000	2014	Complete
Canadian Urban Institute	The Ontario Parking Area and Garage Project	Building on its success with municipal street lighting, CUI will extend the LightSavers model of establishing and educating a peer network of early adopters to accelerate the adoption of Light-Emitting Diode (LED) technology with adaptive controls in Ontario's outdoor parking areas, multi-story parking structures, and underground garages.	Commercial & Institutional	$ 134,934	$ 179,230	2014	Complete
EnWin Utilities	Recommissioning of Commercial Buildings	The pilot will evaluate the benefits of offering retrocommissioning services to commercial customers beyond the incentives for chilled water system retrocommissioning currently offered through the Save on Energy EXISTING BUILDING COMMISSIONING initiative. Participants will be provided with expert analysis on the function of their building systems with recommendations for operational improvements and capital investments. Energy savings would be quantified to determine cost effectiveness.	Commercial	$ 700,000	$ 700,000	2014	Complete
EnWin Utilities	HAP Water Integration	The project will evaluate the benefits of enhancing the existing Home Assistance Program for Low Income customers by providing free water conservation measures in addition to the standard energy efficiency measures. The project seeks to capture the energy savings from reducing water consumption both at point-of-use (due to reduced water heating) and upstream in the water/waste water treatment process. Additionally it would try to establish the value of such a program to water utilities with the aim of securing financial support to deliver an integrated conservation program.	Residential	$ 150,000	$ 150,000	2014	Complete
Hydro Ottawa	Residential Demand Response Wi-Fi Thermostat Pilot	This pilot with Honeywell will test both a new delivery model and technology for Residential Demand Response. Rather than a direct install approach, the pilot will leverage retail and HVAC contractor partners' relationships to offer a rebate covering 60-70% of a new peaksaver PLUS-integrated, two-way communicating, Wi-Fi-enabled thermostat. Compared to the traditional peaksaver PLUS offer, the pilot expects to find great market uptake due to customer preference for the Wi-Fi device, reduced program administration costs, and greater confidence in the demand response thanks to the validation opportunity provided by the two-way communication functionality. The pilot will also test the potential for energy efficiency savings with the user-friendly programmable thermostat.	Residential	$ 987,379	$ 987,379	2014	Complete
Kitchener-Wilmot Hydro	Direct Install of Demand Control Ventilation Control System in Kitchens	The pilot would quantify the energy savings from retrofitting commercial kitchens with demand control ventilation controls and determine whether the direct install model can be cost effectively implemented for commercial customers. Demand ventilation controls can reduce fan energy consumption by optimizing equipment start/stops and exhaust fan speeds based upon building needs.	Commercial & Institutional	$ 207,042	$ 207,042	2014	Complete
Niagara on the Lake Hydro	Direct Install Energy Efficiency Measures for the Agricultural Sector	Commercial greenhouse, wineries, and other agricultural businesses have shown limited participation in the Save on Energy programs to date. This pilot will investigate whether a sector-specific, direct install approach can increase uptake and deliver cost-effective energy savings.	Commercial	$ 683,538	$ 683,538	2014	Complete
Cambridge and North Dumfries Hydro	Residential Demand Response Smart Thermostat Pilot	This pilot with Nest Labs will test both a new delivery model and technology for residential demand response using two-way communicating Nest Thermostats. Instead of a peaksaver PLUS style direct-install offer of a one-way communicating thermostat and incentive In-Home Display, consumers will be offered a rebate covering 80% of the cost of a new Nest device conditional on signing up for Nest's Rush Hour Rewards DR program. The pilot will determine if consumer preference for the device drives greater market uptake compared to historical Residential DR programs, evaluate the program administration advantages of using retailers and contractors as the delivery channel, and analyze consumer opt-out frequency and duration when an easy opt-out option is available. The pilot will also seek to capture the energy efficiency savings accruing from the Nest device's "learning" functionality.	Residential	$ 910,625	$ 910,625	2014	Complete

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
EnWin Utilities	Operation Savings-Based C&I Rewards Pilot	This pilot will test a pay-for-performance model for operational savings in certain C&I subsectors by establishing an energy baseline for participant facilities and providing rewards for tracked improvements. Included subsectors are Automotive, Hospitality, Hospital, University, Multi-Unit Residential Buildings, Pharmaceutical, Agri-food, and Municipal.	Commercial & Institutional	$ 271,294	$ 271,294	2014	Complete
Canadian Manufacturers & Exporters Ontario	Energy Pathfinder Initiative	The Energy Pathfinder Research Initiative is designed to identify common opportunities to improve, control or optimize energy intensive processes for industry, and develop new best practices to realize efficiency improvements at low cost.	Industrial	$ 289,500	$ 499,000	2014	Active
Ecospex	Development of an Online Industry Platform for Verified Energy Efficient Products and Knowledge Transfer	Ecospex aims to accelerate the penetration of energy efficient products in the Ontario building industry by creating a free online resource of performance verified products with integrated gas and electricity conservation program incentive information allowing easy and confident evaluation and comparison of products. By centralizing and verifying information on available green building products, Ecospex believes its service will significantly reduce the time and risk entailed with procuring “green” materials and equipment.	Commercial & Industrial	$ 100,790	$ 145,933	2014	Complete
Waterfront Toronto	Building Sustainable Communities : Energy Performance Tracking Project at New Toronto Waterfront Buildings	The goal of this project is to collect and analyze energy and water data from new, LEED-certified commercial and residential buildings in Toronto’s designated waterfront area, and prepare a white paper analyzing the datasets.	Commercial	$ 34,650	$ 141,300	2014	Complete
Toronto and Region Conservation Authority	Performance Based Conservation Pilot Program	This project will pilot a strategic concept using large-scale energy benchmarking diagnostics to enhance conservation program performance for an entire region and drive the adoption of energy benchmarking as a standard practice in the Ontario Commercial & Institutional sector.	Commercial & Institutional	$ 250,000	$ 383,348	2014	Active
SUMARAN	Zoned Distribution Strategies and the Use of Gravel bed Thermal Storage with Cold Climate Air Source Heat Pumps and Air Conditioners to Reduce Peak Load Demand and Annual Energy Consumption in Low-Rise Housing	The project will assess the potential for zoning, cold climate air source heat pumps (CC-ASHPs) and low cost thermal storage to reduce residential peak load demand and annual energy consumption, using test facilities in Ottawa and computer modeling.	Residential	$ 242,000	$ 569,000	2014	Complete
Globe Electric	Upstream Lighting Pilot	Resulting from a strategic call for pilots, this project will pilot a new "upstream" program delivery model for high efficiency lighting products that shows potential to reduce program administration costs and expand retailer participation compared to traditional incentive programs.	Residential	$ 100,000	Confidential	2014	Complete
OSRAM SYLVANIA	Upstream Lighting Pilot	Resulting from a strategic call for pilots, this project will pilot a new "upstream" program delivery model for high efficiency lighting products that shows potential to reduce program administration costs and expand retailer participation compared to traditional incentive programs.	Residential	$ 100,000	Confidential	2014	Complete
Toronto Hydro	Determining the Impact of Demand Response in the Multi-Unit Residential Building Sector- Further Testing	Leveraging installed measurement and load control equipment, this project extends Toronto Hydro's MURB DR pilot to learn more about suite and common area load control and energy management.	Multi-Unit Residential	$ 169,850	$ 169,850	2014	Complete

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Toronto Hydro	Commercial Energy Management and Load Control (CEMLC) to Determine the Impact of Demand Response in the 50-400 kW Commercial Sector	To test the effectiveness of a demand response and energy management program for 50-400 kW C&I customers using Roof-Top Units fro space heating and cooling. Pilot will initially feature the installation of load control devices and programmable communicating thermostats at 12 sites divided by C&I subsector (Office, Retail, Hospitality, Institutional), with later expansion to up to 50 sites in total. DR activation will be in alignment with peaksaver PLUS.	Commercial	$ 543,900	$ 543,900	2013	Complete
CanmetENERGY	Ontario Archetypes for RETScreen Expert	This project will populate the new RETScreen Expert software with Ontario-specific building archetype and cost data to provide provincial consumers with access to an expert decision intelligence software platform which can provide financial and technical evaluation for energy efficiency projects over the entire project life cycle.	Industrial, Commercial & Institutional	$ 402,000	$ 884,175	2013	Complete
ASE Smart Energy	RetroSAVE Emerging Technology Demonstration	The project will install a wireless HVAC zoning technology called RetroSAVE into 35 homes (25 in Toronto, 10 in Ottawa) for a one-year demonstration project designed to measure impacts on energy use and occupant comfort.	Residential	$ 182,300	$ 714,800	2013	Complete
Strategic Energy Group	Continuous Energy Improvement – Industrial Pilot	The Industrial CEI project will put in place a continuous improvement process that creates and verifies behavior based energy efficiency savings of 5 to 15 % in addition to conventional equipment savings.	Industrial	$ 500,000	$ 754,075	2013	Complete
EnerNOC	Strategic Energy Management – Commercial & Institutional	The project is a collaboration between EnerNOC, the OPA, and Local Distribution Companies (LDCs) to engage medium and large commercial and industrial companies in Ontario in strategic energy management.	Commercial & Institutional	$ 417,271	$ 688,226	2013	Complete
City of Toronto	Energy Retrofit Financing Pilot	The proposed City of Toronto Energy Retrofit Financing pilot program will test the residential housing market's receptivity towards a comprehensive energy efficiency program that utilizes local improvement charge (LIC) financing and neighborhood-based marketing to encourage property owners to undertake energy efficiency investments. The pilot's participation-related goals include the completion of energy assessments, the installation of energy efficiency measures and acceptance of LIC (property-assessed) financing offered by the City for 200 single family homes and 2 multi-residential buildings (representing approximately 200 housing units).	Residential	$ 458,000	$ 914,000	2013	Complete
Loblaw Properties Limited	Results-Based Performance Optimization Program	The pilot program will test a new approach to encouraging commercial stores to identify areas for potential energy efficiencies through improvements focusing on daily operations, systems and equipment upgrades. Actions undertaken in individual stores will be motivated by a 'pay for performance' incentive through which actual, not forecasted, energy savings are rewarded. The intent is to capture incremental efficiency gains from optimization associated with store-specific upgrades and improvements, and to validate the potential of pay for performance models as a next generation approach to conservation programming.	Commercial	$ 1,000,000	$ 3,000,000	2013	Complete
McMaster University, DeGroote School of Business	The Electric Heating Benefits of Thermal Energy Storage	For the benefit of low income customers, McMaster University in partnership with Hydro One will examine the conservation and load shifting benefits of thermal energy storage (TES) under current time of use (TOU) rates. The pilot will test customer interaction with TES units and determine its potential as a next generation offering for low income customers.	Residential	$ 375,443	$ 615,943	2013	Complete
Ryerson University	Centre for Urban Energy	As a founding sponsor of the Centre for Urban Energy (CUE) at Ryerson, the OPA will support the three fellowship positions and student awards focused on: Integration of Energy and Urban Planning, Integrated Delivery of Electricity, Gas and Water Conservation and Energy Storage.	Various	$ 1,800,000	TBD	2013	Complete

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Toronto Hydro	Determining the Impact of Demand Response in the Multi-Unit Residential Building Sector- Further Testing	To test the effectiveness of demand response and whole building energy efficiency in multi-unit residential buildings. The pilot will incorporate the following: • Demand Response – control of suite and common area cooling loads aligned with the peaksaver PLUS activation rules • Energy Efficiency – leveraging of installed demand response equipment for energy efficiency and the promotion of a holistic approach to energy efficiency by requiring audits of lighting and hydronic systems	Multi-Unit Residential	$ 606,000	$ 606,000	2013	Complete
Niagara Peninsula Energy	Electric Vehicle Load Shifting Pilot	NPEI is conducting a pilot to verify the demand savings from a load shifting program that would install timers to allow golf courses and industrial facilities with electric vehicles to shift charging to off peak hours. The potential demand savings from the pilot are 330 kW.	Commercial	$ 250,000	$ 250,000	2013	Complete
Toronto Hydro	Local Demand Management Pilot Study	To create a model to determine the avoided generation, transmission, and distribution costs provided by a local DR capability and to develop an activation protocol for Local DR events harmonized with the transmission system and IESO-administered DR capabilities.	Various	$ 99,844	$ 133,125	2013	Complete
Hydro One Networks & Opower	Social Benchmarking Pilot Program	Hydro One Networks and Opower are collaborating to deliver an opt-out program to 50,000 Hydro One customers. Central to the program is the Home Energy Report, a printed paper report that will be delivered to participating customers via the mail. These reports will include a normative comparison that compares that customer to efficient neighbors and other neighbors. In addition, customers will have access to a website that enables them to explore their energy usage in detail and to receive energy efficiency information.	Residential	Confidential	Confidential	2012	Complete
Milton Hydro & Simple Energy	Milton Hydro Social Benchmarking Pilot Program	Milton Hydro and Simple Energy are collaborating to deliver an opt-in program to the customers of Milton Hydro. Up to 10,000 Milton residential customers who sign up to participate will receive personalized reports by email. These reports will include normative energy use comparisons, energy savings tips, and the ability to earn rewards points for energy savings performance. Customers that register for the service will have the ability to compete against other registered customers, and will have the opportunity to participate in both individual or team challenges. These customers will have access to a web portal that will allow them to create a user profile and access their energy usage information, compete with other customers, and view rewards activity. To raise awareness and encourage participation in the program, Milton Hydro will run a school challenge to engage local students to motivate their households to participate in the program and save energy.	Residential	Confidential	Confidential	2012	Complete
Horizon Utilities Corp. & Simple Energy	Horizon Utilities Social Benchmarking Pilot Program	Horizon Utilities and Simple Energy are collaborating to deliver an opt-out program to 50,000 Horizon Utilities customers. The Program seeks to empower customers to drive energy conservation utilizing behavioral science, gaming mechanics, and rewards, including AIR MILES for Social Change. The program will be delivered via web portal and email to engage and motivate customers in the places where they already spend their time. Personalized energy reports for each participating customer will be emailed on a periodic basis and participating customers will also have access to a web portal that will allow them to create a user profile and access their energy usage information, compete with other customers, and view rewards activity.	Residential	Confidential	Confidential	2012	Complete
Ekologix	Energy efficient apparatus for the treatment of wastewater	Ekologix is piloting its Plunge-Aero-Mix™ (PAM) technology in an Energy efficient apparatus for the treatment of wastewater project, which enhances mixing and aeration systems in a municipal wastewater treatment plants. It is anticipated that this process innovation will result in 60% energy savings in treatment plants.	Commercial	$ 375,000	$ 500,000	2012	Complete
National Research Council (NRC)	High Performance Buildings Program	Through resource-efficient collaboration with critical and high profile stakeholders representing commercial building owners and operators, technology vendors, utilities and governments, the NRC-managed program will define, scope and execute collaborative demonstration and validation projects. These industry-driven projects will establish the value of retrofit solutions to potential early adopters for building owners and managers, provide the technical and market insight that participating companies and organizations need to support commercialization for vendors and service providers, and provide program design and delivery information for utilities and governments.	Commercial	$ 2,000,000	$ 18,495,175	2012	Complete

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Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
EnerQuality	Green Renovator Market Characterization Study	The goal of EnerQuality's Green Renovator Market Characterization Study is to acquire an in-depth understanding of the industry landscape for renovations in order to determine the potential market opportunity, feasibility, and go-to-market strategy for energy efficient and sustainable construction renovator training in Ontario.	Residential	$ 100,000	$ 163,700	2012	Complete
Avvasi Inc.	Energy-Efficient Video Traffic Management	Avvasi's goal is to manufacture and test its video optimization technology, the Q-SRV, which is anticipated to be up to 40 times more efficient than competing technologies at managing streaming video traffic.	Commercial	$ 273,333	$ 537,999	2012	Complete
Caneta Research Inc.	Residential Furnace Fan Motor Retrofit Feasibility Study	This strategic research project will evaluate the potential energy and demand savings associated with retrofitting existing Permanent Split Capacitor (PSC) furnace fan motors to higher efficiency Electronically Commutated Motors (ECMs). Caneta will quantify the electricity usage associated with furnace fan operation in typical homes, from which the total usage associated with furnace fan operation across Ontario will be extrapolated. To accomplish this, Caneta will determine the proportion of existing homes that have PSC motors installed compared with existing ECM installations. Caneta's analysis will determine whether ECM furnace fans require an incentive to be cost effective, and will detail any practical implementation barriers associated with this type of retrofit.	Residential	$ 30,000	$ 30,000	2012	Complete
Ontario Centres of Excellence (OCE)	OCE Energy Conservation Connections	Ontario Centers of Excellence's Energy Conservation Connections project facilitates the partnerships of final year post-secondary students with electricity sector clients to work on real-world energy conservation projects. The best projects are showcased at the OCE's annual Energy Connections event, which brings together universities and commercial entities for technological innovations.	Various	$ 248,800	$ 2,917,800	2012	Complete
ArcelorMittal Dofasco (AMD)	Innovative Efficiency Improvement in Large Industrial Motor Cooling System	ArcelorMittal Dofasco (AMD) in Hamilton is conducting a detailed pilot field study to assess whether large industrial motors can be safely cooled through the application of variable speed drive technology. Optimizing the cooling systems by using variable speed drive controlled fans may potentially reduce the energy associated with these systems, thus reducing the overall energy consumption at the AMD Hot Mill by an estimated 4,200 MWh.	Industrial	$ 381,054	$ 534,246	2011	Complete
ArcelorMittal Dofasco (AMD)	Innovative Application of LED Technology to Industrial High Bay Lighting Retrofits	ArcelorMittal Dofasco (AMD) in Hamilton is installing and testing an innovative lighting system that uses LED technology based on the bulb/ballast design of current industrial High Bay lighting. The expected outcomes of this retrofitting project are increased lamp life, better lighting at floor level, and good system component serviceability in the extreme environment of industrial mill high bay lighting.	Industrial	$ 92,630	$ 144,318	2011	Complete
Canada Green Building Council (CaGBC-GTC)	Sustainable Communities – Regional Toolkit & website	The Canada Green Building Council (Greater Toronto Chapter) is facilitating information sharing in their Sustainable Communities project through creation of a web-based resource centre, called the Ontario Green Policy Hub (www.ogph.ca). This publically available tool will contain case studies and policy language to use in green building and sustainable community planning across Ontario municipalities.	Various	$ 45,000	$ 57,500	2011	Complete
Green Light on a Better Environment (GLOBE) with SHSC	Utilities Management Program (UMP)	Green Light on a Better Environment (GLOBE) is developing a Utilities Management Program tool for the low-income social housing sector. Through integration with Portfolio Manager this tool will enable energy performance benchmarking and assist housing providers in improving building performance.	Multi-Unit Residential	$ 361,000	$ 651,000	2011	Complete
Horizon Utilities Corp.	CDM Electric Energy Density Mapping: City of St. Catharines and City of Hamilton	Horizon Utilities Corporation is using geographic information system (GIS) technology to develop energy density maps that correlate electricity consumption with building square footage in St. Catharine's and Hamilton. Once completed, these maps could be used to effectively target the deployment of conservation and demand management programs, including the OPA's Tier 1 programs.	Commercial	$ 525,435	$ 821,570	2011	Complete

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Town of Caledon	Development and implementation of a "sustainable community" policy framework for new residential developments based on best practices, and, stakeholder consultation	The Town of Caledon is developing and implementing a sustainable community policy framework for new residential developments based on best practices and stakeholder consultation. Once completed, this document may help municipalities reduce the long term energy demand of new residential developments and has the potential to feature a number of water and energy- related measures.	Residential	$ 29,500	$ 48,650	2011	Complete
Ontario Centers of Excellence (OCE)	OCE Energy Conservation Connections	To both stimulate student interest in electricity sector careers and facilitate the recruitment of new engineers and technicians, the Ontario Centers of Excellence Energy Connections program will partner final year post-secondary students with electricity sector clients for whom the student teams will work on real-world projects.	Various	$ 315,500	$ 3,215,000	2011	Complete
PCS Utilidata and Flakeboard	Industrial Voltage Optimization	Flakeboard will install and test an industrial voltage optimization system at their MDF production facility in Sault Ste. Marie. The potential for electricity savings will be verified and recommendations for the creation of voltage optimization conservation programs will be provided.	Industrial	$ 499,170	$ 570,570	2011	Complete
CivicAction	Race to Reduce	The "Race to Reduce" encourages landlord-tenant collaboration, the implementation of energy saving measures, and sector benchmarking through use of Portfolio Manager. The goal is for commercial buildings in the GTA to achieve a 10% reduction in overall energy use over four years.	Commercial	$ 675,000	$ 1,520,400	2011	Complete
St. Lawrence	Investigation of Electricity Conservation Achieved from Water Conservation Measures	St. Lawrence College's Sustainable Energy Applied Research Centre worked with Utilities Kingston to quantify the energy consumption (kWh) per cubic meter of water sourced, treated, and delivered by the utility. Additionally SEARC provided a report detailing what water conservation measures are offered in jurisdictions across North America with an analysis of those most appropriate for integration into energy conservation efforts.	Commercial	$ 99,800	$ 156,680	2011	Complete
Canadian Urban Institute	Lightsavers Ontario: Accelerating Adoption of LEDs and Adaptive Controls in Outdoor Lighting	The Canadian Urban Institute is entering into the third phase of the "LightSavers Ontario" program, which involves the development of a number of tools for the accelerated adoption of advanced lighting technologies, such as LEDs, and smart adaptive controls in outdoor lighting by Ontario municipal governments, MASH sector institutions, and companies that own large lighting assets such as parking lots and garages.	Commercial & Institutional	$ 65,000	$ 110,000	2011	Complete
Torrefuels	Carbon Neutral Fuels Through Direct Firec Torrefaction using Various Biomass Feedstocks - Torrecoal from Torremax	Torrefuels is developing and analyzing the combustion and torrefaction processes associated with various low grade feedstocks in a project entitled "Carbon Neutral Fuels Through Direct Fired Torrefaction using Various Biomass Feedstocks". Additionally, the project aims to design an integrated system for its demonstration plant.	Industrial	$ 250,000	$ 504,450	2011	Complete
Greening Greater Toronto/ Toronto City Summit	Greening Greater Toronto Procurement of Energy Efficient Products Initiative ("GGT Procurement Initiative")	Greening Greater Toronto's Procurement project aims to increase corporate procurement of energy efficient products and services in the GTA by holding events, developing an online document repository, and convening a leadership group to promote solutions.	Commercial	$ 175,000	$ 716,000	2010	Complete
Five Nations Energy Inc.	First Nations Energy Conservation Program	An energy conservation and education program model focused on public education and residential housing retrofits will be piloted by Five Nations Energy Inc. with the goal of reducing electricity consumption and costs for customers in the First Nation communities on the west coast of James Bay.	Residential	$ 235,000	$ 644,500	2010	Complete

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Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Centre for Environmental Sustainability in Healthcare	Healthcare Energy Management Program	To determine its potential to reduce energy consumption at four healthcare service providers, the project will pilot a healthcare-specific energy monitoring system that provides baseline and ongoing energy consumption and demand monitoring functionality.	Commercial & Institutional	$ 99,996	$ 520,911	2010	Complete
EnerQuality	Renovator Energy Efficiency Training Pilot	A training program for renovators and trade contractors will be piloted with the goal of increasing the availability of the technical, managerial and business development skills required to service the demand for energy efficient home renovations and retrofits.	Residential	$ 85,000	$ 171,000	2010	Complete
Hatch Ltd.	Industrial Energy Design Pilot Project	By measuring the impact of cross-functional energy efficiency and renewable energy design reviews of industrial sites in Ontario, Hatch Ltd. developed a business case for conducting Industrial Energy Design reviews prior to industrial facility development or expansion. Results webinar attended by reps from many of province's largest industrial energy consumers.	Industrial	$ 210,000	$ 440,000	2010	Complete
Tower Labs @ MaRS	Tower Labs™ @ MaRS	To accelerate the adoption of innovative green building solutions in Toronto's high-rise buildings, the Tower Labs @ MaRS project will facilitate pilot and demonstration projects of new and emerging energy efficient technologies.	Commercial	$ 149,321	$ 230,000	2010	Complete
Ontario Centers of Excellence	Energy Connections	To both stimulate student interest in electricity sector careers and facilitate the recruitment of new engineers and technicians, the Ontario Centers of Excellence Energy Connections program will partner final year post-secondary students with electricity sector clients for whom the student teams will work on real-world projects.	Various	$ 250,000	$ 1,123,079	2010	Complete
Toronto Hydro	Small Scale Ice Storage	To determine the potential of thermal storage as a tool for managing summer peak demand, this Small Scale Ice Storage project by Toronto Hydro will evaluate the technical feasibility of small-scale ice storage combined with rooftop cooling units.	Commercial	$ 352,750	$ 687,800	2010	Complete
Toronto and Region Conservation Authority	Partners in Project Green – Energy Management Co-op Program	The Toronto and Region Conservation Authority Partners in Project Green program is designed to develop and implement a cooperative Energy Management education program for post-secondary school students with the purpose of providing work placements in energy management.	Industrial	$ 36,500	$ 101,000	2010	Complete
Waterfront Toronto	Climate Positive Development – Waterfront Toronto Green Building Requirements	By developing a Carbon Tool and Minimum Green Building Requirements, Waterfront Toronto aims to provide planners with the ability to better assess the sustainability and performance implications of new development.	Commercial	$ 253,399	$ 543,399	2010	Complete
Alliance of Manufacturers and Exporters (Marbek)	Adapting Lean Manufacturing to Support Implementation of ISO 50001 Energy Management Systems Standard	To facilitate implementation of the ISO 50001 energy management standard by Ontario's manufacturing sector, Marbek will both identify opportunities for the adoption of Lean Manufacturing practices and develop mechanisms to better support Lean Manufacturing for ISO 50001 Energy Management adoption.	Industrial	$ 90,000	$ 110,235	2010	Complete

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Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Energent	Monitoring and Targeting - A managed approach to energy conservation	Energent's Managed Approach to Energy Conservation project will assess how providing four industrial clients with a holistic energy "one-stop-shop" program increases participation in conservation. The monitoring and targeting program will include audit and engineering services, mentorship, and training and education.	Commercial	$ 414,596	$ 1,529,990	2010	Complete
Hydratek	Towards Municipal Sector Conservation: A Pump Efficiency Assessment and Improvement Pilot Study	Hydratek conducted high accuracy pump-efficiency testing across the province with the goal to encourage investments by Ontario municipalities in electricity conservation via pump efficiency improvements and proactive energy management of their water and wastewater systems.	Commercial & Institutional	$ 246,000	$ 556,410	2010	Complete
Morgan Solar	Sun Simba HCPV Concentrating Solar Power Module: Optical Efficiency	The goal of Morgan Solar's technology development project is to certify and patent its "Sun Simba High Concentration Photovoltaic Concentrating Solar Power Module" technology.	Commercial	$ 250,000	$ 1,107,600	2010	Complete
McMaster University	Extended Utility Controlled Zone Field Trial	McMaster University will determine through this "Extended Utility Controlled Zone Field Trial" if zoned forced air systems under utility control can reduce peak demand from residential air conditioners.	Residential	$ 66,397	$ 528,862	2010	Complete
Ryerson University	Building Performance Assessment Using Occupant Questionnaires and Energy Data	The ultimate goal of this project is to formalize a building performance evaluation protocol which relies on both user-generated and quantitative data to uncover efficiencies that have not yet been realized by building designers, managers, and occupants. The result will be a software tool that practitioners can use to understand occupant behavior (a major barrier currently) and to evaluate design and management decisions.	Commercial	$ 61,958	$ 122,108	2010	Complete
Electrovaya	Demonstration of Utility-Scale Advanced Battery Electricity Storage for Renewable and Clean Energy Applications	Electrovaya's "Demonstration of Utility-Scale Advanced Battery Electricity Storage for Renewable and Clean Energy Applications" project aims to demonstrate utility-scale electricity storage based on modular Li-ion polymer battery technology commonly used in electric vehicle applications.	Commercial	$ 450,000	$ 8,185,000	2010	Complete
CEATI	Biomass Torrefaction/Carbonization #0530	CEATI will evaluate the commercial potential of torrefied/ carbonized biomass for use in pulverized coal combustion facilities.	Industrial	$ 100,000	$ 2,100,000	2010	Complete
GEMCO (Glenbarra)	Solar Cooling and Dehumidification to Reduce Summer Cooling Peak Load and Displace Conventional Air Conditioners in Urban Communities	To reduce summer cooling peak loads and displace conventional air conditioners in urban communities, GEMCO will demonstrate a solar triple-state absorption thermal heating/cooling system at the Shouldice Hospital.	Commercial	$ 250,000	$ 1,300,000	2010	Complete
Enerworks	Oxford Gardens Retirement Village - Solar Cooling Project	Enerworks will demonstrate a "plug and play" solar thermal cooling controller as part of Canada's largest solar thermal cooling project at the Oxford Gardens Retirement Village in Woodstock, Ontario.	Commercial	$ 112,500	$ 745,000	2010	Complete

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IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Enbala Power Networks	Ancillary Services from Municipal Water/ Wastewater Facilities	In cooperation with the Ontario Clean Water Agency and a network of municipal water treatment and wastewater plants, this ancillary services project will demonstrate Enbala Power Network's potential to provide regulation services to Water and Wastewater facilities.	Industrial	$ 300,000	$ 1,068,510	2010	Complete
Temporal Power	Long Duration Flywheels for Distributed Grid-Scale Energy Storage	Temporal Power's "Long Duration Flywheel" electricity storage device will be modified to facilitate the integration of grid-scale intermittent renewable generation by distribution and transmission utilities in Ontario.	Industrial	$ 300,000	$ 1,136,829	2010	Complete
ARDA Power	Advanced Integrated Solar Photovoltaic and Battery Energy Storage	In response to the need for safe rooftop solar photovoltaic systems, ARDA Power is demonstrating a low-cost, high-efficiency "plug-in electrical energy storage" solution that harvests energy from solar PV modules at low voltages.	Various	$ 232,000	$ 510,400	2010	Complete
TRIAS Innovations	A Dual-Rotor Small Wind Energy Converter	In collaboration with the University of Ottawa, TRIAS Innovations will deliver an international workshop on small wind energy converters and a research report on the Ontario market for small wind turbines for their dual-rotor small turbine.	Commercial	$ 50,000	$ 1,050,000	2010	Complete
University of Toronto	Efficient, low-cost solar cells: Prototype engineering to enable customer validation and investor diligence	The University of Toronto is developing a pre-commercial prototype of low-cost, high efficiency quantum dot solar cells for external validation and demonstration.	Commercial	$ 100,000	$ 650,000	2010	Complete
InMotive	Mechatronic Variable Speed Drive (MVSD) Commercialization Project	To improve the energy efficiency of heating, ventilation and air conditioning systems in office, commercial, industrial, institutional and multi-unit residential buildings, InMotive will be testing and certifying its "Mechatronic Variable Speed Drive" (MVSD), leading to commercialization of this product.	Commercial	$ 350,000	$ 1,544,640	2010	Complete
Canadian Urban Institute	Integrated Energy Mapping for Ontario Communities	The Canadian Urban Institute, through the "Integrated Energy Mapping for Ontario Communities" (IEMOC) project, developed energy land-use maps for the municipalities of Barrie, Guelph, Hamilton and London. These maps, through increased data analyses and visual representations, were designed to assist in the long term energy land-use planning goals of reducing energy demand within the constructed environment and encouraged renewable energy sources.	Commercial & Institutional	$ 400,000	$ 800,568	2009	Complete
Ontario Centers of Excellence (OCE)	Energy Connections	Ontario Centers of Excellence's (OCE) "Energy Connections" project facilitated the partnerships of final year post-secondary students with electricity sector clients to work on real-world energy conservation projects.	Various	$ 250,000	$ 750,000	2009	Complete
Ecos Consulting	Ecos Qualified Technical Solutions Program	The "Ecos Qualified Technical Solutions Program" developed by Ecos Consulting enlisted utilities and computer manufacturers to integrate more energy-efficient power supplies into desktop computers, desktop-derived servers, data center servers, and computer peripherals. This program design provided utility rebate incentives upstream to the computer manufacturer to decrease the cost of more expensive power supplies, which was anticipated to be more cost effective than providing incentives to end consumers due to the smaller per unit incentive cost.	Commercial	$ 400,000	$ 1,050,000	2009	Complete

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Enerquality Corporation	Home Builders' Association Local Energy Efficiency Partnership Project (HBA LEEP Project) and Technology Adoption Pilot (TAP)	Through the Enerquality Corporation, the Home Builder Association (HBA) "Local Energy Efficiency Project" (LEEP) aims to identify barriers that builders face in adopting new energy efficiency and renewable energy technologies, and to create strategies that will enable the builders to overcome these barriers. One such strategy - the Technology Adoption Pilot (TAP) - is a training initiative that introduces new energy efficiency/renewable energy technologies to R-2000 builders.	Residential	$ 200,000	$ 550,000	2009	Complete
Hatch Ltd.	Application of ANSI/MSE 2000/2008 to manufacturing plants in Ontario	Hatch Ltd. worked with five manufacturing plants in Ontario to develop a business case for implementing the American National Standards Institute's Management System for Energy - ANSI/MSE 2000/2008. Additionally, Hatch developed a public version of an International Organization for Standardization (ISO) diagnostic software tool and worked with one manufacturing plant toward compliance with ISO 50001.	Industrial	$ 398,000	$ 2,167,000	2009	Complete
OntarioGreenSpec.ca c/o Mindscape Innovations	Home Sweet Home Competition	Mindscape Innovations developed a green building competition, the "Home Sweet Home Competition", to engage post-secondary architecture and design students in applying energy saving principles to innovative home designs.	Residential	$ 69,200	$ 163,800	2009	Complete
Retail Council of Canada	Market Characterization Study of Energy Conservation in the Ontario Retail Sector	The Retail Council of Canada conducted a market characterization study of the Ontario retail sector in order to determine how to best approach this sector in terms of energy reduction initiatives.	Commercial	$ 149,175	$ 174,900	2009	Complete
Canadian Plastics Industry Association (CPIA)	(Additional funds to complete 2007.13 project)	The Canadian Plastics Industry Association undertook this project to identify and employ electricity reduction strategies in the plastic processing sector. Some of the strategies identified were education and identification opportunities, as well as engaging employees to foster a 'conservation culture'.	Commercial	$ 39,750	$ 49,688	2009	Complete
Carleton University	E3 : Education for Energy Programming and Evaluation	Carleton University's School of Public Policy and Administration developed and piloted a professional development training entitled "E3: Education for Energy Programming and Evaluation", which targeted professionals who design and evaluate energy programs.	Commercial	$ 265,000	$ 496,000	2009	Complete
Energyshop	Energy Efficiency for Swimming Pools	Energyshop assessed the market for energy efficiency designs and technologies, such as variable speed motors, for residential swimming pools.	Residential	$ 258,300	$ 283,250	2009	Complete
Toronto Atmospheric Fund	Lightsavers Phase II	The Toronto Atmospheric Fund worked with Greater Toronto Area lighting asset managers to create clarity on solid state lighting (SSL) opportunities in public garages and roadways. This project, entitled "Lightsavers Phase II", also aimed to overcome policy and regulatory barriers for advanced lighting.	Commercial & Institutional	$ 49,500	$ 186,440	2009	Complete
Toronto Community Housing Corporation	Electricity Sub-Metering Pilot for Multi-Family Residential Buildings	Toronto Community Housing Corporation conducted research on policy and social issues related to electricity sub-metering for multi-family residential buildings in Ontario and developed recommendations for sub-metering initiatives in social housing units.	Multi-Unit Residential	$ 400,000	$ 922,500	2009	Complete

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Waterloo Region Green Solutions	Residential Energy Efficiency Project (REEP) House Project	Waterloo Region Green Solutions' "Residential Energy Efficiency Project - the REEP House" - supported and promoted residential energy efficiency through a community-based storefront model, which demonstrated training and energy efficiency programs to the public.	Residential	$ 212,800	$ 288,800	2009	Complete
Fifth Light Technologies	Web-based intelligent dimming and lighting management system	The goal of Fifth Light's project was to demonstrate its web-based intelligent dimming and lighting management system. This test involved dimming all types of linear fluorescent light and other types of indoor light sources, while eliminating the undesirable side effects such as reduced power factor, and excessive heat dissipation.	Commercial & Institutional	$ 250,000	$ 1,000,000	2009	Complete
Whalepower	Applying Tubercle Technology to Small and Medium Sized fans	Whalepower's project measured efficiency gains produced by the application of its Tubercle technology to small and medium sized fan blades (8 cm to 30 cm in length).	Commercial	$ 59,000	$ 119,000	2009	Complete
Unified Corp	The Ultra Fridge Project	Unified Corp tested the 'Ultra Fridge', which integrates a loop heat pipe (LHP) into standard refrigeration platforms with simple modifications. Reductions in electricity consumption of 50% are anticipated by determining when to capture the outdoor 'cold' for refrigeration and when to create 'artificial' refrigeration.	Residential	$ 249,555	$ 611,610	2009	Complete
University of Waterloo	North House Prototype Construction	The University of Waterloo built a prototype solar powered home - the North House - designed for northern climates. The North House served as a public demonstration project for education in new technologies, solar living, and energy conservation. It also operated as a living laboratory for extensive monitoring, testing and evaluation of these technologies and systems. The goal of North House was to provide the building industry with much needed data for high performance residential buildings.	Residential	$ 125,000	$ 778,500	2009	Complete
Whirlpool Corporation	Smart Dryer: DR Capable Smart Appliance Technology Development and Demonstration	Whirlpool worked to develop, demonstrate and verify its new "Smart Dryer" appliance technology, which includes smart metering infrastructure for potential demand response applications.	Commercial	$ 250,000	$ 555,000	2009	Complete
Converted Carbon of Canada	Bioenergy Integrated Production System	Converted Carbon of Canada tested its "Bioenergy Integrated Production System" for its ability to mitigate high volumes of CO2 and cultivating large quantities of algae in a closed tank bioreactor. The continuous process converted algae biomass to electrical energy and clean water. The pilot plant consisted of one bioreactor without a wet gasification reactor.	Industrial	$ 250,000	$ 7,000,000	2009	Complete
OCE - Queen's University	Biomass Energy From Field to Grid (Matovic-LaFarge) #50938	OCE and Queen's University's "Biomass Energy From Field to Grid" project aimed to have direct impact on all stages of the biomass-to-energy path in Ontario. The key to sustainable economics for biomass-to-energy industry is keeping supply local to use. The small and medium scale production units were planned to exploit co-generation potential by placing the energy-producing unit close to the potential users of lower-grade energy.	Industrial	$ 185,000	$ 847,500	2009	Complete
OCE - Queen's University	OCE - Energy Efficient Primary Power Distribution Systems for Data Centers (Jain) #10042 / 51888	This OCE and Queen's University "Energy Efficient Primary Power Distribution Systems for Data Centers" project developed hardware to significantly improve IPC conversion efficiency from its current level of 55% to 75% by introducing a new concept: multi-port power processing that reduces the number of power conversion stages.	Commercial	$ 250,000	$ 2,700,000	2009	Complete

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CEATI	High Percentage Biomass Utilization in Coal-Fired Power Plants	CEATI's "High Percentage Biomass Utilization" project in coal-fired power plants identified and prioritized the main knowledge gaps and technology challenges for high percentage biomass utilization in existing and future coal fired plants.	Industrial	$ 55,000	$ 258,000	2009	Complete
Lumentra	Nanomaterial development for LED applications	Lumentra's project aims to develop quantum dots in the form of nanoparticles as they have been found to be versatile in color temperature tuning.	Commercial	$ 240,000	$ 734,000	2009	Complete
University of Toronto	Gemini Nested Thermal Envelope	The Gemini Nested Thermal Envelope (NTED) project from the University of Toronto plans to modify an existing low-rise building by incorporating the NTED building system concept.	Residential	$ 200,000	$ 490,650	2009	Complete
Clean Air Foundation (CAF)	Piloting integration of Air Conditioner and Dehumidifiers into EKC	The Clean Air Foundation's "Keep Cool" pilot project is a market transformation/ energy conservation program that encouraged residents to permanently retire and recycle their old, inefficient room air conditioners (RACs) and dehumidifiers and to replace them with more efficient cooling options.	Residential	$ 125,386	$ 268,236	2008	Complete
Toronto Community Housing Corporation (TCHC)	Low income housing	This Toronto Community Housing Corporation (TCHC) low income housing project tested the importance of tenant and staff education in achieving electricity conservation in social housing. Working with the Social Housing Services Corporation and housing providers in Ottawa and Windsor-Essex, TCHC's module measured the impact on electricity consumption that social marketing techniques and staff training can bring to a variety of building types and levels of tenant responsibility for utility bills.	Multi-Unit Residential	$ 250,000	$ 474,000	2008	Complete
World Wildlife Fund (WWF)	Living Planet @ work	The "Living Planet @ Work" initiative from the WWF motivated and supported employee networks and executive leaders in reducing tenant electricity use in office workplaces. Using a web-based tool, workspace metering and social marketing techniques in a number of different workplaces, WWF supported employee networks in businesses that wish to conserve electricity while exploring how tenants and landlords can work together to save on utility costs.	Commercial & Institutional	$ 399,525	$ 722,973	2008	Complete
York Catholic District School Board	Incentive Program Administrator	The York Catholic District School Board (YCDSB) "Incentive Program Administrator" project applied an economy of scale to support school boards across the province and leverage incentive programs for electricity-saving retrofits. YCDSB also hosted a worker to assist school boards in developing building retrofit plans and applying for incentives to increase their cost-effectiveness as well.	Commercial & Institutional	$ 250,000	$ 500,000	2008	Complete
Centennial Energy Institute	Training Tomorrow's Industrial and Building Energy Efficiency Specialists (T2IBEES)	"Training Tomorrow's Industrial and Building Energy-Efficiency Specialists" program from the Centennial Energy Institute addressed Ontario's need for trained energy-efficiency specialists in the industrial and building management sectors through the use of self-paced training modules adapted from the U.K.'s "Training in Energy Management Through Open Learning" program. The adapted program provided students with an understanding of energy issues and was augmented by mentored audits of facilities and limited in-class instruction.	Industrial	$ 285,500	$ 809,300	2008	Complete
University of Windsor	UWin APCEM	The University of Windsor's Advanced Professional Certificate in Energy Management (APCEM) provided leading-edge energy manager training in accessible and convenient weekend courses. These courses were intended for members of the workforce whose work involves energy management but who have not been formally trained in the subject. With the benefit of training, these workers were able to manage their organization's energy use more effectively.	Industrial	$ 230,000	$ 317,000	2008	Complete

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Metis Nation of Ontario (MNO)	Métis Energy Conservation Workforce Project	The "Métis Energy Conservation Workforce" Project used the housing portfolio administered by the Métis Nation of Ontario (MNO) to develop a hands-on apprenticeship in energy-efficiency auditing and retrofits for college-level Métis students. A key element of the project was to learn how energy-efficiency retrofits can leverage other housing programs to increase the quality of off-reserve housing. This initiative was piloted with the MNO's Housing Branch in Thunder Bay and endeavoured to expand to other housing portfolios in the second year.	Residential	$ 250,000	$ 600,000	2008	Complete
Seneca College	Seneca's BEST: Building Energy Savings Training	Seneca College's "BEST: Building Energy Savings Training" program delivered customized energy conservation training to building operators in their own buildings, rather than in a classroom. By interacting with, and managing, building systems on a daily basis, these professionals are the guarantors of sustainable, efficient energy use in this sector.	Commercial	$ 67,370	$ 154,740	2008	Complete
World Green Building Council	International Education & Training in Green Building: A University Pilot Program	"International Education & Training in Green Building" is an interdisciplinary pilot program from the World Green Building Council that equipped post-secondary students with the knowledge and training required to enter the green building industry upon graduation. The program offered a full-credit undergraduate level course and a three-month internship with select employers or Green Building Councils around the world.	Commercial	$ 101,000	$ 419,800	2008	Complete
National Set-top Box Initiative Working Group: BC Hydro/OPA/DSMA	National ENERGY STAR® Set-Top Box Initiative	BC Hydro, Manitoba Hydro, the OPA, Hydro-Québec and Natural Resources Canada collaborated on a national project to accelerate the penetration of ENERGY STAR® Tier 1 and 2 compliant set-top boxes (STBs). This project was initiated as a result of the mandatory transition from analog to digital and high-definition broadcasting signals in August 2011, which was expected to increase the number of high-energy consuming STBs in Canada by 30-50%. This initiative worked with cable service providers and manufacturers to reduce the electricity consumption of the STBs while maintaining unit functionality. This was among the first Conservation Fund initiatives to focus upstream of the customer and will be studied for replication across other end-uses.	Residential	$ 130,000	$ 353,000	2008	Complete
Local Enhancement and Appreciation of Forests (LEAF)	Residential Shade Tree Planting Program	"The Cool Communities: Residential Shade Tree Planting Program", initiated by the Local Enhancement and Appreciation of Forests (LEAF), aimed to reduce residential electrical demand from air conditioners through the design and implementation of a strategic urban reforestation program. This project tested three delivery models to determine the most effective means of delivering a potential province-wide shade-tree planting program in Ontario.	Residential	$ 198,130	$ 460,255	2008	Complete
The Now House Project Inc.	The Now House Project, Windsor 5	The Now House Project retrofitted, to near zero energy use, five wartime homes from the Windsor Essex Community Housing Corporation's social housing portfolio . This project aimed to replicate the achievements from the first Now House, completed in September 2008, which was retrofitted to achieve a near zero energy use, including a 60-percent reduction in electricity and a 5.4-tonne reduction in carbon-dioxide emissions.	Residential	$ 284,000	$ 1,026,088	2008	Complete
District School Board of Niagara	Ambassadors for Conservation of Energy (ACE)	The "Ambassadors for Conservation of Energy" (ACE) program delivered by the District School Board of Niagara aimed to develop a new "Specialist High Skills Major" program that introduced secondary school students to careers in the energy sector through experiential learning, co-operative education, and mentorship. Working alongside industry professionals, students also actively participated in industry-recognized training, energy audits and retrofits.	Commercial	$ 184,000	$ 369,000	2008	Complete
The Toronto Renewable Energy Co-operative (TREC)	Green Collar Co-ops	"Green Collar Co-ops" is a collaborative effort between the Toronto Renewable Energy Co-operative (TREC) and the Toronto District School Board (TDSB) to introduce students to green energy jobs through both the grade 10 career studies curriculum and to grade 11 and 12 co-op training opportunities. With the ultimate goal of providing students and at-risk youth with pathways to the green energy industry, this project will also develop a green energy job fair and web-based green energy job portal that will be made available to youth across Ontario.	Commercial	$ 159,840	$ 360,840	2008	Complete
OCE	The Solar Venture - Low Cost, High Performance Thin Film PV Solar Cells #50713	OCE with the Solar Venture Inc. examined the use of nanostructures to enhance high performance thin film (plastic) PV solar cell efficiency while maintaining a low cost. These nanowires can offer an efficient energy absorbing media as well as electron transport media.	Industrial	$ 250,000	$ 3,321,444	2008	Complete

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OCE - U of Western/ U of Waterloo	Large Scale Solar PV Integration in T&D Networks (Accumetrics- Varma) #50712	OCE with the University of Western Ontario and the University of Waterloo worked to develop comprehensive solutions that would help grid operators integrate large-scale PV solar farms onto their networks.	Industrial	$ 125,000	$ 6,250,000	2008	Complete
CEATI - National Research Council	Development of Guidelines for Effective Solar Shadings of Residential Windows	CEATI and the National Research Council of Canada developed guidelines to use effective solar shadings of residential windows. The project addressed thermal peak loads and energy consumption of new and retrofit Canadian houses, energy costs and paybacks, thermal and visual comfort of house occupants, potential moisture condensation on windows and durability of window products.	Residential	$ 10,000	$ 160,000	2008	Complete
OCE - U of Waterloo	Energy Hub Management System (Rowlands) #50681	This project between the OCE and the University of Waterloo developed and implemented an "Energy Hub Management System" allowing static energy users to effectively manage their energy requirements. Individual energy hubs were empowered so that they can contribute to the development of a sustainable society through the real-time management of their energy demand, production, storage and resulting energy import or export.	Residential	$ 250,000	$ 3,503,600	2008	Complete
Ivaco Rolling Mills	Trail and Testing of a New 4 Gate Door for the Arc Furnace	The concept on trial from Ivaco Rolling Mills is the replacement of the Arc Furnace door with 2 sets of water cooled gates assembly. The top set provides an improved air seal to minimize cold air infiltration therefore reducing consumption of process energy inputs, specifically electric energy consumption, and lowering the volume of polluting hot exhaust gases. The bottom set of gates controls removal of slag reducing energy and steel loss and overall improving safety and working conditions.	Industrial	$ 175,000	$ 475,000	2008	Complete
CEATI - National Resources Canada	Very Low Head Turbine #0522	CEATI and Natural Resources Canada developed and promoted the technology breakthrough of the Very Low Head (VLH) turbine through an on-site demonstration of its performance, cost-effectiveness, fish-friendliness at a VLH hydro site in Ontario. A report on the regulatory approval process followed the technology demonstration.	Industrial	$ 250,000	$ 3,104,000	2008	Complete
CEATI - Tweedsmuir Green Power	Very Low Head Displacement	CEATI and Tweedsmuir Green Power worked on creating an economically viable very low head displacement project which is a turbine technology typically under 1 MW. In Canada, no fish-friendly turbine had yet been installed which is something this project also aimed to address.	Commercial	$ 250,000	$ 480,000	2008	Complete
REGEN	Peak Demand Management and Response Tech Demonstration	REGEN Energy Inc. examined the peak demand management and response tech demonstration cost of the solution per KW and the consumer acceptance of the solution. Pilot facilities were commercial, industrial and retail consumers with typical (greater than 50 KW) spanning. The REGEN units reciprocate simple messages to each other to enable frequent, autonomous decisions to be made in order to provide a flexible and resilient network.	Commercial	$ 240,000	$ 6,128,942	2008	Complete
OCE	H2Green - Development of a Grid Interface for Intermittency Mitigation Device	OCE's "H2Green" project developed a grid interface for an intermittency mitigation device called the Hydrolyser™, which is a scalable system consisting of grid interface, energy storage, and electrical regeneration sub-systems. This project provided the initial development of the envisioned multi-mode grid-interface subsystem that allowed the Hydrolyser™ to rapidly respond to the energy intermittency in both local and system wide environments.	Industrial	$ 250,000	$ 800,000	2008	Complete
CEATI - NR Can	High EER AC Unit Demonstration #7042	The intent for this CEATI and Natural Resources Canada technology demonstration project was to install a number of 'high EER' central air conditioners (AC) and compare their performance with a similar number of control houses. Proper AC sizing and blower speed selection are critical to AC performance. High EER equipment benefits homeowners by providing more effective humidity reduction and lower operating costs during both cooling and heating periods.	Commercial	$ 74,000	$ 148,000	2008	Complete

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CEATI - UBC	Solar Canopy Development	CEATI and the University of British Columbia developed "The Solar Canopy Illumination System" which provides daylight to the core (i.e. interior regions) of multi-floor office buildings in order to substantially reduce the need for electric lighting. This project aimed to design and demonstrate an extremely lightweight and comparatively inexpensive core daylighting system.	Commercial	$ 80,000	$ 289,000	2008	Complete
Energy Efficient Contractors Network (EECN)	Energy Efficiency Education Program for Trade Contractors Serving SME Sector	The Energy Efficient Contractors Network (EECN) created an "Energy Efficiency Education Program for Trade Contractors Serving the SME Sector". The education program involved defining retrofit projects, developing cost /benefit analyses, accessing existing incentives from gas and electric LDCs through an information website, and offering the total package to their existing customer base and to other members of the sector.	Various	$ 150,675	$ 538,900	2007	Complete
EnerQuality Corporation	ENERGY STAR® for New Homes	The goal of this EnerQuality " ENERGY STAR for New Homes" project was to transform the way all houses are built in Ontario by converting the largest, most influential builders to building 100% ENERGY STAR qualified homes.	Residential	$ 240,000	$ 616,490	2007	Complete
Faith and the Common Good (FCG)	Greening Sacred Spaces - Phase II	This FCG project was designed to build on the success of phase I of the "Greening Sacred Spaces" project by piloting the development of a single 'package deal' of service provisions for greening faith communities, and focusing on energy audits and retrofits. It aimed to scale this initiative by liaising with 100 faith communities. At the end of the project, FCG aimed to be in the position to promote a service that can quickly grow to meet the electricity reduction needs of the 7,000 places of worship in the province.	Commercial	$ 244,000	$ 805,315	2007	Complete
Green$aver	Market-Driven Incentives for the Residential Sector - Pilot Project	GreenSaver's 'Market-Driven Incentives for the Residential Sector' pilot project encouraged the home resale supply chain to promote and endorse energy efficiency as an important consideration in determining the price of a home by educating real estate agents and encouraging financial institutions to offer special lending options for energy efficiency home retrofits.	Residential	$ 152,000	$ 274,500	2007	Complete
Green$aver	Direct Install Small Business Pilot Project	Green$aver's "Direct Install Small Business Pilot Project - No Catch to Conserve" was targeted to reduce electrical summer peak demands in the York Region small business sector. The 'No Catch to Conserve' pilot program identified low-cost energy reduction opportunities (such as energy assessments), tested the impact of energy education on the sector, provided incentives to participating businesses, and engaged clients in the energy upgrade process. Energy upgrades and installations were facilitated and recommendations and design data for launching a full-scale provincial incentive program were made as well.	Commercial	$ 250,000	$ 362,200	2007	Complete
Ontario Forest Industries Association (OFIA)	OFIA 2007 Energy Management Program	Building on the success of the 2006 OFIA energy management program, and the positive response to the interim program, OFIA drove the achievement of tangible energy savings at the mills to further encourage continued participation and to expand the number of participants within the sector. Site teams were encouraged to institute the cultural changes required to sustain these energy savings so the industry could overcome typical implementation barriers.	Commercial	$ 168,475	$ 462,720	2007	Complete
University Health Network (UHN)	Energy management and engagement program for University Health Network hospitals	The purpose of this University Health Network (UHN) energy management and engagement program was to develop a replicable model for energy efficiency in UHN hospitals.	Commercial	$ 250,000	$ 611,895	2007	Complete
Peterborough Green Up	Green Solar Audit	The "Green Solar Audit" from Peterborough Green Up is a program to research, design, market and deliver solar site audits and information kits for residential housing covering domestic solar hot water heating and solar photovoltaic power. These audits advised the property owner as to the suitability of their site for a solar installation and provided a detailed information kit showing the economic and environmental benefits of a particular project and listing local product suppliers and contractors. The main goal was to decrease the use of electricity and fossil fuels to heat domestic hot water thereby reducing electrical load requirements.	Residential	$ 54,329	$ 82,514	2007	Complete

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Colleges Ontario	Ontario Colleges Energy Conservation Secretariat (OCECS)	Colleges Ontario's "Energy Conservation Secretariat" developed a model for a sector approach to the municipalities, academic institutions, school boards, and health and social service providers (MASH) sector for energy management and retrofitting that would lead to greater energy efficiency and enable meeting requirements under the Energy Conservation Leadership Act.	Commercial	$ 250,000	$ 1,750,000	2007	Complete
St. Lawrence College	Small School Deep Energy Audit and Retrofit Project	St. Lawrence College (SLC) developed a "Small School Deep Energy Audit and Retrofit Project" that would feed into their three-year-old Energy Systems Engineering Technician program which prepares students for work in the renewable-energy technology sector by providing such projects and real world learning opportunities.	Commercial	$ 148,937	$ 366,637	2007	Complete
Ontario Association of Physical Plant Administrators	Energy Benchmarking in Ontario Universities	The Ontario Association of Physical Plant Administrators established a benchmarking system for energy usage for each of the 19 Ontario universities plus OCAD. This data could then be used to facilitate energy planning and management at both the institutional and system level allowing the sector to better monitor their usage and the overall impact of energy reduction initiatives.	Commercial	$ 250,000	$ 450,000	2007	Complete
Canadian Plastics Industry Association (CPIA)	Ontario Plastics Sector Energy Conservation Outreach Program	This project was designed to reduce electricity use in the plastic processing sector on an ongoing basis and improve competitiveness in this SME dominated sector. This will be achieved both by stimulating action by processors in direct response to education and identification of opportunities as well as, in the longer term, by the development of a conservation culture in the sector, which will perpetuate the enthusiasm that will be generated by the activities of this project.	Industrial	$ 247,950	$ 434,800	2007	Complete
Federation of Rental Housing Providers of Ontario (FRPO) (cancelled)	Rental Housing Conservation Pilot	This "Rental Housing Conservation Pilot" from the Federation of Rental Housing Providers of Ontario wished to develop an appropriate approach for achieving energy savings in private rental housing buildings. The four components of the project were: measurement and monitoring to develop benchmarks, education and engagement of residents/ staff with conservation action awareness, implementation of physical conservation measures (sub-metering of electricity and appliance replacement), and the recommendation of a long-term approach to private rental housing energy conservation based on the pilot results.	Commercial	$ 232,335	$ 499,750	2007	Complete
Mt. Sinai (TC LHIN)	Toronto Central Local Health Integration Network Energy Management Program	Through the "Toronto Central Local Health Integration Network Energy Management Program", Mt. Sinai hospital brought energy conservation awareness, behavior change, knowledge transfer events, and measurement tools to 3 Local Health Integrated Networks to build a culture of energy conservation within the Local Health Integration Network.	Commercial	$ 247,950	$ 397,000	2007	Complete
Ontario Centers of Excellence (UofT)	Nanowire-based Solar Cells	The University of Toronto, in tandem with the OCE, developed a new type of nanowire based solar cell that can operate cost effectively at a relatively high efficiency to ultimately improve power generation efficiency. This research addressed developing fabrication techniques for nanowires whose absorption will be tuned to cover the solar spectrum, and exploring methodologies to incorporate them into efficient organic structures showing good carrier transport and built-in fields for carrier separation.	Commercial	$ 100,000	$ 673,200	2007	Complete
Ontario Centers of Excellence (U of Waterloo) 50671	Improving Technologies for Deployment of Energy Conservation & Demand Management Programs	The OCE, with the University of Waterloo, aimed to improve energy conservation and demand management program deployment technology according to the implementation of industrial conservation programs in Ontario. Conservation and demand management programs present financial benefits, despite their uptake gap, and so this project addressed the need and opportunity for the development and deployment of technologies and services provided by performance contracting industries.	Various	$ 31,489	$ 83,000	2007	Complete
Ontario Centers of Excellence (OCIT/ Marnoch) #50667	High-Pressure Prototype of Marnoch Thermal Power Apparatus	Marnoch, with OCE, developed a high-pressure thermal energy conversion apparatus. This allowed thermal energy sources that cannot be harnessed with other current technologies to produce electricity. A prototype and a mathematical model to verify the viability of the power generation device was developed at UOIT.	Commercial	$ 89,000	$ 270,000	2007	Complete

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Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Ontario Centers of Excellence (UofT/ InVisage Technologies) #50392	Infrared Solar Cells Made by Solution-Coating	With OCE, InVisage Technologies and the University of Toronto investigated and demonstrated the efficacy of infrared solar cells made by Solution Coating.	Commercial	$ 100,000	$ 541,150	2007	Complete
Centre for Energy Advancement through Technological Innovation (UBC/ UofT) #7033	Electrical Energy Reduction in Mechanical Pulping and Pulp Processing	CEATI has developed a 5 year, $2M multi-disciplinary research program with UBC and University of Toronto with the goal of reducing electrical energy consumption in mechanical pulping by 20% through scientific discovery and the development of new technology while maintaining or improving product quality and production to ensure the long term competitiveness of the Canadian mechanical pulping industry.	Industrial	$ 100,000	$ 2,000,000	2007	Complete
Centre for Energy Advancement through Technological Innovation (Hydro Quebec IREQ LTE) #7028	Benchmark study to establish a test protocol for determining the efficiency of variable frequency drives (VFDS)	CEATI worked with Hydro Quebec to report a benchmark study of 3 variable frequency drive sizes (VFDs) from 5 different manufacturers and to establish a common test protocol for determining the efficiency of the VFDs. This proposed test protocol would form the basis of a new standard, CSA C838: Variable Frequency Drives. Different configurations of different sized VFD-motors (10, 50 and 100 hp) was conducted during this project.	Industrial	$ 24,000	$ 126,312	2007	Complete
Centre for Energy Advancement through Technological Innovation (Enbridge Gas Distribution) #7035	Micro-CHP in a Residential Application	CEATI, with Enbridge Gas Distribution, focused on developing a micro-CHP system in a residential application with domestic hot water, automatic backup power, and dispatch capabilities, and 5,000 hours p.a. of operation.	Residential	$ 70,000	$ 680,000	2007	Complete
Centre for Energy Advancement through Technological Innovation (UBC) #7036	Solar Canopy/ Development of a Lightweight Solar Canopy Illumination System	CEATI and UBC developed a lightweight solar canopy illumination system providing daylight to the core (i.e. interior regions) of multi-floor commercial office buildings in order to substantially reduce the need for electric lighting.	Commercial	$ 20,000	$ 75,000	2007	Complete
Centre for Energy Advancement through Technological Innovation (Leapfrog)	High frequency electromagnetic interference generated by power electronic equipment at the farm environment and its effect on stray voltage	CEATI and Leapfrog Sustainability Inc. conducted a study and analysis of the electromagnetic interference (EMI) issues and associated stray voltage effects in a farm environment due to presence of power electronic equipment for load control and energy efficiency improvements (such as variable frequency drives, solid-state switches, compact florescent lamps etc.). The goal was to provide recommendations for effective EMI mitigation and or prevention.	Industrial	$ 15,000	$ 67,000	2007	Complete
Centre for Energy Advancement through Technological Innovation (TAF)	TAF Lightsabers LED Market Transformation Initiative	CEATI and the Toronto Atmospheric Fund's launched a 'Lightsabers' market transformation acceleration initiative in the outdoor LED lighting sphere with a focus on end-users in the public sector to engage a network of partners across the Greater Toronto Area. This initiative also aimed to develop a common monitoring protocol for evaluating advanced lighting technologies, and to establish, monitor, and report on advanced outdoor lighting field tests in multiple GTA cities.	Commercial & Institutional	$ 100,000	$ 950,000	2007	Complete
Centre for Energy Advancement through Technological Innovation (CORE)	Cornwall Ontario River Energy (CORE) Project	Through the Cornwall Ontario River Energy project, Verdant Power demonstrated their proprietary "River Kinetic Hydropower System", which employs arrays of underwater axial-flow turbines to generate electricity from the kinetic energy of naturally-flowing river currents. This is not a run-of-river system and does not require any dams, impoundments or major civil works, nor does it dramatically alter or redirect the flow of the river.	Industrial	$ 54,000	$ 2,000,000	2006	Complete
AgEnergy	Demand Side Management Energy Program-Agricultural Sector "Learning Locations"	AgEnergy developed and employed a "Learning Locations" demand side management Energy program for the agricultural sector aimed to reduce energy volume by more than 10% through natural gas and electricity conservation, identify energy consumption through audits, and identify efficiencies and electricity load shifting at selected "Learning Locations".	Commercial	$ 147,800	$ 313,000	2006	Complete

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IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Clean Air Partnership (CAP) (with Canadian Urban Institute)	Skills for Energy Efficient Construction	The Clean Air Partnership with the Canadian Urban Institute examined the capacity of the workforce in the Toronto region to engage in a large-scale program of new energy-efficient construction, energy retrofits of existing buildings, and the integration of renewable energy systems into those buildings.	Various	$ 26,000	$ 149,500	2006	Complete
Toronto Region Conservation Authority	Greening Health Care: Creating Conservation Action Plans in the Hospital Sector	The 'Greening Health Care' program created conservation action plans in the hospital sector by enabling Ontario hospitals to actively improve energy and water use efficiency through quarterly workshops that benchmarked their current energy efficiency, identified energy conservation potential, shared best practices, and evaluated technologies.	Commercial & Institutional	$ 62,000	$ 180,000	2006	Complete
EarthCare Sudbury	Efficient Sudbury - A Retail/Consumer Level Community Conservation Program	EarthCare Sudbury organized and implemented "Efficient Sudbury - A Retail/Consumer Level Community Conservation Program" to increase retailer and consumer level awareness of products and services that enhance energy conservation and promote efficiency.	Residential	$ 69,154	$ 204,580	2006	Complete
Faith and the Common Good - Toronto School of Theology	Greening Sacred Spaces	The "Greening Sacred Spaces" project from the Faith and the Common Good Toronto School of Theology project aimed to engage faith communities to 'green' their sacred spaces, through reduced energy consumption, and the promotion of a greener, less energy-intensive lifestyle to their members.	Commercial & Institutional	$ 122,500	$ 200,500	2006	Complete
Ontario Mining Association	Compressed air system audit and sustainable air leak control program.	This air leak control program from the Ontario Mining Association audited compressed air use and set up benchmarking programs and best practices for distribution to industry and government.	Industrial	$ 210,538	$ 432,260	2006	Complete
The Sustainability Office at the University of Toronto	Re-Wire: Applying Community-Based Social Marketing Tools to Reduce Electricity Use at U of T	The "Re-Wire" project by the Sustainability Office at the University of Toronto piloted a more effective approach to reduce electricity consumption by applying community-based social marketing tools to make simple changes in the daily behaviors of individuals. This results-based project involved hundreds of campus members in fostering a culture of conservation on campus. The tools used in Re-Wire will create transferable best-practice toolkits that can be widely applied across sectors.	Commercial & Institutional	$ 54,400	$ 128,400	2006	Complete
Toronto Catholic District School Board (TCDSB)	The Energy Drill Schools Program	The Toronto Catholic District School Board with IndEco Strategic Consulting promoted the "Energy Drill Schools Program": a demand-response program modeled after fire drills. An energy drill is triggered by such events as extreme temperatures, smog, electricity supply constraints and high market prices and schools respond by carrying out a number of energy conservation measures. The program provides an education opportunity for all participants and a tangible demand reduction at times of need that is documented with report cards to the schools.	Commercial & Institutional	$ 159,290	$ 301,090	2006	Complete
Association of Major Power Consumers in Ontario (AMPCO)	Conservation through Dialogue and Design	AMPCO's "Conservation Through Dialogue and Design" held consultation sessions, outreach meetings, and workshops designed to raise conservation awareness at senior levels, among energy/ plant managers, and small-large industrial consumers, gather comprehensive data related to industrial electricity users, and generate recommendations on conservation activities. Deliverables included data and analysis and the development of a comprehensive communications and implementation strategy for conservation action programs.	Industrial	$ 114,100	$ 195,050	2006	Complete
The Toronto Association for Business Improvement Areas (TABIA)	greenTbiz	The Toronto Association of Business Improvement Areas (BIAs) provided programs and services to Toronto BIAs through the "greenTbiz" project, which developed and delivered energy and environmental conservation programs to improve the bottom line of the businesses and properties.	Commercial	$ 92,500	$ 169,000	2006	Complete

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Alliance of Ontario Food Processors (AOFP)	Pilot Energy Program (PEP) for Food Processors	The Alliance of Ontario Food Processors piloted an energy program by the designing and implementing monitoring and tracking capacity in 5 food processing plants. The project identified and implemented suitable metering equipment and programs, as well as critical sub-metering points for a range of food processing establishments.	Industrial	$ 160,000	$ 474,000	2006	Complete
Net Zero Energy Home Coalition	Net-Zero Energy Homes - Building Capacity in Ontario' Consultation Forums	Net-Zero Energy Homes Coalition researched, designed, and executed two Ontarian building capacity consultation forums. These forums were held in Toronto and Ottawa on net zero energy home (NZEH) design and integration by leveraging the ENERGY STAR labeling program. Net zero energy homes build upon ENERGY STAR by integrating energy efficiency and renewable energy technologies in residential home design. These forums aspired to engage the residential builder community in Southern Ontario and advance sustainable design in this sector through identifying and conveying tenets for NZEH specification that build on existing ENERGY STAR qualification attributes.	Residential	$ 40,000	$ 95,581	2006	Complete
Ontario Forest Industries Association	OFIA Interim Energy Management Program	The Ontario Forest Industries Association (OFIA) Interim Energy Management Program was designed to keep the momentum for energy conservation going at mills that participated in the 2006 conservation pilot, and to lay the foundation for an effective implementation program in 2007. This interim approach was expected to help sites apply their knowledge to realize energy savings from identified opportunities to make effective use of the proposed implementation assistance funding for 2007.	Industrial	$ 49,000	$ 54,000	2006	Complete
Ontario Centers of Excellence (HAWT)	Smart Hot Water Storage & Delivery System	Heat and Water Technologies Inc.'s "Smart Hot Water Storage & Delivery System" involved the development of the device and control systems to be added to hot water tanks allowing them to be heated above 98°C. This technology allows for the use of lower cost electricity generated at off-peak periods to produce and store enough hot water for long periods of time, ultimately shifting demand load from peak hours.	Residential	$ 29,497	$ 87,195	2006	Complete
Ontario Centers of Excellence (ABB)	Reactive Power Ancillary Service Markets & Dispatch	OCE and Asia Brown Bovary (ABB) implemented a "Reactive Power Ancillary Service Markets & Dispatch" project involving analysis and modeling work around the creation of an energy management system for reactive power in North America. This research is expected to provide critical insights into the proper purchase and dispatch of reactive power sources in the context of competitive electricity markets. It is also expected to lead to the prototyping and eventual full development of new tools for the energy management systems used by system operators to maintain stability.	Various	$ 50,098	$ 152,197	2006	Complete
Ontario Centers of Excellence (Whalepower)	Proof of Engineering Principle for Turbercle Airfoils on Rotating Platforms	OCE and Whalepower Corp tested whether tubercle enhanced airfoils work as well on rotating platforms as they do on static airfoils. Whalepower has retrofitted commercial turbine blades and is testing their performance at the Wind Energy Institute of Canada (WEICan) on Prince Edward Island.	Industrial	$ 71,398	$ 161,380	2006	Complete
Ontario Centers of Excellence (REGEN)	Maestro Pilot Installations & Energy Reduction Analysis.	REGEN Energy Inc. with OCE conducted an energy reduction analysis which gathered operational data on the "Maestro" controllers - an expected low-cost, peak demand response technology designed to automatically shift load in buildings without management intervention in order to maintain a maximum peak demand below a pre-established ceiling.	Commercial	$ 61,500	$ 160,500	2006	Complete
Ontario Centers of Excellence (LES Smart Ballast)	L.E.S. Smart Ballast	This technology development project with the OCE focused on "L.E.S. Smart Ballast", which is a new microchip technology that replaces ballasts and in existing fluorescent fixtures thereby reducing energy use and extending bulb life.	Commercial	$ 51,675	$ 240,855	2006	Complete
Ontario Centers of Excellence (DY Refrigeration)	Development of a new thermally-driven heat pump unit for combined heating and cooling supply	In conjunction with the OCE, DY Refrigeration developed a thermally driven refrigeration unit heat pump. This technology allows heat from renewable sources such as geothermal, solar thermal, biomass, or waste heat from engines to drive the refrigeration cycle, thereby replacing the mechanical compressor and reducing the electrical load associated with current refrigeration technologies.	Commercial	$ 99,900	$ 570,200	2006	Complete

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IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Centre for Energy Advancement through Technological Innovation (Powertech)	Performance and Efficiency Testing of Electronic HID Ballasts	This CEATI project identified the appropriate performance and efficiency testing requirements of electronic HID ballasts for metal halide and high pressure sodium lamps. An efficiency and performance standard was developed and employed in laboratory testing of 15 North American ballasts of 50 to 400W, and was compared with the efficiency and performance of the different models.	Commercial	$ 12,600	$ 67,000	2006	Complete
Ontario Energy Association (OEA)	Energy Management Best Practices in Multi-Use Facilities	Rogers Centre, under the direction of the Ontario Energy Association, undertook a general engineering study to identify and prioritize energy efficiency and conservation opportunities. The project team also undertook a communications campaign to showcase the study and its findings to a broader industrial/ commercial audience to promote the value of energy efficiency and conservation.	Commercial	$ 30,000	$ 30,000	2005	Complete
Ontario Hospitals Association (OHA)	Hospital Energy Efficiency Report	The Ontario Hospitals Association (OHA) undertook the hospital energy efficiency project to summarize the barriers and best energy management practices in Ontario hospitals. The OHA identified conservation and demand management opportunities and made recommendations for an energy efficiency strategy for Ontario's publicly funded hospitals.	Commercial	$ 23,500	$ 23,500	2005	Complete
London Hydro	Chill Out: Appliance Exchange Program	London Hydro launched the 'Chill Out: Appliance Exchange Program' with the target of exchanging 3,500 fridges, freezers and air conditioners. For this project, participants received cash incentives to turn over their inefficient appliances in exchange for energy-efficient ones. This program included a primary refrigerator exchange program (homeowners and multi-residential buildings), a secondary refrigerator bounty program (homeowners), a freezer disposal (homeowners), and a room air conditioner bounty program.	Residential	$ 52,046	$ 1,405,500	2005	Complete
Toronto Region Conservation Authority (TRCA)	Combined Heat and Power for High-rise Condominiums	The Toronto Region Conservation Authority (TRCA) established a business case for providing distributed generation in high-rise condominiums through a design and operating feasibility study for a project under Tridel development. This initiative provided a template for other multi-unit residential developers to use to increase the energy efficiency of condominiums.	Multi-Unit Residential	$ 46,628	$ 90,740	2005	Complete
Ontario Convenience Store Association (OCSA)	Convenience Stores Conservation Pilot	Through a partnership between the Ontario Convenience Stores Association (OCSA) and the Clean Air Foundation (CAF), this project focused on developing a strategy for promoting energy efficiency within the convenience store sector of Ontario. This was accomplished through two approaches: 1) developing a sector profile through in-store assessments of 100 Ontario convenience stores and 2) test marketing an incentive-based program with 10 case study stores in Ontario. The results of these reports were communicated to the members of the OCSA at their annual conference.	Commercial	$ 44,835	$ 44,835	2005	Complete
Sustainable Buildings Canada (SBC)	Developing an Ontario Energy Efficiency Contractors Network	Sustainable Buildings Canada worked with key contractor associations to develop the Energy Efficiency Contractors Network. The network's purpose was to provide the information and expertise needed to turn contractors into energy efficiency promoters.	Commercial	$ 15,340	$ 15,340	2005	Complete
Canadian Energy Efficiency Alliance (CEEA)	Effective Demand Side Management (DSM): Webinar Series	The Canadian Energy Efficiency Alliance worked with the Electricity Distributors Association to deliver a series of forums and webinars for LDCs and other relevant stakeholders in Ontario to exchange ideas and experiences on conservation demand management (CDM) plans and programs. These sessions also provided partnership opportunities for LDCs to connect with not-for-profit organizations that have CDM programs or proposals.	Commercial	$ 25,000	$ 37,400	2005	Complete
Wine Council of Ontario (WCO)	Energy Benchmarking and Best Practices in the Ontario Wine Industry	The Wine Council of Ontario (WCO) conducted energy benchmarking at 25 wineries in the Niagara, Southwestern and Eastern areas of the province. The results were used to develop industry-wide performance measures that allowed each winery to compare its performance to a standard. Wineries that under-performed in certain areas were provided with knowledge and expertise to improve their energy efficiency.	Industrial	$ 25,000	$ 175,000	2005	Complete

IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Association of Colleges of Applied Arts and Training of Ontario (ACAATO)	Energy Efficiency Secretariat for the College System	The Association of Colleges of Applied Arts and Training of Ontario (ACAATO) provided funding for an energy efficiency coordinator to assist with developing college-specific energy efficiency plans, establishing a reporting and tracking system on energy consumption data, and reporting best practices to all members. An initial survey of 24 members in ACAATO identified ways of reducing electricity consumption by 25%, demand by 50% and natural gas consumption by 15%.	Commercial & Institutional	$ 85,000	$ 150,000	2005	Complete
Association of Colleges of Applied Arts and Training of Ontario (ACAATO)	Energy Savings & Capital Renewal Symposium	The Association of Colleges of Applied Arts and Training of Ontario, in partnership with the Ontario Council of Universities, mounted a 2-day event for key officials in the post-secondary education sector to share ideas and best practices related to the energy efficiency opportunities in capital renewal strategies. It also explored a range of existing financing opportunities and potential financial solutions for the sector.	Commercial	$ 9,713	$ 32,500	2005	Complete
EnerQuality Corporation	Energy Star for New Homes	Through this project EnerQuality sought to expand its 'ENERGY STAR for New Homes Program' across the province, which is a voluntary program that recognizes superior energy performance in new homes. The overall objective of this program is to offer consumers a more energy efficient housing alternative and encourage builders to improve the energy efficiency of their product offerings.	Residential	$ 95,000	$ 360,000	2005	Complete
Clean Air Partnership (CAP)	Feasibility of Expanding the TAF	The Clean Air Partnership produced a feasibility study that identified major sectors and sources for clean energy and conservation and demand management in the GTA. This report formed the basis of a plan to expand the Toronto Atmospheric Fund to all municipalities in the GTA.	Commercial	$ 7,500	$ 55,000	2005	Complete
WindFall EcoWorks	First Nations Conservation Project: Chippewas of Georgina Island	Windfall EcoWorks is delivered a conservation and demand management program that targeted at residents of the Chippewas of Georgina Island First Nation reserve, which is located 2 km off the south eastern shore of Lake Simcoe. Electricity demand reduction and conservation targets were achieved by performing home energy audits, a community load analysis, installing appropriate energy saving measures, and creating education opportunities at the community and household level.	Residential	$ 55,000	$ 372,000	2005	Complete
Summerhill Group	Flick Off!/ Unplug!: Text-Messaging Pilot	Flick Off/ Unplug was a pilot project that ran in Owen Sound and Toronto in July-August, 2005. Through a radio and public relations campaign and flyer distribution, people were encouraged to sign up for Flick Off/Unplug on their cell phone or on the internet. Participants then received alerts via email or a SMS text message that informed them to cut back electricity usage, provided tips on how to cut back, and dispelled myths around energy conservation.	Residential	$ 25,000	$ 110,000	2005	Complete
Ontario Forest Industries Association (OFIA)	Forest Industry Energy Manager and CDM Pilot	Ontario Forest Industries Association (OFIA) helped to improve the electrical energy efficiency of the forestry sector through the creation of an energy manager program, which involved the distribution of conservation and demand management information to association members, the establishment of energy benchmarking programs, research in best practices, and the mounting of an energy efficiency workshops. Ultimately, opportunities and priorities for electrical and other energy savings were identified in mills across Ontario.	Industrial	$ 150,000	$ 356,000	2005	Complete
Pembina Institute	Greenlearning.ca	This project aimed to expand the Pembina Institute's education program called "Greenlearning" to Ontario. Greenlearning provides teachers and students with web-based, curriculum-linked materials on energy and the environment.	Commercial	$ 75,000	$ 1,000,000	2005	Complete
Ontario Hospitals Association (OHA)	Hospital Energy Conservation Program	The Ontario Hospital Association mounted a 2-day conference for the hospital sector to help build momentum for the adoption of a culture of conservation. This project also involved the creation of a resource guide, which profiled some of the leading conservation projects in Ontario hospitals today	Commercial & Institutional	$ 19,900	$ 55,960	2005	Complete

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IESO Grid Innovation Fund, Conservation Fund, and Technology Development Fund Project Portfolio

Proponent	Project Title	Summary	Sector	Amount Awarded	Total Budget	Year	Status
Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)	On-farm Energy Audits	The Ontario Federation of Agriculture and the Ontario Ministry of Agriculture, Food and Rural Affairs collaborated with the Ministry of Energy and Hydro One to develop an on-farm energy audit program to assist Ontario farmers in saving energy. Sixty audits were delivered as part of this project, building on 30 audits conducted in an earlier phase funded by the Ministry of Energy in 2004.	Industrial	$ 80,000	$ 80,000	2005	Complete

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AMPCO INTERROGATORY 8

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-8

INTERROGATORY

Ref: A-2-2 Page 11

Preamble: The IESO indicates it is expanding opportunities for newer technologies to compete is central to the IESO's innovation and efficiency agenda.

a) Please describe the IESO's innovation agenda.

RESPONSE

a) Electricity systems all over the world are facing significant change as a result of multiple factors, including: emerging technologies, increased digitization, decarbonisation, new business models and energy solution providers, and changing consumer preferences and needs. The IESO has developed an Innovation Roadmap that identifies the key challenges and opportunities facing the IESO in maintaining affordability and reliability. The Roadmap sets out priorities for learning, capability building and the removal of barriers within the IESO's scope of accountability to the innovation of others in order to support improved system reliability and affordability. The Roadmap is supported by a multi-year plan that sets out specific initiatives that the IESO will undertake or support to address the priority areas of focus identified in the Roadmap.

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AMPCO INTERROGATORY 9

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-9

INTERROGATORY

Ref: A-2-2 Page 6

Preamble: The IESO indicates creating an innovation roadmap to enhance system reliability and drive down costs for an ever-changing sector in collaboration with industry partners.

Please explain further how innovation is expected to drive down costs.

RESPONSE

The significant change faced by Ontario's electricity sector comes with substantial risks and opportunities. If risks are not adequately managed and if opportunities are missed, reliability and costs are likely to be adversely impacted.

Many of the activities identified with the Innovation Roadmap are focused on removing barriers to the fair competition of new technologies (or existing technologies used in new ways) in IESO markets. Markets have demonstrated time and again that more competition on the supply side results in lower costs for buyers (i.e. Ontario's electricity consumers). For example, there are currently many energy storage assets that have been installed in Ontario by businesses for the purpose of the Industrial Conservation Initiative (ICI); these resources are used for a few hours each year by individual consumers for ICI purposes and could compete in IESO-administered markets at other times to provide electricity products and services that the IESO needs. IESO's tools and systems were designed at a time before battery energy storage; the upgrades needed to enable the competition of these resources are included in capital projects set out in the Roadmap. Furthermore, by clearly setting out a set of research topics that IESO will investigate over the period of 2019-2021 IESO is creating a platform for industry/stakeholder collaboration on this work to avoid duplication of efforts that involve ratepayer-funded resources.

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AMPCO INTERROGATORY 10

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-10

INTERROGATORY

Ref: A-2-2 Page 11

Preamble: The evidence states "With the energy sector continuing to transform, the IESO's investment in innovation will contribute to the assessment of potential future scenarios for the electricity and broader energy sector in the province, and help identify potential roles for other organizations."

Please explain what the IESO means by "identify potential roles for other organizations."

RESPONSE

As the electricity sector continues to evolve, new roles and responsibilities may need to be fulfilled in order to cost-effectively and reliably deliver electricity to consumers. For example, as the penetration of distributed energy resources continues to grow in Ontario, there may be a need for new and/or enhanced planning, operations, and market functions at the distribution level which may in turn impact planning, operations, and markets at the transmission level.

The IESO, through white papers and demonstration projects included in the Innovation Roadmap and associated Work Plan, is exploring how roles and responsibilities could evolve in the future and considering the effect that different paths may have on the bulk electric system, wholesale market, and sector as a whole.

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AMPCO INTERROGATORY 11

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-11

INTERROGATORY

Innovation in the electricity sector is a popular topic, with multiple entities engaged in innovation related work.

Please indicate exactly what steps the IESO has taken to avoid duplication of effort and expense as part of its Innovation Roadmap.

RESPONSE

To the best of IESO's knowledge, no other entity within Ontario's electricity sector has developed and published a multi-year plan containing specific, prioritized activities to be undertaken to prepare for the changes, challenges and opportunities impacting electricity system affordability and reliability. The Innovation Roadmap sets out priorities specific to IESO's unique mandate and role within Ontario's electricity sector.

The IESO used a transparent and open engagement process to seek input from all interested stakeholders into the development of the Roadmap. By making the Roadmap public, IESO has clearly indicated the specific innovation initiatives it will focus on between 2019 and 2021 (and the key issues that impact affordability and reliability out to 2030). The Roadmap and Work Plan provide a clear and transparent agenda for any entities interested in the topics included in the document to collaborate with the IESO. Furthermore, IESO has committed to enabling interested stakeholders to provide input to research and white papers (i.e. to help shape research questions and draft research) in order to make this work as useful as possible to potential/actual market participants, utilities, policy-makers and others and to support the creation of a shared set of facts and alternatives on emerging issues in order to move more quickly to solutions that benefit customers.

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AMPCO INTERROGATORY 12

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-12

INTERROGATORY

Ref: B-3-2 Attachment #2

Please add 2017 actuals and 2018 actuals to Appendix 2-JB.

RESPONSE

Please see the response to Energy Probe Interrogatory 7 a), at Exhibit I, Tab 1.3, Schedule 4.07.

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AMPCO INTERROGATORY 13

1.0 Revenue Requirement, Operating Costs and Capital Spending

1.1 Is the IESO's Fiscal Year 2019 net revenue requirement of $190.8 million appropriate?

AMPCO-13

INTERROGATORY

Ref: B-3-2 Attachment #3

Please add 2017 actuals and 2018 actuals to Appendix 2-JC.

RESPONSE

Please see the table below:

Appendix 2-JC
Operating Tables Table

(in $ millions)		2017 Actual	2018 Latest Estimate	2018 Actual	2018 Budget	2019 Budget
CEO		**8.4**	**7.9**	**7.9**	**7.7**	**7.7**
	CEO Office	6.9	6.5	6.5	6.0	6.3
	Internal Audit	1.5	1.4	1.4	1.6	1.5
Planning, Acquisition and Operations		**39.9**	**40.8**	**40.7**	**46.2**	**44.2**
	VP Office	1.7	1.2	1.3	1.8	0.7
	Power System Assessments	13.8	14.1	13.6	14.9	15.1
	Resource Planning	3.4	4.3	4.4	4.3	4.8
	Transmission Planning	2.9	3.6	3.6	4.2	4.9
	Market Operations	14.4	14.7	15.1	16.1	15.7
	Markets & Procurement	3.7	2.8	2.8	5.0	3.0
Policy, Engagement and Innovation		**24.3**	**20.6**	**21.0**	**22.1**	**24.5**
	VP Office	0.7	1.0	0.8	0.5	0.8
	Energy Efficiency	8.2	4.7	4.6	4.1	4.4
	Alliances and Marketing	3.2	2.9	2.9	2.9	3.4
	Corporate & Indigenous Relations	7.0	6.9	7.4	8.0	8.4
	Policy Innovation	2.7	2.9	2.9	3.9	4.7
	Regulatory Affairs	2.4	2.2	2.3	2.8	2.8
Information and Technology Services		**36.1**	**39.9**	**40.2**	**39.7**	**41.8**
	VP Office	1.0	1.3	1.1	1.1	0.6
	Organizational Governance Support	3.7	1.6	1.7	1.3	1.9
	Information Security	-	3.5	3.5	3.9	5.5
	Business Solutions	14.5	16.0	16.0	15.3	16.7
	Technology Services	16.8	17.5	17.9	18.1	17.2
Legal Resources and Corporate Governance		**16.3**	**15.4**	**16.3**	**15.3**	**14.1**
	VP Office	1.2	1.1	1.1	1.1	1.3
	General Counsel	6.5	5.9	6.5	5.3	5.0
	Board	0.7	0.7	0.7	0.7	0.7
	Contract Management	8.0	7.8	7.9	8.2	7.0
Corporate Services		**24.0**	**24.8**	**24.9**	**23.8**	**24.4**
	VP Office	0.5	0.9	1.0	0.4	0.5
	Finance & Treasury	-	3.5	3.4	3.5	3.7
	Procurement	-	1.5	1.5	1.6	1.5
	Financial Planning and Analysis	1.4	1.6	1.6	1.5	1.5
	Settlements	5.1	5.2	5.3	5.4	5.4
	Enterprise Change	3.0	3.7	3.6	2.7	2.8
	Facilities	8.6	8.4	8.5	8.7	9.0
Human Resources		**5.1**	**5.1**	**5.1**	**5.1**	**5.0**
Market Assessment and Compliance Division		**3.2**	**1.6**	**1.6**	**1.9**	**2.0**
Market Renewal		**7.9**	**15.0**	**14.9**	**12.7**	**11.7**
Corporate Adjustments		**18.2**	**18.1**	**20.4**	**16.3**	**15.3**
	General	3.9	4.1	7.2	2.0	2.8
	Amortization	18.2	18.8	19.6	17.7	18.4
	Interest	- 4.0	- 4.8	- 6.4	- 3.4	- 5.9
Total		**183.3**	**189.2**	**193.0**	**190.8**	**190.8**

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