AMPCO INTERROGATORY 12

Issue 4.0 Market Renewal Program (MRP)

4.0-AMPCO-12

INTERROGATORY

Ref: Exhibit D Tab 1 Schedule 2 Attachment 1

Please provide the organizational chart for MRP.

RESPONSE

See Schedule 2 - 4.0 AMPCO 12, Attachment 1 - MRP Org Chart. This org chart includes staff down to the initial senior manager, manager, and lead level.

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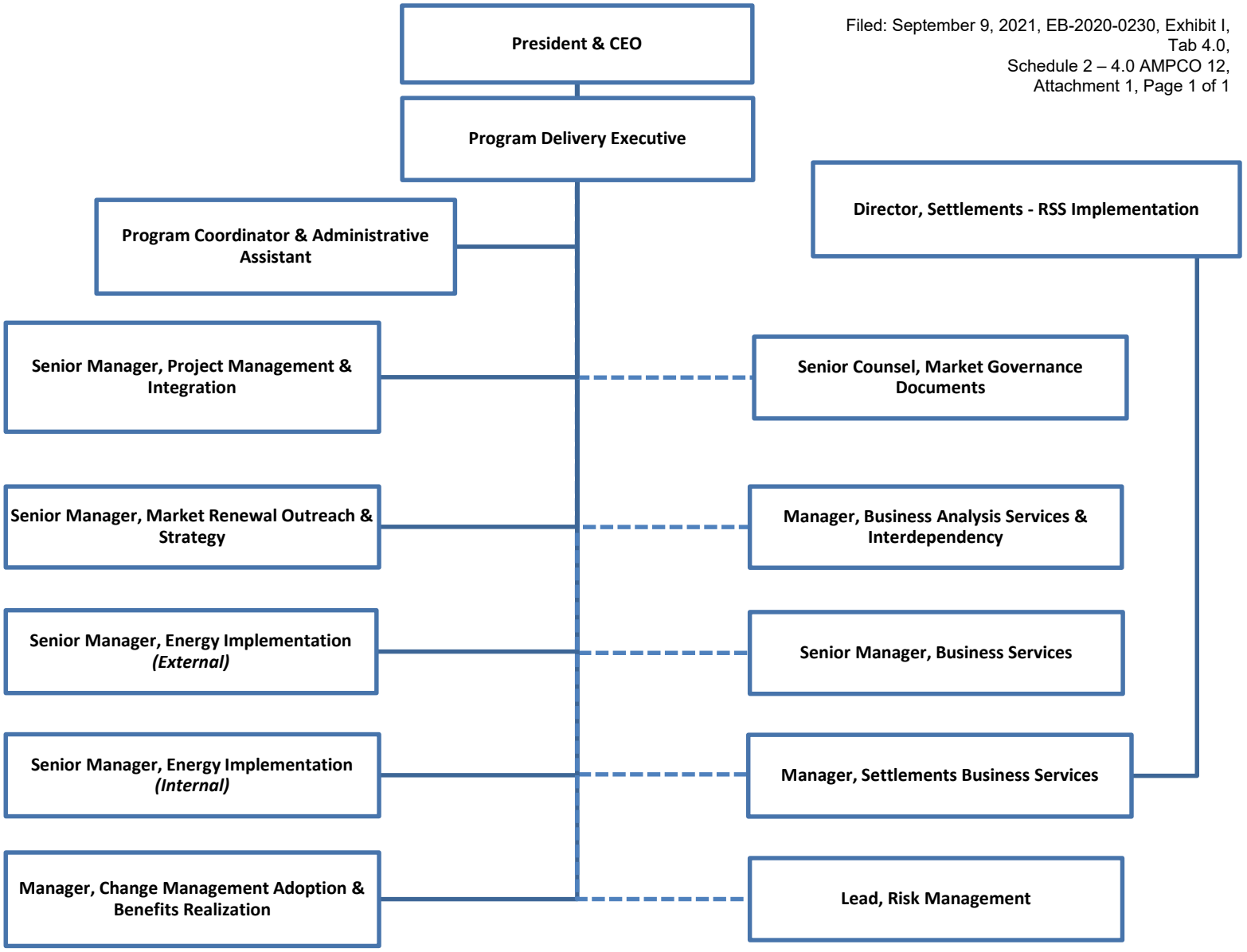
Market Renewal Program (MRP Energy) & Replacement Settlement Systems (RSS) Program (MRP-RSS Program)

Filed: September 9, 2021, EB-2020-0230, Exhibit I,
Tab 4.0,
Schedule 2 – 4.0 AMPCO 12,
Attachment 1, Page 1 of 1



Effective Date: July 5, 2021

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AMPCO INTERROGATORY 13

Issue 4.0 Market Renewal Program (MRP)

4.0-AMPCO-13

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 2

The final detailed design was published in January of 2021.

a. Does the IESO anticipate any scope changes to the detailed design during implementation?

b. How will design scope changes be managed during implementation.

RESPONSE

a. The IESO does not anticipate any scope changes during implementation.

b. Transparency is one of the Market Renewal Program's guiding principles and the IESO regularly provides updates on the implementation phase of work during the monthly stakeholder engagement days. Design features may need to be changed if, for example, through the implementation phase it is discovered that it not feasible to implement the proposed features in the IESO's tools and systems. These items will be identified and raised with stakeholders through the IESO's engagement days.

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AMPCO INTERROGATORY 14

Issue 4.0 Market Renewal Program (MRP)

4.0-AMPCO-14

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 3

The MRP Business Case was approved by the IESO Board of Directors (IESO Board) on October 23, 2019. The business case estimates $800 million in net system benefits expected to be realized in the first 10 years after implementation and a cost to deliver the project, including contingency, within a range from $151 million to $194 million.

a) Please identify the top 5 highest cost projects managed by the IESO in the last ten years.

b) Please identify any relevant lessons learned from these projects and how they have been incorporated into the implementation phase of MRP.

RESPONSE

a) 5 highest cost projects are:

1. MDM – Meter Data Management
2. Operations Readiness Initiative
3. Enhanced Day Ahead Commitment (EDAC)
4. Renewal Integration Initiatives
5. Unified Communications

b) Lessons Learned from our largest past projects/programs that were incorporated into the MRP include, but not limited to:

1. The importance of having a dedicated project team, including project management staff, business and IT leads and subject matter experts;
2. The need for enhanced stakeholder engagement and dedicated change management, adoption and benefits realization resources;
3. Robust Program governance. For the MRP program, the IESO has two levels of Governance: Director level project steering committee, and an Executive level steering committee.
4. Establishing a clear set of measures; For MRP, the IESO implemented clear project progress reporting metrics.
5. Engaging with the major vendor early to refine the design, cost and timelines; and

6. Drafting manuals and rules side by side so there is alignment in the language in those two sets of documents.

AMPCO INTERROGATORY 15

Issue 4.0 Market Renewal Program (MRP)

4.0-AMPCO-15

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 3

The evidence states "As the IESO transitioned from detailed design to implementation, it provided a natural point of review of the schedule, budget, and risks – a common practice based on project management principles.

Please identify the body of project management principles the IESO is using to manage and monitor MRP.

RESPONSE

The IESO uses the following project management principles for all projects, including MRP.

- Adopting industry best practice in governance, controls, change management and delivery methodologies.
- Collaborating with customers and partners across the organization.
- Empowering team members by developing their skills and competencies.
- Streamlining and continually improving processes and products to ensure they efficiently achieve their objectives.
- Capturing lessons learned and leveraging these to improve how change is delivered.
- Clearly articulating roles and responsibilities and holding people accountable.
- Providing effective governance to manage changes in project scope, cost and timing.
- Examining and effectively managing risks throughout the project lifecycle, from initiation through delivery.
- Ensuring that quality and human performance is considered in all aspects of project delivery.
- Effectively managing human change to ensure the readiness of the customer to accept change.
- Ensuring value is provided in all of the services and keeping the customer experience in mind.

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AMPCO INTERROGATORY 16

Issue 4.0 Market Renewal Program (MRP)

4.0-AMPCO-16

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 4 Table 2

Please add 2016 to 2020 actuals to the Table and add a column to present the Totals of each row.

RESPONSE

MRP began incurring costs in 2017, therefore values for 2016 have not been added to the table. 2017 – 2020 actuals have been added in the Table below.

Table 1: 2017-2020 Actual and 2021-2023 MRP Budget

(In $ millions)	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Budget	2022 Budget	2023 Budget	Total
Operating Expenses								
Compensation & Benefits	2.7	4.4	1.7	1.6	2.6	3.6	3.0	19.5
Professional & Consulting	1.9	2.2	1.2	0.4	0.9	1.2	0.8	8.6
Operating & Administration	0.2	0.4	0.2	0.1	0.1	0.1	0.1	1.2
Total Operating Expense	4.7	7.1	3.1	2.1	3.6	4.9	3.9	29.4
Capital Expenses								-
Compensation & Benefits	-	0.6	6.8	10.2	13.3	14.1	12.1	57.1
Professional & Consulting	-	0.2	2.5	2.7	4.1	4.8	4.3	18.6
Operating & Administration	0.1	0.3	0.9	11.8	14.1	17.7	10.7	55.6
Interest	-	-	0.1	0.3	1.0	2.3	3.3	7.0
Contingency	-	-	-	-	3.5	3.1	3.4	10.0
Total Capital Expenses	0.1	1.1	10.3	25.0	36.0	42.0	33.8	148.3
Total MRP Expenses	4.8	8.2	13.4	27.1	39.6	46.9	37.7	177.7

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AMPCO INTERROGATORY 17

Issue 4.0 Market Renewal Program (MRP)

4.0-AMPCO-17

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 9 Table 10

a) Please add 2020 budget amounts to the table.

b) Please add 2022 and 2023 budget amounts to the table.

RESPONSE

Please find the updated table below:

Table 1: MRP FTEs Actual and Budget

MRP FTEs	2019 OEB Approved	2019 Actual	2020 Actual	2020 Budget	2021 Budget	2022 Budget	2023 Budget
Total Regular	35	36	36	44	45	44	44
Temporary	16	4	9	4	7	9	9
MRP Core FTEs	**51**	**40**	**45**	**48**	**52**	**53**	**53**
MRP Support FTEs	12	14	28	37	42	49	40
MRP FTEs Total	**63**	**54**	**73**	**85**	**94**	**102**	**93**

a) The 2020 budget reflects the 70 staff reflected in the 2020 – 2022 Business Plan and 15 IT support resources that were budgeted for the Market Renewal Program (MRP) but were not originally counted as MRP resources.

b) The 2021, 2022 and 2023 budget reflects the updated cost and schedule impacts noted in the 2021 Revenue Requirement Submission as well as the continued support from IT staff.

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AMPCO INTERROGATORY 18

Issue 4.0 Market Renewal Program (MRP)

4.0-AMPCO-18

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 9 Table 10

Please provide a further breakdown of Regular Staff into Executive, Management and Non-Management Regular.

RESPONSE

Please the find updated table below.

Table 1: MRP FTEs by Executive, Management and Non-Management

MRP FTEs	2019 OEB Approved	2019 Actual	2020 Actual	2020 Budget	2021 Budget	2022 Budget	2023 Budget
Executive	-	-	-	-	-	-	-
Management	4	4	4	4	5	5	5
Non-Management	31	32	32	40	40	39	39
Total Regular	**35**	**36**	**36**	**44**	**45**	**44**	**44**
Temporary	16	4	9	4	7	9	9
MRP Core FTEs	**51**	**40**	**45**	**48**	**52**	**53**	**53**
MRP Support FTEs	12	14	28	37	42	49	40
MRP FTEs Total	**63**	**54**	**73**	**85**	**94**	**102**	**93**

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ED INTERROGATORY 1

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-1

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 8 & 14

Preamble:

Page 8: "A thorough financial assessment of the new market design has concluded that the program is financially viable, delivering at least $750 million in net financial benefits to Ontario consumers over the first 10 years of implementation."

Page 14: "the Net Present Value for the Market Renewal Program Energy Stream has been assessed at $290 million - $450 million with a Benefits-to-Costs Ratio of 2.7 - 4.3"

Questions:

(a) Please describe in detail the degree to which the forecast $750 million in benefits from MRP are related to and dependent on continued use of gas-fired power generation.

(b) Approximately what percent of the benefits of MRP are related to and dependent on gas-fired power generation?

(c) Please re-estimate the benefits of MRP if the output of Ontario's gas plants is capped at a level that would produce 2.5 Mt CO2e per year and completely phased out by 2030. Please provide a response on a best efforts basis, making and stating assumptions and caveats as necessary. Please re-estimate both the gross benefits ($750 million), the net present value figures, and the benefits-to-costs ratio.

RESPONSE

(a) As noted in Procedural Order No. 1, the IESO's application is based on a business plan that has been reviewed and approved by the Minister of Energy and the review of the IESO's application should be focused on the IESO's OM&A and capital expenditures. The IESO's revenue requirement submission is not a proceeding to consider market design investments and incorporation of policy initiatives within MRP. In an effort to be responsive to this question, the IESO is providing the following information.

The quantifiable benefits were derived from more efficient unit commitment, improved intertie pricing, increased resource competition, and elimination of unwarranted CMSC payments. These benefits would result from the implementation of MRP regardless of the supply mix in use as the benefits come from better scheduling and price signalling of

resources to meet system needs in a least cost manner using improved mathematical calculations.

(b) The benefits result from improved scheduling and pricing signalling of resources to meet system needs in a least cost manner and do not distinguish between the type of resources used.

(c) The IESO has not re-estimated benefits included in the MRP Business Case as there is no provincial policy that is mandating phasing out of gas-fired power generation.

ED INTERROGATORY 2

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-2

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1

Questions:

(a) What are the expected ongoing costs for MRP that would persist annually beyond 2030? Please provide a breakdown of these by type.

(b) What are the expected ongoing benefits for MRP that would persist annually beyond 2030? Please provide a breakdown of these by type.

(c) What expected ongoing benefits would persist annually beyond 2030 for MRP if gas-fired generation is eliminated by the end of 2030, all else equal? Please provide a breakdown of these by type.

RESPONSE

(a) Amortization of investments in MRP will begin to increase annual operating costs once MRP goes into service in 2023. The overall project costs will be amortized over 15-20 years resulting in an annual amortization expense of $7.4 - $9.9 million.

(b) A thorough financial assessment of the new market design has concluded that the program is financially viable, delivering $800 million in net financial benefits to Ontario consumers over the first 10 years of implementation. The 2019 Business Case only assessed the benefits within the first 10 years of implementation.

(c) As noted in Procedural Order No. 1, the IESO's application is based on a business plan that has been reviewed and approved by the Minister of Energy and the review of the IESO's application should be focused on the IESO's OM&A and capital expenditures. The IESO's revenue requirement submission is not a proceeding to consider market design investments and incorporation of policy initiatives within MRP. This question is outside of scope as the MRP Business Case only assessed the benefits within the first 10 years of implementation. The IESO has not re-estimated benefits included in the MRP Business Case as there is no provincial policy that is mandating phasing out of gas-fired power generation.

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ED INTERROGATORY 3

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-3

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 9

Questions:

(a) Please describe qualitatively how MRP will likely impact the output of Ontario's gas plants as a share of Ontario's electricity supply, all else equal. Please also estimate the impacts, if any, as a % change and kWh change annually in Ontario's gas plant output in comparison to what would occur without MRP.

(b) Please describe qualitatively how each specific element of MRP (the single schedule market, the day-ahead market, and the enhanced real-time unit commitment project) will likely impact the output of Ontario's gas plants as a share of Ontario's electricity supply, all else equal. Please also estimate the impacts, if any, as a % change and kWh change annually in Ontario gas plant output in comparison to what would occur without MRP.

To address uncertainties, please make and state assumptions, simplifications, and caveats as necessary.

RESPONSE

(a) As noted in Procedural Order No. 1, the IESO's application is based on a business plan that has been reviewed and approved by the Minister of Energy and the review of the IESO's application should be focused on the IESO's OM&A and capital expenditures. The IESO's revenue requirement submission is not a proceeding to consider market design investments and incorporation of policy initiatives within MRP. In an effort to be responsive to this question, the IESO is providing the following information. All things equal, it is expected that MRP will help to increase non-emitting resources as a proportion of Ontario's electricity supply. The proportion change (%) is difficult to estimate due to market conditions and market participant behaviour. As it is very difficult to predict future market conditions and market participant behaviour, the IESO does not conduct this kind of modelling.

(b) The Single Schedule Market (SSM) will provide the foundation for better market operations as it will send accurate locational prices to Market Participants (suppliers and price responsive loads) that better reflect system needs and constraints. The SSM will eliminate the two-schedule system and the need for out-of-market real time congestion

payments by introducing locational prices that create alignment between pricing and dispatch on the system. Market prices will account for congestion and losses and will reflect the true costs of producing electricity at a given place and time.

Gas Market Participants, will benefit from the improved certainty provided by a Day-Ahead Market (DAM) in their own operations. The IESO will time the completion of the DAM specifically for the timely gas nomination window to provide gas generators with more certainty on gas procurements.

The Enhanced Real-Time Unit Commitment (ERUC) initiative will create a level playing field for all resource types through three-part offers which will include energy, start-up and speed-no-load costs thus increasing transparency and competition within the commitment process. ERUC will result in pre-dispatch schedules and unit commitments that better reflect the total cost of Non-Quick Start (NQS) resources that are based on a longer, more efficient optimization timeframe.

However, as it is very difficult to predict future market conditions and market participant behaviour, the IESO does not conduct the kind of modelling described in the interrogatory.

ED INTERROGATORY 4

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-4

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 35

Preamble:

> "Improved price signal for flexibility: under the current two-schedule design, price signals for resources to provide flexibility by ramping up or down to meet demand fluctuations are muted and based on an unconstrained system. With the introduction of SSM, the use of actual resource ramp rates and consideration of system constraints will produce accurate and transparent prices that will better value flexibility and incentivize resources to respond and invest to meet ramping needs."

Questions:

(a) Please describe how the change described above will impact each resource type in general (e.g. gas, wind, solar, storage, etc.). In particular, please address whether the change will in general or in aggregate cause that resource type to be dispatched more or less often.

(b) Will the change described above cause resource types that are easier to dispatch quickly to be dispatched more often?

RESPONSE

(a) Replacing the two-schedule market with a Single Schedule Market (SSM) with locational pricing is expected to enhance reliability, increase operational certainty, and significantly reduce system costs paid for by consumers. Impacts to individual resources are dependent on the market participant's costs and offer strategies, which the IESO does not model and therefore cannot provide comment.

(b) The introduction of the SSM with locational pricing aligned with dispatch will ensure resources are responding to the right incentives and price signals for dispatch, reducing costs and enabling better decision-making. Resources will continue to be scheduled based on economics.

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ED INTERROGATORY 5

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-5

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 36

Preamble:

> "Resource commitment plays an important role in the electricity market as it provides time and certainty to NQS resources, such as a combined-cycle gas turbine facility, to make necessary arrangements to produce energy. As explained previously, the current commitment process does not take all this information into account when making commitments, leading to inefficient resource selections. The more efficient commitment process will be designed to consider all resource costs and respect individual operational characteristics over multiple hours of the day. As a result, the inefficiency costs associated with today's commitment process will be eliminated."

Questions:

(a) Please describe how the change described above will impact each resource type in general (e.g. gas, wind, solar, storage, etc.). In particular, please address whether the change will in general or in aggregate cause that resource type to be dispatched more or less often.

(b) Will the change described above cause resource types that are easier to dispatch quickly to be dispatched more often?

(c) Because resource commitment provides time and certainty to NQS resources, such as a combined-cycle gas turbine facility, to make necessary arrangements to produce energy, will this change likely result in an increase in output from combined-cycle gas facilities on an annual basis? If yes, by approximately how much (% and MWh)?

RESPONSE

(a) As it is very difficult to predict future market conditions and market participant behaviour, the IESO does not conduct this kind of modelling.

(b) Resources will continue to be scheduled based on economics. As it is very difficult to predict future market conditions and market participant behaviour, the IESO does not conduct this kind of modelling.

(c) As it is very difficult to predict future market conditions and market participant behaviour, the IESO does not conduct this kind of modelling. See response to Schedule 6 - 4.0 ED 3a).

ED INTERROGATORY 6

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-6

INTERROGATORY

Reference: Exhibit G, Tab 2, Schedule 1, Plus Attachment(s), Page 3

Exhibit G-2-1, Attachment 1, Page 8 & 12

Preamble:

Page 3: "The business case estimates $800 million in net system benefits expected to be realized in the first 10 years after implementation"

Page 8: "A thorough financial assessment of the new market design has concluded that the program is financially viable, delivering at least $750 million in net financial benefits to Ontario consumers over the first 10 years of implementation."

Page 12: "Better scheduling and commitment of resources in the real-time operating timeframe delivering system-wide efficiency benefits of over $500 million over the first 10 years of operating the new market design.

Elimination of approximately $450 million of unnecessary Congestion Management Settlement Credits over the first 10 years of operating the new market design. These benefits will accrue directly to Ontario consumers."

Questions:

(a) Please reconcile the three different benefits estimates cited above. Please include a table with a breakdown of the reconciliation.

RESPONSE

(a) The Net Present Value (NPV) analysis is a valuation tool and is used extensively across finance and accounting for determining the value of a capital project. If the NPV is positive, that means that the value of the benefits (in today's dollars) is greater than the project costs and vice-versa

Table 1: Breakdown of Reconciliation

Source of Savings	Description	NPV
Constrained off CMSC	Assets receiving constrained-off CMSC will no longer receive these payments. These are payments on top	$450M (range of $360M to $540M)

Source of Savings	Description	NPV
	of current regulated and contract payments, so generators' fixed rates will not be impacted.	
Market Efficiencies. Page 12.	More efficient use of interties (particularly exports), better unit commitment and enhanced competition will result in better asset utilization and reduced natural gas burn, avoiding fuel cost.	$525M (range of $500M to $550M)
Total Benefits		$975M (range of 860M to 1,090M)
MRP Energy Project Costs		$176M (range of $157M to $200M)
Expected Net Benefits (subtract total costs from total savings). Page 3.		$799M (rounded up to $800M, and range of $660 to $933M)

At the time of publication of the MRP Business Case, the IESO was using analysis, simulation, and best available information to forecast the range and costs. Within the Business Case are values that reflect a range of possibility, including the project costs. The "at least $750 million" was derived from using the mid-level possible project costs ($176 million), using a very conservative view of the benefits ($975 million), and rounding down to provide stakeholders the assurance that the project is on very sound financial footing even when looking at the most conservative scenarios. As the project proceeds, it is more common to see the figure of $800 million in net benefits in MRP materials, and the IESO will continue to report on project benefits and costs.

ED INTERROGATORY 7

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-7

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 8 & 12

Preamble:

Page 8: "A thorough financial assessment of the new market design has concluded that the program is financially viable, delivering at least $750 million in net financial benefits to Ontario consumers over the first 10 years of implementation.

Page 12: "Better scheduling and commitment of resources in the real-time operating timeframe delivering system-wide efficiency benefits of over $500 million over the first 10 years of operating the new market design.

Elimination of approximately $450 million of unnecessary Congestion Management Settlement Credits over the first 10 years of operating the new market design. These benefits will accrue directly to Ontario consumers."

Questions:

(a) Will all of the $750 million in net financial benefits accrue to energy consumers?

(b) If not, please estimate the benefits ($) that will accrue to energy consumers and recalculate the NPV based only on those benefits accruing to energy consumers.

(c) Will a portion of the $750 million in net financial benefits accrue to resource/generation owners? If yes, approximately how much?

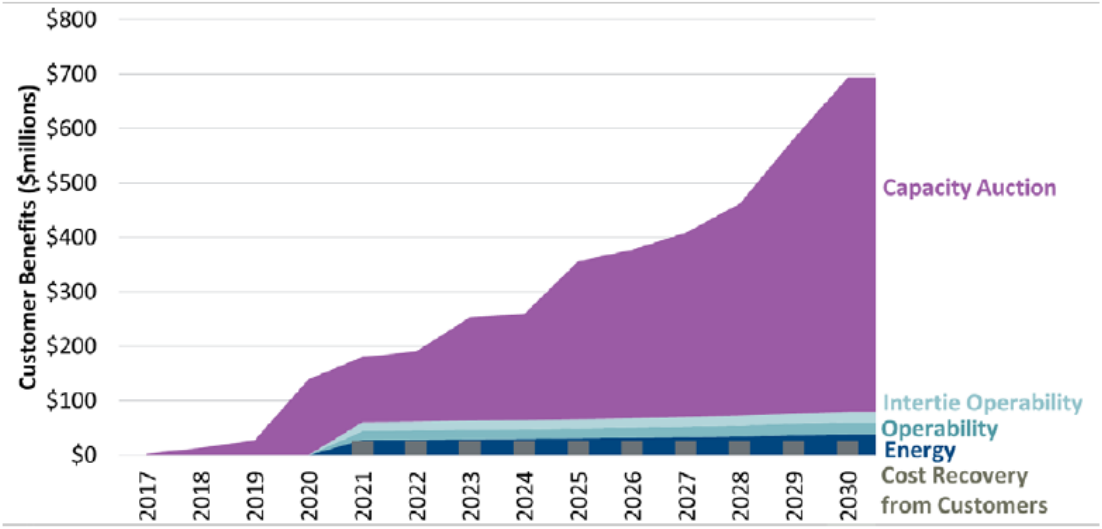
(d) According to the Brattle Group report[1] (p. 26), "The day-ahead settlement also allows natural-gas generators to procure much of their fuel on a day-ahead basis, which reduces fuel-related intra-day balancing costs." Approximately how much of the $750 in net financial benefits is attributable to this factor? Will this benefit accrue to gas plant owners or consumers? Please explain and estimate the division between beneficiaries.

(e) Page 108 of the Brattle Group report identifies the share of monetized efficiencies that will accrue to customers (pasted below). Please (i) reconcile these figures with the IESO figures, (ii) explain the difference in estimates, (iii) produce and updated figure with the IESO's best estimates.

[1] Brattle Group, *The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project*, prepared for the IESO, April 20, 2017.

(f) Please file the Brattle Group report for ease of reference by an exhibit number in this proceeding.

Figure 24
Estimated Customer Share of Efficiency Benefits from Market Renewal
(Excludes Customer Benefits from Avoided Transfer Payments, Gaming, and Other Unquantified Benefits)



Notes:
Capacity exports start in 2017 and the capacity auction begins in 2020. Energy and operability reforms begin in 2021. Once Projects come into service, the IESO recovers costs based on expected life of the investment. Cost recovery is small compared to large sector benefits.

RESPONSE

(a) Yes.

(b) See response to a).

(c) No.

(d) This was not calculated as a part of the quantifiable benefits. As identified in the IESO's response to a), the quantified benefits of MRP as specified in the MRP Business Case will accrue to consumers.

(e) Please note that the 2017 MRP Benefits Case "Brattle Group Report" was an initial study to confirm directionally that MRP would provide sufficient benefits and to guide the IESO to pursue a more formal business case. The subsequent 2019 MRP Business Case is more relevant given it used information specific to Ontario as inputs for the financial assessment of benefits. The IESO also notes that the OEB's decision in EB-2019-0002 ordered the IESO to include the MRP Business Case within this filing, which has been done.

(f) See response to e) above. The requested report was included previously in EB-2019-0002, Exhibit I, Tab 6.1, Schedule 10.21, Attachment 1. A link to the requested report is also provided here[2].

[2] https://ieso.ca/-/media/Files/IESO/Document-Library/market-renewal/Benefits-Case-Assessment-Market-Renewal-Project-Clean-20170420.ashx

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ED INTERROGATORY 8

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-8

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 8 & 12

Preamble:

Page 8: "A thorough financial assessment of the new market design has concluded that the program is financially viable, delivering at least $750 million in net financial benefits to Ontario consumers over the first 10 years of implementation."

Page 12: "Better scheduling and commitment of resources in the real-time operating timeframe delivering system-wide efficiency benefits of over $500 million over the first 10 years of operating the new market design.

Elimination of approximately $450 million of unnecessary Congestion Management Settlement Credits over the first 10 years of operating the new market design. These benefits will accrue directly to Ontario consumers."

Questions:

(a) The Brattle Group report[1] found that "assume that only 66–72% of the potential benefits from energy and internal operability enhancements estimated in Sections III and IV will be achieved under Market Renewal, absent amendments to existing contracts and regulated rate structures." (see p. 85). Does the IESO agree? If not, please provide its estimate.

(b) Will all of the $750 million in net financial benefits accrue to energy consumers absent amendments to existing contracts and regulated rate structures as described in the Brattle Group report? If not, please quantify the amount that would not be realized.

(c) Is the IESO implementing the "amendments to existing contracts and regulated rate structures" as described in the Brattle Group report on page 85? Please list each amendment needed and whether they are being implemented.

RESPONSE

(a) Please note that the 2017 MRP Benefits Case "Brattle Group Report" was an initial study to confirm directionally that MRP would provide sufficient benefits and to guide the IESO

[1] Brattle Group, *The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project*, prepared for the IESO, April 20, 2017.

to pursue a more formal business case. The subsequent 2019 MRP Business Case is more relevant given it used information specific to Ontario as inputs for the financial assessment of benefits. The IESO also notes that the OEB's decision in EB-2019-0002 ordered the IESO to include the MRP Business Case within this filing.

(b) The benefits of MRP as described in the MRP Business Case were not based on amendments to existing contracts or rate regulated structures.

(c) All contracts for facilities that participate in the IESO-administered market will require amendments that are consistent with the provisions of the contract, which can include changing references to the Hourly Ontario Energy Price, and enabling participation in the Day-Ahead Market.

ED INTERROGATORY 9

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-9

INTERROGATORY

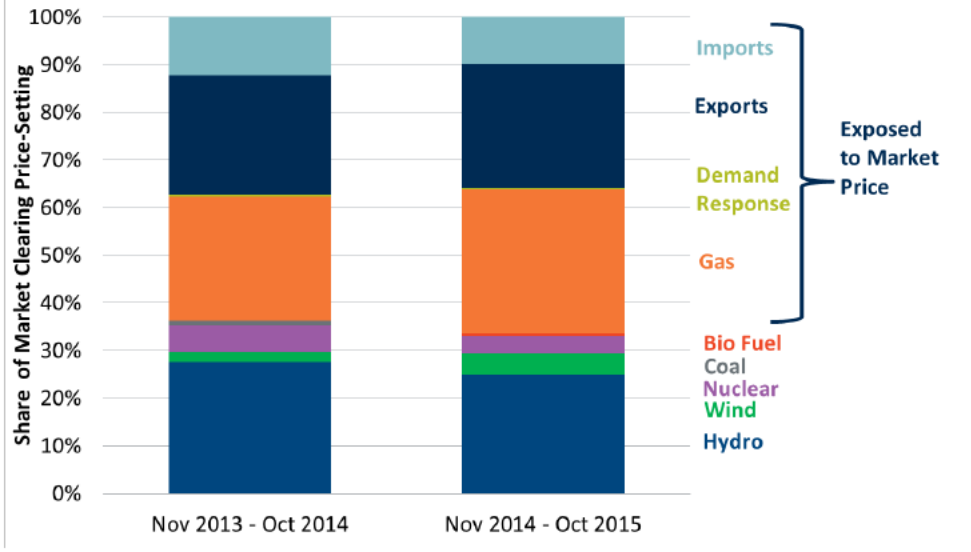
Reference: Exhibit G-2-1, Attachment 1, Page 8 & 12

Questions:

(a) Do the estimated $750 million in net benefits relate to resources exposed to market prices? If not, (i) please explain why not, (b) estimated the percent of benefits attributable to resources exposed to market prices, and (c) explain how benefits can be attributable to resources not exposed to market prices that recoup their costs minus HOEP through the GA.

(b) The Brattle Group report[1] describes includes a chart of resources that are and are not exposed to market prices on page 85 (pasted below). Does the IESO believe this is accurate? Please recreate this for 2019 and forecast for 2030, making and stating assumptions, simplifications, and caveats as necessary.

Figure 19
Marginal Price-Setting Resources on an Hour-Ahead Basis in Ontario



Sources and Notes:
Hour-ahead marginal resources, adapted from Ontario Energy Board (2016b), Figure 1-7.

[1] Brattle Group, *The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project*, prepared for the IESO, April 20, 2017.

RESPONSE

(a) Please note that the 2017 MRP Benefits Case "Brattle Group Report" was an initial study to confirm directionally that MRP would provide sufficient benefits and to guide the IESO to pursue a more formal business case. The subsequent 2019 MRP Business Case is more relevant given it used information specific to Ontario as inputs for the financial assessment of benefits. The IESO also notes that the OEB's decision in EB-2019-0002 ordered the IESO to include the MRP Business Case within this filing.

The benefits calculated in the MRP Business Case accrue to Ontario electricity consumers based on reducing the inefficiencies of the current energy market. These benefits will accrue regardless of whether resources are contracted, rate regulated, or operating on a merchant basis. This is due to the benefits of MRP coming from reducing the inefficiencies of the current energy market through better scheduling and commitment (I.e. choosing the least cost set of resources to meet system needs).

(b) See response to Schedule 2 - 4.5 AMPCO 30. Calculating the resources that are contracted and rate-regulated vs. merchant is not required as the benefits of MRP will accrue to consumers regardless of this distinction.

ED INTERROGATORY 10

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-10

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 8 & 12

Preamble: The Brattle Group report states the following at page 100:

> "**Reduced curtailment and spilling of non-emitting resources.** Certain frictions in the current market design, including intertie scheduling, preclude the IESO from fully utilizing all resources with flexibility on the system. Moreover, incentives for flexible resources are insufficient and not market-driven. This results in the unnecessary curtailment and spilling of non-emitting low-marginal-cost resources such as hydro, wind, and nuclear generation. The curtailed output from these resources cannot be utilized to meet energy needs. Compared to an alternative design that absorbs this energy for productive use, the current design increases production costs and carbon emissions, or results in forgone export market revenues. Market Renewal will increase the extent to which Ontario can utilize its non-emitting resources without curtailments by better enabling system flexibility."[1]

Questions:

(a) MRP has been developed further since that report. Will the current iteration of MRP capture the benefit described above? Please explain in detail, including a discussion of whether all or part of this benefit will be realized.

(b) Other things equal, will MRP increase or decrease the non-emitting resources as a proportion of Ontario's electricity supply? Please estimate the proportion change (%) on a best-efforts basis.

RESPONSE

(a) See response to Schedule 2 - 4.5 AMPCO 30 with regard to references to the Brattle Report. Further, the financial benefits associated with a day-ahead market (improved consumption and investment, hydro and system optimization, reduced gaming opportunities as well as those associated with future improvements and enabling greater and diverse market participation) have not been quantified. Replacing the two-schedule market to a single schedule market with locational pricing is expected to enhance

[1] Brattle Group, *The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project*, prepared for the IESO, April 20, 2017.

reliability, increase operational certainty, and significantly reduce system costs paid for by consumers. These benefits are expected, but the scale of benefits will be influenced by many factors that make them difficult to predict with certainty.

(b) Other things equal, it is expected that MRP will help to increase non-emitting resources as a proportion of Ontario's electricity supply. The proportion change (%) is difficult to estimate due to market conditions and market participant behaviour. As it is very difficult to predict future market conditions and market participant behaviour, the IESO does not conduct this kind of modelling.

ED INTERROGATORY 11

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-11

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1

Preamble: The Brattle Group report forecasts a "likely reduction in gas sales" on page 112.[1]

Questions:

(a) Was this forecast reduction attributable to the energy, operations, or capacity projects as described by Brattle Group?

(b) Is the IESO still forecasting a reduction in gas sales due to MRP (all other things equal)? If yes, by approximately how much (m3)? If not, why not and what has changed?

RESPONSE

(a) Please note that the 2017 MRP Benefits Case "Brattle Group Report" was an initial study to confirm directionally that MRP would provide sufficient benefits and to guide the IESO to pursue a more formal business case. The subsequent 2019 MRP Business Case is more relevant given it used information specific to Ontario as inputs for the financial assessment of benefits. The IESO also notes that the OEB's decision in EB-2019-0002 ordered the IESO to include the MRP Business Case within this filing, which has been done.

(b) See response to Schedule 6 - 4.0 ED 10. As it is very difficult to predict future market conditions and market participant behaviour, the IESO does not conduct this kind of modelling.

[1] Brattle Group, *The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project*, prepared for the IESO, April 20, 2017.

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ED INTERROGATORY 12

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-12

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1

Preamble: The Brattle Group report states as follows on page 114:

> **What Is the Role of Electricity Markets in Curbing Carbon Emissions?**
>
> Wholesale electricity markets and capacity auctions offer a powerful tool for policymakers intent on reducing carbon emissions from the electric sector. Market-based carbon policies, including carbon taxes and cap-and-trade regimes, attempt to accurately reflect the societal costs of carbon in the price of any commodity whose production creates carbon emissions.
>
> Electricity is one such commodity. Wholesale electricity markets can be harnessed to reduce carbon emissions from power plants. Electricity markets naturally complement cap-and-trade policies by integrating carbon allowance costs into the energy offer prices that fossil plants submit to the system operator. These offers therefore accurately reflect production costs, including the cost of carbon emissions. The system operator then dispatches the plants that minimize total cost to meet load and maintain reliability. Plants with high emission rates run less as their costs increase relative to plants with lower emission rates. Thus, the energy market efficiently reduces carbon emissions in the lowest-cost manner. Capacity markets offer an opportunity to enhance carbon policy effectiveness through long-term investment and retirement decisions. Suppliers offering into a capacity auction take into account their expected carbon costs and energy market net revenues. This makes lower-emitting resources more competitive compared to higher-emitting resources. Over time this incentivizes high-emitting resources to retire and be replaced by lower-emitting resources.
>
> However, electricity markets on their own will not necessarily achieve emissions reductions in the absence of a market-based carbon policy. If no carbon pricing exists or carbon prices are too low to achieve the desired level of emissions reductions, then the wholesale electricity market will simply minimize other costs without fully considering the public policy value of avoiding carbon emissions.[1]

[1] Brattle Group, *The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project*, prepared for the IESO, April 20, 2017.

Questions:

(a) Please describe the extent to which this goal will be achieved in the current iteration of MRP.

(b) Please describe any aspects of MRP as conceived at the time of the Brattle Group report that would allow markets to reduce carbon emissions in the lowest-cost manner that are no longer being pursued in the current iteration of MRP.

(c) If a policy decision were made in the future to decarbonize electricity by 2030, how would MRP contribute to achieving that policy, if at all?

(d) Please describe in detail how carbon prices are incorporated in the prices of different resource options (if at all) and the IESO's expectations on how carbon prices will be incorporated in 2025 and 2030?

RESPONSE

(a) Please note that the 2017 MRP Benefits Case "Brattle Group Report" was an initial study to confirm directionally that MRP would provide sufficient benefits and to guide the IESO to pursue a more formal business case. The subsequent 2019 MRP Business Case is more relevant given it used information specific to Ontario as inputs for the financial assessment of benefits. The IESO also notes that the OEB's Decision in EB-2019-0002 ordered the IESO to include the MRP Business Case within this filing, which has been done. See response to Schedule 6 - 4.0 ED 10.

(b) See response to (a)

(c) As noted in Procedural Order No. 1, the IESO's application is based on a business plan that has been reviewed and approved by the Minister of Energy and the review of the IESO's application should be focused on the IESO's OM&A and capital expenditures. The IESO's revenue requirement submission is not a proceeding to consider market design investments and incorporation of policy initiatives within MRP. Further, the IESO has not re-estimated benefits included in the MRP Business Case as there is no provincial policy that is mandating phasing out of gas-fired power generation. This scenario was also not within scope of the MRP Business Case.

(d) It is up to the Market Participants if they choose to incorporate carbon costs into their offers.

ED INTERROGATORY 13

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-13

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1

Preamble: According to a report published by the Ontario Clean Air Alliance:

"1. EV batteries with bi-directional chargers are cheaper than gas plants for peak power

2. EVs are an enormous opportunity to lower electricity rates & carbon emissions

3. By 2030, EVs will have more than twice the capacity of Ontario's gas plants

4. When all cars are electric, their gross discharge capacity (GW) will be more than 6 times Ontario's total peak demand

5. Technical barriers to bi-directional charging have largely disappeared (with more bi-directional-capable cars and chargers and million+ mile batteries)"[1]

Questions:

a. How will MRP impact the cost-effectiveness or potential for vehicle-to-building integrations that offset building loads at the time of peak demand with a car's battery, if at all?

b. How will MRP impact the cost-effectiveness or potential for vehicle-to-grid integrations that offset grid loads at the time of peak demand with a car's battery, if at all?

c. Can customers or third-party aggregators providing peak demand reductions through vehicle-to-building technology participate in current or future IESO capacity auctions? If not, when is that expected to be available?

d. Can customers or third-party aggregators providing peak power through vehicle-to-grid technology participate in current or future IESO capacity auctions? If not, when is that expected to be available?

e. When are the next IESO capacity auctions scheduled for and how much capacity will be procured in each?

f. Has the IESO worked with Peak Power or other providers of vehicle-to-grid/building technology to ensure the removal of market barriers for the provision of capacity, peak energy, and other services through V2X?

[1] https://www.cleanairalliance.org/wp-content/uploads/2021/08/Vehicle-to-Building-and-Grid-for-Peak-Needs-August-3-2021.pdf.

RESPONSE

a. This is outside the scope of the Market Renewal Program (MRP). The IESO is currently undertaking an Enabling Resources Program that will produce an integrated plan outlining the sequencing, timing and scope of activities to be undertaken by the IESO to enable existing electricity resources to provide electricity system services in the renewed Ontario wholesale market that they cannot, or cannot fully, currently provide. Information on the engagement is available at: https://ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Enabling-Resources-Program.

b. See response to a).

c. Third party aggregators can participate in the capacity auction as virtual hourly demand response resources. The IESO does not stipulate which technologies are eligible to be used behind a customer's load meter in order to provide the demand response, however, the demand response resource must be compliant with the Market Rules in order to participate.

d. Third party aggregators can participate in the capacity auction as virtual hourly demand response resources. The IESO does not stipulate which technologies are eligible to be used behind a customer's load meter in order to provide the demand response, however, the demand response resource must be compliant with the Market Rules in order to participate. Please also note that resources that inject behind-the-meter of a load are considered to be providing demand response through load displacement (i.e., behind-the-meter resources cannot participate directly in the wholesale market, they must participate through the load behind which they are embedded. Future procurements will outline the need that will be procured and what the eligible resources would be.

e. Auctions are held annually every December. Pre-auction reports indicating target capacities and related information are issued every September. The IESO's 2021 Annual Acquisition Report (AAR) also includes forwad looking inormation with regard to potential future capacity needs. The AAR is available at: https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Acquisition-Report

f. Through its Grid Innovation Fund (GIF), the IESO has funded a number of projects related to vehicle-to-grid (V2G) technologies. These grid innovation projects gather data on the viability and scalability of V2G to provide grid level services. This includes demonstrating technical integration, performance of the assets through distributed energy resource (DER) test cases, and evaluating both project and long-term market effects. It should be noted that the GIF projects are funded through Global Adjustment and not through IESO regulated fees. The following is a list of projects funded through the GIF related to V2G:

Lead Proponent	Project Name	Project Description
Alectra Utilities	Alectra @ Work	Alectra seeks to assess the role that smart electric vehicles charging at workplaces can play in Ontario's electricity system. It will do so by conducting a real-world implementation of a smart charging solution, and analyzing the business and technical considerations that would make this an economical service for utilities and service providers to offer in the Ontario market.
Alectra Utilities	Alectra Drive @ Home	Alectra seeks to develop and implement an electric vehicle (EV) deployment model for residential customers to identify the economic, technical, regulatory and customer outreach considerations that will be relevant to deploy these solutions at scale in the future to benefit the local and provincial electricity system. Participants will pay a monthly fee for access to electricity vehicle supply equipment (EVSE) i.e., charging station provided by Alectra and will pay for use of the station according to time-varying rates designed to encourage vehicle shifting during off-peak periods, while also being subject to demand response events that respect customer needs.
Elocity Technologies Inc.	HIEV – A digital platform for Local Distribution Companies ("LDCs") to Manage Grid Reliability and Enable Smart EV ("EV") Charging.	Elocity proposes to demonstrate the value of an interoperable, secure, scalable digital platform (Hyper Integrated EVs - HIEV) with two LDCs (Toronto Hydro and Waterloo North Hydro). The HIEV hardware and software will be used to monitor, manage and control residential EV charging load within the distribution network. HIEV enables grid-friendly EV charging infrastructure management. The benefit to EV owners is the ability to secure utility incentives, while enabling ratepayer benefits through improved grid capacity utilization.
Essex Powerlines Corporation	DER & EV Visibility Tool	This project will enable clear visibility to EVs and DERs and their impacts on distribution system assets by giving detailed data that will allow for better planning, operation, and integration of distributed energy resources. The detection tool will be an integrated software that helps manage and promote customer

Lead Proponent	Project Name	Project Description
		trends in electrification and conservation in a cost-effective manner.
Peak Power Inc.	V2H for Improved Reliability and IAM Participation	Peak intends to partner with Hydro One Networks Inc. (HONI) to demonstrate the feasibility and cost-effectiveness of Vehicle-to-Home (V2H) technology for two distinct use cases – improving reliability for residential customers by providing back-up power during outages, and modelling participation in IESO Administered Markets (IAMs) when the vehicle is connected, and it benefits the grid to do so.
Plug'n Drive Coalition of Ontario	Charge My Car Project	The purpose of the project is to advance EV uptake, education, visibility and reporting to benefit LDCs and Ratepayers. Plug'n Drive (PND) will hire/second a short term (one-year) resource to be its internal/external champion and evolve the program to ensure the short- term objectives are met and long term strategies developed. PND will maintain and evolve their specialized product (EV charging station store) and will maintain and grow their exclusive partnerships with LDCs for EV data sharing and reporting.
Sky Clean Energy, LTD	Optimal Vehicle to Grid Charging System Considering Solar, Storage, and User Privacy	This project demonstrates a public-facing, V2G charging system that enables EV owners to participate in demand response events (DR) while aggregated with other on-site DERs. The project will: 1) Design a control algorithm that reduces peak demand while respecting EV owner preferences; 2) Implement a data privacy protection algorithm to prevent the unauthorized disclosure of EV owner data using distributed ledger technology (DLT); and 3) Perform a V2G incentive feasibility analysis for the LDC partner, which aims to develop an incentive structure for potential roll-out to the broader Ontario energy sector.
SWTCH E-Car Inc.	Enhancing grid efficiency through a blockchain-based EV charging	SWTCH E-Car Inc. is proposing a project with the objective of addressing the challenge of increased energy demand and its impact on distribution networks from localized, high-density deployments of EVSE through DER aggregation and DR integration using an efficient and scalable blockchain platform for EV charging management that materially enhances grid efficiency.

Lead Proponent	Project Name	Project Description
	and DER aggregation platform	SWTCH will implement of IESO'S Standardized DER Test Cases for Demand Response, Operating Reserve, Regulation Service, and Target Ramp to assess performance of the platform and resources in providing grid services.
York University	Impacts of Adopting Full Battery-Based Electric Transit Bus Systems on Ontario Electricity Grid	In this project, the smart grid research team at York University will develop the engineering tools, i.e., modeling, simulation, design, and optimization, required for studying the impacts of adopting full battery-based electric city and school buses on utility grids. In collaboration with the project industry partners, the developed tools will be utilized to: 1) quantify the impacts of implementing electric bus systems on local distribution networks and bulk electricity systems, and 2) identify and evaluate the potential energy conservation barriers and technical best practices for efficient electrification of transit bus fleets in Ontario.

The IESO is also studying the potential of V2G technology through the DER Potential Study to better understand how DERs are likely to emerge or become economic, the services they can provide to the grid, and recommendations for integration into the bulk system.

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ED INTERROGATORY 14

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-14

INTERROGATORY

Interrogatory # 4.0-ED-1

Reference: Exhibit G-2-1, Attachment 1

Preamble: The Brattle Group report states as follows on page vi states:

> "As shown, we estimate that Market Renewal will produce benefits with a present value of approximately $510 million from energy market reforms, $580 million from operability reforms, and $2,530 million from capacity auction reforms."[1]

Questions:

(a) Is it correct to say that the "energy market reforms" and "operability reforms" are being pursued in the current iteration of MRP before the OEB in this proceeding?

(b) Has the IESO already implemented some or all of the capacity auction reforms as described in the Brattle Group report? If yes, please list which are and are not being implemented.

(c) In light of the large benefits to the capacity market reforms indicated in the Brattle Group report, please describe each capacity market reform that is not being pursued and explain why.

RESPONSE

(a) Energy market reforms are being pursued in the current iteration of the MRP. The expected benefits will span the sector, enabling the IESO to realize significant improvements, reduce costs for market participants, address known inefficiencies, and establish a robust market to integrate emerging and new technologies. Operability reforms are not pursued in the current iteration.

(b) No. The IESO made the decision not to move forward with the Incremental Capacity Auction as proposed; as a result, the descriptions in this report are no longer directly applicable. Instead, the IESO has developed a Resource Adequacy Framework. Within

[1] Brattle Group, *The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project*, prepared for the IESO, April 20, 2017.

that framework, the IESO will continue to evolve and expand participation to enable the Capacity Auction to serve as a balancing mechanism to meet short-term needs.

(c) Please see response to (b).

ED INTERROGATORY 15

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-15

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 11

Preamble: "The new design will ensure a greater share of system costs are reflected in market prices, eliminating the need for most out-of-market payments."

These questions will help to explain the challenges that MRP is attempting to resolve. For the answers to the below questions, the IESO may wish to focus on a recent representative year, such as 2018 or 2019 (which are pre-pandemic).

Questions:

(a) What share of supply costs are currently reflected in market prices? Please provide a detailed answer, including appropriate references to the Global Adjustment ("GA") and Hourly Ontario Electricity Price ("HOEP").

(b) When the IESO refers to costs being reflected outside of market prices, are these costs reflected in the GA, either wholly or partially? If only partially, what percent of these costs are reflected in the GA versus elsewhere, and where else are those costs reflected?

(c) Please describe at a qualitative level the percent of energy costs that are reflected outside of market prices (i.e. outside of HOEP). Please also estimate the approximate percent of energy costs reflected outside of market prices (i.e. outside of HOEP).

(d) Please describe at a qualitative level the percent of operating costs that are reflected outside of market prices (i.e. outside of HOEP). Please also estimate the approximate percent of operating costs reflected outside of market prices (i.e. outside of HOEP).

(e) Please complete this table to the best of the IESO's ability, making and stating assumptions, simplifications, and caveats as necessary:

Breakdown of Total Electricity Supply Costs				
	Operating costs	Capital costs	Return/profit	Total
% reflected in HOEP				100%
% reflected in GA				100%
% elsewhere				100%

Total	100%	100%	100%	

(f) Please complete this table to the best of the IESO's ability, making and stating assumptions, simplifications, and caveats as necessary:

Breakdown of Total Electricity Supply Costs			
	Energy costs	Capacity costs	Total
% reflected in HOEP			100%
% reflected in GA			100%
% elsewhere			100%
Total	100%	100%	

RESPONSE

(a) As noted in Procedural Order No. 1, the IESO's application is based on a business plan that has been reviewed and approved by the Minister of Energy and the review of the IESO's application should be focused on the IESO's OM&A and capital expenditures. The IESO's revenue requirement submission is not a proceeding to consider market design investments or analyze historical wholesale market outcomes. Further, this calculation would require a large set of detailed data and could not reasonably be completed within the time allowed for interrogatories. Additionally, this calculation was not necessary for the MRP Business Case assessment as the benefits were calculated based on reducing inefficiencies of the current energy market only.

(b) The IESO's website provides public data sets on HOEP, Global Adjustment and Supplier output and interested parties can avail themselves of this information[1]:

(c) These would include out-of-market uplifts and Global Adjustment.

(d) Please see response to (a).

(e) Please see response to (a).

(f) Please see response to (a).

(g) Please see response to (a).

[1] https://www.ieso.ca/en/Power-Data/Price-Overview/Global-Adjustment

ED INTERROGATORY 16

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-16

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 11

Preamble: "The new design will ensure a greater share of system costs are reflected in market prices, eliminating the need for most out-of-market payments."

Questions:

(a) Currently, what share of system costs are reflected in market prices?

(b) After MRP is completed (e.g. in 2030), approximately what share of system costs will be reflected in market prices.

To address future uncertainties, please make and state assumptions, simplifications, and caveats as necessary.

RESPONSE

(a) See response to Schedule 6 - 4.0 ED 8 and 4.0 ED 15.

(b) See response to a).

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ED INTERROGATORY 17

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-17

INTERROGATORY

Reference: Exhibit G, Tab 2, Schedule 1, Plus Attachment(s), Page 1

Preamble:

> "MRP high level design began with two streams: the energy stream and the capacity stream (known as the Incremental Capacity Auction (ICA)). In July 2019, further work on the ICA portion of the program was stopped as a result of updated planning assumptions and in response to stakeholder feedback."

Questions:

(a) Please describe in detail the updated planning assumptions that resulted in the stoppage of the ICA portion of the program. Please include the specific data points with respect to the updated assumptions. Please also describe how the assumptions resulted in the stoppage.

(b) Please describe in detail the stakeholder feedback that resulted in the stoppage of the ICA portion of the program. Please summarize the feedback and attribute each item to the specific stakeholder or stakeholder type (e.g. generator, customer, LDC, etc.).

RESPONSE

a) The rationale for why the IESO ceased to move forward with the ICA was included in EB-2019-0002, Exhibit C-2-2, Pages 1 and 2. In general, the IESO ceased to move forward with the ICA due to updates to the IESO's planning outlook made at the time that indicated sufficient energy supply to meet demand and a limited need for additional capacity if existing resources were reacquired when their contracts expired. These capacity needs were deemed to be able to be met through existing and available resources.

   Please note that the IESO's 2020 and 2021 Revenue Requirement Submissions do not include spending related to the ICA.

b) See response to a). In general, stakeholders felt the IESO should have considered alternative options to the ICA, while others felt the ICA did not provide sufficient investment certainty to commit to multi-year construction of new resources. Stakeholder feedback on the ICA, including engagement summaries, are available on https://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Market-Renewal-

Incremental-Capacity-Auction. Please note that requests for specific materials will need to be submitted to engagement@ieso.ca.

Please note that the IESO's 2020 and 2021 Revenue Requirement Submissions do not include spending related to the ICA.

ED INTERROGATORY 18

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-18

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 13

Preamble:

> "The Single Schedule Market design changes will ensure that costs are transparently reflected in price thereby enabling resources, including new technologies such as energy storage and demand response, to more actively participate in the market and make more informed decisions when supplying and withdrawing energy."

Questions:

(a) Please elaborate on how MRP will allow storage and demand response to more actively participate in the market.

RESPONSE

(a) The Enhanced Real-Time Unit Commitment (ERUC) initiative will create a level playing field for all resource types through three-part offers which will include energy, start-up and speed-no-load costs thus increasing transparency and competition within the commitment process.

The IESO is currently undertaking an Enabling Resources Program that will produce an integrated plan outlining the sequencing, timing and scope of activities to be undertaken by the IESO to enable existing electricity resources to provide electricity system services in the renewed Ontario wholesale market that they cannot, or cannot fully, currently provide. Information on the engagement is available at: https://ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Enabling-Resources-Program.

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ED INTERROGATORY 19

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-19

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 33, 35

Preamble: Page 33 describes a new kind of hydro modelling. Page 35 notes that "Reduced spilling from hydro resources should also increase taxpayer revenues from hydro rental charges."

Questions:

a. Does the hydro modelling included in MRP present an opportunity to reap additional benefits from MRP?

b. Please confirm that hydro rental charges are currently treated as a variable operating cost as part of a hydro facility's Gross Revenue Charge ("GRC"). If not, please explain.

c. Please confirm that hydro facilities are currently expected to spill water when the price is below their GRC?

d. In the quote above from page 35, the IESO notes that hydro rental charges result in taxpayer revenues. Please describe how hydro rental charges are different from other variable operating costs from the perspective of society as a whole.

e. Once MRP has been implemented, could the hydro modelling be set such that hydro facilities will only spill when the price is below their variable operating costs excluding hydro rental charges?

f. Please provide a best-efforts order-of-magnitude estimate of additional hydro rental charges that might be generated if the MRP hydro modelling were to be done in accordance with (e) above.

g. What kinds of resources provide bids in the range of $0 to $14 / MWh?

h. Under the current market structure, are gas plants ever operating when a hydro facility that could serve the same load is spilling? If yes, how often and approximately for how much energy (MWh)?

RESPONSE

a. Yes, there is opportunity to gain additional benefits from improved hydro modeling. This benefit could not be reasonably and accurately quantified.

b. Hydro resource owners may choose to reflect such charges into their offers for the energy market. The IESO cannot dictate how resource owners form their offer prices.

c. It is up to the resource owner to determine how they form their offers for dispatch. If the offers are not economic in the energy market, the resource would not be scheduled.

d. Hydro resource owners may choose to reflect such charges into their offers for the energy market.

e. Resource dispatch is based on economics. The resource owner determines the offer price at which they wish to produce energy.

f. As it is very difficult to predict future market conditions and market participant behaviour, the IESO does not conduct this kind of modelling.

g. Market participants determine their offer price based on their variable costs that may vary with market conditions.

h. Resource dispatch is based on economics. Hydro resources may offer such that they are not economic relative to gas offers. Spill amounts would be known by the resource owners.

ED INTERROGATORY 20

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-20

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 36

Preamble:

> "As a proxy of the inefficiency costs of today's commitment process, over 1,300 historical resource commitments were individually inspected. A re-dispatch of resources to meet demand was undertaken with each individual resource commitment removed and replaced by resources that were available and not previously scheduled. The total costs to meet demand from the re-dispatched case were compared against the total costs with the original commitment and its start-up costs. If the redispatched costs were lower, the inefficiency cost of the commitment was the difference between the two values, otherwise, the commitment was efficient."

Questions:

(a) Please provide the underlying documentation in which this comparison was made. Please also provide any internal summaries of this comparison.

(b) For the aggregate of all time periods deemed in efficient, please provide a breakdown of the (i) original commitment and (ii) the re-dispatched commitment, by MW per generator type (gas, wind, solar, nuclear, etc.).

RESPONSE

(a) The MRP Business Case focused on why changes to Ontario's energy market are required, addressing known flaws and inefficiencies, and the value of creating a new platform to enable future market improvements and evolution. The Business Case also includes an assessment of the net benefits of the energy market enhancements over the first 10 years. In 2019, the IESO engaged stakeholders on the development of the Business Case to aid understanding and build support. The IESO held five engagement sessions, including an in-depth look at the benefits. Stakeholders contributed feedback and participated in discussions into topics such as costs and risks that were factored into the MRP Business Case. The IESO Board approved the Business Case in October of 2019.

The Business Case includes the methodology for the analysis that was undertaken with regards to the inefficiency costs of today's commitment process. Further, the comparison was calculated using actual individual market participant submitted costs

and offers that are commercially sensitive. The underlying market data is not relevant to a focused review of the IESO's capital and OM&A expenditures. The quantifiable benefits are relevant, which are provided for in the Business Case, with more efficient commitments expected to save consumers approximately $190 million in MRP's first 10 years of operation.

(b) The savings calculated is the difference between the original commitment and re-dispatched commitment and were based on using actual individual market participant offers. The calculation did not distinguish which type of resources the original commitment or re-dispatched commitment came from, only that there was a lower cost offer available. The MW amounts per generator type were also not calculated as they were not necessary values required for the MRP Business Case assessment.

ED INTERROGATORY 21

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-21

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 36

Preamble:

> "Resource commitment plays an important role in the electricity market as it provides time and certainty to NQS resources, such as a combined-cycle gas turbine facility, to make necessary arrangements to produce energy."

Questions:

(a) Please provide a list of which resource types are and are not NQS (gas, wind, solar, nuclear, etc.).

(b) NQS resources "can take significant time to start-up and must remain online for a minimum amount of time to avoid damaging equipment." Please provide the approximate range of start-up times and minimum operating times for the different resource types.

RESPONSE

(a) Please see the table below.

Table 1: Quickstart and Not Quickstart Resources

		Start Times		Minimum Generation Block Run Time	
	Fuel Type	**Min**	**Max**	**Min**	**Max**
Not Quickstart	**Bio Fuel**	10 minutes to 16 hrs		1 to 8 hours	
	Gas				
	Oil				
	Steam				
	Uranium				
	Other				
Quickstart	**Solar**	1 to 5 minutes		N/A	
	Water				

		Start Times		Minimum Generation Block Run Time	
	Fuel Type	**Min**	**Max**	**Min**	**Max**
	Wind				
	Other				

(b) See response to a).

ED INTERROGATORY 22

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-22

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 38

Preamble:

> "The assessment indicated that on average 9% and 13% of net exports to MISO and the New York Independent System Operator respectively have been inefficient.
>
> …Projecting the inefficiency costs of net exports avoided with improved pricing at the interties, a total of approximately $285 million is expected to be saved over the first 10 years MRP is in operation."

Questions:

(a) Will the elimination of the inefficiencies described above lead to greater or lesser net exports. Please calculate the change in % and MWh. The IESO may wish to use the data from 2015 to 2018 used to calculate the inefficiencies.

(b) For the years used by the IESO to answer (a), please provide a breakdown of Ontario's energy imports and exports (MWh) by resource type and trading partner (i.e. State or Province).

(c) Will the elimination of the inefficiencies described above likely increase or decrease the gas-fired electricity consumed in Ontario? Please estimate the likely change (% and MWh).

(d) Will MRP likely result in an increase or decrease in imported gas-fired generation on an annual basis, all else equal?

RESPONSE

(a) As noted in Procedural Order No. 1, the IESO's application is based on a business plan that has been reviewed and approved by the Minister of Energy and the review of the IESO's application should be focused on the IESO's OM&A and capital expenditures. Further, modeling of the change to net exports was not necessary for the MRP Business Case assessment and was not performed.

(b) As noted in Procedural Order No. 1, the IESO's application is based on a business plan that has been reviewed and approved by the Minister of Energy and the review of the IESO's application should be focused on the IESO's OM&A and capital expenditures. Further, these calculations were not necessary for the MRP Business Case assessment as

the benefits were calculated based on reducing inefficiencies of the current energy market.

The IESO also makes available reports of the scheduled intertie imports and exports, and actual flow, on the IESO website, here: http://reports.ieso.ca/public/. The report in question is labeled, "IntertieScheduleFlow". For clarity, the IESO is unable to report on the resource type for imports as this data is not available.

(c) This type of modeling was not necessary for the MRP Business Case assessment and was not performed. See response to Schedule 6 - 4.0 ED 10.

(d) This type of modeling was not necessary for the MRP Business Case assessment and was not performed. See response to Schedule 6 - 4.0 ED 10.

ED INTERROGATORY 23

Issue 4.0 Market Renewal Program (MRP)

Interrogatory # 4.0-ED-23

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 70

Preamble:

> "For the Decentralized Future scenario, … the financial benefits from improved commitment and competition could be lower than expected as the expansion of distributed resources reduces the role of traditional generators from which these benefits are attributable."

Questions:

(a) Please provide a breakdown of what the IESO would include in the category of "traditional generators" in the above reference.

(b) Please provide an approximate breakdown of the benefits of MRP according to the resource type they are attributable consistent with the above reference.

RESPONSE

(a) For the purposes of the MRP Business Case, in assessing the Decentralized Future scenario, a distinction between specific types of resources making up "traditional generators" was not necessary and was not performed. The IESO was pointing out that for a Decentralized Future scenario, more system needs may be served by resources not connected to the IESO-controlled-grid that would not be optimized for dispatch via price signalling in the energy market.

(b) This calculation was not necessary for the MRP Business Case assessment and was not performed. Further, the MRP Business Case calculated benefits that accrue to electricity consumers and not to resources.

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AMPCO INTERROGATORY 19

Issue 4.1 Is the reporting on financial and operational performance of the MRP appropriate?

4.1-AMPCO-19

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 4 Table 3

The IESO provides the annual CPI and SPI for the MRP work performed in 2019 and 2020.

a) Please provide the calculations that underpin the CPI and SPI values for 2019 and 2020.

b) Please provide the CPI and SPI results to date for 2021.

RESPONSE

a) The calculations that underpin the CPI and SPI values have been included in the table below. For 2019, annual project costs were used for SPI/CPI. For 2020 and 2021, the accumulated project costs were used for SPI/CPI.

b) The CPI and SPI results to date for 2021 have been included in the table below.

Table 1: MRP Performance Measures

Year	Earned Value (EV)	Planned Value (PV)	Actual Cost (AC)	SPI=EV/PV	CPI=EV/AC
2019	$20,517,000	$25,290,000	$12,586,000*	0.81	1.63
2020	$47,950,000	$55,789,000	$53,351,000	0.86	0.90
2021(up to July)	$83,365,000	$91,899,000	$68,657,000	0.91	1.21

* The 2019 actual cost for the CPI calculation differs from the filing actual cost of $13.4M due to financial accruals that occurred after the CPI was calculated.

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AMPCO INTERROGATORY 20

Issue 4.1 Is the reporting on financial and operational performance of the MRP appropriate?

4.1-AMPCO-20

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 6

The SPI for MRP was below target due to delays associated with IT vendor contract negotiations and detailed design documents development, which impacted dependency tasks such as static testing and process design work.

a) Please discuss how the delays associated with IT vendor contract negotiations and detailed design documents development are being addressed.

b) Please discuss if these delays are an ongoing issue that could impact the schedule in 2021, 2022 and 2023.

RESPONSE

a) The IESO has established contracts with all major vendors so the risk of delays associated with IT vendor contract negotiations has been mitigated.

b) While there are future negotiations for IT vendors that may need to occur, it is not expected that any of the remaining IT vendor contracts that need to be negotiated will cause delays in future years as any remaining negotiations are expected to generally be change requests to existing contracts that are smaller in size (i.e., not major vendors) and are not on the critical path.

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AMPCO INTERROGATORY 21

Issue 4.1 Is the reporting on financial and operational performance of the MRP appropriate?

4.1-AMPCO-21

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 6

With respect to Project Governance, the evidence states "Governance of the MRP is provided by the IESO Board who approve business objectives and an envelope on schedule and budget. An Executive Steering Committee (ESC), comprised of the IESO Executive Leadership Team, works within this envelope to provide strategic direction to the project team and approve scope and delivery strategy. The ESC and the project team are supported by an advisory group comprised of senior leaders throughout the organization who provide guidance and direction for the successful delivery of the program.

a) Please provide the key metrics for MRP beyond CPI and SPI that the IESO is reporting on regarding the implementation phase of the project.

b) Please provide the results for 2019 and 2020.

RESPONSE

a) In addition to SPI and CPI the IESO uses qualitative metrics on project health, adherence to business objectives, schedule and cost. Please see Schedule 14 - 4.4 SEC 22, ttachment 1, MRP Status Update, for the additional reporting metrics used for MRP.

b) The implementation phase of the project, and use of these metrics, did not begin until 2021. Please see Schedule 14 - 4.4 SEC 22, Attachment 1, MRP Status Update for the latest status update for 2021.

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EDA INTERROGATORY 9

Issue 4.1 Is the reporting on financial and operational performance of the MRP appropriate?

EDA Interrogatory 9

INTERROGATORY

Evidence Reference: G/2/1/p7 T4

EDA Interrogatory 9

Please restate the 2019 budget amounts to show the amount that was planned to be incurred in 2019 after the decision to delay the deployment of MRP was made and discuss whether the remainder will be incurred in a future period:

a) in the same amount

b) a lesser amount

c) a greater amount.

Please be detailed and state all assumptions.

RESPONSE

a) 2019 budgets amounts were unchanged. Decision to delay the deployment of MRP was made in 2021.

b) See response to a).

c) See response to a).

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EDA INTERROGATORY 10

Issue 4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

EDA Interrogatory 10

INTERROGATORY

Evidence Reference: G/2/1/p4

Preamble

The IESO's evidence references that MRP will go live in November 2023 and that this is approximately 8 months later than the originally proposed go live date.

EDA Interrogatory 10

a) Please quantify the impact of this delay on costs to be incurred in 2021, including incremental OM&A and incremental carrying charges on MRP assets.

b) Please discuss how these incremental costs are to be recovered and the appropriateness of this proposal.

RESPONSE

a) The impact of the delay on costs to be incurred in 2021 is $8.6 million less capital spend and no change to operating spend. The IESO's 2021 proposed capital expenditure envelope in Exhibit A-1-3 includes $36.0 million for MRP.

Table 1: 2021 MRP Variance in Operating and Capital Budget

(In $ millions)	2020-2022 Business Plan (Exhibit B-1-2)	2021 Revenue Requirement Submission (see Exhibit G-2-1)	Variance
2021 Operating Budget	3.6	3.6	-
2021 Capital Budget	44.6	36.0	(8.6)

Due to the deferral of capital costs, the incremental carrying charges in 2021, or capital interest, estimated in the 2021 Revenue Requirement submission is $0.2 million lower than what was originally submitted in the 2020 – 2022 Business Plan.

Table 2: 2021 MRP Variance in Capital Budget and Carrying Costs

(In $ millions)	2020-2022 Business Plan (Exhibit B-1-2)	2021 Revenue Requirement Submission (see Exhibit G-2-1)	Variance
2021 Capital Budget	44.6	36.0	(8.6)
2021 Capital Carrying Costs (Capitalized Interest)	1.2	1.0	(0.2)

b) See response to Schedule 7 - 1.1/1.2 EDA 1b).

AMPCO INTERROGATORY 22

Issue 4.2 Are the IESO's 2020 and forecast 2021 operational costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.2-AMPCO-22

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 6

With respect to operating costs, please explain the nature of the delays in 2019 in adding resources to the program during the development of the detailed design and the resulting impact on schedule.

RESPONSE

The delay in adding a consultant during the development of detailed design resulted in $0.3 million in costs saved in 2019. This consultant was eventually determined to not be required in 2020. The delay in detailed design resulted in $1.1 million of deferred external legal counsel to support market rule amendments in 2019.

The schedule impacts as a result of these savings and deferrals have already been reflected in the updated schedule included in the 2021 Revenue Requirement Submission.

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APPrO INTERROGATORY 24

Issue 4.2 Is the $1,000 Application Fee for market participation appropriate?

4.2-APPrO-24

INTERROGATORY

Reference: Executive Summary Exhibit A, Tab 1, Schedule 4, Page 3 of 6, Lines 13-16

Preamble: The evidence includes an increase of $3.9 million in budgeted OM&A expenses for 2021 as compared to 2020 actual OM&A expenses.

How much of the $3.9 million increase is attributable to "market rule and manual amendments"? And how much of this is attributable to *MRP*-related manual rule and manual amendments?

RESPONSE

Of the $3.9 million increase in budgeted OM&A expenses for 2021 as compared to 2020 actual, $1.5 million is related to MRP market rule and manual amendments and there is no increase related to non-MRP market rule and manual amendments.

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APPrO INTERROGATORY 25

Issue 4.2 Is the $1,000 Application Fee for market participation appropriate?

4.2-APPrO-25

INTERROGATORY

Reference: Executive Summary, Exhibit A, Tab 1, Schedule 4, Page 5 of 6, lines 24-25

Preamble: The evidence provides that the implementation phase of MRP will include a significant complement of IT resources.

What is the total associated cost for these IT resources? What portion of this total cost is associated with MRP? What portion of that cost is associated with necessary system upgrades due to obsolesce?

RESPONSE

The table below shows the IT staff and associated costs.

Table 1: IT Staff and Associated Costs

Year	2021	2022	2023
IT Staff Count	24	31	23
IT Staff Cost (In $ millions)	3.9	4.9	3.6

All of the identified IT costs are associated with MRP. None of the identified costs are associated with system upgrades to due to obsolescence. System upgrades are not part of the MRP budget. The IESO plans system upgrades as part of regular technology maintenance.

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REASCWA INTERROGATORY 19

Issue 4.2 Are the IESO's 2020 and forecast 2021 operational costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.2-REASCWA-19

INTERROGATORY

Reference: Exhibit A, Tab 1, Schedule 4, Page 5, Lines 16-18

Preamble: Lines 15 to 18 of Exhibit A, Tab 1, Schedule 4, Page 5 states "The MRP presents an opportunity to implement much needed reforms to the Ontario electricity market. The expected benefits will span the sector, enabling the IESO to realize significant operational improvements, reduce costs for market participants, address known inefficiencies, and establish a robust market to integrate emerging and new technologies." However, broader integration of emerging and new technologies (e.g., energy storage, 'hybrid' resources, DERs) is being planned for post MRP implementation (e.g., as specified within the planned timeframes to implement the ERP and HIP initiatives of the IESO). Therefore, clearer understanding is needed towards how MRP will unlock the benefits relating to how it will assist in integrating emerging and new technologies.

a) Considering that an expected benefit of the MRP is to establish a market to integrate emerging and new technologies, what components within the IESO's 2020 and forecast 2021 operational costs for the MRP will result in realizing the expected benefits of integrating emerging and new technologies (e.g., energy storage, 'hybrid' renewable generators coupled with energy storage, DERs) after the MRP has been implemented?

RESPONSE

a) There are no portions of the forecasted operational costs for 2020 and 2021 that account for this. Please see response to Schedule 4 - 4.2 REASCWA 19 with regard to MRP capital costs related to integrating emerging and new technologies.

The IESO is currently undertaking an Enabling Resources Program that will produce an integrated plan outlining the sequencing, timing and scope of activities to be undertaken by the IESO to enable existing electricity resources to provide electricity system services in the renewed Ontario wholesale market that they cannot, or cannot fully, currently provide. Information on the engagement is available at: https://ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Enabling-Resources-Program.

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ENERGY PROBE INTERROGATORY 13

4.2 Are the IESO's 2020 and forecast 2021 operational costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.2-EP-13

INTERROGATORY

Reference: Exhibit G, Tab 2, Schedule 1, Table 4, and Table 10 Plus Attachment(s)

Please provide a schedule showing approximate FTEs and related compensation costs related to MRP 2018-20 and forecast for 2021 and 2022 and 2023.

a) Please indicate if the FTEs are permanent or temporary.

b) Please provide the costs of external resources and provide a list of major contractors and amounts disbursed in 2018-2020.

RESPONSE

a) All MRP resources are non-permanent program resources. Upon the closure of MRP, all implementation resources will return to their home positions, shared resources will be assigned to other initiatives and temporary staff will be terminated.

b) See response to Schedule 14 - 4.2 SEC 20.

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OSEA INTERROGATORY 7

Issue 4.2 Are the IESO's 2020 and forecast 2021 operational costs for the MRP appropriate in the context of the scope and timing of the overall project?

Issue 4.3 Are the IESO's 2020 and forecast 2021 capital costs for the MRP appropriate in the context of the scope and timing of the overall project?

OSEA IR 7, ISSUES 4.2 AND 4.3

INTERROGATORY

Reference: Exhibit E-1-2 Attachment 1 – Appendix 2-AA Capital Projects & Exhibit G-2-3 Attachment 1

Preamble: The IESO, through the Energy Storage Advisory Group (ESAG) and Energy Storage Design Project, explored options to remove barriers to energy storage in the IESO-Administered Markets.[1][2] These initiatives followed activities underway in other US electricity markets to meet the requirements of Federal Energy Regulatory Commission (FERC) Order 841 (Energy Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators). The processes concluded that barriers existed to energy storage resources and that removing barriers would be beneficial for the Ontario electricity market. The IESO has decided to not include the long-term design changes for energy storage under the MRP. For clarity, the IESO states in the Long-Term Design Vision Document that energy storage incorporation in the IESO-Administered Market will occur after MRP. OSEA is interested in understanding the IESO's estimate of costs for incorporating energy storage in MRP and the analysis IESO completed to conclude that including energy storage in MRP was not prudent at this time.

Questions:

a) Please provide the business case supporting the decision to not include enabling energy storage resources in MRP.

b) Please provide any implementation cost estimates for incorporating energy storage resources into MRP, i.e., implementation cost estimates for IT (additional costs of including energy storage resources in the IT hardware and software spending for MRP system upgrades), training, testing, creation of internal protocols and manuals, capital infrastructure, and plant and equipment investments.

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[1] Removing Obstacles for Storage Resources in Ontario (https://www.ieso.ca/-/media/Files/IESO/Document-Library/engage/esag/Removing-Obstacles-for-Storage-Resources-in-Ontario_20181219.ashx)

[2] Energy Storage Design Project (https://www.ieso.ca/-/media/Files/IESO/Document-Library/engage/esag/esag-20200915-long-term-design-vision.ashx)

c) Has the IESO completed an analysis on the value of energy storage benefits to the IESO-Administered Markets if incorporated under MRP? For clarity, value is dollar amount savings or reduced costs to electricity rate-payers from removing barriers to energy storage resources. If yes, please provide the analysis.

RESPONSE

a) Storage is currently enabled to participate in the IESO-administered markets and that will continue post- MRP. In January 2021, the Market Rules were amended such that storage is reflected in the IESO's market rules and manuals and is enabled to provide capacity, energy and operating reserve.

As part of the IESO's Storage Design Project (SDP) a number of potential future enhancements were identified for energy storage. These enhancements were captured in the SDP's long-term storage design vision. In May 2020, the IESO made a determination that the long-term storage design would not be included within the scope of the MRP.

A business case was not developed for this decision. Rather, the key driver for the decision was the risk that a material expansion in scope would pose to MRP timelines, costs, and benefits. Given that the IESO continues to target an in-service date of 2023, including storage integration within MRP would adversely impact the IESO's ability to meet that timeline and heighten the risk of increased costs and deferred benefits.

b) As noted in the response to a) above, energy storage is incorporated in the IESO-Administered Markets today and will continue to be under MRP. The costs, benefits and appropriate timing of future storage enhancements will be considered within the projects captured in the IESO's Enabling Resources Program which is currently under development.

c) See response to b) above.

SEC INTERROGATORY 20

Issue 4.2 Are the IESO's 2020 and forecast 2021 operational costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.2-SEC-20

INTERROGATORY

[EB-2019-0002, Exhibit I, Tab 6.1, Schedule 10.22 SEC 22, Attachment 1] With respect to the Market Renewal Program, in the same format as provided in EB-2019-0002, please provide a similar table showing a breakdown of all MRP related Professional & Consulting Costs for each of 2020 and 2021, describing the: a) the name of the professional/consultant, b) cost of services, c) description of specific service provided, and d) method of procurement.

RESPONSE

The table below shows a breakdown of all MRP major contractors for each of 2020 and 2021, describing the: a) name of the major contractor, b) cost of services, c) description of specific service provided, and d) method of procurement.

Table 1: MRP Major Contracts for 2020 and 2021

Major Contractor	Services Provided	Procurement Type	2018 Actual	2019 Actual	2020 Actual	2021 Budget
Operating Expenses						
The Brattle Group	Consultant support for high level design	Competitive	0.3	0.3	-	-
FTI Consulting	Consultant support for high level design	Competitive	0.7	0.3	-	-
Charles River Associates	Review of MRPs impact on existing supply contracts	Competitive	0.4	0.1	-	0.2
Stikeman Elliott LLP	Legal support for market rule amendments	Competitive	-	-	0.4	0.7
Hunton Andrews Kurth LLP	Legal support for designs, supply contract inputs & governance	Competitive	0.2	-	-	-
Stikeman Elliott LLP	Legal support for designs, supply contract inputs & governance	Competitive	0.1	0.1	-	-
Torys LLP	Legal support for designs, supply contract inputs & governance	Competitive	0.3	-	-	-

Major Contractor	Services Provided	Procurement Type	2018 Actual	2019 Actual	2020 Actual	2021 Budget
Capital Expenses						
FTI Consulting	Consultant support for detailed design	Competitive	-	0.5	0.3	0.1
The Brattle Group	Consultant support for detailed design	Competitive	-	0.1	0.3	-
Hatch Ltd	Engineering Study Consultations	Competitive	-	-	0.3	0.4
EMS GROUP NA, LLC	Design Integration Support	Non-Competitive	0.1	0.5	0.4	0.5
SMCS LLC	Technical Integration Support	Non-Competitive	0.1	0.6	0.4	0.5
Paul Gribik Consulting LLC	Consultant support for optimization expertise	Competitive	-	-	0.3	0.3
Stoneman Consulting	Consultant hired for program delivery	Competitive	-	0.1	0.2	-
Gartner Consulting	Readiness Audit Vendor	Competitive	-	-	-	0.4
Kaihen Inc	Control Room Specialist	Competitive	-	-	-	0.4
Torys LLP	Legal support for designs, supply contract inputs & governance	Competitive	-	0.4	0.3	0.2
Stikeman Elliott LLP	Legal support for designs, supply contract inputs & governance	Competitive	-	-	-	0.2
Osler, Hoskin & Harcourt LLP	Legal support for designs, supply contract inputs & governance	Competitive	-	0.2	-	0.2
Hunton Andrews Kurth LLP	Legal support for designs, supply contract inputs & governance	Competitive	-	0.1	-	-
Hitachi ABB Power Grids	Dispatch Scheduler & Optimization vendor	Competitive	-	-	10.8	10.0
Symphono	Development of market charge types	Competitive	-	-	-	1.6

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AMPCO INTERROGATORY 23

Issue 4.3 Are the IESO's 2020 and forecast 2021 capital costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.3-AMPCO-23

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 4 Table 2

a) Please provide a breakdown and description of the Professional and Consulting capital costs for each year.

b) Please provide a breakdown and description of Operating & Administration capital costs for each year.

RESPONSE

a) Please find below the breakdown of capital Professional and Consulting budget for each year.

Table 1: Professional and Consulting Costs

(In $ millions)	2021 Budget	2022 Budget	2023 Budget
Consultants - Engineering Services for Market Power Mitigation consultations	0.4	0.5	0.4
Contract Services - Readiness Audit Vendor	0.4	0.4	-
Contract Services - Design Integration Support	0.5	0.6	0.6
Contract Services - Technical Integration Support	0.5	0.6	0.6
Contract Services - Control Room Specialist	0.4	0.2	0.2
Contract Services - Ontario Market Expertise	0.3	0.4	0.3
Contract Services - Optimization Expertise	0.3	0.4	0.3
Contract Services - Generator Operator Expertise	0.2	0.4	0.3
Contract Services - Audit Settlements	0.2	0.4	0.3
Contract Services - Audit Dispatch Schedule & Optimization system	-	-	0.6
Legal Services	0.6	0.6	0.5
Professional & Consulting (less than $0.5M)	0.4	0.5	0.2
Total Professional & Consulting	**4.1**	**4.8**	**4.3**

b) Please find below the breakdown of Operating & Administration budget for each year.

Table 2: Operating & Administration Budget

Operating & Administration			
(In $ millions)	2021 Budget	2022 Budget	2023 Budget
IT Systems & Infrastructure	13.3	16.9	9.0
Post Production Fixes	-	-	1.0
Rent	0.8	0.8	0.7
Total Operating & Administration	**14.1**	**17.7**	**10.7**

AMPCO INTERROGATORY 24

Issue 4.3 Are the IESO's 2020 and forecast 2021 capital costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.3-AMPCO-24

INTERROGATORY

Exhibit G Tab 2 Schedule 1 Page 7

With respect to capital costs, please explain the nature of the delays in 2019 in onboarding detailed design external support and the impact on the schedule.

RESPONSE

The delay with onboarding an external consultant to assist with detailed design in early 2019 was due to the delay in completing the detailed design itself. In 2020 it was determined that this external consultant would no longer be required. Detailed design is now complete and a delay of 8 months has been incorporated in the updated schedule included in the 2021 Revenue Requirement Submission.

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AMPCO INTERROGATORY 25

Issue 4.3 Are the IESO's 2020 and forecast 2021 capital costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.3-AMPCO-25

INTERROGATORY

Exhibit G Tab 2 Schedule 1 Page 8

In 2020, capital spending was lower than planned due to the delayed onboarding of implementation resources, including the external vendor for the DSO tool development.

Please explain the reasons for the delays and the impact on schedule and cost.

RESPONSE

The reason for the delay was extended DSO vendor negotiations, which triggered delays in onboarding the vendor and internal IT resources. The impacts on cost and schedule have been reflected in the revised schedule and budget included in the 2021 Revenue Requirement Submission.

For clarity, this resulted in an increase of $7.7 million in total budget cost and an 8-month extension. This takes into consideration updated cost estimates for the delivery of the DSO and the extended time to deliver MRP.

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AMPCO INTERROGATORY 26

Issue 4.3 Are the IESO's 2020 and forecast 2021 capital costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.3-AMPCO-26

INTERROGATORY

Exhibit G Tab 2 Schedule 1 Page 7

OPG identifies a change in the payment structure for the Dispatch Scheduling Optimization (DSO) procurement which moved a $10 million upfront payment budgeted for 2019 into smaller milestone payments starting in 2020.

a. Please explain why the DSO payment in 2019 was adjusted.

b. Please provide the 2020 milestone payment for the DSO and the new schedule of smaller payments going forward.

RESPONSE

a. The original planning assumption in the budget was that the DSO would require an upfront payment of $10.0 million, this estimate was made before the vendor was procured. After the vendor was procured and the statement of work was signed, the IESO updated the forecast to reflect the negotiated milestone payments within the contract.

b. The schedule of payments, including 2020, are shown in the table below.

Milestone Date	Milestone Payment (In $ millions)
Feb 2020	0.2
Mar 2020	1.7
May 2020	0.8
Jul 2020	3.1
Aug 2020	0.8
Sep 2020	0.8
Oct 2020	1.2
Dec 2020	2.1
Feb 2021	3.5
Mar 2021	1.6
Aug 2021	3.2
Nov 2021	1.6
Jan 2022	2.0
Jul 2022	4.7
Oct 2022	1.9
Dec 2022	1.5
Apr 2023	1.5
Aug 2023	1.5
Sep 2023	0.2
Oct 2023	0.2
Nov 2023	3.4

REASCWA INTERROGATORY 20

Issue 4.3 Are the IESO's 2020 and forecast 2021 capital costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.3-REASCWA-20

INTERROGATORY

Reference: Exhibit A, Tab 1, Schedule 4, Page 5, Lines 16-18

a) Considering that an expected benefit of the MRP is to establish a market to integrate emerging and new technologies, what components within the IESO's 2020 and forecast 2021 capital costs for the MRP will result in realizing the expected benefits of integrating emerging and new technologies (e.g., energy storage, 'hybrid' renewable generators coupled with energy storage, DERs) after the MRP has been implemented?

RESPONSE

a) Based on MRP project forecasts for the year 2021, the MRP project anticipates spending $1.65 million in capital costs for modeling improvements and implementation efforts related to supporting emerging and new technologies.

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ENERGY PROBE INTERROGATORY 12

4.3 Are the IESO's 2020 and forecast 2021 capital costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.3-EP-12

INTERROGATORY

Reference: Exhibit G, Tab 2, Schedule 1, Plus Attachment(s)- Market Renewal Program

Preamble: "In March 2021, the IESO Board approved a revised budget and schedule, including a new go live date of November 2023 with six months of contingency. This baseline schedule incorporates lessons learned from the high-level and detailed-design phases of the project, makes best use of existing resources, while delivering a high-quality program."

a) Please confirm the revised MRP capital and operating cost estimate and go live dates.

b) Please provide the 2021 YTD Capital Expense.

c) Will there be capital and operating costs in 2023? If so please provide an estimate.

d) Please provide the updated/most recent Benefits Realization Report. Compare this to the prior version(s).

e) Confirm the MRP without the Capacity Auction Option will produce a net benefit of $290 million (Business Case Table 9.1).

RESPONSE

a) Based on the updated cost and schedule:

- Total MRP program costs are estimated at $177.7 million
- Total MRP capital costs are estimated at $148.3 million
- Total MRP operating costs are estimated at $29.4 million
- The new go live date is November 2023 with six months of contingency

This information is presented in chart form in Exhibit G-2-1, Table 1.

b) MRP capital results for the year to date as of July, 2021 are as follows:

Table 1: MRP Capital Results YTD

(In $ millions)	2021 July Actual
Compensation & Benefits	6.6
Professional & Consulting	0.9
Operating & Administration	5.9
Interest	0.3
Contingency	-
Total Capital Expenses	**13.7**

c) Yes, the capital budget estimate is $33.8 million and the operating budget is estimated at $3.9 million.

d) There is not an updated MRP Business Case. The revised budget and schedule will not impact the program's scope. The change in schedule is not expected to have a significant impact on the project's expected benefits – the primary impact will be a short delay before benefits realization. The program will bring approximately $800 million in net benefits over a 10-year period.

e) MRP will bring approximately $800 million in net benefits over a 10-year period.

ENERGY PROBE INTERROGATORY 14

4.3 Are the IESO's 2020 and forecast 2021 capita costs for the MRP appropriate in the context of the scope and timing of the overall project?

4.3-EP-14

INTERROGATORY

Reference: Exhibit G, Tab 2, Schedule 1, Attachment 1, Table 4.1 MRP Energy Stream Contingency Breakdown

a. Why is the Cost and Contingency for IT so high?

b. How many MRP contracts for IT does IESO have? Please provide a list of major contracts and costs.

c. Why cannot IESO control IT procurement to a contingency of 10% of contract costs and NOT require a 23% Contingency? Please discuss and provide further details on contingency used to date.

RESPONSE

a. The IESO did not have complete information on the potential costs or timing that would be required to complete the successful integration with market participants at the time the MRP Business Case was developed.

b. The IESO has 10 vendors that it manages through contracts, Vendors of Record (VOR) etc. There are three core vendors that are utilized on MRP – Hitachi ABB Power Grids (~$40 M), First Derivatives (~$2.5 M), Accenture (~$2 M).

c. Contingency was based on a reasonable amount of time and budget required to mitigate risk events that were most likely to occur given the level of uncertainty of when the business case was approved. To date, the IESO has used $6 million of the contingency by allocating this amount to the program budget. Through the schedule and budget update exercise which resulted in the schedule and budget included in the 2021 Revenue Requirement Submission, the IESO expanded the program budget envelope from $170M ($154M + $16M contingency) to $177.7M ($167.7M + $10M contingency).

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OSEA INTERROGATORY 6

Issue 4.3 Are the IESO's 2020 and forecast 2021 capital costs for the MRP appropriate in the context of the scope and timing of the overall project?

OSEA IR 6, ISSUE 4.3

INTERROGATORY

Reference: Exhibit E-1-2 Attachment 1 – Appendix 2-AA Capital Projects; Table 2 of Exhibit G-2-1, Page 5 of 10; Exhibit G-2-1, Attachment 1

Preamble: Over 50% of the projected spending for MRP in 2021 is expected to be capital costs. Table 2 in Exhibit G-2-1 provides a breakdown of MRP by administrative cost components but does not provide a breakdown by MRP workstream categories (e.g., Day-Ahead Market, Single Schedule Market, Enhanced Real-Time Unit Commitment, etc.). Further information on the breakdown of MRP capital spending is needed to understand the priorities and potential risks of delay or overages.

Questions:

a) The IESO MRP Business Case estimates IT costs to be $53M.[1] Please provide a breakdown of the MRP capital spending by phase or component from 2021 to the 2023 implementation date for the implementation phase of MRP. Please provide sub-categories of capital spending if available, e.g., IT, training, testing, creation of internal protocols and manuals, capital infrastructure, and plant and equipment investments.

b) Please provide the IESO's contingency and reserve funding estimates related to MRP cost overruns or delays.

c) The implementation costs of the Interim Market Rules and Manuals for Energy Storage under the MRP are unclear. Please provide capital and O&M forecasts for incorporating the Interim Market Rules and Manuals for Energy Storage under MRP capital and O&M programs. Please provide any supporting documentation supporting the forecasted estimates.

RESPONSE

a) Based on the updated schedule and cost, IT related expenses from 2021 to 2023 are in the table below:

[1] Figure 4-9: MRP Energy Stream IT – Exhibit G-2-1, Attachment 1, Page 57 of 82.

Table 1: IT Related Expenses

(In $ millions)	2021 Budget	2022 Budget	2023 Budget
IT Development Staff	3.1	3.9	2.6
IT Testing Staff	0.8	1.1	1.0
IT Systems & Infrastructure	13.3	16.9	9.0
Post Production Fixes	-	-	1.0
Total IT Costs	**17.2**	**21.8**	**13.6**

b) Based on the updated schedule and cost included in the 2021 Revenue Requirement Submission, MRP has allocated $10.0 million in program contingency and 6 months of schedule contingency.

c) The effort required to align MRP Rules and Manuals with the interim storage Rules and Manuals that came into effect in January 2021 is not distinct from the overall effort required to align the MRP Rules and Manuals with the rest of the baseline Market Rules and Manuals currently in effect.

AMPCO INTERROGATORY 27

Issue 4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

4.4-AMPCO-27

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Page 3

In March 2021, the IESO Board approved a revised budget and schedule, including a new go live date of November 2023 with six months of contingency. This baseline schedule incorporates lessons learned from the high-level and detailed-design phases of the project, makes best use of existing resources, while delivering a high-quality program.

a) Please summarize the lessons learned from the high-level and detailed-design phases and how they have been incorporated in the baseline schedule.

b) Please explain how the six months of schedule contingency was determined.

RESPONSE

a) MRP is focused on continuous improvement and incorporating lessons learned from the high-level and detailed design phases to ensure the schedule for the remaining years of the project reflects the most accurate information and best practices. See response to Schedule 2 - 4.0 AMPCO 14.

b) Six months of contingency was based on a reasonable amount of time required to mitigate risk events that were most likely to occur given the level of uncertainty when the MRP Business Case was approved. When the project schedule was revised in March 2021, the contingency was reassessed and six months of contingency was deemed to still be appropriate given the risks and level of uncertainty remaining.

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AMPCO INTERROGATORY 28

Issue 4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

4.4-AMPCO-28

INTERROGATORY

Ref 1: Exhibit G Tab 2 Schedule 1 Page 3

The new go live date is an extension of eight months relative to the March 2023 go live date estimated in the MRP Business Case.

Ref 2: Exhibit G Tab 2 Schedule 1 Page 4

The new schedule is a result of a number of factors, including the need to take into account design considerations influenced by stakeholder feedback, vendor related constraints and the resulting impact on the development of Market Rules and manuals.

Please explain the vendor related constraints, and discuss the schedule contingency provided to address this issue.

RESPONSE

The vendor constraint was due to contract negotiations. The contract negotiations have been completed and a contract is now in place with the vendor. See response to Schedule 2 - 4.4 AMPCO 27 b).

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AMPCO INTERROGATORY 29

Issue 4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

4.4-AMPCO-29

INTERROGATORY

Ref: Exhibit G Tab 2 Schedule 1 Attachment 2

Please advise of any new changes to the MRP Schedule.

RESPONSE

There have been no changes to the MRP schedule that is included in the 2021 Revenue Requirement Submission.

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REASCWA INTERROGATORY 21

Issue 4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

4.4-REASCWA-21

INTERROGATORY

Reference: Exhibit G, Tab 2, Schedule 1, Page 3, Lines 20-23

a. What risks and contingencies have the IESO planned for within the MRP project schedule and budget relating to readiness of IAM market participants and other stakeholders?

b. What are the impacts to the MRP schedule and budget if some market participants are not ready for the planned November 2023 MRP go-live date?

c. Please provide any analysis and documents relating to a) and b) above.

RESPONSE

a. Planning is underway for the market participant readiness component of the MRP Implementation phase. The IESO will work with stakeholders through the Technical Advisory Group, and outline training and support plans to work on market participant readiness.

b. Market participant readiness is a key component for MRP go-live. The planning activities referred to in the response to a) will inform timing and any potential impacts to schedule and budget.

c. This work is underway as per a).

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ENERGY PROBE INTERROGATORY 15

4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

4.4-EP-15

INTERROGATORY

Reference: Exhibit G, Tab 2, Schedule 1, Attachment 2 - MRP Implementation Schedule

a) Please provide an MRP status report and if appropriate, an update to the MRP Schedule shown in the reference.

b) What are the IESO's contingency plans if the tests reveal problems?

RESPONSE

a) There have been no changes to the MRP schedule included in the 2021 Revenue Requirement Submission. Please refer to Schedule 2 - 4.1 AMPCO 21, Attachment 1 for latest status update for 2021.

b) Defect resolution is already built into the schedule included in the 2021 Revenue Requirement Submission.

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SEC INTERROGATORY 21

Issue 4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

4.4-SEC-21

INTERROGATORY

[G-2-1] With respect to MRP:

a. [p.3] Please explain the difference between the original and revised budget and schedule.

b. [p.4] Please explain why the IESO believes that the extension in the go-live will have no effect on the estimated system benefits.

c. Please provide the most recent SPI and CPI measures.

RESPONSE

a. See the Market Renewal Program Cost Report at Exhibit G -2-1, Pages 3 - 6 with regards to the new baseline schedule and budget, as well as performance reporting. These sections explain the differences between the original and revised budget and schedule.

b. The increased schedule is not expected to have a significant impact on the project's expected benefits – the primary impact will be a short delay in achieving the $800 million in net benefits to be realized over the first 10 years in service.

c. See Schedule 2 - 4.1 AMPCO 19.

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SEC INTERROGATORY 22

Issue 4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

4.4-SEC-22

INTERROGATORY

[G-2-1] With respect to MRP Reporting:

a. [p.5] Please provide the most recent reporting of MRP that is made to the IESO: a) executive leadership, b) Board of Directors.

b. Please provide a copy of the most recent: a) Monthly Cost Report, b) Monthly Schedule Report, and c) Monthly Risk Report.

c. For any change described in part (b), please provide their impact on the cost and/or benefit as set out in the business case. If the IESO is unable to quantify the impact, please provide the directional impact.

RESPONSE

a) The most recent reporting on MRP to executive leadership and the IESO is provided as:

- Attachment 1, MRP Status Update;
- Attachment 2, MRP Milestones;
- Attachment 3, MRP KPIs;
- Attachment 4, MRP Strategic Risks Update, and;
- Attachment 5, MRP Update for Board of Directors.

b) See Attachment 4 in response to a).

c) The MRP Business Case used conservative assumptions to show a very positive cost benefit for ratepayers. The IESO does not expect any change in the benefits from MRP. At this point in the project the IESO also does not expect any major differences in costs from those included in the currently approved budget and contingency amount.

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JULY 27, 2021

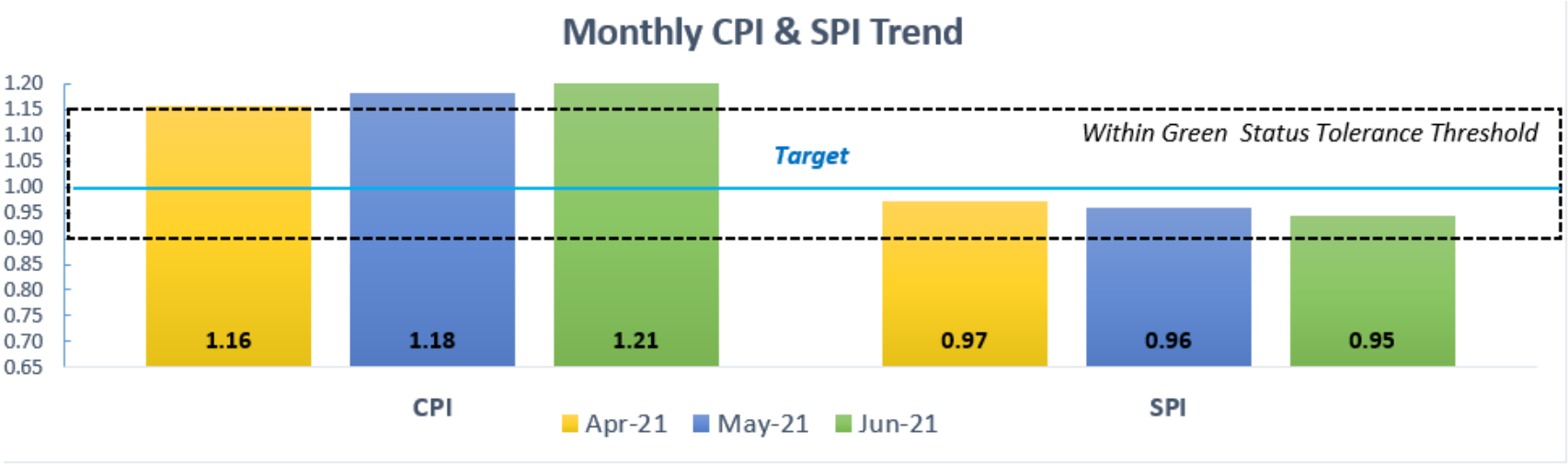
MRP Status Update: MRP-RSS Executive Steering Committee

Key Messages

Highlights and Key Messages	
Focus Area	**Description**
Key Messages	▪ The Joint Application Developments (JAD) have been delayed due to underestimating the effort required to complete the requirements gathering and the availability of key resources during the summer months. This delay, in addition to the project team working on unscheduled items (for example, Economic Operating Point), have contributed to a further reduction in SPI. To mitigate further delays the project is onboarding additional staff and updating the schedule to better reflect all known work activities on the project. ▪ Requirements stemming from the JAD sessions will likely result in the need to expand on the integration with the HAPG (ABB) solutions. This may result in the use of project budget and schedule contingency. ▪ The project has posted a Senior Integration Lead position. This new role will have a longer term focus in the project planning and will develop a plan to ensure that program deliverables of technology, data and processes are being effectively integrated into the line of business.
Project Achievements	• Preparation for publication on August 12, 2021 of Market Power Mitigation Market Rules and Manuals (Batch 2) for market participant engagement
Decisions Required	▪ N/A

Overall: Program Key Performance Indicators						
Overall Project Health	Budget Health	Cost Performance Index (CPI)	Schedule Health	Schedule Performance Index	Business Objectives	PPMLC Process Adherence
✓	✓	✓	✓	✓	✓	✓

Program Earned Value KPIs



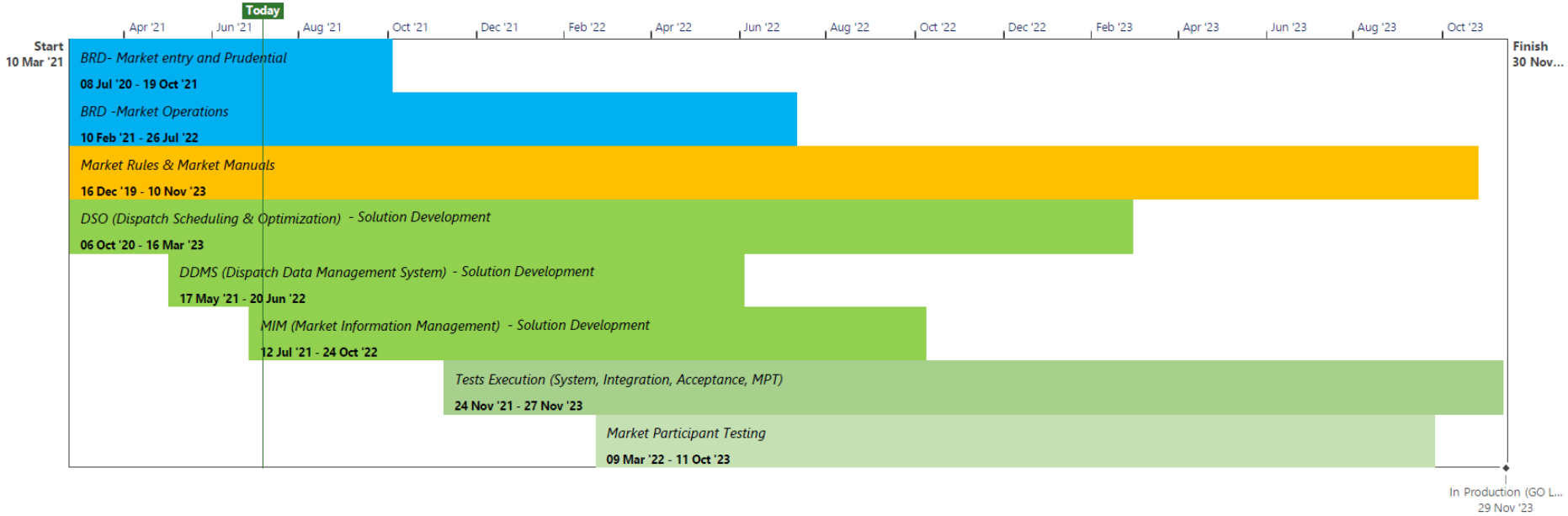
Link to CPI/SPI details

Program Financial Status

The life-to-date spend is $67 M (38%) against the Board-approved budget of $177.7M including contingency.

Financial Status						
KPI	Type	Total approved (with contingency)	Budget Contingency Available	Spend to Date (Actual Costs)	Forecast Cost at Completion	Variance to Approved Budget
✓	CapEx	$150.4 M	$10 M	$49 M	$150.4 M	$0 M
✓	OpEx	$27.3 M	$0 M	$18 M	$27.3 M	$0 M
✓	**Total**	**$177.7 M**	**$10 M**	**$67 M**	**$177.7 M**	**$0 M**

Schedule & Milestones (1 of 2)



Schedule & Milestones (2 of 2)

*Critical path is defined as 10 or less working days of slack
*Milestones listed as "N/A" under Planned Completion (Baseline 4) were added or created after the baseline was set.

Legend - Trend to Meet Forecasted Completion Date	
Ahead of Forecast Completion	Progress is anticipated to be ahead of the forecast completion date, no issues to raise
Trending to Forecast Completion	Progress is on schedule to meet the forecast completion date, no issues to raise
Potential Delay to Forecast Completion	A delay greater than 10 working days to the forecast completion date of the milestone has materialized, and mitigations are under development to correct the delay
Delay to Forecast Completion	A delay greater than 10 working days to the forecast completion date of the milestone has materialized, with no established mitigations to correct the delay

				← Past	↓ Present	↗ Trending	↗ Trending	→ Future	
ID	Schedule Subphase	Milestone	Available Slack	Planned Completion (Baseline 4)	Forecast Completion Date	Variance from Baseline (Days)	Change from Previous Forecast (Days)	Trend to Meet Forecast Completion Date	Comments
1	Requirements	MIM input JAD completed	Critical Path	N/A	13-Aug-21	N/A	NEW	Trending to Forecast Completion	MIM input JADs and MIM output JADs have been split up to allow us to advance some work for HAPG
2	Solution Development	Complete MIM Back End Development	Critical Path	5-Jul-22	24-Jun-22	-6	-4	Trending to Forecast Completion	
3	Quality Assurance	Operational tools acceptance testing completed	Critical Path	28-Sep-23	13-Oct-23	10	-1	Trending to Forecast Completion	
4	GO LIVE	In Production (GO LIVE)	Critical Path	30-Nov-23	29-Nov-23	-1	-1	Trending to Forecast Completion	

Link to detailed Critical Path Milestones

MRP Energy - Progress Report

For Reporting Period: 01/June/2021 to 30/June/2021

Milestones

Note: The Milestone Report is based on summary tasks with a Slack of less than 60 days, critical deliverables, key dates to start an activity and other items at the request of the Steering Committees. Milestones listed as "N/A" under Planned Completion (Baseline 4) were added or created after the baseline was set.
"Previous Forecast" is the Forecast Completion Date included within last month's milestone report.

				← Past	↓ Present	↗ Trending	↗ Trending	→ Future	
ID	Schedule Subphase	Milestone	Available Slack	Planned Completion (Baseline 4)	Forecast Completion Date	Variance from Baseline (Days)	Change from Previous Forecast (Days)	Trend to Meet Forecast Completion Date	Comments
1	Requirements	DDMS CM JAD completed	N/A	N/A	15-Jun-21	N/A		Completed	Completed June 15.
2	Requirements	DDMS RDISP JAD completed	N/A	N/A	8-Jul-21	N/A	16	Completed	Completed July 8.
3	Readiness	Start of Gartner readiness assessment review #1	N/A	N/A	12-Jul-21	N/A		Completed	Started July 12.
4	Requirements	Complete Draft Requirement - Facility Registration	Not on Critical Path	1-Apr-21	26-Jul-21	78	7	Trending to Forecast Completion	
5	Requirements	Complete Draft Requirement -DFS	Not on Critical Path	21-Jul-21	12-Aug-21	15		Trending to Forecast Completion	
6	Requirements	MIM input JAD completed	Critical Path	N/A	13-Aug-21	N/A	NEW	Trending to Forecast Completion	MIM input JADs and MIM output JADs have been split up to allow us to advance some work for HAPG
7	Requirements	Complete Draft Requirement- Direct Short Term Ops v1	Approaching Critical Path	N/A	19-Aug-21	N/A	13	Trending to Forecast Completion	
8	Requirements	DDMS UCM JAD completed	Not on Critical Path	N/A	31-Aug-21	N/A	43	Potential Delay to Forecast Completion	UCM VCR JADs have been postponed to August as the completion of the work will be later than anticipated
9	Requirements	DDMS IS JAD completed	Not on Critical Path	N/A	7-Sep-21	N/A	37	Potential Delay to Forecast Completion	IS VCR JADs have been postponed to August as the completion of the work will be later than anticipated
10	Requirements	DDMS SEM JAD completed	Not on Critical Path	N/A	8-Oct-21	N/A	NEW	Trending to Forecast Completion	DDMS SEM requirements have been advanced to allow the current Control Room resource to take on this work
11	Requirements	MIM output JAD completed	Not on Critical Path	N/A	8-Oct-21	N/A	NEW	Trending to Forecast Completion	
12	Readiness	Start of Gartner readiness assessment review #2	Not on Critical Path	N/A	1-Nov-21	N/A		Trending to Forecast Completion	
13	Market Rules/Market Manuals Approval	MPM & Market Administration (Batch 2) Technical Panel Meeting - Vote to Recommend	Not on Critical Path	15-Feb-22	15-Feb-22			Trending to Forecast Completion	
14	Readiness	Start of Gartner readiness assessment review #3	Not on Critical Path	N/A	6-Jun-22	N/A		Trending to Forecast Completion	
15	Solution Development	Complete DDMS Development	Not on Critical Path	N/A	20-Jun-22	N/A	-30	Trending to Forecast Completion	Completion of DDMS development is advanced due to advancement of DDMS SEM work
16	Solution Development	Complete MIM Back End Development	Critical Path	5-Jul-22	24-Jun-22	-6	-4	Trending to Forecast Completion	
17	Quality Assurance	DSO Milestone 10 Complete DSO FAT	Approaching Critical Path	N/A	29-Jul-22	N/A		Trending to Forecast Completion	
18	Market Rules/Market Manuals Approval	Calculation Engine (Batch 5) Technical Panel Meeting - Vote to Recommend	Not on Critical Path	N/A	11-Aug-22	N/A	NEW	Trending to Forecast Completion	
19	Quality Assurance	MIM back end system testing Complete	Not on Critical Path	1-Sep-22	29-Aug-22	-3	-1	Trending to Forecast Completion	
20	Solution Development	Complete MIM EMI Development	Not on Critical Path	N/A	26-Sep-22	N/A	13	Trending to Forecast Completion	
21	Solution Development	Complete MIM EMAT Development	Approaching Critical Path	N/A	24-Oct-22	N/A	-50	Trending to Forecast Completion	MIM EMAT work requires Ex-Post Operations BRD to be completed

				← Past	↓ Present	↗ Trending	↗ Trending	→ Future	
ID	Schedule Subphase	Milestone	Available Slack	Planned Completion (Baseline 4)	Forecast Completion Date	Variance from Baseline (Days)	Change from Previous Forecast (Days)	Trend to Meet Forecast Completion Date	Comments
22	Quality Assurance	Start of Gartner readiness assessment review #4	Not on Critical Path	N/A	7-Nov-22	N/A		Trending to Forecast Completion	
23	Readiness	MIM EMI system testing complete	Not on Critical Path	4-Nov-22	15-Nov-22	7	16	Trending to Forecast Completion	
24	Quality Assurance	DSO Milestone 12 DSO Sytem Testing Complete	Approaching Critical Path	9-Dec-22	8-Dec-22	-1	NEW	Trending to Forecast Completion	
25	Quality Assurance	MIM EMAT system testing complete	Approaching Critical Path	4-Nov-22	13-Dec-22	27	-47	Trending to Forecast Completion	MIM EMAT system testing is dependent on completion of MIM EMAT development
26	Market Rules/Market Manuals Approval	Settlements, Metering & Billing (Batch 4) Technical Panel Meeting - Vote to Recommend	Not on Critical Path	17-Jan-23	17-Jan-23			Trending to Forecast Completion	
27	Quality Assurance	Reports system testing complete	Near Critical Path	28-Dec-22	20-Jan-23	17		Trending to Forecast Completion	
28	Solution Development	Complete CAMS Development	Approaching Critical Path	N/A	1-Feb-23	N/A		Trending to Forecast Completion	
29	Quality Assurance	Operational tools Integration testing complete	Near Critical Path	4-Apr-23	27-Mar-23	-6	-17	Trending to Forecast Completion	
30	Quality Assurance	Reports Integration testing complete	Near Critical Path	27-Mar-23	20-Apr-23	16		Trending to Forecast Completion	
31	Quality Assurance	External Training Delivered	Not on Critical Path	18-Apr-23	26-Apr-23	6	30	Trending to Forecast Completion	
32	Quality Assurance	Complete Reports Acceptance testing	Not on Critical Path	6-Jun-23	29-Jun-23	17		Trending to Forecast Completion	
33	Market Rules/Market Manuals Approval	Market & Systems Operations (Batch 3) Technical Panel Meeting - Vote to Recommend	Not on Critical Path	N/A	10-Aug-23	N/A		Trending to Forecast Completion	
34	Quality Assurance	Complete DSO Audit	Near Critical Path	N/A	18-Sep-23	N/A	-11	Trending to Forecast Completion	
35	Quality Assurance	Operational tools acceptance testing completed	Critical Path	28-Sep-23	13-Oct-23	10	-1	Trending to Forecast Completion	
36	Readiness	Complete Control Room Training	Near Critical Path	N/A	3-Nov-23	N/A	39	Trending to Forecast Completion	
37	Market Rules/Market Manuals Approval	MC/BOD Conditional approval - Mkt. & Sys.Ops. Rules & Manuals	Not on Critical Path	N/A	10-Nov-23	N/A	10	Trending to Forecast Completion	
38	GO LIVE	In Production (GO LIVE)	Critical Path	30-Nov-23	29-Nov-23	-1	-1	Trending to Forecast Completion	

Legend - Available Slack	
Critical Path	Milestone has 0-10 working days of available slack
Near Critical Path	Milestone has 11-30 working days of available slack
Approaching Critical Path	Milestone has 31-60 working days of available slack
Not on Critical Path	Milestone has greater than 60 working days of available slack

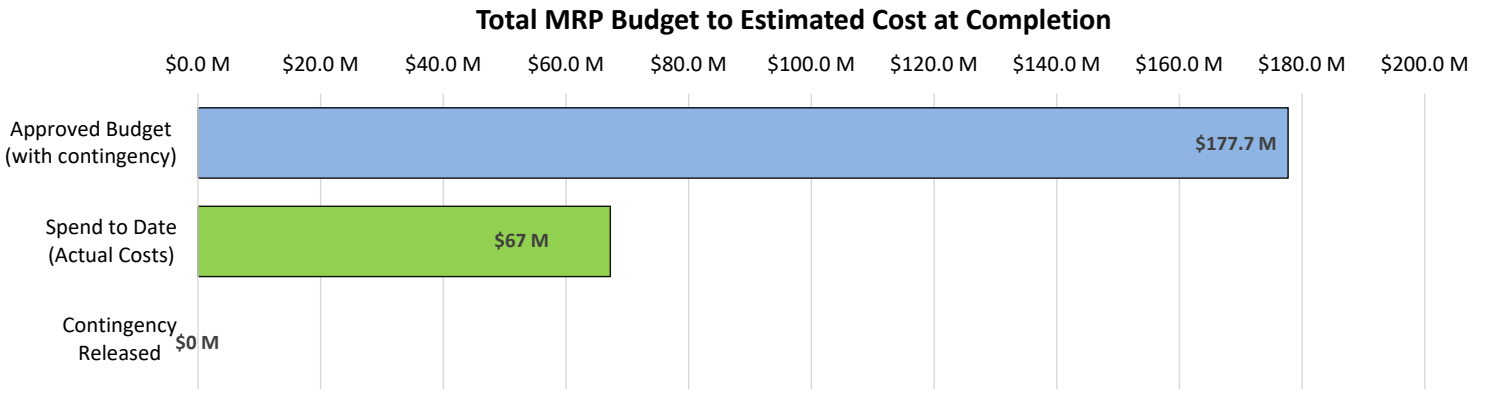
Legend - Trend to Meet Forecasted Completion Date	
Ahead of Forecast Completion	Progress is anticipated to be ahead of the forecast completion date, no issues to raise
Trending to Forecast Completion	Progress is on schedule to meet the forecast completion date, no issues to raise
Potential Delay to Forecast Completion	A delay greater than 10 working days to the forecast completion date of the milestone has materialized, and mitigations are under development to correct the delay
Delay to Forecast Completion	A delay greater than 10 working days to the forecast completion date of the milestone has materialized, with no established mitigations to correct the delay

MRP Energy - Progress Report

For Reporting Period: 01/June/2021 to 30/June/2021

Financial Status

KPI	Type	Total approved (with contingency)	Budget Contingency Available	Spend to Date (Actual Costs)	Forecast Cost at Completion	Variance to Approved Budget
✓	CapEx	$150.4 M	$10 M	$49 M	$150.4 M	$0 M
✓	OpEx	$27.3 M	$0 M	$18 M	$27.3 M	$0 M
✓	**Total**	**$177.7 M**	**$10 M**	**$67 M**	**$177.7 M**	**$0 M**

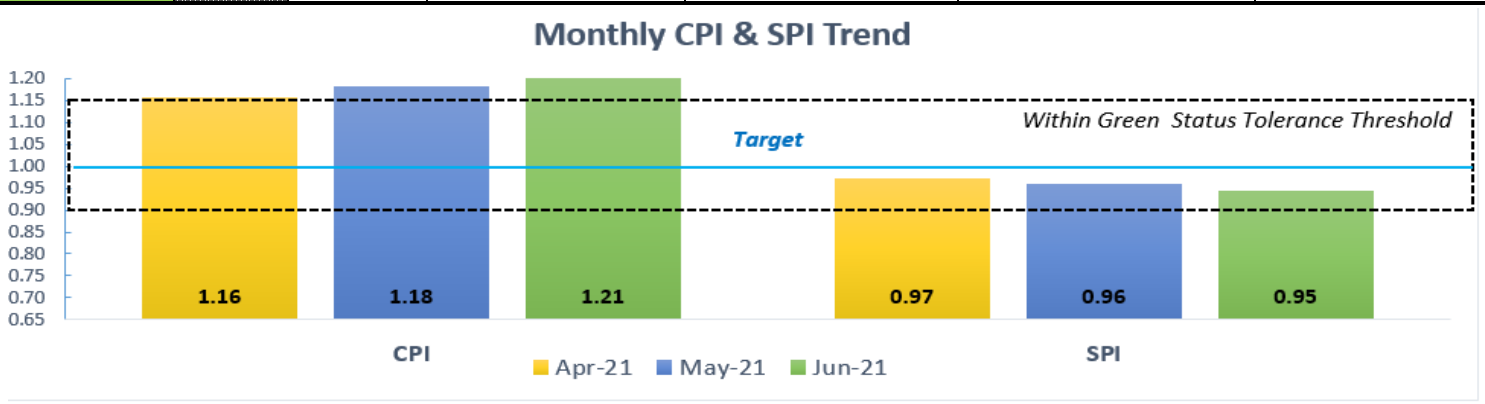


Budget: The life-to-date spend is $67 M (38%) against the Board-approved budget of $177.7M including contingency.

Overall Schedule Status

Schedule Health KPI (within Contingency)	% Overall Planned	% Overall Completion	Project Start Date	Approved Project Completion with Cont.	Contingency Available in days	Forecast Completion date	Schedule Variance (%)
✓	51.4%	48.5%	01-Jan-17	31-May-24	183	30-Nov-23	-2.8%

SPI & CPI Key Performance Index	SPI	CPI	Planned Value (PV) $000's	Earned Value (EV) $000's	Actual Cost (AC) $000's	(*) Variance to Schedule in days
Behind Schedule	0.95		$86,195	$81,507	$67,152	-20
Under Budget		1.21				



Notes: SPI and CPI are at "green" status. An updated methodology for CPI measurements will be proposed to the PSC/ESC at the August meeting.

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AUGUST 16, 2021

Market Renewal Program (MRP) Strategic Risk Report Appendix B

Market Renewal Program (MRP) Strategic Risks

Risk #	Strategic Objective	Risk Event Description	Management Risk Assessment					
			Residual			Target Risk Level	Risk Trend	Mitigation Status
			Impact	Likelihood	Risk Level			
1	Program Delivery	Market Participants are unprepared for technology and market operation at go-live date.	Significant	Likely	Critical	Low	-	●
2	Market Design	Market Participants challenge MRP rules at the OEB.	Moderate	Almost Certain	Critical	Critical	-	●
3	Market Design & Implementation	Market systems and related processes produce materially unexpected or unacceptable results.	Significant	Possible	High	Medium	-	●
4	Integration	IESO is unable to effectively integrate technical solutions and internal processes given complexity and volume.	Moderate	Likely	High	Medium	-	●
5	Program Delivery	IESO is unable to implement MRP Energy on time and on budget due to unexpected deliverable delays, uncertainties in forecasting task details and time estimates.	Moderate	Almost Certain	Critical	Medium	↓	●
6	Market Design	IESO is unprepared to respond to unforeseen design and/or implementation flaws post go-live.	Moderate	Almost Certain	Critical	Low	-	●
7	Program Delivery	Internal IESO is unprepared to use technology solutions and operate the market.	Moderate	Likely	High	Medium	-	●

RISK TREND

× Closed risk or risk is no longer applicable

\- No change

↓ Residual Risk Level is on a downward trend/Residual Risk Level has lowered

↑ Residual Risk Level is on an upward trend/Residual Risk Level has increased

MITIGATION HEALTH STATUS (descriptions in Appendix 2)

● Unfavourable

● Developing

● Neutral

● Positive

1	MARKET PARTICIPANT READINESS				Risk Owner: Jessica Savage
Strategic Objective: Prepare Market Participants in advance of go-live to ensure successful delivery of the MRP-RSS Program.		Impact	Likelihood	Risk Score	Trend
Risk Description: Market Participants are unprepared for technology and market operation at go-live date.	**RESIDUAL**	Significant [4]	Likely [4]	**Critical [16]**	—
	TARGET	Minor [2]	Possible [3]	**Low [6]**	
Why is this risk important? Market Participant readiness is critical to the launch and acceptance of the MRP-RSS program and will lead to the demonstration of benefits. As we execute on the scheduled MRP-RSS deliverables, we will gain more insight into the level of preparedness.					

Root Causes	Impacts
• An inability to understand the requirements and readiness of Market Participants prior to go-live; • Inability to proactively identify requirements and to track, monitor and manage Market Participant deliverables within the Program; and • Market Participants do not have the internal capacity to prepare and incorporate changes derived from Market Renewal Program.	• Threat to IESO's achievement of MRP's key objectives: 1) Enhanced reliability, 2) Operational certainty for IESO and Market Participants; 3) Increased system efficiency; 4) Enabling future markets

Controls/Control Effectiveness	Score
COMMUNICATION & STAKEHOLDER ENGAGEMENT Engagement services implemented as per Communication and Stakeholder Plan.	3
RESOURCES Resource was hired to build out the Change Management & Adoption/Benefits Realization program in order to ensure Market Participant readiness.	3
PROGRAM MANAGEMENT Monitoring, tracking and reporting on program schedule and resources.	3
RISK MANAGEMENT Continuous identification, assessment, response, and reporting of project, operational, and strategic risks facing the program.	4

Mitigation	Due	Status
MARKET READINESS STRATEGY The Market Readiness Strategy has been drafted, which has component tactical elements, including participant segmentation and participant support plans to be delivered over the balance of 2021. These tactical activities, when implemented, establish the foundation for readiness for in-service.	Q4 2021	neutral
INDEPENDENT REVIEW Gartner to conduct a series of readiness reviews, including the effective management of external participant readiness for change.	1st review- Q3 2021	neutral
MARKET READINESS ASSESSMENT Develop Market Readiness assessment criteria per Market Participant type to measure readiness.	Q1 2022	developing

2	MARKET RULES CHALLENGES AT OEB				Risk Owner: Jessica Savage
Strategic Objective: Successfully bringing into effect new market rules as part of the implementation of the market renewal designs.		**Impact**	**Likelihood**	**Risk Score**	**Trend**
Risk Description: Market Participants challenge MRP rules at the OEB.	**RESIDUAL**	Significant [4]	Almost Certain [5]	**Critical [20]**	—
	TARGET	Moderate [3]	Almost Certain [5]	**Critical [15]**	

Why is this risk important? It is almost certain that market participants will challenge MRP rules at the OEB, the potential impact is significant and our ability to mitigate against the worst potential impacts is limited until the challenge occurs and challenge details are known.

Root Causes	Impacts
• The *Electricity Act* provides market participants with an avenue to challenge new market rules, at little cost to the participant; • Inability to satisfying (potentially competing) stakeholder preferences (e.g. Market Participant Capacity contracts); • Inability to develop clear, consistent, and enforceable rules within the project timelines; and • Ineffective stakeholder consultation/communications.	• Threat to IESO's achievement of MRP's key objectives: 1) Enhanced reliability, 2) Operational certainty for IESO and Market Participants; 3) Increased system efficiency; 4) Enabling future markets. • Multiple challenges from Market Participants may result in reduction in IESO's ability to successfully defend. • Significant project delay, reduced value or efficacy of residual design elements, the need for re-design and associated implementation work, increased costs, reputational damage, and stakeholder confusion are all impacts should rules be impugned or OEB finds challenged rules are contrary to the purposes of the Act or unjustly discriminatory against a participant or classes of participants.

Controls/Control Effectiveness	Score
MARKET RULES & MARKET MANUAL DRAFTING STRATEGY • Market Rules and Market Manuals are being drafted in tandem with significant legal involvement through the drafting process.	3
ENGAGEMENT • Stakeholder Engagement (adhering to IESO Engagement Principles) to increase transparency and tracking of stakeholder comments and IESO responses. • Focused Implementation Engagement Sessions with key stakeholders. • Technical Panel – another forum where critical issues may be identified and addressed.	3

Mitigation	Due	Status
OEB EDUCATION AND OUTREACH Education and outreach efforts to strengthen OEB's understanding of the foundational changes for MRP are planned to take place over the next couple of months between IESO and OEB Senior Management teams.	Oct 2021	developing

3	DESIGN & IMPLEMENTATION FLAW DISCOVERY				Risk Owner: Jessica Savage
Strategic Objective: Ensure new market systems functionality and implementation reflects the market design expected outcomes pre and post go-live.		**Impact**	**Likelihood**	**Risk Score**	**Trend**
Risk Description: Market systems and related processes produce materially unexpected or unacceptable results.	**RESIDUAL**	Significant [4]	Possible [3]	**High [12]**	—
	TARGET	Moderate [3]	Possible [3]	**Medium [9]**	

Why is this risk important? Diligent and adequate testing of optimization solutions and associated processes measures MRP-RSS program market readiness while allowing for early detection and response to gaps/defects/unforeseen results from the design and/or implementation.

Root Causes	Impacts
• Despite best efforts, inability to proactively solve design and/or implementation flaws prior to go-live. • Inadequate systems and tools to test optimization and expected market outcomes in advance and post go-live. • Market outcomes produce expected results but are not within acceptable thresholds.	• Threat to IESO's achievement of MRP's key objectives: 1) Enhanced reliability, 2) Operational certainty for IESO and Market Participants; 3) Increased system efficiency; 4) Enabling future markets • Undiscovered design & implementation flaws create more opportunities for market challenges, system reliability issues, reputational impact, etc

Controls/Control Effectiveness	Score
DEVELOPMENT OF FUNCTIONAL SPECIFICATIONS FOR VENDORS Vendors are provided with a set of functional specifications directly informed by the detail design.	3
DEVELOPMENT OF BUSINESS PROCESSES AND REQUIREMENTS Processes governing the future requirements are developed to ensure the business is organized and positioned to support the execution of the renewed market.	3
SYSTEM SUPPORT HAPG to validate, fix and test flaws, scenarios/use cases in response to mitigating unexpected outcomes and unacceptable results.	3

Mitigation	Due	Status
PRE-GO-LIVE TESTING MRP deliverables will undergo numerous stages of system and process testing (Static Testing, Factory Acceptance Testing, Site Acceptance Testing, System Integration Testing, User Acceptance Testing and Market Trials) with the intent of ensuring the market outcomes are consistent with expectations.	Q4 2023	neutral
GO-LIVE ACCEPTANCE CRITERIA Define a set of criteria and thresholds that need to be met before placing MRP deliverables into service.	Q1 2022	developing
POST-GO-LIVE SIMULATOR Develop a new simulator to model and test a variety of market scenarios, helping discover any unintended market outcomes.	2024 (in-service)	developing

4 TECHNOLOGY INTEGRATION

Risk Owner: Rado Jovic

Strategic Objective: Establish an MRP-RSS program integration plan which adequately ensures internal stakeholders are prepared for go-live, thereby enabling the achievement of all the MRP strategic objectives identified in the Business Case.		**Impact**	**Likelihood**	**Risk Score**	**Trend**
Risk Description: IESO is unable to effectively integrate technical solutions and internal processes given complexity and volume.	**RESIDUAL**	Moderate [3]	Likely [4]	**High [12]**	—
	TARGET	Minor [2]	Likely [4]	**Medium [8]**	

Why is this risk important? Successful integration of new/upgraded technical solutions and processes enables MRP-RSS program delivery's success.

Root Causes	Impacts
• Volume of new systems or changes to existing systems provided by a variety of vendors. • Parallel development and implementation of systems leads to missing or revised requirements.	• Threat to IESO's achievement of MRP's key objectives: 1) Enhanced reliability, 2) Operational certainty for IESO and Market Participants; 3) Increased system efficiency; 4) Enabling future markets • Delays in testing and software development rework (additional cost to project). • Delays in successful MRP implementation and support from internal stakeholders.

Controls/Control Effectiveness	Score
MANAGEMENT & OVERSIGHT • Key role representation within the program • Interdependency Advisory Panel monitors interdependencies between MRP-RSS Program and other inflight projects within IESO capital project portfolio. • Program Design Change Management Process reviews deviations from published Detail Design.	3
BUSINESS INTEGRATION • Detailed Design Chapters, Process Maps, Process Specifications, and Information models and catalogues map interactions between business process and corresponding business requirements. • Process and Solution Stewards review MRP business requirements prior to development.	3
TECHNOLOGY INTEGRATION • Solution development and integration follows the Software Development Life Cycle (SDLC) process. Efforts are tracked against this process within the schedule. • Vendor alignment to SDLC process. Project managers monitor vendor deliverables. • IESO IT acts as a system integrator, directing the vendors' work, specifying interfaces, etc. • Reusing technology architectural patterns and cyber security thus reducing the amount of change.	3
PROJECT MANAGEMENT • Program Cost and Schedule Impact Assessment is factored into MRP/RSS program design change management process.	3

Mitigation	Due	Status
REQUIREMENT TRACEABILITY Requirement traceability ensures that the detailed design is implemented in both processes and solutions. Business Requirement Documents continue to be developed and added to the traceability tool, JIRA.	Q4 2021	positive
STATIC TESTING Static Testing ensures that the requirements are consistent with detailed design, before solutions were built. This is achieved by conducting requirement walkthroughs and tabletop exercises ("day in the life").	Q4 2021	positive
SYSTEM INTEGRATION TESTING Solution Integration and Interfaces Testing confirms exchange of data between solutions as per requirements.	Q1 2023	developing
USER ACCEPTANCE TESTING (UAT) User Acceptance Testing assures that all business processes can be executed as designed, and that all solutions and procedures that support those processes are in place.	Q2/Q3 2023	developing

5	PROGRAM DELIVERY TRACKING				Risk Owner: Jessica Savage
Strategic Objective: MRP-RSS Program deliverables are achieved within current cost, scope and schedule parameters as approved by the Board of Directors.		**Impact**	**Likelihood**	**Risk Score**	**Trend**
Risk Description: IESO is unable to implement MRP Energy on time and on budget due to unexpected deliverable delays, uncertainties in forecasting task details and time estimates.	**RESIDUAL**	Moderate [3]	Almost Certain [5]	**Critical [15]**	↓
	TARGET	Moderate [3]	Possible [3]	**Medium [9]**	
Why is this risk important? Program governance and program management are key drivers to deliver MPR-RSS program on schedule and on budget.					

Root Causes	Impacts
• Unforeseen challenges with complex integration for business and technology solutions. • Unexpected changes to resource availabilities. • Inaccurate or delayed critical path analysis and cost reporting. • Lack of visibility on potential scope changes. • Lack of project management controls.	• Threat to IESO's achievement of MRP-RSS's key objectives: 1) Enhanced reliability, 2) Operational certainty for IESO and Market Participants; 3) Increased system efficiency; 4) Enabling future markets • Unforeseen expenses and request for additional contingency. • Loss of credibility with stakeholders and the Board. • Potential delays to other IESO business priorities.

Controls/Control Effectiveness	Score
PROGRAM MANAGEMENT • Progress and changes from the baseline costs published in Business Case (Oct 2019) are reported on a monthly basis. • Program status is reported against program's schedule critical path on a bi-weekly basis. Weekly project status touch-points. • Continuous Review of governance structures, processes, and tools. • Aligned project's resource management tools, processes and accountabilities with the Project Management Office.	3
VENDOR MANAGEMENT • Status of project deliverables (as per Statement of Work) and risk mitigation actions are reviewed weekly. Risks are assessed and reviewed via monthly risk call with vendor. • Vendor costs verification processes.	2
PROGRAM GOVERNANCE • MRP-RSS program governance, terms of reference, and roles & accountability reviewed, updated, and approved.	3

Mitigation	Due	Status
INDEPENDENT REVIEW Gartner to conduct a series of readiness reviews, including the effectiveness of project management services against scope, schedule and budget.	1st review - Q3 2021	neutral

6	POST GO-LIVE PREPAREDNESS				Risk Owner: Lechard Kula
Strategic Objective: Put in place appropriate strategies and tactics to adequately prepare internal stakeholders to address material unintended consequences of MRP implementation without significant delay.		**Impact**	**Likelihood**	**Risk Score**	**Trend**
Risk Description: IESO is unprepared to respond to unforeseen design and/or implementation flaws post go-live.	**RESIDUAL**	Moderate [3]	Almost Certain [5]	**Critical [15]**	—
	TARGET	Minor [2]	Possible [3]	**Low [6]**	
Why is this risk important? Pro-active planning to ensure availability of skills, knowledge, and resources following market go-live helps mitigate lack of preparedness and/or failure to respond on time to unexpected events.					

Root Causes	Impacts
• Despite best efforts, inability to proactively identify all outcomes of the renewed market due to significant complexity. • Lack of appropriate and expert resources to address material flaws that are not predicted. • Potential new government policies impacting markets.	• Threat to IESO's achievement of MRP's key objectives: 1) Enhanced reliability, 2) Operational certainty for IESO and Market Participants; 3) Increased system efficiency; 4) Enabling future markets • Persistent bias in day-ahead forecast, resulting in volatility in real-time.

Controls/Control Effectiveness	Score
ENGAGEMENT & PLANNING Engage with MRP and internal/external stakeholders to identify potential areas of concern and develop plans to either address or limit impacts.	2
MRP TRANSITION TEAM A dedicated team "Continuous Market Improvement" has been setup at the beginning of 2021 to support MRP Transition.	3

Mitigation	Due	Status
MRP TRANSITION PLAN A plan outlining the shift in responsibilities (budget, roles, responsibilities, processes) between MRP project and line of business.	Q1 2022	developing
HUMAN & FINANCIAL RESOURCE AVAILABILITY Ensure key resources (e.g. internal Subject Matter Experts and external support) that understand MRP design, processes, and tools are available to respond to post go-live flaws.	Q4 2021	developing
POST-GO-LIVE SIMULATOR Develop a new simulator to model and test a variety of market scenarios, helping discover any unintended market outcomes.	2024 (in-service)	developing

7	INTERNAL READINESS				Risk Owner: Marlene Kadin
Strategic Objective: Prepare internal IESO business units in advance of go-live to ensure successful delivery of the MRP-RSS Program.		**Impact**	**Likelihood**	**Risk Score**	**Trend**
Risk Description: Internal IESO is unprepared to use technology solutions and operate the market.	**RESIDUAL**	Moderate [3]	Likely [4]	**High [12]**	—
	TARGET	Moderate [3]	Possible [3]	**Medium [9]**	

Why is this risk important? Readiness of our operations, our employees, and the use of our systems are critical to the launch and management of MRP-RSS program, including supporting external stakeholders.

Root Causes	Impacts
• Capacity and capability of resources. • Defective or poorly implemented technical systems. • Ineffective operational systems. • Poor quality and/or insufficient requirements. • Delayed delivery of scheduled efforts.	• Threat to IESO's achievement of MRP's key objectives: 1) Enhanced reliability, 2) Operational certainty for IESO and Market Participants; 3) Increased system efficiency; 4) Enabling future markets. • Additional costs with prolonged schedule delays. • Loss of talent.

Controls/Control Effectiveness	Score
STAKEHOLDER ANALYSIS Internal stakeholder community segmentation for the purposes of tailoring communications, training, and support.	2
IMPACT ANALYSIS Impact Analysis establishes the repository of changes and assesses the impact of those changes across 10 dimensions. It identifies adoption risks and informs the communication, training, support, and sustainment plans.	2
TRAINING A variety of training efforts have been established and continue to be rolled out throughout the course of the program. Examples include MRP Academy.	2
INTERNAL STAKEHOLDER COMMUNICATION Deployment of the stakeholder communication strategy throughout the course of the program.	2

Mitigation	Due	Status
STATIC TESTING (DAY-IN-LIFE) Testing of most impacted processes and roles to determine effectiveness of people and processes. Pilot test scheduled for August 2021 and a Suite of Static Testing will commence in September of 2021.	Q3 2021	developing
USER ACCEPTANCE TESTING (UAT) User Acceptance Testing assures that all business processes can be executed as designed, and that all solutions and procedures that support those processes are in place.	Q2/Q3 2023	developing
READINESS SURVEYS A series of surveys established to target different stakeholders and/or project-specific areas to understand readiness.	TBD	developing
CHANGE READINESS CRITERIA Criteria established to assess the state of people and process readiness.	TBD	developing
SUPPORT RESOURCE Change Champions and Super-User Network established to support program delivery (i.e. training and post go-live).	TBD	developing

Exhibit 1 – Control Status Scale

Exhibit 1: Control Status Scale

The following control status scale is used to measure the effectiveness of the control identified to mitigate a risk. It is important to note that the scales 1 to 4 are NOT to be considered in silo. For example, for a control to have a score of 4, it is a control that also has a score of 1, 2, and 3. The more oversight, management, analysis, and awareness of the control – the more effective the control.

1

- Reactive
- Repetitive Task/ Review
- No particular resource dedicated to effort
- Managed by Team
- Compliance
- Personal Protective Equipment (PPE)

2

- Reactive
- Periodic Task/ Review
- One resource dedicated to effort
- Managed by Department
- Operational
- Administrative Controls
- Engineering Controls

3

- Proactive
- Planned Task/ Review
- A few resources dedicated to effort
- Executive oversight/Approval
- Consulting
- Substitution (replace the hazard)

4

- Proactive
- Random Scheduled Task/Review
- Many resources dedicated to effort
- CEO/Board oversight
- Control Self-Assessment
- Elimination (physically remove the hazard)

Exhibit 2 - Mitigation Health Trend Status Scale

Exhibit 2: Mitigation Status Scale

Unfavourable

- Key actions are delayed and/or behind schedule; or
- Funding is uncertain / not yet approved.

Developing

- Actions are at a conceptual or early planning state; or
- Key actions have not started.

Neutral

- Actions have commenced and are tracking to plan;
- Timing/resource dependencies and prerequisites exist; or
- ELT trade-off discussions may be required.

Positive

- Actions are well underway (past mid-point) or nearing completion; or
- If required, interim (stop-gap) measures have been implemented.

Exhibit 3 – Risk Criteria

Exhibit 3: Risk Criteria

Impact Criteria – Strategic & Ops

Impact Score	Impact Level	Impact of Occurrence					
		Financial	Reputation	Legal / Regulatory	Workforce	Competitive Marketplace	Reliability & Resiliency
5	Critical	• Financial impact greater than 21% of budget • > $40 Million	• Concerns raised by multiple influential stakeholders • Decision and control is contrary to IESO mandate	• Deliberate non-compliance with legal obligations including market rules, that has a material impact on market participants or ratepayers	• Broad reduction in staff engagement • Inability to attract / retain skilled staff to execute all core strategies • Widespread (e.g. pandemic) incidence of mental/physical injury	• Market inefficiencies continue and with continued material long-term ratepayer costs	• Wide-scale disruption to critical infrastructure, services and bulk electricity system reliability lasting greater than two days
4	Significant	• Financial impact between 11% to 20% of budget • $11M to $40M	• Concerns raised by at least one influential stakeholder	• Non-compliance with legal obligations, including market rules, or negligence that has significant impact on market participants or ratepayers	• Sustained reduction in staff engagement • Inability to attract / retain skilled staff to execute one core strategy • Sporadic and localized mental/physical injury	• Significant market inefficiencies persist and mid-term ratepayer costs are further escalated	• Significant disruption to critical infrastructure, services and local area electricity system reliability lasting up to two days
3	Moderate	• Financial impact between 5% to 10% of budget • $5M to $10M	• Concerns raised by a group of moderately influential stakeholders	• Non-compliance with legal obligations, including market rules, or negligence that has moderate impact on market participants or ratepayers	• Sporadic reduction in staff engagement • Inability to attract / retain skilled staff to execute department objectives • Injury with permanent work restrictions	• Moderate market inefficiencies and short-term increase in ratepayer costs	• Temporary disruption to critical infrastructure and services isolated to local area electricity system reliability lasting up to one day
2	Minor	• Financial impact less than 2.5% of budget • < $5 Million	• Concerns raised by a single, moderately influential stakeholder	• Non-compliance with legal obligations, including market rules, or negligence that has minimal impact on market participants or ratepayers	• Isolated reduction in staff engagement • Inability to attract / retain skilled staff execute section deliverables • Injury with temporary work restrictions	• Immaterial market inefficiencies and impacts to minor ratepayer costs	• Negligible disruption to critical infrastructure and services with minor electricity system inefficiencies
1	Insignificant	• No financial impact	• Occasional questions raised by stakeholders seeking general information	• Non-compliance with legal obligations, including market rules, or negligence that has no impact on market participants or ratepayers	• Anticipated reductions in engagement for specific roles • Anticipated attraction or retention issues for specific roles • Isolated, no/minor injury	• Isolated impacts or impediments to competitive markets that are fully anticipated	• Insignificant impacts that can be addressed through existing operational controls

Exhibit 3: Risk Criteria

Impact Criteria – Project

Impact Score	Impact Level	Impact of Occurrence			
		Cost*	Schedule	Stakeholder Value	Objectives
5	Critical	• Financial impact over 20% of approved budget	• Schedule delay or missed milestone exceeds allocated contingency and/or impacts the delivery of other projects • Lesser of >20% time increase or >3 months	• Mission critical impact to deliverable quality • Widespread reputational impact: substantial negative media coverage, reaction from Ministry/government	• Critical impact to achieving majority of Project's Objectives leading to Project failure • Impact to delivery of other projects and/or operational interdependencies • Benefits would not be realized
4	Significant	• Financial impact between 10-20% over approved budget	• Schedule delay or missed milestone which impacts critical path activities and schedule exceeds allocated contingency • Lesser of 10% - 20% time increase or 3 months	• Significant impact to deliverable quality • Minimal impact to external brand and stakeholders	• Impact to achieving two or more of the Project's Objectives • Benefits realization uncertain • Missed compliance with Directives and/or Accountability Agreements
3	Moderate	• Financial impact of 5-10% over approved budget	• Schedule delay or missed milestone which impacts critical path activities however slippage remains within project schedule contingency • Lesser of 5% - 10% time increase or 2 months	• Moderate impact to deliverable quality that can be addressed within Project parameters (quality/cost/schedule) • Potential external impact to stakeholders	• Moderate disruption in achieving one of the Project's Objectives • Benefits will be realized later than anticipated • Potential impact to brand internally
2	Minor	• Financial impact of 3-5% over approved budget	• Schedule delay or missed milestone with minor impact the on project's critical path and course corrected in short period • Lesser of 3%-5% time increase or 1 month	• Minor impact on deliverable quality • Minor external impacts to stakeholders	• Minor impact on the achievement of any of the Project's Objectives
1	Insignificant	• Insignificant cost impact - <3%	• Schedule delay or missed milestone which does not impact the project's critical path • Lesser of time increase - <3% or 2 weeks	• No impact on deliverable quality • No external impacts to stakeholders	• No impact on the achievement of any of the Project's Objectives

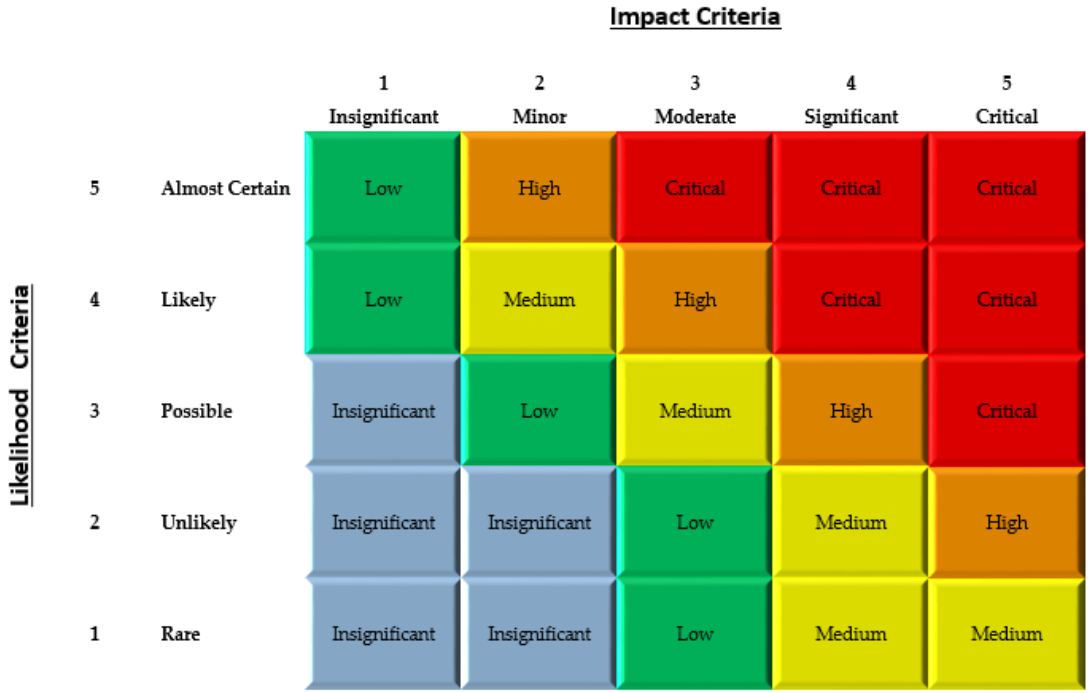
Exhibit 3: Risk Criteria

Likelihood Criteria – Strategic/Operational/Project

Likelihood Score	Description	Likelihood Value	Factors to consider that drive likelihood
5	Almost Certain	95% to 100%	• Maturity / complexity of the process or system • Past occurrences of the risk event • External factors (economic, competitive, regulatory) • Experience of management / employees / board • Performance indicators / industry trends • Regulatory changes • Effectiveness of training • Adherence to policies & procedures • Current controls, or lack of controls • Management's understanding of / focus on the risk
4	Likely	65% to 95%	
3	Possible	35% to 65%	
2	Unlikely	5% to 35%	
1	Rare	0% to 5%	

Exhibit 3: Risk Criteria

Risk Criteria Matrix



AUGUST 17, 2021

Market Renewal – Energy Project Update

Purpose and Executive Summary

Purpose of Item

- To provide status updates on the Market Renewal – Energy Project (MRP)

Executive Summary

- Overall project health is favourable where near-term delays are being monitored closely and actions are underway to mitigate potential impacts on overall schedule

Performance Indicator	Status	Comment
Business Objectives	On Track	Expect all business objectives to be achieved
Budget	On Track	Current overall project cost is forecast to be within budget
Schedule	On Track / Actively Managing	Business requirements gathering delayed due to underestimated effort and key resource unavailability. Mitigating schedule impact by onboarding additional staff and reprioritizing work. Currently no impact to go-live date

Program Financial Status

The life-to-date spend is $67 M (38%) against the Board-approved budget of $177.7M including contingency.

Type	Total Approved (with Contingency)	Budget Contingency Available	Spend to Date (Actual Costs)
CapEx	$150.4 M	$10 M	$49 M
OpEx	$27.3 M	$0 M	$18 M
Total	**$177.7 M**	**$10 M**	**$67 M**

Schedule Overview

Schedule Sub-phase	Progress Indicator	Comments
Business Requirements	Delayed	• Defining requirements continues to progress for Market Registration, Prudential Security, Network Modeling, Day-Ahead Market, Real-Time Operations, Market Power Mitigation • Adoption of Joint Application Development sessions with key vendors to facilitate expedited translation of business requirements into functional tool specifications is helping to minimize further delays
Solution Development	On Track	• Software development ongoing for Market Registration and Prudential Security solutions • Hitachi ABB Power Grids (HAPG) developing software for Dispatch Scheduling and Optimization engine; IESO providing test data • Requirements stemming from the Joint Application Development sessions will likely result in the need to expand on the integration with HAPG solutions

Schedule Overview

Schedule Sub-phase	Progress Indicator	Comments
IESO Organizational Change Management & Readiness	On Track	• Detailed impact analysis to itemize changes and assess impact on processes, systems, and behaviours is underway. The impact analysis informs the detailed planning for Communications and Training design • Refreshed MRP landing page on the intranet, including the addition of learning modules
Market Rules & Market Manuals	On Track	• Market Power Mitigation rules and manuals will be published for market participant engagement in August 2021 • Technical Panel review starting in October 2021 with vote to provisionally recommend scheduled for February 2022

Schedule Overview

Schedule Sub-phase	Progress Indicator	Comments
Testing	On Track	• Testing of solutions for Market Registration and Prudential Security in progress • Static testing of requirements in progress • Preparing test plans, test data, test scenarios and test environments in advance of upcoming phases
Market Participant Support And Readiness	On Track	• Market Participant Readiness Strategy has been created, with tactical plans to be drafted in Q4 of 2021, informed by stakeholder input • First meeting of Technical Advisory Group took place in June; next meeting in mid-August to discuss participant segmentation and start developing detailed market participant support and readiness plans

MRP-RSS Program Readiness Review – Status

- First of four reviews is underway to assess state of readiness for Market Renewal – Energy Project (MRP) and Replacement of the Settlement System (RSS) Project
  - Readiness reports will highlight key program areas that are performing well towards readiness and key program areas that are not with recommendations for mitigation and correction
- Gartner reviewed project artifacts and conducted ten group interviews with staff to inform their assessment on the following readiness dimensions: governance; delivery assurance; technology & architecture; people/change management; and supplier management
- Report drafting is underway with the first readiness report and management response to be shared with the Markets Committee in October

MRP-RSS Program Readiness Review – Early Observations

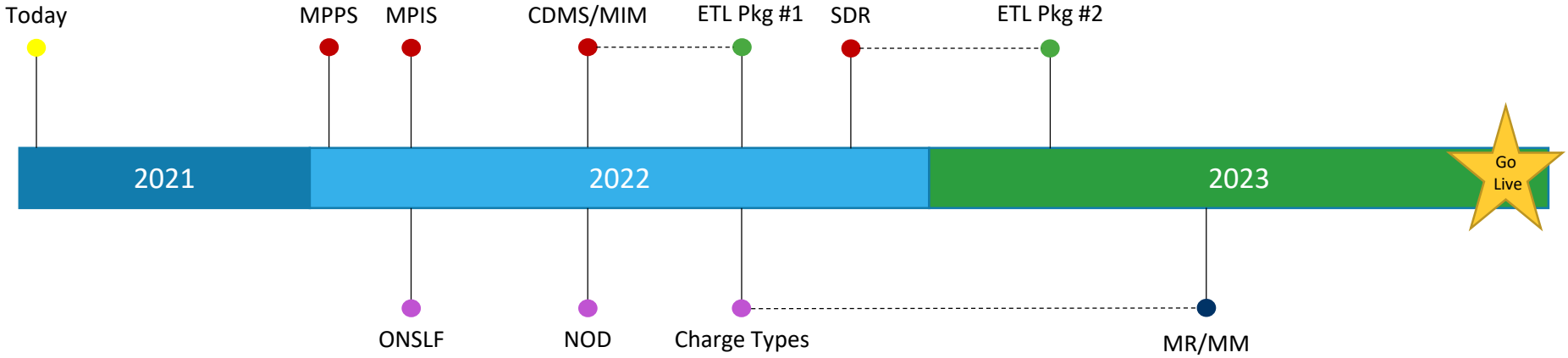
- Positive feedback from Gartner on collaboration and communication; strong governance and risk frameworks
- Potential caution areas for MRP:
  - Ambitious implementation timeline
  - Resistance from market participants
  - Resource fatigue stemming from the length of the program
  - Interdependency management of multiple systems in a complex multi-vendor program

MRP-RSS Interdependency Risk

- At the March 2021 Markets Committee meeting an action was taken to track MRP-RSS interdependency risk on an ongoing basis
- MRP and RSS independency risk is being mitigated through joint program governance and by phasing RSS implementation; MRP/RSS teams are coordinating to ensure all component process and systems effectively combined to function as one from bid to bill
- Integration issues reviewed weekly at MRP/RSS management and Information Technology meetings and are reflected in coordinated quality assurance plan as part of the overall MRP testing strategy
- MRP hiring a Senior Integration Lead to provide a longer term focus on ensuring that program deliverables of technology, data and processes are being effectively integrated

Key Areas of Integration between MRP and RSS

Planned Development Completion for Dependent Systems/Activities



Legend

- MRP Systems
- RSS Systems
- MRP RSS ETL Modifications
- Market Rules
- Dependencies

Acronyms

MPPS – Market Participant Prudential System	RSS – Replacement of the Settlement System
MPIS – Market Participant Information System	ONSLF – Online Settlement Forms
CDMS – Customer Data Management System	NOD – Notice of Disagreement
MIM – Market Information Management System	ETL – Extract, Transform, Load
SDR – Surveillance Data Repository	MR/MM – Market Rules & Market Manual

SEC INTERROGATORY 23

Issue 4.4 Is the IESO's MRP Baseline Schedule and Budget for each year of the MRP appropriate?

4.4-SEC-23

INTERROGATORY

[A-2-2, Attach 1, p.2] Please provide a copy of the IESO Integrated Project Plan and Project Charter for the MRP.

RESPONSE

These are products prepared for internal use in support of project approval, monitoring and control of our individual projects. Further, The IESO also notes that the OEB's decision in EB-2019-0002 ordered the IESO to include the MRP Business Case within this filing, which has been done. See response to Schedule 14 - 4.4 SEC 22 for other MRP reporting provided to the project steering committee and IESO Board of Directors.

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SEC INTERROGATORY 24

Issue 4.5 - Is the IESO's MRP Business Case appropriate?

4.4-SEC-24

INTERROGATORY

[G-2-1, Attachment 1] With respect to the Market Renewal Program Business Case:

a. Please detail all material changes to the design/scope of the Market Renewal Program since the release of the business case on October 22, 2019.

b. [p.73-74] Section 7.1 provides the IESO's MRP risk mitigation plans at the end of Q3, 2019. Please provide an update on the risks and mitigation plans. Please also provide information on any subsequent identified risks.

RESPONSE

a. There have not been any material changes in scope since the release of the October 2019 MRP Business Case.

b. See response to Schedule 14 - 4.4 SEC 22.

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AMPCO INTERROGATORY 30

Issue 4.5 Is the IESO's MRP Business Case appropriate?

4.5-AMPCO-30

INTERROGATORY

Exhibit G-2-1, Attachment 1, Page 10

In 2017, the IESO commissioned an independent report: The Future of Ontario's Electricity Market - A Benefits Case Assessment of the Market Renewal Project, The Brattle Group, April 20, 2017.

Please provide a copy of the report or link to the report.

RESPONSE

The requested report was included previously in Exhibit I, Tab 6.1, Schedule 10.21, Attachment 1, as a part of EB-2019-0002. A link to the requested report is also provided as follows:

https://ieso.ca/-/media/Files/IESO/Document-Library/market-renewal/Benefits-Case-Assessment-Market-Renewal-Project-Clean-20170420.ashx

Please note that the 2017 MRP Benefits Case "Brattle Group Report" was an initial study to confirm directionally that MRP would provide sufficient benefits and to guide the IESO to pursue a more formal business case. The subsequent 2019 MRP Business Case is more relevant given it used information specific to Ontario as inputs for the financial assessment of benefits. The IESO also notes that the OEB's decision in EB-2019-0002 ordered the IESO to include the MRP Business Case within this filing, which has been done.

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AMPCO INTERROGATORY 31

Issue 4.5 Is the IESO's MRP Business Case appropriate?

4.5-AMPCO-31

INTERROGATORY

Ref: Exhibit G-2-1, Attachment 1 Page 8

The MRP Business Case indicates thorough financial assessment of the new market design has concluded that the program is financially viable, delivering at least $750 million in net financial benefits to Ontario consumers over the first 10 years of implementation.

a) Please explain how the Brattle Report was used in the financial assessment provide in the MRP Business Case.

b) With respect to the Energy Stream financial assessment, please compare the findings of the Brattle Report to the findings in the MRP Business Case.

RESPONSE

a) The 2017 MRP Benefits Case "Brattle Group Report" was an initial study to confirm directionally that MRP would provide sufficient benefits and to guide the IESO to pursue a more formal business case. The subsequent 2019 MRP Business Case is more relevant given it used information specific to Ontario as inputs for the financial assessment of benefits. The IESO also notes that the OEB's decision in EB-2019-0002 ordered the IESO to include the MRP Business Case within this filing, which has been done.

b) As described in response to a), the Brattle Group Report and the MRP Business Case were developed for different purposes and are therefore not directly comparable.

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AMPCO INTERROGATORY 32

Issue 4.5 Is the IESO's MRP Business Case appropriate?

4.5-AMPCO-32

INTERROGATORY

Ref: Exhibit G-2-1 Attachment 1 Page 8

The MRP costs are divided into five category components namely: IESO Labour, IT (Hardware and Software), Professional and Consulting, Contingency and Other (Interest and Rent).

The contingency component is $16 million or 9%. Please provide a breakdown of the MRP contingency used to date.

RESPONSE

To date, the IESO has used $6 million of the contingency by allocating this amount to the program budget. Through the schedule and budget update exercise, the IESO expanded the program budget envelope from $170M ($154M + $16M contingency) to $177.7M ($167.7M + $10M contingency).

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REASCWA INTERROGATORY 22

Issue 4.5 Is the IESO's MRP Business Case appropriate?

4.5-REASCWA-22

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 14

a. The MRP Business Case states implementation costs to be approximately $170 million. Does this cost include costs that IAM market participants will need to incur to be ready for the IESO planned MRP go-live date of November 2023?

b. If not, does the IESO have an estimate of costs that IAM market participants will need to incur to be ready for the planned go-live date?

c. Please provide any analysis and documents related to b) above.

RESPONSE

a. No.

b. The IESO does not have an estimate of costs that market participants will need to incur to be ready for the planned go-live date. However, market participant readiness is a key component for the Market Renewal Program (MRP) go-live. Planning is underway for the market participant readiness component of the MRP's implementation phase. The IESO will work with stakeholders through the Technical Advisory Group, and outline training and support plans to work on market participant readiness. These planning activities will inform timing and any potential impacts to schedule and budget.

c. See response to b).

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REASCWA INTERROGATORY 23

Issue 4.5 Is the IESO's MRP Business Case appropriate?

4.5-REASCWA-23

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1, Page 14

a. If the IAM market participant costs were to be factored into the MRP Business Case analysis, can the IESO provide any changes to the dollar benefits of implementing the MRP?

b. Please provide any analysis and documents related to a) above.

RESPONSE

a) The MRP Business Case focused on why changes to Ontario's energy market are required, addressing known flaws and inefficiencies, and the value of creating a new platform to enable future market improvements and evolution. The Business Case also includes an assessment of the net benefits of the energy market enhancements over the first 10 years. In 2019 the IESO engaged stakeholders on the development of the Business Case to aid understanding and build support. The IESO held five engagement sessions, including an in-depth look at the benefits. Stakeholders contributed feedback and participated in discussions into topics such as costs and risks that were factored into the MRP Business Case. The IESO Board approved the Business Case in October of 2019.

The MRP Business Case cost estimate included costs within IESO's control: expenditure and implementation for the new energy market design and the incremental/decremental impact (e.g., avoided cost) of operations and maintenance compared to the current system. Further, the MRP Business Case covers the calculation of benefits from the consumer's perspective. Market participant costs were therefore disconnected from cost/benefit assessment for consumers and would not have been included even if they were available. The MRP Business Case uses conservative assumptions and many potential benefits have not been quantified. Overall, the IESO is confident that the realized value of the MRP will exceed the benefits that are presented in the MRP Business Case.

b) See response to a).

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VECC INTERROGATORY 5

Issue 4.5 Is the IESO's MRP Business Case appropriate?

4.5-VECC-5

INTERROGATORY

With respect to the MRP the IESO identifies the value of three potential benefits: (1) Constrained-On CMSC $450M; (2) Constrained-off CMSC $450M and (3) Market Efficiency Benefits $525M.

a) We are unable to locate the derivation of those values. If not provided please provide the underling calculation for these figures.

RESPONSE

(a) For clarity, only the Constrained-off CMSC amount is considered ($450M) in the quantifiable benefits for the Market Renewal Program (MRP). While the IESO expects benefits from reductions in Constrained-On CMSC, these benefits were not quantified in the MRP Business Case. For the underlying calculations for determining CMSC, please see the formulas for charge type 105 in Section 2.2 of the IESO Charge Types and Equations list, available here: https://www.ieso.ca/-/media/Files/IESO/Document-Library/Market-Rules-and-Manuals-Library/market-manuals/settlements/imo-charge-types-and-equations.ashx.

Market efficiency benefits of $525M include a breakdown as such: $190M from improved commitment, $285M from better intertie scheduling, $50M from improved competition. Refer to Exhibit G-2-1, Attachment 1 for the MRP Business Case, Figure, 3-4 and Section 3.7.1 of the MRP Business Case provides further information on the calculations.

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VECC INTERROGATORY 6

Issue 4.5 Is the IESO's MRP Business Case appropriate?

4.5-VECC-6

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1 MRP Energy Stream Business Case, page 60

a) IESO notes that the introduction of the SSM would eliminate the HOEP. Are there are any cost ramifications to stakeholders (other parties) who are reliant upon or use the HOEP as part of their business processes? If so, please explain what these might be and what cost/benefit might ensue with the HOEP elimination.

RESPONSE

a) With the renewed market, The Hourly Ontario Energy Price (HOEP) is being replaced with Locational Marginal Pricing (LMP), with non-dispatchable loads being settled on a zonal price. It is not possible for the IESO to comment on potential cost ramifications to stakeholders from this transition. It is an IESO objective to minimize system costs and impacts to participants. Further, market participant readiness is a key component for the Market Renewal Program (MRP) go-live. Planning is underway for the market participant readiness component of the MRP's implementation phase. The IESO will work with stakeholders through the Technical Advisory Group, and outline training and support plans to work on market participant readiness. These planning activities will inform timing and any potential impacts to schedule and budget.

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VECC INTERROGATORY 7

Issue 4.5 Is the IESO's MRP Business Case appropriate?

4.5-VECC-7

INTERROGATORY

Reference: Exhibit G-2-1, Attachment 1 MRP Energy Stream Business Case, page 48

The IESO looked to other system operators who have completed significant market change programs to determine if they had any insight into participant costs that might be leveraged. For various reasons, including the nature of the market change programs completed and different market participation models, it was found that market participant costs varied considerably. As a result, the IESO has no effective way of estimating potential cost or saving impacts to stakeholders at this time. The IESO cannot track Market Participant costs and therefore these impacts have not been included as part of the costs in the business case.

a) Having completed a review of other operators please provide what were the low and high cost scenarios to market participants arising from a significant change to market rules such as those contemplated by the MRP?

b) Please confirm (or correct) that the summarized cost-benefit analysis shown at page 62 of the G-2-1, Attachment 1, does not include any stakeholder costs.

c) Why should the cost-benefit analysis of the MRP not be considered seriously deficient if it does not incorporate an estimate of the cost of the proposed market rule changes to market stakeholders?

RESPONSE

a) The IESO's comment on page 48 of the MRP Business Case was based on the Brattle report which described the variation of such costs but did not point out specific high and low values.

b) Confirmed.

c) The analysis uses conservative assumptions and many potential benefits have not been quantified. Overall, the IESO is confident that the realized value of the Market Renewal Program (MRP) will exceed the benefits that are presented in the MRP Business Case. Further, market participant readiness is a key component for the Market Renewal Program (MRP) go-live. Planning is underway for the market participant readiness component of the MRP's implementation phase. The IESO will work with stakeholders through the Technical Advisory Group, and outline training and support plans to work on market participant readiness. These planning activities will inform timing and any potential impacts to schedule and budget.

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